Chemical and Process Engineering Research
ISSN 2224-7467 (Paper) ISSN 2225-0913 (Online)
Vol.65, 2023

Environmental Degradation: An Issue for Ethiopia

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ABSTRACT
Environmental degradation is the deteriorating of the environment caused by the depletion of resources such as air, water, and soil, as well as ecosystem devastation, habitat loss, species extinction, and pollution. It comes in many forms and has numerous causes, consequences, and mitigation measures. Anthropogenic factors (economic growth, population growth, urbanization, agricultural intensification, rising energy use, transportation, deforestation, etc.) are primarily responsible for environmental degradation. Natural factors (floods, typhoons, droughts, rising temperatures, fires, etc.) are also to blame for environmental degradation. Pollution of the air, water, and soil caused by the emission of harmful gases, the release of industrial effluents, urban wastes, and radioactive wastes, and the irresponsible use of fertilizers and pesticides is going to threaten the very survival of modern civilization. A number of studies have been conducted to grasp the health benefits of improved environmental quality in order to address various environmental challenges. Minimizing exposure to environmental risk factors by improving soil and air quality, as well as access to improved sources of water and clean energy, has been linked to significant health benefits and can contribute significantly to a country's sustainable development (economic, social, and environmental). Environmental degradation is widespread in Ethiopia. Soil erosion and land degradation (including impacts on forests, agricultural and pastoral land), deforestation and forest degradation, water scarcity, biodiversity loss, climate change, and various types of pollution (air, water, soil, and land pollutions) are among the major environmental issues affecting Ethiopia. Soil erosion and land degradation is a widespread problem in Ethiopia, and it is one of the major causes of low and declining agricultural productivity, ongoing food insecurity, rural poverty, a lack of potable water, and biodiversity loss. Environmental degradation must be recognized as a serious issue, and the ecosystem must be protected before it is too late. To avoid illegal activities, countries' governments must improve filling gaps in the legal system. This paper discusses the global and national (Ethiopia) causes, effects, and solutions to environmental degradation and it conducts a literature review on studies related to reduced environmental risk, with a focus on reduced air pollution, soil erosion and pollution, improved water quality, and climate change mitigation.
Keywords: Atmospheric degradation, Environmental degradation, Ethiopia, Land degradation, Pollution, Water degradation
DOI: 10.7176/CPER/65-03
Publication date: November 30th 2023

1. INTRODUCTION

The environment is defined as the set of living and nonliving components that surround an organism, including the air, land, water, forests, seas, animals, and all other elements on Earth, influences, and events. Environmental degradation is the deterioration of the environment as a result of resource depletion, which encompasses all biotic and abiotic elements that make up our surroundings, such as air, water, soil, plants, animals, and all other living and non-living parts of the earth's planet (Bourque *et al*., 2005). Degradation of the environment can also be described as any changes or disturbance to the environment that is deemed harmful or undesirable (Johnson *et al*., 1997). The environment gets degraded when natural habitats are destroyed or natural resources are exhausted. Environmental degradation is defined as "the reduction of the environment's capacity to meet social and ecological objectives and demands" by the United Nations International Strategy for Disaster Reduction.

Over the last few decades, environmental degradation has become a "universal concern" for mankind. Environmental degradation is one of the ten threats identified by the United Nations' High Level Threat Panel. Pollution, biodiversity loss, and animal extinction, deforestation and desertification, global warming, and many other challenges are all part of the global problem of environmental degradation (Tian *et al*., 2004). Environmental degradation has a positive side; more novel genes have been developed, and some species have thrived as others have decreased (Maurya *et al*., 2020). Species are constantly regenerating via natural selection as the environment changes.

The magnitude of environmental degradation varies by country and region of the world. Environmental degradation is common in Ethiopia, though it is unevenly distributed and takes various forms across the country (Adam, 2014). The extent and severity of the environmental degradation problem vary spatially due to differences in relief, ecology, rainfall, land use, land cover, and soil types. According to FAO (1986), land

degradation is particularly severe in Ethiopia's highlands, where average soil loss from farmland is estimated to be 100 tons/hectare/year. In Ethiopia, environmental degradation manifests itself in the form of land degradation, water resource degradation, and biodiversity loss (Demel, 2001). Natural processes, such as the physical shaping of the landscape and heavy rainfall cause some types of land degradation in the country. However, the scale of the problem has risen dramatically as a result, of increased deforestation, overgrazing, over-cultivation, inappropriate farming practices, and the rising human population (Adugnaw, 2014)).

Several studies have found that environmental degradation is, caused by different factors. Environmental change is, influenced by economic growth, population growth, urbanization, agricultural intensification, rising energy use, transportation, and other factors. Poverty is still a major issue at the root of many environmental issues. The impact on the environment varies depending on the cause, the habitat, and the plants and animals that live there (Swati *et al*., 2014). Different kinds of the human activities are the primary causes for the environmental degradation. Land degradation, for example, is caused by two interconnected complex systems: the natural ecosystem and the human social system (Berry, 2003). Modern urbanization, industrialization, overpopulation growth, deforestation, and other factors are major contributors to environmental pollution. According to Swati et al. (2014), Environmental pollution is the degradation of the quality and quantity of natural resources. Pollution is primarily caused by waste products, smoke emitted by vehicles, and industries such as chlorofluorocarbon, nitrogen oxide, carbon monoxide, and other dust particles. Deforestation, overuse of pesticides, chemical fertilizer, and insecticides, congested housing, litter production, sewage and garages, unplanned urbanization and industrialization, and other factors have all contributed to water, air, soil, and sound pollution. Vehicles, loudspeakers, mills, and other sources of noise pollution are the most common. Excessive use or overconsumption of natural resources depletes these resources and creates an environmental imbalance.

The ecosystem gets degraded when natural habitats are destroyed or natural resources are exhausted. Poverty, overcrowding, starvation, weather extremes, species extinction, acute and chronic medical illnesses, war and human rights violations; and an increasingly unstable world are just some of the effects of Environmental degradation. Maurya et al. (2020) stated that climate change and environmental degradation have an impact on all types of development projects across the globe. Many research findings indicate that climate change and environmental degradation are accelerating and are already affecting many developing-country communities. The population pressure in town is terrible, resulting in poor air, water, and sound quality. Slowing population growth could provide 16-29% of the emissions reductions needed by 2050 to avoid dangerous climate change (O'Neill *et al*., 2010). This 35-country study found that slowing population growth could save 1.4 to 2.5 billion tons of carbon emissions per year by 2050, significantly assisting in the resolution of the climate crisis.

For economic growth and development, good environmental management is crucial. Environmental protection and environmental resource management are the common approaches to address the environmental degradation problems. Mismanagement that results in environmental deterioration can also lead to environmental conflict, in which communities' come together to oppose the forces that have harmed the environment.

Realizing the state of environmental degradation, including its root causes, nature, and consequences, as well as previous management practices, is critical for identifying solutions to the problem and its impact. Thus, this paper critically analyzes the concept, types, causes, and consequences of environmental degradation. It also discusses the environmental/ land degradation issues in the context of Ethiopia. Finally, an attempt has been made to highlight various mitigation measures to address environmental degradation effects.

2. OBJECTIVES

2.1 General Objective

- To review and discuss the Environmental Degradation Types, Causes, Effects and Mitigation Measures that enables to be familiar with the concept of environmental degradation.

2.2 Specific Objectives

- To know what is environmental degradation
- To identify the types/nature of environmental degradation
- To assess the causes of environmental degradation
- To realize the adverse effects of environmental degradation
- To understand the mitigation measures for the environmental degradation effects

3. REVIEW METHODS

This paper used a literature search and synthesis of relevant peer-reviewed articles and related literature as its methodological approach. The literature was chosen primarily through search engines and platforms such as Google Scholar (https://www.scholar.google.com/), Web of Science, Research Gate, Science Direct, and many other scientific journals publishing websites relevant to the topic of environmental degradation. This review covered every aspect of the literature on environmental degradation and natural resource management by

focusing on the most relevant publications. By searching for and downloading relevant types of literature, the literature review examined and discussed the nature, cause, effect, and solutions of environmental degradation. Formal literature (peer-reviewed papers/journals, books, institutional publications) and a small amount of grey literature (unpublished sources related to project documents, internal reports, Ph.D. dissertations, and M.Sc. theses) were used as source material. However, peer-reviewed sources were prioritized in shaping the paper's conclusion, while unpublished sources served as background material and sources of supplementary reading. Several keywords were used to search for available English-language electronic papers Environmental degradation, biodiversity, conservation, climate change, degradation, environmental degradation, degradation causes, effects of degradation, types of degradation, degradation solutions, forest, reforestation, global warming, natural resource degradation, environmental pollution, water, soil, Ethiopian resource degradation, and population growth are among them. According to the search engine results, over 100 papers are used. The total of 85 papers were chosen for review and synthesis. Finally, the pertinent information about Environmental Degradation is organized, and the entire write-up is finished.

4. LITERATURE REVIEW FINDINGS AND DISCUSSION

4.1 Environmental Degradation

According to Katar (2009), the environment performs the four functions listed below, which are critical to our survival and well-being:

(I) Provision of 'natural goods' such as air, solar energy, lakes, landscape, and wildlife;
(II) Provision of natural resources such as land, water, forests, and minerals that are used to create economic goods;
(III) Acting as a 'sink' into which the byproducts of economic activities are dumped/discarded; and
(IV) Provision of environmental services and amenities such as the maintenance of a habitable biosphere, including the stratospheric ozone layer, climate stability and genetic diversity, recreation, and aesthetic appreciation.

As previously, stated in the introduction part, environmental degradation is the disintegration or deterioration of the environment caused by the consumption of assets such as air, water, and soil; the destruction of environments; and the extinction of wildlife. It is defined as any change or aggravation to nature's turf that is deemed harmful or undesirable.

The majority of the world's population relies directly on natural resource-based activities for a living, while the remainder relies on these resources indirectly for food, fuel, industrial output, and recreation. Their economic well-being is inseparably linked to natural resource productivity and environmental quality. Unfortunately, most of the globe's natural resources, including the environment, are in serious decline. Soil erosion, water logging, salinity, and general loss of fertility, for example, make agricultural lands less productive. Similarly, groundwater aquifers in many arid and semi-arid areas are over-exploited, surface water sources are highly polluted, and as a result, water for drinking and irrigation is becoming increasingly scarce and polluted. Fishery yields are declining, and air pollution is increasing. Fishery production is declining, and air quality is deteriorating. Rapidly increasing levels of air, water, and land pollution endanger human health and longevity.

4.1.1 Types of Environmental Degradation

4.1.1.2 Land and soil degradation

Land is a vital resource to humankind, like air and water. Land degradation is defined here as a process that reduces land productivity, while other factors such as technology, management, and weather remain constant (Jan and David, 1995). It is caused by two interconnected complex systems: the natural ecosystem and the human social system (Berry, 2003). Land and soil degradation is the soil degradation due to poor farming practices, excessive use of fertilizers and pesticides, landfill leakage, and so on. It can also be defined as the deterioration or loss of soil productive capacity for the present and future. Land degradation is caused by a variety of processes, including water and wind erosion, chemical degradation (acidification, salinization, fertility depletion, and a decrease in cation retention capacity), physical degradation (crusting, compaction, hard-setting, and so on), and biological degradation (a decrease in total and biomass carbon and a decline in land biodiversity) (WMO, 2005). It is a global issue that affects everyone due to food insecurity, higher food prices, climate change, environmental hazards, and the loss of biodiversity and ecosystem services. Land degradation is occurring at an alarming rate, contributing to a dramatic decline in cropland and rangeland productivity around the world.

Land degradation is one of the world's most pressing environmental problems, and it will worsen unless immediate action is taken. According to various sources, approximately 25% of the total land area has been degraded globally, with 5 to 10 million hectares lost annually due to severe degradation. Scherr and Yadav (1996) confirmed that if current trends continue, 1.4 to 2.8% of total agricultural, pasture, and forestland will have been lost by 2025. Land degradation contributes significantly to climate change by releasing soil carbon and nitrous oxide into the atmosphere. In addition to increases in CO_2 emissions, industrialization has increased the amount of nitrogen deposition. Human-caused nitrogen deposition may Benefit nitrogen-limited forests, but excessive

nitrogen deposition can cause soil acidification and reduced nutrient availability to plants (Magnani *et al*., 2007). Scientists recently warned that 24 billion tons of fertile soil is lost each year, largely as a result of unsustainable agricultural practices. If current trends continue, 95% of Earth's land areas may be degraded by 2050. Land degradation affects 3.2 billion people worldwide, primarily rural communities, smallholder farmers, and the poor. The global population is expected to grow by approximately 35% to 9.7 billion by 2050, resulting in increased demand for agricultural products such as food, feed, fiber, and fuel. However, pressure on the global land resource is increasing due to other factors as well, such as agricultural production systems becoming less resilient due to biodiversity loss, and natural factors such as climate variability and extreme weather events. Climate change exacerbates variations in agricultural yields and income, threatening the resilience of agro-ecosystems and the stability of food production systems. The problems are especially severe in the world's driest regions. Dry land landscapes cover roughly 40% of the world's land area and are home to two billion people. The vast majority of people who rely on dry-lands are found in developing countries, where children are particularly vulnerable to the effects of land degradation and drought.

Land and soil degradation become nearly synonymous concepts. According to FAO (1979), soil degradation can take the following forms:

(I) Water erosion (sheet, rill, gully erosion, mass movements)
(II) Erosion caused by wind
(III) Biological decomposition (decrease in humus)
(IV) Physical deterioration (increase in bulk density, decrease in permeability)
(V) Chemical deterioration (acidification, toxicity)
(VI) Surplus of salts (salinization, alkalinization)

A. Impacts of Land Degradation

Land degradation conveys itself in a variety of ways: vegetation becomes scarcer, water courses dry up, thorny weeds take over once-rich pastures, footpaths become gullies, and soils become thin and stony (Temesgen *et al*., 2014). All of these manifestations have the potential to have serious consequences for the environment, land users, and people who rely on the products of a healthy landscape to make a living (Berry, 2003). According to the United Nations Convention to Combat Desertification (UNCCD), land degradation directly affects more than 250 million people. Furthermore, one billion people in more than 100 countries are at risk. Many of the world's poorest, most marginalized, and politically powerless citizens are among them (WMO, 2005).

The socioeconomic impact of land degradation: Land degradation and desertification have a negative impact on agricultural productivity, human and livestock health, and economic activities like ecotourism (UNCCD, 2004). Land degradation also contributes to persistent poverty by reducing ecosystem resilience and environmental service provision (Bossio *et al*., 2004).

The ecological impact of land degradation: The primary environmental consequences of land degradation include rapid loss of habitat and biodiversity, changes in water flows, and sedimentation of reservoirs and coastal zones (Project Development Facility, 2007).

4.1.1.2 Soil Pollution

Many plants and microorganisms rely on **soil quality**. However, because of human intervention, the soil has become severely polluted. Soil pollution (also known as soil contamination) is defined as the presence of toxic chemicals in the soil. Pollution is defined as a level of contaminants that exceeds the natural concentration of these substances. Excessive amounts of fertilizer and pesticides, for example, are used in farming practices. Pesticides frequently contain toxic elements that can pollute the soil. Furthermore, many landfills have leaks, and trash containing harmful components can enter the soil and pollute it. Mercury, arsenic, lead, nickel, zinc, copper, and polyaromatic hydrocarbons are the most common soil pollutants.

4.1.1.2.1 Causes, Effects, and Solutions of Soil Pollution

The following sections explore the types, causes, effects, and solutions to the soil pollution problem.

A. Causes of Soil Pollution

Agriculture: Agriculture contributes significantly to soil pollution. The soil frequently loses its fertility as a result of over-exploitation. This results in lower crop yields in the future, potentially leading to food shortages.

Excessive application of fertilizers and pesticides: Another issue is the excessive use of pesticides and fertilizers. Farmers in industrial farming culture frequently use large amounts of chemicals to increase yields. However, this has serious consequences for soil quality. Some fertilizers and pesticides are not absorbed by the plants and thus pollute the soil. Furthermore, because chemical contamination changes the structure and composition of the soil, soil pollution increases the likelihood of erosion by air or water.

Processes in industry: Since the industrial revolution, industrial production has been a major source of soil pollution. Since then, human consumption levels have steadily increased, resulting in an ever-increasing demand for natural resources and goods made from them. As a result, significant quantities of precious metals and other elements are extracted from the ground. However, most people are unconcerned about the environment. Byproducts of manufacturing processes are frequently dumped nearby, contaminating the soil.

Deforestation: Soil pollution can also result from deforestation. The roots of trees help to keep the soil stable. When trees or entire forests are cut down, the soil is exposed to wind and water, increasing the likelihood of soil erosion dramatically.

Leaks and spills: All types of leaks and spills can contaminate the soil. A leak in an oil transport vehicle, for example, can contaminate the soil. The problem is exacerbated if the leaking transport vehicle transports extremely dangerous chemicals, such as nuclear waste. If a leak occurs in this mode of transportation, the soil in this area may become contaminated for an extended period.

Littering: It has become a significant contributor to the problem of soil pollution. People frequently throw away their garbage with no regard for how it is disposed of. This is evident, for example, when we consider how people dispose of their used cigarettes. They frequently just throw them on the ground, unconcerned about the negative consequences for our environment. Because cigarettes contain numerous harmful substances, smoking pollutes the soil because these chemicals are washed into the ground by rainfall and eventually reach our groundwater.

Disposal of Wastes: Our waste can cause severe soil pollution if proper waste disposal processes are not in place. This issue is especially severe in developing countries. Many companies that manufacture in developing countries are unconcerned about proper waste disposal management. To get rid of their industrial waste, they frequently simply dump it nearby. However, this garbage frequently contains hazardous chemicals that, if not disposed of properly, contaminate the soil.

