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Soil and Land Pollution in the Course of Study Related to the Biological Science at Various Levels

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Abstract **- Soil is the mixture of biotic and abiotic substances. The soil can be considered a chief organizing center for land ecosystem. During present situations as well as past years the graph of pollution is rapidly increasing in the world. The land is also polluted with the polluted air and water. The air polluting agents and polluted particles air also make pollution on the soil and land. The water polluting agents either soluble in water or unsoluble in water also create the pollution on the land with mixing in the soil or sand etc. The acid rain and green house gases also effect on the lives of land and quality of soil.**

Keywords: Soil Pollution, Soil Composition, Land Pollution, Acid Rain, Global Warming.

I. INTRODUCTION

Biotic and abiotic components are especially intimate in soil, which by definition consists of a weathered layer of Earth's crust with diving organisms intermingled with products of their decay. Because, for the most part, nutrients are regenerated and recycled during decomposition in the soil before they become available to the primary producers (plants), the soil can be considered a chief organizing center for land ecosystem. Without life, Earth would have a crust of some sort, but nothing like soil. Thus, soil is not only a factor of the environment to organisms, but it also is produced by them. In general, soil is the net result of the action of climate and organisms, especially Vegetation and microbes, on the parent material of the surface of Earth. Thus, soil the is composed of a parent material underlying geological or mineral substrate- and an organic component in which organisms and their products are intermingled with the finely divided and modified parent material. Spaces between the soil particles are filled with gases and water. The texture and porosity of the soil are highly important characteristic that largely determine its fertility.

Soil may be considered as the Shallow body of the material on the surface of the land, derived directly or indirectly from weathered mantle rock in association with water, air, and living organisms. This is not only provides anchorage for root systems of plants but also furnishes a habitat for soil microorganisms, home sites for burrowing animals, and supplies of materials for indwelling members of the biota, Terrestrial soils usually undergo changes that lead toward greater incorporation of organic matter in the soil. When changes lead in this direction they are referred to as the soilforming, process, or development, when organic Soils are developed in water, the process is reversed and sediment is mixed with organic remains.

The deposition of solid or liquid waste materials on land or underground in a manner that can contaminate the soil and ground water, threaten public health, and cause unsightly conditions and nuisances. The waste materials that cause land pollution are broadly classified as municipal solid waste (MSW, also called municipal refuse), construction and demolition (C&D) waste or debris, and hazardous waste. MSW includes non hazardous garbage, rubbish and trash from homes, institutions, commercial establishments, and industrial facilities, Garbage contains moist and decomposable good wastes; rubbish comprises mostly dry papers such as paper, glass, textiles, and plastic objects; and trash includes bulky waste materials and objects that are not collected routinely for disposal, C&D waste Code or debris) includes wood and metal objects, wall board, concrete rubble, asphalt, and other inert materials produced when structures are build, renovated, or demolished. Hazardous wastes include harmful and dangerous Substances generated primarily as liquids but also as solids, sludges, or gases by various chemical manufacturing companies, petroleum refineries, paper mills, smelters, machine shops, dry cleaners, automobile repair shops, and many other industries or commercial facilities. In addition to improper disposal of MSW, C&D waste and hazardous waste, contaminated effluent from subsurface sewage disposal can also be cause of land pollution.

Soil Profile: The mineral and organic components of soil are differentiated into horizons of strata of variable depth. Each of these horizons differs in morphology, physical structure, and chemical and biological characteristics. These horizons are evident when a vertical cut is made through the soil, revealing the soil profile. Horizons are categorized by their position in the soil profile as well as by the dynamic processes that have

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brought them about. The widely accepted structure of the soil profile is as follows:

i. Organic litter of loose leaves and debris.
ii. Rich in humus and hence dark in colour, the result of decomposed organic material mixed with minerals.
iii. Zone of maximum leaching of minerals; since the minerals are in solution and hence readily available, plant roots tend to be concentrated in this horizon.
iv. Little organic material and the chemical composition is largely that of the underlying to as the zone of also referred accumulation since minerals from above and below tend to concentrate here.
v. Parent rock, which is weakly, weathered.
vi. Unweathered bedrock.

Soil composition: In typical topsoil mineral matter constitutes about 45% of soil, organic matter 5%, water and air 25% each.

Mineral meter in soil is derived from the weathering of the present material and dissolved substances introduced at the soil surface or microphytes. These can include mosses, lichens, liverworts, and algae. Their role in energy flow and other ecological activities is not, however, well understood (West, 1990).

