CLASS X

SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

Environmental awareness and its importance.

Awareness about the problems caused by unthinkingly exploiting our resources has been a fairly recent phenomenon in our society. When this awareness rises, some action is usually taken.

Ganga Action Plan

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

Pollution of river Ganga*: The Ganga runs its course of over 2500 km from Gangotri in the Himalayas to Ganga Sagar in the Bay of Bengal. Ganga river is turned into a drain by more than a hundred towns and cities in Uttar Pradesh, Bihar and West Bengal that pour their garbage and excreta into it. Largely untreated sewage is dumped into the Ganges every day. In addition human activities like bathing, washing of clothes and immersion of ashes or unburnt corpses have polluted this holy river. And industries also contribute chemical effluents to the Ganga's pollution load and the toxicity kills fish in large sections of the river.*

Pollutants: *Substances which cause pollution are generally called as pollutants*
Pollution: Any undesirable change in the physical , chemical and biological characteristics of air, water, or soil which makes it unfit for use by living things is termed as pollution.

Types of Pollution*: Air pollution , Soil pollution , W2ater pollution and Noise Pollution*

Checking pH of Water to measure the severely of pollution*: Checking of pH used to quantify pollution or the quality of the water used for various activities*

The three Rs to save the environment.
Reduce*: This means that we should use less. We can save electricity by switching off unnecessary lights and fans. We can save water by repairing leaky taps. We should not waste food.*

Recycle*: This means that we can collect plastic, paper, glass and metal items and recycle these materials to make required things instead of synthesising or extracting fresh plastic, paper, glass or metal. In order to recycle, we first need to segregate our wastes so that the material that can be recycled is not dumped along with other wastes. Our village/town/city should have a mechanism in place for recycling these materials.*

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

Concept of sustainable development*: The concept of sustainable development encourages forms of growth that meet current basic human needs, while preserving the resources for the needs of future generations. Economic development is linked to environmental conservation. Thus sustainable development implies a change in all aspects of life. It depends upon the willingness of the people to change their perceptions of the socio-economic and environmental conditions around them, and the readiness of each individual to alter their present use of natural resources.*

Need for managing resources*. All the things we use or consume are obtained from resources on this earth. The only thing we get from outside is energy which we receive from the Sun*

1) *Resources are not unlimited Because of the increase in human population due to improvement in health-care, the demand for all resources is increasing at an exponential rate.*
2) *The management of natural resources requires a long-term plan so it helps these resources to last for the generations to come and will not merely be exploited for short term gains.*
3) *The management of resources ensure equitable distribution of resources so that al people, benefit from the development of these resources.*
4) *Sustainable natural resource management helps to plan for the safe disposal of wastes.*

When we exploit natural resources it may cause damage to the environment.. For example, mining causes pollution because of the large amount of slag which is discarded during metal extraction.

Forest and Wildlife

Forest: *Forests are 'biodiversity hot spots.*
Biodiversity of an area*: is the <u>number</u> of species found in that area .and the <u>range</u> of different life forms (bacteria, fungi, ferns, flowering plants, nematodes, insects, birds, reptiles and so on) found in the area.*

The main aims of conservation*: is to try and preserve the biodiversity.*

Effect of loss of diversity: *leads to a loss of ecological stability of the area.*

Forest Products*:Timber,Firewood,Medicinal plants,Fodder for cattle,Lac, honey etc.*

Stakeholders of forest *(to be considered at the time of forest conservation):*

When we consider the conservation of forests, we need to look at the stakeholders who are –
(i) the local people who live in or around forests are dependent on forest produce for various aspects of their life.
(ii) the Forest Department of the Government which owns the land and controls the resources from forests.
(iii) the industrialists – (Who uses raw materials collected from forests) .Small scale Bidi industry to large scale paper industry.
(iv) the wild life and nature enthusiasts who want to conserve nature in its untouched form.

