

A REVIEW ON QUALITY MEASURES ON SOIL AND WATER POLLUTED BY INDUSTRIAL WASTE

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[Received: 26/02/2013, Published: 12/07/2013]

ABSTRACT:

Indian government promotes the industry for betterment of economic and living standards of the community. This is a one side image of coin that the development are in good way, but other is to deployment of the quality of soil and water. Chemical pollutants can pollute the soil the transport of these soil pollutants mixes with the water, this transmission indirectly pollutes the health of community.

In present paper, we have reviewed the present status of soil quality, causes, effects and some preventive measures regarding the soil and water.

Keywords: quality, pollutants, water, soil, transmission.

INTRODUCTION

Soil pollution is defined as the build-up in soils of persistent toxic compounds, chemicals, salts, radioactive materials, or disease causing agents, which have adverse effects on plant growth and animal health. [1]

Soil supports the growth of most food and fibre and contributes to the wellbeing of Canadians and economic stability. Healthy soil, an essential component of a healthy environment, is the foundation upon which sustainable agriculture is built. Soil health, also called soil quality, is defined in agricultural terms as the soil's fitness to support crop growth without becoming

degraded or otherwise harming the environment [2].

Soil pollution can be divided into inorganic pollutants and Organic pollutants Two categories. Inorganic pollutants including acid, alkali, Heavy metal, salt, Radioactive element Cesium, strontium compounds, arsenic, selenium, fluorine compounds. Organic pollutants include Organic pesticides, phenols, Cyanide, oil, synthetic detergent, 3, benzo pyrene and by 4-City sewage, sludge and manure brought harmful Microorganism Etc.. When the soil containing excessive harmful substances, more than soil Self-purification capacity, will cause the soil

composition, structural and functional changes, microbial activity was inhibited, harmful substances or its decomposition product accumulation in the soil gradually through "soil, vegetation and human", or the "soil, water and human" indirect absorbed by human body, achieve the degree of harm to human health, is the soil pollution.

The study of chemical transport in soils is important for a number of reasons. Some chemicals are important as they are required for soil and plant health (e.g. micronutrients). Other chemicals may be highly toxic particularly if they are present in high concentrations. A chemical becomes a pollutant if its concentration exceeds some prescribed water quality standard, or if a beneficial water use has been impaired, and if the cause is induced by human activity. The study of the fate of chemicals and chemical pollution in soil is vital for sustaining agricultural productivity and land utility. The geological media between the land surface and the regional water table below is called the unsaturated zone or vadose zone [3]. The word "vadose" is derived from the Latin word *vadosus* meaning shallow [4]. In accord with its definition and meaning, the vadose zone includes the crop root layer, the intermediate zone between the root layer and the capillary fringe above the saturated water table. This zone therefore plays an integral role in the global hydrological cycle controlling surface water infiltration, runoff and evaporation and hence the availability of soil water and nutrients to plants. Initial investigations of this zone were focused on water availability to crops and optimal management of the root zone. However, in recent years much more attention has focused on chemical transport in and through this zone as a result of increased use of agrochemicals such as fertilizers and pesticides and increased demands to store and dispose of industrial and municipal wastes such as sewage. This zone is typically the first subsurface environment to encounter surface

applied agrochemicals and contaminants and hence all surface and subsurface chemical concentrations and subsequent environmental impacts are inextricably linked to the physical, biological and chemical dynamics including sorption-desorption, volatilization, photolysis and degradation [4]



The dead part of the soil includes weathered rocks and minerals which are obtained from the decay of plants and animals, which is called organic matter or humus, and water and air are categorized in this part. But the live soil is the soil which enjoys small animals like insects and worms and plants, fungi, bacteria and other microbes are grown in the live soil [6].

also, the polluting unit is duty bound to employ consultant and contractor for removal of the pollution in the region. Both the consultant and contractor should continue their activity as long as the soil of the region reaches to its standard level and the danger does not threaten the region as well [8].

Soil Pollution The soil will be polluted as a result of different human activities. Most of these pollutions are caused by vehicle accident which moves contaminants. The other pollutants, which cause soil pollution, include cars, trucks and airplanes that do not move the waste; rather, they carry materials like fuel which can cause soil pollution as a result of pouring and emitting them from the vehicle.

The factors like human activities will also pollute the soil. Dumping of toxic substances like different types of solvents, colored materials and detergents will extend earth and soil pollution [5]. Sources of Soil Pollutant When the balance is entangled between constituent components and elements of the soil due to the human excess or intervention, we had to wait outbreak of many disorders. Addition of excessive chemical fertilizers to the soil in order to increase the product may cause difficulty in task of soil purification. Also, the drainage water, containing high chemical fertilizer compounds, can cause salinity of the soil in somewhere else like excessive irrigation with the inappropriate quality water. The heavy and rare elements are of the pollutants which are placed on the soil absorbent complex surfaces with adding to the soil in different ways especially discharging wastewater and will cause chemical pollution of the soil. Then, the polluted soil is entered human and animal food chain and consequently, will bring about unpleasant health hazards in the environment [7].

Textile industries can act as one of the major sources of metal pollution in the environment [9]. There is evidence that significant amounts of trace metals have been released into the surrounding soil from textile industries. In one of the previous studies conducted in Bangladesh, mean soil concentrations of Pb, Zn, Mn, Ni, and Cd in the vicinity of textile industries were found to be 56.4, 207, 382, 51.1, 164 mg kg⁻¹, respectively [10].