Mining: Raw materials are frequently processed and crushed during the mining process to make them usable for further use. However, heavy metals and other chemicals are frequently used in these processes, which can contaminate the soil if not handled properly.

Construction: Construction processes play an important role in the context of soil pollution because many chemicals and other harmful substances are used in construction, which can contaminate the ground. Furthermore, construction sites frequently emit large amounts of toxic dust, which settles in nearby areas and thus contaminates the air and soil.

Transportation: Transportation, whether by private individuals or for industrial purposes, contributes significantly to the problem of soil pollution. Vehicles emit toxic gases that pollute the ground and the air. They also cause pollution because these chemicals can cause acid rain.

Landfills: Landfills, if not properly constructed, can be a major source of soil contamination. If landfills are used, we must ensure that the materials disposed of in these landfills do not come into contact with the soil. If they come into contact with the ground, they can contaminate it with heavy metals and other harmful substances.

Waste chemicals: If chemical waste is not disposed of properly, it can have serious negative effects on the soil. Many of these chemicals, particularly those used in industrial processes, are highly toxic and can contaminate the soil for a long time.

Nuclear/Radioactive waste: When it comes to nuclear waste, the situation becomes even worse. Nuclear power plants are frequently used to generate electricity because they are an efficient and relatively inexpensive source of energy. The byproducts of nuclear energy production, on the other hand, are highly toxic to the environment. These by-products are frequently dumped on the ground in storage. This method solves the problem for a limited time. However, the affected areas will be heavily polluted for a very long time, and human beings will be unable to use them for future settlement or agricultural activities.

Acid rainfall: Acid rain is another source of soil pollution. Air pollution is the primary cause of acid rain. When it rains, the contaminated air adds chemicals to the rain, raising the acidity level. The increased acidity causes soil pollution and has a negative impact on vegetation.

Illegal dumping: Illegal dumping has become a major issue, particularly in developing countries. Industries must process large amounts of resources in order to meet humans' demand for material goods. The byproducts of the manufacturing process must be disposed of in some way. If the garbage disposal process is not properly set up and the garbage is dumped in nearby lakes, rivers, or other natural areas, the soil is severely contaminated. Because officials are frequently bribed to tolerate illegal dumping, the problem is exacerbated in poor and corrupt countries.

Natural causes: The majority of the causes of soil pollution are caused by humans. However, there are a few natural causes of soil pollution. Natural chemical processes, for example, may cause soil pollution if certain elements come into contact with each other.

B. Effects of Soil Pollution

Health Consequences: Soil pollution can have serious consequences for public health. If the soil is contaminated, the plants grown on it are also contaminated. This has a negative impact on humans via the food chain. Humans will be contaminated because they consume vegetables and fruit. Furthermore, farm animals consume these contaminated crops. Peoples will be polluted if they consume these farm animals later on. This, in turn, can lead to serious health problems in humans. Furthermore, these chemicals can cause changes in genetic structure, resulting in serious health problems for future generations.

The impact on microorganisms: Soil pollution harms microorganisms because they are extremely sensitive to changes in their natural environmental conditions. Because of the contamination of soil with heavy metals and other harmful substances, these microorganisms are frequently unable to adjust to the new circumstances and die off. Because all natural processes are interconnected, the decline in microorganisms may cause chain reactions that have far-reaching consequences for the entire environmental system.
The impact on animals: Soil pollution has an impact on all types of animals. Many animals eat crops or plants to meet their energy needs. If the soil and thus the crops become contaminated, the animals that consume the crops and plants become contaminated as well. Soil pollution, like air pollution, can have serious health consequences for animals.
Impacts on plant fertility: Furthermore, plant fertility is likely to be reduced as a result of soil pollution. Because plants are typically very sensitive to changes in their natural environmental conditions, soil contamination can result in a decrease in the fertility of the affected plants.
Impacts on the growth behavior of plants: Soil pollution can also influence plant growth behavior. Because plants require a stable level of acidity and nutrient supply, a change in these parameters caused by soil pollution will most likely have an adverse effect on plant growth.
Crop yield reduction: Crop yields are also likely to suffer as a result of soil pollution. When plants' natural environments are contaminated with harmful chemicals, they typically are unable to adapt to these new circumstances in a timely manner. As a result, crop yields will be lower than in an unpolluted environment.
The impact on aquatic life: Soil pollution has an indirect impact on aquatic life. Harmful chemicals will eventually reach our rivers, lakes, and seas due to the overuse of pesticides and the release of toxic gases from industrial processes. Thus, soil pollution will have an adverse effect on sea animals and plants.
Ground water contamination: It is only a matter of time before chemicals and other harmful substances contaminate the soil and reach the groundwater. These chemicals will eventually be washed through the soil by heavy rains, contaminating our groundwater.
An increase in algae: Algae production increases as a result of soil contamination. Because fertilizers contain substances that promote algae growth, when these chemicals end up in rivers and lakes, the algae production in these water environments will increase. This, in turn, is likely to reduce oxygen levels, resulting in the death of many aquatic animals.
PH-level Changes: PH levels are also affected by soil pollution. The pH level of an environment or substance measures its acidity. For example, if the soil is contaminated and the pH level changes as a result, plants usually suffer because they are quite sensitive to changes in pH levels, and crop yields are likely to suffer as a result.
Impacts on soil structure: Furthermore, the structure of the soil itself can change as a result of chemical contamination. This can increase the likelihood of erosion while also reducing soil fertility.
Impact on the atmosphere: Soil pollution may contribute to an increase in air pollution by aerating soils.

C. Solutions to the Problem of Soil Pollution

Government rules and regulations: To address the issue of soil pollution, governments all over the world must take action and implement strict regulations. This entails strict oversight of landfill operations to ensure that the soil is not contaminated. Furthermore, illegal dumping must be stopped. This could be accomplished through increased fines and greater control. To prevent soil pollution, the use of fertilizers and pesticides should be limited. Furthermore, industries must be prohibited from emitting excessive amounts of acid rain-causing gases. Industries should be required to use proper waste disposal processes in order to dispose of their garbage in an environmentally friendly manner. Furthermore, local governments must prohibit the process of deforestation, particularly in tropical rainforests.
Reforestation: Reforestation is another method of reducing soil pollution. On the one hand, an increase in trees means that more harmful gases can be filtered, resulting in cleaner air, less acid rain, and thus less soil pollution. Increased forest cover, on the other hand, protects the surface and thus prevents erosion from wind and water.
Consumption reduction: Every one of us can help to reduce soil pollution in our daily lives by reducing our consumption. For the production of material goods, precious metals and other elements must be extracted from the ground. Toxic elements that contaminate the soil are frequently used in the extraction process of these elements. Furthermore, harmful gases are emitted by industries during the manufacturing process, which can lead to acid rain, which further contaminates the soil.
Recycling: Soil pollution can be reduced by recycling properly. The more efficient the recycling process, the more material that can be reused and the less material that is wasted. As a result, recycling prevents resource depletion and thus indirectly contributes to a reduction in soil contamination.
Bioremediation: The contaminated soil can be naturally decontaminated using bioremediation. To degrade the target pollutants, specific microorganisms are used. As a result, the level of contamination is likely to be reduced.
Reduced use of fertilizer and pesticides: Another important step toward reducing soil pollution is to reduce the use of fertilizers and pesticides. Fertilizers are used by farmers to boost crop yields. Pesticides protect plants and crops to be eaten by animals or insects. Pesticides and fertilizers, on the other hand, contain harmful elements

that contribute to soil pollution. Farmers can help reduce soil pollution by becoming more aware of the issue and reducing their use of these substances.

Replace conventional products with organic ones: Soil pollution can be reduced by switching from conventional to organic products. Conventional products are typically much cheaper than organic products, so consumers are eager to consume them. However, due to the overuse of pesticides, the level of contamination with harmful substances in conventional products is typically much higher than in organic products. Less soil pollution can be applied by switching from conventional to organic products because organic agriculture allows for far fewer harmful substances.

Avoid leaving litter: This issue appears to be quite simple to resolve. However, littering remains a major issue. People appear to be unconcerned about how their actions affect our planet. Instead of using trash cans on a daily basis, people simply throw their garbage on the ground. Stopping this behavior is critical for reducing soil pollution because the soil absorbs toxic elements from trash on the ground.

Avoid using fossil fuels: Fossil fuels are used in industries as well as in our daily lives, such as when we drive our cars. Fossil fuels contribute to soil pollution because their combustion emits harmful gases that cause acid rain. This rain pollutes the soil and increases its acidity, harming the entire ecosystem. Soil contamination reduction can be done by avoiding the use of fossil fuels in day-to-day life. Furthermore, reducing consumer products made with the help of fossil fuels will help to mitigate the problem.

Organic gardening: Organic gardening is a further step toward reducing soil pollution. Planting human parts of food organically rather than buying conventional food from the store is a practice that can contribute to a lower level of total fertilizer and pesticide use and, thus, less soil pollution.

Proper waste disposal: It is critical to ensure that waste is properly disposed of. This entails separating garbage in one's daily life. Furthermore, it must be ensured that industries have proper waste disposal processes in place and do not dump their trash in nearby rivers, lakes, or other natural storage areas.

Wetland rehabilitation: Wetland restoration can help to mitigate soil pollution to some extent. Microorganisms in wetlands can degrade some contaminants and thus improve soil quality through natural processes.

Persuade others: Making sure that others are convinced can help with problem mitigation.

4.1.1.3 Water Resources degradation

Water covers approximately 70% of the Earth's surface area; 97.5% of this is saltwater, mostly found in oceans and seas, and 2.5% is fresh water. The majority of freshwater, approximately 68.7%, is frozen in ice caps and glaciers, 30.1% is stored as groundwater, and the remaining small fraction (1%), is found as surface water in lakes and rivers, soil moisture, and in the atmosphere and biota. At any given time, usable fresh water constitutes approximately 0.01% of the world's total water (Assefa and Leonard, 2015).

Water is a "renewable" resource that provides important services, is constantly replenished by the hydrologic cycle, and can degrade when used or altered faster than it can be replenished. Water degradation is the pollution of water from trash dumped in oceans, illegal dumping, disposal of large amounts of industrial waste into nearby rivers or lakes etc. Natural processes (climate change, water-rock interactions, and geological factors), as well as human activity (agriculture practices and urban waste), can all contribute to the degradation of water resources, as can the presence of significant chemical compounds since the industrial revolution (Nagaraju et al., 2016). Water pollution is the contamination of water by an excessive amount of a substance that can harm humans and/or the environment (Matthew, 2022). The level of water pollution is determined by the abundance of the pollutant, its ecological impact, and how the water is used. Water pollution is caused by one of four factors: sewage discharges, industrial activities, agricultural activities, and urban runoff (including storm water) (Eckenfelder and Wesley, 2000). It is classified as either surface water pollution (freshwater pollution or marine pollution) or groundwater pollution. Pollutants are produced by biological, chemical, or physical processes. Although natural processes such as volcanic eruptions or evaporation can occasionally cause water pollution, the majority of pollution is caused by human, land-based activities. Water pollutants can move through different reservoirs as the water carrying those moves through the stages of the water cycle.

Figure 1 depicts pollutant types, pathways, and sources, as well as how they influence surface water and groundwater systems based on natural and anthropogenic sources.

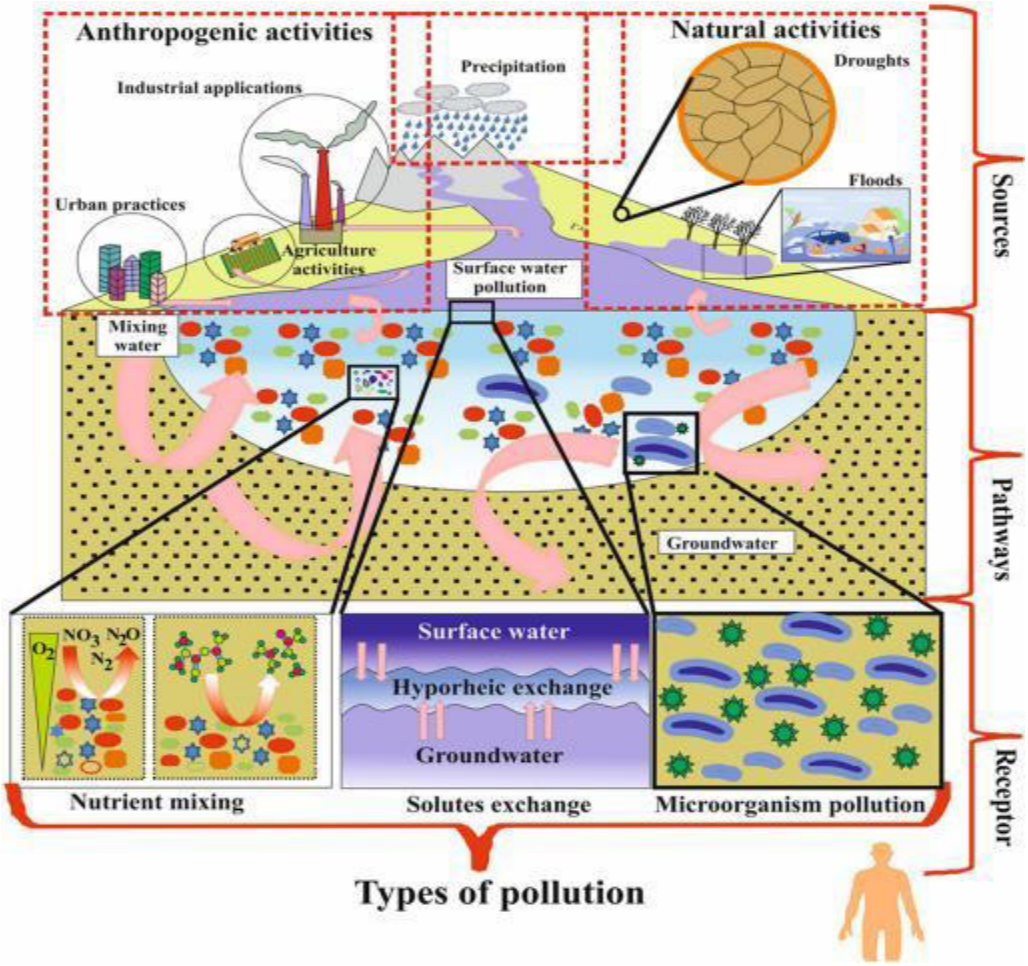


Figure 1. The schematic diagram depicts water contamination caused by natural (droughts and floods) and anthropogenic (industrial, agricultural, and urban activities), as well as the pathways, receptors, and other types of pollution. (**Sources:** Akhtar *et al*., 2021).

Water pollution sources

Water pollution can occur from a variety of sources. Point-source pollution occurs when pollution originates from a single/discrete source, such as an oil spill or discharge pipe. Industrial effluents, wastewater treatment plants, landfills, and abandoned mines are examples of point sources that are easy to identify, have quantifiable discharges, and have obvious environmental impacts. Nonpoint-source pollution occurs when pollution originates from multiple sources. And these kinds of sources are produced by broad and diffuse sources, which can be difficult to identify and quantify. Agricultural and urban runoffs are two examples. Pollutants from nonpoint sources enter water bodies via surface and groundwater movement, as well as precipitation from the atmosphere (e.g., acid rain). Nonpoint source pollution is one of the primary sources and causes of water degradation worldwide. Most types of pollution have an immediate impact on the area around the source. Nonpoint source pollution is usually much more difficult and expensive to control than point source pollution because of its low concentration, multiple sources, and much greater volume of water. Trans-boundary pollution occurs when pollution affects the environment hundreds of miles away from the source, such as nuclear waste.

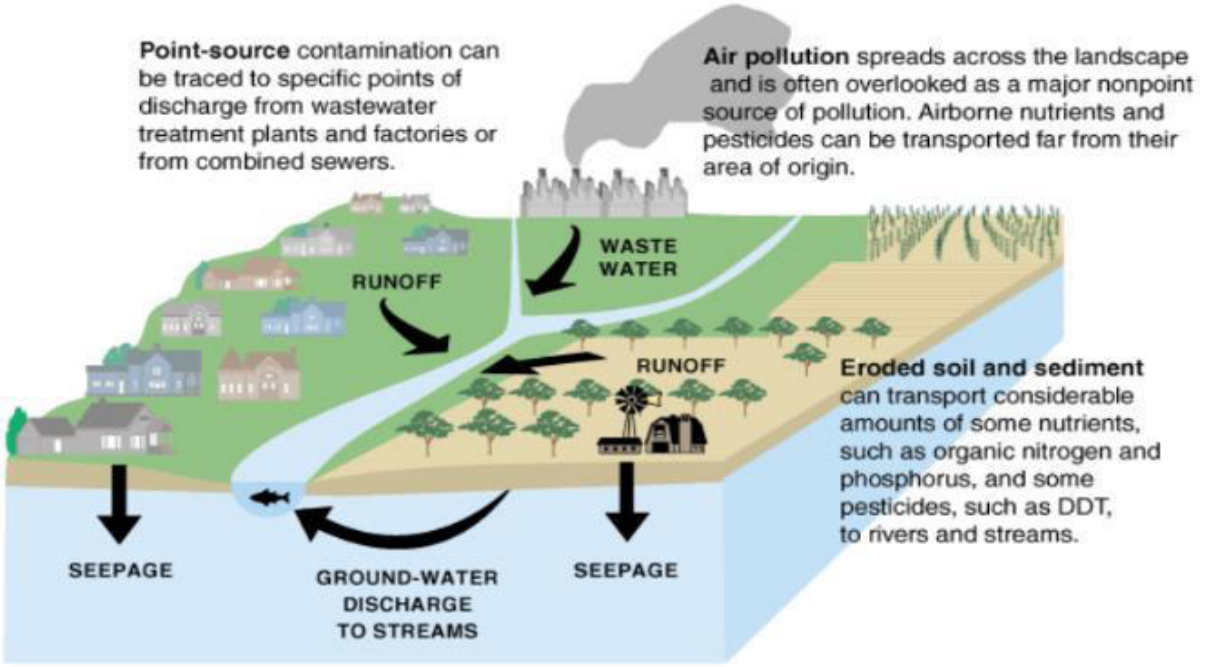


Figure 2. Some water pollutants' sources and movement into different water reservoirs of the water cycle (**Source:** United States Geological Survey; cited in Matthew, 2022)

A. Causes of water degradation

Water pollution is now a global issue as a result of increasing population, industrialization, urbanization, and other human activities (Engida *et al*., 2020). Pollution can take the form of toxic substances (e.g., oil, metals, plastics, pesticides, persistent organic pollutants, industrial waste products), stressful conditions (e.g., pH changes, hypoxia or anoxia, increased temperatures, excessive turbidity, unpleasant taste or odor, and salinity changes), or pathogenic organisms. Pollutants can both be organic and inorganic substances. Degrading factors that affect water quality can be chemical, biological, or physical, and these three causes frequently interact with one another.

