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# Microbiomes and the Global Climate Change

Springer

# Climate Change Extenuation by Greenhouse Gas Quenching Microflora

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Ruqeya Nazir and Riasa Zaffar

**Abstract**

The major cause of climate change is global warming, which refers to an increase in the concentration of three most important greenhouse gases such as $CO_2$, $CH_4$, and $N_2O$ in the atmosphere. Climate change has become a hot topic because of its pervasive detrimental impacts globally. World over, the high level think tanks suggest the remedial measures to the policy makers so as to ameliorate the ramifications of climate change but till now, no suitable method has been devised which can mitigate the effects of climate change. The world is in need of a strategy that will be cost-effective and sustainable. Such techniques can now be used by harnessing the ability of microbes to sequester the greenhouse gases in an irreversible manner, thus aiding in climate change mitigation. The varied biogeochemical processes on earth are wholly and solely dependent upon the metabolic activities of microbes, without which our planet would have been packed with debris. Microbes thriving in the extreme conditions have an inherent ability to sequester $CO_2$, $CH_4$, and $N_2O$. Microorganisms such as Methylobacillus and Methanotrophs are important carbon recyclers as they use the greenhouse gases as their sole carbon and nitrogen sources which are consequently needed for their metabolic activities. Such bacteria are found in abundance in paddy fields, landfill sites, extreme alkaline environments and geothermal areas. There are some microbes which can convert $CO_2$ to $CaCO_3$ that can fetch minerals of economic value. Thus microorganisms have a great potential to fight against global

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# Polar Microbes as Climate-Resilient Pathways for Mitigation of Climate Change

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Shah Ishfaq, Baba Uqab, Jeelani Gousia, Ruqeya Nazir, and B. A. Ganai

**Abstract**

Changing climate challenges economic and sustainable growth. IPCC in all its reports has highlighted that climate change has grown its roots and needs immediate attention. For natural environments, documentation of observable impacts from climate change is strongest and much more extensive. Several effects have also been related to climate change on human environments, with a significant or small effect to climate change distinguishable from other factors. Changes in climate have effects throughout all continents and around the world in both ecological and human processes. Soil microbes shape the foundation of the Earth ecological model by regulating biogeochemical processing of essential resources, such as carbon (C) and nitrogen (N). Through part of these biogeochemical processes, bacteria generate and absorb heat-trapping pollutants, such as carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$). Regardless of the large carbon deposits sequestered in soils of Arctic, the carbon cycles in these regions do need to be inferred if the effects of global warming are to be correctly measured. Microbial cells inside the permafrost are frozen, hence preserved. While permafrost comprises just about 9% of total land mass on earth, it is assumed that it produces about 25–50% of the soil organic carbon on earth. As it is discharged atmospherically in the form of methane or carbon dioxide, polar carbon has been described as a possible symptom and engine of global warming. Global warming and other human impacts reveal formally frozen ecosystems to increase temperatures which are likely to lead higher performance of accumulated organic material and nutrients. Only small amounts of warming can have significant effects on the structure and function of microbial community in polar soils,

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# Role of Green Nanotechnology in Alleviating Climate Change

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Ruqeya Nazir and Insha Amin

**Abstract**

Industrialization along with population explosion in the developed and developing countries has led to accelerated degradation of natural resources on a large scale, ultimately leading to climate change. Since environment is being loaded with a large quantity of pollutants and recalcitrant compounds, environmental remediation has become a major cause of concern today. The advancement of clean technologies for reclamation of environment and sustainable development of society is very vital nowadays. Nanotechnology can help in developing clean and green technology with noteworthy benefits for human health and environment. The field of nanotechnology is now being investigated for its possible solutions for the management and mitigation of polluted water, land and air, and also to enhance the working of traditional technologies which are helpful in the remediation of contaminated environment. Green nanotechnology is the specialized branch of nanotechnology that envisions sustainable development by means of several applications. Various nanoparticles are being utilized increasingly in many areas, but there is mounting interest in the biological and environmental safety linked to their production. Green nanotechnology offers tools and techniques for the transformation of biological systems to green methods to synthesis of nanomaterial, while averting any related toxicity. Due to the large number of harmful chemicals used in the physicochemical synthesis of these nanoparticles, green methods are now being employed which utilize biological sources, such as microorganisms. Through the integration of the principles of green chemistry, engineering and microbiology, green nanotechnology can yield safe and eco-friendly metal nanoparticles that do not use toxic substances in their synthesis. The present chapter highlights the role of

