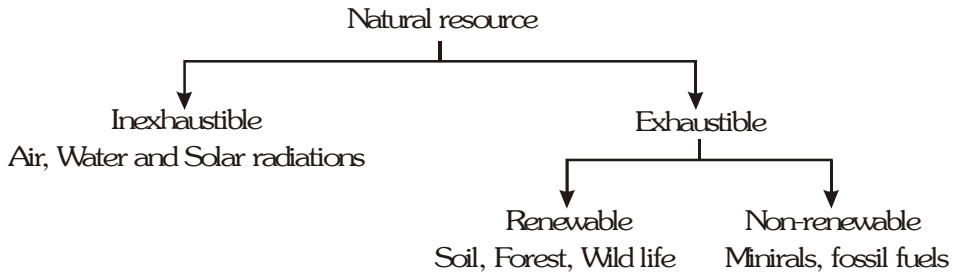
MANAGEMENT OF NATURAL RESOURCES

Resource : A source of supply held in reserve, which is useful to man or can be transformed into more valueable and useful item for mankind.

Natural resource : A Natural resource is a source obtained from nature.

Conservation of natural resources : Conservation is the management for the benefit of all life including human kind of the biosphere so that it may yeild sustainable benefit to the present generation while maintaining its potential to meet the needs and aspiration of the future generations

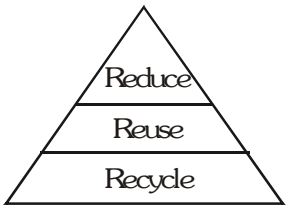


The three R's to save natural resources :-

(1) Reduce

(2) Reuse

(3) Recycling



POLLUTION IN GANGA

The Ganga runs its course of over 2500 km from Gangotri in Himalayas to Ganga sagar in bay of Bengal. It is being turned into a drain by more than a hundred towns and cities in Uttar Pradesh, Bihar and West Bengal.

Ganga along with its tributaries is the largest and very important river basin of the country. Ganga's pollution load and the toxicity kills fish in large sections of river. It has been treated as a symbol of purity but today it is very much polluted due to following factors.

(i) Disposal of untreted sewage, garbage and excreta by more than a hundred towns and cities situated along the river in uttrakhand uttar pradesh, Bihar and West Bengal.

(ii) Daily Human activities like bathing, washing of clothes immersion of ashes or unburnt corpses.

(iii) Dead bodies of animals and humans

(iv) Wallowing of cattle

(v) Discharge of chemical effluents by the industries

Ganga action plant : Ganga action plan was launched in 1985 Ganga action plan is a multi crore project to clean river Ganga. To reduce domestic load on the Ganga, some of the schemes to be implemented in three states (UP, Bihar and West Bengal) through which the river runs under the Ganga Action Plan are :

(i) Interception and diversion (ii) Treatment of waste water (iii) River front development

(iv) Electric crematorium (v) Construction of community toilets

(vi) Conversion of dry toilets to flush toilets

Why do we need to Manage our Resources ?

Over-exploitation and non-Judicious utlization has become a threat to our natural resources with the phenomenal rise in human population and tremendous developement of science and technology, natural resources are being heavily exploited all over the world.

If we judiciosly distribute the resources available to us we can maintain a harmony between population growth and utilization of natural resources. So that nature can sustain for longs.

AIMS of conservation :

(i) To increase the preservation of a quality environment that have aesthetic and recreational values.

(ii) To ensure a continuous yield of useful plants, animals and materials by establishing a balanced cycle of harvest and renewal.

Forests and wild life :-

Forests are the invaluable wealth of a country and renewable natural resource. Forests constitute 90% of the global biomass.

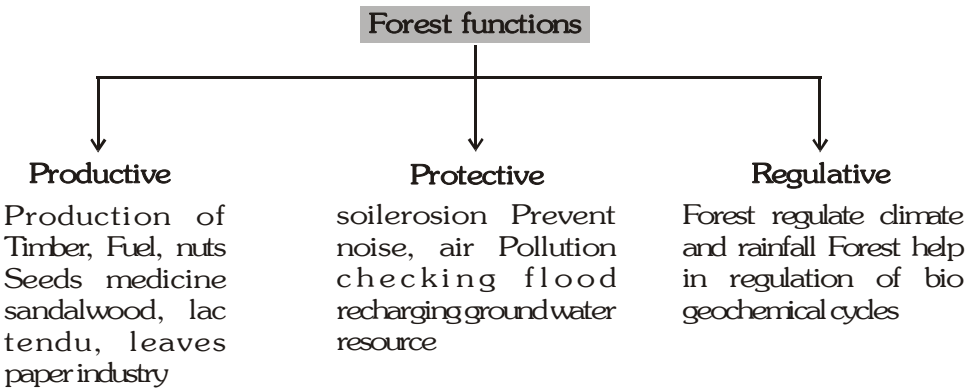
Forests are uncultivated and inhabited land area managed for diverse purposes of forestry. Whether covered with trees, shrubs, climbers, etc or not.

Do you know ?

According to central forestry commision nearly 22.7% of the total land area of India is occupied by forests.

Importance of forest

Forests have three broad functions



Deforestation :- Destruction of forest is known as deforestation. It has been estimated that forests in India have declined from about 7000, million hectares in 1900 to 2890 million hectares in 1975. It has furthur gone down to 2300 million hectares by 2000.

Tropical rain forests are most productive type of forests in the world.

Major cause of deforestation :-

(i) Growing food needs

(ii) Raw materials for industrial use

(iii) Forest fire

(iv) Damage caused by pests.

Questions :

1. What is the literal meaning of resource ?
2. Mention two causes of over-exploitation of natural resources.
3. Give one example each of inexhaustible and exhaustible resources.
4. Define recycling. Give one example.
5. Name the three R's to save the environment.

STAKE HOLDERS

Stake holders are persons or the company that has invested in business and owns a part of it or some one who has an intrest in the success of a system or organisation.

The four stake holders of forest are:-

(a) The people who live in or around forest
(b) The forest department
(c) The industrialist
(d) The wild life and nature enthusiasts

WILD LIFE RESOURCES

Life in any form, plant or animal, which exists in its natural habitat is called wild life.

Reasons for depletion of wild life :-

(i) Deforestation for various reasons like urbanization, cultivation dam building, road construction, establishment of industries have caused a considerable loss of wild life.

(ii) Indiscriminate hunting by man for meat skin and for sport.

