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The sustainable natural materials and their role in waste management and soil contamination stabilizing. Chapter 4 -- The sustainable natural materials used for adsorbing contaminants from aqueous medium. Chapter 5 -- Biotechnologies as the sustainable environmental protection technologies. Chapter 6 -- The major properties of natural materials used in biofiltration systems. Chapter 7 -- