

Shellino Education Society's

**Arunamai College of Pharmacy,
Mamurabad , Jalgaon**



**Field Work in Environment Science
Project Report 2022-2023**

Entitled

"AIR POLLUTION"

Submitted By

RakshaYogeshBedmutha

(F.Y.B.Pharm)

Guided By

Punam Chaudhari

NORTH MAHARASHTRA UNIVERSITYJALGAON



PRINCIPAL
Shellino Education Society's
Arunamai College of Pharmacy
Mamurabad, Tal. Dist. Jalgaon

Shellino Education Society's

**Arunamai College of Pharmacy,
Mamurabad, Jalgaon**



CERTIFICATE

This is to certified that Ms.Raksha Yogesh Bedmutha

*Exam Seat no.500246,has satisfactorily carried out the required
Project work prescribed by NorthMaharashtraUniversity ,Jalgaon.
For First year B.PharmacyCourse in the Subject Environmental
Science.Entitled AIR POLLUTION During the academic session
2022-2023UnderMy Guidance forFulfillmentof course in
Environmental Studies.*

(Signature)
GUIDE NAME

(Punam.chaudhari)

(Signature)
PRINCIPLE

(Dr .T .A. Deshmukh)

PRINCIPAL

Shellino Education Society's
Arunamai College of Pharmacy
Mamurabad, Tal. Dist. Jalgaon





CAUSES, CONSEQUENCE AND CONTROL OF AIR POLLUTION

Abstract

Air pollution occurs when gases, dust particles, fumes (or smoke) or odour are introduced into the atmosphere in a way that makes it harmful to humans, animals and plant. Air pollution threatens the health of humans and other living beings in our planet. It creates smog and acid rain, causes cancer and respiratory diseases, reduces the ozone layer atmosphere and contributes to global warming.

In this industrial age, air pollution cannot be eliminated completely, but steps can be taken to reduce it. The government has developed, and continues to develop, guidelines for air quality and ordinances to restrict emissions in an effort to control air pollution. On an individual level, we can reduce our contribution to the pollution problem by carpooling or using public transportation. Additionally, buying energy-efficient light bulbs and appliances or otherwise reducing our electricity use will reduce the pollutants released in the production of electricity, which creates the majority of industrial air pollution.

Introduction

Air pollution is the introduction into the atmosphere of chemicals, particulates, or biological materials that cause discomfort, disease, or death to humans, damage other living organisms such as food crops, or damage the natural environment or built environment.

A substance in the air that can be adverse to humans and the environment is known as an air pollutant. Pollutants can be in the form of solid particles, liquid droplets, or gases. In addition, they may be natural or man-made. Pollutants can be classified as primary or secondary. Usually, primary pollutants are directly produced from a process, such as ash

from a volcanic eruption, the carbon monoxide gas from a motor vehicle exhaust or sulphur dioxide released from factories. Secondary pollutants are not emitted directly. Rather, they form in the air when primary pollutants react or interact. An important example of a secondary pollutant is ground level ozone – one of the many secondary pollutants that make up photochemical smog. Some pollutants may be both primary and secondary: that is, they are both emitted directly and formed from other primary pollutants.

Major primary pollutants produced by human activity include:

- **Sulphur oxides** (SO_x) - especially sulphur dioxide, a chemical compound with the formula SO_2 . SO_2 is produced by volcanoes and in various industrial processes. Since coal and petroleum often contain sulphur compounds, their combustion generates sulfur dioxide. Further oxidation of SO_2 , usually in the presence of a catalyst such as NO_2 , forms H_2SO_4 , and thus acid rain. This is one of the causes for concern over the environmental impact of the use of these fuels as power sources.
- **Nitrogen oxides** (NO_x) - especially nitrogen dioxide are expelled from high temperature combustion, and are also produced naturally during thunderstorms by electric discharge. Can be seen as the brown haze dome above or plume downwind of cities. Nitrogen dioxide is the chemical compound with the formula NO_2 . It is one of the several nitrogen oxides. This reddish-brown toxic gas has a characteristic sharp, biting odor. NO_2 is one of the most prominent air pollutants.
- **Carbon monoxide** (CO) - is a colourless, odourless, non-irritating but very poisonous gas. It is a product by incomplete combustion of fuel such as natural gas, coal or wood. Vehicular exhaust is a major source of carbon monoxide.
- **Volatile organic compounds** - VOCs are an important outdoor air pollutant. In this field they are often divided into the separate categories of methane (CH_4) and non-methane (NMVOCs). Methane is an extremely efficient greenhouse gas which contributes to enhanced global warming. Other hydrocarbon VOCs are also significant greenhouse gases via their role in creating ozone and in prolonging the life of methane in the atmosphere, although the effect varies depending on local air quality. Within the NMVOCs, the aromatic compounds benzene, toluene and xylene are suspected carcinogens and may lead to leukemia through prolonged

exposure. 1, 3-butadiene is another dangerous compound which is often associated with industrial uses.

- **Particulates**, alternatively referred to as particulate matter (PM), atmospheric particulate matter, or fine particles, are tiny particles of solid or liquid suspended in a gas. In contrast, aerosol refers to particles and the gas together. Sources of particulates can be manmade or natural. Some particulates occur naturally, originating from volcanoes, dust storms, forest and grassland fires, living vegetation, and sea spray. Human activities, such as the burning of fossil fuels in vehicles, power plants and various industrial processes also generate significant amounts of aerosols. Averaged over the globe, anthropogenic aerosols—those made by human activities – currently account for about 10 percent of the total amount of aerosols in our atmosphere. Increased levels of fine particles in the air are linked to health hazards such as heart disease, altered lung function and lung cancer.
- **Persistent free radicals** connected to airborne fine particles could cause cardiopulmonary disease.
- Toxic **metals**, such as **lead** and **mercury**, especially their compounds.
- **Chlorofluorocarbons** (CFCs) - harmful to the ozone layer emitted from products currently banned from use.
- **Ammonia** (NH₃) - emitted from agricultural processes. Ammonia is a compound with the formula NH₃. It is normally encountered as a gas with a characteristic pungent odor. Ammonia, either directly or indirectly, is also a building block for the synthesis of many pharmaceuticals. Although in wide use, ammonia is both caustic and hazardous.
- **Odors** – such as from garbage, sewage, and industrial processes
- **Radioactive pollutants** – produced by nuclear explosions, nuclear events, war explosives, and natural processes such as the radioactive decay of radon.

Secondary pollutants include:

- **Particulates** created from gaseous primary pollutants and compounds in photochemical smog. Smog is a kind of air pollution; the word "smog" is a portmanteau of smoke and fog. Classic smog results from large amounts of coal

burning in an area caused by a mixture of smoke and sulphur dioxide. Modern smog does not usually come from coal but from vehicular and industrial emissions that are acted on in the atmosphere by ultraviolet light from the sun to form secondary pollutants that also combine with the primary emissions to form photochemical smog.

- **Ground level ozone** (O_3) formed from NO_x and VOCs. Ozone (O_3) is a key constituent of the troposphere. It is also an important constituent of certain regions of the stratosphere commonly known as the Ozone layer. Photochemical and chemical reactions involving it drive many of the chemical processes that occur in the atmosphere by day and by night. At abnormally high concentrations brought about by human activities (largely the combustion of fossil fuel), it is a pollutant, and a constituent of smog.

Causes: Factors Responsible for Air Pollution

Air pollution can result from both human and natural actions. Natural events that pollute the air include forest fires, volcanic eruptions, wind erosion, pollen dispersal, evaporation of organic compounds and natural radioactivity. Sources of air pollution refer to the various locations, activities or factors which are responsible for the releasing of pollutants into the atmosphere.

Man-made sources mostly related to burning different kinds of fuel.

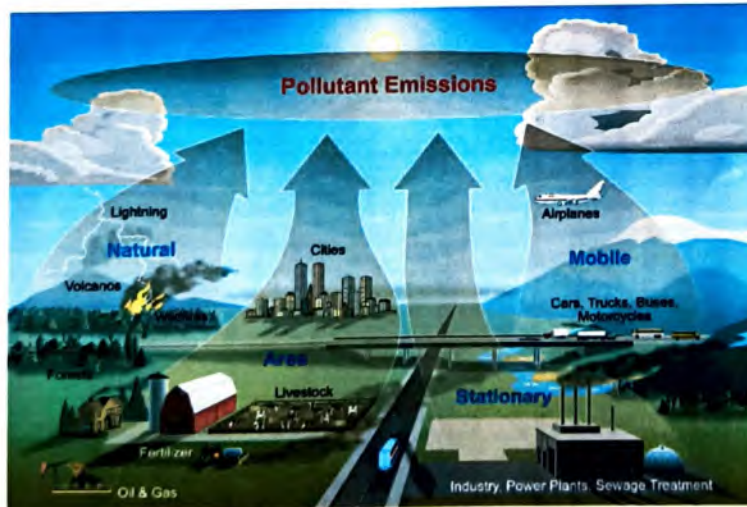
- "Stationary Sources" include smoke stacks of power plants, manufacturing facilities (factories) and waste incinerators, as well as furnaces and other types of fuel-burning heating devices. In developing and poor countries, traditional biomass burning is the major source of air pollutants; traditional biomass includes wood, crop waste and dung.
- "Mobile Sources" include motor vehicles, marine vessels, aircraft and the effect of sound etc.
- Chemicals, dust and controlled burn practices in agriculture and forestry management. Controlled or prescribed burning is a technique sometimes used in forest management, farming, prairie restoration or greenhouse gas abatement. Fire

is a natural part of both forest and grassland ecology and controlled fire can be a tool for foresters. Controlled burning stimulates the germination of some desirable forest trees, thus renewing the forest.

- Fumes from paint, hair spray, varnish, aerosol sprays and other solvents.
- Waste deposition in landfills, which generate methane. Methane is highly flammable and may form explosive mixtures with air.
- Military, such as nuclear weapons, toxic gases, germ warfare and rocketry.

Natural sources

- Dust from natural sources, usually large areas of land with few or no vegetation.
- Methane, emitted by the digestion of food by animals, for example cattle.
- Radon gas from radioactive decay within the Earth's crust. Radon is a colorless, odorless, naturally occurring, radioactive noble gas that is formed from the decay of radium. It is considered to be a health hazard. Radon gas from natural sources can accumulate in buildings, especially in confined areas such as the basement and it is the second most frequent cause of lung cancer, after cigarette smoking.
- Smoke and carbon monoxide from wildfires.
- Vegetation, in some regions, emits environmentally significant amounts of VOCs on warmer days. These VOCs react with primary anthropogenic pollutants – specifically, NO_x, SO₂, and anthropogenic organic carbon compounds – to produce a seasonal haze of secondary pollutants.
- Volcanic activity, which produce sulfur, chlorine, and ash particulates.



AIR POLLUTION



Consequences: Effects of Air Pollution

Health Effects

Air pollution is a significant risk factor for multiple health conditions including respiratory infections, heart disease, and lung cancer, according to the WHO. The health effects caused by air pollution may include difficulty in breathing, wheezing, coughing, asthma and aggravation of existing respiratory and cardiac conditions. These effects can result in increased medication use, increased doctor or emergency room visits, more hospital admissions and premature death. The human health effects of poor air quality are far reaching, but principally affect the body's respiratory system and the cardiovascular system. Individual reactions to air pollutants depend on the type of pollutant a person is exposed to, the degree of exposure, the individual's health status and genetics.

