1.1 Unique Characteristics of Environmental Problems

Environmental problems are

1) Pollution

Pollution of the air, water and soil caused by toxins such as plastics, heavy metals and nitrates, caused by factors such as toxins and gases released by factories, combustion of fossil fuels, acid rain, oil spill and industrial waste.

2) Global warming

The emission of greenhouse gases due to human activity causes global warming, which in turn causes an increase in temperature that then leads to rising sea levels, melting of polar ice caps, flash floods and desertification.

3) Overpopulation

We are facing a shortage of resources such as food, water and fuel to sustain the rising global population, particularly in developing countries. Intensive agriculture attempting to lessen the problem actually leads to more damage through the use of chemical fertilizers, pesticides and insecticides.

4) Waste disposal

An excessive amount of waste is produced and dumped in the oceans. Nuclear waste is particularly dangerous, as well as plastics and electronic waste.

5) Ocean acidification

The increase in the production of carbon dioxide by humans causes the oceans' acidity to rise, which has a negative impact on marine life.

6) Loss of biodiversity

Species and habitats are becoming extinct due to human activity. This causes an imbalance in natural processes like pollination and poses a threat to ecosystems – coral reef destruction is particularly affected.

7) Deforestation

Loss of trees in order to make space for residential, industrial or commercial projects means that less oxygen is produced, and temperature and rainfall are affected.

8) Ozone layer depletion

Pollution caused by chlorofluorocarbons (CFCs) in the air creates a hole in the ozone layer, which protects the earth from harmful UV radiation.

9) Acid rain

Pollutants in the atmosphere such as sulfur dioxide and nitrogen oxides cause acid rain, which has negative consequences for humans, wildlife and aquatic species.

10) Public health issues

Lack of clean water is one of the leading environmental problems currently. Pollutants in the air also cause issues such as respiratory disease and cardiovascular disease.

Characteristics of Environmental Problems

They are complex

- Environmental problems tend to be very complex.
- Human activities cause natural resources to be extracted and used, thereby producing emissions and waste.
- A change in one physical or chemical aspect of the environment generally affects other parts and interacts with the living environment.
- The complexity is further increased when the complex human, social, technical and economic interactions involved are taken into account.

They have long time frames

- Environmental problems are often characterized by very long time frames between an action and its ultimate consequences.
- When a chemical is released it may take years or decades before it is accumulated in some species further up in the food chain and becomes a problem for the humans eating that species.
- For the gases that contribute to climate change it takes over a decade before an addition of methane is removed, whereas carbon dioxide (CO2) may persist up to 200 years and the lifetime in the atmosphere of perfluoromethane has been estimated at more than 50,000 years (IPCC, 2001: 38).
- While the time taken for temperatures to rise as a result of higher concentrations of CO2 may be more than a century the sea level responds even more slowly, due to the large heat capacity of the oceans. Thus sea-level rise is expected to continue for centuries even after the climate stabilizes (IPCC, 2001).
- The long time frames of many environmental problems also imply that the outcomes of actions to counter these problems will not be observed for a long time.

They concern geographically remote areas

- Environmental problems often connect geographically remote regions.
- Emissions of sulphur dioxide from an electricity plant may contribute to change in fish populations in a small lake.
- In the 1970s a Finnish family using daily products that utilized CFCs, such as deodorants and refrigerators, may have contributed to the cause of skin cancer in Australia, by contributing to the depletion of the ozone layer.

- Geographically remote regions are not connected only through environmental processes, but also through the global economy.
- A Japanese consumer while eating his sushi could play a part in the extinction of a whale or fish species in the Atlantic, or a French consumer buying new furniture could affect the loss of biodiversity in Amazonia.

Their consequences and causes are unequally distributed

- Environmental problems are closely related to equity, since the consequences tend to be very unequally distributed.
- This is often the case internationally, nationally and even regionally.
- Developing countries are assumed to be far more adversely affected by climate change than developed countries.
- Most developing countries are in tropical regions, and therefore are more dependent on agriculture and natural resources and have fewer assets to cope with climate change
- Several studies have shown that in the higher proportions of racial minorities and low-income groups live in communities with hazardous waste facilities than in other communities
- Nor is it only the consequences that are unequally distributed; the same goes for the causes.
- The 15 percent of the world's population living in the richest countries produce about 50 percent of the world's total CO2 emissions. This is largely because their economies are much more energy intensive, for example the average American uses 16 times as much energy as the average inhabitant of India (*Economist*, 2003: 94).

They involve huge uncertainties

- The knowledge about environmental problems is characterized by huge uncertainties.
- Brian Wynne (1992) identifies four categories of environmental uncertainties: risk, uncertainty, ignorance and indeterminacy.
- If the possible outcomes can be defined and their probabilities can be assigned in a meaningful way, one is talking of risks.
- If the possible outcomes are identifiable, but their probabilities cannot be determined, one is faced with uncertainty.
- Ignorance refers to when we do not know what we do not know; this often increases when there is commitment to act based on some particular knowledge.
- Finally, indeterminacy is used to describe situations in which the complexity of the system is so large and so little is known about the relevant parameters and their relationships that modelling becomes a matter of hit and miss.
- Even though the research in climate change has been enormous and most scientists agree that global warming is taking place and is largely induced by human activities there are still those who disagree.
- The uncertainties related to the future energy use of our societies or the technological development that will take place add to the uncertainties surrounding the issue.