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11. Challenges to the Environment Degradation and Their Mitigation

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Abstract:

Environment comprises of atmosphere, lithosphere, hydrosphere and biosphere. The interaction between these components is crucial for life. The links between human activity and the environment are complex and varied. Humans need to interact with the environment to obtain our food, water, fuel, medicines, building materials and many other things. The world has begun to witness the dramatic environmental degradation caused by anthropological activity in the name of development.

The impact of environmental problems on humans is notable leading to bleak outcomes in health and socio-economic development. Global warming, acid rain, water and air pollution, toxic waste, and dwindling energy supplies are startling challenges that may menace our future if we don't confront them.

The environment gives us multitudinous benefits that we can't compensate our entire life. The severe environmental problems of the 21st century have the capability to alter the course of life on this planet. To address this crisis, we need to make better use of and manage our resources, support a green mind, sustainable development, and a society that is actively involved in all on going activities.

Keywords:

Environmental degradation, sustainable development, pollution, exploitation, mitigation.

11.1 Introduction:

Environmental degradation is a deterioration in which the natural environment is harmed in some way, resulting in a reduction in biological diversity and overall environmental health.

This process can be fully natural, or it can be expedited or triggered by human actions. It is the central causes of diseases, health issues and incessant impact for the world. The relationship between physical environment and individual and societal well-being is complex and varied, with both qualitative and quantitative aspects.

The sustainable administration of the earth and natural resources is vital for financial progress and human opulence. Natural resources give line of work to a substantial number of individuals and create sizeable assessment revenue.

The long-term development of financial areas requires healthy biological systems. They as of now give legions of occupations. The entire biosphere relies on the biological communities that regulate the world's air, water, and soil.

They form a unique and useful cradle in the face of unprecedented climate change and atmospheric change. However, the integrity and functionality of these critical natural resources are progressively being jeopardised.

Environmental degradation, according to the United Nations International Strategy for Disaster Deterioration, is defined as "the reduction of the environment's capacity to meet societal and ecological objectives and needs.

The relationship between human health and the environment has been extensively researched, and environmental dangers have been shown to have a significant impact on human health, either directly by exposing humans to hazardous chemicals or indirectly by disturbing life-sustaining ecosystems.

Sanitation has been linked to notable health benefits and can contribute significantly to the achievement of the Millennium Development Goals of environmental sustainability, health, and development by reducing exposure to environmental elements of danger by improving air quality and access to improved sources of drinking and bathing water.

Causes of Environment Degradation:

