UNIT 3

NATURAL RESOURCES AND MANAGEMENT

3.1 Types of Natural Resources and Energy Resources
3.2 Water Conservation - Rain Water Harvesting: Watershed Management - Meaning and Importance.
3.3 Wasteland Reclamation, Soil Conservation, Afforestation - Meaning and Importance
3.4 Disaster - Definition and Types (Natural and Man-made), Self-protection during Disasters (Fire, Floods, Earthquakes)

3.1 TYPES OF NATURAL RESOURCES AND ENERGY RESOURCES

3.1(A) TYPES OF NATURAL RESOURCES

The word '*Resource*' means *'a source of supply' or support generally held in revserve'*. Living and non-living factors of nature used by humans for various purposes are called *'natural resources'*. These are used to support human life and fulfil human requirements.

On the basis of origin, natural resources may be divided into two types. They are;

1) Biotic resources and 2) Abiotic resources

1. Biotic resources

The resources obtained from the biosphere are categorized as Biotic resources. The biosphere is made of living and organic material. As a result, the resources obtained from forests and animals are ***living biotic resources*** and the materials formed from decayed organic matter such as *coal* and *petroleum* categorized as ***"fossil fuels"*** are the biotic resources obtained from ***organic material***.

2. Abiotic resources

The resources obtained from non-living, non-organic material are known as abiotic natural resources. It includes the resources such as land,

air, fresh water, earth metals and heavy metals including ores such as gold, iron, copper silver etc.

On the basis of stage of development, natural resources are further classified in the following ways.

1) Potential resources
2) Actual resources
3) Reserve resources and
4) Stock resources

1. Potential Resources

The resources that remain in the earth's crust and may be used in the future are referred to as potential resources.

Eg:- Petroleum

2. Actual Resources

The resources that have been surveyed, quantified, qualified and are currently being used for various purposes using technology are the actual resources.

Eg:- Wood, Wind etc

3. Reserve Resources

The part of an actual resource that can be developed profitably in the future is reserve resource.

Eg:- Wind

4. Stock Resources

These are the resources that have been surveyed, but cannot be used due to lack technology are the stock resources

Eg:- Gases such as hydrogen, sea water etc

3.1(B) ENERGY RESOURCES

Energy resources are all forms of fuels used in the modern world, either for heating, generation of electrical energy, or for other forms of energy conversion processes.

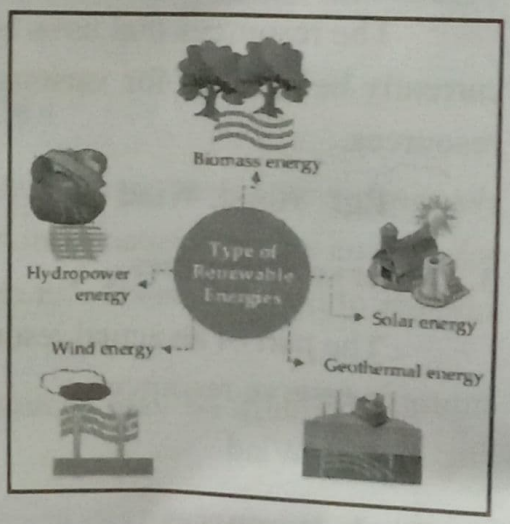
There are 10 main different sources of energy that are used in the world to generate power. They are;

1) Solar Energy
2) Wind Energy
3) Geothermal Energy
4) Hydrogen Energy
5) Tidal Energy
6) Wave Energy
7) Hydro power energy
8) Biomass Energy
9) Nuclear Power
10) Fossil fuels (coal, oil & Natural Gas)

Classification of Energy Resources

The energy resources can be roughly classified into three categories. They are;

1) Renewable energy resources
2) Fossil energy resources and
3) Nuclear energy resources



1. Renewable Energy Resources

The forms of energy that are naturally replenished on our planet are renewable energy resources.

Eg: Hydropower, Biomass, Wind, Wave, Tidal, Solar, Geothermal energy etc

2. Fossil Energy Resources

The forms of energy resources obtained from dead plant and animal deposits created over the long history of planet Earth are fossil energy resources.

Eg:- Fossil fuels - Coal, Oil and Natural gas. This energy resource is limited in supply and can get exhausted on continuous use i,e "Non-renewable" in nature.

3. Nuclear Energy Resources

Deposits of certain radioactive elements present in Earth's crust are classified as nuclear energy resources. These resources are used as fuel for

nuclear fission-based power plants to produce nuclear energy. In this type of energy, using a small amount of raw material, large quantity of energy is produced. Even though, radioactive elements are limited in earth's crust and are non-renewable, the energy sources will last long for a long time. So it is also known as sustainable energy resource.

Further, these energy resources can be categorised into two types: **Conventional sources** of energy and **Non conventional sources** of energy.

The energy sources which have been in common use are called conventional sources of energy. Electricity, petrol, coal, wood, gas etc. are examples of conventional sources of energy.

The energy sources which are either new or have not been in common use are non-conventional sources of energy. Solar energy, wind energy, wave energy, geothermal energy,[1] Biogas energy etc. are examples of non-conventional sources of energy.

3.2 WATER CONSERVATION- RAIN WATER HARVESTING

Water shed management - Meaning and importance.

WATER CONSERVATION

Water is an integral component of ecosystem. It is vital for the survival of plants and animals. Various human activities need water. With rapid urbanization and industrialization, acute shortage of water is observed. This is due to the over exploitation of surface water and rapid decline of ground water. This necessiates the need to *renew the water conservation methods followed by our ancestors* and *to invent innovative methods to conserve water.* The purpose of water conservation is ***to recharge the depleting ground water*** and ***collect and use the rain water for various purposes.***

These objectives are fulfilled in the following ***two*** methods of water conservation.

3.2.1(A) Rain Water Harvesting

It is seen that in urban areas complete concretization of land in the form of buildings, roads, footpath, etc., has left too little earth exposed for rainwater to soak in. Thus, the water flows into the drains and moves into the natural water bodies [rivers / lake or sea] or reservoir. If this water were

1. Energy obtained from the temperature of the earth's crust.

to stay longer on the land, it would seep into ground and recharge ground water. This is becoming popular method of water conservation. Rain water harvesting is the conservation technique of collecting rain water and storing it in tanks for future use or putting it back to soil to recharge the ground water.

