Discussing Contemporary Environmental Issues

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Abstract

This paper is focused on contemporary environmental issues and problems. It starts by defining the term 'environment' followed by an outline of the major human activities that exert pressure on the natural environment and some of the evidence of environmental deterioration. The paper then discusses the following contemporary issues and problems; Ozone Depletion, Global Warming, Deforestation, Biodiversity Loss, Air Pollution, Water Pollution, Land pollution and Solid Waste Disposal. In concluding the paper, a way forward to the discussed environmental dilemmas is given.

DEFINITION OF ENVIRONMENT

The term 'Environment' is defined differently depending on the focus and type of environment. There are different types of environments (e.g. social, political, natural or physical and economic). Environment is a multi-dimensional system of complex inter-relationships in a continuing state of change and humans have used the environment as a resource, sink and amenity. In this paper, the focus will be on the biophysical environment. The biophysical environment is the sum of living and non-living substances and forces external to the organism that affect the organism's existence in terms of its survival, development and evolution.

In the past, human interaction with nature, though sometimes disruptive, often enriched the quality and variety of the living world and its habitats. However, while humans sought domination over nature in 5,000 years of recorded history they have in the last 50 years begun to realize that their welfare and their very existence are deeply intertwined with the natural cycles and systems (Panneerselvam and Ramakrishnan, 2005).

There is now a realization that people are exerting great pressure on the natural environment. The major activities which have resulted in pressure on the environment include:

(i) intensive modern agriculture which has replaced traditional farming;
(ii) mass tourism which is affecting natural habitats;
(iii) formulation of policies pursued in industry, transport and energy sectors which have a direct and damaging impact on the environment;
(iv) destruction of forests for timber production and other uses like agriculture, settlement construction;
(v) reduction and fragmentation of habitats and landscapes: The expansion of human activities into natural environments due to urbanisation, agriculture, recreation, and industrialisation causes uniformity in landscapes, disappearance, fragmentation or isolation of habitats and landscapes; and
(vi) Loss of species (both fauna and flora).

ENVIRONMENT GETTING WORSE

The Population Report (2000) states that in every environmental sector, conditions have either failed to improve or have worsened. This scenario has continued to date. The deterioration of the environment has been observable in the following areas:

(a) *Public health.* Unclean water, along with poor sanitation kills millions of people each year, mostly in developing countries. Heavy metals and other contaminants also cause widespread health problems.

(b) *Food supply.* The world at large has been grappling with the shortage of food. In 64 of the 105 developing countries studied by the UN Food and Agriculture Organisation, population has been growing faster than food supplies. Furthermore, population pressure has degraded billions of hectares of arable land.

(c) *Freshwater.* The demand has soared as population grows and use per capita has continued to increase.

(d) *Coastlines and oceans.* Half of all coastal ecosystems have been pressured by high population densities and urban development. A tide of pollution has risen in the world seas. Ocean fisheries have been overexploited and fish catches have gone down.

(e) *Forests.* Nearly half of the world's forest cover has been lost, and each year another 16 million hectares are cut, bulldozed or burnt.

(f) *Biodiversity.* The earth's biological diversity is crucial to the continued vitality of agriculture and medicine, yet human activities are pushing many thousands of plants and animal species into extinction.

(g) *Global climate change.* The earth's surface has been warming due to greenhouse gas emissions, largely from fossil fuels resulting in the rise of sea levels, widespread flooding and increase in drought occurrences.

Scientists world over have become increasingly concerned with the long term effects of deteriorating environmental conditions on the health of both humans and nature. It has been observed that the natural biophysical processes that are the basic source of sustained good health have been disrupted or are being depleted. The ecosystems that determine food productivity and global systems such as the hydrological cycle and the ozone shield are at increasing risk.

The deterioration of the environment and resulting threats to health has led to a syndrome known as *environmental distress syndrome*. Environmental distress syndrome refers to the array of environmental maladies. The symptoms of this syndrome include the following:

(a) Re-emerging infectious diseases which include typhoid, cholera, pneumonia and the emergence of new diseases such as covid-19, ebola, drug-resistant tuberculosis and human reproductive disorders linked to industrial chemicals.

