

Preface

It is very necessary to protect groundwater from contamination in order to ensure its availability for future generations. There is an increasing need for groundwater remediation because of human population expansion and on-going growth in industrial and agricultural development. Among various sources of groundwater contamination, nitrate is considered as the most ubiquitous chemical contaminant.

In view of nitrate contamination found in many aquifers of the world, a number of physical, chemical, or biological in situ remediation approaches have been reported over the past few years which can be applied by means of permeable reactive barrier (PRB) (See [Chap. 1](#)). Nevertheless, there remains a need to develop innovative and especially cost-effective remediation approaches. We have proposed a novel heterotrophic-autotrophic denitrification (HAD) approach which is supported by granulated spongy iron, pine bark, and mixed bacteria (See [Chap. 2](#)). The HAD involves biological deoxygenation, chemical reduction of nitrate and dissolved oxygen, heterotrophic denitrification and autotrophic denitrification. We have proposed two HAD PRBs as well and provided clear descriptions of their denitrification capacities (See [Chap. 3](#)). We have attempted to provide the reader with bacterial community structure and phylogenetic analysis (See [Chap. 4](#)).

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This monograph serves as a valuable resource to engineers, researchers, teachers, and students specialized in Environmental Science and Engineering, Hydrogeology and Engineering Geology, and Molecular Biology.

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Study on Heterotrophic-Autotrophic Denitrification
Permeable Reactive Barriers (HAD PRBs) for In Situ
Groundwater Remediation

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