6. Soil as A Depositing Medium of Man-Made Pollutants

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Abstract:

The article considers a multi-level system of soil protection aimed at ensuring the overall sustainability of the natural environment.

Keywords:

Ecosystem, Toxicity, Soil, Fertilizers, Urban environment.

6.1 Introduction:

Soil is a very specific component of the biosphere, since it not only geochemically accumulates components of pollutants, but also acts as a natural buffer that controls the transfer of chemical elements and compounds to the atmosphere, hydrosphere and living matter. Trace elements coming from various sources end up on the surface of the soil, and their further fate depends on its chemical and physical properties. The residence time of polluting components in soils is much longer than in other parts of the biosphere. The global ecological role of soil as a natural filter for various kinds of technogenic pollutants, among which heavy metals occupy a special place, is well known. Soils, due to their natural properties, are capable of accumulating significant amounts of pollutants [1-2]. There are a large number of examples of direct anthropogenic, as well as human-mediated environmental impacts on the soil, contributing to its pollution. As part of all terrestrial ecosystems, the soil is actively involved in many important processes of substance transformation. When there is a quantitative change in long-standing environmental factors or completely new environmental factors affecting the soil come into play, loads can occur that will harm soil organisms or even change the system of coenotic relationships between them.

Soil pollution is caused by various phenomena in scale and territorial scope, including:

- large-scale territorial (global) soil pollution caused by the combination of a large number of individual sources that cannot be identified in more detail
- geographically limited pollution, which is caused in most cases by a more or less well-known small number of sources that are limited in their territorial influence

- local narrowly limited soil contamination with short-or long-term effects on individual organisms and ecosystems.

Soil contamination occurs mainly in two forms:

1. Physical change. It is associated with various, primarily mechanically acting agents that can lead to significant loads on ecosystems. As a rule, all those of anthropogenic origin, i.e. highly modified soils, are highly susceptible to physical stress. This applies to most of the soils that arise during the reclamation of former mining developments, on the site of settlements or industrial enterprises.

2. Chemical contamination is caused by substances acting in the form of gases, solutions, or solids that do not cause physical changes, at least in the initial stage. This type of pollution exceeds both in quantitative and qualitative terms all types of its physical change [16-20].

Various compounds of natural and anthropogenic origin, accumulating in the soil, cause its contamination and toxicity. These concepts should be distinguished. Pollution is the introduction of new physical, chemical or biotic agents that are usually not characteristic of the environment, or the excess of the natural long-term average level (within its extreme fluctuations) of the concentrations of these agents in the environment at the time under consideration.

Toxicity - toxicity, the ability of certain chemical substances to have a harmful effect on organisms, to infect them [1-2]. The degree of soil toxicity can be determined by bioassay [2].

Chemical contamination of the soil is caused by various causes. It occurs either deliberately (for example, as a result of the use of plant protection products) or unintentionally (in the case of industrial emissions). In accordance with this, in most cases, from the territorial point of view, both the range of action and the intensity of pollution can be different. In addition, a high level of technogenic load on the soil is characteristic of an urbanized territory. The peculiarity of soil pollution in large cities is the arrival of a large number of heavy metal compounds on their surface from various sources of pollution [3].

Based on the aggregate state (gaseous, liquid, solid) and the mode of action of pollutants, they can be divided into the following groups in a simplified way. Gases (especially sulfur-containing industrial emissions, halides and nitrogen oxides). Soil contamination with sulfur dioxide (or the corresponding products of its oxidation SO_3, SO_4SO3, SO4) in the field, as a rule, occurs together with contamination with other gases or dust.

Dust (ash, lime dust, heavy metal particles, especially industrial emissions). In large areas of Central Europe, dusty lime emissions are of great importance, leading, primarily in weakly buffered acidic soils, to a change in pH to neutral and basic values.

A high level of technogenic load on the soil is characteristic of an urbanized territory. The peculiarity of soil pollution in large cities is the arrival of a large number of heavy metal compounds on their surface from various sources of pollution [4].