Water Pollution Caused by Chemicals

Chemical water pollution is the degradation of water's usefulness caused by one or more degrading substances such as sediments, organic wastes, nutrients, metals, salts, and many other natural and synthetic chemicals that can be caused by both anthropogenic and natural processes. Humans have a significant impact on water quality through consumption and pollution generation. Evaporation from surface pools, for example, can concentrate salts and other chemicals by reducing overall water volume and runoff and infiltration can leach harmful levels of metals into groundwater. Background pollution or natural contamination refers to degradation of water quality caused by processes in the hydrologic cycle, as opposed to degradation caused by anthropogenic causes.

Pollution from biological sources

According to Elizabeth (2022), biological pollutants are substances in our environment that are produced by living organisms and have the potential to harm our health. Pollen from trees and plants, insects or insect parts, certain fungi, some bacteria and viruses, and even animal hair, skin scales, saliva, and urine are examples. Not all of these substances are harmful to everyone who comes into contact with them.

Waterborne diseases such as infectious hepatitis, cholera, bacterial dysentery, and microscopic parasites such as Giardia and Cryptosporidium have all been linked to the biological pollution of water resources. Many of these diseases are linked to the presence of untreated or improperly treated sewage or animal waste in a drinking water source. Although advances in wastewater treatment have reduced or eliminated the majority of cases of waterborne infectious diseases in developed countries, these diseases remain prevalent in developing countries. Organic matter discharges, such as sewage, pulp mill effluents, and animal processing wastes, can have an impact on water quality by increasing the demand for oxygen. Aerobic (oxygen-using) waterborne bacteria consume available dissolved oxygen (DO) during organic matter decomposition, lowering DO to levels insufficient to support other oxygen-breathing aquatic organisms (e.g., fish) and rendering the water unsuitable for humans' consumption. The biological oxygen demand is the measurement of the amount of oxygen required to decompose organic matter (BOD).

Eutrophication

Eutrophication is a widespread issue that exemplifies the interactions between chemical pollutants and biological processes that degrade water quality. Eutrophication is the process by which a body of water accumulates

nutrients (mostly nitrates and phosphates) that are required for, and often limit, the growth and proliferation of algae and other aquatic plants. Eutrophication is a natural process (natural eutrophication) that occurs when nutrients leach from soils or erode from rocks. However, anthropogenic activities, primarily the use of agricultural fertilizers, have significantly increased the rate at which water bodies are becoming eutrophied (cultural eutrophication). Algae proliferate (bloom) and use excess nutrients, converting atmospheric carbon dioxide (CO_2) into organic matter in the form of new algal cells. As these cells die and decompose, they produce BOD, which leaves little DO for other aerobic aquatic organisms (e.g., fish).

According Casper (2018), when the environment becomes nutrient-rich, this is referred to as eutrophication. This can be a problem in marine habitats like lakes because it can lead to algal blooms.

- Fertilizers are frequently used in farming, and sometimes these fertilizers run off into nearby water, increasing nutrient levels and causing phytoplankton to grow and reproduce more rapidly, resulting in algal blooms.
- This algae bloom disrupts normal ecosystem functioning and causes numerous problems.
- The algae may consume all of the oxygen in the water, leaving none for other marine life. Many aquatic organisms, such as fish, die as a result of this, because they rely on the oxygen in the water to survive.
- Algal blooms may also block sunlight from reaching photosynthetic marine plants below the water's surface.
- Some algae even produce toxins that are harmful to higher forms of life. This can disrupt the food chain and harm any animal that consumes them.

Physical Factors

Water control and supply structures such as dams, reservoirs, and distribution systems can help with urban and agricultural development, but they frequently have negative environmental consequences. Dams and reservoirs can have an impact on water quality by reducing stream flows, halting nutrient and sediment delivery, negatively impacting fish migration, and destroying habitats.

Water Stress

Water stress is primarily caused by over-exploitation of available water resources without regard for sustainability, or by implementing few or no water and soil conservation practices to augment groundwater recharge and reduce runoff. Over pumping of groundwater is frequently associated with salinization of groundwater in coastal areas. The increase in soluble salts in water caused by a variety of factors is known as salinization. The major sources of salinization are increased use of chloride salts in roads during the winter and over-pumping of groundwater in coastal areas, which results in lowering of the piezometric surface (saltwater intrusion). Some surface irrigation practices in arid regions can also increase salt accumulation on the surface of irrigation fields, increasing the salinity of receiving water bodies during runoff.

Thermal/ Heat pollution

Thermal pollution, also known as heat pollution, is the degradation of water quality caused by changes in water temperature. It is a common problem, especially for aquatic organisms. The use of water as a coolant in electrical power generation and other industrial manufacturing plants is currently the main source of thermal pollution. These processes raise the temperature of receiving bodies of water, lowering available dissolved oxygen and stressing aquatic organisms, such as fish and other aquatic animals. In some cases, such as when deep cold water is released from a dam, the temperature of bodies of water drops, which can stress warm water organisms. Global warming will cause an increase in both air and water temperatures. As water temperatures rise, algae concentrations are likely to rise, potentially reducing oxygen levels and polluting the water with harmful substances.

B. Effects of water degradation

When the physical, chemical, or biological properties of water become harmful to the environment or organisms including humans, the usefulness of the water resource is reduced in some way.

Many basins' water resources are over-exploited. According to WRI (2000), surface water in major river basins like the Colorado, Huang-He (Yellow), Indus, Nile, SyrDarya, and Amu Darya is completely exploited, harming aquatic ecosystems and human well-being. Trends in unsustainable groundwater exploitation, particularly in South Asia, are also significant (Morris *et al.*, 2003). Water scarcity is widely acknowledged to be a major factor limiting food production and wealth generation for the poor, and scarcity is expected to worsen (Rijsberman, 2000). Water pollution is also an increasing issue (WRI, 2000), with approximately 12,000 km^3 of polluted water on the planet, equivalent to more than the contents of the world's ten largest river basins and six years' worth of global irrigation needs. Diborah et al. (2004) stated as water quality degradation restricts the range of productive uses of that water and, in particular, reduces its value for environmental services.

C. Measures to Prevent Water Pollution

The most effective methods of reducing water degradation are to identify and, if possible, reduce or eliminate the causes. This frequently involves land management procedures referred to as Best management practices (BMPs). BMPs include practices such as substituting dry-land (xerophytic) crops for water-demanding crops in order to

reduce water consumption and excess nutrient runoff from agriculture by using less fertilizer and more conservative cropping systems (Assefa and Leonard, 2015). Water pollution control necessitates appropriate infrastructure, management plans, and legislation. Improved sanitation, sewage treatment, industrial wastewater treatment, agricultural wastewater treatment, erosion control, sediment control, and urban runoff control (including storm water management) are examples of technological solutions. Reduce the speed and volume of flow to effectively control urban runoff.

4.1.1.4 Atmospheric degradation

Atmosphere refers to the envelope of gases that surrounds the Earth. Atmospheric degradation refers to the alteration of atmospheric conditions by humans, either directly or indirectly, that has significant deleterious effects that endanger human life and health as well as the Earth's natural environment. Atmospheric degradation includes air degradation, particle pollution and depletion of the ozone layer. Atmospheric pollution refers to the introduction or release of substances into the atmosphere by humans, directly or indirectly, that contribute to deleterious effects that extend beyond the State of origin and are of such a nature as to endanger human life and health, as well as the Earth's natural environment. Air pollution is the contamination of air caused by the presence of substances in the atmosphere that are harmful to human and other living beings' health or cause damage to the climate or materials. Gases (including ammonia, carbon monoxide, sulfur dioxide, nitrous oxides, methane, carbon dioxide, and chlorofluorocarbons), particulates (both organic and inorganic), and biological molecules are all examples of air pollutants (WHO, 2022).

According to Manisalidis (2020), humans are susceptible to diseases, allergies, and even death as a result of air pollution. Air pollution negatively impacts other living organisms such as animals and food crops, as well as harms the natural environment (for example, climate change, ozone depletion, or habitat degradation) or the built environment (for example, acid rain). Lelieveld et al. (2015) stated that air pollution is a global environmental health hazard that causes an estimated three million deaths each year. Both human activities and natural phenomena can contribute to air pollution (Dimitriou *et al*., 2011). The World Health Organization provides the most extreme figures, reporting that in 2012, over seven million people died as a result of air pollution exposure (one in every eight total global deaths) (WHO, 2014).

A. Causes and consequences of air pollution

Fossil fuel combustion: The majority of air pollution is caused by the combustion of fossil fuels such as coal, oil, and gasoline to generate energy for electricity or transportation. The amount of carbon monoxide released indicates how much fossil fuel is burned. This also generates other toxic pollutants into the atmosphere. Inhaling polluted air caused by the combustion of natural gas and fossil fuel reduces the heart's ability to pump enough oxygen, resulting in respiratory illness.

Emissions from Industry: Industrial activities emit a variety of pollutants into the atmosphere, which has far-reaching consequences for air quality. Particulate matter 2.5 and 10, nitrogen dioxide, sulfur dioxide, and carbon monoxide are all major pollutants emitted by industries that use coal and wood as their primary energy sources. The health effects of industrial pollution can range from irritation in the eyes and throat to breathing problems, which can sometimes lead to chronic illness.

Pollution of Indoor Air: Toxic products, also known as Volatile Organic Compounds (VOCs), insufficient ventilation, uneven temperature, and humidity levels can all contribute to indoor air pollution, whether at work, school, or at home. House air pollution can occur as a result of careless factors such as smoking inside a room or leaving mold-infested walls untreated. The use of wood stoves or space heaters can quickly raise humidity levels, which can have a negative impact on a person's health.

Wildfires: Climate change is increasing not only wildfires but also air pollution. Burning stubble and farm residue also contributes significantly to wildfires. It increases the amount of fine particulate matter ($PM_{2.5}$) in the air, which collides with other harmful substances such as chemical gas and pollen, resulting in smog. Smog makes the air foggy, making it difficult to breathe. Controlled or prescribed burning is a technique used in forestry, agriculture, prairie restoration, and greenhouse gas reduction (Harper *et al*., 2022).

Transportation: There is no doubting that vehicle pollution is a major source of air pollution, particularly in urban areas. Motor vehicles, trains (particularly diesel locomotives), marine vessels, and aircraft are examples of mobile sources (USEPA, 2022). When the car burns gasoline, it emits pollutants in the air which is as harmful as smoking 10 cigarettes a day. Carbon monoxide, hydrocarbons, nitrogen oxide, and particulate matter are all emitted by the vehicle. When there is a lot of vehicle pollution in the air, it causes a hole in the ozone layer, which contributes to smog and other health problems.

Open Burning of Garbage Waste: Open garbage burning is far more hazardous to one's health and the environment than one might believe. Exposure to open garbage burning can cause serious health problems such as cancer, liver problems, immune system impairment, and reproductive dysfunction; it can also harm the developing nervous system.

Building and Deconstruction: Several building sites and raw materials, such as bricks and concrete, produce pollutants and poisonous air, which endangers people, particularly children and the elderly.

Agricultural Operations: Agricultural practices have had a serious influence on the deterioration of air quality. To begin, the primary sources of air pollution are pesticides and fertilizers. Fertilized farmland could be a significant source of nitrogen oxides (Francie, 2018). Pesticides and fertilizers are now mixed with new invasive species that are not found in nature to promote the rapid growth of crops and vegetation. The smell and effect of the pesticides remain suspended in the air after they have been sprayed. Some combine with water and some seep into the ground, destroying crops while also causing lots of new health problems.

Chemical and synthetic product use: Indoor air pollution from household products is ten times more dangerous than outdoor air pollution. Volatile Organic Compounds (VOCs), which are found in paints, cleaners, and personal care products like perfume and deodorants, are a source of many health problems. Other issues caused by inhaling poor house air quality include asthma or other respiratory issues, as well as lung disease.

Air pollutants

Air pollutants are classified as either primary or secondary. Primary pollutants are typically produced by processes such as ash from a volcanic eruption. Other examples include carbon monoxide gas from automobile exhausts and sulfur dioxide emitted by factories. Secondary pollutants are not emitted directly. Rather, they form in the air when primary pollutants react or interact. Ground-level ozone is a well-known example of a secondary pollutant. Some pollutants are both primary and secondary, meaning they are both emitted directly and formed from other primary pollutants.

Human activity emits the following pollutants into the atmosphere:

Carbon dioxide (CO_2): Carbon dioxide has been termed the leading pollutant and the worst climate pollutant due to its role as a greenhouse gas. Carbon dioxide is a natural component of the atmosphere that is required for plant life and is emitted by the human respiratory system (Keith, 2009). CO_2 increases in the earth's atmosphere have been accelerating. CO_2 now accounts for about 410 parts per million (ppm) of the earth's atmosphere, up from about 280 ppm in pre-industrial times, and the burning of fossil fuels emits billions of metric tons of CO_2 each year (NASA, 2021).

Sulfur oxides (Sox): Specifically sulfur dioxide, a chemical compound with the formula SO_2. Volcanoes and various industrial processes produce SO_2. Sulfur compounds are commonly found in coal and petroleum, and their combustion produces sulfur dioxide. Further oxidation of SO_2, usually in the presence of a catalyst such as NO_2, results in the formation of H_2SO_4, and thus acid rain. This is one of the factors for concern about the environmental impact of using these fuels as energy sources.

Nitrogen oxides (NOx): Nitrogen oxides, especially nitrogen dioxide, are emitted during high-temperature combustion and are also produced by electric discharge during thunderstorms. They can be seen as a brown smog dome above or a plume downwind of cities. Nitrogen dioxide is a chemical compound with the formula NO_2. It is one of several nitrogen oxides. This reddish-brown toxic gas, one of the most visible air pollutants, has a distinctive sharp, biting smell.

Carbon monoxide (CO): Carbon monoxide is a toxic gas that is colorless and odorless. It is a byproduct of fuel combustion, such as natural gas, coal, or wood. The majority of carbon monoxide released into the atmosphere is caused by vehicle exhaust. It causes smog-like formations in the air, which have been linked to a variety of lung diseases as well as disruptions to the natural environment and animals (NHS, 2017).

VOCs (volatile organic compounds): VOCs are well-known outdoor air pollutants. They are classified as methane (CH_4) or non-methane (NMVOCs). Methane is a highly effective greenhouse gas that contributes to increase global warming. Other hydrocarbon VOCs are significant greenhouse gases due to their role in the formation of ozone and the extension of the life of methane in the atmosphere. This effect varies depending on the quality of the local air. The aromatic NMVOCs Benzene, toluene, and xylene are suspected carcinogens that can cause leukemia if exposed for a long period of time.

Particulate matter/particles (PM): PMs are microscopic solid or liquid particles suspended in a gas. They are also known as particulate matter (PM), atmospheric particulate matter (APM), or fine particles. Aerosol, on the other hand, is a particle-gas mixture. Particles are produced by volcanoes, dust storms, forest and grassland fires, living plants, and sea spray. Human activities such as the combustion of fossil fuels in automobiles, power plants, and a variety of industrial processes produce aerosols. According to American Heart Association (2010), anthropogenic aerosols, or those produced by human activity, currently account for approximately 10% of our atmosphere on a global scale. Increased fine particle levels in the air have been linked to health risks such as heart disease altered lung function, and lung cancer. Particulates are connected with respiratory infections and can be especially harmful to people who suffer from conditions such as asthma.

Persistent free radicals: Cardiopulmonary disease has been linked to persistent free radicals associated with airborne fine particles.

Toxic metals, particularly lead and mercury compounds are also pollutants emitted to the atmosphere by human activity.

Chlorofluorocarbons (CFCs): Chlorofluorocarbons are emitted by now-prohibited products; harmful to the ozone layer. These are gases emitted by air conditioners, freezers, aerosol sprays, and other similar devices.

CFCs reach the stratosphere after being released into the atmosphere. They interact with other gases here, causing harm to the ozone layer. As a result, UV rays can reach the earth's surface. This can lead to skin cancer, eye problems, and even plant damage (USEPA, 2017).

Ammonia is primarily emitted by agricultural waste. The chemical formula for ammonia is NH3. It is typically encountered as a gas with a distinct pungent odor. Ammonia, as a precursor to foodstuffs and fertilizers, contributes significantly to the nutritional needs of terrestrial organisms. Ammonia is also used in the synthesis of many pharmaceuticals, either directly or indirectly. Despite its widespread use, ammonia is both caustic and hazardous (Damian, 2021). Ammonia reacts with nitrogen and sulfur oxides in the atmosphere to form secondary particles. **Odors:** Garbage, sewage, and industrial processes, for example, emit odors.