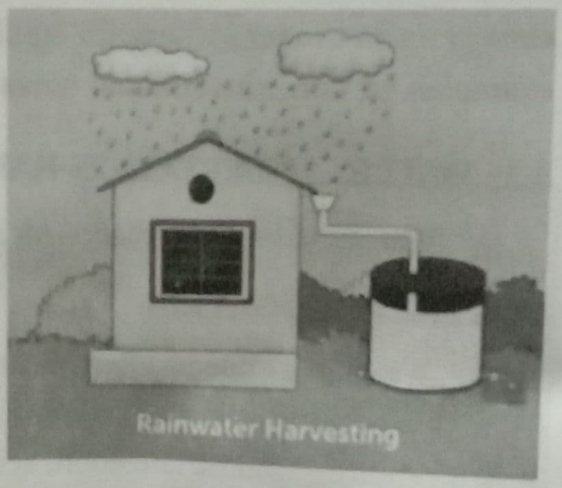
Techniques of Rainwater Harvesting

There are two main techniques of rain water harvesting:

1. *Surface rain water harvesting*
2. *Rain water harvesting to recharge the ground water.*

1. Surface Rain Water Harvesting

In this method of harvesting, the roof is used as the catchment area and surface or ground water tanks are used as the storage area.



Steps Involved in Surface Rain Water Harvesting

1. As roof is used as the catchment area, roof surface must be kept clean.
2. The first rain water is not harvested as it is likely to contain suspended material.
3. Once the roof gets cleaned, the water from the roof is directed into primary filtration unit. This unit consists of a wire mesh to remove the unwanted suspended materials.
4. The water from primary filtration unit is directed into secondary filtration unit. In this unit, chemical treatment of water is done with potassium permanganate or chlorine. This purifies the water.
5. The filtered and purified water is then stored in the store tanks.
6. The storage tanks should not be directly exposed to sunlight to prevent the growth of algae.
7. Depending on the storage capacity, this water can be used for days or months.

2. Rain Water Harvesting to Recharge Ground Water

In this method of rain water harvesting, the water collected from the roofs or rain water flouring on the ground is directed into pits, dug wells, trenches, etc., to increase the ground water table.

1. Recharge pits of 1 - 2 m wide and 3 m deep are dug and filled with boulders, gravel and coarse sand to filter water.
2. Trenches of 0.5 - 1 m wide and 1 - 1.5 m deep and 10 - 20 m long are made and filling it with the filling material.
3. The dug wells are used into which run off water can be channelized but only after passing through filters.

3.2.1(B) Rain Water Harvesting-Importance

The importance of Rain water harvesting lies in the fact that it shows following advantages;

a) Rain water harvesting helps the environment by reducing *flooding* and *soil erosion.*

b) Rain water harvesting reduces the dependence on corporation/ municipal water and there by reduces the water bills.

c) Rain water harvesting reduces the demand on ground water

d) Rain harvested water can be used for non drinking purposes as well

e) Rain harvested water can be used for plant growth purpose as well.

3.2.2(A) Water Shed Management

Watershed region is any area of land that catches rain water and drains into a stream, river or lake or allows it to seep into the ground. ***OR***

Watershed management can be defined as 'a well defined area of land from which rain water drains out to a common point.

Water shed can occur in all shapes and sizes. The water shed that drains into rivers measures thousands of hectares whereas the watershed that drains into a pond or pool may measure only a few hectares.

Therefore, watershed management refers to the process of creating and implementing plans, programs and projects to sustain and enhance watershed functions that affect the plant, animal and human communities within a watershed boundary.

The main purpose of watershed management is to protect, maintain and restore water quality in our watersheds through integrated and holistic efforts.

3.2.2(B) Water Shed Management - Importance

The following are the importance of watershed management

a) Water shed management mitigates droughts and floods.

b) It increases the production and income of the water shed community

c) It can prevent future community water shortages and poor water quality

d) It increases the life of the downstream dams and reservoirs.

e) It helps in recharging ground water levels.

3.3. WASTELAND RECLAMATION, SOIL CONSERVATION, AFFORESTATION-MEANING AND IMPORTANCE

3.3(A) Wasteland Reclamation - Meaning and Importance

Land is an important resource as it is put to different uses by man. Loss of vegetation cover leads to the loss of soil through erosion leading to the creation of wastelands.

"Wastelands are lands which are unproductive, unfit for cultivation, grazing and other economic uses due to rough terrain and eroded soil. The lands which are waterlogged and saline are also termed as wastelands. The loss of soil fertility followed by erosion also leads to the conversion of marginal forest lands into waste lands.

If this goes on unchecked, it will affect the remaining land. So, conservation of soil, protecting the existing cultivable land and reclaiming the already depleted waste land assumes significance.

It is reported that every year about 3 million hectores of cropland are ruined by erosion and about 8 million hectares are taken away for non-agricultural purpose (plots for houses, roads, industries, reservoirs etc)

Wastelands are classified into two types;

1. ***Barren and uncultivable wasteland***: These lands cannot be brought under cultivation or economic use except at a very high cost Eg:- Sandy deserts, Gully land, stones/ leached land on hilly slopes, rocky lands etc.

2. ***Cultivable Wastelands***: These are the lands that are not cultivated for five years or more. It consists of land available for cultivation, but not used for cultivation.

Reclamation of Wastelands

Reclamation of wasteland means "re-claiming the land or use of land for productive purposes

Following are the methods of wasteland reclamation:

1) ***Afforestation***: It consists of growing a forest over cultivable wasteland.

2) ***Reforestation***: Growing the forest again over the land where they are once existed and were destroyed due to overgrazing, fires, excessive tree cutting etc.

3) ***Providing Surface Cover***: This is the easiest way to protect the land surface from soil erosion. Here crop residue is left on the land after harvesting. This prevents the land surface from soil erosion.

4) ***Mulching***: Here protective cover of organic matter and stalks of plants (Cotton, Tobacco, etc.) are used, to reduce evaporation and thereby helping in retaining soil moisture & reduce soil erosion.