(iii) Natural calamities like flood, drought, fire, epidemic have played a major role in depletion of wild life.

(iv) Cutting of plants for obtaining timber and fuel deprived wild animals their most palatable food.

Importance of wild life :-

- The wild life can be used commercially to earn money through tourism.
- Wild life is responsible for maintaining the natural balance of the environment.
- Wild life is a symbol of national pride and represents the cultural heritage.
- Since wild life is a renewable source of large variety of commercial products like food fur, lac, musk leather, feather, ivory, medicines.

Management and conservation of wild life :-

Preservation, protection and utilization of wild life in such a way that it is not destroyed and can be used later.

Conservation measures :-

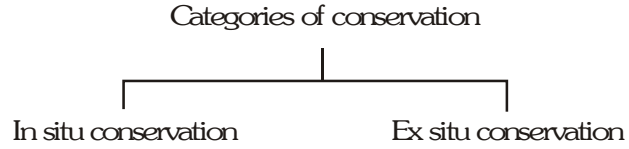
The Indian Board of wild life (IBWL) in march 1980 launched a national wild life action plan for conservationof wild life in India.

Establishment of protected areas :-

The protected areas for wild life conservation are the santuries and national parks.

What is conservation ?

Conservation may be defined as the controlled utilization of natural resources for the benefit of all life so that it may yield sustainable benefit to the present generations as well as the future generations



In situ conservation :- When conservation of natural resources is done in their natural habitats, it is called in situ conservation for **e.g. :** National parks, wild life sanctuaries bio sphere.

Ex situ conservation :- When conservation of natural resources is done outside their habitals it is called exsitu conservation for **e.g. :** Botanical gardens, zoos, seed banks, pollen storage, tissue culture.

NATIONAL PARKS AND SANCTUARIES

1. Jim Corbett National Park, Uttaranchal (tiger).
2. Kanha National Park, M.P. (tiger).
3. Bharatpur Bird Sanctuary, Rajasthan (winter home of migratory birds, most commonly Siberian crane).
4. Nandankanan Biological Park near Bhubaneswar (captive breeding of white tigers).
5. Simplipal Biosphere Reserve, Orissa (tigers).
6. Gir Sanctuary, Gujarat (Asiatic lion, chital, sambhar).
7. Kaziranga Sanctuary, Assam (one horned rhinoceros).
8. Sariska Sanctuary, Haryana (tiger).
9. Sultanpur Bird Sanctuary, Haryana (birds).
10. Bandipur Sanctuary, Karnataka (Indian elephant).
11. Madumalai Sanctuary, Tamil Nadu (Indian elephant).
12. National Botanical Garden, West Bengal (rare species of plants).
13. Desert National Park, Rajasthan (black buck, great Indian bustard, chinkara neelgai).

SUSTAINABLE MANAGEMENT

Development which meets the needs of present generation as well as of future generations.

Examples

1. CHIPKO MOVEMENT

In December, 1972, the illiterate tribal women of a small hilly village of upper reaches of Himalayas commenced this unique movement against the exploitation of forests by the timber merchants. This demonstration transformed into first Chipko movement in Mandel village of Chamoli district in **April 1973,** when people declared that they would cling to trees if trees were felled by a sport goods company. This movement was led by **Shri Sunder-Lal Bahuguna** and **Shri Chandi Prasad Bhatt**. Later a voluntary institution called **Dasholi Gram Swarajya Sangh** was formed and a massive membership campaign was launched to demonstrate against removing trees and upto 1978 this movement spread over entire TehriGarhwal area of Uttaranchal.

Main features of Chipko movement were :

1. It was based on Gandhian thought and persuaded the men and women not to indulge in violence.
2. This movement remained non-political though political parties supported it.
3. It raised certain fundamental issues and questioned the development based on the ruthless butchery of nature. The common people were made aware that deforestation leads to landslides which may threaten the human beings.
4. It was a totally voluntary movement and relied upon the motivation and moral of small groups of people.
5. It was concerned with the ecological balance of nature. It propagated the idea of ecology as permanent economy.
6. Main aim of Chipko movement was to give a slogan of five **F**-Food, foder, fuel, fibre and fertilizer trees; and to make communities self-sufficient in all their basic needs.

Significance

(i) It **stimulated an all-round debate** on the problems of economic and social development. Mr. Bahuguna presented the plan of conservation of soil and water through ban on tree-felling, at the UNEP meeting held in June 1982 in London.

(ii) It **inspired similar movements** in the other parts of the country as well e.g. **"Appikko movement"** was started on **September 8, 1983** against the felling of trees in the Kalese forest of North Kanara district of Karnataka. This movement was led by **Shri Panduranga Hegde**.

(iii) Here contractor would have felled the trees, destroyed them altogether. Local people only lopped the branches and leaves for use. Due to this tree regained with passage of time.

2. SILENT VALLEY PROJECT

The Silent Valley Hydro-Electric Project was aimed to generate more energy to the power-deficit people of Palghat and Mallapuram districts of Kerala, enhancing irrigation facilities to increase agricultural production manifold and to generate employment for thousands of people. But this project required the large-scale deforestation of large area of silent valley, the forests of which have over 900 species of flowering plants and ferns, large number of rare species of plants and animals, it was one of the world's richest biological and genetic heritages. KSSP **(Kerala Sastra. Sahitya Parishath)** highlighted the wrong policies of distribution of electricity by the electricity board and advocated the increasing irrigation potential by alternative means. Environmentalists asserted the silent valley as home to one of the few remaining rain forests in Western Ghats.

Under the pressure of KSSP, the Kerala Government abandoned the project and declared the silent valley and adjoining areas as **Bisphere Reserve**.

3. SAL FORESTS IN THE SOUTHERN DISTRICTS OF WEST BENGAL

Sal forests in the Southern Districts of West Bengal were in highly degraded form in 1972. Forest officials and villagers usually clashed with each other. It also led to militant farmer movements encouraged by Naxalites. **Joint Forest Managment** Committees were formed by the Forest Department with partnership of the Government and the local communities to recover degraded forests. This type of working was started in Arabari Forest Range of Midnapore district. Forest officer A.K. Banerjee involved the villagers for protection of 1,272 hectares of badly spoiled sal forest area. Villagers in lieu of that were provided with following facilities :

(i) 25% of final harvest. They got employment in silviculture and harvesting activities.

(ii) Fuelwood and fodder collection on nominal charges.

