

Soil Pollution by Industrial Waste

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Abstract: This article covers the types of chemical soil pollution and the causes of their occurrence, the negative impact of industrial waste on soil composition, sources of pollution, and consequences. In particular, the influence of heavy metals, pesticides, petroleum products, and other toxic substances on the soil composition was analyzed. Also considered are the levels of pollution, environmental standards, and criteria for assessing the state of soils. Information is provided on the negative impact of these pollutants on agriculture, the environment, and human health, as well as on preventive measures.

Keywords: Soil pollution, industrial waste, heavy metals, radioactive contamination, environmental hazard, chemicals, degradation, monitoring, environmental protection, human health.

Introduction:

The role of land resources in ensuring sustainable development and the well-being of the people in the Republic of Uzbekistan is of strategic importance. Today's generation, especially young people, are responsible for the scientific preservation and rational use of natural resources, in particular soil cover, in order to preserve ecological stability.

Although economic and social problems were balanced in many regions at the end of the XXth and beginning of the XXst centuries, environmental crises, especially soil degradation, await a serious solution. The main determinants of this process are the decrease in soil fertility, the compression of the land fund, anthropogenic pressure, and excessive amounts of chemicals.

In recent years, a number of important decisions and decrees have been adopted in our country to protect the environment, especially soil resources, prevent pollution, and ensure environmental safety. In particular, the "Uzbekistan-2030 Strategy" of the President of the Republic of Uzbekistan №PP-300 dated September 11, 2023, defines the need to take strict measures to radically improve the environmental situation in our country, eliminate

environmental problems that directly affect human health, preserve the natural composition of soil, water resources, and the atmosphere, and prevent its pollution. At the same time, issues of improving and effectively organizing the environmental monitoring system are also among the urgent tasks.

METHOD

For accurate assessment and monitoring of the level of soil contamination by industrial waste, scientifically based sampling and laboratory analysis methods are of great importance. These methods allow for the determination of the type, level, location, and distribution characteristics of pollution. The processes from sampling to final analysis are an integral stage of environmental monitoring.

RESULT

Unlike other natural environments, soil has the property of accumulating environmental pollution products and retaining them for a long time. The final destination of harmful substances from the atmosphere is precisely the soil layer. Therefore, the conservation of land resources and ensuring their natural regeneration has become a pressing issue on

a global scale.

In the history of mankind, more than 2 billion hectares of fertile land have been degraded. Every year, 3-7 million hectares of land become unsuitable for economic activity due to salinization, erosion, soil compaction, and other anthropogenic factors. Irrigated agriculture, intensive livestock farming, and incorrect agricultural practices accelerate this process.

In our country, the Law "On Nature Protection" has been adopted on environmental protection and rational use of natural resources. This indicates the high level of attention paid to environmental safety and land resource management issues in state policy.

Although the rapid development of industrial production in the 21st century has become one of the integral factors of human development, the negative impact of this process on the ecological balance is becoming an increasingly urgent issue. Soil is not only a natural resource, but also one of the main ecological elements of the biosphere, and its composition and fertility ensure the continuity of life on Earth. Therefore, the soil's resistance to anthropogenic factors, especially pollution caused by industrial activity, and the degree of its response to this influence require separate scientific analysis and monitoring [4].

Although the changes in the physicochemical and biochemical properties of soils contaminated with industrial waste are widely covered in the scientific literature, due to the fact that this problem manifests itself in various forms depending on geographical regions, industries, and types of waste, its in-depth analysis and territorial study remains one of the urgent scientific tasks.

The impact of waste from industrial enterprises of the Fergana Valley on air and soil was analyzed, and an excess of heavy metals in groundwater and soil was noted [7;10].

Soil monitoring in areas contaminated with industrial waste, the influence of industrial waste on the concentration of heavy metals in the soil based on sample analyses, environmental hazard characteristics and changes in the soil based on the analysis of waste from regional industrial enterprises were thoroughly studied, and the results were highlighted with data on the Fergana region [8;9].

The environmental hazard of the amount of heavy metals measured in laboratory analyses is shown, which leads to heavy metal contamination of the soil by the waste of the Fergana Oil Refinery [5;6].

DISCUSSION

Chemical soil contamination occurs under the influence of various factors, and damage to the soil cover is observed over the years. Soil pollution varies, mainly from industrial enterprises, household and other waste, as well as during various processes.

It is known that in each republic and region there are organizations for the protection of land resources, which are considered natural resources, which constantly monitor the state of chemical pollution of soils and determine the necessary measures.

In the Republic of Uzbekistan, issues such as the state of land resources and their protection are addressed by the territorial administration of the Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Uzbekistan, the Hydrometeorological Center, and research institutes. In these, such properties as pollutants, their composition, and quantity are studied in laboratory conditions, and appropriate conclusions are drawn regarding pollution.

Chemically contaminated soils are classified according to their chemical composition, quantity, and toxic properties:

1. Radioactive contamination.
2. Contamination with heavy metals and chemicals.
3. Pollution by various wastes.

According to the results of the conducted research, radioactive contamination is the most dangerous, which causes serious damage to living organisms, has the property of affecting in a large radius, and most importantly, has a dangerous effect on human health, causing various hereditary diseases with genetic changes in offspring.