5) ***Changing Ground Topography on Downhill***: Running water erodes the hill soil and carries the soil along with it. This can be minimized by altering the ground topography by adapting;

   a) *Strip farming*

   b) *Terracing*

   c) *Contour ploughing, etc.*

6) ***Leaching***: In salt affected land, the salinity can be minimized by leaching them with more water

7) ***Changing Agricultural Practices***: Adapting mixed Cropping & Crop rotation, soil fertility can be improved.

8) **Ecological Succession:** It consists of natural development or re development of an ecosystem which helps in reclaiming the minerally deficient soil of wasteland.

Importance/Need for Wasteland Reclamation

1. It makes the soil fertile by preventing soil erosion and conserving the moisture of soil.
2. It helps in maintaining the ecological balance in the area/region.
3. It helps in increasing the forest cover and there by is responsible for maintaining the local climatic condition.
4. It ensures a constant supply of fuel, fodder and timber for local use.
5. It provides a source of income for the rural poor.

3.3(B) SOIL CONSERVATION: MEANING AND IMPORTANCE

Soil conservation is a combination of practices used to protect the soil from degradation.

Importance/Need for Soil Conservation

1. ***To Maintain Adequate Amount of Organic Matter and Biological Life in the Soil***: Organic matter and biological life present in soil accounts for 90-95% of the total soil productivity

2. ***To Ensure a Secure Food Supply at Reasonable Price***: Soil conservation has proven to increase the quality and quantity of crop yield over a long term as it keeps the fertile top soil in its place and thereby preserves the long term productivity of the soil.

3. To grow enough food not only for ourselves but also for those countries where there is shortage of food grains.

4. ***To Improve Water Quality***: Agriculture and urban soil erosion are major sources of sedimentation and contamination of water supplies. Soil conservation prevents this.

5. ***To Improve Wildlife Habitat***: Soil conservation practices such as providing buffer strips and wind breaks or replacing the soil organic matter greatly enhances the quality of environment for wild life.

6. To help to create an environment free of pollution where we can live safely.

7. For the future of our next generation, so that they will have enough soil to support life.

3.3(C) AFFORESTATION: MEANING AND IMPORTANCE

"The forest is not a resource for us. It is life itself. It is the only place for us to live".

- Evaristo Nugkuag Ikanan

Afforestation is the process of planting trees in areas devoid of any forest cover i.e Afforestation *"is the establishment of a forest or stand of trees in an area where there was no previous tree cover".*

Importance of Afforestation

The process of Afforestation holds the following importance/ advantage as it is the process of creating new forest. They are;

1. ***Afforestation Provides an Alternate Source of Tree Products*:** The rate at which trees grow naturally in forests is much slower than the rate at which the trees in forests are being cut down for various products of human use. Increased demand for tree products puts pressure on forests, resulting in deforestation. This is taken care now as afforestation serves the purpose of being alternate source of tree products for human use.

2. ***Afforestation has Increased Supply of Trees that are in High Demand*:** It is observed that there is demand for specific types of trees for commercial purposes. Afforestation allows the stake holders to plant the type of trees in demand, promoting the fast propagation of specific types of trees.

3. ***Protection of Natural Forests*:** Afforestation is making the protection of natural forests a possibility now as alternate source of tree products are easily and readily available. Along with this, protecting natural forests is leading to other benefits such as;

a) Preservation of catchments

b) Preservation of wetlands and

c) Preservation of riverside zones

4. ***Afforestation Leads to Environmental Benefits*:** Planting trees in a barren land helps to create a new ecosystem. Due to this reason, majority of governments use afforestation to revert the arid and semi-arid areas to productive areas.

5. ***Afforestation Brings About Value Addition to a Region*:** Easiest way to transform a barren land is by planting trees. Land with trees is always

more attractive and valuable than the barren land. Moreover planting trees is a sure way of increasing aesthetic value of land along with the properties value.

3.4: DISASTER : DEFINITION AND TYPES (Natural and Manmade): Self Protection during Disasters (Fire, Floods, Earthquakes)

3.4 (A) DEFINITION – DISASTER

Disaster by definition refers to a **Catastrophe,** a **Calamity** - natural or manmade, or a **mishap** occurring at a region, resulting in substantial loss of life and property.

A brief account of various types of disasters are as follows:

1. Earthquakes

Earthquakes can be defined as the shaking of Earth caused by disturbances occurring **at the ground level** and **below** the ground level. These disturbances are caused by the shifts and collisions of tectonic plates. These tectonic plates are the geologic structures that form the outer layer of Earth. Friction between these plates causes the edges of these tectonic plates to stick to one another and plates continue to move. This results in buildup of energy. Whenever the tectonic plates are unstuck and slip past each other, the energy gets released as Earthquakes. Earthquakes can occur anywhere, at any time. But they most commonly occur on the known fault lines. During the earthquake, the earth's shaking may cause landslides and can even rupture the surface of the ground. Collapse of infrastructures such as buildings, monuments etc. occur. Earthquakes intensity and magnitude is measured in **Richter scale**.

One of the consequences of Earthquake is Tsunami.

2. Tsunami

A Tsunami is a series of giant waves observed in seas. These giant waves are caused due to the sudden shift of the sea floor either due to an earthquake or an underwater volcano. Tsunamis can travel at 500 miles an hour with the waves as high as 100 feet tall as they reach the shore.

It is observed that the Earthquakes and Tsunamis occur most frequently in the Pacific Ocean's "Ring of Fire". This is an horse shoe shaped seismically active belt where many volcanic eruptions and earthquakes occur.

3. Forest fires

The most common disaster in forests is forest fire. These forest fires are a threat not only to the forest wealth but also to the flora and fauna of the forest. Whenever these forest fires occur, they lead to distruction of forest wealth and loss of biodiversity resulting in disturbing the biodiversity and ecology of the region.

Forest fires are caused due to natural causes as well as Manmade causes. Natural causes for many forest fires to start are as follows;

- The phenomena of lighting which sets trees on fire.
- High atmospheric temperature and dryness (low humidity) provides favorable circumstances for a fire to start.
- During summer, the forests become littered with dry leaves and twigs. These can burst into flames ignited by the slightest spark.