(b) Loss of biodiversity and the consequent loss of potential sources of new drugs and food crops.
(c) The decline of pollinators such as bees, bats, butterflies, dragonflies and beetles. These are indispensable to the reproduction of flowering plants.
(d) Proliferation of harmful algae along the world's coastlines.

There are a number of contemporary environmental issues and environmental problems that are due to human activities. In this paper environmental issues refer to topics of concern with regard to the environment while environmental problems refer to difficulties or harm of the environment. However, the terms are used interchangeably because a topic of concern could also be a difficulty or harm e.g. deforestation is both a topic of concern as well as harm or difficulty. Some of the environmental issues and problems that are due to human activities include; deforestation, pollution, ozone depletion, global warming, soil degradation, biodiversity loss and solid waste disposal.

Ozone depletion

The ozone is a protective layer in the stratosphere. It absorbs most of the ultraviolet rays from the sun. The ultraviolet rays influence the human body in many ways. Out of its beneficial effects is the formation of vitamin D in the skin, a vitamin which is important for the formation of strong bones and teeth. The negative effect of ultraviolet radiation is that it causes ageing of the skin and skin cancer, it also suppresses the immune defence against tumours, damages the eyes by the formation of cataracts and interferes with the process of photosynthesis in plants. The ozone has been found to be decreasing. In 1985 British atmospheric scientists found vast depletion of ozone in the atmosphere over the Halley Bay in Antarctica. Between 1977 and 1984 more than 40 percent of the ozone layer had been depleted (Panneerselvam and Ramakrishnan, 2005).

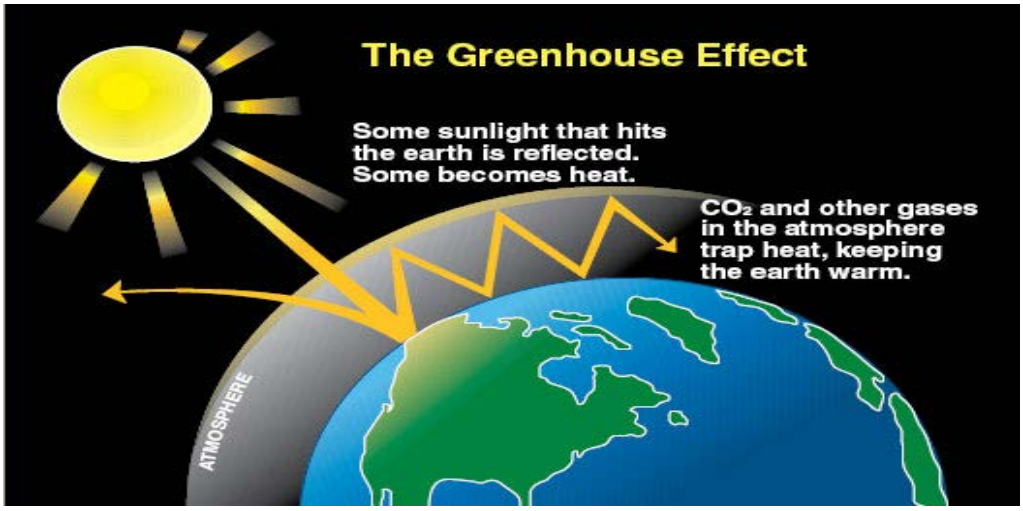
The cause of ozone depletion is due to human-made chemicals like chlorofluorocarbons (CFCs). These are made up of chlorine, fluorine and carbon. The chlorofluorocarbons are used in a wide variety of applications some of which include refrigeration, air-conditioning, blowing agents in foams, fire extinguishing systems, and aerosol. When CFCs reach the stratosphere, the ultraviolet radiation from the sun causes them to break apart and release chlorine atoms which react with ozone, thereby creating chemical cycles of ozone destruction and thus depletion of the ozone layer.

Global warming

This refers to rising global temperatures. Global warming causes climates to change as warmer global temperatures in the atmosphere and oceans lead to changes in seasonal patterns, storms, drought, humidity and sea level.