The most common sources of air pollution include particulates, ozone, nitrogen dioxide, and sulfur dioxide. Both indoor and outdoor air pollution have caused approximately 3.3 million deaths worldwide. Children aged less than five years that live in developing countries are the most vulnerable population in terms of total deaths attributable to indoor and outdoor air pollution. The World Health Organization states that 2.4 million people die each year from causes directly attributable to air pollution, with 1.5 million of these deaths attributable to indoor air pollution.

The worst short term civilian pollution crisis in India was the 1984 Bhopal Disaster. Leaked industrial vapours from the Union Carbide factory, belonging to Union Carbide, Inc., U.S.A., killed more than 25,000 people outright and injured anywhere from 150,000 to 600,000. The United Kingdom suffered its worst air pollution event when the December 4 Great Smog of 1952 formed over London. In six days more than 4,000 died, and 8,000 more died within the following months. An accidental leak of anthrax spores from a biological warfare laboratory in the former USSR in 1979 near Sverdlovsk is believed to have been the cause of hundreds of civilian deaths.

Around the world, children living in cities with high exposure to air pollutants are at increased risk of developing asthma, pneumonia and other lower respiratory infections. Because children are outdoors more and have higher minute ventilation they are more susceptible to the dangers of air pollution. Risks of low initial birth weight are also heightened in such cities.

Environmental Effects

Poisonous air pollutants (toxic chemicals in the air) can form acid rain. It can also form dangerous ground level ozone. These destroy trees, crops, farms, animals and continue to make water bodies harmful to humans and animals that live and depend on water.

Economical Effects

The effect of air pollution on the economy may be a derived one. In simple language, the economy thrives when people are healthy, and business that depends on cultivated raw materials and natural resources are running at full efficiency. Air pollution reduces agricultural crop and commercial forest yields by billions of money each year. This in addition to people staying off work for health reasons can cost the economy greatly.

Control: Measures to reduce Air Pollution

Solution efforts on pollution are always a big problem. This is why prevention interventions are always a better way of controlling air pollution. These prevention methods can either come from government (laws) or by individual actions. In many big

cities, monitoring equipments have been installed at many points in the city. Authorities read them regularly to check the quality of air.

Government (or community) level prevention

- Governments throughout the world have already taken action against air pollution by introducing green energy. Some governments are investing in wind energy and solar energy, as well as other renewable energy, to minimize burning of fossil fuels, which cause heavy air pollution.
- Governments are also forcing companies to be more responsible with their manufacturing activities, so that even though they still cause pollution, they are a lot controlled.
- Companies are also building more energy efficient cars, which pollute less than before.

Individual Level Prevention

- Encourage your family to use the bus, train or bike when commuting. If we all do this, there will be fewer cars on road and less fumes.
- Use energy (light, water, boiler, kettle and fire woods) wisely. This is because lots of fossil fuels are burned to generate electricity, and so if we can cut down the use, we will also cut down the amount of pollution we create.
- Recycle and re-use things. This will minimize the dependence of producing new things. Remember manufacturing industries create a lot of pollution, so if we can re-use things like shopping plastic bags, clothing, paper and bottles, it can help.

Control devices

The following items are commonly used as pollution control devices by industry or transportation devices. They can either destroy contaminants or remove them from an exhaust stream before it is emitted into the atmosphere.

- **Mechanical collectors** (dust cyclones, multi-cyclones)

- **Electrostatic precipitators:** An electrostatic precipitator (ESP), or electrostatic air cleaner is a particulate collection device that removes particles from a flowing gas (such as air) using the force of an induced electrostatic charge. Electrostatic precipitators are highly efficient filtration devices that minimally impede the flow of gases through the device, and can easily remove fine particulates such as dust and smoke from the air stream.
- **Bag houses:** Designed to handle heavy dust loads, a dust collector consists of a blower, dust filter, a filter-cleaning system, and a dust receptacle or dust removal system (distinguished from air cleaners which utilize disposable filters to remove the dust).
- **Particulate scrubbers:** Wet scrubber is a form of pollution control technology. The term describes a variety of devices that use pollutants from a furnace flue gas or from other gas streams. In a wet scrubber, the polluted gas stream is brought into contact with the scrubbing liquid, by spraying it with the liquid, by forcing it through a pool of liquid, or by some other contact method, so as to remove the pollutants.

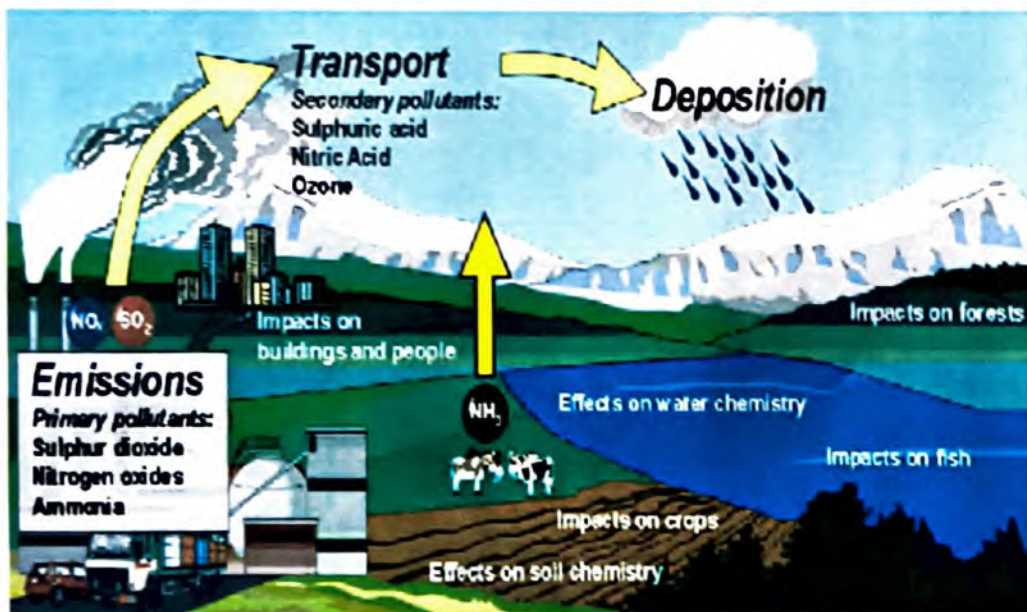
Some Facts and Statistics about Air Pollution

- Air pollution affects kids more than adults due to higher concentrations of polluted air in their systems per body size.
- India is the country with the worst air quality in the world.
- The European Union would save 161 billion Euros a year if deaths caused by air pollution were diminished.
- In large cities, over 80% of fatal pollutants that cause lung damage come from cars, buses, motorcycles and other vehicles on the road.
- According to the World Health Organization, there are as many deaths (1.3 million per year) in the world due to air pollution as there are deaths due to car accidents.
- The average adult breathes 3,000 gallons of air every day.
- The Great Smog of London in 1952 was one of the worst air pollution events in history with over 8,000 deaths.

- The largest cause of air pollution in Europe is road transportation with over 5,000 people dying each year from lung cancer and heart attacks caused by vehicle exhaust fumes.

Conclusion

Air pollution can be prevented only if individuals and businesses stop using toxic substances that cause air pollution in the first place. This would require the cessation of all fossil fuel-burning processes, from industrial manufacturing to home use of air conditioners. This is an unlikely scenario at this time. However, we have to make rules which set stringent regulations on industrial and power supply manufacturing and handling. The regulations are to be designed to further reduce harmful emissions into the Earth's atmosphere.



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Submitted By

Ayush Madhukar Wani

(F.Y.B.Pharm)

Guided By

Punam Chaudhari

NORTH MAHARASHTRA UNIVERSITY, JALGAON



PRINCIPAL
Shellino Education Society's
Arunamai College of Pharmacy
Mamurabad, Jalgaon Dist. Jalgaon

Shellino Education Society's

Arunamai College of Pharmacy, Mamurabad, Jalgaon



CERTIFICATE

This is certified that Ayush Madhukar Wani

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GUIDE NAME

(Punam.chaudhari)

PRINCIPLE


(Dr .T .A. Deshmukh)



PRINCIPAL

Shellino Education Society's
Arunamai College of Pharmacy
Mamurabad, Tal. Dist. Jalgaon

NATURAL RESOURCES



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INTRODUCTION:-

Natural resources are resources that are drawn from nature and used with few modifications. This includes the sources of valued characteristics such as commercial and industrial use, aesthetic value, scientific interest, and cultural value. On Earth, it includes sunlight,

atmosphere, water, land, all minerals along with all vegetation, and wildlife.

Natural resources are part of humanity's natural heritage or protected in nature reserves. Particular areas (such as the rainforest in Fatu-Hiva) often feature biodiversity and geodiversity in their ecosystems. Natural resources may be classified in different ways. Natural resources are materials and components (something that can be used) that can be found within the environment. Every man-made product is composed of natural resources (at its fundamental level) .

A natural resource may exist as a separate entity such as fresh water, air, or any living organism such as a fish, or it may be transformed by extractives' industries into an economically useful form that must be processed to obtain the resource such as metal ores, rare-earth elements, petroleum, timber, and most forms of energy. Some resources are renewable, which means that they can be used at a certain rate and natural processes will restore them, whereas many extractive industries rely heavily on non-renewable resources that can only be extracted once.

Natural-resource allocations can be at the center of many economic and political confrontations both within and between countries. This is particularly true during periods of increasing scarcity and shortages (depletion and overconsumption of resources). Resource extraction is also a major source of human rights violations and environmental damage. The Sustainable Development Goals and other international development agendas frequently focus on creating more sustainable resource extraction, with some scholars and researchers focused on creating economic models, such as circular economy, that rely less on resource extraction, and more on reuse, recycling and renewable resources that can be sustainably managed.

CLASSIFICATION:-

There are various criteria of classifying natural resources. These include the source of origin, stages of development, renewability and ownership.

❖ Origin:-

- Biotic:-

Resources that originate from the biosphere and have life such as flora and fauna, fisheries, livestock, etc. Fossil fuels such as coal and petroleum are also included in this category because they are formed from decayed organic matter.

- Abiotic:

Resources that originate from non-living and inorganic material. These include land, fresh water, air, rare-earth elements, and heavy metals including ores, such as gold, iron, copper, silver, etc.

❖ Stage of development:-

- Potential resources:

Resources that are known to exist, but have not been utilized yet. These may be used in the future. For example, petroleum in sedimentary rocks that, until extracted and put to use, remains a potential resource.

- Actual resources:

Resources that have been surveyed, quantified and qualified, and are currently used in development. These are typically dependent on technology and level of their feasibility, wood processing for example.

Reserves:

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

Stocks:

Resources that have been surveyed, but cannot be used due to lack of technology, hydrogen vehicles for example.

❖ **SOURCES :-**

• Renewable resources:

These resources can be replenished naturally. Some of these resources, like solar energy, air, wind, water, etc. are continuously available and their quantities are not noticeably affected by human consumption. Though many renewable resources do not have such a rapid recovery rate, these resources are susceptible to depletion by over-use.

Resources from a human use perspective are classified as renewable so long as the rate of replenishment/recovery exceeds that of the rate of consumption. They replenish easily compared to non-renewable resources.

-Victoria Nile waters as one of Uganda's key natural resources

-The waters of the White Nile River are a key natural resource for Uganda.



White Nile River

- Non-renewable resources:

These resources are formed over a long geological time period in the environment and cannot be renewed easily. Minerals are the most common resource included in this category. From the human perspective, resources are non-renewable when their rate of consumption exceeds the rate of replenishment/recovery; a good example of this are fossil fuels, which are in this category because their rate of formation is extremely slow (potentially millions of years), meaning they are considered non-renewable. Some resources naturally deplete in amount without human interference, the most notable of these being radio-active elements such as uranium, which naturally decay into heavy metals. Of these, the metallic minerals can be re-used by recycling them,[5] but coal and petroleum cannot be recycled.[6] Once they are completely used they take millions of years to replenish.