Role of Stakeholders of forest

The local people and the forest

The local people need large quantities of firewood, small timber and thatch.
Bamboo is used to make slats for huts, and baskets for collecting and storing food materials.
Implements for agriculture, fishing and hunting are largely made of wood.
Forests are sites for fishing and hunting.
Local people are gathering fruits, nuts and medicines from the forests
Cattle of local people graze in forest areas or feed on the fodder which is collected from forests

Use of forest resources would not lead to the exhaustion of resources
Before the arrival of Britishers: Local people living the forest area had developed their own practices to ensure that the resources were used in a sustainable manner.
After the arrival of Britishers: After the British took control of the forests the local people were forced to depend on much smaller areas and forest resources started becoming over-exploited .
. The Forest Department in independent India: *took over from the British but local knowledge and local needs continued to be ignored in the management practices. Thus vast tracts of forests have been converted to monocultures of pine, teak or eucalyptus.*
Monoculture*:Grwing only one kind of tree or plant in area is called Monoculture.*
Effect of monoculture: In order to plant the trees, huge areas are first cleared of all vegetation.*
** This destroys a large amount of biodiversity in the area.*
**The local people are unable to collect leaves for fodder, herbs for medicines, fruits and nuts for food from forests.*

Advantages of Monoculture plantations:Monoculture plantations are useful for
** the industries to access specific products*
**and are an important source of revenue for the Forest Department*

Industries based on forest produce

timber, paper, lac and sports equipment.

Industries and Forest

Industries consider the forest as merely a source of raw material for the factories. Industrialists influence the government to access raw materials at very low rates. Since these industries have a greater reach than the local people, they are not interested in the sustainability of the forest in one particular area.

For example,

After cutting down all the teak trees in one area, they will get their teak from a forest farther away. They do not have any interest in ensuring that one particular area should yield an optimal amount of some produce for all generations to come.

Nature enthusiasts and Forest

We should recognize local people as forming part of the forest system .There are many examples of local people working traditionally for conservation of forests.

The case of the Bishnoi community in Rajasthan

For the Bishnoi community in Rajasthan, conservation of forest and wildlife has been a religious rule .

'Amrita Devi Bishnoi National Award for Wildlife Conservation'

The Government of India has recently instituted an 'Amrita Devi Bishnoi National Award for Wildlife Conservation' in the memory of Amrita Devi Bishnoi, who in 1731 sacrificed her life along with 363 others for the protection of 'khejri' trees in Khejrali village near Jodhpur in Rajasthan.

The traditional use of forest areas has no basis-. *a Prejudice (Wrong idea)*

An example –

The great Himalayan National Park contains, within its reserved area, alpine meadows which were grazed by sheep in summer. Nomadic shepherds used to take their animals from the valleys to the reserved forest every summer. When this national park was formed, this practice was put to an end.

Now it is seen that without the regular grazing by sheep the grass first grows very tall, and then falls over preventing fresh growth.

Possible reasons for forest damage:

**The damage caused to forests cannot be attributed to only the local people*

**The deforestation is caused by industrial needs*

**The deforestation is caused development projects like building roads or dams*

**The damage of forest is caused by tourists or the arrangements made for their convenience*

Managing the forests/ Managing the extent of Human Intervention in forests

Forest resources should be used in a manner which is both environmentally and developmentally sound
While the environment is preserved, the benefits of the controlled exploitation go to the local people,
Ecological conservation should go hand in hand.with decentralized economic growth
The kind of economic and social development we want will ultimately determine whether the environment will be conserved or further destroyed.
The environment must not be regarded as a unspoiled collection of plants and animals. It is a vast and complex entity that offers a range of natural resources for our use. We need to use these resources with due caution for our economic and social growth, and to meet our material aspirations.

Sustainable Management
The Chipko Andolan(Hug the Trees Movement)

The Chipko Andolan ('Hug the Trees Movement') was the result of a grassroot level effort to end the alienation of people from their forests.
The movement originated from an incident in a remote village called Reni in Garhwal, high-up in the Himalayas during the early 1970s.
There was a dispute between the local villagers and a logging contractor who had been allowed to fell trees in a forest close to the village.
On a particular day, the contractor's workers appeared in the forest to cut the trees while the men folk were absent.
Undeterred, the women of the village reached the forest quickly and clasped the tree trunks thus preventing the workers from felling the trees.
Thus thwarted, the contractor had to withdraw.

