The Environmental Change and Anthrosphere

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Abstract- ***The earth has entered a period of hydrological, climatological and biological changes that differs from previous episodes of global change. Environmental science has been divided among the study of the atmosphere, the hydrosphere, the geosphere, and the biosphere. To an increasing extent during their brief time on earth, humans have used their ingenuity and technology to cause enormous perturbations in the natural environment. This has occurred to such a degree that it is now necessary to recognize a fifth sphere of the environment that is constructed and operated by humans, the anthroposphere. To explain or predict the cause of the present global environmental changes, one must therefore understand the human sources, consequences, and responses. To understand global environmental change, it is necessary to focus on the interactions of environmental system, including the atmosphere, the biosphere, the geosphere and the hydrosphere as well as human system, including economic, political cultural and socio technical system. Human system and environmental system meet in two places: where human actions proximately cause climate changes, i.e. where human activities directly affect the environment, and where environmental changes directly affect the human life.***

I. INTRODUCTION

The anthroposphere is that part of the environment that is made or modified by humans for use in human activities and human habitats. It is one of the Earth's spheres. The term was first used by nineteenth-century Austrian geologist Eduard Suess. Almost all human activity has some potential relevance to global change. Researchers in a number of fields have studied human environment interactions, usually within the boundaries of single disciplines and almost always below the global level. All living entities on Earth compose the biosphere. Living organisms and the aspects of the environment pertaining directly to them are called biotic, and other portions of the environment are abiotic. The anthrosphere consists of all the structures and devices made and operated by humans. The anthrosphere is composed of buildings, highways, parking lots, railroads, vehicles, aircraft, and other things that people make and do in Earth's environment. It obviously has a major influence on all environmental phenomena, and any realistic treatment of environmental science must consider the anthrosphere along with the other four environmental spheres. Pollutant sulfur dioxide is generated in the anthrosphere by combustion of sulfur in coal, which has been extracted from the geosphere. The SO_2 is transported to the atmosphere with flue gas and oxidized by chemical and photochemical processes in the atmosphere to sulfuric acid. The sulfuric acid, in turn, falls as acidic precipitation, where it may have detrimental effects, such as toxic effects, on trees and other plants in the biosphere. Eventually the sulfuric acid is carried by stream runoff in the hydrosphere to a lake or ocean, where its ultimate fate is to be stored in solution in the water or precipitated as solid sulfates and returned to the geosphere Natural waters are afflicted with a wide variety of inorganic, organic, and biological pollutants. In some cases, such as that of highly toxic cadmium, a pollutant is directly toxic at a relatively low level. In other cases, the pollutant itself is not toxic, but its presence results in conditions detrimental to water quality. For example, biodegradable organic matter in water is often not toxic, but the consumption of oxygen during its degradation prevents the water from supporting fish life. Atmospheric air may contain up to 5% water by volume, although the normal range is 1 to 3%. The two major constituents of air are nitrogen and oxygen, present at levels of 78.08 and 20.95% by volume in dry air, respectively. The noble gas argon comprises 0.934% of the volume of dry air. Carbon dioxide makes up about 0.037% by volume of dry air, a figure that fluctuates seasonably because of photosynthesis, and which is increasing steadily as more CO_2 is released to the atmosphere by fossil-fuel combustion. There are numerous trace gases in the atmosphere at levels below 0.002%, including neon,

helium, krypton, xenon, sulfur dioxide, ozone, CO, N_2O, NO_2, NH_3, CH_4, SO_2, and CCl_2F_2, a persistent chlorofluorocarbon (Freon compound) released from air conditioners and other sources. Some of the trace gases may have profound effects, such as the role played by chlorofluorocarbons in the depletion of the stratosphere's protective ozone layer and that played by methane in global warming. The most abundant hydrocarbon in the atmosphere is methane, CH_4. This gas is released from underground sources as natural gas and produced by the fermentation of organic matter. Methane is one of the least reactive atmospheric hydrocarbons and is produced by diffuse sources, so that its participation in the formation of pollutant photochemical reaction products is minimal. The most significant atmospheric pollutant hydrocarbons are the reactive ones produced from automobile exhaust emissions, as well as from other sources, including even plants such as pine and citrus trees. In the presence of NO, under conditions of temperature inversion (which hold masses of air stationary for several days), low humidity, and sunlight, these hydrocarbons produce undesirable photochemical smog manifested by the presence of visibility-obscuring particulate matter, oxidants such as ozone, O_3, and noxious organic species, such as aldehydes. The process of smog formation is initiated by the photochemical dissociation of nitrogen dioxide by ultraviolet solar radiation.

They have demonstrated that a complex of social political, economic technological and cultural variables, sometimes referred to as driving forces, influences the human activities that proximately cause global change. The driving forces can be roughly classified as follows-

- Population growth: - Each person makes some demand on the environment for the essentials of life-food, water, clothing, shelter and so on. If all else is equal the greater the number of people, the greater the demands placed on the environment for the provision of resources and the absorption of waste and pollutants. However, all else is not equal. For example, a new individual with the standard of living and technological base of on average North American would use about 35 times as much energy as an individual living at India's average standard with a roughly proportional impact on the global environment.
- Economic growth: -For the first time in human history, economic activity is so extensive that it produces environmental change at the global level; the prospect of further economic growth arouses concern about the quality of the global environment. Economic growth necessarily stresses the environment, but the amount of stress from a given amount of economic growth depends, among other things, on the pattern of goods and services produced the population and resource base for agricultural development, forms of national political organization and development policies.
- Technological change: -Technology can influence environmental change by finding new ways to discover and exploit natural resources or by changing the volume of resources required or the amount or kind of wastes produced per unit of output. Technologies may either increase or decrease the impact of human activity on the environment, depending on the other driving forces, which determine which technologies are developed and used.
- Political-economic institutions: - The global environment responds to the action of markets governments, and the international political economy.

Markets are always imperfect, and the impact of economic activity on the environment depend on which imperfect market method of environmental management is being used. Governmental structure and policies can also have significant environmental consequences, both intentional and inadvertent. And the international political economy with its global division of labor and wealth, can promote environmental abuses particularly in the third world. The effects depend on policy at the national level and on the behavior of particular economic actors. Although each of these driving forces is important at certain times and under certain conditions, much remain unknown about what determines their relative importance how they affect each other and how the driving forces in particular places combine to produce global effects. For example, various combination of social conditions may lead to a single outcome, such as deforestation.

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