Radioactive pollutants are created by nuclear explosions, nuclear events, war explosives, and natural processes such as radon radioactive decay.

Secondary pollutants include the following:

Photochemical smog: particles are generated from gaseous primary contaminants and chemicals. Smog is an example of an atmospheric pollution. Smog is caused when a large amount of coal is burned in one area, resulting in a mixture of smoke and sulfur dioxide. Modern smog is typically caused by automotive and industrial emissions, which are acted on by UV light from the sun in the atmosphere to produce secondary pollutants, which then combine with the primary emissions to produce photochemical smog.

Ground-level ozone (O_3) is formed when NOx and VOCs combine. It contributes significantly to the troposphere. It is also an important component of the ozone layer, which can be found in various parts of the stratosphere. It is a pollutant and smog component produced in large quantities as a result of human activity (mostly the combustion of fossil fuels) (Amazing world, 2022).

Peroxyacetyl nitrate ($C_2H_3NO_5$): The NOx and VOCs both produce peroxyacetyl nitrate ($C_2H_3NO_5$).

Natural Sources

Dust from natural sources, big areas of land with little or no vegetation Methane emitted by animal digestion of food, such as cattle Radon gas from radioactive decay within the Earth's crust.

Radon is a colorless, odorless, found naturally radioactive noble gas produced by the decay of radium. It is regarded as a health hazard. Radon gas from natural sources can accumulate in buildings, particularly in confined areas such as the basement, and it is the second leading cause of lung cancer after cigarette smoking.

Wildfire smoke and carbon monoxide: During active wildfires, smoke from uncontrolled biomass combustion can account for nearly 75% of all air pollution by concentration (Goldstein et al., 2009). On warmer days, vegetation in some areas emits significant amounts of volatile organic compounds (VOCs) into the environment. These VOCs combine with primary anthropogenic pollutants, such as NO_x, SO2, and anthropogenic organic carbon compounds, to form a seasonal fog of secondary pollutants. Some examples of VOC-producing vegetation include black gum, poplar, oak, and willow. These species' VOC production causes ozone levels to be up to eight times higher than low-impact tree species (Mark, 2014).

Volcanic activity: Sulfur, chlorine, and ash particulates are produced as a result of volcanic activity.

B. Air pollution prevention

To reduce air pollution, various pollution control technologies and strategies are available.

Land-use planning: More particularly, modern land-use planning aims to conserve the environment, limit urban sprawl, reduce transportation costs, prevent land-use conflicts, and reduce pollution exposure.

Energy transition: The most effective approach to reduce air pollution is to switch to clean power/ renewable energy sources such as wind power, solar power, and hydropower, which do not pollute the environment.

Pollution alternatives: viable alternatives to the primary causes of air pollution, such as
- Strategic replacement of air pollution sources in transportation with lower-emission or, over time, emission-free modes of public transportation and bicycle use and infrastructure (along with remote work, work reductions, relocations, and localizations)

- The phase-out of fossil-fuel vehicles is an essential component of the transition to sustainable transportation.
- Even when areas with frequent ship calls and heavy freeway and city traffic are considered, areas downwind (more than 20 miles) of major airports have more than double total particulate emissions in the air than other areas.
- Ship propulsion and idling can be converted to much cleaner fuels, such as natural gas.
- Ground source heat pumps and seasonal thermal energy storage can be used to replace the combustion of fossil fuels for space heating.
- Nuclear and renewable energy can be used to replace electricity generated by the combustion of fossil fuels.
- Electric vehicles can replace fossil-fuel-powered vehicles, which contribute significantly to urban air pollution.
- Reducing vehicle travel can help to reduce pollution.

- Bio-digesters can be used in poor countries where slash and burn are common, transforming a useless commodity into a source of income.
- Both induced humidity and ventilation can significantly reduce air pollution in enclosed spaces.

Control Devises

In industry and transportation, the following items are commonly used as pollution control devices.

Particulate management

- Collectors that work mechanically (dust cyclones, multi cyclones)
- Precipitators that are electrostatic
- Bag-houses:
- Particulate scrubbers

Scrubbers

- Baffle spray scrubber
- Cyclonic spray scrubber
- Ejector venturi scrubber
- Mechanically aided scrubber
- Spray tower
- Wet scrubber

NO_x control

- LO-NO_x burners
- Selective catalytic reduction (SCR)
- Selective non-catalytic reduction (SNCR)
- NO_x scrubbers
- Exhaust gas recirculation
- Catalytic converter (also for VOC control)

VOC abatement

- Adsorption systems, using activated carbon, such as
- Fluidized Bed Concentrator
- Flares
- Thermal oxidizers
- Catalytic converters
- Biofilters
- Absorption (scrubbing)
- Cryogenic condensers
- Vapor recovery systems

Acid gas/ so_2 control

- Wet scrubbers
- Dry scrubbers
- Flue-gas desulfurization

Mercury control

- SorBent injection technology
- Electro-catalytic oxidation (ECO)
- K-Fuel

Dioxin and furan control

Regulations: There are two types of air quality standards in general. The first type of standard (such as the United States' National Ambient Air Quality Standards and the European Union's Air Quality Directive) establishes maximum atmospheric concentrations for specific pollutants. The second category (such as the North American air quality index) is a scale with different thresholds that are used to communicate to the public the relative risk of outdoor activity.

4.1.1.5 Other kinds of pollution

A part from land/soil, water, heat/thermal and atmospheric degradation/air pollution, many other kinds of pollution such as noise pollution, light pollution, plastic pollution, visual pollution, nuclear pollution, agricultural pollution that are part of environmental degradation.

Light pollution

Light pollution is common in areas with dense populations and high electricity consumption. Light pollution can take many forms. Leaving lights on all night, for example, can have a negative impact on sleep quality. Furthermore, vehicle lights disturb the peace at night in areas with a high concentration of vehicles. If the distance between the house and the streetlamp is short, streetlamps can also cause light pollution.

Noise pollution

Noise pollution can be hazardous to one's mental health. Noise pollution can be a major issue, especially in large

cities with a high concentration of motor vehicles. Noise pollution can also come from airports, freeways, and starting and landing planes, which can cause significant noise disruption and harm to living quality throughout the day.

Pollution from plastics

Plastic pollution is a major issue for the environment. Plastic or plastic-related components cover or package many products. As a result, massive amounts of plastic waste are produced. To get rid of this plastic, it must be either burned or disposed of in landfills. Plastic trash, on the other hand, is frequently dumped into rivers or lakes, polluting the local flora and fauna. Furthermore, some of the plastic trash will end up in our oceans. There is currently a massive amount of plastic waste polluting the oceans, which can harm many sea animals, plants, and other sea organisms.

Visual pollution

People prefer to live or spend their time in nice, clean areas over polluted ones. As a result, people should be motivated to keep their natural environment clean. However, there are numerous instances of visual pollution. People, for example, frequently discard their used cigarettes on the ground rather than in the trashcan. People's waste disposal habits can cause significant visual pollution.

Nuclear waste pollution

A significant portion of electricity can be generated by nuclear power plants. However, nuclear waste is a dangerous byproduct of the energy production process that must be disposed of in some way. Radioactive waste is frequently dumped into mines deep underground. This disposal behavior, however, can result in serious nuclear pollution. For example, if these underground storage spaces leak, it can cause severe soil pollution and contaminate the groundwater.

Pollution from agriculture

Agricultural pollution is a major issue for the planet right now. Farm animals emit significant amounts of greenhouse gases, which contribute to the problem of global warming. Furthermore, the soil and groundwater are likely to be polluted as a result of the excessive use of pesticides and fertilizer.

4.1.2 Factors of Environmental Degradation

The causes of environmental degradation are numerous and frequently complicated. They are largely location-specific and are heavily influenced by local socioeconomic and national political forces at work in a given society (Taddesse, 1995). Some of the causes are overpopulation, air and water pollution, deforestation, global warming, unsustainable agricultural and fishing practices, overconsumption, wealth redistribution, the rise of the corporation, the Third World debt crisis, and militarization and wars. Mining is another destructive development activity in which the environment suffers at the altar of the economy (Swati *et al*., 2014). In general, the human (modern urbanization, industrialization, overpopulation expansion, deforestation, etc.) and natural (floods, typhoons, droughts, rising temperatures, fires, etc.) factors are the primary factors of environmental degradation (Maurya *et al*., 2020).

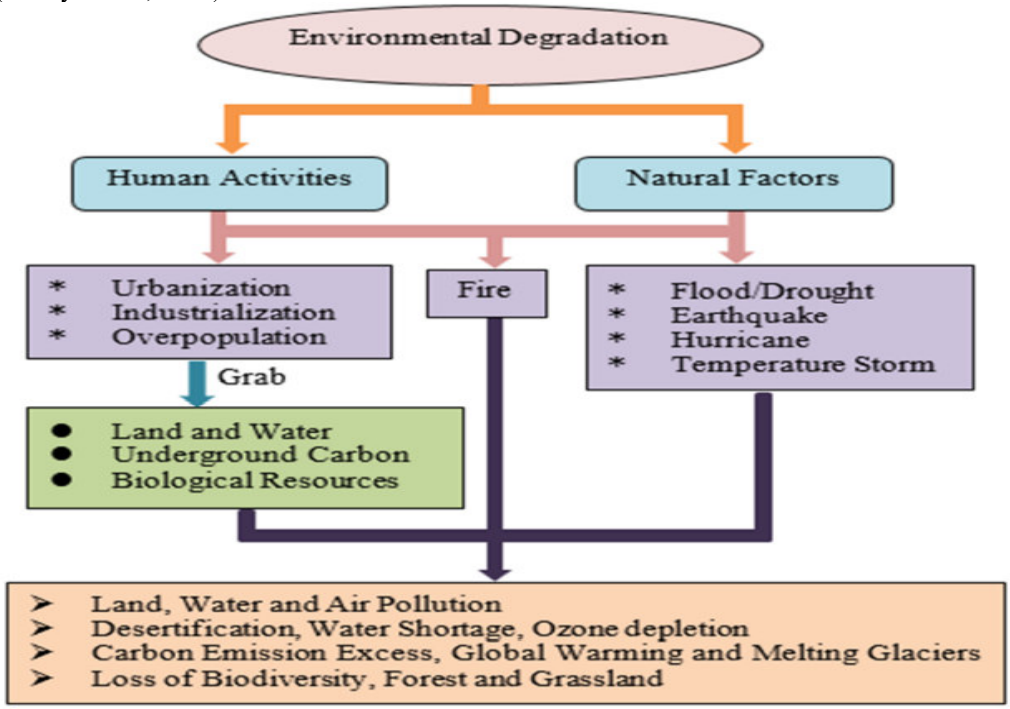


Figure 3: Causes of environmental degradation (**Source:** Maurya et al. (2020))

4.1.2.1 Land Disturbance

It is the main cause of environmental degradation. As to make different uses or while using resources of land like land excavating, leveling, construction of buildings, roads, etc.

4.1.2.2 Environmental Pollution

The term "pollution" refers to any substance that negatively impacts the environment or organisms that live within the affected environment. The five major types of pollution include: air pollution, water pollution, soil pollution, light pollution, and noise pollution. Pollution, in whatever form, whether it is air, water, land or noise is harmful to environment. This pollution has lots of side effects on living life. The toxic substances and chemicals emitted from fossil fuel combustions, industrial wastes, homemade utilities, among other industry-processed materials such as plastics, have destroyed most of the planet's natural environments, and a large portion is under severe threat. Pollution from land, air, and water has long-term cumulative effects on the quality of the natural environments in which it occurs. Polluted environments have lost their value because pollution makes it difficult for biotic and abiotic components to survive. Pollution has an effect on the chemical compositions of lands, soil, ocean water, underground water, and rocks, as well as other natural processes. Air pollution from automobiles and industries causes acid rain, which causes the acidic lake to form, and is an example of how pollution degrades the environment.

4.1.2.3 Overpopulation and Resource Overexploitation

One of the primary causes of environmental degradation in a country could be related to rapid population growth, which has a negative impact on natural resources and the environment. The three basic demographic factors of births (natality), deaths (mortality), human migration (migration), and immigration (population moving into a country produces a larger population) cause information on population size, composition, and distribution, and these changes raise a number of significant cause-and-effect questions (Ray, 2011). More population simply means more demand for food, clothes and shelter. It needs more space to grow food and provide homes to millions of people. This results in deforestation, loss of biodiversity, destruction of the ecosystem which are other factors in environmental degradation.

"A crowded society is a restrictive society; an overcrowded society becomes an authoritarian, repressive and murderous society." Edward Abbey

The challenge of sustainable development is posed by an expanding population and deteriorating environmental conditions. Obviously, when human populations were low, their impact did not exceed the carrying capacity of the natural resource base. However, as human populations increased, there were fewer and fewer natural resources to be utilized on a sustainable basis, and resource overexploitation and mining had to occur in order to satisfy more and more people with fewer and fewer resources (Shibru and Kifle, 1998). As the human population continues to grow, there is increasing pressure on natural resource utilization. This frequently leads to the overuse of natural resources and contributes to environmental degradation. According to a UNEP Global Environment Outlook study, excessive human consumption of naturally occurring non-renewable resources may outstrip available resources in the near future, causing significant environmental damage during extraction and utilization. Overpopulation simply means more pollution and faster depletion of natural resources than can be replaced.

4.1.2.4 Destructive Agricultural Practices

Because of the accumulation of toxic substances like bad minerals and heavy metals, which destroy the soil's biological and chemical activities and have reduced the quality of the majority of our natural environments, intensive agricultural practices destroy fertile lands and nearby vegetation cover. The vast majority of farmers convert forests and grasslands to croplands, thereby degrading the quality of natural forests and vegetation cover. The growing pressure to convert land into resource areas for the production of high-priced foods, crops, and livestock has resulted in the depreciation of natural environments such as forests, wildlife, and fertile lands. Agricultural waste, chemical fertilizers, and pesticide runoff into marine and freshwater environments have also negatively affected the quality of wildlife habitats, natural water resources, wetlands, and aquatic life.

4.1.2.5 Landfills

Landfills Cause pollution and degrade city beauty. Landfills are located within cities as a result of the large amount of waste generated by households, industries, factories, and hospitals. One of the most disastrous consequences of landfills is the destruction of nearby environmental health and ecosystems. The landfills discharge various types of chemicals on the land adjacent to the forest, various natural habitats, and water systems such as underground and surface water, making the environment unappealing for the survival of trees, vegetation, animals, and humans. It even disrupts the interactive food chains of animals because the chemicals contaminate plants and waters that the animals consume. Furthermore, the foul odor from landfills and the periodic burning of waste make living in such environments unbearable.

4.1.2.6 Deforestation

Our forests are natural CO_2 storage spaces that also produce oxygen, which is critical for many life forms on our planet. Rapid growth in population and urban sprawl are two of the major causes of deforestation. Deforestation

is the clearing of a forest with the intent of converting the land for non-forest use. The use of forestland for agriculture, animal grazing, mining, harvest for fuel wood and logging, or other economic purposes are some of the other causes of deforestation. Deforestation (tree cutting) has had an impact on the world in terms of depreciating the natural environment and wildlife. Deforestation is particularly severe in the Amazon Rainforest, where large areas of forest are cut or burned down, often on purpose, to make more land available for farming. Deforestation has a number of negative effects on the environment. Changes in environmental support processes, such as weather conditions, have also had an impact on humans. For more than a century, the global population has been declining, resulting in devastating consequences such as biodiversity loss, soil erosion, species extinction, global warming (via the release of greenhouse gases such as CO_2), and interference with the water cycle. As a result, it is critical to protect our forests, particularly the rainforest.

4.1.2.6.1 Causes, Effects, and Solutions of Deforestation

A. Deforestation Causes

Aside from rapid population growth and urban sprawl, other causes of deforestation include the use of forestland for agriculture, animal grazing, fuel wood harvesting, and logging.

Agriculture: One of the primary causes of deforestation is the world's growing demand for meat and plants. According to the UNFCCC, subsistence farming accounts for 48% of deforestation, while commercial agriculture accounts for 32% (UNFCCC, 2007). Farmers can often earn far more money by cutting down trees and converting the land to farmland than by preserving the forest.

Logging: Another major cause of deforestation is logging. Wood is used for a variety of purposes in people's daily lives. It is used in the manufacture of paper, furniture, firewood, and charcoal, among other things. As a result, it is profitable for landowners to cut down significant amounts of forest in order to meet this demand.

Desertification: A large portion of the land is used for industrial purposes. These industries frequently do not care about the environment and dump their chemical by-products into rivers and forests, which can lead to land contamination and desertification. This land will no longer be suitable for planting new trees due to desertification.

Urbanization: As the population grows, more space is required for the construction of houses and related infrastructure. Road construction is also included. As a result, one method of increasing settlement space is deforestation.

Forest fires: Forest fires can be caused by both human activity and natural causes. Forest fires can be a major issue, especially during hot and dry seasons. Uncontrolled wildfires can destroy vast swaths of forest and even take lives.

Mining: The use of coal and oil mines is another driver of deforestation. Exploiting these natural resources can be extremely lucrative. However, in order to do so, large areas of the forest must be cleared. Furthermore, the chemicals used in resource extraction are frequently dumped into nature, contaminating large parts of the ecosystem.

B. Effects of Deforestation

Deforestation causes environmental degradation by increasing the rate of soil erosion, increasing the sediment load of rivers, silting of reservoirs and river beds, increasing the frequency and magnitude of hoods and droughts, changing the pattern of precipitation distribution, intensifying greenhouse effects, increasing the destructive force of atmospheric storms, and so on (Maurya *et al*., 2020). Deforestation contributes to global warming because reduced forest size returns carbon to the environment.

