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Editorial: Soil and sediment pollution, processes and remediation, volume II

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Editorial on the Research Topic
Soil and sediment pollution, processes and remediation, volume II

Since industrialization, anthropogenic activities have generated a large amount of toxic organic and inorganic pollutants that have been emitted to the surface environment, posing several risks to ecological environment and public health (Song et al., 2017; Du et al., 2020). Industrial activities produce large numbers of pollutants (e.g., heavy metals, excess nutrient microelements, pesticides, antibiotics, environmental hormones, antibiotics resistance genes, pathogens, and microplastics) that reach soil and sediment *via* waste discharge, mining activities, abusive use of fertilizer and pesticides, and wastewater irrigation, atmospheric transport, and other disposal pathways (Liu et al., 2019; Zhou et al., 2020; Han et al., 2021; Liu et al., 2022). These pollutants can accumulate in soils and sediments, posing significant threats to food security. A lot of industrial sites are abandoned due to weak environmental management (insufficient management, legislation, and enforcement). The pollution process, migration, transformation, degradation, and accumulation of toxic pollutants in soils and sediments are not well understood and remediation are required if these soils are reused.

Most importantly, tracing the sources of pollutants is critical to understand their pollution levels and fates, which are effectively control soil and sediment pollution. There are many method has been used, such as concentration gradient, matrix models, relative enrichment factors, and isotopes. Recently, many remediation methods including physical, chemical, biological, and combined methods were proposed and adopted for the purpose of solving the problems of soil and sediment pollution (Song et al., 2017; Du et al., 2022; Khanam et al., 2022). The remediation method is usually dependent upon the pollutant characters and levels in soil and sediment. Through remediation, prime land in established locations can be reused (e.g., agricultural, residential, and commercial land), thereby lowering the pressure on green

land. Therefore, studies on the biogeochemical processes of soil and sediment pollution, control, and remediation are urgently needed. Since soil and sediment remediation followed by redevelopment prevent degradation of the environment, it is a topic of enormous public interest.

In this Research Topic, we wish to include studies on pollutants such as heavy metals, excess nutrient microelements, pesticides, antibiotics, environmental hormones, antibiotics resistance genes, pathogens, and microplastics. This Research Topic covers the following themes: 1) Sources, migration, and transformation of pollutants in soil and sediment; 2) Plant and microbe response and environmental effect in polluted soils; 3) Biogeochemistry and processes of pollutants between the atmosphere, organisms, water, and soil/sediment systems; 4) Safe use and risk assessment and control of contaminated soil and sediment; 5) Mitigation and remediation technologies; and 6) Environmental modeling of the fate and biogeochemical process of pollutants.

This collection of articles features critical interdisciplinary questions related to the environmental pollution, processes, and remediation of soil and sediment in understudied areas. It approaches a series of key questions surrounding the organic and inorganic pollutant detections, sources, accumulation characters, health risk assessments, dynamics with water, atmosphere, and microorganism, and remediation techniques. The authors of contributing papers are uniquely placed to debate the theme of soil and sediment pollution, processes and remediation. The contributors come from a range of disciplines, including Science, Technology Engineering and Mathematics (STEM) and these papers can solve real-world, urgent challenges that affect a range of societies. Of special interest is the discussion on the new method of electrostatic separation and differential scanning calorimetry for microplastic analysis in river sediments.

We hope this Special Issue can illuminate the opportunities and challenges involved in rethinking environmental pollution and processes of soil and sediment and the need for a multidisciplinary approach to fully remediate the contaminated soil and sediment. This has important implications for public health, policy guidelines, and practical solutions. To this end, we encourage more research to advance the topics of the papers contained herein, including but not limited to 1) Effectively identify the sources; 2) understand the mechanism of pollutant fate and biogeochemistry processes; 3) efficiently remove pollutants or stabilize pollutants; 4) develop more environmental friendly remediation measures and engineering technologies; 5) investigate the influences of global climate change on the fate, transformation, and transportation of the pollutants.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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