-Ownership

Individual resources:

Resources owned privately by individuals.
These include plots, houses, plantations, pastures, ponds, etc.

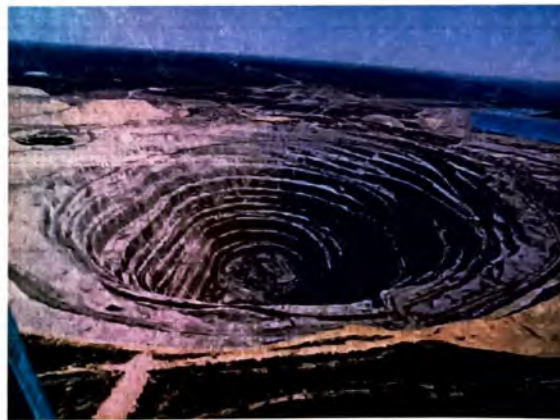
-Community resources:

Resources which are accessible to all the members of a community. E.g.: Cemeteries

-National resources:

Resources that belong to the nation. The nation has legal powers to acquire them for public welfare. These also include minerals, forests and wildlife within the political boundaries and Exclusive economic zone.

- International resources: These resources are regulated by international organizations. E.g.: International waters.



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EXTRACTION:-

Resource extraction involves any activity that withdraws resources from nature. This can range in scale from the traditional use of preindustrial societies to global industry. Extractive industries are, along with agriculture, the basis of the primary sector of the economy. Extraction produces raw material, which is then processed to add value.

Examples of extractive industries are hunting, trapping, mining, oil and gas drilling, and forestry. Natural resources can add substantial amounts to a country's wealth ; however, a sudden inflow of money caused by a resource boom can create social problems including inflation harming other industries ("Dutch disease") and corruption, leading to inequality and underdevelopment, this is known as the "resource curse".

Extractive industries represent a large growing activity in many less-developed countries but the wealth generated does not always

lead to sustainable and inclusive growth. People often accuse extractive industry businesses as acting only to maximize short-term value, implying that less-developed countries are vulnerable to powerful corporations.

Alternatively, host governments are often assumed to be only maximizing immediate revenue. Researchers argue there are areas of common interest where development goals and business cross. These present opportunities for international governmental agencies to engage with the private sector and host governments through revenue management and expenditure accountability, infrastructure development, employment creation, skills and enterprise development, and impacts on children, especially girls and women.[8] A strong civil society can play an important role in ensuring the effective management of natural resources. Norway can serve as a role model in this regard as it has good institutions and open and dynamic public debate with strong civil society actors that provide an effective checks and balances system for the government's management of extractive industries, such as **the Extractive Industries Transparency Initiative (EITI)**, a global standard for the good governance of oil, gas and mineral resources. It seeks to address the key governance issues in the extractive sectors.

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Hunting



Trapping



Mining



Oil Drilling



Gas drilling

Depletion:-

Wind is a natural resource that can be used to generate electricity, as with these 5 MW wind turbines in Thorntonbank Wind Farm 28 km (17 mi) off the coast of Belgium.

See also: Exploitation of natural resources

In recent years, the depletion of natural resources has become a major focus of governments and organizations such as the United Nations (UN). This is evident in the UN's Agenda 21 Section Two, which outlines the necessary steps for countries to take to sustain their natural resources.[10] The depletion of natural resources is considered a sustainable development issue.[11] The term sustainable development has many interpretations, most notably the Brundtland Commission's 'to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs';[12] however, in broad terms it is balancing the needs of the planet's people and species now and in the future.[10] In regards to natural resources, depletion is of concern for sustainable development as it has the ability to degrade current environments[13] and the potential to impact the needs of future generations.[11]

"The conservation of natural resources is the fundamental problem. Unless we solve that problem, it will avail us little to solve all others."

Theodore Roosevelt[14]

Depletion of natural resources is associated with social inequity. Considering most biodiversity are located in developing countries,[15] depletion of this resource could result in losses of ecosystem services for these countries.[16] Some view this depletion as a major source of social unrest and conflicts in developing nations.[17]

At present, there is a particular concern for rainforest regions that hold most of the Earth's biodiversity.[18] According to Nelson,[19] deforestation and degradation affect 8.5% of the world's forests with 30% of the Earth's surface already cropped. If we consider that 80% of people rely on medicines obtained from plants and 3/4 of the world's prescription medicines have ingredients taken from plants,[16] loss of the world's rainforests could result in a loss of finding more potential life-saving medicines.[20]

The depletion of natural resources is caused by 'direct drivers of change'[19] such as mining, petroleum extraction, fishing, and forestry as well as 'indirect drivers of change' such as demography (e.g. population growth), economy, society, politics, and technology.[19] The current practice of agriculture is another factor causing depletion of natural resources. For example, the depletion of nutrients in the soil due to excessive use of nitrogen[19] and desertification.[10] The depletion of natural resources is a continuing concern for society. This is seen in the cited quote given by Theodore Roosevelt, a well-known conservationist and former United States president, who was opposed to unregulated natural resource extraction.



Depletion

PROTECTION:-

Environmental protection

In 1982, the United Nations developed the World Charter for Nature, which recognized the need to protect nature from further depletion due to human activity. It states that measures must be taken at all societal levels, from international to individual, to protect nature. It outlines the need for sustainable use of natural resources and suggests that the protection of resources should be incorporated into national and international systems of law.[21] To look at the importance of protecting natural resources further, the World Ethic of Sustainability, developed by the IUCN, WWF and the UNEP in 1990,[22] set out eight values for sustainability, including the need to protect natural resources from depletion. Since the development of these documents, many measures have been taken to protect natural resources including establishment of the scientific field and practice of conservation biology and habitat conservation, respectively.

Conservation biology is the scientific study of the nature and status of Earth's biodiversity with the aim of protecting species, their habitats, and ecosystems from excessive rates of extinction.[23][24] It is an interdisciplinary subject drawing on science, economics and the

practice of natural resource management.[25][26][27][28] The term conservation biology was introduced as the title of a conference held at the University of California, San Diego, in La Jolla, California, in 1978, organized by biologists Bruce A. Wilcox and Michael E. Soulé.

Habitat conservation is a type of land management that seeks to conserve, protect and restore habitat areas for wild plants and animals, especially conservation reliant species, and prevent their extinction, fragmentation or reduction in range.



MANAGEMENT:-

Natural resource management

Natural resource management is a discipline in the management of natural resources such as land, water, soil, plants, and animals—with a particular focus on how management affects quality of life for present and future generations. Hence, sustainable development is followed according to judicious use of resources to supply both the present generation and future generations. The disciplines of fisheries, forestry, and wildlife are examples of large subdisciplines of natural resource management.

Management of natural resources involves identifying who has the right to use the resources, and who does not, for defining the boundaries of the resource.[30] The resources may be managed by the users according to the rules governing when and how the resource is used depending on local condition[31] or the resources may be managed by a governmental organization or other central authority.[32]

A "...successful management of natural resources depends on freedom of speech, a dynamic and wide-ranging public debate through multiple independent media channels and an active civil society engaged in natural resource issues..."[33] because of the nature of the shared resources, the individuals who are affected by the rules can participate in setting or changing them.[30] The users have rights to devise their own management institutions and plans under the recognition by the government. The right to resources includes land, water, fisheries and pastoral rights.[31] The users or parties accountable to the users have to actively monitor and ensure the utilisation of the resource compliance with the rules and to impose penalty on those peoples who violate the rules.[30] These conflicts are resolved in a quick and low cost manner by the local institution according to the seriousness and context of the offence.[31] The global

science-based platform to discuss natural resources management is the World Resources Forum, based in Switzerland.



TYPES OF NATURAL RESOURCES MANAGEMENT:-

-seven types of resource management are:

(1) Forest resource management (2) Water resource management (3) Mineral resource management (4) Land resource management (5) Energy resource management (6) Wildlife management (7) Agriculture resource management.

According to Remade (1984), a resource is a form of energy and or matter which is essential for the functioning of living or-ganisms (population and

ecosystem). In other words any part of the environment such as land, water, air, minerals, forest, wild life etc. that the man can utilise to promote his welfare may be regarded as resources.

The increasing human population, rapid industrialization, unplanned urbanization, steady technological growth etc. exert tremendous pressure on the existing natural resources. If these over exploitations continue unchecked, with in a very short span of time, many of the non-renewable resources will be exhausted.

So, it is the need of the hour to evolve suitable methods for efficient management of these resources so that the human beings can get continuous supply of required materials without the fear of their complete exhaustion.

Resource management involves sustainable socioeconomic development of human society through purposive and judicious utilization of natural resources and to maintain environmental quality. In terms of conservation, resource management is a set of practices pertaining to maintaining a balance in the natural environment.

Let us discuss the various segments of resource management.

❖ 1. Forest Resource Management:

Besides providing wood, timber, food, leaves etc., forest provide a number of invisible environmental benefits. These include release of oxygen, preparation of leaf protein, control of soil erosion, operation of hydrologic cycle, and carbon dioxide, cycle control of humidity, control of wind flow, providing shelter to birds, squirrels and insets, control of air pollution, mitigation of green house effect etc. Forests also safeguard the economy from flood, drought and natural calamities.

In view of the vital importance of forests in maintaining ecological stability and preserving biophysical system of the environment. The Government has revised the old forest policy of 1952 in 1988.

The main objectives of new national forest policy are

- (i) To maintain ecological stability by maintaining appropriate measures of environment protection, conservation and restoration.
- (ii) To preserve the natural traditions by conserving the remaining natural forests as well as to conserve their vast original sources for benefiting the future generation.
- iii) To meet the basic requirements of the rural people and the tribal people for their firewood, fodder and small timbers for building purposes.

Conservation of forests can be possible by adopting the following techniques.

1. Since forest is a renewable resource, it can be conserved through intensive plantation by afforestation and social forestry.
2. The available forests should be protected by taking necessary steps.
3. Steps should be taken to prevent the occurrence of forest fire.
4. The use of fuel woods should be discouraged and it should be replaced and promoted by the use of biogas plants and smoke less solar Chula.
5. There should be intensive and extensive social forestry programmes with the active involvement of the people.

6. Adequate afforestation programmes should be encouraged in the wastelands and hill slopes.

7. The indiscriminate felling of trees and shifting cultivation should be strictly banned.

8. Protection of wild life should be ensured through strict enforcement of wildlife conservation act and declaring more forests as reserve forest.

9. The community forestry and agro forestry should be promoted.

10. There should be more number of National parks, Sanctuaries and Biodiversity reserves to conserve flora and fauna.

11. The plants like Acacia, Eucalyptus and Leucaena should be grown on wastelands and degraded lands which will provide fuel woods.

12. There should be incentives from Government side to make the maximum involvement of tribals for the proper management of forest resources.

❖ 2. Water Resources Management:

Water is indispensable for the sustenance of life on earth. It is highly essential for drinking, cooking, washing, irrigation, industrial uses, generation of power, navigation, recreation etc. In order to meet the increasing demand of population growth, water is over utilized and polluted.

The pollution of water is due to dumping of sewage, fertilizers, pesticides etc. So, to provide safe water to all the living organisms, water resource management is highly essential. The management of water means making the best use of water resources available for human benefit. The processes not only prevent its depletion and

degradation but also take appropriate steps for its development in view of the present and future need.

