Practical Manual

on

Environmental Studies and Disaster Management

HNR 133 3(2+1)

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2020

College of Agriculture
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Syllabus HNR 133 3(2+1):

Visit to local areas - river/forest/ grassland/catchment etc. to document components of ecosystem. Study of common plants, insects, birds and animals. Visit to industries to study pollution abatement techniques and case studies - solid waste management, Human population and the Environment.

Name of Student.....

Roll No. .....

Batch.....

Session.....

Semester.....

Course Name: .....

Course No. : .....

Credit.....

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Date: Course Teacher

INDEX

Practical No. 1

Objective: To learn case study of NO_2 pollution in industries

Material required:……

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Data download (SPCB):……

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Sample Location	2000 (NO_2)	2010 (NO_2)	2020 (NO_2)

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Modeller:……

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Observation:……

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Impact on flora and fauna:……

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Discussion and Conclusion:

Practical No. 2

Objective: To learn case study of SO_2 pollution in industries.

Material required:……

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Data download (SPCB):……

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Sample Location	2000 (SO_2)	2010 (SO_2)	2020 (SO_2)

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Modeller:……

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Observation:……

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Impact on flora and fauna:……

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Discussion and Conclusion:

Practical No. 3

Objective: To visit a local area to document environmental assets river.

Material required:……

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Sample collection:……

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Sample Location	LAT	LONG

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Observation:……

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Location/WQI Parameter				
Sample Location 1				
Sample Location 2				
Sample Location 3				
Sample Location 4				
Sample Location 5				
Sample Location 6				
Sample Location 7				

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Discussion:……

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Conclusion:……

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Practical No. 4

Objective: To visit a local area to document environmental assets forest.

Material required: ……

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Procedure:……

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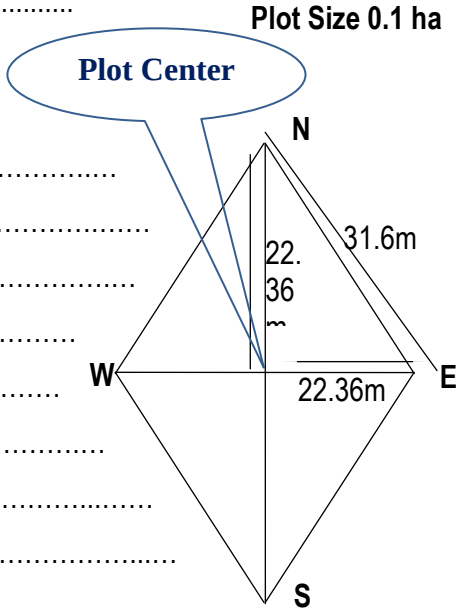
Layout plot design:.....



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S. No.	Plot No.	Species Name

Discussion:……

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Conclusion:……

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Practical No. 5

Objective: To visit local area to document environmental assets grassland.

Material required: ……………………………………………………………………………………………

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Experimental design and data analysis:……………………………………………………………

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Calculation of LAI:…..……

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	LAI-I	LAI-II	LAI-III
Species-1			
Species-2			
Species-3			
Species-4			
Species-5			
Species-6			
Species-7			

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Discussion:……

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Conclusion:……

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Practical No. 6

Objective: To visit a local area to document environmental assets catchment.

Material required: ……

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Identify the type of hill:……

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Qualitative aspects catchment:……

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Discussion:……

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Conclusion:……

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Practical No. 7

Objective: To study and document common plants.

Material required: ……

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Procedure:……

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Observations:……

S. No.	Common Name	Botanical Name	Family	Habit	Major Identification Features
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					

Used of medicinal plant:……

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Location of plant:……

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Species Name	LAT	LONG

Conclusion:……

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Suggestions:……

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Practical No. 8

Objective: To study and document local insects.

Material required: ……

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Type of local insects:……

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Beneficial roles of insects for nature and humans:……

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Summary:……

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Conclusion:……

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Suggestions:……

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Practical No. 9

Objective: To study and document local birds.

Material required: ……

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Type of local birds:……

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Beneficial roles of birds for nature and humans:……

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Summary:……

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Conclusion:……

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Suggestions:……

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Practical No.10

Objective: To study and document local animals.

Material required: ……

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Type of animals:……

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Beneficial roles of animals for nature and humans:……

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Summary:……

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Conclusion:……

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Suggestions:……

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Practical No. 11

Objective: To study simple ecosystems-pond.