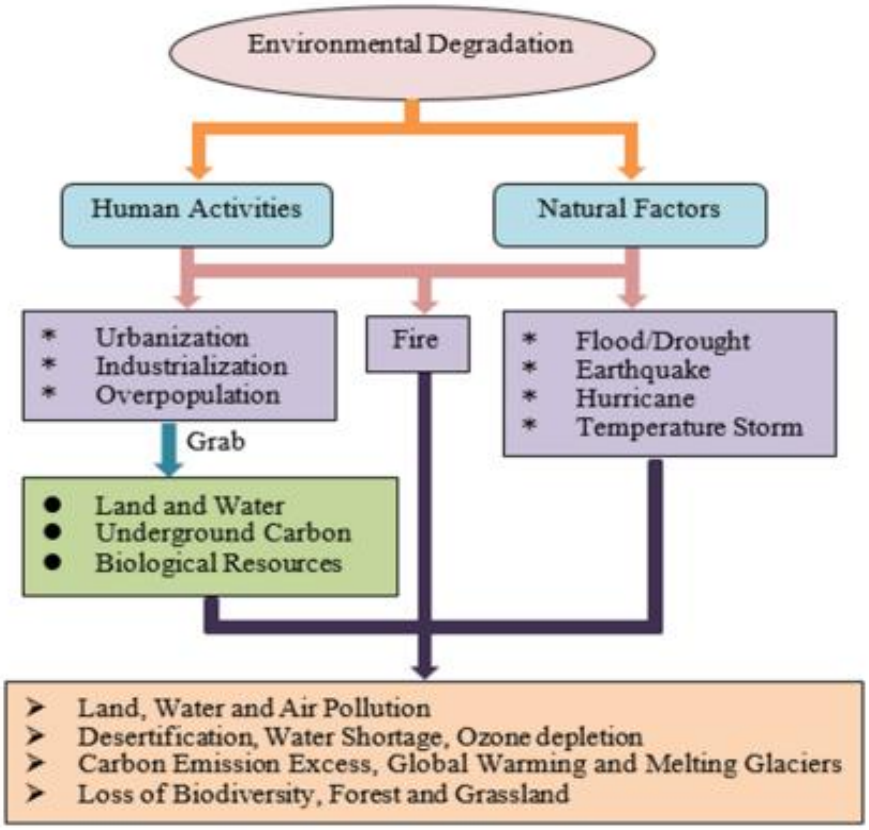

Figure 11.1: This Flow Chart Shows The Different Causes Of Environmental Degradation.

Human Sources:

Changes to biophysical environments, ecosystems, biodiversity, and natural resources caused directly or indirectly by humans, such as global warming, environmental degradation, mass extinction and biodiversity loss, ecological crisis, and ecological collapse, are examples of anthropogenic impact on the environment. Population expansion, overconsumption, overexploitation, pollution, and deforestation are just a few of the human activities that are causing havoc on the environment on a massive scale.

Air Pollution:

Unfortunately, air pollution is one of the most common causes of environmental damage. Pollution releases contaminants into the environment, which can harm or even kill plants and animals. Industry and automobiles are the principal and secondary sources of air pollution, respectively.

It is a major health danger in the environment, causing an estimated two million premature deaths each year throughout the world. The worldwide burden of disease from respiratory infections, heart disease, and lung cancer is predicted to decrease when air pollution is reduced. Because air quality is a major concern for both developed and developing countries, there have been a slew of first-hand studies published in the literature aiming to quantify the health advantages of improved air quality.

Air pollution is a serious problem in India, with the main causes being the burning of wood and biomass for fuel, fuel adulteration, car emissions, and traffic congestion. The increased use of coal for energy generation and the growing number of car owners are two key contributors to rising fine particulate matter levels.

The preponderance of air pollution is caused by energy use and production. The earth's temperature rises as a result of carbon dioxide and methane pollution in the air. Smog, a kind of air pollution that develops when the temperature is warmer and there is more UV light, is exacerbated by the increased heat. Every year, the cumulative effects of ambient (outdoor) and indoor air pollution cause approximately seven million premature deaths, chiefly due to increased mortality from stroke, heart disease, chronic obstructive pulmonary disease, lung cancer, and acute respiratory infections.

Figure 11.2: This Picture Shows Air Pollution Caused by Industries by Emitting Smoke into The Environment.

According to the World Health Organization (WHO), on a yearly basis air pollution is responsible for almost seven million deaths around the globe. Nine out of ten human beings presently breathe air that outstrip the WHO’s guideline limits for pollutants, with those living in low- and middle-income countries suffering the most.

A countless number of air pollutants give rise to severe health risks and can sometimes be disastrous even in small amounts. Almost 200 of them are managed by law; some of the general pollutants are mercury, lead, dioxins, and benzene. These are also regularly emitted during gas or coal combustion, incinerating, or in the case of benzene found in gasoline.

Greenhouse Gases:

By trapping the earth's heat in the atmosphere, greenhouse gases lead to warmer temperatures, which in turn lead to the authentication mark of climate change: rising sea levels, more severe weather, heat-related deaths, and the increased transmission of contagious diseases.

In 2018 carbon dioxide rated for 81 per cent of the country's overall greenhouse gas emissions, and methane made up 10 per cent. Carbon dioxide emitted by combusting fossil fuels, and methane hail from natural and industrial sources, including enormous amounts that are released during oil and gas drilling.

We emit far enormous amounts of carbon dioxide, but methane is consequentially more potent, so it's also catastrophic. Another category of greenhouse gases, hydro fluorocarbons (HFCs), are thousands of times more powerful than carbon dioxide in their increased capacity to trap heat. In October 2016 over 140 countries end up at an agreement to bring down the use of these chemicals which are found in air conditioners and refrigerators—and develop greener alternatives over the near future.