Thus village community were entitled for the share prescribed. This type of activity had the objective of providing fuel wood, fodder and small timber to village communities. Simultaneously, it also looks at the development of forests. Due to the participation of local communities, a remarkable recovery was noticed. The value of this useless forest in 1983 was calculated for 12.5 crores.

Do You Know ?

Bisnois – an Eco-religion

The conservation of forests and wild life for the Bishnoi community in Rajasthan has been a religious act. **Guru Jambeshwarji,** a great saint, launched a new sect and prescribed 29 tenets. The followers of these 29 tenets are called Bishnois (literally meaning 'twenty-nine in Hindi). Of the 29 tenets, 8 tenets are prescribed for preservation of biodiversity and good animal husbandary. These include a ban on killing of all animal and felling of trees.

It is said that in 1737, an official of Jodphur (Rajasthan) started felling a few **Khejari** trees in Kheijrali village. This was opposed by the Bishnois of the village. The initiative was taken by a woman, Amrita Devi, a mother of three minor childern, who sacrificed her life by hugging the tree that was being cut. Her example was followed first by her three children and later on by a long chain of Bishnoi men, women and childern. In all, 363 Bishnois from Khejrali and adjoining villages sacrified their lives. Recently, the Government of India has instituted an 'Amrita Devi Bishoni National Award for Wildife Conservation' in the memory of Amrita Devi.

The Great Himalayan National Park :

In national Park, the growth of grass has been reduced drastically because by the time the park was formed, the **traditional grazing of sheep** was stopped. This led to the extra growth of grass in the very beginning. The large grass fell down preventing fresh growth from below. But when the nomadic shepherds were not banned for grazing of their sheep, such type of problem was never found.

Thus we can say that the traditional use of forest areas should be allowed for the local people so that the conservation of the forest areas could occur naturally and automatically.

Questions :

1. What are the reasons for conservation of forest and wildlife ?
2. How can we conserve the forests ?
3. What are the reason of deforestation ?
4. Name the stakeholders of forests.
5. What are the goals of various stakeholders of forests ?
6. Give an example of people's participation in the management of forests.
7. Who was Amrita Devi ?

WATER FOR ALL

Water is a renewable resource. Like air, water is vital to life for all physiological activities of plants and animals, it is essential. Water is essential for the survival and economic development of human resources. Water covers about three quarters of earth surface and constitutes 60-70 % of total body weight of living organisms.

Fresh water resources range from ponds to lakes and large rivers. Freshwater is exhaustible, however it is being made available again and again by oceans through water cycle.

Freshwater is obtained through precipitation. Rainfall in India during monsoon is nearly 75% of the mean annual rainfall. Rains in India are mainly due to **monsoons**. It means, most of rainfall in India is confined to few months of the year and are seasonal.

In India, 70 per cent of water withdrawn is utilized in agriculture sector. About 93 per cent of water, in India, is used for agriculture. Global average water consumption for industries is 25 per cent. In developing countries this consumption may be as low as 5 per cent.

Do you know ?

Water qualitycriteria for Designated Best Use in India

S. No.	Criteria	Designated Best Use
1	Total coliform bacteria 50 or less than 100 ml	For drinking water source after disinfection but without conventional treatment.
2	pH between 65 and 8.5	
3	Dissolved oxygen 6 mg/l or more	
1	Total coliform bacteria 500 or less than 100 ml	For outdoor bathing.
2	pH between 6.5 and 8.5	
3	Dissolved oxygen 5 mg/l or more	

Underground water availability has decreased due to :

(i) Loss from vegetation cover.

(ii) Diversion for high water demanding crops.

(iii) Pollution from industrial effluents and wastes.

From early times, methods of irrigation like dams, tanks and canals are in practice in India. They were used by local people in such a way that water requirements were easily available throughout the year. Use of water was regulated as per need.

But lately in British regime and in Independent India above system changed. Practices followed were

(i) Construction of large dams.

(ii) Long distance canals.

The above led to negligence of water demands of local people.

IMPORTANCE OF WATER

The importance of water to the life of plants can be emphasized best by enlisting its functions :

1. Water is the main constituent of protoplasm.
2. It is the solvent through which mineral salts are transported from one part of the plant to the other.
3. Various metabolic reactions take place in medium containing water.
4. It acts as a reactant in numerous metabolic reactions.
5. During photosynthesis, water releases oxygen.
6. Turgidity of the growing cells is maintained with water.
7. Various movements of plant organs like movements in sensitive plant (touch-me-not) are controlled by water.
8. The growth of the cells is mainly dependent on absorption of water.
9. Metabolic end product of respiration is water.

DAMS

The construction of big dams and river valley projects, which are required for hydroelectric power generation have affected the forests. Big dams and river valley projects have multipurpose uses and have been referred as "Temples of Modern India."

Large dams can ensure the storage of sufficient water for two purposes

(i) For irrigation purposes.

(ii) For generating electricity.

(iii) Canal system from these canals distribute water to far away places.

- **Highest Dam.** Tehri Dam on river Bhagirathi in Uttaranchal.
- **Largest in capacity.** Bhakra Dam on river Sutlej in H.P.
- **Indira Gandhi Canal** has brought greenery to large areas of Rajasthan.
- Mismanagement of water has largely led the benefits to a few people due to the following reasons :

  (i) No equitable distribution of water.

  (ii) People near the source usually get more water.

  (iii) More discontent is particularly there in those persons who have been displaced due to building of dams etc.

- The oustees of Tawa Dam in 1970's are still fighting for the benefits they were promised.
- The harnessing of water resources like building Dams has social, economic and environmental implications. Alternatives to large dams exist. These are local specific. They should be developed. Control should be given to local people.

Damage caused due to building of dams :

(i) Large scale devastation of forests.

(ii) It imbalances ecosystem of the region.

(iii) Frequent occurrence of floods, droughts and landslides.

(iv) Loss in bio-diversity.

Criticism of large dams

(i) Social problems. Without adequate compensation, several peasants and tribals have been displaced.

(ii) Economic problems. Huge expenditure is involved for construction of these dams. Proportionate benefits are comparatively few.

(iii) Environmetal problems. Construction of dams leads to deforestation and loss of bio-diversity.

1. Tehri Dam on river Ganga

Tehri Dam is the highest one, on river Bhagirathi in Uttaranchal. This Dam across the river Bhagirathi, about 1.5 Km. downstream of Tehri, has been a subject of controversy. For example, during tunnelling process, tunnelling materials and by products of explosives has distrupted the natural set up of that area. Other affected factors are flow speed, transparency, temperature and dissolved oxygen. The crusade against the ecological damage and deforestation caused due to Tehri Dam was led by **Sh. Sunder Lal Bahuguna**, the leader of Chipko movement.