The following conservation methods should adopted for proper water management.

1. Awareness should be created among the people regarding the importance of water and its unnecessary wastage.
2. Steps should be taken for the harvesting and storage of roof top rain water.
3. The village ponds should be revived or rehabilitated.
4. There should be controlling measures to check flood and improper use of river water.
5. The leakage of water through pipes and taps should be checked.
6. Qualitative degradation should be avoided.
7. For the conservation of water resources, there should be reclamation of waste water, storage of ground water transfer of surplus water:
8. Steps should be taken to check pollution of water resources.
9. The waste water or effluents from different industries should be recycled after suitable treatments for the benefits of humanity.
10. There should be adequate afforestation programmes. Through afforestation, the plants bind the soil and the soil binds water.
11. There should be long-range forecasting of rain.

12. There should be national and state level water harvesting perspective plants.

There are some central and state organisations with specific aspects of water resources management.

Some important organi-sations are:

- (1) Central Water Commission for surface water,
- (2) Central ground water board,
- (3) Central and state pollution con-trol boards,
- (4) Central Public Health and Environment etc.

❖ 3. Mineral Resource Management:

Minerals are non-renewal resources obtained from earth crust by the process of mining. Coupled with population explosion rapid industrialization and technological growth, have put tremendous pressure on mineral resources.

So it is highly essential to take necessary steps for the conservation and management of min-eral resources. The conservation of mineral does not mean pres-ervation of minerals underground to be used by future genera-tion but it suggests efforts to utilise minerals in best possible way to satisfy the needs of industries and human begins.

Some important measures to conserve the mineral resources are as follows:

1. Suitable methodology of mining should be selected for the extraction of maximum possible amount of minerals.
2. The methodology selected should be ecofriendly.

There should be optimum and economical use of the mineral.

4. All the associated element with the mineral should be recovered as by-products.
5. The scraps should be used and reused after suitable treatments.
6. The rare and costly mineral should be replaced by others which are easily available and cheaper.

❖ 4. Land Resource Management:

Soil is a very important natural resource for all living organisms. All the nutrient requirements of plants are obtained from the top layer of the soil. Due to over exploitation of top soil by the processes like deforestation, overgrazing, unplanned urbanization etc., the fertile soil is lost either by water or by air.

Since soil is precious for the existence of living organisms, it is highly essential to check the loss of soil by adopting suitable conservation mechanisms.

Some important soil conservation mechanisms are as follows:

1. The soil should be protected from the impact of rain drops by giving a vegetation cover throughout the year.
2. Steps should be taken to prevent water from concentrating and passing through the slopes.
3. The momentum of water flow should be slow down by adopting various scientific techniques.
4. The wind velocity should be minimised by massive afforestation and social forestry.
5. In order to avoid direct contact in between soil and different eroding agents, the top soil should be covered by soil binder like grasses.
6. The vegetation cover should be protected against reckless destruction by local people.
7. Since repeated cultivation of land is prone to soil erosion, some agricultural lands should be reclaimed for forestry pasture or horticulture for a certain period of time.

❖ 5. Energy Resource Management:

Out of the two types of energy, nonrenewable sources are under high stress because of high energy demand of increased population in their multifarious activities. The scarcity of fuel wood, coal petroleum,

natural gases etc., at the present rate of exploitation, has posed serious problem of total elimination in near future.

Some important causes of energy crisis are as follows:

- (i) Anthropogenic activities requiring massive energy input.
- (ii) Rapid depletion of fossil fuels.
- (iii) Economic constraints to develop conventional energy source.
- (iv) Lack of seriousness towards energy consumption.
- (v) Unplanned exploitation of energy resulting in serious environmental damage.

In view of the above facts, the need of conservation of energy has assumed greater significance.

Some energy conservation methodologies are outlined below:

1. There should be use of biogas and solar energy instead of conventional energy sources like fire wood, coal etc.
2. The use of alternative sources of energy like hydel energy, wind energy, tidal energy etc. should be encouraged by adopting suitable technology.

3. The unplanned and improper exploitation of energy should be checked or controlled.

4. Methodologies should be developed for the harnessing higher and higher amount of renewable energy.

❖ **6. Wildlife Management:**

According to ecologists, all the naturally occurring animals (fauna) and plants (flora) are considered as wildlife. Several factors account for the extinction of wildlife.

Some important factors are:

(i) Loss of natural habitats due to unplanned urbanization, industrialization and expanding agriculture.

(ii) Rapid growth of population leading to demand for food milk, meat, skin etc.

(iii) Killing of animals due to hunting as a pleasure or recreation.

(iv) Over grazing of domestic animals.

(v) Export of important species.

In order to maintain ecological balance and preservation of the living organisms on the earth, the wildlife conservation is highly

essential. The conservation of wildlife means sound preservation, management and rational use of wild life.

Some important methods of conservation of wildlife may be outlined as follows:

1. The endangered species should be protected through the creation of wildlife sanctuaries, reserved forests, national parks, biosphere reserves etc.
2. The extensive hunting, fishing, trapping etc. should be banned.
3. The rare species having small population should be allowed to live under protected environment.
4. There should be restriction on export of rare animal and plant species and their products.
5. The threatened species can be protected, through habitat management by ensuring food, water, shelter etc.
6. In order to protect the rare species from diseases, there should be proper sanitation measures.
7. There should be strict laws to check extensive hunting.

❖ 7. Agriculture Resource Management:

Agriculture plays an important role for the existence of human beings because it provides food, raw materials for clothes etc. In order to meet the requirements of increased population, a number

of steps have been taken to increase crop productivity and to store the agricultural products in a proper manner. It is estimated that two fold increase in crop productivity results in tenfold increase in the amount of fertilizers, pesticides, etc. which are released to environment causing pollution.

In addition to pollution, another problem faced in agriculture management is safe storage of agricultural products. As per statistics, about 10% of food grains produced in India is lost every year due to defective and inadequate methods of storing.

So for agricultural resource management, importance should be given to both increases in productivity without pollution and proper storage.

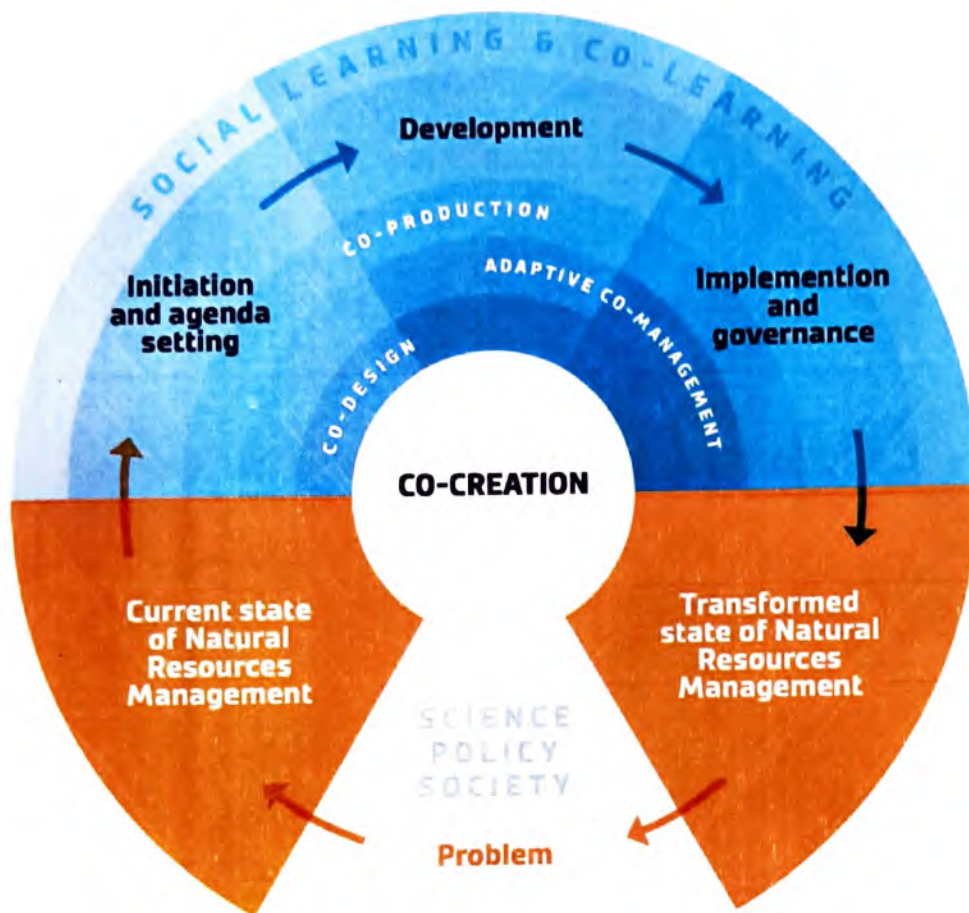
For an increase in productivity without pollution, the following points should be considered:

1. The fertility of the soil should be increased by using bio fertilizers.
2. The farmers should adopt improved methods of agriculture instead of conventional practices.
3. The farmers should select high yielding and disease resistant varieties.
4. Bio insecticides and bio herbicides should be used to check weeds and pests.

5. The farmers should adopt mixed cropping as far as practicable.

For the safe storage of agricultural products, the following points should be considered:

1. The containers in which the products are preserved should be clean and dry.
2. The container should be kept at dry, cool and well ventilated space.
3. The storage site should be away from rats and insects.
4. The containers should be perfectly closed to protect from dust, moisture and insects.
5. The storage container material should not be toxic to food grains.



Submitted by :- Ayush Wani

f.y.b.pharm

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Shellino Education Society's

Arunamai College of Pharmacy, Mamurabad, Jalgaon



Field Work in Environment science

Project Report 2022-2023

Entitled

“Noise Pollution”

Submitted By

Faisal Mushtaque Patel

(F. Y. B. Pharm)

Guided By

Puman Patil

(Msc)

North Maharashtra University, Jalgaon



PRINCIPAL

Shellino Education Society's
Arunamai College of Pharmacy
Mamurabad, Tal. Dist. Jalgaon

Shellino Education Society's

Arunamai College of Pharmacy, Mamurabad, Jalgaon



CERTIFICATE

This is to certified that **Patel Faisal Mushtaque** Exam Seat No **500277** has satisfactorily carried out the required Project work prescribed by North Maharashtra University, Jalgaon for First Year B. Pharmacy Course in the subject Environmental Science. Entitled **Noise Pollution** During the academic session 2022-2023 under my guidance for fulfilment of course in environmental studies.

GUIDE NAME

PUNAM PATIL

PRINCIPLE

DR. T.A. Deshmukh)

PRINCIPAL

Shellino Education Society's
Arunamai College of Pharmacy
Mamurabad, Tal. Dist. Jalgaon



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INTRODUCTION

What is noise?

Sound, a normal feature of our life, is the means of communication and entertainment in most animals, including human beings. It is also a very effective alarm system. A low sound is pleasant whereas a loud sound is unpleasant and is commonly referred to as 'noise'. Noise can be defined as an unpleasant and unwanted sound that is loud and disruptive to hearing.

There are 4 different types of noise: continuous, intermittent, impulsive and low frequency. Continuous noise refers to noise that is produced continuously by machinery that does not stop working while intermittent noise refers to the quick rise or drop in the noise volume. Additionally, impulsive noise is characterised by its sudden and fast nature. Low frequency noise refers to the background noise that we hear in our surroundings.

These 4 types of noise contribute to the noise pollution that we experience daily, especially in our highly urbanised world today.