Forest fires are also caused due to humans. When a source of fire like naked flame, cigarette/bidi, electric spark, any source of ignition can lead forest fires. These sources of ignition when comes in contact with inflammable material such as dry leaves littered on the surface of forests leads to forest fires.

4. Floods

Flood is a term used to denote an **enormous amount of water**. The area is said to be **flooded**, when there is an outflow of water into a region that is usually dry. The floods are caused due to;

- Heavy rains
- Overflowing rivers
- Broken dams
- Storm surges
- Tsunamis
- Melting snow and ice
- Deforestation etc.

5. Cyclones

Cyclones are wind storms accompanied with heavy rainfall at low pressure areas. The cyclones are caused due to the continuous process of

rising of hot air over the ocean surface. This rising creates a vacant space and this space gets occupied by cool air around creating low pressure.

The impact from cyclones extends over a wide area, with strong winds and heavy rains. The storm surges, flooding, landslides etc caused due to cyclones are the reasons for damage to life and property.

Interesting names are kept to each cyclone. This is done by **Regional Specialized Meteorological Centres** (RSMC) and **Tropical Cyclone Warning Centres** (TCWC).

When a Disaster strikes, following consequences are seen / bound to occur;

1) People in large number die.
2) Due to disaster, people may become homeless and parentless.
3) Damage to infrastructure is observed.
4) In these unexpected incidences, all life and life support systems are affected.
5) The extent of damage caused due to the sudden, catastrophic events makes many people sad and depressed.

Types of Disasters

Disasters broadly can be categorized into two types. They are;

1. Natural Disasters

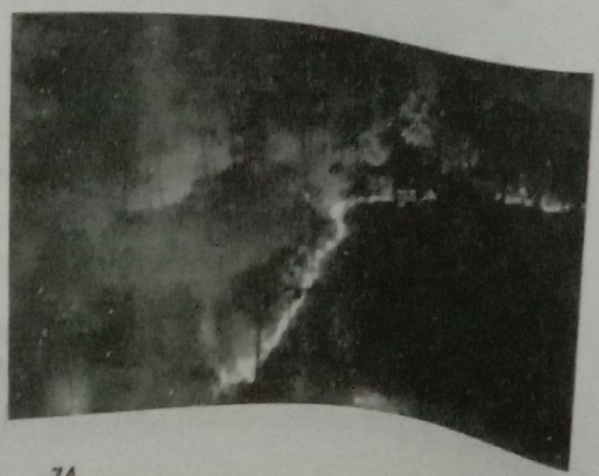
   And

2. Manmade disasters

1. Natural Disaster

A disaster caused by natural factors such as extreme temperature and geological events are called as natural disaster

Eg: Earthquake, Flood, Cyclone, Drought, Tsunami, Forest fires, etc.



Further, the natural disaster is classified into following two types. This is based on potential of disaster to cause damage to human life and property. They are;

a) Major type of Natural disaster

b) Minor type of Natural disaster.

a) The disaster whose impact is huge and intensity of damage to life and property is large, then such natural disaster are classified as Major type of natural disaster.

Eg:- Earthquakes, Cyclones, Floods, Volcanic-eruptions, Forest fires, etc.

b) The natural disaster whose impact is localized and intensity of damage to life and property is much less, then such natural disaster are categorized as Minor type of natural disaster.

Eg: Hail storms, Avalanches, Landslides, Bush Fires, etc.,

Features/Characters of Natural Disasters

a) Occur without any warning

b) Causes damage to property and lives.

c) Through technological advances, regions that could get affected with natural disasters can be identified.

d) General awareness and preparedness for appropriate responses by local population and local administration can lead to effective handling of these natural disasters with minimum loss to lives and properties.

2. Man-made Disasters

A disaster caused due to human activities are known as man-made disaster.

Eg: Fire accidents, Industrial accidents, Wars, Economic collapse, Oil & Chemical spills, Terrorist attacks, Nuclear accident, Forest fires, etc.

The Bhopal Gas Tragedy of 1984 is one of the worst man-made industrial disaster in our country. In this disaster, from **The Union Carbide** factory, at least 30 tonnes of methyl isocyanate gas leaked killing more than 15,000 people and more than 500,000 people were exposed to this toxic gas making this one of the worst industrial disaster of the world.

3.4 (B)SELF PROTECTION DURING DISASTERS

The best personal protection strategy during disaster depends on "How one plans to respond" to the threats during a disaster.

Self protection Strategy during Earthquakes

The following strategy is useful during earthquakes.

1) ***Drop Down onto your Hands and Knees***: In this position, one still can move but is protected from falling
2) ***Cover your Head and Neck*** preferably the entire body underneath a sturdy table/desk. If such shelter is not available, then bend down near an interior wall and cover your head and neck with arms and hands.
3) ***Hold on to your Shelter*** until the shaking stops. And be prepared to move if shakes shifts.
4) Move away from glass, hanging objects, book cases etc.,
5) If one is inside a high rise building, move away from windows and outside walls. Do not use elevators and stay in the building.

Self Protection during Floods

The steps to protect Self during hazardous flood water are as follows;

1) Emergency essential supply collection like food, water, medicines etc., should be done.
2) Keep oneself updated about the situation by listening to local radio / television station.
3) Prepare an emergency supply of food and water at least for 3 days.
4) If evacuation becomes necessary, turn off the main power switch and the gas connection of the house.
5) Areas subjected to flooding such as low lying areas should be left / evacuated.

6) Avoid driving through flooded areas and standing water.

7) Do not drink flood water or use it to wash dishes & to prepare food.

Self Protection during Fire

The best self protection strategy during fire accidents are as follows:

1) Immediately exit the building and raise the fire alarm.

2) If smoke is there in the air, stay low to the ground and the head should be lowered to reduce inhalation exposure. Keep the hand on the wall to prevent disorientation and crawl to the nearest exist.

3) While evacuating the building, feel the doors for heat to make sure that there is no fire danger on the other side.

4) Once out and clear from danger of fire, call the fire authorities and your contacts and inform them of the fire.