Heavy metal pollution is dangerous, and the sources of this pollution are transport and industrial enterprises. The retention period of heavy metals in the soil is several thousand years.

Soil pollution by waste The amount of the above-mentioned pollution series is very large. Various types of waste accumulate in large quantities in the soil cover due to human impact and industrial enterprises. "Cemeteries" where special waste is buried have a negative impact on the environment and soil cover for years.

Waste mainly differs from each other in chemical composition and nature of action. Soil cover is most directly polluted by industrial (e.g., chemical, metallurgical, oil refining, and construction materials) and household (household, utilities) waste. Processing industry and other types of waste come in less. These wastes may contain heavy metals, toxic substances, radioactive elements, plastics, inorganic

waste, and other harmful components. categories (1-table).
Contaminated soils are divided into the following

Categories of chemical soil contamination

1-table

Categories of soil pollution	Contamination description	Use state	Suggested events
Category I uncontaminated	Chemical substances in the soil do not exceed the MPC value.	All crops can be planted.	Reduce impact on soil pollution
Category II moderate danger	The amount of chemicals is in the state of the general sanitary norm, reaching the soil through water and air.	By controlling the qualitative composition, it is possible to plant some plants.	Control over the boundaries of water and airways, water sources on agricultural lands
Category III - high risk	The amount of chemical substances in the soil exceeds the MPC and is harmful to transcasion indicators.	It is allowed to use only for sowing industrial crops. Planting agricultural crops is prohibited.	1. Strict application of Category I measures and control of the content of toxic substances, composition of plants, products 2. Transfer of productive plants to clean soil conditions, control. 3. Green plants limit the use of masses
Category IV Extremely Dangerous	Chemical substances in the soil exceed the MPC and are harmful to all soil parameters.	Planting all types of crops is prohibited.	Application of measures to reduce the level of contamination of contaminated soil cover. Control over the composition of water used in agriculture and the formation of natural protection factors.

When classifying the levels of chemical contamination of soils, they are not determined uniformly for all types of chemical contamination, but are expressed separately depending on the chemical

composition of a particular pollutant, its content in the soil, the toxicity of DMs, and other properties. For chemically contaminated soils, pollution levels and coefficients are adopted (2-table).

Degrees of pollution of chemically contaminated soils coefficients.

2-table

Level of pollution	Degree of soil contamination	Pollution coefficient
1	Contaminated	0
2	Weak	0,3
3	Middle	0,6
4	Strong	1,5
5	Very strong	2,0

Protection of soils from chemical pollution is one of the most pressing tasks on Earth today. Therefore, serious attention should be paid to this problem.

In terms of the hazard of chemical substances, stress index indicators are established, such as pesticides 140, heavy metals 135, nuclear power plant waste 120, toxic solid waste 120, metallurgical materials 90, untreated wastewater 85, sulfur (II) oxide 72, oil 72, chemical fertilizers 63, organic household waste 48, nitrogen oxides 42, stored radioactive waste 40, alkaline waste 40, volatile carbohydrates 18, carbon monoxide 12 [1;2;3;].

Conclusion

The peculiarities of the activities of various branches of production play an important role in the chemical pollution of soils. Each industry is distinguished by the pollutants released into the soil cover, and they are distinguished by their unique chemical composition, physical state, and degree of impact. Among the types of chemical soil pollution, the most widespread is pollution associated with toxic chemicals and technogenic waste.

Constant monitoring plays an important role in preventing chemical pollution of soils. By observing the level of pollution over the years, the mechanisms of its formation, patterns of distribution, and factors of influence are determined. Based on this scientifically substantiated data, it is possible to develop and implement specific preventive and rehabilitation measures.

In order to prevent soil contamination with toxic technogenic waste, it is recommended to control these wastes from the stage of their formation,

neutralize them by environmentally safe methods, and store or bury them in special landfills that meet the established sanitary standards.

Soil pollution from oil and its products is more common. The presence of various carbohydrates (naphthenic, aromatic), as well as heavy metals such as Ni and Pb, significantly impacts the soil cover. Tuproqlarni kimyoviy ifloslanishini oldini olish uchun sanoat korxonalarini zamonaviy texnologiyalar bilan ta'minlash ekologik uskunalar o'rganish.

1. Establishing strict state control, defining various types of collectives.
2. Conducting large-scale monitoring of scientific, practical, and legal measures aimed at solving the problem of chemical pollution.
3. Protection of soils from the effects of chemical pollution, solution of the problem in contaminated areas, development of new methods and technologies for their purification.

4. Neutralization and processing of industrial waste, achieving a reduction in chemical soil contamination.

When eliminating soil contamination by industrial waste, we consider it necessary to pay attention to the following:

- Purification of soils contaminated with oil and oil products and restoration of their ecological condition
- a technology for soil purification has been developed, which is determined based on the properties and characteristics of the soil.
- Achieving physical, chemical, and biological soil purification.
- Conducting reclamation measures in soils

contaminated with oil and oil products.

- Plowing the soil to a depth of up to 30 cm, using cotton humus to regulate the air regime, and using a biopreparation rich in bacteria to halve the concentration of fuel oil and petroleum.

- Conducting biological treatment of contaminated soils using preparations containing microorganisms that decompose hydrocarbons.

- Establishing environmental monitoring, monitoring the results of cleaning works, and conducting regular laboratory analyses to assess changes in the soil.

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