Noise pollution, an urban territorial phenomenon is assuming serious proportions in every city. The frequency and intensity of pollution has been increasing day by day. Noise pollution is an annoyance to human beings. The noise is usually machine-created sound that disrupts activity or balance of human's way of life. It is a growing environmental problem that is increasingly becoming an omnipresent, yet unnoticed form of pollution not only in developed countries but also in the developing countries. The word noise is derived from Latin word "Nausea" implying "unwanted sound" or sound that is loud, unpleasant or unexpected. It can be defined as wrong sound, in the wrong place and at the wrong time.

The noise problems of the past pale in significance when compared with those experienced by modern city dwellers; noise pollution continues to grow in extent, frequency, and severity as a result of population growth, urbanization, and technological developments. Due to exposure of noise people are suffering from different kinds of diseases like hearing impairment, interference with spoken communication, Sleep disturbances, cardiovascular disturbances, annoyance etc.

Types of Noise Pollution:

The types of noise pollution are categorized into three broadly.

1. Industrial Noise

Industrial noise is caused by some high intensity decibels that is the result of industry machines and other such appliances. The noise comes from the use of mills, heavy industrial machines and even the small exhaust fans that run for a long period. Noise from mechanical saws and pneumatic drills is unbearable and the ultimate form of pollution to the public and neighbourhood. This is one cause of noise pollution.

2. Transport Noise: Transport noise is simply inevitable. The traffic jams cause considerable amount



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of vehicle noise and the honking of the many vehicles in the crowd are nothing but a pure nuisance. Whether road, rail or aircraft, their noise is a considerable contributor to noise pollution. Tractors and other heavy vehicle sounds are difficult to control for their sound.

3. Neighbourhood Noise

Gadgets, electrical appliances like the grinder and mixer are the prime contributors to noise pollution. Loud loudspeakers in the name of wedding, political parties and other such events call for a significant amount of noise pollution. In the long run, they become difficult to bear posing problems to the health of humans.

Sources of Noise Pollution

Noise contamination is an undesirable or hostile sounds that irrationally interfere into our day by day exercises. It has numerous sources, the majority of which are related with urban improvement like street, air ,rail transport, modern noise , neighbourhood and recreational commotion. Various components add to

issues of high noise levels, including expanding population and expanding commotion levels in a vehicle.

Major causes / sources of noise pollution are:

1. Industrial Sources



Progress in technology (industrialization) has resulted in creating noise pollution. Textile mills, printing presses, engineering establishments and metal works etc. contribute heavily towards noise pollution. In industrial cities like Kolkata, Ludhiana, Kanpur etc., often the industrial zones are not separated from the

residential zones of the city especially in the case of small scale industries.

These operate from workshops located on the ground floors of the residential areas and cause annoyance, discomfort and irritation to the residents exposed to the noise that is inevitably produced. The situation is much better in modern planned cities like Chandigarh where the industrial area is kept away from the residential areas and both are separated from each other by a sufficiently wide green belt.

2. Transport Vehicles



Automobile revolution in urban centres has proved to be a big source of noise pollution. Increasing traffic has given rise to traffic jams in congested areas where the repeated hooting of horns by impatient drivers pierce the ears of all road users.

Noise from airplanes constitutes an increasing serious problem in big cities like Delhi & Mumbai. Airport situated in the vicinity of population centres and the air planes pass over residential areas. Heavy trucks, buses trains, jet-planes, motor-cycles, scooters, mopeds, jeeps—the list of vehicles is endless but the outcome is same — noise pollution.

3. Household

The household is an industry in itself and is a source of many indoor noises such as the banging of doors, noise of playing children, crying of infants, moving of furniture, loud conversation of the inhabitants etc. Besides these are the entertainment equipment in the house, namely the radio, record-players and television sets. Domestic gadgets like the mixer-grinders, pressure cookers, desert coolers, air- conditioners, exhaust fans, vacuum cleaners, sewing and washing machines are all indoor sources of noise pollution

4. Public Address System

In India people need only the slightest of an excuse for using loud speakers. The reason may be a religious function, birth, death, marriage, elections, dem-onstration, or just commercial advertising. Public system, therefore, contributes in its own way towards noise pollution.

Effects of Noise Pollution

The effects of noise pollution has a ill effects not only on the human beings but also on other living and non-living things, which will be discussed below:

1.Repeated Interference with sleep: In a social survey carried out amongst people living in the vicinity of London Airport, some 22 per cent said that they sometimes found difficulty in getting to sleep because of airport noises. In areas where the noise level was particularly high, up to 50 per cent complained about the noise. An even higher percentage said they were awakened by high intensity noises, usually early at night when sleep was not yet deep. After people have been asleep for some hours, they do not readily wake up, even when subjected to very loud noises. Different

people have different depths of sleep and they can adjust to nocturnal sounds. Undoubtedly, however, noisy conditions near residential areas at night must be avoided lack of continuous sleep has as counteract it. Many techniques for sound insulation are available today and can be applied at relatively modest expense.

2. Effect on hearing or deafness: These effects only become of real importance if the sounds are exceptionally loud. Continuous exposure to noise levels much above 100 dB has an adverse effect on hearing ability within a fairly short time. Many workers who are exposed to the noise of jet aircraft or very noisy workshops for even moderate periods soon develop detectable hearing defects. Today it has become the practice for workers in these situations to the

equipped with ear protectors and provided these are



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worn all the time hearing ability is not affected.

3. Effect on Communication or Speech Interference:

External sounds can interfere with conversation and use of the telephone, and well as the enjoyment of radio and television programmes and like pastimes. It can thus affect the efficiency of offices, schools and other places where communication is of vital importance. The maximum accepted level of noise under such conditions is 55 dB. 70 dB is considered very noisy and serious interference with verbal communications is inevitable.

4. Mental or Physiological Effects: Many people complain that noise makes them mentally ill.

Experiments have been performed to attempt to confirm or disprove these claims. According to the H.M. Stationary Office report Noise; noise certainly does not contribute in the least to mental illness. Doctors and scientist have now medically confirmed that noise disturbs the biological organisms and their respective functions of the humans. Fire crackers and other excessive and continuous explosives become physically painful giving rise to neurosis, mental illness, cardiovascular diseases, stomach ulcers and respiratory disorders reducing human life. Recent researches have concluded that short exposures to noise (in excess of about 100 dB) leads to adverse effects on foetus, headache and, dizziness, dilatoriness in intestines, stomach problems and effects on eye sights to the extent that these at times become incurable.

5. Effects on Physical Health and working efficiency or Psychological problems: Noise has little physical effect on the biological performance provided that the noise level is below about 90 dB. Damage to the inner ear may result if continuous noise levels exceed about 100 dB as has been observed by the Doctors leading to physical illness. Psychiatrists and psychologists have in recent researches have made observations that noise

has certain relation with physical health causing tension resulting in problems such as speech interference, annoyance, fatigue, sleep interference and emotional distress. Noise levels in industries causes interference in efficiency and communication and raises possibilities of accidents. World Health Organisation has estimated remarkable loss in the industries annually.



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Prevention of Noise Pollution

We can reduce noise Pollution by following the below mentioned Tips:

1. Turn of Appliances at Homes and Offices:



We can turn off home and office appliances when not in use such as TV, games, computers etc. it can create unnecessary stress on ears. We can save electricity also when we turn them off.

2. Shut the door when using noisy machines:

We can shut the door after we turn on dishwashers or washing machines for rooms where it is kept or we can turn them on before leaving the house so that overlapping of exposure to loud noises can be reduced

3. Use Earplugs:



Use of earplugs or earmuffs can bring down loud noises to a manageable level. Earplugs are small inserts that fit into our ear canal. And earmuffs fit over the entire outer ear to form an air seal keeping ears safe from loud noises.

4. Lower the volume:

We can listen to songs, radios, TVs in lower volume when listening from headphones or speakers.

Stay away from Noisy area: Noise producing industries, airports, vehicles should be far from residential areas as it is very dangerous for infants and senior citizens.

5. Follow the limits of noise level:



Community law should check the use of loudspeakers, outdoor parties as well as political public announcements.

6. Control of Noise level near sensitive areas:

There should be control on noise level (Silent zones) near schools, hospitals. Place noise limits boards near sensitive areas.

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Arunamai College of Pharmacy, Mamurabad, Jalgaon



Field Work in Environment Science

Project Report 2022-2023

Entitled

"SOIL POLLUTION"

Submitted By

Ritesh Pruthviraj Chavhan

(F.Y.B.Pharm.)

Guided By

Punam Chaudhari

NORTH MAHARASHTRA UNIVERSITY, JALGAON

Shellino Education Society's



PRINCIPAL

Shellino Education Society's
Arunamai College of Pharmacy
Mamurabad Tal Dist. Jalgaon

Arunamai College of Pharmacy, Mamurabad , Jalgaon



CERTIFICATE

This is to certified that Ritesh Pruthviraj Chavhan

Exam Seat no.500255 ,has satisfactorily carried out the required

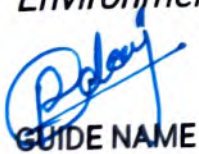
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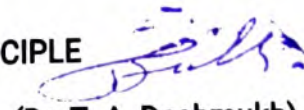
2022-2023 Under My Guidance for Fulfillment of course in

Environmental Studies.


GUIDE NAME

(Punam.chaudhari)

PRINCIPLE



(Dr .T .A. Deshmukh)
PRINCIPAL

Shellino Education Society's
Arunamai College of Pharmacy
Mamurabad, Tal. Dist. Jalgaon



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SOIL POLLUTION



Definition:

Soil pollution is defined as the build-up in soils of persistent toxic compounds, chemicals, salts, radioactive materials, or disease causing agents, which have adverse effects on plant growth and animal health.

Soil is the thin layer of organic and inorganic materials that covers the Earth's rocky surface. The organic portion, which is derived from the decayed remains of plants and animals, is concentrated in the dark uppermost topsoil. The inorganic portion made up of rock fragments, was formed over thousands of years by physical and chemical weathering of bedrock. Productive soils are necessary for agriculture to supply the world with sufficient food.

There are many different ways that soil can become polluted, such as:

- Seepage from a landfill
- Discharge of industrial waste into the soil
- Percolation of contaminated water into the soil
- Rupture of underground storage tanks
- Excess application of pesticides, herbicides or fertilizer
- Solid waste seepage

The most common chemicals involved in causing soil pollution are:

- Petroleum hydrocarbons
- Heavy metals
- Pesticides
- Solvents

Types of Soil Pollution

- Agricultural Soil Pollution

i) pollution of surface soil

ii) pollution of underground soil

Soil nutrients are important for plant growth and development. Plants obtain carbon, hydrogen and oxygen from air and water. But other necessary nutrients like nitrogen, phosphorus, potassium, calcium, magnesium, sulfur and more must be obtained from the soil. Farmers generally use fertilizers to correct soil deficiencies. Fertilizers contaminate the soil with impurities, which come from the raw materials used for their manufacture. Mixed fertilizers often contain ammonium nitrate (NH_4NO_3), phosphorus as P_2O_5 , and potassium as K_2O . For instance, As, Pb and Cd present in traces in rock phosphate mineral get transferred to super phosphate fertilizer. Since the metals are not degradable, their accumulation in the soil above their toxic levels due to excessive use of phosphate fertilizers, becomes an indestructible poison for crops.