●●●●●●●●

UNIT 4

ENVIRONMENTAL AWARENESS AND LEGISLATION

4.1 Environment Movements - Chipko, Appiko, Narmada Bachao Andolan

4.2 Individual and Community Initiatives - Salu Marada Thimmakka: Concept of Sacred Groves (Devarakadu)

4.3 National Environmental Policy, 2006 - Provisions and Importance: Swachh Bharat Mission - Objectives

4.4 Environmental Ethics - Issues & Possible Solutions.

4.1: ENVIRONMENTAL MOVEMENTS

A **social** or **political** movement *"for the conservation of environment"* or *"for the improvement of the state of environment"* is known as *environmental movement*. These movements aim to preserve the environment for future generations, and to make life better for those living now. Some of the important environmental movements we have witnessed are explained below;

4.1 (a) CHIPKO

The word ***"chipko"*** refers to *"stick"* or *"to hug"*. It came from a Hindi word meaning *"embrace"*.

Chipko Movement was primarily a forest conservation movement aimed to protect trees. This movement inspired many eco groups and stirred up the civil society in India to address the issue of *a) rapid deforestation and b) Tribal people.*

Founder of Chipko Movement

Sri Sundaer Lal Bahuguna was the founder of Chipko Movement. He was awarded *Padmabhusan* for his contribution to the movement, its success and the environmental impact it created.

History of Chipko Movement

Chipko Movement originated in Rajasthan in 20 century. **BISHNOI** community living around the forest protested against the king and in a daring act of non-violence hugged the trees to prevent them from getting cut. As a result of this protest, many men and women got killed by king's men during protest.

Causes of Chipko Movement

During 20th century, in the Northern State of India, Uttarakand, large scale of deforestation resulted in causing lot of hardships to common people. This was the result of inefficient policies of the government and lack of environmental and ecological awareness in the society.

This large scale deforestation lead to following consequences;

1) People gave up on keeping large livestock.
2) It resulted in malnutrition among people.
3) It caused scarcity of drinking water.
4) The condition of land started to deteriorate

Rise of Chipko Movement

On 16th March 1974, in the Reni village of Uttarkand, Lumber /Timber laborers arrived and started logging operation.

In the absence of men folk, **Gaura Devi** along with 27 of village women confronted the loggers. Loggers threatened these women but the women held bravely and hugged the trees.

Next day, the movement spread to the neighboring villages and eventually after this standoff, the contractors had to disbandon their operation. Thus women were the backbone of the Chipko Movement.

Thereafter, Sri Sunder Lal Bahuguna led this movement and it spread to states such as

- Bihar
- Uttar Pradesh
- Himachal Pradesh
- Rajasthan
- Karnataka

Aims of Chipko Movement;

1. To save the trees of the area as forest is the main source of livelihood in tribal region.
2. To maintain the ecological balance of these tribal areas.

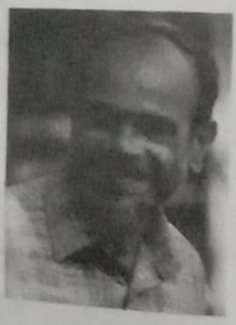
Consequences of Chipko Movement

1. It resulted in stopping the felling of trees in Western Ghats and Vindhyas
2. It created pressure on Government to formulate *'Natural Resource Policy'*.
3. This movement was instrumental to achieve in 1980, a 15 year ban on green felling in Himalayan forests.
4. New methods of forest farming have been developed, both to conserve the forests and create employment.

4.1 (b) APPIKO MOVEMENT

The word ***"Appiko"*** in Kannada, the local language of Karnataka means *"embrace"* or *"hug"*.

Appiko is a nonviolent grass root movement for ecological preservation and restoration of trees/forest centered in the Indian state of Karnataka. This movement can be said as the southern version of Chipko Movement.



Appiko Movement was started by **Sri Pandurang Hegde** in September 1983 at **Salkani Village** in **Sirsi** (Uttara Kannada). Under his leadership, representatives of a **Yuvak Mandali of Salkani Village** launched this movement to save the **Western Ghats** in **South West India**.

The Appiko movement goes by the slogan;

- *Ulsu (save)*
- *Belesu (grow) and*
- *Balasu (rational use)*

to spread awareness about the fragile state of the regions ecology.

Objectives of Appiko Movement

The objectives of Appiko Movement are three fold;

1. To protect the existing forest cover of Western Ghats.
2. To regenerate trees in the denuded land and forest land.
3. Sustainable utilization of forest products with due consideration to conservation.

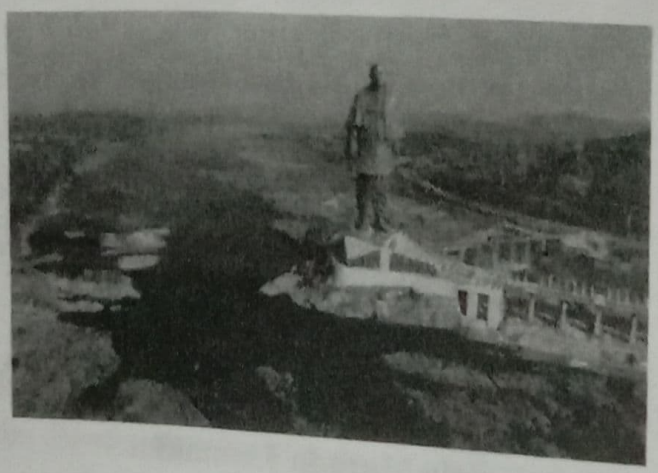
Consequences of Appiko Movement

1. The Appiko Movement had a ripple effect not only in **Karnataka** but also in parts of **Kerala** and **Tamil Nadu** that lead to creating awareness about environment and its misuse.
2. It created awareness among villagers throughout the Western Ghats about the destruction of forest wealth.
3. The movement forced the government to bring about change in forest policy that included;
   - Ban on clear felling
   - No further issuing of concessions to logging companies.
   - Moratorium on felling of green trees in the tropical rainforest of the Western Ghats.

4.1(c) NARMADA BACHAO ANDOLAN

Narmada Bachao Andolan (NBA) was the most powerful mass movement started in **1985** against the construction of huge dam on the **Narmada River.**

River Narmada passes through the states of Madhya Pradesh, Gujarat and Maharashtra flowing into Arabian Sea.