Global Warming:

Global warming has been the most important confirmation of global climate change. It is one of the primary contributors to environmental devastation and calamities. Evidence suggests that the Earth's climate system is warming in a way that has never been seen before in human history. The current temperature increase may disrupt the balance of a human environment that has been developed at a lower condition for a long timeframe.

In consideration of the Industrial Revolution, the global annual temperature has increased in total by a little more than 1 degree Celsius, or about 2 degrees Fahrenheit. For the last 40 years, we have seen the global annual temperature rise by 0.18 degrees Celsius, or 0.32 degrees Fahrenheit, per decade.

Now climate scientists have drawn the interference that we must constrain global warming to 1.5 degrees Celsius by 2040 if we are to avoid a future in which everyday life around the world is marked by its serious, most disastrous effects: the extreme droughts, wildfires, floods, tropical storms, and other disasters that we refer to jointly as climate change.

These effects are suffered by all people in one way or another but are experienced intensely by the underprivileged, the economically marginalized, and for whom climate change is often a key driver of poverty, displacement, starvation, and social unrest.

Extreme heat waves have resulted in thousands of deaths around the world in recent years and in a startling sign of events to come, Antarctica has lost nearly four trillion metric tons of ice since the 1990s. The rate of loss could increase if we keep burning fossil fuels at our current pace it may cause sea levels to rise several meters in the next 50 to 150 years and wreaking havoc on coastal communities worldwide.

Water Pollution:

Water is uniquely exposed to pollution. When hazardous substances such as chemicals or microbes enter a stream, river, lake, ocean, aquifer, or other body of water, the water quality deteriorates and becomes lethal to humans and the environment.

Agriculture runoff is a problem caused by farming. Agriculture is a dangerous source of pollutants that can deteriorate the ecosystem, to the point where the EPA has identified agriculture as the leading source of water pollution. Surface water drains into lakes and streams after sweeping over the soil.

Poisons introduced into waterways will have disastrous results. Fertilizers, whether organic or not, are equally dangerous. Large levels of phosphorus in fertilizer can cause algae to bloom in lakes. It quickly devolves into a situation where bacteria consume all of the available dissolved oxygen in the water. Plants, fish, and other species start to die, and the water gets more acidic as a result.

Municipal and industrial waste discharges contribute decent amount of toxins adding to the random wastes that industry and individuals dump directly into waterways.

Groundwater is also widely contaminated by the original polluting source as it seeps into streams, lakes, and oceans. More than 80% of the world's wastewater is discharged into water bodies without remediation.

Figure 11.3: This Picture Shows Water Being Polluted by Industrial Effluents.

At sea, tanker spills account for more than 10% of the oil in the world's waterways, while the maritime industry's systematic operations—both legal and illicit discharges contribute around one-third.

Radioactive Waste Pollution:

Radioactive waste is any pollution that release radiation beyond what is naturally released by the environment. It's created by uranium mining, nuclear power plants, and the manufacturing and testing of military weapons, as well as by universities and hospitals that use radioactive materials for research and medicine. Radioactive waste can persist in the environment for thousands of years, making disposal a major problem.