The over use of NPK fertilizers reduce quantity of vegetables and crops grown on soil over the years. It also reduces the protein content of wheat, maize, grams, etc., grown on that soil. The carbohydrate quality of such crops also gets degraded. Excess potassium content in soil decreases Vitamin C and carotene content in vegetables and fruits. The vegetables and fruits grown on over-fertilized soil are more prone to attacks by insects and disease.

Indiscriminate use of pesticides, insecticides and herbicides



Plants on which we depend for food are under attack from insects, fungi, bacteria, viruses, rodents and other animals, and must compete with weeds for nutrients. To kill unwanted populations living in or on their crops, farmers use pesticides. The first widespread insecticide use began at the end of World War II and included DDT (dichlorodiphenyltrichloroethane) and gammaxene. Insects soon became resistant to DDT and as the chemical did not decompose readily, it persisted in the environment. Since it was soluble in fat rather than water, it biomagnified up the food chain and disrupted calcium metabolism in birds, causing eggshells to be thin and fragile. As a result, large birds of prey such as the brown pelican, ospreys, falcons and eagles became endangered. DDT has been now banned in most western countries. Ironically many of them including USA, still produce DDT for export to other developing nations whose needs outweigh the problems caused by it.

The most important pesticides are DDT, BHC, chlorinated hydrocarbons, organophosphates, aldrin, malathion, dieldrin, furodan, etc. The remnants of such pesticides used on pests may get adsorbed by the soil particles, which then contaminate root crops grown in that soil. The consumption of such crops causes the pesticides remnants to enter human biological systems, affecting them adversely.

An infamous herbicide used as a defoliant in the Vietnam War called Agent Orange (dioxin),

↓ Definition of Soil Pollution

Soil pollution as part of land degradation is caused by the presence of xenobiotics (humanmade) chemicals or other alteration in the natural soil environment. It is typically caused by industrial activity, agricultural chemicals or improper disposal of waste. The most common chemicals involved are petroleum hydrocarbons, polynuclear aromatic hydrocarbons (such as naphthalene and benzo(a)pyrene), solvents, pesticides, lead, and other heavy metals. Contamination is correlated with the degree of industrialization **and** intensity of chemical substance. The concern over soil contamination stems **primarily** from health risks, from direct contact with the contaminated soil, **vapour** from the contaminants, or from secondary contamination of water supplies within **and** underlying the soil.



Excavation showing soil contamination at a disused gasworks in England

In **North America and Western Europe**, the extent of contaminated land is best known, with many of **countries in these areas** having a **legal framework** to identify and deal with this environmental **problem**. **Developing countries** tend to be less tightly regulated **despite** some of them having **undergone significant industrialization**. **Soil pollution** is the **removal** of useful substances from **the soil** or the **addition** of **harmful substances** to it. **Garbage, cotton clothes, newspapers, trees waste, are the causes** of soil pollution. **Plastic, glasses and metal objects** may also cause soil pollution.

- Soil pollution by industrial effluents and solid wastes
 - i) pollution of surface soil
 - ii) disturbances in soil profile
- Pollution due to urban activities
 - i) pollution of surface soil
 - ii) pollution of underground soil

Causes of Soil Pollution

Soil pollution is caused by the presence of man-made chemicals or other alteration in the natural soil environment. This type of contamination typically arises from the rupture of underground storage tanks, application of pesticides, percolation of contaminated surface water to subsurface strata, oil and fuel dumping, leaching of wastes from landfills or direct discharge of industrial wastes to the soil. The most common chemicals involved are petroleum hydrocarbons, solvents, pesticides, lead and other heavy metals. This occurrence of this phenomenon is correlated with the degree of industrialization and intensities of chemical usage.

A soil pollutant is any factor which deteriorates the quality, texture and mineral content of the soil or which disturbs the biological balance of the organisms in the soil. Pollution in soil has adverse effect on plant growth.

Pollution in soil is associated with

- Indiscriminate use of fertilizers
- Indiscriminate use of pesticides, insecticides and herbicides
- Dumping of large quantities of solid waste
- Deforestation and soil erosion

Indiscriminate use of fertilizers



was eventually banned. Soldiers' cancer cases, skin conditions and infertility have been linked to exposure to Agent Orange.

Pesticides not only bring toxic effect on human and animals but also decrease the fertility of the soil. Some of the pesticides are quite stable and their bio- degradation may take weeks and even months.

Pesticide problems such as resistance, resurgence, and health effects have caused scientists to seek alternatives. Pheromones and hormones to attract or repel insects and using natural enemies or sterilization by radiation have been suggested.

Dumping of solid wastes



In general, solid waste includes garbage, domestic refuse and discarded solid materials such as those from commercial, industrial and agricultural operations. They contain increasing amounts of paper, cardboards, plastics, glass, old construction material, packaging material and toxic or otherwise hazardous substances. Since a significant amount of urban solid waste tends to be paper and food waste, the majority is recyclable or biodegradable in landfills. Similarly, most agricultural waste is recycled and mining waste is left on site.

The portion of solid waste that is hazardous such as oils, battery metals, heavy metals from smelting industries and organic solvents are the ones we have to pay particular attention to. These can in the long run, get deposited to the soils of the surrounding area and pollute them by altering their chemical and biological properties. They also contaminate drinking water aquifer sources. More than 90% of hazardous waste is produced by chemical, petroleum and metal-related industries and small businesses such as dry cleaners and gas stations contribute as well.

Solid Waste disposal was brought to the forefront of public attention by the notorious Love Canal case in USA in 1978. Toxic chemicals leached from oozing storage drums into the soil underneath homes, causing an unusually large number of birth defects, cancers and respiratory, nervous and kidney diseases.

Deforestation

↓ Causes of Soil Pollution

1) Microplastics

Microplastics are emerging persistent contaminants of increasing concern. Although microplastics have been extensively detected in aquatic environments, their occurrence in soil ecosystems remains largely unexplored. This review focused on recent progress in analytical methods, pollution characteristics and ecological effects of microplastics in soils. In spite of the presence of microplastics in soils, no standardized methods are available for the quantification.



Uniform protocols including microplastic extraction and identification are urgently needed to develop. In soil environments, main sources of microplastics include mulching film, sludge, wastewater irrigation and atmospheric deposition. The fate of microplastics is closely related to soil physio-chemistry and biota. Existing evidence shows that microplastics can influence soil biota at different trophic levels, and even threaten human health through food chains. Therefore, further research is needed to fully reveal the fate and ecological risks of microplastics in soils; and necessary action is required to control microplastic pollution in terrestrial ecosystems.



Soil Erosion occurs when the **weathered** soil particles **are dislodged** and carried away by wind or water. Deforestation, **agricultural development**, **temperature extremes**, **precipitation** including acid rain, and human activities contribute to this **erosion**. **Humans** speed up this process by construction, mining, cutting of **timber**, over cropping and overgrazing. It results in floods and cause soil erosion.

Forests **and** grasslands are an excellent binding material that keeps the soil **intact** and healthy. They **support** many habitats and ecosystems, which provide **innumerable** feeding pathways or food chains to all species. Their loss would threaten food chains and the survival of **many** species. During the past few years quite a lot of vast green land has been converted into deserts. The precious rain forest habitats of South America, tropical Asia and Africa are coming under pressure of population growth and development (especially **timber**, **construction** and **agriculture**). Many scientists believe that a **wealth** of medicinal substances including a **cure for cancer** and aids, lie in these forests. Deforestation is **slowly** destroying the most productive flora **and** fauna areas in the world, which also **form** vast **tracts** of a very **valuable** sink for CO₂.

Pollution Due to Urbanisation



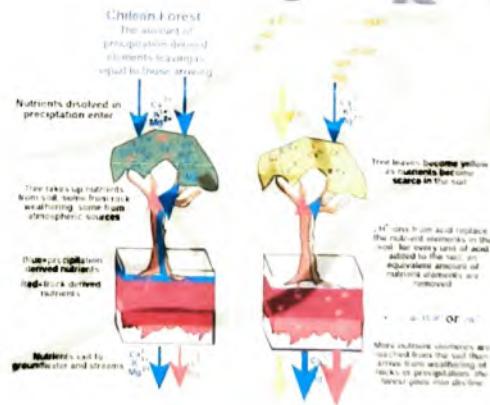
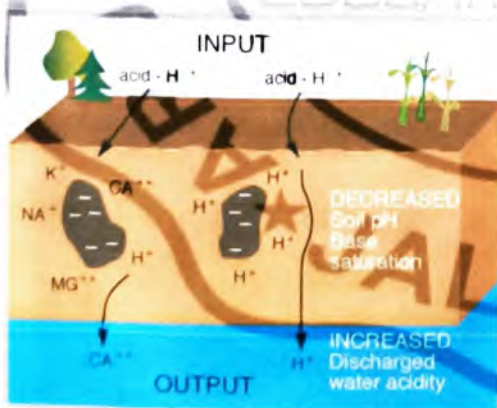
2) Oil spills

While extracting mineral oil from the oil fields, an oil spill can occur and that crude oil can get mixed with the soil causing **soil pollution**. The chemicals in the mineral oil increase the soil Ph level and reduce the phosphorous concentration of the soil. The basic composition of the soil hence gets changed and the overall temperature rises.



3) Acid rain

Another contributor to soil pollution is acid rain. **Acid rain** is mainly caused by **air pollution**. When it rains, the contaminated air will **add** chemicals to the rain which increases **the level** of acidity. **An increase** in acidity will lead to soil pollution and affect the vegetation in an **adverse** way.



Effects of Acid rain on Soil

Pollution of surface soils



Urban activities generate large quantities of city wastes including several Biodegradable materials (like vegetables, animal wastes, papers, wooden pieces, carcasses, plant twigs, leaves, cloth wastes as well as sweepings) and many non-biodegradable materials (such as plastic bags, plastic bottles, plastic wastes, glass bottles, glass pieces, stone / cement pieces). On a rough estimate Indian cities are producing solid city wastes to the tune of 50,000 - 80,000 metric tons every day. If left uncollected and decomposed, they are a cause of several problems such as

- **Clogging of drains:** Causing serious drainage problems including the burst / leakage of drainage lines leading to health problems.
- **Barrier to movement of water:** Solid wastes have seriously damaged the normal movement of water thus creating problem of inundation, damage to foundation of buildings as well as public health hazards.
- **Foul smell:** Generated by dumping the wastes at a place.
- **Increased microbial activities:** Microbial decomposition of organic wastes generate large quantities of methane besides many chemicals to pollute the soil and water flowing on its surface
- **When such solid wastes are hospital wastes they create many health problems:** As they may have dangerous pathogen within them besides dangerous medicines, injections.

Pollution of Underground Soil



4) Intensive farming



Soil fertility is decreased because of **intensive farming** techniques. **Soil invertebrates** are fewer where **inorganic fertilizers** are used and **crop residues** are burned. Weed control is more efficient further **limiting** the range of species of plants and animals. **Intensive farming causes** more nitrate and phosphate **pollution** of surface waters.

5) Waste disposal

Soil pollution occurs due to untreated **disposal** of industrial **wastes** into soil; it has **high toxic** contaminants, which leads to **soil pollution**.

a) Oil and fuel dumping

Soil contamination can also happen as a result of underground storage tanks rupturing or the leaching of waste from landfills. Mining, fertilizer application, **oil** and **fuel dumping** and a multitude of other environmental issues can also cause **pollution** of the **soil**.