The Government of India undertook the **"Narmada Dam Project"**. It is one of the biggest water development project in India. The first dam to be built is the **"Sardar Sarovar"** located in Gujarat, near Vadgam. On completion of this biggest dam of the project it will;

- Provide safe drinking water to 30 million people
- Irrigate 4.8 million hectares of land.
- Provide 550 megawatts of power
- Provide 1,300 cubic meters of water per year for municipal and Industrial purpose.

Along with it, the project had its draw backs such as;

- Being one of the largest hydroelectric projects in the world, it would displace approximately 1.5 million people from their land in the three states of Gujarat, Madhya Pradesh and Maharashtra.
- The project will destroy the human lives & biodiversity as thousands of acres of forest and agricultural land will inundate.
- The Sardar Sarovar in itself will flood 37,000 hectrares of forest land resulting in loss of biodiversity and destroying some of Indias most fertile land.

As we can clearly understand that, in multipurpose dams like Sardar Sarovar – their purpose i.e., irrigation, power production and flood control conflict with one another.

It is in this light, **Smt. Medha Patkar** established Narmada Bachao Andolan (NBA) in **1989**. It constituted human activists, farmers, adivasis and people established on the bank of Narmada River. Narmada Bachao Andolan opposed the dam project as;

1) It would result in submerging of 245 villages.
2) It requires huge relocation and proper rehabilitation of about two and a half lakh people from these 245 villages.

Narmada Bachao Andolan started Satyagraha in protest of the dam projects on Narmada river. It was later joined by several NGOs with local people, professionals and activists as the founders' of this, movement with a non-violent approach. NBA's slogans included;

- *"Vikas chahiye, Vinash Nahi" (Development wanted, not destruction)*
- *"Koi nahi hatega, bandh nahi banega" (We won't move, the dam won't be constructed)*

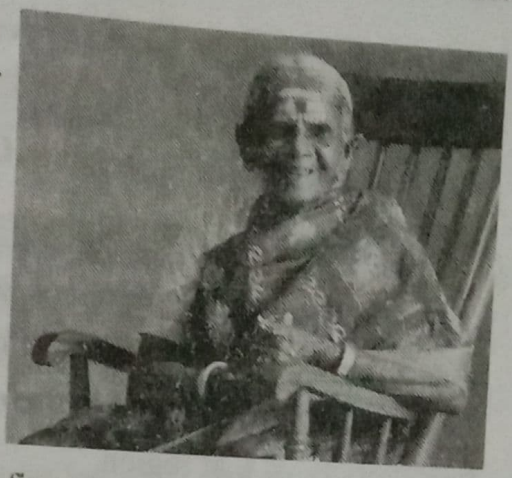
4.2 INDIVIDUAL AND COMMUNITY INITIATIVES

– Salu Marada Thimakka

– Concept of Sacred Grooves (Devara Kadu)

4.2 (a) SALU MARADA THIMAKKA

Smt. Thimakka the Green centenarian (109 years in 2020) is referred as **Salu Marada Thimakka** (*In Kannada Salu Mara is equal to Row of trees*) was born in **Gubbi** Taluk, **Tumkur** District, Karnataka.



Thimakka has no formal education due to poverty and lack of facilities. At an early age, she took up to grazing of sheep and cattle. As she grew up, she was married to **Sri Bikkala Chikkayya** of **Hulikal** Village.

At the age of 40, she started planting Banyan trees along with her husband and found a purpose in it. In the first year, they planted 10 Banyan saplings on either side of the road covering a stretch of highway; Both nurtured these plants by watering and fencing them against predators. Every year, the count of these trees kept on increasing and till date she has planted 384 Banyan trees along a four kilometer stretch of highway between **Hulikal** and **Kudur**. Along with these, she has planted nearly 8000 other trees as well.

For this yomen service of conservation, Thimakka has been honoured with ***National Citizen Award of India.***

There is an environmental organization called ***Thimakka's Resources for Environmental Education,*** set up in **U.S.A.**

Government of India conferred Thimakka with the Prestigious Civilian Award ***Padmashri*** *in* ***2019***.

Salu Marada Thimakka is an inspiration to all of us and she often gives a simple message; *"Respect the Environment – It's the biggest gift you can give this planet".*

4.2 (b) CONCEPT OF SACRED GROVES (DEVARA KADU)

Sacred Groves

Sacred groves of India are the varying sizes of forest fragments which are communally protected and usually have a significant connotation for protecting the community. In these patches, hunting and logging are strictly prohibited. Use of forest products like honey collection and deadwood collection is allowed sometimes on a sustainable basis.

Scared groves are scattered all over India. These are referred by different names in different parts of India.

Scared groves occur in variety of places from Scrub forests in the **Thar Desert** to rain forests in the **Western Ghats**.

Among many scared groves of India, the two largest groves are found in

1) **Hariyali near Gauchar in Chamoli District of Uttarkhand and**
2) **Deodar grove in Shipin near Shimla in Himachal Pradesh**

These sacred groves are found in many states of India and in each state they are known / called differently in local language. The number of such sacred groves found in these states differs. It depends largely on the biodiversity of that region.

Following is the list of states of India with the sacred groves.

Sl. No.	State	Number of Grooves	Local Name
1	Andhra Pradesh	691	Pavitras Khetralu
2	Arunachal Pradesh	65	Gumpa forests
3	Assam	40	Than, Madaico
4	Chhattisgarh	600	Sarna, Devlas, Mandar, Budhadev
5	Gujarat	29	
6	Haryana	248	Beed/Bid, Bani, Bann, Jangalt, Shamlat
7	Himachal Pradesh	329	Devkothi, Devban, Bakhu, Devban
8	Jharkhand	21	Sarna
9	Karnataka	1424	Devarakadu, Devkad
10	Kerala	2000	Kavu, Sarpa
11	Maharashtra	1600	Deorai / Devrai (Dist of Pune, Ratnagiri, Raigarh & Kohlapur)
12	Manipur	365	Umang Lai, Gamkhap, Mauhak (All are sacred Bamboo reserve)
13	Meghalaya	79	Law Kyntang, Law Lyngdoh
14	Orissa	322	Jahera, Thakuramma
15	Puducherry	108	Kovil Kadu
16	Rajasthan	9	Oran, Kenkri, Vani, Shamlatdeh, Devbani, Jogmaya
17	Sikkim	56	Gumpa forests
18	Tamil Nadu	503	Kovil Kadu
19	Telangana	65	
20	Uttarakhand	18	Devbhumi, Baun, Bugyal (Sacred Alpine Meadows)
21	West Bengal	670	Garamthan, Harithan, Jahera, Sabitrithan, Santalburithan

All Numbers quoted from the records of **CPR Environmental Education Centre of Government of India.**

Devarakadu

In many parts of the word, indigenous communities have protected and worshiped forests as local deities to protect them from natural calamities. And these forest patches are called as scared groves and are based on the spiritual and cultural values.

