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Review Paper

The Connection between the Environment and Sustainability: A Preliminary Review

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ABSTRACT

The central idea behind environmental sustainability is the efficient management of natural resources including biotic(plants and animals) and abiotic (rivers, air, soil, minerals, etc) to ensure that the needs of both the present and future generations are met. Human activities continue to impact the environment in various ways. Since the onset of the Industrial Revolution in the 1900s, global temperatures have been rising, leading to climate change. Some of the adverse effects of climate change include melting ice, rising sea levels, droughts, wildfires, and floods. Another significant consequence of human activities on the environment is the thinning of the ozone layer, primarily caused by ozone-depleting substances such as chlorofluorocarbons (CFCs) and hydro- chlorofluorocarbons (HCFCs). This research explores the connection between environmental sustainability and key concepts such as environmental issues, their causes, and possible solutions. It also discusses various approaches to addressing environmental problems. The study draws on information from previous research, which was analyzed and presented to provide a foundational understanding of the link between the environment and sustainability. Several sustainable approaches and solutions are identified, including recycling, reusing, afforestation, reforestation, and the use of renewable energy resources. The environment and sustainability are closely interconnected, as the management and conservation of natural resources heavily depend on sustainable practices. Achieving environmental sustainability requires collective efforts at individual, community, and global levels.

1. Introduction

The environment includes all natural elements around us, excluding human-made factors, although these can impact it in both positive and negative ways. It is composed of two main components: biotic (living organisms like plants, animals, and microbes) and abiotic (non-living elements such as air, water, soil, and climate conditions). In fields like ecology, biology, and geography, the environment is understood as the conditions and resources that influence the growth, health, and survival of organisms, encompassing both living and non-living factors. Sustainability connects how we use the environment today with how we can continue to use it in the future. It involves utilizing natural resources in ways that meet present needs without compromising the ability of future generations to meet theirs. As environmental concerns grow, sustainability has become a key concept in addressing the gap between current and future needs. Sustainable development, as defined by the United Nations Environment Programme (UNEP), is development that "meets the needs of the present without compromising the ability of future generations to meet their own needs." UNEP emphasizes four pillars of sustainable development: economic growth, environmental protection, social equity, and international

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cooperation. The environment is crucial for the survival of all species, and the health of ecosystems depends on how we manage and interact with the natural world. Sustainability is essential to ensuring a balanced relationship between human activities and the environment; ensuring resources are preserved for future generations.

2. Understanding Environmental Issues

Environmental issues are numerous ranging from global warming, climate change, ozone layer depletion, air pollution, water pollution, biodiversity loss, Deforestation, waste and pollution. Environmental issues arise from the harmful effects of man's activities on the environment or how he he manage the various resources in his surroundings. The need to address current environmental issues without compromising the ability to meet the needs of future generation continue to accelerate the need for sustainable practices.. Environmental issues especially climate change are of global concern and therefore require collective efforts from all levels(individual, national, regional and global) to address their adverse effects on the planet. Most environmental issues cannot be amicably address in isolation due to the interconnection of countries and continents for instance the increased in carbon emission from developed countries does not only affect the temperature of the area where these greenhouse gases are emitted but to a larger extent the global temperature.Its against this backdrop that international commitments through conventions to encourage international collaboration in preventing or mitigating environmental issues that are detrimental to the health of the environment.

2.1 Global Warming

It is the gradual increase in the surface temperature of the Earth due to the emission of greenhouse gases in the atmosphere. These green house gases mainly CO2 are produced from the burning of fossil fuels from automobiles and other industrialmachines which emit green house gases in the atmosphere. The Earth's atmosphere has a natural way of trapping the heat from the sun to keep the surface below the troposphere warm; this support life on the planet by providing the required temperature for human and animal survival. However excess emission of these harmful gases result to high global temperature that negatively impacts the environment. According to the UN, July 2023 recorded 16.95'C; the hottest month ever on Earth. The World Meteorological Organization (WMO) also reported the year 2023 as the warmest year ever recorded with a temperature 1.4degrees Celsius which exceeds the 1850-1900 baselines. Continuous global warming has the potential of disrupting food chains, biodiversity loss and harm ecosystems and wildlife habitats. Global Warming is a major environmental issue which drives climate changes. It can be mitigated through collective efforts at all levels through commitments to shift from non renewable energy sources primarily fossil fuels to renewable energy sourcesfor a sustainable environment.

2.2 Climate Change

This is by far the most crucial consequence of human's activities that give rise to much environmental degradation. This subject has forced the world to unite in combating adverse changes on the environment. In scientific term, Climate change is define as the significant changes in global temperature, precipitation, wind patterns, and measures of climate that occur over several decades or longer. Global Warming and climate Change are closely used and in fact they are attributed to human induced changes primarily driven by burning of fossil fuels and the aftermath increase in green house gas emissions. As global temperature increases, it is followed by several climatic variability ranging from rising sea level and ocean acidification. Effects of Climate Change may include increased temperature, drought, severe storms, species extinction, food shortage and wildlife habitat lost.

2.3 Rising Sea Level

As temperature increases it proportionally results to rising sea level, sea ice and glaciers melt and flow into sea and ocean bodies. These melting glaciers and ice sheets increase water volume which subsequently results to rising sea level. Rise in sea levels further lead to flooding which may severely affect coastal settlements. Flood degrades soils and pose serious threats to agricultural production. Sea levels areincreasingly rising to climate change and its reported that since 1900(the end of the pre industrious era) the earth has observed a global average sea level of approximately 15-20cm, a rate much faster than previous averages(Masterson, Hall, North 2024).