Underground soil in cities is likely to be polluted by

- Chemicals released by industrial wastes and industrial wastes
- Decomposed and partially decomposed materials of sanitary wastes

Many dangerous chemicals like cadmium, chromium, lead, arsenic, selenium products are likely to be deposited in underground soil. Similarly underground soil polluted by sanitary wastes generate many harmful chemicals. These can damage the normal activities and ecological balance in the underground soil

Causes in brief:

- Polluted water discharged from factories
- Runoff from pollutants (paint, chemicals, rotting organic material) leaching out of landfill
- Oil and petroleum leaks from vehicles washed off the road by the rain into the surrounding habitat
- Chemical fertilizer runoff from farms and crops
- Acid rain (fumes from factories mixing with rain)
- Sewage discharged into rivers instead of being treated properly
- Over application of pesticides and fertilizers
- Purposeful injection into groundwater as a disposal method
- Interconnections between aquifers during drilling (poor technique)
- Septic tank seepage
- Lagoon seepage
- Sanitary/hazardous landfill seepage
- Cemeteries
- Scrap yards (waste oil and chemical drainage)
- Leaks from sanitary sewers

Effects of Soil Pollution

Agricultural



b) Discharge of sewage

Excessive and inefficient use of chemical pesticides can result in severe **soil pollution**.

Sewage produced in urbanized areas can also contaminate **soil** (if not disposed of correctly).

These wastes may also contain several carcinogenic substances. Other forms of waste that can **pollute soil** include nuclear waste, e-waste, and coal ash.



c) Landfill & illegal dumping



The end products of the sewer also end up in **landfills**. Also, cases of **illegal dumping** of chemicals have witnessed disposal of highly poisonous materials in **landfills**. Because these wastes contain toxins and a mix of chemicals, they majorly seep into the land and causes **soil pollution**.

- Reduced soil fertility
- Reduced nitrogen fixation
- Increased erodibility
- Larger loss of soil and nutrients
- Deposition of silt in tanks and reservoirs
- Reduced crop yield
- Imbalance in soil fauna and flora

Industrial

- Dangerous chemicals entering underground water
- Ecological imbalance
- Release of pollutant gases
- Release of radioactive rays causing health problems
- Increased salinity
- Reduced vegetation

Urban



- Clogging of drains
- Inundation of areas
- Public health problems
- Pollution of drinking water sources
- Foul smell and release of gases
- Waste management problems

d) Electronic Waste

The **pollution** of **soil**, water, and air by **e-waste** also pose a threat to human beings. **Soil** and water **pollution** can compromise the food chain, leading to a variety of neurological and organ problems. The dioxins released by burning **e-waste** can contribute to numerous health issues.



e) Nuclear wastes

Improper disposal of **radioactive/nuclear waste** can severely contaminate the **soil** and result in **soil pollution**. The **radioactive** matter present in this type of **waste** may mix with the components of the **soil**, rendering it highly toxic and infertile. Furthermore, any **plants** grown in such soils may absorb the **radiation** present in the soil and accumulate it within the **bodies**. This **radiation** may make its way up the **food chain** when herbivores consume these **plants** and carnivores consume those herbivores.



Environmental Long Term Effects of Soil Pollution

When it comes to the environment itself, the toll of contaminated soil is even more dire. Soil that has been contaminated should no longer be used to grow food, because the chemicals can leech into the food and harm people who eat it.

If contaminated soil is used to grow food, the land will usually produce lower yields than it would if it were not contaminated. This, in turn, can cause even more harm because a lack of plants on the soil will cause more erosion, spreading the contaminants onto land that might not have been tainted before.

In addition, the pollutants will **change the makeup of the soil and the types of microorganisms** that will live in it. If **certain** organisms die off **in the area**, the larger predator **animals** will also have to move away or die **because they've lost their food supply**. Thus it's possible for soil pollution to change whole ecosystems

Effects of soil **pollution** in brief:

- **pollution runs off into rivers and kills the fish, plants and other aquatic life**
- **crops and fodder grown on polluted soil may pass the pollutants on to the consumers**
- **polluted soil may no longer grow crops and fodder**
- **Soil structure is damaged (clay ionic structure impaired)**
- **corrosion of foundations and pipelines**
- **impairs soil stability**
- **may release vapours and hydrocarbon into buildings and cellars**
- **may create toxic dusts**
- **may poison children playing in the area**

Control of soil pollution



The following steps have been suggested to control soil pollution. To help prevent soil erosion, we can limit construction in sensitive area. In general we would need less fertilizer and fewer pesticides if we could all adopt the three R's: Reduce, Reuse, and Recycle. This would give us less solid waste.

Reducing chemical fertilizer and pesticide use

Effects of Soil Pollution

1) Health Effects

Contaminated or polluted soil directly affects human health through direct contact with soil or via inhalation of soil contaminants which have vaporized; potentially greater threats are posed by the infiltration of soil contamination into groundwater aquifers used for human consumption, sometimes in areas apparently far removed from any apparent source of above ground contamination. This tends to result in the development of pollution-related diseases. Health consequences from exposure to soil contamination vary greatly depending on pollutant type, pathway of attack and vulnerability of the exposed population. Chronic exposure to chromium, lead and other metals, petroleum, solvents, and many pesticide and herbicide formulations can be carcinogenic, can cause congenital disorders, or can cause other chronic health effects health conditions. Industrial or man-made concentrations of naturally occurring substances, such as nitrate and ammonia associated with livestock manure from agricultural operations, have also been identified as health hazards in soil and groundwater.

2) Ecosystem Effects



Effects of soil pollution on Eco System

Effects on the Ecosystem Since the volatile contaminants in the soil can be carried away into the atmosphere by winds or can seep into underground water reserves, soil pollution can be a direct contributor to air and water pollution. It can also contribute towards acid rain (by releasing huge quantities of ammonia into the atmosphere).



Applying bio-fertilizers and manures can reduce chemical fertilizer and pesticide use. Biological methods of pest control can also reduce the use of pesticides and thereby minimize soil pollution.

Reusing of materials

Materials such as glass containers, plastic bags, paper, cloth etc. can be reused at domestic levels rather than being disposed, reducing solid waste pollution.

Recycling and recovery of materials

This is a reasonable solution for reducing soil pollution. Materials such as paper, some kinds of plastics and glass can and are being recycled. This decreases the volume of refuse and helps in the conservation of natural resources. For example, recovery of one tonne of paper can save 17 trees.

Reforestation



Control of land loss and soil erosion can be attempted through restoring forest and grass cover to check wastelands, soil erosion and floods. Crop rotation or mixed cropping can improve the fertility of the land.

Solid waste treatment



Proper methods should be adopted for management of solid waste disposal. Industrial wastes can be treated physically, chemically and biologically until they are less hazardous. Acidic and alkaline wastes should be first neutralized; the insoluble material if biodegradable should be allowed to degrade under controlled conditions before being disposed.

+ Prevention of Soil Pollution

1) Get a better understanding of the soil environment quality baseline

In order to properly control and prevent soil erosion, it is paramount that every stakeholder understands the baseline of soil environment quality, which can be done by carrying out sensitizations and surveys on soil pollution. However, to ensure consistent results, the technical requirements for the survey should be formulated including the frequency of **when** the survey should be conducted.

2) Proper management of agricultural land and the practice of organic farming

Poor utilization of land is a major concern in the prevention and control of soil pollution. Agricultural land pollution usually causes the loss of soil fertility as it involves the loss of organic matter, topsoil and nutrients, and the soil's ability to retain water. In agricultural land management, ideal soil conservation methods include mechanical and biological control techniques.

Developing forests in new areas can help reduce erosion caused by rainwater and air thus ensuring increased soil fertility and formation. In areas with excessive pollution or surface degradation, reforestation should be done. The mechanical method of soil pollution control includes the use of contour holding system, gully control, and making bunds. In excessive sloping areas, making bunds across the slope helps to prevent erosion.

3) Proper Solid Waste Treatment

It is important to dispose of solid waste properly by treated it before it's released into the environment. Acidic and alkaline waste, for example, can be neutralized before they are disposed of to avoid soil contamination. Biodegradable waste should also be broken down in a controlled environment before it is released into the environment. A great example is the proper treatment of sewage sludge.

The waste materials should also be categorized based on the degree of contamination. Materials that are mildly or moderately contaminated should be treated in controlled environments before release into the natural environments while those that are heavily contaminated should be put under strict management, treatment, and control.

As a last resort, new areas for storage of hazardous waste should be investigated such as deep well injection and more secure landfills. Burying the waste in locations situated away from residential areas is the simplest and most widely used technique of solid waste management. Environmental and aesthetic considerations must be taken into consideration before selecting the dumping sites.

Incineration of other wastes is expensive and leaves a huge residue and adds to air pollution. Pyrolysis is a process of combustion in absence of oxygen or the material burnt under controlled atmosphere of oxygen. It is an alternative to incineration. The gas and liquid thus obtained can be used as fuels. Pyrolysis of carbonaceous wastes like firewood, coconut, palm waste, corn combs, cashew shell, rice husk paddy straw and saw dust, yields charcoal along with products like tar, methyl alcohol, acetic acid, acetone and a fuel gas.



Anaerobic/aerobic decomposition of biodegradable municipal and domestic waste is also being done and gives organic manure. Cow dung which releases methane into the atmosphere, should be processed further in 'gobar gas plants' to produce 'gobar gas' and good manure.

Natural land pollution:

Land pollution occurs massively during earth quakes, land slides, hurricanes and floods. All cause hard to clean mess, which is expensive to clean, and may sometimes take years to restore the affected area. These kinds of natural disasters are not only a problem in that they cause pollution but also because they leave many victims homeless.

4) Strengthen policies that manage pollution sources

The best way to control soil pollution is to strictly control the mining and industrial pollutants. In addition to controlling the pollutants, daily environment supervision should be enhanced. This should be implemented by making a layout plan that should include close supervision on the soil environment including regular information updates. To ensure accountability, the companies in the specified area should conduct soil research at least once annually and release the information to the public.

Surrounding soil should also be **monitored** on a **regular** basis to ensure the soil is not contaminated. The **relevant** authorities should also proactively look for **potential** risks and point out the **alternatives** for minimizing the risks. The **government** should also **put** in place measures to ensure **electronic wastes and heavy metals** do not **contaminate** the soil. At the same time, the **government** should **take stronger** measures against people, businesses, and companies that **breach** the policies.

5) Promote objective assessment and accountability among all stakeholders

To ensure long term success in the **prevention and control** of soil pollution, all stakeholders role in the **implementation** of the soil pollution control should be clear. All tasks should be **defined and inter-departmental cooperation and coordination** should be strengthened to ensure **seamless implementation and immediate resolutions** focused towards correct **disposal** of garbage, **proper treatment** of sewage sludge, **minimized** the use of **agro-chemicals**, **reforestation**, **construction of drainage systems**, and **strengthening chemical use related laws**.

↓ Soil Pollution & INDIA

Industrial sector in India is **witnessing rapid growth** since the last decade of twentieth century with reforms in **economic laws** and **with establishment of special economic zones (SEZ)**. Such rapid industrial growth **has also increased** threat to the environment. **In spite** of great difficulty in its remediation in comparison with **polluted air and water**, soil pollution as a threat to human life is by and large ignored at national level in **India** due to lack of comprehensive information on the subject. Though coordinated effort on assessment of soil pollution is absent at national level, sporadic information has been generated by several researchers on various aspects of pollution affecting soil quality. This chapter analyses this information and attempts to assess the quantum of threat being faced by agroecosystem in the country. It indicates that soil resources are facing threats from deliberate use of contaminated organics, amendment materials and irrigation water or from atmospheric depositions, spillage of effluents etc. Nature pollutants varies from salts, toxic metals, metalloids, persistent organics with varying degree of toxicity and may be of both industrial and geogenic origins.