2. Save Narmada Movement

The cause of Sardar Sarover Dam has been taken up by the environmental activites **Medha Patekar** joined by **Arundhati Roy** and **Baba Amte**. The dam is present across Gujarat, Maharashtra and Madhya Pradesh on river Narmada. Exclusive features are :

(i) Total area to be submerged underwater : 1,44,731 hectares of land.

(ii) Forest land affected : 56, 547 hectares.

(iii) Villages to be submerged by dam : 573.

Forest area affected

(i) For Narmada sagar : 40,000 hectares.

(ii) For Sardar sarover. 13,800 hectares.

(iii) For Omkareshwar. 2,500 hectares.

Adjoing forests will also be affected due to construction of this dam. Few **bad effects** will be :

(i) Destruction of wildlife. Many of the animals are affected as mentioned in schedule I and II of Wildlife Protection Act, 1972.

(ii) It will lead to displacement of more than one million people. It affect many tribal people.

WATER HARVESTING

Various organisations are working on rejuvenating ancient systems of water harvesting as an alternative "mega-project" like dams.

Rain water harvesting is a technique of increasing the recharge of ground water by capturing and storing rain water by the construction of special water-harvesting structures.

Need for Rain water harvesting. Ground water is a precious natural resource. It plays a significant role in our national economy and in our daily life. It is the primary source of water for domestic, industrial as well as irrigation sectors. To cope with the growing demand, there has been rapid development of ground water supply. But increasing demand, especially in urban areas, has led to depletion of ground water and associated problems. With growing human population, the gap between demand and supply of water has widened. About 85 percent of rural water supply and more than 50 percent of urban and industrial supply is mined. So ground water is sinking to new depths in most of Delhi, all of Daman and Deu, nearly three-fifth of Punjab, about two-fifth of Haryana and Mehsana area of Gujarat. Hence conserving the surplus water during the monsoons by water harvesting and recharge techiques must be adopted as the water management agenda.

Significance of Rain water harvesting :

(i) It **reduces run off loss** and avoids flooding.

(ii) It **meets the increasing demand** of water.

(iii) It **reduces contamination** of ground water and raises the water table.

(iv) It **supplements ground water supplies** during lean period.

(v) Reduces power consumption.

(vi) It arrests sea water-ingress as during ground water deficiency in coastal areas, there is landward movement of fresh water-sea water interface and contamination of fresh water sources.

(vii) It improves soil moisture and decreases soil erosion.

Methods of Rain water harvesting:

(i) Traditional methods :

(a) In high rainfall areas, rainwater from roof tops shown in figure is collected into water storage tanks from where water is diverted to some abandoned well or lifted by using a hand pump.

(b) In foot hill areas, spring water is collected into water storage embankments.

(c) In the ancient times, rain water was collected in talabs, baawaris, johars, hauz, etc. to be used in dry period.

KULHS IN HIMACHAL PRADESH

About four hundred years, Himachal Pradesh people had developed a novel local system for water requirements like irrigation etc. Water from streams was diverted towards villages called Kulhs. These canals were made down the hillside. A common management of villagers worked with the agreement of all. Two or three managers looking after the Kulhs were paid by the villagers. Water flowing downwards in these Kulhs was first used by the village farthest away from source. Water from these Kulhs also percolated in the soil and became the source of springs at various points.

After the irrigation department took over the charge of such kulhs, the following changes were noticed

(a) Most of the kulhs have become defunct. [No longer in use]

(b) Amicable sharing of this water between different villages is also lacking.

(ii) Modern techniques of Rain water harvesting :

These are employed in arid and semi-arid regions :

(a) Rainwater from large catchment areas is collected in check dams. This techiques was nicely used in Rajasthan by Magasaysay Award winner **Rajender Singh**, commonly called **"Water man"**.

(b) By building ground water dams for storing water underground. These are more advantageous than surface dams due to minimum loss by evaporation and low chances of contamination.

Government of India has established a Central Groundwater Authority under the Ministry of Water Resources. Main theme of this authority is :

"Replete Groundwater Before it Depletes"

According to its authority, Rain water harvesting is the only option for the 21st Millennium. It has successfully completed the artificial recharge experiments in the following areas resulting in the rise in water level:

1. **Mehsana Project (Gujarat) :** Water level increased from 1.84 to 15 metres by spreading channel techniques.
2. **Amaravati Project (Maharashtra) :** Rise in water level by 3 metres through percolation tanks.
3. **Kolar Project (Kerala) :** Rise of 5-10 metres of ground water level through watershed management.

WATERSHED MANAGEMENT

Characteristics of watershed

(i) It is an area of high land from where water flows under gravity into river or sea.

(ii) It has a natural unit of water.

(iii) It has a well defined topographic boundary and has only one water outlet.

(iv) It includes complex interactions of water, soil vegetation, animals and human beings.

(v) Watersheds vary in size from few sq. km. to few thousand sq. km.

Watersheds supply water for irrigation, hydro-power generation, transportation, vegetation growth and reducing the chances of floods and droughts. So watersheds improve the economy of the region.

Water harvesting is an age old concept in India like :

(i) **Khadins**, tanks and **nadis** in Rajasthan.

(ii) **Bandharas** and **talc** in Maharashtra.

(iii) **Bundhis** in M.P. and U.P.

(iv) **Ahars** and **Pynes** in Bihar

(v) **Kulhs** in H.P.