A lesson from Chipko Andolan:

**The Chipko movement quickly spread across communities and media, and forced the government, to rethink their priorities in the use of forest produce.*
**Experience has taught people that the destruction of forests affected not just the availability of forest products, but also the quality of soil and the sources of water.*
**Participation of the local people can indeed lead to the efficient management of forests.*

An Example of People's Participation in the Management of Forests
In 1972, the West Bengal Forest Department recognized its failures in reviving the degraded Sal forests in the southwestern districts of the state.
Traditional methods of surveillance and policing had led to a 'complete alienation of the people from the administration', resulting in frequent clashes between forest officials and villagers. Forest and land

related conflicts in the region were also a major factor in fuelling the militant peasant movements led by the Naxalites.
Accordingly, the Department changed its strategy, making a beginning in the Arabari forest range of Midnapore district. Here, at the instance of a far-seeing forest officer, ***A.K. Banerjee****, villagers were involved in the protection of 1,272 hectares of badly degraded sal forest.*
In return for help in protection, villagers were given employment in both silviculture and harvesting operations, 25 per cent of the final harvest, and allowed fuelwood and fodder collection on payment of a nominal fee.
With the active and willing participation of the local community, the sal forests of Arabari underwent a remarkable recovery by 1983.

Damage caused to forests by the following –

(a) Building rest houses for tourists in national parks.(Comment: yes/no)
(b) Grazing domestic animals in national parks. (Comment :yes/ no
(c) Tourists throwing plastic bottles/covers and other litter in national parks.(Comment :yes/no)

Water for all

Rainfall, pattern in India

**Rains in India are largely due to the monsoons.*
**In our country most of the rain falls in a few months of the year.*
**Due to the loss of vegetation cover there is a failure to sustain underground water availability*
**The cultivation of high water demanding crops causes water scarcity*
**Pollution from industrial effluents and urban wastes also causes water problems in our country.*

Water Conservation Efforts In Ancient India

Irrigation methods like dams, tanks and canals have been used.
These were managed by local people and assured that the basic minimum requirements for both agriculture and daily needs.
. The use of this stored water was strictly regulated
The optimum cropping patterns were based on the water availability .
The maintenance of irrigation systems was also a local affair,

Effect of Arrival Of British

Large dams and canals passing through large distances were planned and implemented by the British

Effect of introduction of dams and Canals

These mega-projects led to the neglect of the local irrigation methods,
The government took interest in the administration of these systems.
This lead to the loss of control over the local water sources by the local people.

Kulhs in Himachal Pradesh (A traditional method)

Parts of Himachal Pradesh had evolved a local system of canal irrigation called kulhs over four hundred years ago.

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

Demerits of Canal Systems/ Example of mismanagement of water/ Indira Gandhi Canal in Rajasthan

The Indira Gandhi Canal has brought greenery to considerable areas of Rajasthan.
But the mismanagement of the water has largely led to the benefits enjoyed by a few people.
There is ***no equitable distributio****n of water,*
Thus people close to the source grow water intensive crops like sugarcane rice
People farther downstream do not get any water.
The woes of these people who have been promised benefits which never arrived are added to the discontentment among the people who have been displaced by the building of the dam and its canal network.

Problems associated with large dams

Three problems associated with large dams in particular are –

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

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

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

People fight against Developmental Projects / People's Agitation

The people who have been displaced by various development projects are largely poor tribals.
They do not get any benefits from these projects
They are alienated from their lands and forests without adequate compensation.

Example:*The oustees of the Tawa Dam built in the 1970s are still fighting for the benefits they were promised.*
Tehri Dam on the river Ganga.
The protests by the Narmada Bachao Andolan ('Save the Narmada Movement') about raising the height of the Sardar Sarovar Dam on the river Narmada.

Water Harvesting
Need for Water Shed Management

Watershed management emphasises scientific soil and water conservation in order to increase the biomass production.
The aim is to develop primary resources of land and water, to produce secondary resources of plants and animals for use in a manner which will not cause ecological imbalance.