Heavy metals (whose density is higher than 5.0) are considered as trace elements (Cu, Ni, Co, Pb, Sn, Zn, Cd, Bi, Sb, Hg), that is, chemical elements present in organisms in low concentrations (usually thousandths of a percent or lower), which are more or less important elements with limited (nickel, vanadium) or still insufficiently studied physiological functions and ecological roles (cadmium, arsenic, uranium, lead, chromium, mercury) are also important for the body's nutrition (iron, magnesium, zinc, copper, cobalt, and molybdenum). The proportion of individual elements in the total content of heavy metals is very different in soils enriched with them both by natural and anthropogenic means. The decisive factor in the toxic effect of heavy metals on (plant) organisms is not so much their total content in the soil, but rather their concentration in the state accessible to the body. This concentration near natural heavy metal sites is increased by a factor of 10-10000 compared to normal; it can reach the same values in anthropogenic soils enriched with heavy metals [4,5].

Currently, more than 60 such chemical elements have been identified in organisms using special, highly sensitive methods. However, it can be argued that this number is not a limit and the composition of organisms actually includes all known chemical elements and their isotopes (both stable and radioactive).

Chemical elements that, as part of plant, animal and human organisms, take part in metabolic processes and have a pronounced biological role, are called biogenic elements. Bioelements include: nitrogen, hydrogen, iron, iodine, potassium, calcium, oxygen, cobalt, silicon, magnesium, manganese, copper, molybdenum, sodium, sulfur, strontium, carbon, phosphorus, fluorine, chlorine, and zinc [7-9].

This list will undoubtedly increase as our knowledge grows. For example, the biogenic value of cobalt and molybdenum was determined not long ago. Some elements are biogenic only in relation to certain classes, genera, and sometimes even species of organisms. For example, boron is necessary for plants, but it cannot yet be considered biogenic in relation to animals and humans [5].

A significant number of chemical elements that are constantly detected in organisms have a certain influence on the course of metabolic processes and on a number of physiological functions in experiments, but it is not yet known what role these elements play in organisms under natural conditions, and therefore their biogenic significance is still doubtful. These elements include aluminum, barium, beryllium, bromine, bismuth, gallium, germanium, cadmium, lithium, arsenic, nickel, tin, radium, mercury, rubidium, lead, silver, antimony, titanium, uranium, chromium, and caesium.

The quantitative content of bioelements that make up organisms varies greatly depending on the habitat, type of nutrition, species belonging, and so on.

The bulk of living matter (99.4%)consists of the so-called macronutrients: O, C, H, Ca, N, K, P, Mg, S, Cl, Na. Among the trace elements, the content of which in the body is calculated in thousandths or even trillionths of a percent, are: iron, cobalt, manganese, copper, molybdenum, zinc, cadmium, fluorine, iodine, selenium, strontium, beryllium, lithium, etc.

Microelements, despite their low quantitative content in organisms, play a significant biological role. In addition to the general beneficial effect on growth and development, a specific effect of a number of trace elements on the most important physiological processes, such as photosynthesis in plants, has been established [17-19].

The relationship between the role of an element in a living organism and its position in the periodic table is well established for many trace elements, but not all aspects of this relationship are sufficiently studied.

Let us now turn to the essence of the effect of trace elements on a living organism. The most characteristic is the high biological activity of trace elements, i.e. the ability of extremely small doses of them to have a strong effect.

The powerful effect of trace elements on physiological processes in the body is explained by the fact that they come into close contact with biologically active organic substances — hormones, vitamins. Their association with many proteins and enzymes has also been studied. These relationships determine the main ways of involving trace elements in biological processes [7].

The link between trace elements and vitamins is now firmly established. It is shown that manganese is necessary for the formation of vitamin C (ascorbic acid) in a number of plants, which protects humans and some animals from scurvy. There are data showing that the introduction of manganese can cause the formation of ascorbic acid in the body of those animal species that are usually unable to produce this vitamin. Manganese, apparently, is also needed for the action of vitamin D (anti-rickets) and B_{B1} (anti-neuritis). There is a connection between the trace element zinc and vitamin$_{b1}$. However, the most interesting discovery is that of the antianemic vitamin B_{B12},a deficiency of which in the body leads to severe forms of anemia (malignant anemia).It turned out that this vitamin is a compound of the trace element cobalt and a complex organic group [20-22].

As is known, many metals, mainly trace elements, in solutions have a pronounced catalytic effect, i.e. they are able to significantly accelerate the course of chemical reactions by hundreds of thousands and millions of times. Microelements also exhibit this catalytic effect in a livingorganism, especially when they interact with organic substances containing nitrogen.