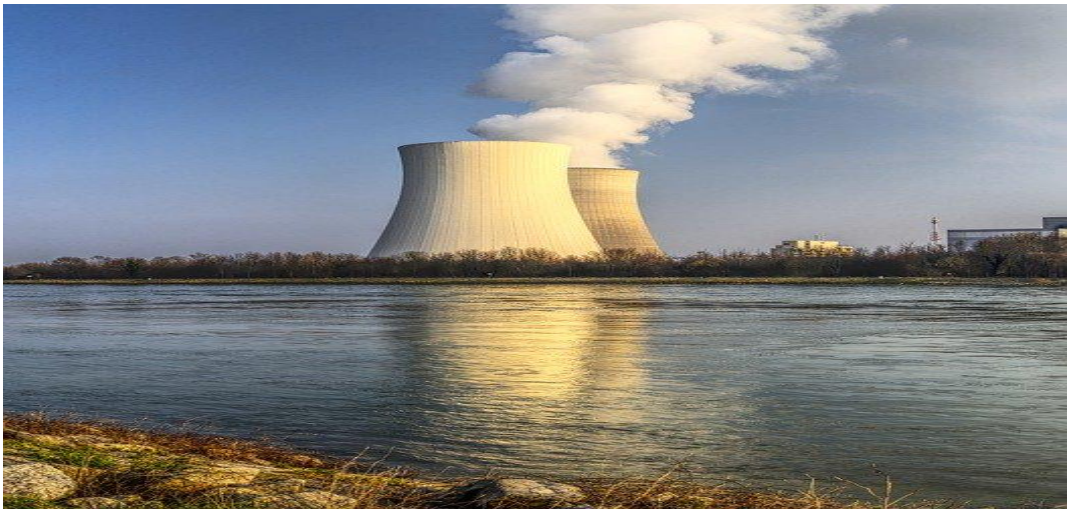

Figure 11.4: This Picture Shows Nuclear Power Plant Near The Water Body.

Every exposure to radiation raises the risk of damage to tissues, cells, DNA and other essential molecules. Each exposure assuredly can cause programmed cell death, genetic mutations, cancers, leukaemia, birth defects, and reproductive, immune and endocrine system disorders.

Land Pollution:

Land degradation refers to any disruption to the land that is deemed undesirable. It can be caused by both human and natural disasters such as floods and forest fires, as well as a variety of other climate change impacts, land clearance, deforestation, soil nutrient depletion owing to bad farming methods, overgrazing, and over grafting, among others.

The disposal of waste that is not biodegradable, such as plastics, Styrofoam, and metal fragments. These wastes remain trapped in the soil, affecting the soil's fertility. The soil is generally suitable for the growth and cultivation of a wide range of plant species. It also serves as a home for a variety of animals and microbes that play a crucial role in maintaining the ecological balance.

Farming the same crop on the same piece of land might result in fertility loss. Crop rotation can assist to improve soil quality and conserve natural resources, but it is not widely practised, resulting in a progressive decrease in the amount of product produced on the land.

The use of chemicals as fertilisers or pesticides frequently leaves traces of toxic chemical residues, which can eventually make their way into the food chain and pollute water. Up to 40% of the world's agricultural land has been severely damaged, according to estimates.

Figure 11.5: This Picture Shows Dumping of Garbage in Urban Area.

The disposal of waste that is not biodegradable, such as plastics, Styrofoam, and metal fragments. These wastes remain trapped in the soil, affecting the soil's fertility.

Landfills are contributions made by urban cities in response to the massive amounts of trash generated by families, industry, companies, and hospitals.

They represent a serious threat to the environment as well as the people who live there. Furthermore, when burned, they emit a horrible odour that degrades the environment and pollutes the air.

Quarries also create harm to natural environments by generating a variety of pollution types. Soil erosion and landslides are exacerbated by the unregulated cutting of land and stones from slopes.

Deforestation:

Cutting down trees to make place for additional dwellings and industries is known as deforestation. Deforestation is caused by a number of factors, including population expansion and urban sprawl.

Figure 11.6: This Picture Shows the Trees Being Cut Down for Other Uses.

Aside from that, deforestation is caused by the use of forest area for agriculture, animal grazing, fuel wood harvesting, and logging. Deforestation contributes to global warming by releasing carbon into the atmosphere diminishing forest size.

Two-thirds of global forest cover loss is happening mainly in the tropics and sub-tropics, where vast clump of deforestation hotspots are destroying the important ecosystem services forests provide.

Deforestation causes several problems encompassing environmental degradation through increased rate of soil erosion, increase in the sediment load of the rivers, siltation or reservoirs and river beds, increase in the frequency and dimension of Hoods and droughts, changes in the pattern of distribution of precipitation, raise of greenhouse effects increase in the destructive force of the atmospheric storms, etc.

