


Chapter 13

Monitoring Soil Pollution From Agricultural Land With Heavy Metals and Radioactive Elements in Russia

Vladimar N. Goryachkin


Center for Agrochemical Service “Leningradsky”, Russia

Nadezhda Anatolievna Lebedeva

 <https://orcid.org/0000-0003-4095-2631>

International Personnel Academy, Germany

Olga A. Pasko

 <https://orcid.org/0000-0001-8322-834X>

National Open Institute, St. Petersburg, Russia

ABSTRACT

The system of state monitoring of soil pollution of agricultural lands with heavy metals and radioactive elements is designed to control the environmental safety of soils in Russia. The article comprehensively describes the tasks, structures, regulatory framework, survey methods, and an example of the results of the ecological-toxicological assessment of soil pollution. Monitoring the content of pollutants entering the soil from pesticides, biocides, and mineral fertilizers, as well as from water and air environments, allows for the prevention of serious diseases in humans and animals, and therefore is a task of national importance.

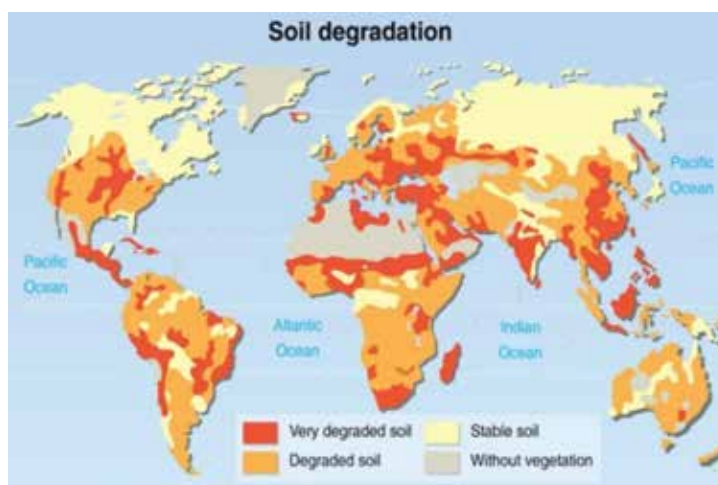
INTRODUCTION

For any country, the soil is the most important strategic resource, the basis of its food and national security, and its anthropogenic degradation is one of the most important problems of our time (State of Land..., 2024). The share of arable land on a global scale is 13% of the total crop area (11,477 million hectares), while the share of degraded arable land is 29% of the area of all degraded lands. Almost a

DOI: 10.4018/979-8-3693-8532-6.ch013

third of the area of rainfed arable land and nearly half of the area of irrigated land are degraded. The area of meadows and pastures used for forage harvesting and grazing animals has decreased by 191 million hectares over 20 years. In Russia, 134 million hectares of agricultural land are degraded; more than 20-40 million hectares of agricultural land are abandoned and not circulated (Soil Degradation in the World, 2024). Erosion processes are in first place in terms of scale and degree of negative impact on the soil cover; the second is chemical pollution (Avetyan, Savitskaya et al., 2023). The problem of pollution is especially relevant for industrialized countries in areas of influence of large enterprises of the metallurgical and chemical industries and extractive industries (Fig. 1). Soil pollution by plant protection products against weeds, bacterial infections and insect pests, organic and mineral fertilizers (with excessive application) is also common (How serious is soil pollution, 2024).

Figure 1. Soil degradation in the world (Soil degradation in the world, 2024).



According to a UN report, global production of agrochemicals doubled between 2000 and 2020, reaching 2.3 billion tons. By 2030, it is expected to double again, and, accordingly, soil pollution processes will intensify and scale up on a global scale (How serious is soil pollution, 2024). In Europe, the area of agricultural land is about 39% of the total land area, i.e. 200 thousand hectares of land. Soil pollution with heavy metals has been identified (Aleksakhin, 2011), for example, cadmium from mineral fertilizers, and copper from fungicides; residues of pesticides, microplastics, pharmaceuticals and personal hygiene products have been found. More than 40% of the area of agricultural land in Europe requires a reduction in the application of nitrogen fertilizers to maintain the environmental safety of water bodies located near the fields (Golovaty, 2006; Vodyanitsky, 2013). Heavy metals were found in agricultural soils, the sources of which were pesticides, ameliorants, and synthetic and organic fertilizers (manure, litter, compost). More than 20% of agricultural land in Europe contains cadmium in doses significantly exceeding the maximum permissible values.

In Russia, 134 million hectares of agricultural land are subject to chemical degradation (pollution). More than 20-40 million hectares of agricultural land are abandoned and not in circulation (Zakharchenko, Pasko et al., 2021). The problem of soil pollution is no less urgent than in Europe. This determined the purpose of the study (Soil Degradation in the World, 2024).

24 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/monitoring-soil-pollution-from-agricultural-land-with-heavy-metals-and-radioactive-elements-in-russia/376409

Related Content

Promises and Challenges of Medical Patient Healthcare Portals in Underserved Communities: The Case of Einstein Medical Center Philadelphia (EMCP)

Diane C. Lee and David Gefen (2020). *Impacts of Information Technology on Patient Care and Empowerment* (pp. 219-251).

www.irma-international.org/chapter/promises-and-challenges-of-medical-patient-healthcare-portals-in-underserved-communities/235962

Utilizing the Socio-Ecologic Model as a Framework for the Prevention of Teen Pregnancy

Mandy Golman, Nila Ricks, Irene D. Gallegos and Jesse Weaver (2019). *Socio-Cultural Influences on Teenage Pregnancy and Contemporary Prevention Measures* (pp. 208-233).

www.irma-international.org/chapter/utilizing-the-socio-ecologic-model-as-a-framework-for-the-prevention-of-teen-pregnancy/211444

Healthcare Professionals' Perceptions of Factors That Could Inform Adherence Interventions for Postnatal Depression Treatments

Omobolanle Omisade and Alice Good (2023). *International Journal of Applied Research on Public Health Management* (pp. 1-13).

www.irma-international.org/article/healthcare-professionals-perceptions-of-factors-that-could-inform-adherence-interventions-for-postnatal-depression-treatments/315802

RETRACTED: On the Possible Spatial Structures of the α -Amyloid: The Native Structure of Proteins

Gennadiy Vladimirovich Zhizhin (2022). *International Journal of Applied Research on Public Health Management* (pp. 1-8).

www.irma-international.org/article/retracted-on-the-possible-spatial-structures-of-the--amyloid/290380

Technology Adoption Model-Based Comparison of Clinical Trial Software: A Case Study Using Jeeva and REDCap

Hossain Shahriar, Evbusogie Sogbesan, Lorna Migiro, Temitope Balogun, Sweta Sneha, Harsha Rajasimha, Arleen Joy Patinga and Masrura Tasnim (2023). *International Journal of Applied Research on Public Health Management* (pp. 1-24).

www.irma-international.org/article/technology-adoption-model-based-comparison-of-clinical-trial-software/315803