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# SOIL BIOREMEDIATION

## AN APPROACH TOWARDS SUSTAINABLE TECHNOLOGY

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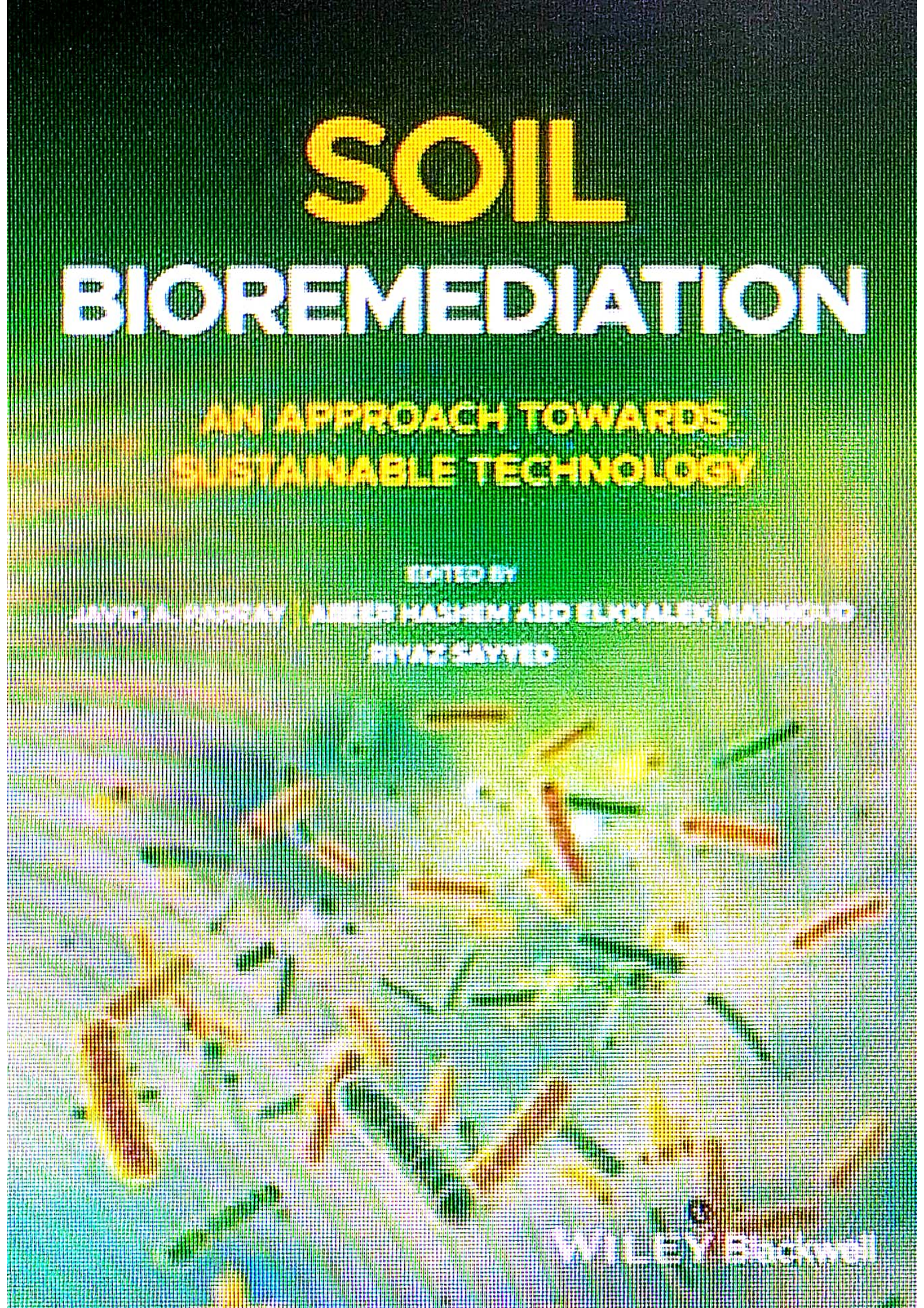

Chapter 13

# Trends in Heavy Metal Remediation

## An Environmental Perspective

Baba Uqab Gousia Jeelani Sabeehah Rehman B.A. Ganai
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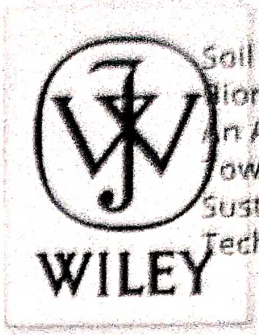


References Related Information

## Summary

Industrial pollution is the most serious problem in the environment that requires a solution. A large variety of toxic wastes and chemicals like heavy metals and constant organic pollutants have been detected in a number of biota like water, soil, and air. Among the various pollutants, heavy metals are of serious concern to the environment and human health due to their occurrence as a contaminant, little solubility in the biota, and their carcinogenic, and mutagenic effect. Heavy metal pollution is a widespread problem that disrupts the environment as a result of numerous anthropogenic activities. The heavy metals, moreover, cannot be degraded further to less harmless products and thus persist in the environment for an indefinite period. As a result of this, several remediation methods have been adopted, among them remediation by using

# Bioactive Compounds and Nutraceuticals from Dairy, Marine and Nonconventional Sources

## Extraction Technologies, Analytical Techniques, and Potential Health Prospects

CHAPTER-17

# Technological Aspects of Bioactive Compounds and Nutraceuticals From Microbial Sources

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## ABSTRACT

Natural bioactive compounds and nutraceuticals confer health-promoting and medical benefits to humans. There is growing demand for such compounds and