Effects on climate: Deforestation is a major contributor to global warming because it is the second-largest anthropogenic source of carbon dioxide after fossil fuel combustion. Carbon dioxide is produced when forest biomass is burned and plant material decomposes. Forests also serve as a natural carbon sink. Plants use photosynthesis to convert carbon into sugar and oxygen. Plants and trees store carbon as well. As a result, burning these trees releases carbon dioxide, which contributes to the global warming problem.

Effects on Animal: Animals suffer greatly as a result of deforestation because they lose their natural habitat. They must either relocate to find a new home or die as their food sources are depleted. In the worst-case scenario, deforestation may even result in the extinction of certain animals.

Effects on humans: Humans are affected by deforestation in a number of different ways. While there is an economic Benefit to deforestation for a small group of farmers, the majority of the world's population will suffer as a result of climate change.

Loss of living space for indigenous tribes: There are still some areas on our planet where people live in harmony with their natural surroundings. Several tribes, particularly in the Amazon Rainforest, continue to live quite traditional lives without our modern conveniences. Because they still make a living from fishing or other nature-related activities, these people rely on a healthy environmental system. Nevertheless, as humans' desire for more land for housing and infrastructure grows, areas that were previously used by indigenous people are increasingly being used for farming or industrial purposes. This means that large areas of land are cut or burned down in order to make more land available for farming and thus make more money. This also implies that the

tribes' natural living space has been eviscerated, and they may lose their home. As a result, deforestation can have a negative effect on living conditions of many people.

Loss of biodiversity: Deforestation has resulted in a significant decrease in biodiversity. Many species are also wiped out as a result of it. Forests not only provide habitat for wildlife but also promote medicinal conservation. Tropical rainforests are home to roughly 80% of the world's biodiversity. This figure demonstrates the significance of the forest as a habitat for a wide range of species. also, various studies revealed that deforestation destroys the microbial community, which is responsible for producing clean water, removing pollutants, and recycling nutrients. According to researchers of the Brazilian Amazon, up to 90% of predicted extinctions will occur within the next 40 years.

Soil erosion: Another effect of deforestation is soil erosion. Forests shade the soil and keep it moist. By removing the trees, the soil is no longer protected and will dry out, potentially leading to soil erosion.

Hydrological effects: Deforestation has an impact on the water cycle as well. Tree roots extract groundwater and release it into the atmosphere. The removal of trees thus contributes to a drier climate by lowering the concentration of atmospheric moisture.

Floods: Water is naturally stored in trees. Their roots absorb a lot of rainwater. When trees are cut down, this natural water storage is lost, and the vulnerability to flooding increases remarkably.

C. Deforestation Solutions

Government rules and regulations: To protect the forests, strict regulations must be imposed on how much forest can be cut down and how much must be preserved. It's far too tempting to clear the forest and convert it to farmland. Without regulation, deforestation will continue until no forest remains.

Persuade farmers to refrain from deforestation: Farmers must be persuaded of the grave consequences of deforestation for humanity. Farmers have a financial incentive to convert their forests into farmland; therefore, it should be considered to subsidize them so that they have a financial incentive to protect their forests.

Reforestation and afforestation: Reforestation is the replenishment of depleted forests and woodlands, whereas afforestation is the planting of trees in areas where there has previously been no tree cover. Thus, another measure to combat deforestation is to plant new trees, either through reforestation or afforestation. However, it takes a long time for the trees to reach a significant size and impact the climate.

International projects: There are several foundations that address the issue of deforestation and seek solutions. The Arbor Day Foundation, founded in 1972, is the world's largest nonprofit organization dedicated to tree planting. The goal of the Billion Tree Campaign, which was launched in 2006, is to plant as many trees as possible. As of 2011, this organization's efforts had resulted in the planting of over 12 billion trees. At the end of 2017, the campaign was renamed "Trillion Tree Campaign." Furthermore, there is a project called the Amazon Fund that aims to raise funds to monitor, combat, and prevent deforestation.

Change consumption habits: Since the industrial revolution, humans have been able to consume at previously unheard-of levels. humans enable the production of large quantities of goods at a low unit price due to the use of machines. This appears to be a good thing, but it also has significant drawbacks. One of them is that more resources must be extracted in order to meet the rising demand for material goods. Furthermore, so much farming is required to meet the increasing demand for meat. Large areas of forest have been cut down to provide all of those resources. This problem is especially severe in the Amazon Rainforest, where farmers intentionally start wildfires in order to gain more land for farming purposes, which is more profitable for them. As a result, in order to address the issue of deforestation, consumption habits must be changed. For example, this could simply not always purchasing the most recent shit, but rather keeping items that are still functional. It could also imply a reduction in meat consumption. As a result, everyone can help to mitigate the issue of deforestation in a variety of ways in their daily lives.

Education: Education is another important counter-measure to deforestation and its associated environmental problems. Many people in modern society are unaware of how vital forests are to the planet and, by extension, to the quality of life for their children. People must be aware and scholars must make it clear that forests are an important part of the environment and that mankind has no chance of combating global warming if the clearing of large areas of forest will be continued. This education should begin at a young age. Forests should be taught in elementary school. This education is likely to have even more positive effects. Because these educated children will inform their parents about the negative consequences of deforestation and how they can prevent it, parents are more likely to pay attention to their children's daily behavior. Furthermore, when educated children grow into adults, they are more likely to behave in an environmentally friendly manner than uneducated children.

Improper Land use Planning and Development: The unplanned conversion of land into urban areas, mining areas, housing development projects, office spaces, shopping malls, industrial sites, parking spaces, road networks, and so on causes pollution and the degradation of natural habitats and ecosystems. Mining and oil exploration, for example, degrade the environment by releasing toxic materials into it. Across the globe, improper land use has resulted in the loss and destruction of millions of acres of natural habitat.

4.1.2.7 Natural Causes

Regardless of the fact that environmental degradation is normally associated with anthropogenic activities, natural causes are also contributors. Natural disasters such as wildfires, hurricanes, avalanches/landslides, tidal waves, storms, tsunamis, and earthquakes can drastically reduce the survival rate of a region's animal and plant communities. These disasters can also destroy or change the nature of the landscape, rendering it unfit to support life forms. Furthermore, natural disasters such as hurricanes and flooding can wash or force invasive species into foreign environments, resulting in their eventual degradation.

4.1.3 Effects of Environmental Degradation

Environmental degradation, according to Swati et al. (2014), causes increased poverty, overcrowding, famine, weather extremes, biodiversity loss, acute and chronic diseases, war and human rights violations, and an increasingly unstable global situation that portends Malthusian chaos and disaster.

4.1.3.1 Effects on human health

Environmental degradation has a significant impact on human health. Floods and other natural disasters will become more common in many countries as a result of deforestation, mining, or other human-caused interactions with nature. The consequences of these natural disasters will be horrifying. Many people will lose their homes and face extremely poor sanitary conditions as a result of the destruction of critical infrastructure. These conditions promote the spread of diseases and have the potential to kill a large number of people. According to the Swanti et al. (2014) report, environmental factors account for 24% of the global disease burden (healthy life years lost) and 23% of all deaths (premature mortality), with the environmental burden of diseases being 15 times higher in developing countries than in developed countries due to differing in environmental exposure to risk and access to health care. Water quality degradation is responsible for over two million deaths and billions of illnesses worldwide each year. Water scarcity and a decline in food quality are two of the consequences of environmental degradation. Toxic air pollutants can cause respiratory problems such as pneumonia and asthma in areas exposed to them. Pollutants in the environment, according to Brusseau et al. (2019), can cause respiratory diseases, heart disease, and certain types of cancer. Landfills increase the risk of hazardous materials entering the food chain, causing bio-magnification and, ultimately, the risk of developing chronic diseases. Toxic materials and harmful chemicals from factories, agriculture, and automobiles cause illnesses and death in children and adults Low-income individuals are more likely to live in polluted areas with contaminated drinking water. Furthermore, children and pregnant women are predisposed to pollution-related health problems (Brusseau *et al*., 2019). Air pollution causes more than 300,000 deaths each year, as well as millions of chronic diseases. Adakole and Oladimeji (2006) clarified that millions of people have died as a result of the indirect effects of air pollution. Every year, more than 12 million people die as a result of living or working in hazardous environments (Prüss-Ustün *et al*., 2016).

4.1.3.2 Erosion of the soil

Another issue caused by environmental degradation is soil erosion. Soil erosion can be caused by natural forces such as wind or water, or by human activity such as deforestation or dam construction. In either case, soil erosion can cause severe environmental degradation because it can render large areas of land useless.

4.1.3.3 Loss of Biodiversity

Biodiversity, also known as biological diversity, refers to the total variation in all forms of life on Earth or within a given area or ecosystem, which is typically expressed as the total number of species found within the area of interest or the genetic diversity within a species. According to Katar Singh (2009), there are three types of biodiversity: genetic diversity, species diversity, and ecosystem diversity. The total genetic information contained in all animal, plant, and microorganism species on the planet is referred to as genetic diversity. The number of species within a system or a given area is referred to as species diversity. The number of habitats, biotic communities, and ecological processes in the biosphere, as well as the extent to which ecosystems vary, are all examples of ecosystem diversity.

The estimates of the global biodiversity range from 2 million to 100 million species, with the best estimate being around 10 million. So far, only 1.4 million people have been named (Katar Singh, 2009). Biodiversity, according to Maurya et al. (2020), is important for maintaining ecosystem balance by combating pollution, restoring nutrients, protecting water sources, and stabilizing the climate.

Biodiversity loss is defined as a decrease in genetic, species, and ecosystem diversity, and it is currently happening at an unprecedented rate. The primary causes of biodiversity loss are habitat degradation and destruction, disease, and over-exploitation of animal and plant populations (Ben, 2015). Since 1970, human activity, specifically overconsumption, population growth, and intensive farming, has wiped out 68% of vertebrate wildlife (Patrick, 2020). Anthropogenic causes, such as expanding human land use for industrial agriculture and livestock rearing, as well as overfishing, are threatening the extinction of one million plant and animal species (Brand, 2019). Humans have altered roughly 70% of the earth's land surface since the advent of agriculture over 11,000 years ago, with global biomass of vegetation reduced by half and terrestrial animal communities experiencing a biodiversity decline of more than 20% on average (Brandon, 2021). According to a

2021 study, only 3% of the planet's terrestrial surface is ecologically and faunally intact, which means it has healthy populations of native animal species and little to no human footprint. Many of these pristine ecosystems were found in indigenous communities (Damian, 2021).

Many academics have discovered that biodiversity loss results in depleted ecosystem services, with disproportionate effects on poor people and significant implications for livelihoods, sustainable development, and green growth. Furthermore, Turner et al. (2012) confirmed that biodiversity loss results in depleted ecosystem services (such as the provision of fresh water, food, and fuel), which in turn affects human health, livelihoods, income, and well-being. So because the poorest people are frequently those who rely most directly on adequate local ecosystem services like freshwater supplies, fuel wood provision, and flood protection, there is a direct link between biodiversity loss and poverty, and poor people are disproportionately affected by biodiversity loss (Haines-Young and Potschin, 2010). The continued destruction of wild forests and the damage to natural ecosystems caused by environmental degradation have greatly contributed to the mass extinction of species. Many species are becoming extinct as a result of human activities (Swati *et al*., 2014). Worldwide, the number of threatened species is increasing, while some have become extinct. This is due to human activities such as acidifying water systems, over-exploitation of natural resources, overpopulation, and the intentional and indirect destruction of natural systems required for the survival of various species. These anthropogenic activities simply alter the natural processes that support biodiversity, demolishing natural ecosystems. Some of the major causes of biodiversity loss include deforestation, global warming, overpopulation, and pollution (Maurya *et al*., 2020).

4.1.3.4 Poverty

The majority of developing countries attribute poverty to poor crop harvests and a scarcity of high-quality natural resources required to meet basic survival needs. The inadequacy of basic survival resources and a lack of high-quality food is a direct result of environmental degradation in the regions. The majority of vulnerability situations in developing countries caused by water scarcity, climate change, and low crop yields are linked to environmental degradation. As a result, a lack of access to adequate basic needs such as water and food directly causes poverty. Environmental degradation may raise a variety of economic and social issues, including conflict between user groups, each of which may rely heavily on the availability and access to environmental resources for their livelihoods and/or survival. For instance, in Ethiopia, these conflicts may be acute due to the country's large refugee population (approximately 750,000 people) (Ben, 2015).

4.1.3.5 Atmospheric Changes

Some natural processes, such as the water cycle and the normal processes of animal and plant activity, can be influenced by environmental degradation. Furthermore, environmental degradation factors like deforestation and mining destroy natural land cover. This, along with air, water, and land pollution, poses a number of threats to climate change. Global warming and climate change, which can increase the risk of natural disasters, as well as ozone layer depletion, which increases the risk of skin cancer, eye disease, and crop failure, are among the changes.

Global warming

The observed rise in the average temperature of the Earth's climate system is referred to as global warming, also known as climate change. In the lowest emissions scenario, the global surface temperature is expected to rise by 0.3 to 1.7°Cand by 2.6 to 4.8°C in the highest emissions scenario (Maurya *et al*., 2020). Environmental degradation can also hasten the rate of global warming. Trees, for example, are a natural storage space for greenhouse gases such as carbon dioxide. Because of deforestation, the affected areas can no longer store greenhouse gases and must emit them into the atmosphere. Furthermore, humans contribute to climate change through industrial production processes, electricity generation, and their daily use of automobiles, because the majority of these processes involve the combustion of fossil fuels, which results in the release of massive amounts of greenhouse gases into the atmosphere.

According to Katar (2009), the Earth's surface temperature has risen by about 1 degree Fahrenheit over the last century, with accelerated warming over the last two decades. The average global temperature in 1980 was 15.180°C; it rose to 15.380°C in 1990, 15.390°C in 1995, and 16.040°C in 2005. Scientists predict that the average global surface temperature will rise by 0.6 -2.5°C in the next fifty years and 1.4 - 5.8°C in the next century, with significant regional variations.

According to Cunningham et al. (1999), the predicted effects of climate change include an increase in global temperatures, rising sea levels, deforestation, climatic imbalance, changing precipitation, and the expansion of deserts, all of which have a negative impact on human health (due to the increased incidence of malaria, dengue fever, yellow fever, and other disease carriers to warm areas) and agricultural production (due to the increased frequency of droughts, floods and hurricanes and increased incidence of pests).

Climate change and its negative effects on the environment, human health, and the economy have recently risen to the top of the economic and political agenda in a number of national and international environmental forums and meetings. The most significant and harmful climatic changes that have recently come to light are

acid rain, global warming, and the depletion of the stratospheric ozone shield or layer (Katar, 2009). Furthermore, climatic anomalies such as floods, droughts, cyclones, and tsunamis cause severe damage to humans and have a negative impact on local, regional, and global climate. Acid rain negatively impacts plants, fish, and birds, as well as corrodes metals and building materials. The author also noticed that acid rain has been observed in parts of the United States, the former Federal Republic of Germany, Czechoslovakia, the Netherlands, Switzerland, Australia, and Yugoslavia, among other places. It is also becoming a major issue in Japan, China, and Southeast Asia. As the climate warms, evaporation will increase, increasing global precipitation on average. Soil moisture is expected to decline in many areas, and heavy rainstorms are expected to become more common.

4.1.3.5.1 Global Warming's Causes, Effects, and Solutions

Climate change is defined as a change in the earth's climate system that results in new weather patterns. These patterns can persist for decades or even millions of years. The hydrosphere, atmosphere, biosphere, cryosphere, and lithosphere are the five interconnected parts of the climate system. Almost all of the energy in the climate system comes from the sun, with only a small fraction coming from the earth's interior. Some of the energy in the climate system escapes into space. Incoming and outgoing energy determine the Earth's energy budget. When there is more incoming energy than outgoing energy, global warming occurs. When there is more outgoing energy than incoming energy, global cooling occurs. Global warming is a serious issue for humanity as well as the entire environmental system. Throughout Earth's history, there have been periods of global warming. However, global temperature changes have increased much faster since the mid-twentieth century than in previous periods.

The causes and effects of global warming are depicted in the following sections. Furthermore, solutions to the global warming issue are provided at the end.

The magnitude of global warming

Leading scientists predict that in the absence of political action to combat global warming, the global surface temperature will rise by 4.1 to 4.8°C (7.4 to 8.6 degrees Fahrenheit) until the end of the century. Scientists expect that by taking actions to mitigate global warming, humanity will be able to limit the increase in global air temperature to a range of 2.5 to 3.2°C (4.5 to 5.8 degrees Fahrenheit), depending on the model assumptions used to calculate the various values. The extent of global warming is primarily determined by climate feedback effects and the rate of future greenhouse gas emissions.

A. Causes for Global Warming

Variations in orbit: Changes in the earth's motion cause changes in the seasonal distribution of sunlight reaching the surface and its distribution across the earth. These changes may contribute to the problem of climate change.

Solar radiation: Short-term and long-term variations in solar intensity are likely to have an impact on our climate. The sun's intensity has increased over the last 4 billion years and will continue to do so in the future. As a result, future increases in solar intensity are likely to raise global temperatures.

Volcanism: Volcanoes must emit massive amounts of SO_2 and sulfate aerosols when they erupt in order to have a significant impact on our climate for more than a year. These chemicals have optical properties that scatter or absorb sunlight, contributing to climate change.

Tectonic plates: over millions of years, the movement of tectonic plates reshapes ocean and land areas, resulting in topography. This process has the potential to affect both global and local climates.

Increase in greenhouse gas emissions: Greenhouse gases trap heat radiated from the earth into space. This heat is absorbed by gases in the atmosphere, causing the earth's surface to warm. Water vapor, carbon dioxide, methane, and ozone are all major greenhouse gases. Since the industrial revolution, human activity has significantly increased the emission of greenhouse gases, and thus the carbon footprint. Domestic flights, as well as our travel habits, exacerbated the problem of excessive greenhouse gas emissions. The emissions of greenhouse gases such as methane and CO2 from fuel combustion play a significant role in climate change. Other factors that contribute to global warming indirectly include ozone depletion, deforestation, and animal husbandry. Changes in land use alter the earth's surface, influencing how much sunlight is reflected back into space and how much heat is lost through evaporation. For example, converting woodland to grassland results in a lighter surface, which reflects more sunlight.