Global warming is caused by greenhouse gases. Although many greenhouse gases occur naturally, human activities have increased their levels and added new ones. Greenhouse gases of concern include carbon dioxide, methane, nitrous oxide and fluorinated gases. Increased levels of these gases is contributing to climate change. The greenhouse gases trap the sun's heat and keep it close to the earth. Thus, the heat that would have been lost to outer space is returned on earth giving rise to global temperature. The earth's natural greenhouse effect keeps it about 60 degrees warmer than it would otherwise be. This enables us to live comfortably on earth. However, because of human activities more of the greenhouse gases are being released into the atmosphere such that more heat is being retained on earth resulting in global warming.

Figure 1: The greenhouse effect



Source: wwwbuzzle.com/articles/greenhouse-effect-diagram.html

Examples of activities that contribute to an increase of greenhouse gases include:

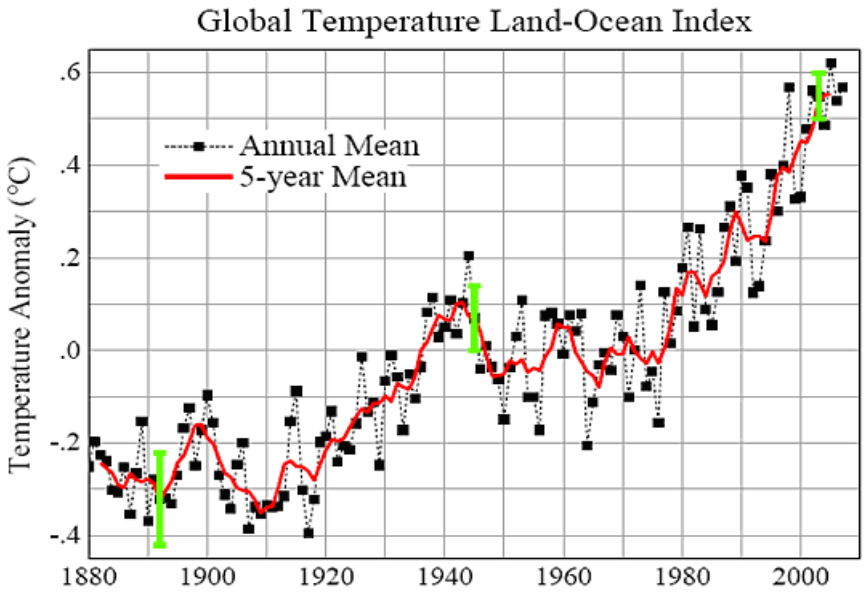
(a) Burning fossil fuels – oil, gasoline, gas and coal
(b) Industrial processes and mining
(c) Landfills, septic and sewer systems
(d) Agricultural practices, including fertilizer and manure management
(e) Deforestation

In this regard, there is a concern that temperatures on earth are increasing beyond the expected norm. In February 2007, the Intergovernmental Panel on Climate Change (IPCC) reported to the United Nations that the Earth's climate system was getting warmer. Evidence for the sentiments is in figure 2. The figure shows the global temperature land-ocean index with two graphs indicating the global annual mean temperature and the global 5-year mean change from 1880 to 2000. Even

with variation over the years, the general trend is clearly upward. Some cooler temperatures in recent years have prompted people to ask if there is now a global cooling trend but, as the graph shows, even several years of cooling do not mean that the long-term warming trend is over.

The land-ocean temperature index combines data on air temperatures over land with data on sea surface temperatures. "Mean" is the midpoint between the highest and lowest. The black line shows the annual changes, the red line tracks 5-year periods (NASA, 2008).

