

Environmental Sustainability through Natural Resource Conservation in the Hills of Sikkim

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The search for sustainable growth has been prompted by the speeding up of environmental degradation and worries about climate change. The abundance of natural resources worldwide is further threatened by global warming and climate change. In light of good management and conservation of natural resources, it is absolutely necessary to recognize that the base of available natural resources is limited and that their wise use is essential to securing the future of the next generation. The Sikkim Himalayas are a highly biodiverse, fragile ecosystem that are rich in various agro-climatic zones from the north to the south, giving rise to distinct ecosystems. The state is blessed with plentiful wildlife, diverse woodlands, and mineral wealth. Natural resources and the rich biodiversity of Sikkim, a state in the eastern Himalayas, face an uncertain future due to climate change.

Environment and its conservation

Our surroundings are what we call our environment. Both living and non-living things in our immediate environment fall under this category. Land, water, and air are the non-living elements of the environment. Germs, plants, animals, and people are the living things. All plants and animals adapt to the environment in which they are born and raised. Any alteration to the environment has the potential to be uncomfortable and have an impact on everyday living.

Environmental pollution is the term for any unfavorable alteration or degradation of the environment. Clean surroundings and protection from pollutants are essential for a better

environment. Our woods, water supplies, land, and atmosphere need to be well-maintained. In order to fulfil human needs, it is also important to maintain a balance between these resources and living things.

The three R's to save environment are Reduce, Recycle and Reuse.

- ❖ Reduce: refers to utilizing less natural resources and preventing resource wastage.
- ❖ Recycle refers to the process of reusing previously created materials, such as paper, plastic, glass, or metals, in place of creating new ones synthetically or through the extraction of new materials.
- ❖ Reusing something involves putting it to use repeatedly, such as when we buy jam, pickles, and other items in plastic bottles that we later use to store things.

Climate change and effect on natural resources:

The resources found in nature, such as air, water, sunlight, soil, minerals, forests, and wildlife, are known as natural resources. Natural resources are abundant in Sikkim. It is where roughly half of the country's biodiversity is found. Important natural resources, such as land, water, air, biodiversity, forests, etc., are deteriorating daily as a result of anthropogenic disruptions, overexploitation, and risks posed by global warming. The quality of the land, water, and air are steadily declining, which could have a serious impact on people's health. Natural resources are classified mainly into two categories:

1. **Renewable natural resources:** Natural resources that can be replaced quickly, such

as water, air, light, and forests, are known as renewable resources.

2. **Nonrenewable natural Resources:** Non-renewable natural resources are those that require millions of years to create, such as minerals (coal, petroleum, natural gas, metals, etc.), and which cannot be renewed quickly.

Need of conservation of natural resources

- ❖ To maintain ecological balance for supporting life.
- ❖ To preserve different type of biodiversity.
- ❖ To preserve the natural resources for the present and future generations.

The proper management of natural resources consists of:

- ✓ Judicious use of natural resources and avoiding wastage of natural resources.
- ✓ Long term planning for the use of natural resources so that it last not only for the present but also for the future generations.
- ✓ The exploitation of natural resources should not be for the benefit of few people but should be distributed equally for all.
- ✓ While extracting and using natural resources we should also plan for the safe disposal of waste so that no damage is caused to the environment.

Conservation of Water Resources and water quality in Sikkim:

Availability of fresh water resources is one of the best environmental index of any region. The Sikkim state of India have huge water resources available in the form of rivers and natural springs. Glaciers, rivers and springs form an important component of the surface water resources of Sikkim.

There is a strong need for ensuring water security in Sikkim due to its dependence on springs, streams and rainfall for drinking water and irrigation. The water quality in Sikkim varies seasonally. Sikkim relies only on bodies of surface water.

Water pollution and classification of impurities in water:

1) **Suspended impurities:** These impurities are solid particles that are large enough to be removed by filtration or if they are heavier they will settle down. The suspended impurities are macroscopic in size and cause turbidity in water. Suspended impurities are algae, fungi, protozoa, bacteria, clay silt, etc.

2) **Dissolved impurities:** Some impurities in the form of solid, liquid & gas are dissolved in water when it moves over the rocks, soils etc. These may contain Organic compounds, inorganic salts and gases etc. The concentration of total dissolved solids is expressed in ppm & is obtained by weighing the residue after evaporating the filtered water sample. They may be Ca, Mg, Na of HCO_3 , CO_3 , SO_4 , F, Cl_2 metals & gases.