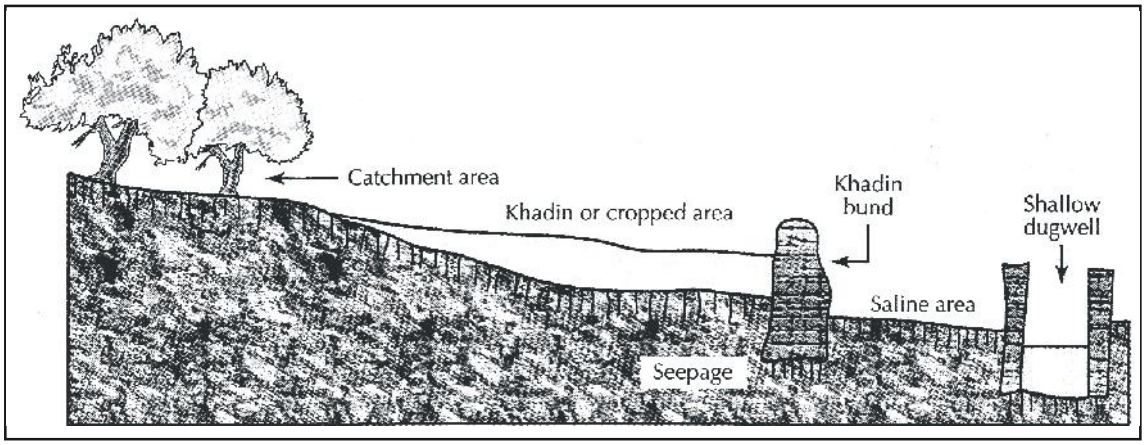
(vi) **Ponds** in Kandi belts of Jammu.

(vii) **Eris** (Tanks) in Tamil Nadu.

(viii) **Surangams** in Kerala.

(ix) **Kattas** in Karnataka.

Water can be retained throughout the year only in large structures. In most of the structures water depletes within few months after monsoons. Main aim of storing water should not be to hold the surface water but to recharge the ground water.



Ground water is useful in :

(a) It provides soil moisture for plant growth.

(b) It is commonly used for human consumption.

(c) It supplements water in streams.

(d) This water is used by human beings for drinking, cooking, bathing, cleaning, etc. It is relatively protected from contamination by human and animal waste.

(e) Fresh water is also required for various types of industries.

(f) It is required for irrigation purpose (agriculture).

(g) Ground water does not evaporate but spreads out to recharge wells and provides moisture for vegetation over a large area.

(h) It does not provide breeding ground for mosquitoes like stagnant water collected in ponds or artificial lakes.

Questions :

1. State any two advantages of constructing a dam on a river.
2. What is meant by water table ? Why is it important ?
3. Mention two ways of conservation of water.
4. What are the steps involved in the conservation of water ?
5. Name the various sources of water.

COAL AND PETROLEUM

Most extensively used fossil fuels are coal, petroleum and natural gas. Such fuels are obtained- from underground and sea bed exploratrions. However, due to uncontrolled consumption by the ever increaing population. In the world, such fossil fuels may perish in coming years. Most of the world's energy requirements are met from petroleum and natural gas.

COAL

Coal is composed of carbon, oxygen and hydrogen. It is widely used as conventional fossil fuel. It releases enormous heat after burning. Coal is combustible organic rock being used for manufacturing of steel, fertilizers, pesticides, etc. Before plant material is converted into coal, it forms dark brown organic matter called **peat. Lignite** is formed after deposition of many layers over peat. **Anthracite** is the last stage of coal formation. It is the hardest form of coal with maximum carbon content. Its heat value is double than that of lignite.

Coal and petroleum have been formed from bio-mass. They contain carbon, hydrogen, nitrogen and sulphur. When burnt, they release CO_2, H_2O, oxides of nitrogen and oxides of sulphur. In presence of less oxygen, carbon monoxide is released instead of CO_2. Oxides of sulphur and nitrogen and CO_2 at high concentration (a green house gas) is poisonous. Increase in CO_2 concentration in atmosphere will lead to global warming.

Types of Coal

We have learnt that coal is formed by the carbonisation of remains of plants and animals. Depending upon the extent of carbonisation, we get different varieties of coal. These different varieties of coal have different carbon content.

Since the fuel value of coal depends upon the carbon content, **Peat is an inferior variety of coal while anthracite is a superior type of coal**.

Uses of Coal

The important uses of coal are :

1. Coal is used as a fuel.
2. It can be converted into other useful forms of energy like, coal gas, electricity and oil.
3. Coal is used in the manufacture of synthetic petrol and synthetic natural gas.
4. Coal is used to manufacture many organic compounds like benzene, toluene, phenol, aniline, naphthalene, anthrancene, etc.
5. Coal is used as reducing agent in industries in the extraction of metals.
6. Coal is used to make coke.

PETROLEUM

World's crude oil reserves are expected to remain up to only 40 years. OPEC (Organization of Petroleum Exporting Countries) with 13 countries have 67% of petroleum reserves. Saudi Arabia has 25% of reserves.

Crude oil is purified and refined by **fractional distillation**. Several products like petrol, diesel, kerosine, lubricating oil, plastic are obtained during this process.

ADVANTAGES OF PETROLEUM : 1. Cleaner fuel as compared to coal. **2.** It is easier to transport.

The proven reserves for **natural gas** as on April 1993 works out to be approx. 700 billion cubic meter (BCM). Keeping in future demands and proven gas reserves, it is unlikely that our gas reserves might last more than 25 years.

India is poorly endowed with mineral wealth. If present trend of production continues, we will exhaust most of our reserves soon.

SOME METHODS FOR CONSERVATION OF ENERGY

(i) **Use of alternative sources of energy.** We should develop the renewable sources of energy like solar energy, wind energy, tidal energy, nuclear energy etc. for our energy requirement.

(ii) **Great care in using fuels.** We should excercise great care in using fuels for getting energy. The fossil fuels should be used only when no other alternative source is available to us. Thus fossil fuels should be conserved as far as possible.

(iii) **Avoid wastage of energy.**

(a) As far as possible, we should use the most efficient fuels available.

(b) For burning fuels, most efficient heating devices (stoves, chulhas etc.) should be used.

(c) We have to change our style of living for conservation of energy because energy saved is energy produced.

AN OVERVIEW OF NATURAL RESOURCE MANAGEMENT

Main aims of natural resource management are :

1. **To maintain i.e. essential biological processes** (like food chains, food webs, and material cycling), to maintain the life-support systems of the earth."
2. **To ensure the availability and sustainability of resources,** to assure survival of all the species in a healthy and easy manner.
3. **To preserve the biodiversity** so that evolution and development of life in the long run does not get disturbed.

Individuals and community both play important role in sustainable development by conserving the natural resources e.g.,

1. Conservation of water by closing the water taps when not in use; using less water-consuming toilets; watering of plants in the evening; rain-water harvesting in the houses; using drip irrigation and sprinkling irrigation to water lawns; economic use of water for domestic and industrial purposes.
2. Conservation of energy by avoiding wastage of energy by using most efficient fuels in a judicious manner in efficient heating devices; change of life style to avoid wastage of energy because energy saved is energy produced; development of alternative and renewable sources of energy like solar energy, tidal energy, wind power, nuclear energy, biomass energy, biodiesel, etc. to decrease the demand of fossil fuels like coal, petroleum, etc.
3. Conservation of soil by preventing the soil erosion by crop rotation, terrace-farming on the slopes, contour-farming, regulating grazing, afforestation, reforestation, etc. and restoring the soil fertility by judicious use of fertilizers, green manuring, biofertilizers, etc.
4. To promote environmental education and awareness through our education system and mass media, to develop a feeling of belongingness to earth, called Earth thinking, from the childhood.