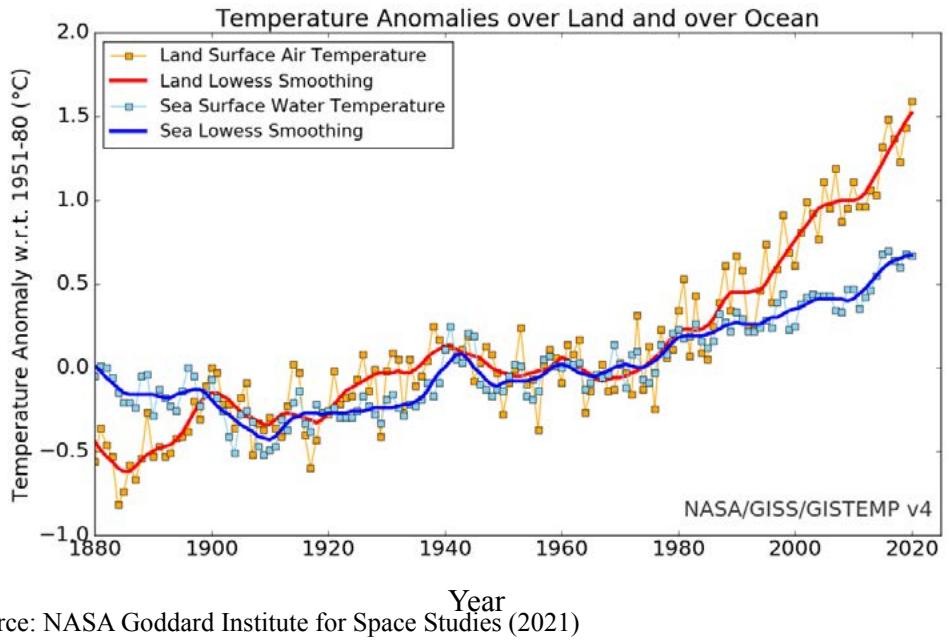
Figure 2: Global Temperature Land-Ocean Index



Source: NASA Goddard Institute for Space Studies

When the land-ocean temperatures are separated the graphs generated are as shown in figure 3 below: In the figure, annual (thin lines) and five-year lowess smooth (thick lines) for the temperature anomalies (vs. 1951-1980) averaged over the Earth's land area and sea surface temperature anomalies (vs. 1951-1980) averaged over the part of the ocean that is free of ice at all times (open ocean) (NASA, 2021).

Figure 3: Temperature anomalies over land and over ocean



Source: NASA Goddard Institute for Space Studies (2021)

It is clear from the graphs in the two figures that there is global warming taking place and that most of the warming has happened over the last 50 years and the trend has been upwards. Both land surface air and sea surface water temperatures have been on an increase. The year with the warmest land surface air temperature has been 2020. Much of the warming has been due to human activities in an effort to satisfy human need for food, shelter, clothing etc.

In addition, ice core taken from ancient ice of Antarctica show that carbon dioxide levels are higher than at any time in the past 650,000 years (IPCC, 2007). Global warming has had a number of impacts, some of which include:

(a) An average sea level rise of between 10 cm to 20 cm during the twentieth century, (Houghton 2004).
(b) Retreating mountain glaciers on all continents (e.g. on Mount Kilimanjaro).
(c) Thinning ice caps in the Arctic and Antarctic.
(d) A change in average weather conditions and a change in the distribution of events around that average (e.g., more or fewer extreme weather events).

Because so many systems are tied to climate, a change in climate can affect many related aspects. For example, a change in the usual timing of rains or temperatures can affect when plants bloom and set fruit, when insects hatch or when streams are at their fullest. This can affect historically synchronized pollination of crops, food for migrating birds, spawning of fish, water supplies for drinking and irrigation, forest, health and more.

The IPCC has noted many indications of climate change around the world:

(a) More frequent heavy precipitation events (rainstorms, floods or snowstorms) in many areas than before.
(b) More intense and longer droughts over wider areas, especially in the tropics and subtropics than before.
(c) Heat waves in recent years.

As a nation Zambia has been grappling with some of the following contemporary environmental issues:

Deforestation

This is the removal of a forest or stand of trees where land is thereafter converted to a non-forest use. Nearly half of the world's forest cover has been lost, and each year millions of hectare are cut, bulldozed or burnt. Forests are one of the main carbon sinks. This is because plants use carbon dioxide to make food during the process of photosynthesis and oxygen is also produced as a by-product. Thus, the loss of forests means that the carbon dioxide level would increase and the oxygen levels would reduce.