Shellino Education Society's

Arunamai College of Pharmacy, Mamurabad, Jalgaon



Field Work in Environment Science

Project Report 2022-2023

Entitled

"WATER POLLUTION"

Submitted By

Chetan Vasudev Bhole

(F.Y.B.Pharm)

Guided By

Punam Chaudhari



PRINCIPAL
Shellino Education Society's
Arunamai College of Pharmacy
Mamurabad, Tal. Dist. Jalgaon

NORTH MAHARASHTRA UNIVERSITY ,JALGAON

Shellino Education Society's

**Arunamai College of Pharmacy,
Mamurabad , Jalgaon**



CERTIFICATE

EDUCATION SOCIETY

This is to certified that Mr.Chetan Vasudev Bhole

Exam Seat no.500250 ,has satisfactorily carried out the required

*Project work prescribed by NorthMaharashtra University ,Jalgaon. For
First year B.Pharmacy Course in the Subject Environmental Science.
Entitled WATER POLLUTION During the academic session 2022-2023
Under My Guidance for Fulfillment of course in Environmental Studies.*

GUIDE NAME

(Punam.chaudhari)

PRINCIPLE

(Dr .T .A. Deshmukh)



PRINCIPAL
Shellino Education Society's
Arunamai College of Pharmacy
Mamurabad, Tal. Dist. Jalgaon

A dark, textured background with a blue and black color scheme. The word "WATER" is written in large, white, bold, sans-serif capital letters. Below it, the word "POLLUTION" is written in black, bold, sans-serif capital letters inside a bright yellow rounded rectangular box.

WATER POLLUTION

CONTENTS

- 1. INTRODUCTION**
- 2. DEFINATION OF WATER POLLUTION**
- 3. CAUSES OF WATER POLLUTION**
- 4. EFFECTS OF WATER POLLUTION**
- 5. MEASURES OF CONTROL**
- 6. REFERENCE**

INTRODUCTION

- **WATER IS A PRECIOUS RESOURCE AND WITHOUT IT LIFE IS NOT POSSIBLE ON EARTH.**
- **WATER IS GETTING POLLUTED DAY BY DAY DUE TO EXCESSIVE AND CARELESS USE SO THE PERCENT OF AVAILABLE DRINKING WATER IS REDUCING.**
- **THERE ARE MANY WAYS WHICH CAUSES WATER POLLUTION AND THE EFFECTS OF IT ARE VERY HARMFUL FOR ALL LIVING AND NON LIVING OBJECTS.**

DEFINATION OF WATER POLLUTION

CAUSES OF WATER POLLUTION

- **water pollution, the release of substances into subsurface groundwater or into lakes, streams, rivers, estuaries, and oceans to the point where the substances interfere with beneficial use of the water or with the natural functioning of ecosystems. In addition to the release of substances, such as chemicals, trash, or microorganisms, water pollution may also include the release of energy, in the form of radioactivity or heat, into bodies of water.**

The principal sources of water pollution resulting from exploration and production operations are :

- DOMESTIC WASTE
- SEWAGE SYSTEM
- SOLID WASTE
- INDUSTRIAL WASTE
- ACID RAIN □ OIL INDUSTRY
- AQUATIC PLANTS

CAUSES OF WATER POLLUTION

1. DOMESTIC WASTE

DUMPING OF HOUSEHOLD WASTE INTO WATER



CAUSES OF WATER POLLUTION

2. SEWAGE WASTE



CAUSES OF WATER POLLUTION

3.SOLID WASTE

- **Solid waste cause blockage in flow of water**
- **It causes water as well as air pollution**
- **Polythene is the main solid waste**
- **As it does not decomposes**



CAUSES OF WATER POLLUTION

4. INDUSTRIAL WASTE

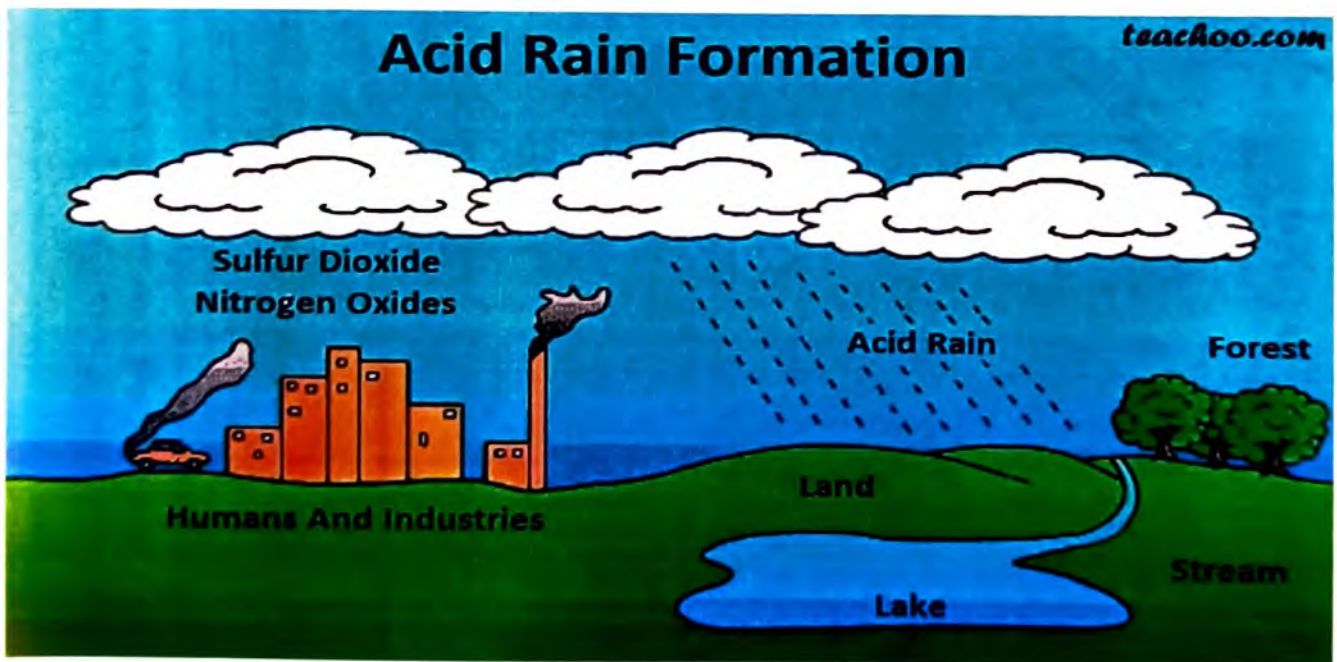
- Industrial waste containing paper waste ,rubber ,metallic ,aluminium waste ,toxic waste,chemical waste etc .is drawn directly into water which pollutes water



CAUSES OF WATER POLLUTION

5. ACID RAIN

Acid rain causes a cascade of effects that harm or kill individual fish, reduce fish population numbers, completely eliminate fish species from a waterbody, and decrease biodiversity



CAUSES OF WATER POLLUTION

7.AQUATIC PLANTS

Water hyacinth can completely cover lakes and wetlands, outcompeting native aquatic species, reducing oxygen levels for fish, and creating ideal habitat for disease-carrying mosquitoes.



EFFECTS OF WATER POLLUTION

1.DEATH OF AQUATIC ORGANISMS



EFFECTS OF WATER POLLUTION

3.SHORTAGE OF DRINKING WATER

The lack of sufficient water resources, including a lack of access to safe water supplies, to meet water needs within a region



EFFECTS OF WATER POLLUTION

4. INCREASE IN BOD

Organic loading is occurrence of excess organic matter inside water due to sewage disposal and eutrophication. This leads to an increase in biological oxygen demand (BOD) for putrefaction

CONTROL OF WATER POLLUTION

Effects of Water Pollution

4. Increase in BOD

BOD



The biochemical oxygen demand is defined as the 'measure of dissolve oxygen require to decompose the organic matter in water biologically.

Pure water has < 1ppm
Polluted water >5ppm



- Control of water pollution requires appropriate infrastructure and management plans. The infrastructure may include wastewater treatment plant.

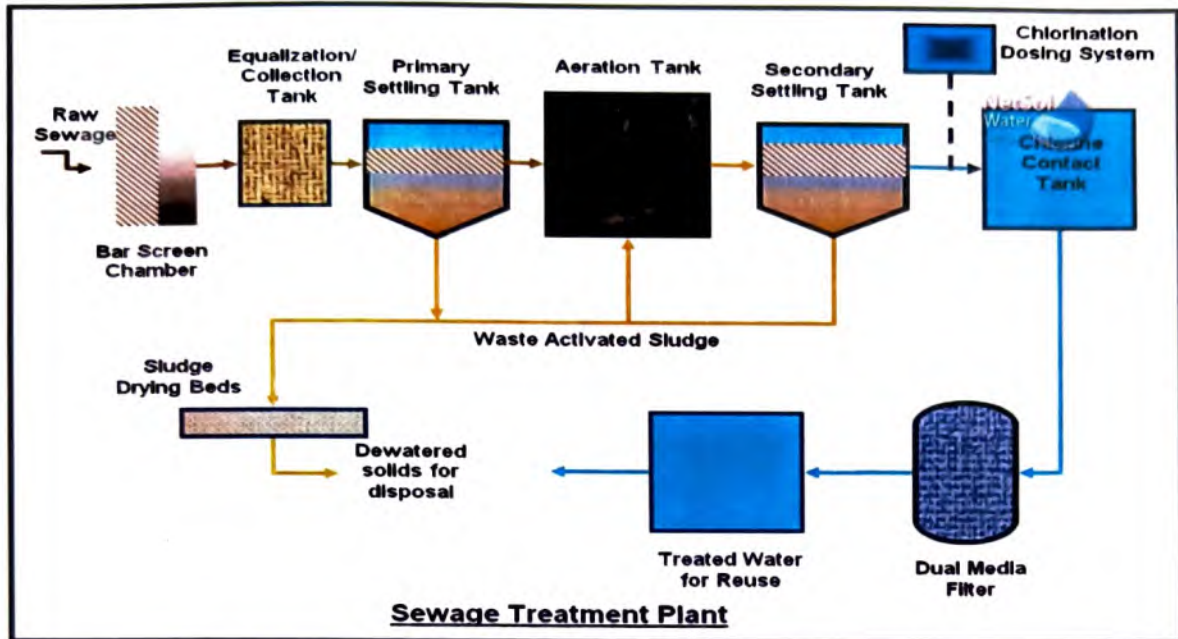
CAUSES OF WATER POLLUTION

6.OIL INDUSTRY

Oil cannot dissolve in water and forms a thick sludge in the water. This suffocates fish, gets caught in the feathers of marine birds stopping them from flying and blocks light from photosynthetic aquatic plants.



SEWAGE TREATMENT PLANT



Understanding of a Sewage Treatment Plant Via Diagram

REFERENCE

- ENVIROMENTAL CHEMISTRY
,DR.PARVEEN BHAIRO, PRADEEP'S
PUBLICATIONS
- ENVIROMENTAL CHEMISTRY
'SAMIR K .BANERJI ,PHI
LEARNING PVT LTD

Decreasing the amount of oxygen available in water. Due to this reduction in the dissolved oxygen in water, there are adverse effects on the aquatic organisms leading to their deaths



EFFECTS OF WATER POLLUTION

2.RIVERS ARE CHANGED INTO DUSTBIN

When the garbage is dumped into the rivers or water bodies, they cannot be degraded and get accumulated in the bodies. The degradation of these materials results in the release of toxic compounds which kill the plants and aquatic animals.