Practice problems :

1. What is conservation ?
2. What are norms ?
3. What is BOD ?
4. How the underground water availability is decreasing ?
5. Name the activists who took up the case of "Save Narmada Movement".
6. Where is the 'Tehri Dam' located.
7. Write few uses of coal.

Our natural resources like water, forests, wildlife and fossil fuels have to be used/managed in a sustainable manner.

The Ganga Action Plan is a multicrore project that started in 1985 to improve the quality of its water.

Presence of coliform bacteria in water indicates contamination by disease causing organisms; the pH of water can also indicate pollution.

1. R's to reduce pressure on environment

The 3 R's are as follows

(i) Reduce the usage of resources

(ii) Recycle the materials like paper, plastics, metals etc.

(iii) Reuse the things again and again.

2. Why to manage resources ?

The management of our resources is necessary

(i) to ensure supply of them for generations to come and not to exploit them for short term gains.

(ii) to ensure equitable distribution of resources to all people.

(iii) to avoid damage to the environment and

(iv) for safe disposal of wastes arising from the processes employed to obtain and use them.

3. Forests and Wildlife

Forests are biodiversity hot spots; they should be conserved for the following reasons

(i) Forests provide place for a large number of wild animals and plants.

(ii) They prevent soil erosion.

(iii) They control floods by holding the water.

(iv) They maintain a balance between oxygen and carbon dioxide in the atmosphere.

(v) They regulate the water cycle and the climate of the given region.

(vi) They maintain ecological stability as the wildlife form links in several food chains.

Forests are destroyed due to

(i) Over-exploitation for raw materials for industries.

(ii) Conversion of forests into grasslands for grazing the animals or agricultural land for growing food to the increasing human population

Some of the approaches towards conservation of forests include

(i) Afforestation i.e., planting of more trees to raise forests.

(ii) Giving enough time for the deforested areas to regenerate themselves before planting new trees.

(iii) Avoiding overgrazing by the animals of the local people.

(iv) Preventing forest fires.

4. Sustainable Management

Sustainable management aims at meeting the needs of the present generation and also of the future generations.

The Chipko Andolan (Hug the Trees Movement) was due to a grass root level effort of ending the alienation of the people from their forests; it started in Reni in Garhwal and spread to other communities **across the** country.

Another example of people's participation is the recovery of sal forests of Arabari.

5. Water Resources

The reasons for failure to sustain water availability underground are

(i) Loss of vegetation cover

(ii) Diversion of water for high-water demanding crops

(iii) Pollution from industrial wastes

Watershed management

(i) Increases the biomass production

(ii) Mitigates floods and droughts

(iii) Increases the life of the downstream dams and reservoirs.

Following are some of the ancient water harvesting structures

(i) Ahars and Pynes (Bihar)

(ii) Eris (Tamil Nadu)

(iii) Surangams (Kerala)

(iv) Kattas (Karnataka)

(v) Khadins and Nadis (Rajasthan)

(vi) Bandharas and Tals (Maharashtra)

(vii) Bundhis (Madhya Pradesh and Uttar Pradesh)

(viii) Kulhs (Himachal Pradesh)

The main purpose of water– harvesting structures is to recharge the ground water beneath, rather than holding surface water.

The advantages of water stored underground are as follows

(i) It does not evaporate but spreads to recharge the wells.

(ii) It provides moisture for vegetation over a wide area.

(iii) It does not provide breeding grounds for flies and mosquitoes like the stagnant water.

(iv) It is also protected from contamination by human and animal excreta.,

6. Coal and Petroleum

These fossil fuels must be **used** judiciously because at this rate of usage, it is expected that petroleum will last for about forty years more and coal for another two hundred years.

Burning of these fossil fuels causes the following ill-effects :

(i) The products like sulphur dioxide and nitrogen oxides are poisonous at high concentrations.

(ii) Carbon dioxide is a green house gas and causes global warming.

(iii) When these fuels are burnt in insufficient air/oxygen, carbon monoxide is formed; it is highly poisonous and causes immediate death.

Energy consumption can be reduced by

(i) walking or cycling and not taking vehicles

(ii) using fluorescent tube and not bulbs in homes and offices

(iii) taking the stairs and not using lift

(iv) wearing an extra sweater and not using a heater.

EXERCISE # 1 FOR SUMMATIVE ASSESSMENT

1. Environment is formed of :

   (A) Only biotic components (B) Only abiotic components

   (C) Both of these (D) None of these

2. BOD stands for:

   (A) Biological oxygen demand (B) Biochemical oxygen demand

   (C) Biochemical organic decomposition (D) Biological organic decomposition

3. Environment day falls on:

   (A) 28th February (B) 23rd March (C) 5th June (D) 16th September

4. Development with both intragenerational and intergenerational quality is called:

   (A) Sustainable development (B) Unsustainable development

   (C) Economic development (D) Sustainable consumption

5. Sustainable consumption can be achieved by:

   (A) 3-R approach (B) Reducing the use of fossil fuels

   (C) By using alterative sources of energy (D) All of these

6. Joint forest management is an example of :

   (A) Political equality (B) Participatory approach

   (C) Food stabilization (D) Economic equality

7. Chipko movement was led by :

   (A) KM. Munshi (B) Sunder Lal Bahuguna

   (C) Panduranga Hegde (D) Menaka Gandhi

8. Which form of coal is hardest and with maximum carbon content ?

   (A) Lignite (B) Peat (C) Anthracite (D) Pearl

FILL IN THE BLANKS

1. In ..... strategy for saving the environment, things are used again and again.
2. The management of ..... resources requires a long term perspective.
3. ..... are 'biodiversity hotspots'.
4. ..... leaves are used to make bidies.
5. Forests are source of ..... materials for many industries.
6. ..... is basic necessity for all terrestrial forms of life.
7. Rains in India are largely due to .....
8. Watershed ..... emphasises scientific soil and water conservation and tends to increase the biomass production.