In **Karnataka**, the **Kodagu** district has over **1214** sacred groves. These sacred groves locally are called as *"Devarakadu"* (*God's forest*). These 1214 Devarakadu are found covering an area of **2250** (hha). There by, every village in Kodagu has at least one devarakadu or more than one in some villages. In terms of density, there is one devarakadu for every 300 acres and this is possibly highest in the world.

The uniqueness of the devarakadu lies in the fact that every devarakadu has its own tradition and culture showcasing the cultural diversity.

Kodagu district can be regarded as *"Hotspot"* of sacred grove as it is located in the region of *"Western Ghats"* – a biodiversity hotspot.

Now in Kodagu, devarakadu are declared as *"protected forests"* and are owned by the Forest department. The management of the devarakadu is under the local communities.

4.3(a) NATIONAL ENVIRONMENTAL POLICY (NEP), 2006

National Environment Policy (NEP), 2006 symbolises the effect of India's commitment to *(i) achieve clear environment (ii) make positive contribution to international efforts.*

NEP builds on the various earlier policies that had addressed the challenges of environment and need for sustainable development prior to this policy. Some of the previous policies are;

1. *National Forest policy, 1988*
2. *National Conservation Strategy and Policy Statement on Environment and Development, 1992*
3. *Policy Statement on Abatement of Pollution, 1992.*
4. *National Agriculture Policy, 2000*

5. *National Pollution Policy, 2000*
6. *National Water Policy, 2002*

We all are aware of the fact that the protection of environment is the mandate in the constitution in **Articles 48A** and **51A**, strengthened by judicial interpretation of **Article 21**.

The purpose of National Environmental Policy, 2006, is to

- Ensure equitable access to environmental resources and quality for all sections of society
- Ensure assured secure access to these resources.

PROVISIONS AND IMPORTANCE OF NATIONAL ENVIRONMENT POLICY

Objectives / Importance of National Environment Policy, 2006

1. To protect and conserve critical ecological resources and ecological systems.
2. To ensure judicious use of environmental resources so that it can meet the needs of both present and future generations.
3. To ensure equal access to environmental resources for the entire population.
4. To ensure efficient use of environmental resource with a view to minimize the harmful impact on the environment.
5. To manage and regulate the use of environmental resources using transparency, accountability, reduction in time and cost and regulatory independence.

Provisions and Importance of National Environment Policy

Following are the provisions of National Environment Policy;

1. *Conservation of critical Environmental resources*: To conserve and protect the critical environmental resources that are essential for supporting livelihoods and welfare of the society.

2. *Inter-generational Equity*: This provision ensures the judicious use of environmental resources to meet the needs of present and future generations.

3. ***Efficiency in use of environmental resources***: To ensure efficient use of environmental resources in the sense of reduction in their use per unit of economic output and to minimize adverse environmental impact on the strata of society.

4. ***Efficient environmental governance in the management of resources***: To apply the principles of good governance such as transparency, accountability, rationality, public participation, etc. for efficient management of environmental resources.

5. ***Use of technological advances to enhance the resources***: Using traditional knowledge, technological advancements, social capital and managerial skills to conserve and enhance the resources.

6. ***Ensuring livelihood security for the poor***: Poor tribal community is most dependent on environmental resources for their livelihood. So ensuring equitable access to environmental resources for poor for their survival is one of the important provision of NEP.

7. ***Integration of environmental Concerns for Socio-economic Development***: To integrate the environmental problems into policies, plans programmes and projects so that it will result in the socio-economic development of the region.

To fulfill the above objectives and provisions, the following strategies has been envisaged for successful implementation of National Environment Policy for conservation of Environmental resources.

1. ***Land degradation***: To reduce the degradation of land, a) traditional sustainable land use practices to be encouraged and b) encourage adaption of science based land use practices through research and development.

2. ***Forests***: To conserve the forests formulation of innovative strategy for increase of forest and tree cover from present 23% of country's land area to 33% through afforestation of degraded forest land, waste land and tree cover on private and revenue land.

3. ***Wild Life***: To conserve the wild life, the strategies of

a) expanding the "protected area network" so that overall area of the network in each biogeographic zone will increase.

b) allowing parallel multistake holder partnerships to

- *encourage afforestation,*
- *enhance wild life habitat and*
- *enhance community reserves*

4. Biodiversity: To conserve biodiversity, following measures would be undertaken;

a) measures to strengthen the protection of biodiversity hotspots

b) Assessing the potential impacts of development projects on biodiversity resources and natural resources.

c) On priority basis conserving the genetic material of threatened species of flora and fauna.

d) Giving Intellectual property Rights (IPR) for Traditional Ecological knowledge (TEK)

5. Wetlands: Wetlands (natural and man-made, fresh water or brakish waters) provide numerous ecological services. Now these are under threat. To conserve these;

a) Legally enforceable regulatory mechanism has been setup to indentify valuable wetlands to prevent their degradation and enhance their conservation

b) To allow multistake holder partnerships involving public agencies and local communities to evolve sustainable tourism strategies for identified as wetlands.

6. *Pollution*: Following measures have been adapted to control the various types of pollution at local and national level.

a) Water pollution

(i) Measures to enhance resuse of treated sewage and industrial waste water before they are discharged into water bodies.

(ii) To set up common effluent treatment plants on cost recovery basis.

(iii) To promote research and development in the field of low cost technologies for sewage treatment.