In 1991, the Food and Agricultural Organisation (FAO) stated that the tropical deforestation rate was 0.64 percent in Latin America, 0.61 percent in tropical Africa and 0.60 percent in tropical Asia. The rate was estimated at 1 to 2 percent every year and at this rate it was further estimated that by 2020 virtually all of the physically accessible forest areas in developing countries will have been cut (Panneerselvam and Ramakrishnan, 2005).

In the case of Zambia deforestation is greatest in the peri-urban areas of major cities like Lusaka where there is high demand for charcoal and land for settlement. According to the Ministry of Tourism, Environment and Natural Resources, Zambia is losing 300,000 hectares of forest each year. Species such as *mukula, mukwa* (*Pterocarpusangolensis*) and *mubanga* (*Pericopsisangolensis*) which are sought for their high value hardwood are facing extinction. By 2000, the Zambian government had to degazette 31,000 hectares of forest reserves to allow for use by various human activities, thereby opening more land to deforestation. ECZ (2001) cites population growth, changes in population distribution, economic pressures and effort to alleviate poverty and ensure food security as the major issues challenging the future of Zambia's forestry sector. For Zambia as many developing countries 90 percent of the wood cut from the forests is used for cooking and heating (Panneerselvam and Ramakrishnan, 2005).

Biodiversity loss

Biodiversity loss is the reduction in variety and numbers of species in a given locality at a given time. The earth's biological diversity plays an important role

in the continuation of vitality in agriculture and medicine, yet human activities continue to push many thousands of plants and animal species into extinction. For example, dragon flies, yellow butterflies, bees and termites are not as numerous as they were about 40 years ago. Various species of birds and animals are either becoming few in numbers or are disappearing altogether. Populations of the black lechwe, antelope, elephant and rhinoceros, for example, have continued to decline over the years in the process leaving zones which merely bear names of such near extinct animals (e.g. Chibuluma which means a roaring lion signifying that the area was once a habitat for lions, and Leopards Hills an area which was a habitat for leopards). Chibuluma is an area located in Kitwe, Copperbelt Province, Zambia and its geographical coordinates are 12° 51' 0" South, 28° 8' 0" East whereas Leopards Hills is one of the most affluent suburb areas in Lusaka district of Lusaka Province.

The main cause of biodiversity loss is exploitation of land by human beings in a way which results in the reduction of wildlife habitat. The reduction of wildlife habitat has the following consequences:

(a) extinction of species
(b) a decreased species diversity due to reduced habitable area as a result of destruction, modification and fragmentation of habitats as well as overuse of pesticides and herbicides, intensive farming methods and hunting. In addition, the deterioration of air and water quality adds to the detrimental influence. The reduced habitat in turn leads to a reduced 'species carrying capacity'
(c) a decrease in the genetic diversity of the species living in a reduced habitable area. Smaller habitats can only accommodate smaller populations resulting in an impoverished gene pool
(d) diminished flexibility and evolutionary adaptability of species to changing situations
(e) reduced quality of life for humans (e.g. people fond of game meat may no longer find it).

Reduction and fragmentation of habitats often prevents living organisms from making use of normal ways to flee from threatened habitats. Human intrusion is so abrupt in that projects are planned and implemented on a much shorter period of time than natural processes. The intrusions also result in the fragmentation of habitats and leads to limitations on the possibility for contact or migration among organisms, further resulting in isolation of the organisms.

Biodiversity is of aesthetic, economic as well as practical importance in that:

(a) Human beings are provided with valuable natural resources to satisfy their subtle needs (e.g. food, clothing, shelter, and a host of other useful products).

(a) Diverse communities of plants, animals and micro-organisms provide humankind with valuable and indispensable ecological services. They recycle waste, maintain the chemical composition of the atmosphere and play a major role in determining the climate of different parts of the world.
(a) Recreation and tourism activities thrive on biodiversity.