VERY SHORT ANSWER QUESTIONS

1. Name few alternative sources of energy other than conventional fossil fuels.
2. Name few inexhaustible natural resources.
3. What is energy ?
4. Define deforestation.
5. List some causes of extinction of wild life.
6. Define sustainable development.
7. What do you mean by rainwater harvesting ?
8. Give the term for rational utilization of land and water resources for optimum utilization causing minimum damage to the natural resources ?
9. List the causes of displacement of people.
10. What are environmental ethics ?

SHORT ANSWER QUESTIONS

1. What are three R's to save the environment ?
2. Why do we need to manage our resources ?
3. Write the uses of forests.
4. Who are the stakeholders of forests ?
5. Give few examples of people's participation in the management.
6. Write the uses of water.
7. How are the big dams useful ?
8. What is watershed management ?

LONG ANSWER QUESTIONS

1. Write briefly about pollution in Ganga. What is Ganga Action Plan ?
2. Write an essay on forests and wildlife.
3. Describe the various methods of sustainable management of forests.
4. Write short notes on:

   (a) Dams

   (B) Water harvesting

ANSWERS

OBJECTIVE QUESTIONS :

Que.	1	2	3	4	5	6	7	8
Ans.	C	A	C	A	A	B	B	C

FILL IN THE BLANKS :

1. Reuse
2. Natural
3. Forests
4. Tendu
5. Raw
6. Water
7. Monsoons
8. Management

EXERCISE # 2 FOR SUMMATIVE ASSESSMENT

1. Which of the following is an inexhaustible natural resources?

(A) Forests (B) Minerals (C) Coal (D) Water

2. Which of the following is an exhaustible natural resources?

(A) Solar radiation (B) Air (C) Minerals (D) Water

3. The quality of environment can be improved by

(A) Deforestation (B) Overuse of natural environment

(C) Erosion (D) Conservation

4. Maximum petroleum is used in

(A) Agriculture (B) Shipping (C) Industries (D) Transportation

5. Deforestation causes

(A) Soil erosion (B) Pollution (C) No floods (D) None of these

6. Ecological imbalance in the biosphere is created by

(A) Cutting of forests (B) Conservation of forest

(C) Production of more paper (D) Both (A) and (C)

7. Floods can be prevented by

(A) Cutting the forests (B) Afforestation (C) Tilling the land (D) Removing the top soil

8. Ganga Action Plan was started in

(A) 1975 (B) 1985 (C) 1995 (D) 2005

9. Which of the following are the stakeholders of the forests?

(A) Local people (B) Industries (C) The government (D) All of the these

10. Amrita Devi Bishnoi National Award is rendered for

(A) water conservation (B) wildlife conservation (C) soil conservation (D) none of these

11. Chipko movement was started in

(A) Uttarakhand (B) Himachal Pradesh (C) Uttar Pradesh (D) Madhya Pradesh

12. Arabari project was started in 1972 in

(A) Bihar (B) Maharashtra (C) West Bengal (D) Delhi

13. Who was the mastermind of Arabari project?

(A) Sunderlal Bahuguna. (B) Jyoti Basu (C) A.K. Banerjee (D) None of these

14. One of the world's most critical watersheds are found in

(A) Himalayas (B) Aravali (C) Vindhyachal. (D) None of these

15. Khadin system of water harvesting is found in

(A) Rajasthan (B) Himachal Pradesh (C) Haryana (D) Gujarat

FILL IN THE BLANKS

1. Develompment which meets the needs of the present as well as of the future generation is called .....

2. Sustainable development can be achieved by .....

3. The 3R's refer to ....., ... and .....

4. Biodiversity-rich areas are the .....

5. Biodiversity can be conserved by developing ..... and .....

6. Ground water can be raised by .....

7. Excess of carbon dioxide in the atmosphere leads to .....

VERY SHORT ANSWER TYPE QUESTION

1. What is Ganga Action Plan ?

2. Name the most common and simplest method to check the pollution of water.

3. What is sustainable development ?

4. Why is 'reuse' considered better than 'recycling' with reference to protection of our environment ?

5. How is the biodiversity of an area measured ?

6. What are the advantage of building dams ?

7. What are the possible effects of mismanagement of water (by building of dams and canal system) ?

8. What is Narmada Bachao Andolan about ?

9. Name any two forms of fossil fuels commonly used.

10. Which category of natural resources are fossil fuels – exhaustible or inexhaustible ?

11. Which of the following is a renewable resource ?

12. Burning of fossil fuels results in global warming – Justify.

13. Name two gases other than carbon dioxide, that are given out during burning of fossil fuel and contribute towards acid rain formation.

SHORT ANSWER TYPE QUESTION

14. Mention the two factors on which sustainable development depends.

15. Enlist the stakeholders who should be considered, while we think of conservation of forests.

16. 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 ?

17. What is meant by wild life ? How is wild life important for us ?

18. What changes would you suggest in your home in order to be enviroment friendly ?

LONG ANSWER TYPE QUESTION

19. Mention the causes of pollution of river Ganga.

20. What do the local people need from the forests ?

21. Describe the Chipko Andolan

22. Mention the indigenous water-saving methods used by the local communities.

23. What is meant by the following :

(i) Kattas (ii) Surangams (iii) Bundhis (iv) Eris

24. What are the advantages of water stored underground over the water stored above ground in ponds/lakes?

25. Mention the disadvantages of using coal/petroleum as fuels.

26. Discuss in detail how the forests have been damaged / affected after they had been taken over by the Forest Department of our Government.

27. Describe along with a diagram, the traditional water harvesting system and their main purpose.

ANSWERS

Que.	1	2	3	4	5	6	7	8
Ans.	D	C	D	D	A	D	B	B
Que.	9	10	11	12	13	14	15	
Ans.	D	B	A	C	C	A	A	

FILL IN THE BLANKS :

1. Reuse 2. Natural 3. Forests 4. Tendu
5. Raw 6. Water 7. Monsoons 8. Management

EXERCISE # 3 NCERT SOLVED EXERCISE

1. What changes would you suggest in your home in order to be environment friendly?

Ans. Few suggestive methods are :

(i) A running tap or a defective tap should be rectified to minimise loss.

(ii) Water should be considered a precious commodity as per the need of a person.

(iii) Turn off the water tap during brushing or soaping up under tap or shower.

(iv) Wash the car with bucket and not with water pipe.

(v) Efforts should be made to utilise the enormous potential of non-conventional energy sources like solar energy. Switch off the light, fans or other electrical appliances when not in use.