Watershed management not only increases the production and income of the watershed community, but also mitigates droughts and floods and increases the life of the downstream dam and reservoirs.

Organizations which are working on rejuvenating ancient systems of water harvesting as an alternative to the 'mega-projects' like dams.
(Refer)

Indigenous water saving methods

People dug small pits and lakes,
People put in place simple watershed systems,
People built small earthen dams,
People constructed dykes,sand and limestone reservoirs,
People set up rooftop water-collecting units.

Some of the ancient water harvesting, including water conveyance, structures still in use today

Khadins, tank and nadis in Rajasthan,
bandharas and tals in Maharashtra,
bundhis in Madhya Pradesh and Uttar Pradesh, ahars and
pynes in Bihar,
kulhs in Himachal Pradesh,
ponds in the Kandi belt of Jammu region,
and eris (tanks) in Tamil Nadu,
surangams in Kerala, and
kattas in Karnataka

Advantage of people participation in Water Harvesting methods

**Because the methods are locale specific local people getthe benefits.*
**Giving people control over their local water resources ensures that mismanagement and over-exploitation of these resources is reduced/removed.*

khadin system
(refer)
These water harvesting structures are mainly crescent shaped earthen embankments largely made on leveled ground
Sometimes water harvesting structures are low, straight concrete-and rubble "check dams" built across seasonally flooded gullies.
Monsoon rains fill ponds behind the structures.
Only the largest structures hold water year round; most dry up six months or less after the monsoons.
Their main purpose, to recharge the ground water beneath

Advantages of storing water on ground (Water harvesting methods)

Water stored on the ground does not evaporate,
Water stored on the ground but spreads out to recharge wells
Water stored on the ground provides moisture for vegetation over a wide area.
Water stored on the ground does not provide breeding grounds for mosquitoes like stagnant water collected in ponds or artificial lakes.
The ground-water is also relatively protected. from contamination by human and animal waste.

COAL AND PETROLEUM

Coal and petroleum, are fossil fuels,

Importance of coal and petroleum/ fossil fuels

**used as important sources of energy for us.*
**used for the manufacture of a large number of goods upon which our lives depend.*
**The energy needs for factories and industries are largely met by the reserves of coal and petroleum.*

Fossil fuels are exhaustible resources

Coal and petroleum were formed from the degradation of bio-mass millions of years ago and hence these are resources that will be exhausted in the future.
After that we would need to look for alternative sources of energy.
Various estimates show that , our known petroleum resources will last for about forty years and the coal resources will last for another two hundred years.

Problems due to the burning of fossil fuels/ consumption of coal and petroleum

. When fossil fuels are burnt, the products are carbon dioxide, water, oxides of nitrogen and oxides of sulphur.
Carbon Monoxide
When combustion takes place in insufficient air (oxygen), then carbon monoxide is formed instead of carbon dioxide. Carbon monoxide is colourless and odourless and cause even death when inhaled in larfe quantities.

The oxides of sulphur and nitrogen

They cause acid rain (refer effects of acid rain)

Carbon Dioxide

Carbon dioxide is a green-house gas.
coal and petroleum are huge reservoirs of carbon and if all of this carbon is converted to carbon dioxide, then the amount of carbon dioxide in the atmosphere is going to increase leading to intense global warming.
Thus, we need to use these resources judiciously.

Some simple choices can make a difference in our energy consumption patterns.

environment-friendliness(Discuss advantages and disadvantages) of the following –
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No.	Methods	Advantage/disadvange
1	Taking bus	Public transport- saves fuel
	Using personal vehicle	Unwanted usage of fuel
	Walking /cycling	No fuel used/ No pollution
2	Using bulbs	Use moe electriciyt
	fluorescent tubes in your homes	Saves electricity
3	*Using the lift*	More electricity used
	taking the stairs	More electricity saved

4	*Wearing an extra sweater*	Saves energy
	using a heating device (heater or 'sigri') on cold days	Use more electricity

Efficiency of our machines.

Fuel is most commonly used in internal combustion engines.
Modern better designed engines ensure complete combustion in order to increase efficiency and also reduce air pollution

Euro I and Euro II norms for emission from vehicles