The composition of soil air is similar to atmospheric air, from which it is derived by diffusion. While the nitrogen content is just about the same as that in the atmosphere, there is typically less oxygen and more carbon dioxide owing to bacterial and fungal decomposition of organic matter in the soil. Anaerobic in sent when the air Conditions can arise in soil when the air spaces are filled with water, and oxygen and other gases are unable to diffuse inward from the atmosphere.

The amount of water held by depends on its texture and structure; in porous situations, stats such as sand and volcanic soils, water drain quickly, but in compact situations, such as clay soil, water drains slowly. In addition to providing water to soil organisms, soil water dissolved soluble entities providing the medium through which plants obtain necessary nutrients. In organic-salts dissociate into positive and negative ions in solutions; for example, sodium nitrate (*$NaNO_3$*) and water (H_2O) dissociate respectively into Na^+ and No_3^+ and H^+ and OH^-. These cations, which potentially could be lost by water seeping more deeply or evaporating, are, however, rationed through the chemical properties of the clay-humus complex.

The colloidal complex, an intimate association of finely divided humus. Its texture is determined by the size and amount of various-sized particles from very small clay particles (less the 0.002 mm diameter) to sand particles (up to 2.0 mm diameter). Although larger particles or stones may occur, for the most part they are not significantly active in Soil meter dynamics.

Organic material is derived from the decay and decomposition of organic matter in the surface of soil. Depending on the environmental situation, the litter and debris in the surface of soil may completely decay within a year; in other instances they may persist for much longer period of time. Among the agents active in the degradation process are earth worms, which ingest the organic material and through their movement and egestion mix it with the mineral part of the Soil. Dy Ksterhuis and Schmutz (1947) found that in an undisturbed virgin prairie in Taxas, earth worm casts formed a layer 2 to 3 mm thick, which, when air dried, weighed 2,400g/m2. In the moderately hot, dry season in Sudan, the earthworm casts weighed (air dried) 475 g/m^2, but 24,000g/m^2 during the rainy season (Evans & Guild 1947) Other burrowing animals such as prairie dogs, pocket gophers, and ground more and mix substantial amounts of soil, as do Cray fish its poorly drained areas.

In addition to the bacteria and fungi associated with decaying plant and animal material in the organic matter of the soil horizons, there is often a significant community of living, small photosynthetic organisms, usually referred to as the micoflora and mineral soil, especially clay, has been called the "heart and soul" of the soil. It influences the water- holding capacity and rate of circulation through it and is the source of plant nutrients, on which are released gradually, clay-humas particles are like highly charged anions and are referred to chemically as micelles. The cations formed when salts dissociate in solution are attracted to and adsorbed by the clay-humus micelle. Each of the cations is capable of being exchanged with other cations, thus constituting a dynamic process in nutrient availability and exchange.

Soil Pollution: Soil Pollution as defined as the presence of toxic chemicals (pollutants of contaminants) um soil, in high enough concentrations to pose a risk to human health and / or the ecosystem, I'm the case of contaminants which occur naturally In soil, even when their levels are not high enough to pose a risk, soil pollution is still said occur if the levels of the contaminants in soil exceed the levels that should naturally by present.

Soil pollution, soil contamination or land pollution as a part of land degradation is caused by the presence of xenobiotic (human-made) chemicals or other alteration in the natural soil environment. It is typically caused by industrial activity, agricultural chemicals or improper disposal of waste. Contamination is correlated with the degree of Industrialization and the intensity of chemical substance. The

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concern over soil contamination stems primarily from health risks, from direct contact with the contaminated soil; vapour from the contaminants, or from secondary contamination of water supply within and underlying the soil. The most common chemicals involved are petroleum hydrocarbons, polynuclear aromatic hydrocarbons, solvents, pesticides, lead and other heavy metals.

II. TYPES OF LAND POLLUTION

1. Simple Bio-Degradable Waste

Pollution which can be minimized or and its components degraded into simples, harm- less constituents by biological activity is termed as biodegradable pollution. Dead and decaying remains of plants and animals, products of their metabolic activity, faceal remains, excreta, waste waters and materials which originate from day to day activity in a domestic establishment, agricultural wastes, wastes from agro-based industries, tannery effluents etc., come under this category.