Aerosols: Because they reflect incoming sunlight, aerosols typically have a cooling effect on the Earth's climate. Because aerosol concentrations have been decreasing, the reflection effect of aerosols has been reduced, and thus global warming has increased.

The effects of feedback: There are several feedback effects associated with global warming, making it difficult to accurately predict future temperature increases. Climate change causes both negative and positive feedback effects. The ice-albedo effect, the water vapor effect, and the net effect of clouds are all significant positive feedback effects. Because infrared radiation increases with increasing temperature, it is the primary negative feedback effect of global temperature change.

Deforestation: Deforestation can contribute significantly to global warming. Trees are natural greenhouse gas

storage because they absorb greenhouse gases like CO_2 from the air and convert them to oxygen. However, if forests are cut down to make more room for settlement or housing, large amounts of CO_2 are released into the atmosphere, accelerating the global warming process. Farmers' behavior in the Amazonian Rainforest is a prime example of this problem. Farmers frequently intentionally burn down trees in order to gain more farmland for growing soy or other crops because it is more profitable for them than selling wood. As a result, the Amazonian Rainforest is being cleared at an alarming rate, and one of our planet's largest natural CO_2 storage is being destroyed.

Agriculture: Agriculture is another contributor to global warming. Large amounts of meat must be produced on a daily basis in order to meet global meat demand. However, the cattle used to produce this meat emit significant amounts of methane, a much more serious greenhouse gas than CO_2. Furthermore, farmers frequently use nitrous oxide-containing fertilizers, which can result in the release of nitrogen-related gases, which are also known to contribute to global warming.

B. Effects of Global Warming

Physical environment effects: The physical appearance of our environment changes as a result of global warming. For example, glaciers will melt and eventually disappear as a result of global warming. Furthermore, sea levels will rise, and small islands will become submerged. Furthermore, natural disasters and weather extremes caused by global warming, such as droughts, are likely to become more common. As a result, affected areas frequently change from fertile land to deserted areas that are no longer suitable for farming.

Rising sea levels: Global sea levels are rising as a result of global warming, destroying the habitats of many plants, animals, and humans. According to various research findings, the melting of glaciers and ice shields in the Antarctic could account for up to 90% of the rise in sea levels, making it the most significant source of sea-level rise. Antarctic glaciers are melting as ocean temperatures rise. Many people will lose their homes as sea levels rise. People who live in countries or islands that are only a few feet above sea level will lose their jobs because the land they currently inhabit will be submerged in the near future.

Heat waves are becoming more common: Heat waves and droughts have become more common since 1950, according to research findings. Furthermore, extreme dry or wet periods during the monsoon season have become more common. These increases in extreme weather are expected to continue in the future. To make matters worse, scientists predict that heat waves will become more common in the future as a result of global warming. These heat waves will cause a slew of other issues, including a lack of drinking water in many impoverished countries.

Average temperature increase: In addition to weather extremes, there will be a significant increase in average temperature over time. Most scientists agree that the average air temperature will rise by 0.3-1.7^{0}C until the year 2100. However, some scientists believe that the extent of global warming may be much worse. Estimates of 4.8^{0}C have been floated in scientific circles. Human behavior will ultimately determine the magnitude of the increase. Humans may be able to limit global warming to a certain extent if they are able and willing to take appropriate measures.

Increase in rainfall and wind speed: Furthermore, typhoon and hurricane wind speeds and maximum rainfall are increasing. Hurricanes are typically powered by warm ocean water. Hurricanes and other tropical storms are expected to become stronger in the near future as global warming raises both air and water temperatures. This could have serious consequences for coastal cities, which could be hit by powerful winds. These winds have the potential to destroy significant infrastructure and kill a large number of people.

Effects on the biosphere: Global warming has resulted in the expansion of drier climatic zones, such as the expansion of deserts in the subtropics. These changes in the structure and composition of ecological systems will occur in the future if global warming is not mitigated. This effect is likely to reduce ecosystem diversity and result in the extinction of many species. This includes marine species. Although the ocean heats up very slowly than land, even small changes in ocean temperature can have a large impact on sea animals, plants, and corals. Global warming will have severe negative consequences for humans in the future. Because some parts of the world will be hit much harder than others, there will be significant social tensions. Global inequality will worsen in the future as a result of the effects of global warming.

Effects on agriculture: Agriculture will be affected differently in different parts of the world. While global warming is likely to have a negative impact on crop yields in low-latitude countries, it may have a positive impact on crop harvests in northern latitudes. If the global warming process continues, there is a serious risk of global food scarcity, desertification, and an increase in global inequality. Furthermore, the supply of drinking water will become an even bigger issue in low-latitude countries. According to various research reports, climate change in Africa is expected to cause increased water stress for up to 600 million people by 2050.

Human health effects: Global warming has serious consequences for human health. This includes the effects of extreme weather, which cause deaths and injuries, as well as the negative effects of undernutrition caused by crop failures. Furthermore, there is evidence that rising temperatures may be increasing the number of suicide cases. Climate change increases the likelihood of conflicts caused by economic shocks and poverty. It also

contributes to an increase in crime and major conflicts. It can also lead to the spread of diseases and even the emergence of new human diseases.

Migration: As sea levels rise, many islands will be flooded, destroying human settlements and infrastructure. Because many people are likely to lose their jobs and homes, they will be forced to flee their home countries in search of a better future. This will almost certainly result in increased migration from low-latitude to high-latitude countries, as living conditions in high-latitude countries will be much better once the negative effects of global warming become apparent.

Changes in land use: Many areas of land that are currently unsuitable for agriculture due to cold temperatures will become suitable for farming purposes in the future as a result of global warming. Thus, global warming will Benefit countries with large areas of land in cold climate zones. Because of global warming, they will be able to farm these areas of land and harvest significant crop yields.

C. Solutions to the Global Warming Problem

Reducing greenhouse gases: According to various reports, the main reasons for an increase in greenhouse gases in the last decades of the twentieth century were population growth and rising GDP per capita. This, in turn, has increased consumption and thus the combustion of fossil fuels, resulting in an increase in greenhouse gases. A reduction in greenhouse gases can help to mitigate global warming. Energy conservation, increased energy efficiency, a carbon tax, and a shift from fossil to renewable energies can all help to reduce greenhouse gas emissions.

Climate engineering: Climate engineering is another method of mitigating global warming. It is defined as the deliberate modification of the climate. Techniques that could be used include CO_2 removal and solar radiation management. Recent studies, however, show that these measures are either ineffective or have serious side effects.

Political measures: It is the responsibility of governments all over the world to unite and combat global warming by enacting appropriate regulations. The UNFCCC took the first steps in this direction. In this framework, governments all over the world attempt to prevent harmful anthropogenic interference with the climate system. This includes lowering greenhouse gas emissions while maintaining economic growth and food security. This framework also requires developing countries to be aware of the greenhouse gas challenge. Although per capita emissions in underdeveloped nations are relatively low, this may dramatically change as developing countries strive for higher living standards, and thus greenhouse gas emissions are likely to increase dramatically. The Paris Agreement was ratified in 2015 in order to limit temperature rise to 2^0C. This should also be accomplished by providing financial assistance to developing countries in order for them to reduce their greenhouse gas emissions.

Changes in daily consumption behavior: Greenhouse gases are also produced as a result of humans' daily consumption of things. Each of us can help to mitigate climate change by reducing our consumption. This may imply avoiding driving instead of taking public transportation. It can also mean turning off lights when someone is not using them to save energy.

Education: Education is a critical way of measuring for mitigating the effects of global warming. Global warming can only be stopped or slowed if people behave responsibly. As a result, it is critical to educate people about the negative effects of global warming and to demonstrate how their daily lives contribute to climate change. This training should begin at a young age. On the one hand, children can persuade their parents to take actions that will help to slow global warming. When these children grow up, they are more likely to be environmentally conscious. As a result, education is critical in combating the global warming issue.

Convince others: persuading others to play their part in reducing greenhouse gas emissions will have a greater impact on global warming mitigation. Everyone can make a big difference in people's lives by convincing many people to change their consumption habits and also changing the minds of others.

Adaptation: It is impossible to completely halt global warming. As a result, humanity's ability to adapt to these new temperature conditions is critical. This means that governments and industries have to take the necessary steps in order to prepare the global society for our new environment. This includes a solution to the migration problem that will result from global warming. Many people are going to lose their homes and income sources and seek a better future in other countries. This will be especially true for low-latitude countries, which will be the hardest hit by global warming. Building a world where people can all live together without conflicts and other difficult situations will be a big challenge for humanity as a whole.

4.1.3.6 Natural resources scarcity

Environmental degradation, such as over-exploitation of natural resources, pollution, and deforestation, can contribute to a scarcity of resources, particularly arable land, water, genetic resources, medicinal plants, and food crops.

4.1.3.7 Ozone Layer Depletion

The ozone layer, which contains approximately 90% of the ozone, is a concentration of ozone molecules in the stratosphere. The ozone layer can be assumed of as the Earth's sunglasses, shielding life on the surface from the

sun's most powerful ultraviolet rays, which can cause skin cancer and other diseases. Cataracts can also be caused by excessive UV exposure.

The stratospheric ozone layer filters the sun's ultraviolet (UV) radiation. However, the ozone layer is depleting due to the presence of chlorofluorocarbons and hydro-chlorofluorocarbons in the atmosphere. According to Buhaug et al. (2010), the Ozone layer will emit harmful radiation back to the earth as it will deplete. Large ozone holes have been reported over Antarctica, allowing dangerous UV rays to reach the Earth's surface. As such, the 2005 ozone hole was one of the largest ever recorded, spanning 24 million square kilometers, roughly the size of North America (Katar, 2009).

4.1.3.8 Loss of livelihood for many people

Many people will lose their jobs and homes as a result of environmental degradation. For example, due to global warming, large areas of land will no longer be suitable for settlement purposes because rising sea levels will simply flood these areas. Furthermore, some areas will no longer be suitable for housing because of a lack of drinking water. Without water, farming and other tasks that ensure people's livelihoods will be impossible. Because of these negative consequences, a large number of people will be forced to migrate in order to find a livable future.

4.1.3.9 Famine

Significant levels of famine will also result from environmental degradation. There will be a scarcity of drinking water as a result of global warming. Furthermore, various types of pollution reduce the amount of clean. Because water is essential for all life on Earth, a lack of water will result in widespread famine because people will be unable to tilt their fields or grow crops due to a lack of water.

4.1.3.10 Conflicts

Famine and poverty caused by environmental degradation also increase the possibility of conflict. People will be more willing to participate in local conflicts to secure their livelihood as they become more frustrated and desperate. Because of their desperation, they may be more willing to participate in radical activities.

4.1.3.11 Disease Transmission

Natural disasters caused by environmental degradation may also increase the likelihood of disease transmission, potentially leading to epidemics or even pandemics. Natural disasters frequently wreak havoc on infrastructure and create unsanitary living conditions. These conditions increase the likelihood of disease transmission and may also result in the transmission of serious health conditions across borders.

4.1.3.12 Tourism decline

Tourism is the primary source of income for many poor countries. This income will be reduced or even eliminated as a result of environmental degradation. If countries are unable to deal with the massive amounts of waste produced, they may lose many tourists, as tourists prefer nice clean spots to spend their vacations rather than polluted ones.

4.1.3.13 Economic Impact

Apart from the negative impacts of environmental degradation on the environment, there are also severe negative economic consequences associated with the issue. Because large areas of land will no longer be suitable for agricultural or settlement uses due to rising sea levels and flooding, considerable sources of food and income will be lost. The enormous costs that a country may have to bear as a result of environmental degradation can have a significant economic impact in terms of restoring green cover, cleaning up landfills, and protecting endangered species. The economic impact can also include the loss of the tourism industry. According to Maurya et al. (2020), most tourists are put-off by environmental damage such as loss of green cover, biodiversity loss, massive landfills, and increased air and water pollution.

4.1.2 Solutions to Environmental Degradation

4.1.2.1 Stop Deforestation

In order to mitigate the adverse effects of environmental degradation, stopping or at least reducing the issue of deforestation is crucial. People rely on trees to store greenhouse gases and produce oxygen, and they cannot afford to cut them down or burn them down. Moreover, forests are a natural habitat for many animals and plants, which may become endangered if these forests are cut down. Making a further positive impact through reforestation or afforestation is vital for the environmental system.

4.1.2.1.1 Benefits/ prons and drawbacks/ cons of reforestation and afforestation

Both afforestation and reforestation refer to the planting of trees to compensate for forest losses caused by deforestation. Although it is critical to keep enough trees on our planet, there are some issues associated with those techniques. The Benefits and drawbacks of reforestation and afforestation are thoroughly discussed in this article.

Differences between afforestation and reforestation: While afforestation refers to the planting of trees where none previously existed, reforestation refers to the replenishment of forests that have previously been depleted. Both are critical to the survival and maintenance of a sufficient number of trees on the planet in order to ensure the preservation of global ecological balance.

A. Benefits of Reforestation and Afforestation

Slow Global warming: Because trees are natural carbon dioxide storage spaces, they can prevent large amounts of carbon from entering our atmosphere, which is an important Benefit of reforestation. As a result, a sufficient number of trees on our planet is critical in order to mitigate global warming and its horrifying side effects.

Trees reduce the risks for landslides: Landslides can be a significant problem, particularly for people who live in areas where the soil is relatively unstable. Due to heavy rain in such areas, the soil becomes unstable and eventually collapses. Nearby houses are frequently destroyed, and if the residents do not realize what is happening in time, they are likely to be buried alive. However, by planting trees, landslides can be avoided to some extent because tree roots can stabilize the soil, making landslides much less likely. As a result, afforestation can also save many lives, particularly in areas prone to landslides.

Desertification Prevention: Another advantage of afforestation is that it can prevent large areas of land from becoming desertified. If a piece of land is not used for farming or other purposes, it will eventually look like a desert, especially in hot and dry climate zones on our planet. Humans, on the other hand, cannot afford desertification of those areas of land because the world population is increasing and humans need to use the land efficiently in order to feed as many people as possible. Thereby, planting trees is a good option for preventing desertification and its associated negative effects because trees retain a certain amount of water in the ground while also providing shade.

Many animals and other organisms have natural habitats: Forests are also a natural habitat for a variety of animals, plants, and organisms. It is therefore critical that those environments be preserved. If large areas of forest have been cut or burned down, reforestation should be used to restore those natural habitats so that animals and plants can relocate and the natural balance between local flora and fauna and humans can be maintained.

Endangered species conservation area: Reforestation can also ensure the protection of endangered species in many parts of the world. Many animals and plants on the endangered species list are only there because their natural habitats have been destroyed. As a result, it should be human beings' responsibility to restore what they have destroyed and to plant enough trees to provide those animals and plants with a new home so that species can begin to grow their populations again.

Shade trees for convenience: Trees are not only useful in forests; they can also provide shade on hot summer days. For example, by planting trees in parks, natural shade can be provided for visitors who want to sit on a Bench and enjoy the nice summer day but do not want to be overly exposed to the sun for various health reasons. As a result, afforestation in cities can also provide nice opportunities for shade trees, improving the overall quality of life for people who want to go for a walk in parks.

Relaxation activities: For example, jogging or running in a forest is usually much more enjoyable than running right next to a busy street where one must contend with noise and air pollution from nearby cars. Furthermore, someone could go foraging for berries or mushrooms in the forest, which can be a lot of fun, especially if he or she has children. As a result, forests provide numerous leisure activities for humans, and everyone should work to preserve or even expand those forest areas through afforestation or reforestation.

Social cohesion among the local population: By planting trees, everyone can help to make the earth's planet a little more livable and to ensure a good future for future generations. As a result, people are often quite motivated to work hard in order to plant as many trees as possible because they understand the importance of it. People will be willing to work together to achieve this large goal, which will strengthen social cohesion because people will spend a lot of time together during the afforestation process.

Planting trees can be enjoyable: Although planting trees can be physically demanding, it can also be enjoyable. People who live in big cities and do not have many connections to nature are more likely to enjoy planting a tree because it is something they have never done before. People should understand that their forefathers lived in harmony with nature for thousands of years, and that our genetics evolved as a result. Planting a tree is unquestionably one of those priceless natural experiences.

Good to educate kids: It is Beneficial to educate your children. Reforestation projects are also enjoyable for children. Many young people, especially those who live in cities rather than rural areas, lose touch with nature. In this case, participating in a reforestation project can be a fun activity because parents can teach their children about the importance of forests and why they must be protected. By doing so, children will learn about nature conservation and will be more likely to live eco-friendly lives as adults.

Assurance of wood supply: Forests are also important for providing people with enough wood. Wood is a valuable natural material that can be used for a variety of purposes. People, for example, frequently use wooden trees, flooring, and cupboards in their daily lives. Furthermore, the charcoal for their barbecue is made from wood as a raw material. As a result, it is critical that people engage in reforestation or afforestation in order to ensure their long-term supply of this critical material.

Employment opportunities: Large projects require a large number of people to carry out the exhausting manual labor. As a result, the local population's unemployment rate will fall and their average income will rise. Thus, especially in areas where unemployment is a major issue, afforestation projects can not only improve the

environmental footprint but also provide job opportunities, allowing fewer people to live in poverty.

Can be serious business: Some locals may even be able to make a living off of reforestation projects, for example, by planting a large number of trees, they could produce timber or charcoal and sell it to local stores. As a result, reforestation may provide locals with the opportunity to start their own businesses, significantly improving their overall living conditions.