When microelements interact with the protein components of enzymes, metalloenzymes are formed. The composition of a large group of metalloenzymes is characterized by the presence of metal as a stable complex (iron-containing enzymes-catalase, peroxidase, cytochromes, cytochrome oxidase, etc.) [6].

Geochemical processes that continuously occur in the Earth's crust and the evolution of the chemical composition of organisms are related processes. According to V. I. Vernadsky, life is not an external, random phenomenon on the earth's surface, but is closely connected with the structure of the Earth's crust. The content of elements in living matter is proportional to the composition of the organism's habitat, adjusted for the solubility of compounds containing these elements.

Closely related to the geochemical provinces of the earth are biogeochemical provinces—regions characterized by more or less the same concentration of one or more elements. Within the limits of biogeochemical provinces with an excess or insufficient content of certain elements, a distinctive biological reaction of the flora and fauna of this area occurs, which is manifested in endemic plant and animal diseases—biogeochemical endemias.

The effects of certain heavy metals on plants are discussed in more detail below.

Nickel. The nickel content in soils is 0.004%, in natural surface waters-0.000,000,000%. On average, plants contain 0.00005% per live weight (depending on the plant type, terrain, soil, climate, etc.). Plants in the area of nickel deposits can accumulate significant amounts of nickel. At the same time, the phenomena of endemic plant diseases are observed, for example, the ugly forms of asters, which can be a biological and specific indicator in the search for nickel deposits. Morphologically altered anemones in nickel-rich biogeochemical provinces concentrate 30-fold nickel; the increased nickel content in soil solutions and in soils of the Southern Urals, which are 50-fold nickel-rich, is the cause of the appearance of ugly forms in the buttercup grass (buttercup family) and thorn berry (asteraceae family).

The critical values of nickel concentration in the nutrient solution are 1.5 mg / kg and 26 mg/kg in the dry weight of barley grown in this medium. The toxic level of this element in the leaves of plants begins with exceeding 1.0 mg/kg of dry weight.

When nickel is absorbed by plants, it interacts with iron, cobalt, chromium, magnesium, copper, zinc, and manganese contained in the soil; at the same time, manganese and magnesium ions do not inhibit, and cobalt, copper, iron, and zinc ions inhibit nickel absorption by 25-42%. There are indications that plants growing on serpentine soils do not show signs of toxic damaging effects of nickel, in cases where the copper: nickel ratio is equal to or more than 1, or the iron: nickel ratio is equal to or more than 5.

Among plants, there is a difference in sensitivity to nickel exposure. Toxic levels of nickel in plant foliage ($^{mm-1}$ dry weight): rice 20-25, barley 26,hardwoods 100-150, citrus 55-140, weeds 154.

Typical symptoms of the damaging toxic effect of nickel are: chlorosis, yellow discoloration followed by necrosis, stopping root growth and the appearance of young shoots or sprouts, deformity of plant parts, unusual spotting, and in some cases, death of the entire plant.

Copper. The total copper content in soils is about 0.002%, and the soluble part accounts for about 1% of this amount.

In soils, there are several forms of copper that are absorbed by plants to varying degrees:

a. water-soluble copper,
b. exchange copper absorbed by organic and mineral colloids,
c. hard-to-dissolve copper salts,
d. copper-containing minerals, e) complex organometallic compounds of copper.

The mobility of copper and its entry into the plant decreases with liming of soils, binding of copper in the form of organic compounds and fixing with soil humus. Part of the soil copper is strongly bound to humus acids in the soil — humic, krenic, and apocrenic; in this form, it becomesimmobile and indigestible to plants. Copper also forms complex compounds with a variety of organic acids — oxalic, citric, maleic, and succinic. Soil microorganisms play an important role in copper fixation.

The amount of water-soluble available copper mainly determines the living conditions of-plants in a given area. Plants of copper-rich soils are enriched with this element, and some species acquire resistance even to very high concentrations of this metal.

Copper is essential for the vital activity of plant organisms. Almost all leaf copper is concentrated in chloroplasts and is closely related to the processes of photosynthesis; it participates in the synthesis of such complex organic compounds as anthocyanin, iron porphyrins, and chlorophyll; copper stabilizes chlorophyll and protects it from destruction.

Copper is included as a structural component in a compound with a protein (a copper protein containing0.3% copper), forming the oxidative enzyme polyphenol oxidase. This enzyme was first discovered in potato tubers, champignons, and later in most common plants.