Material required: ……

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Procedure:……

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Observations:……

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Conclusion:……

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Practical No. 12

Objective: To write case study on solid waste management

Solid waste ……

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Solid waste management practices……

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Observations from the research articles to manage solid waste.....

Place of observation and year reported	Management practices adopted/proposed

Cite references for case study on solid waste management.……

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Conclusion:

Suggestion:

Practical No. 13

Objective: To visit a place highly polluted with solid waste

Visit to a highly polluted site with solid waste……………………………………………

Some management practices to control pollution caused by solid waste……………………

Practical No. 14

Objective: To write a case study on human population

Population affects environment……

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Effect of overgrowing population on disaster of the environment……

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Enlist some disaster occurred due to overgrowing human population with citation from the case studies.……

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Conclusion:……

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Suggestion:……

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Practical No. 15

Objective: To compare the effect of human population on environmental pollution

Visit to a place with highly populated humans and least populated nearby.……

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Discuss the differences you observed in both the places in terms of pollution.……

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Conclusion:………………………………………………………………………………………

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Suggestion:………………………………………………………………………………………

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Practical No. 16

Objective: To study natural resources present in the environment

Natural resources……

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Types of natural resources……

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Observing some of the natural resources practically.……

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Management practices to protect environment by sustaining natural resources present……

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Conclusion:……

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Suggestion:……

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Practical No. 17

Objective: To learn case study of NO_2 pollution in environment

Material required:……

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Data download (SPCB):……

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Sample Location	2000 (NO_2)	2010 (NO_2)	2020 (NO_2)

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Modeller:……

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Observation:……

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Impact on flora and fauna:……

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Discussion and Conclusion:

Practical No. 18

Objective: To learn case study of SO_2 pollution in environment.

Material required:……

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Data download (SPCB):……

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Sample Location	2000 (SO_2)	2010 (SO_2)	2020 (SO_2)

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Modeller:……

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Observation:……

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Impact on flora and fauna:……

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Discussion and Conclusion:

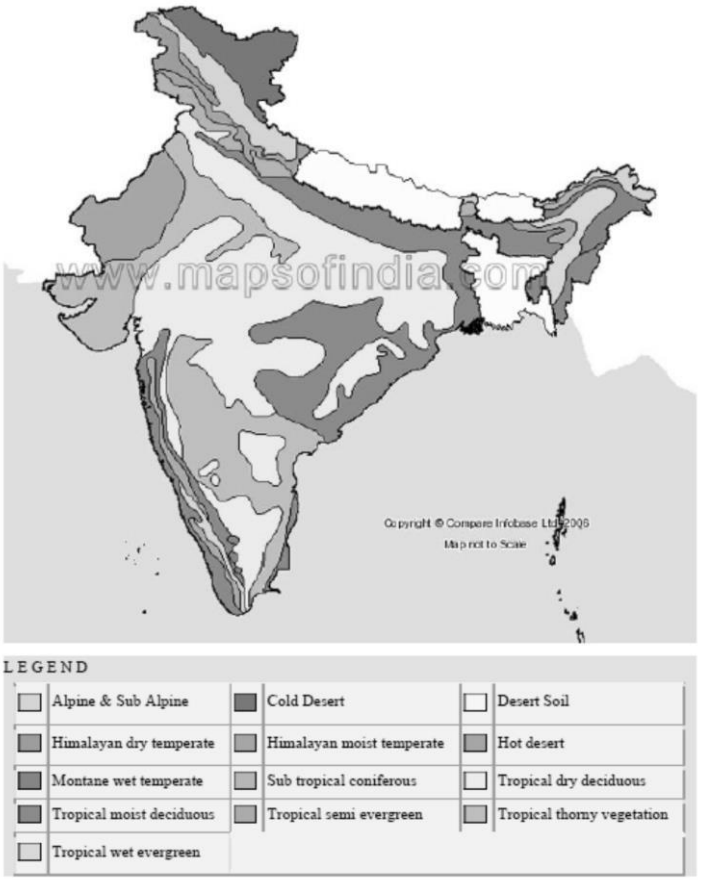
NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) INDEX