Maintaining ecological balance: Forests have been around for millions of years and are thus an important part of the natural environment. Without forests, the planet would suffer from a significant ecological imbalance, with disastrous consequences. As a result, it is critical to conserve forests as much as possible. This also includes reforestation or afforestation when appropriate in the region.

Improve people's overall quality of life: Because of improvements in air quality and the provision of natural spaces for leisure activities, forests are also quite important to improve people's overall quality of life. For example, if they live in a big city and work long hours, they might really enjoy going for a walk in the nearby forest to mentally regenerate and regain mental power for the next exhausting project.

Assist storage of rainwater: Trees are not only natural carbon dioxide storage spaces, but they can also store large amounts of rainwater. As a result, forests are critical in maintaining a certain minimum level of groundwater that the local population can use as drinking water in order to survive, particularly in water-stressed regions. Because water scarcity will worsen in the future as a result of global warming, it is critical that people address this issue through reforestation or afforestation.

Ecotourism source of income: As a result of reforestation, the opportunities for ecotourism grow. Many people have realized how critical it is to protect the environment. This is also true when it comes to travel. A growing number of people want to spend their vacations in ways that have the least negative impact on the environment. Locals can supplement their income because tourists must sleep and eat somewhere. As a result, ecotourism can help not only to plant trees but also to improve the financial situation of many locals in impoverished areas of our planet.

B. Afforestation and Reforestation Disadvantages

Decrease in the value of land for the owner: The owner's land value has decreased: One issue with afforestation is that it can significantly reduce the value of land for the owner. Assume you own a plot of land that was previously intended for residential use. The local municipality now decides that his/her plot of land should be used for reforestation rather than development. The value of his/her property will be significantly reduced as a result, which may be considered unfair to property owners. As a result, there is some conflict associated with land use, and reforestation projects may not Benefit certain landowners at all.

Less housing space: Because of large afforestation projects, there will be less housing space. Large reforestation projects, particularly in areas with limited space, may even preclude large construction projects. Thus, in some areas, reforestation may exacerbate the housing crisis, leading to a higher level of homelessness in the respective region.

Less space for farming: When a greater proportion of land is used for forests, a smaller proportion of land is available for farming. Farmers will produce lower crop yields as a result. This can cause significant problems, particularly in impoverished areas of the world where people rely on farmers to ensure their food supply. As a result, afforestation can even lead to a situation in which the local population faces starvation due to a lack of farming space.

Local poverty may worsen: Some farmers may see a decrease in profits as a result of reforestation activities. They will have limited crop production if they can only farm on a smaller piece of land. As a result, poverty may increase because food prices tend to rise when crop supply is limited.

Wildfires: As the area of forest grows larger, so do the chances of wildfires. This could be a major issue for people who live near those forests, as the fires could destroy their homes and livelihood. Furthermore, people who live many miles away from forest fires may suffer because air quality in those areas may deteriorate significantly.

Litter in forests: Despite the fact that forests are intended to be a natural regeneration space, many people do not care about nature and throw their garbage right into the forests. As a result, the forests may no longer be natural conservation areas and may eventually become garbage dumps.

Less space for other critical public infrastructure: Because afforestation entails the use of large areas of land, it frequently results in a situation in which there is less space left for important public infrastructure projects such as highways. This is especially true near large cities where space is limited. As a result, if large areas of land are covered with plants, important public infrastructure projects may be hampered.

Planting trees can be expensive: Because tree planting requires a lot of manual labor and manpower, reforestation projects can be quite expensive. As a result, large sums of money from donations must be used. As a result, this money can no longer be used for other critical social development projects. As a result, reforestation may be considered problematic in discussions about how to use donations in the most efficient way.

Pests may be a challenge: While forests provide a home for many animals and plants, they also serve as a haven

for harmful pests such as the bark beetle. As a result, it is critical to employ people with extensive forestry knowledge in order to control those pests. However, in some areas, finding those people will be difficult, and as a result, reforestation projects may fail because the forests will be destroyed by pests sooner or later.

Scarcity may raise property and rent prices for the general public: Because reforestation entails the use of large areas of land, there will be less space for housing purposes and, as a result, property prices and rents may rise. As a result, people must spend a larger portion of their income on rent and may not have enough money for other essentials in their daily lives.

Forests require proper care: Reforestation, also known as afforestation, is only the first step toward sustaining and maintaining a sufficient number of trees on our planet. Someone must then be responsible for the proper maintenance of those forests. This includes pest control, but also a lot of extra work because trees have to be cut down for a variety of reasons, and if forests are not controlled and treated properly, they can quickly become useless and even die off in the long run.

Ecotourism causes various challenges: While ecotourism has grown in popularity in recent years and is generally regarded as a good thing, it is not without its drawbacks. For example, despite the fact that many people claim to want to protect our environment and reduce their ecological footprint, many of them continue to dispose of trash in nearby forests. As a result, if people only pretend but do not actually care about protecting our environment, ecotourism is more likely to be harmful than Beneficial to our forests, and reforestation may not be able to realize all of its potential Benefits.

Table 1: Reforestation Pros and Cons summary list

Reforestation Pros	Reforestation Cons
Mitigation of global warming	Less space for farming
Lower risk for landslides	Increasing rents
Employment opportunities	Wildfires
Reforestation as business model	Littering in forests
Afforestation can lead to social cohesion	Pests may spread
Planting trees is a fun activity	Maintenance of forests is costly
Air quality improvement	Local poverty may increase
Restoration of natural habitats	Less space for important infrastructure
Improvements in overall quality of life	Planting trees can be costly

4.1.2.2 Penalties and fines for illegal dumping

To mitigate the negative environmental consequences of illegal dumping, high fines should be imposed. If only minor fines are imposed, people and businesses will continue to dump their trash illegally because they know that even if they are caught, the penalties will be minimal. As a result, increasing fines for illegal dumping would provide an additional incentive to dispose of trash at official waste disposal sites.

4.1.2.3. More stringent government regulations

When there are issues that cause significant environmental degradation, governments should step in and create a framework to eliminate the incentive for such behavior. This could take the form of governments imposing high taxes on activities that harm our planet and providing financial incentives for environmentally friendly behavior. As a result, industries and private individuals have a greater incentive to avoid environmental degradation.

4.1.2.4 Biotopes and nature reserves

Nature reserves and biotopes could also help to mitigate environmental degradation. On the one hand, nature reserves provide a place for stressed-out society to unwind and recharge their batteries. On the other hand, they provide many animals and plants with a habitat where they can reproduce and thus avoid becoming extinct in the future.

4.1.2.5 Reduced levels of consumption

Reduced consumption is critical for transitioning to sustainable environmental behavior. Western society is always looking for the latest electronics, smartphones, clothes, and so on. This behavior, however, results in massive resource depletion as well as excessive waste production. Reduce your consumption significantly to avoid negative environmental consequences.

4.1.2.6. Reduce waste production and reuse

People should also make an effort to reduce their waste generation. This can manifest itself in the way they use their items and food more efficiently. Furthermore, when they want to get rid of old but still functional items, they should ask their family or friends if they want to reuse your old items. Their material possessions will be used more effectively as a result. If no one wants to use their old belongings, properly separate their waste to ensure efficient recycling.

4.1.2.7 Avoid using plastic packaging and disposable cups

Plastic waste is a major environmental problem that causes significant plastic pollution and has negative consequences for the planet. To reduce plastic waste, avoid purchasing items that are wrapped or packaged in

plastic. Furthermore, instead of using disposable plastic cups, bring ones that can be reused multiple times.

4.1.2.8 Education

To address the issue of environmental degradation, it is critical to educate people about the negative environmental consequences of their daily lives and how they can reduce their ecological footprint. This education should begin in elementary school because children are more eager to learn new things and change their behavior than adults. When these children grow up, they are more likely to be environmentally conscious. Furthermore, they may persuade their parents to act in a more environmentally friendly manner.

A. Environmentally Friendly

Being environmentally-friendly (also known as environment-friendly, eco-friendly, green, or nature-friendly) is behavior motivated by a desire to protect our environment. Eco-friendly behavior is critical because our planet faces many problems that can only be solved if humanity works together.

The following examines the most important reasons why it is important to be environmentally friendly.

Reasons to Be Environmentally Conscious

1. Humans only have one Earth.
2. The Western world's responsibility to the poorest people on the planet.
3. Prevent the extinction of animals and plants
4. Provide a livable future for future generations
5. Environmental friendliness in the context of corporate reputation
6. Making someone happy by making a contribution
7. People are broken by regret (a horrible feeling).

Simple Ways to Live Environmentally Friendly

- *Avoid plastic cups*
- *Avoid food delivery*
- *Avoid plastic packaging*
- *Be positive*
- *Buy local food*
- *Collect waste*
- *Dispose of cigarettes appropriately*
- *Don't litter*
- *Don't use taxis*
- *Donate birthday*
- *Eat vegan*
- *Educate children*
- *Grow native plants*
- *Home office*
- *Keep wearing clothes*
- *Organic gardening*
- *Pick food*
- *Plant trees*
- *Raise the awareness of people*
- *Reduce detergents*
- *Reduce heating*
- *Reduce the use of deodorants*
- *Reduce the use of sun cream*
- *Reduce waste whenever possible*
- *Reduce consumption level*
- *Reduce meat consumption*
- *Restore biotopes*
- *Reuse wrappings*
- *Save metals*
- *Save printing paper at work*
- *Save water*
- *Separate waste*
- *Social media*
- *Speak up*
- *Stop using drugs*
- *Support local farmers*

- *Switch off TV*
- *Turn off air conditioning*
- *Turn off the lights*
- *Turn off unnecessary car devices*
- *Use alternative means of transportation*
- *Use carpools*
- *Use electronic tickets*
- *Use energy-efficient devices*
- *Use organic food stores*
- *Use bicycle*
- *Use clothes efficiently*
- *Use food in an efficient manner*
- *Vaccinations*
- *Volunteer in non-profit organizations*
- *Walk short distances*

4.1.2.9 Convince Others

Convincing other people regarding the importance to save our planet is vital to saving the environment. Showing others what environmental degradation really means for future generations and how they can prevent these adverse effects by changing small things in their daily life.

4.2 Environmental degradation in Ethiopia

Soil erosion and land degradation, deforestation and forest degradation, water scarcity, biodiversity loss, climate change, and various types of pollution are the major environmental issues affecting Ethiopia (Ben, 2015). The application of improper farming and management practices, as well as intense pressure from various human activities, have posed serious threats to the sustainability of natural resources and the maintenance of balanced ecosystems (Marques *et al*., 2016).

The widespread problems associated with intensive agriculture, overgrazing, deforestation, soil erosion, water scarcity, livestock fodder, and fuel wood crisis are frequently interconnected, resulting in a self-perpetuating cycle of poverty, food insecurity, and natural resource degradation (Azadi *et al*., 2018). The issue manifests itself in recurring drought and famine, affecting millions of people and threatening the nation's economic development (Dejene, 2003). The state of natural resources in Ethiopia is influenced by a number of interconnected factors, including population pressure, migration and resettlement, land-use changes for agriculture, environmental pollution, climate change, and rapid changes in people's lifestyles, among others (Simachew, 2020).

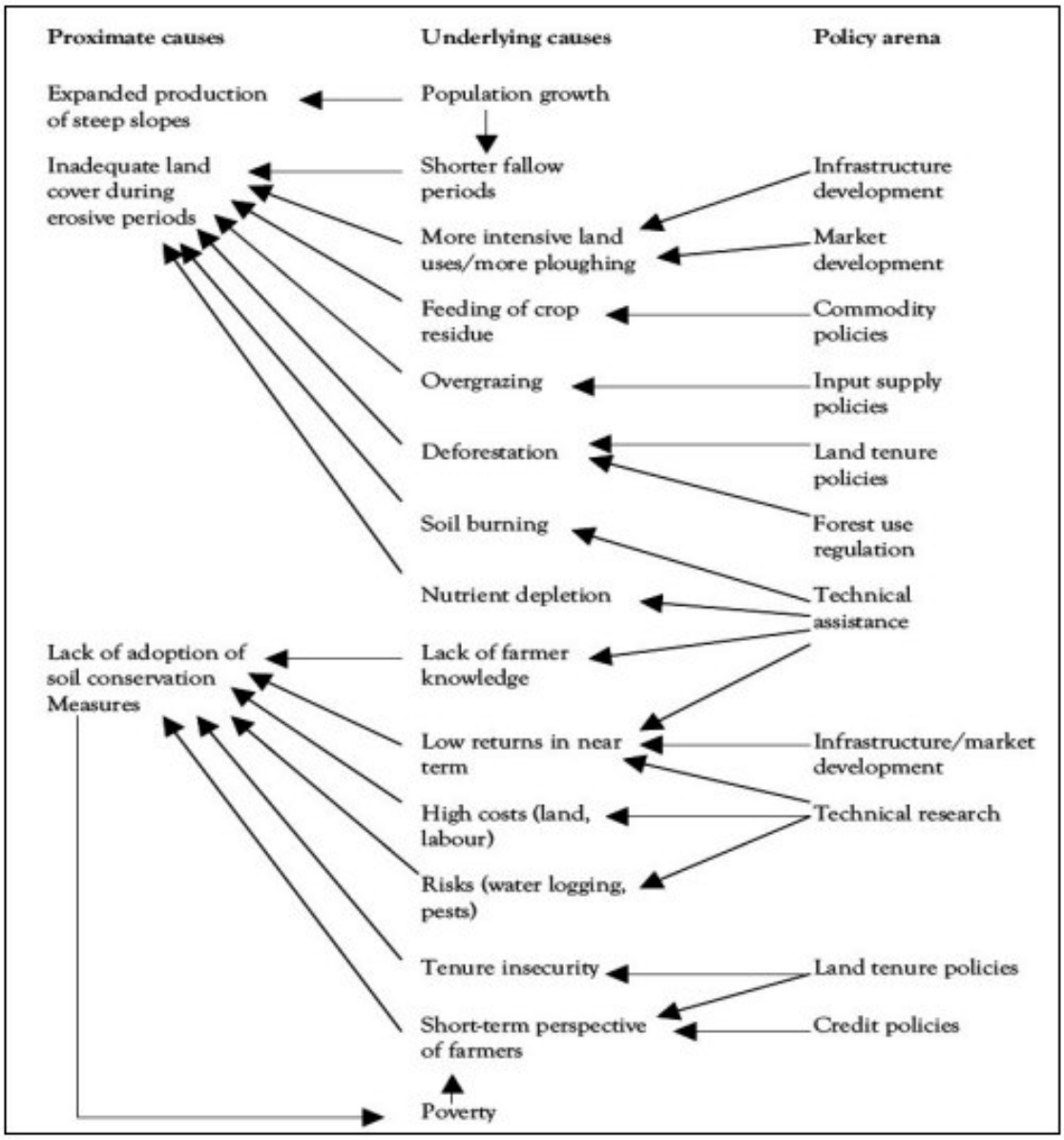
4.2.1 Land and soil degradation

Land degradation is defined by the United Nations Convention to Combat Desertification (UNCCD) as the reduction or loss of the biological or economic productivity and complexity of pastoral, agricultural, and wooded land due to soil erosion, soil impoverishment (such as nutrient depletion), and/or the loss of natural vegetation. Much of the world's land surface area is degraded, particularly in Sub-Saharan Africa, where it is critical to poor farmers' livelihoods (Nkonya *et al*., 2008). Around 85% of Ethiopia's population depends heavily on subsistence agriculture for a living, and their activities contribute to soil resource degradation and vulnerability (Gebreyesus and Kirubel, 2009).

The most serious environmental problems in Ethiopia are land degradation and the threats it poses to the ecological support system that underpins agricultural production. Soil degradation, on the other hand, is Ethiopia's most pressing environmental/land resource problem. According to Badege Bishaw (2001), the average annual loss from soil erosion on cultivated land is 42 tons/ha, compared to 5 tons/ha from pastures. As a result, despite covering only 13% of the country, land under cultivation accounts for nearly half of all soil loss. Not surprisingly, formerly cultivated lands have the highest average rates of soil loss because they are currently unproductive due to degradation and have very little vegetative cover to protect them (Hurni, 1990).

Land resource productivity loss is a major issue in Ethiopia, and with continued population growth, the problem is likely to worsen in the future (Berry, 2003). Girma (2001) confirmed that rapid population growth, severe soil loss, deforestation, low vegetative cover, and unbalanced crop and livestock production are the primary causes of land degradation in Ethiopia. Land degradation is a biophysical process exacerbated by socioeconomic and political factors, with subsistence agriculture, poverty, and illiteracy being major contributors to land and environmental degradation in Ethiopia (Mulugeta, 2004). According to Paulos (2001), topography, soil types, and agroecological parameters are also important factors in the degradation processes influenced by humans. Fitsum et al. (1999) demonstrated that multiple interacting forces have caused and continue to cause land degradation in Ethiopia. These are the immediate and interconnected or root causes. The diagram below

depicts the interaction of several forces that contribute to land degradation in Ethiopia.