Although this enzyme can only oxidize certain phenolic compounds, the presence of pyrocatechin or orthoquinone in plant tissues along with oxidase allows polyphenol oxidase to participate in the oxidation of a large number of organic compounds.

Copper promotes the synthesis of iron-containing enzymes in plants, in particular peroxidase.

The positive effect of copper on protein synthesis in plants and, as a result, on the water — retaining capacity of plant tissues has been established. On the contrary, when copper is deficient, the hydrophilicity of tissue colloids decreases.

Obviously, as a result of this, copper in the form of fertilizers is important for giving plants drought and morozo resistance, as well as, possibly, resistance to bacterial diseases.

Diseases of copper deficiency in plants:

- exanthema, or dryness of fruit trees. It affects citrus fruits, as well as apples, pears, plums and olives. In citrus fruits, the leaves reach a large size, young shoots bend, they develop swellings, then cracks. Damaged shoots lose their leaves and dry out. The crown of the leaves becomes bushy. The fruit is small with brown spots and warts. The leaves first havea bright green color, and later spotting and chlorosis appear.

The "processing disease" mainly affects oats, barley, wheat, beets, legumes, onions; less-often rye, buckwheat, and clover. "Tillage disease "occurs mainly on swampy soils and peatlands; this disease is also called "development disease", as it affects oats, barley, spring and winter wheat and other cereals, as well as flax, hemp, shag and other crops on reclaimed soils [8].

On some peaty soils, cereals in the milky ripeness phase lie down, forming knees. In the tissues of the convex part of the knee, oxidative processes (activity of peroxidase, polyphenol oxidase, and cytochrome oxidase) occur at a higher level and contain 3 times more medi than in the opposite tissues.

"Tillage disease" does not occur if copper sulfate is added to the soil in the amount of 25 kg per 1 ha, which leads to an increase in the copper content in plants (wheat, rye, oats and other cereals).

The use of copper fertilizers not only affects the increase in yield, but also the quality of agricultural products. Thus, the amount of protein in the grain increases, the sugar content of sugar beet increases, as well as the percentage of rubber yield in coca-cola, the content of vitamin C and carotene in fruits and vegetables, and the technological qualities of hemp fiber improve. Under the influence of copper fertilizers, winter wheat's resistance to lodging increases.

Zinc. The average content of zinc in soils is 0.005%; of this amount, soluble zinc accounts for no more than 1 %.

Saline and saline soils contain the most mobile zinc (0.0087-0.014%), which is associated-with the high dispersion of saline soils and the presence of zinc compounds such as sodium and potassium zincates. Chernozems and gray forest soils occupy an intermediate position in terms of the number of mobile forms of zinc; podzolic soils have the least number of such forms (0.00185-0.00241%). On acidic soils, zinc is more visible and is removed from the soil in large quantities;therefore, zinc deficiency occurs more often on acidic soils, and zinc is less mobile on alkaline soils [8-9].

On average, 0.0003% zinc is found in plants. Depending on the species, locality of growth, climate, etc., thecontent of zinc in plants varies greatly.

Zinc is a component of a number of enzyme systems. It is necessary for the formation of respiratory enzymes-cytochromes A and B, cytochrome oxidase (the activity of which sharply decreases with zinc deficiency),and is part of the enzyme’s alcohol dehydroase and glycylglycine dipeptidase. Zinc is associated with the transformation of compounds containing the sulfhydryl group, whose function is to regulate the level of redox potential in cells. When zinc is deficient, polyphenols, phytosterol, and lecithin accumulate in the vacuoles of cells as products of incomplete oxidation of carbohydrates and proteins; leaves contain more reducing sugars and phosphorus, and less sucrose and starch. In the absence of zinc, the process of glucose phosphorylation is disrupted. Lack of zinc leads to a significant decrease in the growth hormone auxin in plants.

Zinc is a component of the enzyme carbonic anhydrase. As a part of carbonic anhydrase, zinc affects the most important photochemical reaction of the "dark" utilization of carbon dioxide by plants and the process of CO_2release, i.e., the process of plant respiration. Plants that develop in zinc-deficient conditions are poor in chlorophyll; in contrast, leaves rich in chlorophyll contain the maximum amount of zinc. In green leaves, zinc may be associated with porphyrins.