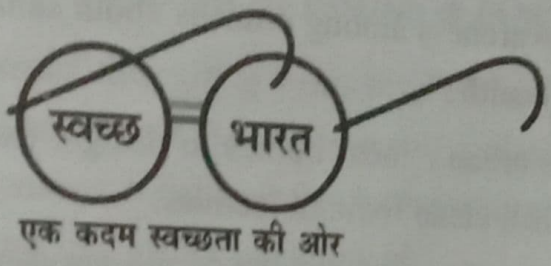
(iv) Pricing policies of pesticides and fertilizers to be made dependent on the ground water pollution it causes.

b) **Air Pollution**

(i) To accelerate the national programme on dissemination of improved fuel wood stoves and solar cookers for rural women to reduce the air pollution.

(ii) To provide adequate investments in low pollution mass transport system with the help of public and private partnership.

4.3(b) SWACHH BHARATH MISSION - OBJECTIVES



Swachh Bharath Mission (SBM) Swachh Bharath Abhiyan (SBA) or ***"Clean India Mission"*** is a country wide campaign initiated by Government of India in 2014 to eliminate *"open defecation"* and to improve *"solid waste management" (SWM)*

Mahatma Gandhi rightly said, *"Sanitation is more important than Independence".*

Swachh Bharath (in Hindi meaning *clean India*) Mission was launched by our **Hon. Prime Minister Shri Narendra Modi** on **October 2, 2014** with **Gandhiji** as the inspiration. Our Prime Minister gave a clarion call to the countrymen to create a clean India by 2019 coinciding with the *150th birth anniversary celebration of Gandhiji.*

Objectives of the Swachh Bharath Mission

Prime Minister Modi, advocating the idea of Swachh Bharath had said, *"The pursuit of cleanliness can be an economic activity contributing to GDP growth, reduction in healthcare costs, and a source of employment".* The various objectives of Swachh Bharath Mission are as following;

1. Elimination of open defecation.
2. Conversion of unsanitary toilets to pour flush toilets.
3. Scientific processing / disposal of Municipal Solid Waste.

Despite the awareness created about the conservation and rejuvelation of National River Ganga under *"Namami Gange Prorgamme"*, it was sad to see the reckless throwing of dead bodies / half burned dead bodies into River Ganga during the Corona Pandemic.

4. To construct toilets separately for girls and boys in all Indian Schools.
5. To provide toilet facility in all Aanganwadies
6. To set up a network of water pipelines in rural India ensuring regular water supply by2019.
7. To bring a behavioural change in the general public about healthy sanitary practices.
8. To generate awareness among citizens about sanitation and linking it with public health.
9. To strengthen urban / local bodies to design, execute and operate systems to fulfill clean India objectives.
10. To create a condusive environment for private sector participation to fulfill Swachh Bharath Mission.

So to eliminate open desecation and to improve solid waste management, Swachh Bharath Mission – a country wide campaign was initiated with two phases;

- *Phase 1 of the mission lasted from 2nd October, 2014 to October 2019.*
- *Phase 2 is now being implemented and will see its completion in October 2025.*

In the first phase of the mission, following objectives were aimed to be achieved and have been implemented. They are;

1. Eradication of manual scavenging
2. By generating awareness bringing about behavioural change towards sanitation practices
3. Increasing the capacity at the local level to achieve the objectives of SBM.

In the second phase of the mission, the following objectives are aimed to be achieved. They are;

1) To sustain the open desecation free status achieved in phase 1 and
2) To improve the management of solid and liquid waste.

The Swachh Bharat Mission is split into two regions to achieve these objectives. They are;

1) Rural areas and
2) Urban areas

In ***rural areas***, ***"Swachh Bharath Mission – Gramin"*** is financed and monitored trhough the *"Ministry of Drinking Water and Sanitation"*. The ***"Swacch Bharath – Urban"*** is financed and monitored by the *"Ministry of Housing and Urban affairs"*.

4.4 ENVIRONMENTAL ETHICS : ISSUES & POSSIBLE SOLUTIONS

Environmental ethics *is a branch of philosophy that studies the relation of human being and the environment and how ethics play a role in this inter-relationship.* It believes that humans are part of a society along with other organisms like plants and animals.

Environmental ethics focusses on

a) How we humans have to co-inhabit the world
b) Issues responsible for human conduct with respect to natural landscapes, resources and other organisms.

In short, it is a cluster of beliefs, values and norms as to how humans should interact with the environment.

Issues involved in environmental ethics are:

1) Consumption of natural resources
2) Destruction of forests
3) Environmental pollution
4) Anthropcentrism
5) Equity, and
6) Animal Rights

1. Consumption of Natural Resources

As humans are part of nature, sustainable use of natural resources can be achieved through co-operation with nature.

2. Destruction of forests

Major exploitation of forests in an unsustainable way are done by industries and multinational companies. It leads to loss of biodiversity, habitats and extinction of plants and animals.

3. Environmental Pollution

Unabated exploitation of natural resources and addition of pollutants to the nature leads to the environmental pollution.

4. Anthropocentrism

It refers to the ethical framework that grants "moral standing" solely to human beings. i.e., humans are morally considerable in their own right, meaning that all the direct moral obligations we possess, including those we have with regard to the environment, are "owned to our fellow human being".

5. Equity

People belonging to economically advanced sections use greater amount of resources and energy per individual and also waste more resources. This comes at the cost of poor people who are resource deprived.

6. Animal Rights

The plants and animals that share the Earth with humans too ***have a Right to live*** and share the ***Earths' resources***.

Animal welfare is relevant to environmental ethics as animals exist within the natural environment and form a part of environmentalists concern.

Possible Solutions / Measures to maintain Environmental Ethics

Following approaches can be used as possible solutions to manage and maintain environmental ethics.

1) By efficiently managing environmental regulations - This consists of investing in environmental protection and making others to follow similar investments in environmental protection.
2) To use environment friendly processes or products.
3) Investing in environment performance improvement.
4) Making efforts to change the basis for competition and re-defining the market so as to benefit both the concerned organization as well as the environment.

5) With increasing human interference with non-human world, the situation is rapidly worsening. This can be prevented by changing the policies. These policies should affect basic economic, technological and ideological structures. This will/should result in state of affairs that are deeply different from the present.

6) By advocating and bringing an ideological change that is "mainly appreciative of life quality rather than adhering to an higher standard of living" should be helpful.

And finally, to cope with the issues of environmental ethics, human beings must reach some value consensus and should co-operate with each other at the personal, national, regional and global levels.

●●●●●●●●