2. Complex Bio-Degradable Waste

In contrast to simple biodegradable Substances which decompose quickly, there are compounds which have a remarkable degree of resistance to the natural agencies of decay and decomposition. These are often harmful substances which persist in the environment for long duration of time during which they are taken up in the biosphere, accumulated and bio- magnified to concentration potentially toxic to organisms at higher trophic levels in the food chain. Many of these chemicals are carcinogenic, tetragenic and metagenic in nature.

Pollutants grouped together under the category of wastes resistant to degradation are organic substances produced naturally or are synthesized by man. Many of these are such chemicals which have caused much concern due to their wide-spread use and dissemination. Broadly speaking these chemicals can be grouped into the following three categories:

i. Pesticides and allied chemicals.
ii. Crude petroleum and its derivatives.
iii. Polymers, plastics, plasticizers and other wastes.

3. Solid waste pollution

The solid waste includes glass containers as bottle, crokeries, plastic containers, polythene and other packing materials that are then thrown away as go garbage. These pile up at public places and cause obstruction in daily used things like automobile spares, machines, cycle parts etc. that are thrown as junk. The wastes from building materials (during construction and demolition), sludge, dead animal skeleton, heaps of crop residues also contribute to solid waste.

In India, several million tonns of solid waste is dumped along high ways and other places in large cities as Delhi. Mumbai, Kolkata, Chennai, Ahmedabad, Jaipur an average over 2 million tons of solid state is generated in class I cities, per year, where as in class I cities about 0-25 million tons/year.

III. PROBLEMS ASSOCIATED WITH SIMPLE BIO-DEGRADABLE WASTES

Bio-degradable pollution which mainly involves water and soil causes little long range problems. Actually, it is the enormous quantity of sewage and organic wastes which causes difficulties. Large towns and cities discharge a tremendous volume of wastes material for handling and treatment of which adequate facilities are often not available. Smaller amounts of such pollutants pose no problems as the biological agencies of degradation quickly decompose most of the organic matter forming carbon dioxide, water and mineral matter. Problems associated with bio- degradable pollution can be summed up as follows:

i. The problem of odorous gases and volatile substances derived from organic wastes.
ii. The problem of abundance of infectious microbes.
iii. The problem of oxygen deficit caused by decomposition of organic matter.
iv. The problem of generation of plenty of plant nutrients in bodies.

Green House Gases: During the past several decades, an increase in Carbondioxide (CO_2) and other greenhouse increase in gases has resulted in an increase in global temperatures, there is still considerable Uncertainty regarding the effects of global warming on rainfall. Grasslands are more vulnerable to changes in rainfall than forests or deserts. Shrubs and trees will invade grasslands with an in rainfall, whereas desert shrubs will invade grasslands with a decrease in rainfall, whereas desert shrubs will invade grasslands with a decrease in rainfall. Changes in grasslands will also depend on the intensity of grazing, as intensity grazing brings on desert shrubs. Only long-term, integrative investigations addressing these global changes provide the necessary information to manage resources on a worldwide scale.

Effects of Acid Precipitation on soil: Soil acidity affects a wide range of ecological processes, including the solubility and exchange reactions of inorganic nutrients and toxic metals, the activity activities of soil animals and microorganisms, and minerals, changes the weathering of soil in soil acidity result from an array of interacting processes that

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produce and consume hydrogen ions, including cation exchange, mineral weathering, anion adsorption, and nutrient uptake from the deep soil, many of which, in turn, are included by changes in land use and consequent vegetative succession.

At very low pHs and high precipitations rates over long periods, reduction in the decomposition of human occurs, presumbly because of a shift in the kinds and abundance of bacteria and fungi.

IV. CONCLUSION AND RECOMMENDATION

Land pollution is harmful for human as well as lives of all other organisms, It is caused by human activities, releasing of waste materials from Industries and automobiles etc. Green house effects of global warming on rainfall. Acid rain is by is the source of factor to change the lives on the land and soil.

Since the life sciences along with the physical sciences have received much + more attention to revise and refresh Courses there is an urgent need now to lay emphasis on the protection of environment all over the world and to provide a better life to the living beings of this planet in order to maintain an environment and proper balance between the environment and human survival it becomes imperative to incorporate concepts of immediate concern that have direct complications not only to theory but practical work and their subsequent application for environmental protection and human survival maintain the ecological and biochemical to maintain and then the ecological balance.

The study of such concept as soil and land pollution should be specifically introduced the course of study related to the biological sciences at various levels.

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