Under the influence of zinc, the content of vitamin C, carotene, carbohydrates and proteins increases in a number of plant species, zinc enhances the growth of the root system and has a positive effect on frost resistance, as well as heat, drought and salt resistance of plants. Zinccompounds are of great importance forношенияfruiting processes [9].

Peas, sorghum and beans in water crops do not produce seeds at a zinc concentration in the medium of 0.005 mg per 1 liter or lower. With an increase in the concentration of zinc in the nutrient mixture, the number of seeds increases accordingly. In areas near zinc deposits, the so-called Galmei flora grows-plants rich in zinc.

Zinc deficiency diseases are prevalent mainly in fruit trees; conifers and maize can also be affected. The most important of these diseases of insufficiency are as follows:

- small-leaved, or rosette forest, deciduous trees. It affects apples, pears, plums, peaches, apricots, almonds, grapes, and cherries. On the diseased plant, shortened shoots with a rosette of small twisted leaves are formed in the spring. On the foliage-the phenomenon of chlorosis. The fruits are small and deformed, often do not appear at all. After 1-2 years, the shoots die off [10].

The disease is cured directly by the introduction of zinc sulfate in crystalline form into the trunks of diseased trees, the introduction of kink compounds into the soil, and the spraying of plants with a solution of zinc salts.

With the abundant development of microorganisms on some soils, they can significantly absorb zinc and create conditions of zinc starvation for higher plants. Soil sterilization, by killing microbes and possibly destroying the compounds that bind zinc, puts higher plants in a more complete supply of zinc.

- spotting of citrus leaves, "mottling". Yellow areas appear between the leaf veins, so the leaves get a mottled appearance. The green color remains only at the base of the leaves, the rest becomes white. The leaves and root system stop growing, and the plants die.
- bronze color of Tungaceae leaves. The leaves acquire a bronze color, some are as die off. New leaves that appear instead of dying ones are deform-ed. Diseased trees are not very resistant to frost.
- rosette disease of pine. The needles at the ends of the shoots acquire a bronze color.
- whitewashing of the top of the corn. Light yellow stripes appear between the leaf veins, necrotic spots and holes develop. Newly growing leaves have a pale-yellow color.

Zinc fertilizers are successfully used to increase the yield of a number of crops: sugar beet, winter wheat, flax, clover, sunflower, corn, cotton, citrus, and other fruit, woody, and ornamental plants.

Some plants are particularly responsive to zinc fertilizers. When using mineral fertilizers containing 20 kg of zinc sulphate per 1 ha, a higher corn grain yield is observed than from the use of any fertilizer mixture without zinc. At the same time, corn that is sick with "whiteness of the vertebrae" completely recovers — chlorosis disappears, normal green leaves appear.

Cobalt. In the biosphere, cobalt is mainly dispersed, but in areas where there are plants that concentrate cobalt, cobalt deposits are formed. In the upper part of the earth's crust, a sharp differentiation of cobalt is observed — clays and shales contain an average of $2 \cdot 10\text{-}3^{-3}$% cobalt, sandstones $3 \cdot 10\text{-}5^{-5}$, and limestones $1 \cdot 10\text{-}5^{-5}$.

The sandy soils of forest areas are most poor in cobalt. In surface waters it is not enough, in the World Ocean it is only $5 * 10\text{-}8^{-8}$%. Being a weak water migrant, it easily passes into sediments, being adsorbed by manganese hydroxides, clays, and other highly dispersed minerals.

The content of cobalt in soils determines the amount of this element in the composition of plants in a given area, and the intake of cobalt in the body of herbivores depends on this.

Constantly present in plant tissues, cobalt participates in metabolic processes. In an animal body, its content depends on its level in forage plants and soils. The average concentration of cobalt in pasture and meadow plants is $2.2 * 10\text{-}5\text{-}4.^{-5}5 \cdot 10\text{-}5^{-5}$% per dry substance.

The ability to accumulate this element in legumes is higher than in cereals and vegetables. Due to their high ability to concentrate cobalt, seaweeds do not differ much from land plants in terms of its content, although it is significantly lower in seawater than in soils [10-12].

Cobalt participates in the enzyme systems of nodule bacteria that fix atmospheric nitrogen; it stimulates the growth, development and productivity of legumes and plants of a number of other families.

In micro doses, cobalt is a necessary element for the normal life of many plants and animals. However, elevated concentrations of cobalt compounds are toxic.