2.4 Drought and Species Extinction

Globally, drought is becoming very common due to rapid increasing temperature. Increasing Temperature can result to lack of rainfall in an area over a long period of time which may result to lowering of water table and shortage of water supply. In California's Central Valley basins, drought-induced pumpage has accelerated thedecline of groundwater levels and water quality degradation over the past 30 years (Joint Research News 2024) The break in supply of water for long duration may lead to several deleterious effects on humans and the environment, Water scarcity impacts 40 percent of the World's population and as many as 700 million people are at-risk of being displaced as a result of drought by 2030(World Health Organization). Drought forces species to migrate to other environments for survival while species like plants may either deteriorate in growth or decline in population due to insufficient availability of water supply to plant roots. When drought continues in an area for a very long period of time, species habitat get destroyed due to wildfires and further creates an in balance in the ecosystem .of that environment.

2.5 Ozone Depletion

Ozone depletion refers to the thinning of the ozone layer in the Earth's stratosphere, particularly over the Polar Regions. The ozone layer, located about 15 to 35 kilometers above the Earth's surface, plays a crucial role in absorbing most of the Sun's harmful ultraviolet (UV) radiation, especially UV-B rays, which can cause severe health and environmental problems. Ozone depletion is primarily caused by human-made chemicals containing chlorine and bromine, such as chlorofluorocarbons (CFCs), which have been used in refrigeration, air conditioning, foam-blowing agents, and aerosol propellants.

The phenomenon of ozone depletion was first discovered in 1985 by scientists Joe Farman, Brian Gardiner, and Jonathan Shanklin. Since then, significant efforts have been made to mitigate or prevent further damage to the ozone layer. In 1987, the Montreal Protocol was adopted by the international community to regulate the production and consumption of ozone-depleting substances like CFCs. This landmark agreement has been instrumental in the recovery of the ozone layer, and it is projectedthat the ozone layer will fully recover by 2066, as long as the Montreal Protocol continues to be adhered to.

3. Approaches and solutions to addressing Environmental issues.

The environment is constantly changing due to human activities that have led to so many environmental problems. These changes drive the nee to identify strategicapproaches and solutions in an effort to minimize those harmful environmental impacts and prevent further disasters to the current generation and the generations thereafter. As creator of many environmental problems, man is also under obligationto introduce new strategies or approaches to addressing the many environmental issues we face globally today. These approaches are considered from individual, community, institutional, governmental and global levels. Some solutions may include the use of recycle materials, shift from fossil fuel to renewable energy resources, afforestation or reforestation, biodiversity conservation, promoting green technologies and introducing sustainable agriculture.

3.1 Individual Level Approach

Individuals can contribute significantly to environmental sustainability in many different ways that when combined can be a giant step in reducing waste, pollution, resource depletion, flood and global warming. Individual may adopt behaviors that are environmentally sustainable which they commit themselves to as reflected in their daily lives. Some individual approaches may include using public transport ratherprivate vehicles especially for long distances. This can significantly reduce CO2 emissions thus contributing to decline in global warming and climate change. Other individual approach may include the use of reusable bags instead of plastic, consumingsustainably, and supporting green initiatives.

3.1 Community Level Approach

Community is defined as a geographical subset of society at the local level(UN) This approach involves the collective involvement of community members in achieving sustainable environmental results. This approach is similar to individual level approach but this require the con-scent and participation of all members in a community in an effort to conserve, preserve and protect the environment. This approach may vary from society to society based on the society's planned goals. Some common community engagements toward a sustainable environment include using renewable energy resources such as solar energy, wind energy, hydroelectricity, geothermal energy etc… This approach promotes an eco-friendly environment free green house gases.

3.2 Global Level Approach

This approach involves the collective commitment of national governments, businesses, international organizations, and individuals to finding solutions to environmental challenges and fostering a more sustainable environment. Nations come together to sign treaties, protocols, and standards aimed at achieving global environmental sustainability. The interconnectedness of the world underscores the need for increased collaboration among countries, as the impact of environmental issues in one region can affect the entire globe. Currently, there are over 3,700 international environmental agreements, conventions, and other accords in existence (Morin & Blouin, 2019). These agreements address a range of environmental issues, including ozone depletion, air and water pollution, global warming, and climate change. Below is a key international agreement that have played crucial roles in addressing global environmental challenges.

3.3 The Montreal Protocol on Substances that Deplete the Ozone Layer

The Montreal Protocol, adopted in 1987 following the discovery of the ozone hole, entered into force in 1989. Driven by the urgency to mitigate ozone layer depletion, 46 countries initially signed the agreement, committing to phasing down hydrofluorocarbons (HFCs) by 80-85% by the late 2040s. The protocol initially required developed countries to begin reducing HFCs by 2019, while developing countries were expected to freeze HFC consumption by 2024 and reduce it by 2028. In addition to addressing ozone depletion, the protocol also included provisions to mitigate threats to the global climate. It emphasized the importance of scientific research, technical and financial assistance, and the adoption of amendments to further strengthen the agreement's impact. The Montreal Protocol now has over 198 member countries and meet every year to identify gains made and challenges as well as new strategies in addressing them.

4. Conclusion

The environment and sustainability are closely connected, as the environment is home to both biotic and abiotic factors, which must be conserved and managed through sustainable practices. Sustainability aims to ensure that resources remain available to meet the needs of both present and future generations. The concept of environment and sustainability is vital for addressing global environmental challenges. Effective mitigation strategies require collective efforts at all levels including individual, societal, governmental, business, and global.

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