Over Population:

Increasing demands on natural resources, agriculture and livestock is a result of growing population. Population explosion is associated with many negative impacts.

Since 1970 onwards, the world has been facing an ecological overshoot; the demand and the supply capacity are not balanced.

The industrial revolution that began in the 18^{th} century greatly improved the lifestyle of the humankind but put an end of sustainable living.

As people adapted to more comforts, they yearned for still more. The mortality rate has reduced due to superior medical facilities which have resulted in increased lifespan.

Figure 11.7: This Picture Shows Large Group of People Gathering.

Unfortunately, the most polluting species is known to be human. Earth is very good at recycling waste, but people are generating far more than earth capacity can cope with. Pollution occurs at various levels and it doesn't just impact our planet; it impacts all species, including mankind, who rely on it.

Natural Sources:

While environmental deterioration is most commonly connected with human activity, the fact is that ecosystems change through time as well.

Some ecosystems degrade over time, whether or not they are influenced by human activity, to the point where they can no longer support the life that is "meant" to exist there.

Landslides, earthquakes, tsunamis, hurricanes, and wildfires can completely devastate local plant and animal communities, rendering them incapable of functioning.

This can occur either as a result of physical destruction caused by a natural disaster or as a result of resource degradation associated with the introduction of an invasive alien species into a new habitat.

The latter occurs frequently during hurricanes, when lizards and insects are transported over tiny spans of water to new habitats. When the environment can no longer support the new species, deterioration occurs.

Figure 11.8: This Picture Shows The Earth Quake Near The Forest Area.

Effects of Environmental Degradation:

Biodiversity Loss:

Biodiversity loss can be related to the decline or disappearance of biological diversity.

Biodiversity loss can be a huge threat to the human as we depend on soil and water for the production of our food. Imbalance created in the ecosystem can lead to the arrival of pests that can damage the crops adversely.

Extinction of species can increase over the years as we alter and destruct the habitats for our own sake. Thousands of species are already in danger. CO_2 emission is increased as a result of industrial revolution and it has the ability to reduce the capacity of absorbance of CO_2 by forest and oceans which can lead to some adverse effect in the ecosystem. As we deteriorate ecosystems, the risk of future pandemics increases.

Ozone Layer Depletion:

Ozone layer depletion refers to thinning of ozone layer in the upper atmosphere. Ozone layer protects us from harmful UV radiation which can cause skin cancer when there is a prolonged exposure. 80 per cent of ozone depletion is caused by production and emission of chlorofluorocarbons (CFCs).

The other substances that lead to ozone layer depletion are hydro chlorofluorocarbons (HCFCs) and volatile organic compounds (VOCs). These chemicals can be found in automobile emissions, industrial waste, aerosols, and refrigerants.

Climatic Change:

The effects of climate change on even the smallest species can threaten ecosystems and other species across the food chain. The ~1ºC rise in mean global temperature is causing serious and often unexpected impacts on species, affecting their abundance, genetic composition, behaviour and survival.

Figure 11.9: This Picture Shows Melting of Ice in Antarctica.

Climate change affects the ability of plant species to sequester carbon, turning carbon sinks into carbon sources. Warmer temperatures are also increasingly leading to tree death caused by disease, drought conditions and an upsurge in the number and severity of forest fires, which leads to an increase in carbon emissions.

Environmental policies aimed at reducing CO_2 emissions are essential for reducing the impact of climate change on species.

Species declines threaten the services that nature provides to people, which include functioning as carbon sinks and increasing our resilience to climate change. Prioritising nature conservation and embracing strategies to promote climate change adaptation can enhance species survival.

Human Health:

As a result of environmental degradation, human health may be jeopardised. Respiratory diseases such as pneumonia and asthma can be caused by toxic air pollution. Indirectly, air pollution has claimed the lives of millions of people.

The air in major cities has become extremely polluted, and the World Health Organization considers pollutant concentrations above a certain level to be dangerous (WHO).