Thus as Kumar (2004: 97) stated *'The existence of human race depends on the well-being of the other life forms present in the biosphere. However, we have been losing this accumulated heritage of millions of years at an alarming fast rate over the past 400 years by our own activities, thereby undermining the very basis of our own existence on this planet'.*

Pollution

Pollution is the introduction of contaminants into the natural environment that cause undesirable change in the physical, chemical or biological characteristics of the atmosphere (air), hydrosphere (water) and lithosphere (land). Pollution has harmful effects on human life and other living organisms. Pollution can also negatively affect industrial processes and raw material resources. Pollution can take the form of chemical substances, energy such as noise, heat, or light.

Substances that cause pollution are known as pollutants and may be categorised according to their existence in nature as either qualitative or quantitative. Qualitative pollutants do not normally occur in the environment but are passed into it through human activity e.g. DDT and other pesticides, fungicides, herbicides. The listed substances were not found naturally in the environment. However, they are now found in the environment because humans have passed them on through their activities. Quantitative pollutants are substances that occur naturally in the environment at certain levels, however they become pollutants when their concentration gets beyond a threshold value in the environment (e.g. carbon dioxide naturally exists in the air at a concentration of 0.04% by volume but beyond that level it becomes a pollutant).

There are many different types of pollution that many countries grapple with of which air pollution, water pollution and land pollution are the commonest.

Air pollution

Air pollution occurs mainly in two types namely, indoor and outdoor. Indoor air pollution happens in enclosed structures (e.g. inside a house). Women and small children are the ones that are mostly affected in cases where biomass fuels are used for cooking and heating. Outdoor air pollution is that which happens in the open. In Zambia, the problem of air pollution is largely concentrated in cities which have the largest number of industries and vehicle traffic. However, it is greatest on the Copperbelt where a variety of air pollutants such as sulphur dioxide are

pumped into the atmosphere from the mines, smelters, concentrators and acid plants. The emissions of sulphur dioxide from smelters at Nkana, Mufulira, and Chambishi have been exceedingly high and emissions exceeding 1,000 ug/$m^3$are fatal to human beings (Feeney 2001). Nonetheless despite the information mine owners seem reluctant to shoulder the burden of ensuring that emissions are reduced to acceptable limits. To exacerbate the problem, the Zambian government has granted privatised mine owners a generous 30-year stabilisation period during which breaches of Zambia's existing environmental standards will be tolerated (Feeney 2001).

Other sources of air pollution include industrial activity, power generation, automobiles, agriculture, domestic and open burning of wastes and vegetative matter. Dust from reclamation of slag dumps and quarrying also contributes to air pollution.

Water pollution

Many countries, especially developing countries such as Zambia, are faced with the problem of insufficient water and low quality water for its people.

The problem of water pollution is greatest in Lusaka and the Copperbelt where industries and the mines discharge effluent into water bodies. For example, *heavy metals* such as arsenic, lead and other industrial chemicals are emptied into the Kafue River, the lifeline of both the Copperbelt and Lusaka, making it one of the most contaminated rivers in Zambia. Kafue River is the only big river which is entirely within the borders of Zambia and which is not shared with any other country. The result is that the water from this river has to be treated at a cost before it can be used for both domestic and industrial purposes. *Eutrophication* of the river has resulted in the flourishing of the Kafue weed (water hyacinth), a menace to river transport, fishing and the flow of the river. Water pollution also emanates from discharge of agro-chemicals and spillage of oils into the environment.

Many of the people in urban cities have no access to clean fresh water due to the fact that governments which should ordinarily provide people with such water are failing to keep up with the demand. This causes urban dwellers, especially those in unplanned settlements, to use water from shallow wells which are contaminated as the wells are in many cases located close to pit latrines (Nachula 2019).

Land pollution

This happens when either a solid or liquid hazardous substance is mixed with the naturally occurring soil. The main cause of land/soil pollution is use of unsound agricultural practices, such as mono-cropping. For example, in Zambia, areas of commercial farming such as Mkushi Farm Block, Chisamba and Southern Province where one crop is grown year after year, the land/soil becomes polluted as a result of excessive use of chemical fertilizers, insecticides, herbicides and fungicides (*agro-chemicals*). Other causes of land/soil pollution include poor disposal of

solid waste, sewage, discharge of heavy metals and waste water from industries into the surrounding areas.