Cobalt is used in agriculture as micro fertilizers-fertilizers containing trace elements (B, Cu, Mn, Zn, Co, etc.), i.e. substances consumed by plants in small quantities.

Liming of the soil reduces the plant's assimilation of cobalt. The excess of manganese and iron in soils also affects; on the contrary, phosphorus increases the intake of copolymer in plants.

The use of cobalt salts (cobalt sulphate) as fertilizers has been shown to accelerate the maturation of barley, increase the yield of red clover seeds, and increase the fat content in flax seeds. Under the influence of cobalt, the yield of sugar beet increases.

Currently, the problem of water pollution in the study of ways to protect vegetation cover is becoming no less, if not more important than air pollution. The reasons for its importance are quite diverse.

Water pollution is an effective environmental factor and one of the processes that is dangerous for plants. Among chemical pollutants, the most dangerous are pollutants with transformative activity, as well as biogenic elements and their compounds that contribute to eutrophication. Pollutants such as oil components, pesticides, arsenic, mercury, cadmium, and lead compounds cause various deviations in plant biorhythms. Human activities in the water and/or on land have a variety of environmental implications on aquatic ecosystems. Waterborne commercial and passenger transit is one of these worldwide expanding anthropogenic stressors (13). The World Bank’s description is a broad term that encompasses a variety of facets of marine sustainability, from maintaining biodiversity to ecosystem health and pollution prevention (14). In addition to, aquatic products are essential nutrients in the human diet and are also present in the global aquatic product industry for consumers. Therefore we need to protect our aquatic environment against to pollution on various environmental and ecological effects. The aquatic ecosystems and living organisms suffer from environmental impact by emissions of volatile organic substances, and pollution of water by oil chemicals and many various hazardous agents (13-15).

Chemical air pollution is dangerous for terrestrial and, to a large extent, aquatic plants. The most important sources of atmospheric pollution are mainly sources related to human activities. These are thermal and other power plants, ferrous and non-ferrous metallurgy enterprises, oil production and processing enterprises, transport, enterprises for the production and manufacture of building materials, mechanical engineering enterprises and other industries.

When plants are exposed to polluted air, a significant variety of pathological phenomena occurs, as a result of which a number of plant body functions are disrupted, individual development and life cycle are incomplete, and biological productivity decreases.

Even at low concentrations of pollutants, long-term exposure of plants to polluted air leads to a decrease in the intensity of their photosynthesis and to a slowdown in their growth, as well as to the simplification and disintegration of cenoses (forests). For example, spruce forests under prolonged exposure to low concentrations of sulfur, nitrogen, and ammonia oxides begin to die. Currently, everyone knows that the species composition of the flora decreases in the steppe regions located near such large metallurgical giants as Zhezkazgan, Balkhash, Oskemen, etc. When plants are polluted, ion transport changes dramatically. This phenomenon is typical not only for higher plants, but also for lower ones and for fungi.

With the increase in the world's population and the subsequent increase in housing density, we are facing the problem of water, soil, and air pollution. On the other hand, the use of physical environmental purification methods is very expensive and can even cause environmental pollution. In this regard, it should be mentioned that pollution in terms of its presence in water and soil sources, due to the entry of many illegal and unhealthy chemical compounds into the cycle of water systems, is of great concern (16-19). The sustainable development element allows for the incorporation of activities consumption based and replacement patterns while creating low or no greenhouse gas pollutants, which is essential in the process of carrying out the activities (14).

6.2 Conclusion:

Thus, air pollution, as well as pollution of natural waters, has now acquired the significance of an ecological factor that determines not only the fate of individual plants and plant cover of the Earth, but also its biosphere as a whole. The pollution in our environment and the impacts on humans and the rest of the species, as a result of global warming, are accelerating further than previously predicted. The causes of this pollution are mainly attributed to manmade activities, such as the burning of fossil fuels. Burning of fossil fuels usually associated with energy generation, development, and the demand for higher standard of living. The increase of the world population imposes further demand on the usage of some pollutants. The pollutants taking place to our environment as a result of rising the global changing, is a major concern, in particular that this phenomenon is creating an environment for the emerging of viruses and bacteria that our immune system cannot defend against them. In this article, causes of environmental pollution and global warming have been discussed and related impacts at various levels to our natural environment and species. Connecting our understanding of how environmental pollution is increasing with an understanding of how those changes may affect human health can inform decisions about reducing the amount of future environmental pollution.

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