Effects of Soil Pollution

Heavy metals, pesticides, solvents and other man-made chemicals, lead and oil spills are some of the common contaminants that lead to soil pollution. Soil pollution changes the natural environment of the soil, killing beneficial microorganisms and creating a pathogenic soil environment. Diseases caused by soil pollution are contracted from direct contact with the

contaminated soil, from inhaling airborne contaminants, from water run-off or from crops grown in the contaminated soil.[11]

Volume Change Behaviour of soil:

Volume changes in soils are important because of their consequences in terms of settlement due to compression. In addition, changes in volume lead to changes in strength and deformation properties, which in turn influence stability.

Compressibility of pure clays can be accounted for quantitatively by the consideration of double-layer repulsive forces. These forces between particles are due to the presence of exchangeable ions. It has been established that electrical double layer theory of Guoy-Chapman can be effectively used to describe the compressibility behaviour. The consolidation characteristics of montmorillonite depend upon the size of the cation present in the clay-water system. Variations in pore water electrolyte concentration have little effect on the void ratio-effective stress relationships for the Ca-montmorillonite in water, apparently because double-layer effects are smaller than predicted by classical theory and because of the formation of permanent domains.[12]

Disease:

Heavy metal pollution is responsible for many negative consequences both for human health and the environment [13-16]. Most heavy metals are considered essential micronutrients and each of them requires an adequate daily intake.

An inadequate intake of microelements is recognized as an important contributor to the global burden of disease through increased rates of illness and death from infectious diseases, and of disability such as mental impairment [17].

A variety of techniques are used for soil remediation, which is cleaning up contaminated soil.

1. These include physical techniques such as

a. soil vapor extraction (SVE), moving air through the soil.

b. thermal conduction heating, heating the soil before SVE.

2. Bioremediation methods include

a. landfarming, fertilizing, liming, and repeatedly plowing contaminated soil to stimulate bacterial decomposition of high molecular weight hydrocarbons like those in diesel oil.

b. bioventing, pumping air at low rates through soil to provided O₂.

c. biosparging, pumping air into aquifers to provided O₂.

d. phytoremediation, which is particularly useful for removing heavy metals.[18]

Water pollution

Water-borne diseases are infectious diseases spread primarily through contaminated water. Though these diseases are spread either directly or through flies or filth, water is the chief medium for spread of these diseases and hence they are termed as water-borne diseases.

Most intestinal (enteric) diseases are infectious and are transmitted through faecal waste. Pathogens – which include virus, bacteria, protozoa, and parasitic worms – are disease-producing agents found in the faeces of infected persons. These diseases are more prevalent in areas with poor sanitary conditions. These pathogens travel through water sources and interfuses directly through persons handling food and water. Since these diseases are highly infectious, extreme care and hygiene should be maintained by people looking after an infected patient. Hepatitis, cholera, dysentery, and typhoid are the more common water-borne diseases that affect large populations in the tropical regions.

Pesticides. The organophosphates and the carbonates present in pesticides affect and damage the nervous system and can cause cancer.

Some of the pesticides contain carcinogens that exceed recommended levels. They contain chlorides that cause reproductive and endocrinal damage.

Lead. Lead is hazardous to health as it accumulates in the body and affects the central nervous system. Children and pregnant women are most at risk.

Fluoride. Excess fluorides can cause yellowing of the teeth and damage to the spinal cord and other crippling diseases.

Nitrates. Drinking water that gets contaminated with nitrates can prove fatal especially to infants that drink formula milk as it restricts the amount of oxygen that reaches the brain causing the ‘blue baby’ syndrome. It is also linked to digestive tract cancers. It causes algae to bloom resulting in eutrophication in surface water.

Petrochemicals. Benzene and other petrochemicals can cause cancer even at low exposure levels.

Chlorinated solvents. These are linked to reproduction disorders and to some cancers.

Arsenic. Arsenic poisoning through water can cause liver and nervous system damage, vascular diseases and also skin cancer.

Other heavy metals. –Heavy metals cause damage to the nervous system and the kidney, and other metabolic disruptions.

Salts. It makes the fresh water unusable for drinking and irrigation purposes. [19]

Water pollution consists of any physical or chemical change in water that adversely affects the health of humans and other organisms.

A. Sewage , wastewater carried off by drains or sewers, contributes to enrichment (fertilization of water) and produces an oxygen demand as it is decomposed.

1. Microorganisms use the process of cell respiration to break down sewage into carbon dioxide, water, and similar materials.
2. Biochemical oxygen demand (BOD) is the amount of oxygen needed by microorganisms to decompose sewage and other organic wastes.
3. BOD spikes immediately downstream from sewage outfalls killing fish and other O₂ requiring organisms. Well over one billion O₂ - consuming bacteria can grow on the organic nutrients contained in each ml of raw sewage. Disease-causing agents , such as bacteria, viruses, protozoa, and parasitic worms, are transmitted in sewage. [20]

Effects:

1. the death of killer whales, seals, fish and birds because they are covered in the oil
2. plants not to be able obtain enough CO₂ for photosynthesis
3. plants and animals not to be able obtain enough O₂ for cellular respiration birds and penguins to ingest the oil and die[21]

CONCLUSION

The polluted soil will have negative effects on the growth and yield of any crop. The specific toxic effects of heavy metals on microorganisms are caused by the binding of the metal to cellular ligands.

River pollution due to industrial waste discharge is one of the major environmental problems. It can be concluded that the surface water pollution in the industrial areas is extremely high and it is due to unfettered effluents and waste from industries. Many industries of these areas do not have treatment plants and discharge their effluents untreated manner.

This can be cure by setting up a pre-treatment plant by recycling those chemicals into their processing plants.

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