Waste dumps and tailing dams created by mining and quarrying activities also contribute to the problem of land/soil pollution as the dumps and dams are polluted with potentially toxic wastes (Feeney, 2001).

Solid waste disposal

This refers to the discarding of garbage generated by households and business entities (e.g. food waste, yard waste and demolition or construction debris). The management of solid waste poses a great challenge to local authorities in major cities of developing countries. High mountains of decayed and maggot-infested garbage have become a common feature of cities and have also become breeding grounds for pests such as rats, cockroaches and flies. For example, in Zambia, the Lusaka City Council (LCC) and the private franchise have failed to keep up with the collection of garbage. In terms of money millions are spent every week on garbage collection even though more than 50% of the waste generated daily is left uncollected. Lack of funds, absence of technical know-how and logistical resources to deal effectively with the matter limits the endeavour to rid the city of garbage. In unplanned settlements, the problem is compounded by congestion and the unplanned nature of the settlements which make it difficult for commercialised utilities. This also makes it impossible to apply conventional methods of garbage collection and disposal. The problem of solid waste disposal also impacts negatively on underground water through seepage. Waste dumps and tailing dams created by mining activities litter the landscape, making it look desolate. Furthermore, the dumps are unstable and prone to erosion.

Way forward and Conclusion

This paper has merely scratched on the surface the issue of contemporary environmental issues. There are a lot more which the available space can never fully exhaust.

Despite the gloomy picture, human beings can play a positive role and help improve the quality of their environment by doing the following:

Taking action:

There is need for people to practice sustainable development without which humanity faces a deteriorating environment. All human beings at individual and group levels should ensure that their ecological footprint is reduced through the use of eco-friendly technologies such as using i) energy saving bulbs ii) solar panels to generate energy iii) wind turbines to generate energy iv) improved braziers for cooking v) electric automobiles vi) biodegradable waste in compositing to improve soil fertility vii) reusing and recycling non-biodegradable waste.

Individuals should also ensure that they make eco-friendly decisions in their actions so that environmental degradation is mitigated and prevented. An example of a decision is that of deciding to buy plastic bags or paper bags as carrier bags when shopping. The eco-friendly decision would be to buy paper bags because paper easily decomposes in the environment and can be used as a resource in composting compared to plastics as they take many years to decompose. Plastics just contribute to land pollution after being discarded.

Ecological footprint is a tool used to analyze the impact of a human being on the earth (Rees, 2001) and is calculated in terms of the amount of land needed to support an individual at the persons' standard of living. Residents in developed nations (such as Canada) are said to require a larger land area to support their lifestyle than residents of developing nations like Zambia, as they are believed to have a smaller ecological footprint due to a lower consumption (Weber 2020). However, despite the above sentiment, everyone on the planet should be involved in ensuring that their footprint is reduced as environmental problems are evident even in developing countries.

Stabilising population:

Slowing population growth would reduce the rate at which resources are being depleted and the rate at which the environment is deteriorating. It would also result in the protection of natural resources. Slowing population growth would mean a reduced number of human beings on the planet resulting in less consumption and reduction in waste production, thus leading to an improvement in the quality of the environment. The population can be stabilised through the following:

(i) Formal education; engaging the youth in formal education particularly the girl child would help stabilise the population as they will be in school longer and thus delay child bearing resulting in one bearing fewer children as one would have if they were not in school. Educating the girl child also entails that they will be knowledgeable on issues of reproductive health and will know the benefits of having a smaller family compared to a large one.

(ii) Poverty alleviation; alleviation of poverty results in positive social impacts such as a) access to education as a result of ability to pay educational fees and other requirements b) improved access to food which results in higher nutritional and health levels of individuals c) improved employment opportunities due to higher educational levels attained.

(iii) Removal of the need for large families; the need for large families results in couples having many children in order to address that need e.g. the need for labour among poor agricultural based families. The thinking is that the more labour one has, the larger the area that would be cultivated and therefore the greater the yield. This need can be addressed by ensuring high yields on small portions of land through the use of improved technologies. When this is achieved the need for large families will not be a necessity for good yields.

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