3) **Organic impurities:** Again these organic impurities may be either suspended organic impurities or dissolved organic impurities. Mostly all the colloidal impurities are associated with organic matter containing bacteria. These are the chief source of epidemics. These organic impurities are either suspended or dissolved vegetable or animal matters.

Water treatment suitable to rural community of Sikkim

The various methods which may be adopted for purifying the public water supplies are,

- ❖ Screening
- ❖ Plain Sedimentation

- ❖ Sedimentation aided with Coagulation
- ❖ Filtration
- ❖ Disinfection
- ❖ Aeration
- ❖ Softening
- ❖ Miscellaneous treatments such as fluoridation, re-carbonation, liming, desalination etc.

Among the above processes screening, plain sedimentation and filtration are suitable to rural community

Strategies for water management and conservation in Sikkim:

The biggest stresses on Sikkim's water sector are due to the state's expanding population and pollution. Domestic, hydroelectric, agriculture, industrial, recreation, and other industries are among the various sectors with water demands. Sikkim's primary industry is agriculture, which requires attention to improve crop yield and net crop production. The infrastructure for water storage at the home, neighborhood, and village levels needs to be improved due to the winter months of November to March's rising water scarcity.

Technical method to conserve water:

- ❖ Rain water harvesting
- ❖ Historical water bodies
- ❖ Lined earthen ponds
- ❖ Digging pits, ponds, lakes
- ❖ Building small earthen dams or concrete check dams.
- ❖ Construction of dykes.
- ❖ Construction of reservoirs.
- ❖ Groundwater recharge
- ❖ Spring rejuvenation

Conservation and Management of Land resources:

Due to its mountainous terrain and small size, the state has a restricted supply of land, a scarce resource. Sikkim makes up 0.22% of India's total land area. The land sustains the entire terrestrial environment, which is essential to human survival in major part. The land resources in Sikkim are negatively impacted by the region's high terrain, tectonic instability, strong monsoon rains, and rapid population increase. Due to the state of Sikkim's undulating terrain, strong rainfall, and large amount of runoff creation, erosion is a serious issue. Agriculture, catastrophe susceptibility, and urbanization are some of the negative aspects that put pressure on Sikkim's land; as a result, sustainable land management techniques must be employed in order to safeguard Sikkim's environment. About 75 percent of Sikkim population resides in the rural areas and primarily depends on agriculture and allied activities for their livelihood. Soil conservation measure should aim at preventing or at least minimizing the soil loss. In order to do this proposal land utilization coupled with agricultural practices should be adopted. Some methods of conserving soil are listed below:

- ❖ **Crop rotation:** alternatively growing cereal and a legume in the same field will not only increase in the yield, but also increases the fertility of the soil. They also help in checking soil erosion.
- ❖ **Mulching:** inter culturing operations will kill weeds and soil mulches help the plants to be rooted firmly in the soil.
- ❖ **Strip cropping:** this is an agricultural practice of growing plants in suitable strips in the field.
- ❖ **Dry farming method:** this may be practiced where rainfall is low, indefinite and variable.

In dry farming methods only crops are grown that sustain even a very low rain fall.

Air Pollution: issues, sources and control measures

Air is the most essential for our living. Air pollution is a serious problem in many countries of the world. Air pollution is nothing but a system where presence of any substance (solid, liquid or gas) in the atmosphere in such a concentration that may or may tend to cause injuries to human, crops or property and to the atmosphere itself. The substances which cause air pollution are called as air pollutants. Air quality data generated by the Central Pollution Control Board (CPCB) under the National Air Quality Monitoring Programme (NAMP). Major issues of concern in air pollution are Global warming, Acid rain, photochemical smog and ozone depletion. Air pollutants may be classified by sources as stationary or mobile sources

- ✓ Stationary sources include
 - Point sources (Industrial processing, power plants, fuels combustion etc.)
 - Area sources (Residential heating coal gas oil, on site incineration, open burning etc.)

- ✓ Mobile sources are Highway vehicles, railroad locomotives, channel vessels etc.

Some of the preventing measures of air pollution are:

- ❖ Use of Public Transport
- ❖ Reduce the Consumption of Electricity
- ❖ Avoid Burning of Plastics
- ❖ Use Filters in Chimneys
- ❖ Reduce the Use of Chemicals
- ❖ Reduction of forest fires and smoking
- ❖ Planting more Trees

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