Pollutant	Time Weighted Average	Concentration in Ambient Air	
		Industrial, Residential, Rural, and Other Areas	Ecologically Sensitive Area (notified by Central Government)
Sulphur dioxide (SO_2), µg/m³	Annual 24 hours	50 80	20 80
Nitrogen dioxide (NO_2), µg/m³	Annual 24 hours	40 80	30 80
Particulate matter (< 10 µm) or PM_{10}, µg/m³	Annual 24 hours	60 100	60 100
Particulate matter (< 2.5 µm) or $PM_{2.5}$, µg/m³	Annual 24 hours	40 60	40 60
Ozone (O_3), µg/m³	8 hours 1 hour	100 180	100 180
Lead (Pb), µg/m³	Annual 24 hours	0.50 1.0	0.50 1.0
Carbon monoxide (CO), mg/m³	8 hours 1 hour	02 04	02 04
Ammonia (NH_3), µg/m³	Annual 24 hours	100 400	100 400
Benzene (C_6H_6), µg/m³	Annual	05	05
Benzo(α)Pyrene (BaP) – particulate phase only, ng/m³	Annual	01	01
Arsenic (As), ng/m³	Annual	06	06
Nickel (Ni), ng/m³	Annual	20	20

BIO-GEOGRAPHIC ZONES IN INDIA

Biogeographic Zone	Percentage of land mass of the country	Location and description
Trans-Himalayas	5.7	An extension of the Tibetan plateau, harboring high-altitude cold desert in Laddakh (J&K) and Lahaul Spiti (H.P).
Himalayas	7.2	The entire mountain chain running from north west to north eastern India, comprising a diverse range of biotic provinces and biomes.
Desert	6.9	The extremely arid area, west of the Aravalli hill range, comprising of both the salty desert of Gujarat and the sand desert of Rajasthan.
Semi-arid	15.6	The zone between the desert and the Deccan plateau, including the Aravalli hill range.
Western Ghats	5.8	The hill ranges and plains running along the western coastline, south of the Tapti river, covering an extremely diverse range of biotic provinces and biomes.
Deccan Peninsula	43	The largest of the zones, covering much of the southern and south-central plateau with predominantly deciduous vegetation.
Gangetic plain	11	Defined by the Ganges river system, these plains are relatively homogenous.
North-East India	5.2	The plains and non- Himalayan hill ranges of north eastern India, with a wide variation of vegetation.
Islands	0.03	The Andaman and Nicobar Islands in the Bay of Bengal and Lakshadweep islands with a highly diverse set of biomes.
Coasts	Negligible	A large coastline distributed both to the west and east, with distinct differences between the two.

DISTRIBUTION OF NATURAL VEGETATION TYPES IN INDIA



Drinking Water Quality as Prescribed by BIS

Constituent	Unit	Drinking water quality standards
PH		6.5-8.5
Total Dissolved solid	mg/l (Max)	500
Electric Conductivity at 25°C	micromho/cm (Max)	-
Alkalinity as $CaCO_3$	mg/l (Max.)	200
Total hardness as $CaCO_3$	mg/l (Max.)	300
Calcium (Ca)	mg/l (Max.)	75.00
Magnesium (Mg)	mg/l (Max.)	30.00
Iron (Fe)	mg/l (Max.)	0.30
Free Ammonia (NH_4)	mg/l (Max.)	-
Chloride (Cl)	mg/l (Max.)	250.00
Fluoride (F)	mg/l (Max.)	1.00
Sulphate (SO_4)	mg/l (Max.)	200.00
Nitrate (NO_3)	mg/l (Max.)	45.00
Dissolved Oxygen (DO)	mg/l(Max.)	6.00
Biochemical Oxygen Demand (BOD)	mg/l (Max.)	2.00
Arsenic (As)	mg/1(Max.)	0.01
Boron (B)	mg/1(Max.)	0.3
Cadmium (Cd)	mg/1(Max.)	0.003
Chromium (Cr)	mg/1(Max.)	0.05
Coper (Cu)	mg/1(Max.)	0.05
Cyanide (Cn)	mg/1(Max.)	0.05
Lead (Pb)	mg/1(Max.)	0.01
Maganese (Mn)	mg/1(Max.)	0.05
Mercury (Hg)	mg/1(Max.)	0.001
Zinc (Zn)	mg/1(Max.)	5.00
Phenolic Compounds (C_6H_5OH)	mg/1(Max.)	0.001
Total Hardness ($CaCO_3$)	**mg/1(Max.)**	**300.00**
Sodium Percentage	(Max.)	-
Sodium Absorption Ratio (SAR)	(Max.)	-

SOLID WASTE MANAGEMENT

Solid waste - Solid waste means any garbage, refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded materials including solid, liquid, semi-solid, or contained gaseous material, resulting from industrial, commercial, mining and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges.