In the recent decade, urban air pollution has risen drastically. Residual suspended particulate matter (RSPM), suspended sulphur dioxide (SO2), and other air contaminants are among the most significant. Increasing industrialization and rising vehicular pollution, industrial emissions, and automotive exhaust are the main causes of urban air quality degradation. The combustion of fossil fuels produces a considerable amount of methane, which causes death by suffocation as well as respiratory damage, heart and lung illness, and other ailments.

Animal excrement and artificial fertilisers damage the soil and water with nitrates. Indoor air pollution may be a larger threat to human health than outdoor air pollution. Smoke containing harmful particles and gases is produced when cooking and heating using wood, crop leftovers, animal dung, and low-quality coal. When these fuels are used indoors with inefficient stoves and inadequate ventilation, TB, other serious respiratory ailments, and even blindness can result.

Drought, Desertification and Water Scarcity:

Drought and water shortages are the primary drivers of climate change, and they may play a substantial role in climate-related migration. As a result of global warming, droughts, desertification, and water scarcity are becoming more common. Around one-third of the world's population is expected to be affected by these events.

As sea levels rise, areas of salinization in groundwater and estuaries will expand, reducing the amount of freshwater available to humans and ecosystems in coastal locations. Furthermore, it alters precipitation patterns, putting a strain on the availability of safe drinking water.

Figure 11.10: This Picture Shows the Drought During Monsoon in India.

Mitigation of Environmental Degradation:

The environmental damage that we inflict is enormous. We have taken for granted the precious natural resources due to a lack of "environmental value. It has also resulted in an overabundance of low-cost, short-lived goods that are haphazardly discarded into the environment after use, followed by the purchase and discard of new goods, a cycle that continues indefinitely, jeopardising the planet's ability to restore its environmental services on time. This model of our interaction with the world must be altered. We certainly do not have the right to exploit and destroy the bestowed resources without considering future generations of humans and animals.

- **Role of Government:**

The role of the central and local government in decentralized decision-making is analysed in detail. It is argued that proper and appropriate environmentally sustainable decision-making requires intense institutional and cultural change in the society. It necessitates those environmental concepts to be incorporated in the values, attitudes, and behaviour at both society and individual levels.

The government at any level can play a vital role in this process through direct investment in the environmental sector, the creation of a stimulant system being able to guide private entrepreneurs towards a more sustainable use of natural resources, the design of more appropriate institutions or the re-organization of the pre-existing ones.

It’s important to achieve the above changes is the adoption of a decision-making approach, that is able to better account for the complexities of the environmental problems and of the sustainability concept.

That is, a decision-making framework able to place due importance on: capacity-building; information and communication; co-operation; negotiation; and consultation and partnership, which, in turn will: improve environmental knowledge and awareness; optimize information collection; and gain support, consensus, and commitment of individuals in the identification, preparation, implementation, monitoring and evaluation of environmental programmes

- **Sustainable Development:**

Sustainable development is the guiding concept for fulfilling human development goals while also preserving natural systems' ability to supply the natural resources and ecosystem services that the economy and society rely on. The targeted outcome is a civilization in which living circumstances and resource utilisation continue to meet human requirements without undermining the natural system's integrity and stability. Sustainable development is defined as development that meets current requirements while not risking future generations' ability. Sustainable development aims to ensure that society develops in a balanced manner. The exploitation of natural resources to achieve economic goals is at the heart of both economic growth and environmental degradation.