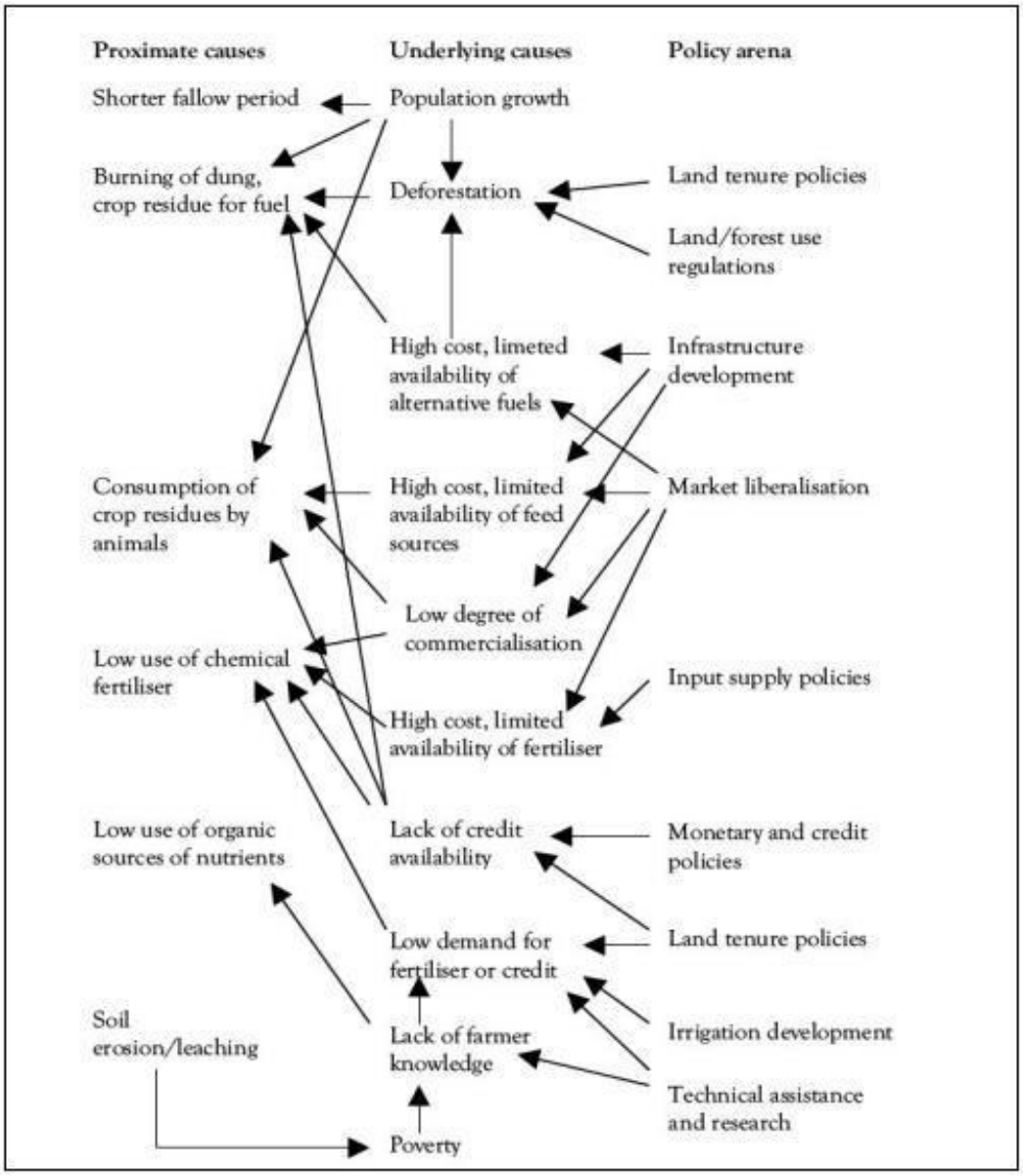


Figure 4: Causes of soil erosion (Source: Fitsum *et al*., 1999)

Land degradation impacts

The ecological consequences of land degradation in Ethiopia include loss of chemical, physical, and/or biological properties of soil, which directly affects the type of plants grown in the area, reduced availability of potable water, reduced volumes of surface water, aquifer depletion due to lack of recharge, and biodiversity loss (Berry, 2003).

Mechanisms for preventing and restoring land degradation: The current state and rate of soil erosion in Ethiopia necessitates immediate action to slow and reverse the process. However, the current population growth rate of 3%, compared to the economic growth rate of 1% (EIAR, 1991), will necessitate even more intensive use of cultivatable and pasture land in order to produce more food and feed for the growing human and livestock populations. Most types of soil degradation can be managed to avoid or reversed by replenishing nutrient-depleted soil with nutrients, rebuilding topsoil with soil amendments, re-establishing vegetation, or buffering soil acidity (Scherr and Yadav, 1996). Despite the fact that various programs, such as afforestation and conservation programs that contribute to soil conservation, have been implemented in the country over the last three decades, success has been limited thus far (Badege, 2001; Paulos, 2001). As a result, it is clear that land use intensification must be accompanied by technological innovations that increase productivity while conserving soil resources.

4.2.2 Water resources degradation

With eleven major lakes totaling 7,400 Km^2, twelve river basins totaling approximately 110 billion m^3, and groundwater with an estimated capacity of 2.56 billion m^3, Ethiopia has a large water resource potential. The

majority of the rivers are transboundary, with more than 75% of annual surface run-off draining to neighboring countries. The water resources have significant potential for hydropower generation, irrigation, and fishing.

Water scarcity: Water scarcity occurs as a result of decreased availability, over-abstraction, and/or contamination of existing supplies. Water quality in cities is poor as a result of pollution from domestic and industrial wastes. Water scarcity in Ethiopia's rural areas manifests itself in two ways: low coverage levels and poor water quality, both of which have consequences for human and animal health, economic and social life, and ecosystem functioning. According to Bogale and Urgessa (2012), many women and children in rural Ethiopia still spend many hours a day collecting water, time that could be better spent on education or productive work.

Dams and commercial irrigation schemes have also been shown to increase soil and water degradation, drought vulnerability, and food insecurity in riverine and lacustrine areas downstream of dams, and dams in Ethiopia are also susceptible to extreme soil erosion rates and earthquakes (Yewhalaw *et al*., 2014). These findings imply that dam construction and water resource development programs in Ethiopia will necessitate ongoing and extensive research and planning, as well as detailed environmental monitoring. Adequate infrastructure and services (whether public, private, NGO, or community-based) are required to improve water security and reduce the spread of infectious diseases in Ethiopia's poor urban areas.

4.3.3 Deforestation and forest degradation

Deforestation has also been a significant environmental issue in Ethiopia, with the consequences still being felt today. According to some historical reconstructions, Ethiopian forest cover has declined from around 40% to around 3% over the last century (Berry, 2003; Wassie *et al*., 2010). Acording to Eshetu (2014), deforestation has been uneven, with some regions, particularly the Ethiopian highlands, nearly deforested.

Natural forest cover in Ethiopia's south-central Rift Valley has declined dramatically from 16% in 1972 to 2.8% in 2000, corresponding to an annual forest loss of approximately 1,440 hectares in that area (Dessie and Kleman, 2007). According to a recent assessment, Ethiopia's remaining cloud forests are being depleted at an eight percent annual rate (Reichhuber and Requate, 2012).

Deforestation has an impact on local microclimates (and, in some cases, regional climates), which in turn causes other environmental issues, such as biodiversity loss and soil erosion, and returns to communities livelihoods.

Forest clearance and forest degradation have occurred in Ethiopia for a variety of reasons. Most notably, forest clearance has occurred in order to find the open land for agriculture (including plantations) and grazing, which was fueled in part by resettlement programs in the 1980s (Kassie *et al*., 2014). Furthermore, harvesting for fuel wood and commercial purposes, such as supplying the construction industry, has resulted in the rapid depletion of forest resources.

Population growth and migration patterns, as well as soil erosion and grazing, all exacerbate deforestation and forest degradation. According to Bishaw (2001), soil erosion, in particular, results in the removal of fertile topsoil, a reduction in soil-water and groundwater storage capacity, and an aggravation of flooding as runoff is concentrated spatially and temporally.

4.3.4 Pollution

Pollution issues include a wide range of types of air, water, soil, and land pollution, resulting in anthropogenic substances contaminating these resources. Air pollution includes the release of black carbon (soot), aerosols, nitrogen oxides, sulfur oxides, volatile organic compounds, lead, and other particulates, as well as the issue of acid deposition. Recent research has highlighted Ethiopia's continued reliance on, and inefficient use of, biomass resources, which has contributed to the loss of forest resources as well as indoor air pollution and poor health due to the use of traditional cooking techniques. This is despite the government's and other institutions' efforts to encourage the adoption of new cooking technologies, which have had limited success (Beyene and Koch, 2013). Pollution of freshwater, groundwater, soil, and land resources includes many point-source and diffuse types of contamination, which can be severe in some cases (for example, due to the improper release of hazardous waste), but these are generally localized events.

Chemical pollutants that are hazardous to human health may accumulate in dangerous concentrations in Ethiopian urban areas. Kampa and Castanas (2008) revealed that sulfur and nitrogen compounds, volatile organic compounds, heavy metals, and other pollutants are released during the combustion of fossil fuels, as well as poorly regulated industrial processes, causing respiratory and heart disease, lung cancer, acute respiratory infections in children, and chronic bronchitis in adults, aggravating pre-existing heart and lung disease and/or triggering asthma attacks. Chemical pollutants may have a greater impact on urban poor populations because both unhealthy working conditions and the use of biomass fuels in indoor cooking stoves and heaters are features of a typical urban poor lifestyle (Kjellstrom *et al*., 2007). In the absence of effective environmental regulation, monitoring, or management, potentially widespread pollution may now occur, with unknown consequences (Bakshi *et al*., 2008).

4.3.5 Overpopulation and Environmental degradation

In Ethiopia, population growth is causing several serious environmental disasters. These include land

degradation, forest destruction, habitat destruction, and biodiversity loss. Rising energy demand has resulted from shifting consumption patterns. Air pollution, global warming, climate change, water scarcity, and water pollution are the results. Because of uncontrolled urbanization and land-use change, agricultural expansion and massive intensification, and forest destruction, Ethiopia's rapidly growing population is causing a number of environmental issues. Forest and agricultural land degradation, resource depletion (water, mineral, soil, forest, etc.), environmental degradation, public health, biodiversity loss, loss of resilience in ecosystems, and livelihood security for the poor are major environmental issues.

4.3.6 Effect of Environmental degradation on public health

Ethiopia suffers from a variety of pollution problems affecting air, water, and land, with particular concerns raised about urban and indoor air quality due to the country's reliance on bio-mass stoves for cooking (Ben, 2015). Chemical pollutants that are hazardous to human health can accumulate in dangerous concentrations in Ethiopian cities. Kjellstrom et al. (2007) stated that the combustion of fossil fuels, along with poorly regulated industrial processes, emit sulfur and nitrogen compounds, volatile organic compounds, heavy metals, and other pollutants that cause respiratory and heart disease, lung cancer, respiratory disease in children, and chronic bronchitis in adults, adversely affecting pre-existing heart and lung disease and/or triggering asthma attacks.

Recent research shows Ethiopia's continued reliance on, and inefficient use of, biomass resources, which has contributed to the loss of forest resources as well as indoor air pollution and poor health due to the use of traditional cooking techniques Water pollution includes both point-source and diffuse pollutant releases, ranging from agricultural fertilizers and pesticides to municipal and industrial effluents. These, in turn, have a wide range of environmental consequences, including eutrophication (due to nutrient enrichment of water bodies), harmful algal blooms, the formation of anoxic 'dead zones' in lakes, and effects on fisheries and livelihoods.

4.3.7 Effect of Environmental degradation on Biodiversity

Ethiopia has a diverse ecological system. According to Zelalem et al. (2018), Ethiopia's flora is very diverse and rich in endemic taxa. The country is estimated to have 6,000 species of higher plants, 10% of which are endemic. It also has 284 species of wild mammals and 861 bird species. However, biodiversity loss is one of Ethiopia's major environmental challenges (Ben, 2015). Major contributors to biodiversity loss include land-use change, pollution, changes in the nitrogen cycle and acid rain, variations in co_2 concentrations in the atmosphere, climate change, and the introduction of invasive exotic species. Ethiopia's high density and rapid growth, high rate of urbanization and agricultural expansion, high incidence of poverty, and high level of illiteracy have all contributed to the degradation of natural resources and the environment, as well as the loss of biodiversity. Many plant and animal species are facing extinction.

Because the poorest people are frequently those who are most directly dependent on adequate local ecosystem services such as clean water, fuelwood, and flood protection, there is a direct link between biodiversity loss and poverty, and poor people are disproportionately affected by biodiversity loss (Millennium Ecosystem Assessment, 2005). Biodiversity loss occurs primarily as a result of habitat degradation and loss, such as deforestation, and disease spread, but it also occurs as a result of direct mortality among animal and plant populations (for instance, through hunting, poaching, and collecting). All of these issues are current concerns in Ethiopia, with significant implications for livelihoods, sustainable development, and green growth. Effective biodiversity conservation is crucial to ensure communities' livelihoods, such as the establishment and maintenance of protected areas.

5. CONCLUSION

Environmental degradation is one of the most pressing environmental issues, and it is a broad term that encompasses a wide range of issues such as land/ soil degradation, water resources degradation, pollution, biodiversity loss, animal extinction, deforestation, desertification, climate change/global warming, and much more.

Understanding the environmental degradation factors is necessary before considering the necessary steps to be taken. The most important factors are social (growing population, poverty, urbanization, changing lifestyle) and economic (agricultural development, industrialization, economic development). Overpopulation, deforestation, landfills, consumption behavior, waste production, lack of education, illegal dumping, agricultural pollution, littering, mining, plastic pollution, resource depletion, etc. can be mentioned among the causes of environmental degradation.

The effects of environmental degradation include acid rain, resource exploitation, biodiversity loss, floods, landslides, soil erosion, species extinction, natural disasters, global warming, public health issues, loss of livelihood for many people, Famine, wars, disease spread, tourism losses, economic effects, and so on.

Due to population increase, environmental degradation, and climate change, the guaranteeing of an acceptable level of food security across the world will become increasingly difficult in the future. High population growth rates result in increased population density, an increase in the number of people living below the poverty line, and increased pressure on natural resources, which contributes to environmental degradation

through over-exploitation of natural resources.

Deforestation is a major issue that affects both humans and the entire ecosystem. Forest resources are being depleted fast because of the ever increasing demand for crop land, high demand for fuel wood and timber. Deforestation is extremely harmful to the environment because it contributes to global warming and causes the extinction of many species. It also makes floods and other natural disasters more likely. Soil erosion and pollution have become major environmental issues, particularly since the industrial revolution. Topsoil depletion has resulted in decreased land water retention capacity, erosion of plant genetic resources, and habitat loss. Global warming is one of the most pressing issues confronting humanity today and in the future. The effects of global warming include many people losing their homes and belongings; an increase in the number of migrants seeking a better future; biodiversity loss; low productivity, famine, and conflict.

Scientific resource management can lead to long-term development. Stopping deforestation, high fines for illegal dumping, stricter government regulations, nature reserves and biotopes, lowering consumption levels, lowering waste production, avoiding plastic packaging and disposable cups, education, persuading others, and so on are examples of environmental mitigation measures.

Mitigating global warming through afforestation and reforestation practices, by reducing our consumption habits, and convincing others to do the same is vital to protect the earth planet and make it clean and healthy. Although there are different disadvantages to reforestation and afforestation, the Benefits outweigh the drawbacks, and trees should be planted in a reasonable manner to Benefit as many people as possible. Because a sufficient number of trees are required on the earth's surface to maintain ecological balance and ensure a livable future for future generations. In general, environmental degradation can be controlled by:

- planting more trees through afforestation or reforestations practices
- harvesting rain water
- reducing green house emissions or reducing the use of chlorofluorocarbons
- reducing fuel consumption
- Treating the industrial effluents before dumping them in water bodies
- reducing the use of fertilizers
- Conserving the endangered species
- Creating awareness among people about the environmental degradation issue, etc.

Soil erosion and land degradation, deforestation and forest degradation, water scarcity, climate change, biodiversity loss, and various types of pollution are the major environmental issues affecting Ethiopia. Land degradation, a common problem in Ethiopia, has a disastrous impact on the country's socio-cultural environment and ecological setting. Rapid population growth, severe soil loss, deforestation, low vegetative cover, and unbalanced crop and livestock production are the primary causes. In addition to manmade factors, topography, soil types, and agro-ecological parameters all play a role in degradation processes.

6. RECCOMENDATIONS

- Because of the high population, soil, water, air and forest resources are being depleted in an unsustainable manner. The exploitation of resources, such as deforestation, has accelerated in recent years in response to a rapidly growing human population. To tackle the problem of over-exploitation of natural resources, food production from crops should be increased in the most sustainable possible manner. Following sustainable development is mandatory to reduce environmental degradation problems. Trying to make things or consume things in the view of reduces and reuse is essential to protect the environment. If development organizations are serious about reducing poverty in the communities where they work, they must consider the climatic and environmental hazards that affect their projects.
- All must conserve the environment and focus on environmental degradation and its consequences in order to live a happy and prosperous life. Humanity as a whole must take steps to ensure a livable environment in the future, including mitigation and adaptation techniques for rising global temperatures. Everyone should make a significant contribution to mitigating global warming through afforestation practices by reducing our consumption habits and convincing others to do the same.
- The present and future environmental degradation can be minimized with careful planning, public awareness, and community participation. Stopping the depletion of natural resources on a national and global scale is essential. Farmers should be encouraged to protect their lands. To ensure that enough forestland remains untouched, governments must strictly regulate the amount of deforestation. The genetic resources of medicinal plants, forest resources, microbial resources, naturally occurring plants, and wild animals must be prioritized in order to protect them from extinction.
- By shifting to cleaner domestic energy sources, there should be an urgent need to halt environmental degradation and improve population health. Through environmental management policies and instruments, much more regulatory and monitoring capacity is required for pollution from commercial

and industrial sources.

- Ethiopia's economic development is based on an agricultural-led industrialization strategy that is likely to result in significant environmental degradation; therefore, effective environmental management measures should be integrated into development planning. The country should implement a responsible national policy for natural resource management and biodiversity conservation that is consistent with its economic and social development policies. Environmental degradation, particularly land/soil degradation in Ethiopia, should be mitigated through various mechanisms based on the nature and form of degradation using an integrated approach.

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