Solid waste management – It includes collecting, treating, and disposing of solid material.

NATURAL RESOURCES PRESENT IN THE ENVIRONMENT

Natural resource - A resource is anything needed by an organism or group of organisms. Any material which can be transformed in a way that it becomes more valuable and useful can be termed as a resource. Thus, only part of our natural environment, such as land, water, air, minerals, forest, wildlife, fish or even human population that man can utilize to promote his welfare may be regarded as a natural resource. In the case of humans, a resource is any form of energy or matter essential for the fulfillment of physiological, socio-economic and cultural needs, both at the individual level and that of the community.

Types of natural resources

Renewable resources: Renewable resources are those which are reproducible and are obtained from the biomass of living organisms e.g., Forests.

Non-renewable resources: Resources which are not reproducible and are obtained from the finite non-living reserves are called non-renewable resources e.g., Coal and metals.

Potentially renewable resources: Potentially renewable can become non-renewable resources, if used for a prolonged time at a faster rate than it is renewed by natural processes e.g., Fertile soil, fresh air

ENVIRONMENTAL POLLUTION

Environmental pollution – Environmental pollution is defined as the contamination of the physical and biological components of the earth/atmosphere system to such an extent that normal environmental processes are adversely affected.

Types of pollutants: The different types of pollutants are:

Primary Pollutants: These are the pollutants that are emitted directly from the sources such as volcanic eruptions, combustion of fossil fuel, etc. These include nitrogen oxide, sulphur-di-oxide, etc.

Secondary Pollutants: These are the pollutants that are not directly emitted from the sources but are formed when primary pollutants react in the atmosphere e.g., ozone.

Types of pollution

Soil pollution: Soil is the loose and unconsolidated outer layer of earth crust that is powdery in nature and made up of small particles of different sizes. Soil ecosystem includes inorganic and organic constituents, and the microbial groups. Soil microorganisms are the active agents in the decomposition of plant and animal solid wastes and said to be nature 's garbage disposal system. The soil microbes keep our planet earth free of unwanted waste materials and recycle the elements (C, N, and P) through mineralization. Soil microbes decompose a variety of compounds, cellulose, lignin, hemi cellulose, proteins, lipids, hydrocarbons etc. The soil microbial community has little or no action on many manmade synthetic polymers. The persistent molecules that fail to be metabolized or mineralized have been termed as recalcitrant.

Water pollution: Water is one of the most important commodities which Man has exploited than any other resource for sustenance of his life. Most of the water in this planet is stored in oceans and ice caps which is difficult to be recovered for our diverse needs. It can be said that no water is pure or clean owing to the presence of some quantities of gases, minerals and life. Pure water is considered to be that which has low dissolved and suspended solids and obnoxious gases as well as low biological life. Water can be regarded polluted when it changes its quality or composition either naturally or as a result of human activities, thus becoming less suitable for drinking, domestic, agricultural, industrial, recreational, wildlife and other uses.

Air pollution: It refers to the release of harmful contaminants (chemicals, toxic gases, particulates, biological molecules, etc.) into the earth's atmosphere. These contaminants are quite detrimental and, in some cases, pose serious health issues. Some causes that contribute to air pollution are: Burning fossil fuels, Mining operations, Exhaust gases from industries and factories

Noise pollution: It refers to the excessive amount of noise in the surrounding that disrupts the natural balance. Usually, it is man-made, though certain natural calamities like volcanoes can contribute to noise pollution.

In general, any sound which is over 85 decibels is considered to be detrimental. Also, the duration an individual is exposed plays an impact on their health. For perspective, a normal conversation is around 60 decibels, and a jet taking off is around 15o decibels. Consequently, noise pollution is more obvious than the other types of pollution. Noise pollution has several contributors, which include:

- Industry-oriented noises such as heavy machines, mills, factories, etc.
- Transportation noises from vehicles, aeroplanes, etc.
- Construction noises
- Noise from social events (loudspeakers, firecrackers, etc.)
- Household noises (such as mixers, TV, washing machines, etc.)

Noise pollution has now become very common due to dense urbanisation and industrialisation. Noise pollution can bring about adverse effects such as:

- Hearing loss
- Tinnitus
- Sleeping disorders
- Hypertension (high BP)
- Communication problems

Radioactive pollution: Radioactive pollution is the pollution caused by the release of radioactive substances in the atmosphere during activities such as nuclear explosions, mining of radioactive ores, etc.