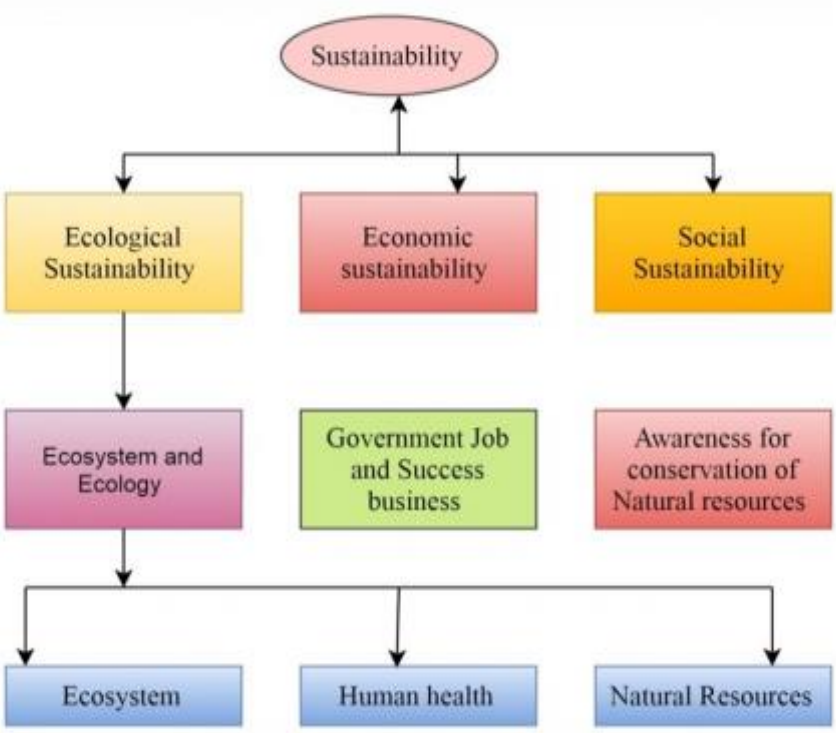

Figure 11.11: This Flowchart Shows Sustainability Components of Human Environment.

- **Solutions for Air Pollution:**

Air pollution is considered to be one of the most serious threats to the living community. Consequently, efficient mitigation strategies need to be adopted. More efforts are needed to improve greenness in developing and developed countries.

zero-emission vehicle , by using alternative fuels, respect to the traditional fossil ones, like electricity, bio-fuels, liquefied petroleum gas (LPG), natural gas (CHG, LNG), and, methane, this kind of cars can produce lower concentrations of pollutants.

Adopt bicycling, skating this also helps to prevent cardiovascular diseases and helps us to stay fit.

Carpooling and public transport must be advised by the enterprises for their labours rather than own transport.

Reduce or eliminate fireplace and wood stove use and try alternatives like LPG and inductions electric and solar cookers.

Avoid burning leaves, trash, and other materials instead try to install compost pit the later can be used as manure. Avoid using gas-powered lawn and garden equipment.

- **Solutions For Land Pollution:**

Make people familiarised with the concept of 3R that is Reduce, Recycle and Reuse. Harvesting resources for requirements can be reduced by reusing materials.

The products which can't be reused can likely be recycled. Use of pesticides and fertilizers in agricultural activities degrade the quality of the soil. So reducing the use of it can improve the quality of the soil. Practicing organic gardening and eating organic food can be healthy also.

By switching to a reusable cloth bag for groceries instead of plastic bags will help break down on the need for non-biodegradable materials. Buying a biodegradable product can be a great alternate.

Avoiding littering and dumping garbage near the residential area is an essential measure. Land is literally the base of our ecosystem as we walk and survive on land. Therefore we should take care of it and nurture it.

- **Solutions For Water Pollution:**

Waste water treatment can be done through physical, chemical and biological process. The more efficient the process the more cleanly the water is.

Green agriculture is also crucial to limit the chemicals that enter the water and it prevents water from getting polluted. Air pollution has a direct influence on water contamination as 25% of human induced CO_2 emissions are absorbed by oceans.

This causes a rapid acidification of oceans, and threatens marine life and corals. Preventing air pollution is the great way to prevent this from happening. In order to reduce plastic entering into the oceans plastic management should be done. Conservation of water is really very important as it is a universal solvent and elixir of life.

Conclusion:

Since humans have only been given one Earth to work with, and if the ecosystem becomes irreversibly harmed, humankind would become extinct, most international bodies identify environmental degradation as one of the primary risks confronting the world. As a result, in order to live a happy and meaningful life, we must safeguard our environment and focus on environmental degradation.

To build a better relationship between society and its environment, timely preparations for the changes that human activity and competition over resource usage may bring about should indeed be made in order to avoid developing conflicts.

We should conduct both problem-driven and core research to generate the knowledge needed to address current and future environmental concerns.

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