(vi) Gas and kerosene need to be used carefully.Pressure cooker and other fuel saving methods help to save the gas and kerosene.

(vii)Reduce and reuse the materials as far as possible.

2. Can you suggest some changes in your school which would make it environment friendly?

Ans. Few methods are :

(i) Celebrate 'van mahotsava' every year. Do plantation on this day. If area available is shady, ornamental trees should be planted.

(ii) Special attention should be given to the cleanliness of your school.

(iii) If you are residing in a nearby area, come to school on a bicycle. Do not use school bus. It will be a fuel saving method. Suggest few more methods to make your school environment friendly.

3. We saw in this chapter that there are four main stakeholders when it comes to forests and wild life. Which among these should have the authority to decide management of forest produce ? Why do you think so ?

Ans. Joint Forest Management (JFM) committees should be set up as a partnership between the Government and local communities to recover degraded forests and wild life. Nature enthusiasts and those who want to conserve the nature should be made a party to this management system. Due to this following benefits can be seen :

(i) State Forest Department and voluntary village community/NGO should work together.

(ii) Village community (beneficiary) should be entitled to their share as prescribed by the Government.

(iii) Ownership should not be given to beneficiary.

(iv) Village community (beneficiary) can use products like grass, tops of branches and minor forest produce. On successful protection of forests, they may get benefit from the sale of trees.

(v) Grazing in such areas should not be permitted.

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

(A) Forest and wildlife (B) Water resources (C) Coal and petroleum

Ans. (A) Forests and wildlife

(i) In conservation schemes, the endangered species should be given priority over vulnerable species, and vulnerable species over rare species.

(ii) In fixing priorities for conservation, the economic values of respective species should also be taken into consideration.

(iii) The wild relatives of all our useful plants and animals should be conserved, because these act as a gene bank for the latter.

(iv) Migratory or wide-ranging wild animals feed, breed and rest in different habitats. All these critical habitats should be safeguarded and preserved.

(v) The wildlife must be protected both in situ (i.e., natural habitats) and ex situ (i.e., in artificial habitats) established as zoological and botanical gardens or parks.

(vi) All efforts should be made to conserve all threatened species, but special attention should be paid to the species which are the sole representative of their respective larger groups or taxa (i.e., genera, families, orders, classes etc.).

(vii) Game hunting should generally be discouraged. Stringent laws for punishing poachers must be enacted.

(viii) Widespread networks should be established to educated general public about the perils of biosphere destruction and benefits of conservation.

(ix) Effective national and international bodies should be set up to control and coordinate conservation programmes of the different countries of the world.

(x) All habitats enroute of the migratory wild animals should be conserved, because these are used as landmarks for navigation by these animals.

(xi) In case of migratory animals which migrate from one to some other country, bilateral or multilateral agreements should be made for combined efforts for conservation of habitats and these animals themselves.

(xii) While planning conservation, emphasis should be laid on the entire ecosystems, and not on single species.

(B) Water resources

(i) Economical utilization of water.

(ii) Preventing the pollution of our water sources by domestic sewage and industrial effluents.

(iii) Dams should be built to store the flood water.

(iv) Afforestation and reforestation at hill slopes to check loss of water in floods.

(v) To maintain top soil to check the soil erosion.

(vi) To decrease loss of water in surface runoff by employing contour cultivation, terrace-farming, developing water storage structures like farm ponds, adding surfactants and chemical conditioners (like gypsum, hydrolysed polyacrylonitrile, etc.) to the soil to improve soil permeability etc.

(vii) To reduce evaporation losses by developing subsoil horizontal asphalt barriers or adding super slurper (a copolymer of starch 'and acrylonitrile) on the sandy soil to increase water availability to the crop plants.

(viii) To reduce irrigation losses of water by drip-irrigation, growing hybrid crop varieties (have low water requirements), early morning or late evening irrigation, and brick-lining of canals (to reduce seepage).

(ix) To prevent wastage of water in households commercial buildings and public places.

(x) To promote recycling of water and treated water should be used for irrigation purposes.

(xi) To increase')Iock pricing to avoid wastage.

(C) Coal and petroleum

Some suggestive methods are:

(i) To develop renewable and pollution-free energy resources like solar radiation, wind power, geothermal power, hydel power, nuclear power, biomass etc.

(ii) Judicious use of our non-renewable sources of energy and their wastage should be avoided.

(iii) Non-renewable energy resources should be used only when no non-conventional source of energy is available.

5. What can you as an individual do to reduce your consumption of various natural resources?

Ans. (i) Minimise depletion of non-renewable resources.

(ii) Conservation of earth's vitality and diversity.

(iii) Change of personal attitudes and practices.

(iv) Improve the quality of life-supporting systems of the earth.

(v) Keep the population within the carrying capacity of the earth.

(vi) Enable communities to take care of their own environment.

(vii) To ensure the availability and sustainability of resources, to assure the survival of all the species in a healthy and easy manner.

(viii) To preserve the biodiversity so that evolution and development of life in the long run does not get disturbed.

(ix) Conservation of water by closing the water taps when not in use, using less water-consuming toilets, watering of plants in the evening, rain water harvesting in the houses using drip irrigation and sprinkling irrigation to water lawns, economic use of water for domestic and industrial purposes.

(x) Conservation of energy by avoidingwastage of energy by using most efficient fuels in a judicious manner using efficient heating devices, change of life style to avoid wastage save energy because energy saved is energy produced, development of alternative and renewable sources of energy like solar energy, tid all energy, wind power, nuclear energy, biomass energy, bio-diesel, etc. to decrease the demand fossil fuels like coal, petroleum, etc.

(xi) Conservation of soil by preventing the soil erosion by crop rotation, terrace-farming on the slopes, contour farming, regulating grazing afforestation, reforestation, etc. and restoring the soil fertility by judicious use of fertilizers, green manuring, biofertilizers, etc.

(xii) With reference to natural resources, sustainable development proposes 3-R approach which states:

– Reduce excessive use of natural resources like fossil fuels, minerals, water etc. -Reuse of natural resources instead of waste generation and pollution.

– Recycle the materials to reduce the pressure on our existing natural resources.

Through these activities, inter-generational equality and intra-generational equality aim of sustainable development can be ensured.

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.

Ans. Think of the activities done by you during last one week and list them. Identify the activities which are responsible for conservation of natural resources and which will increase the pressure on natural environment.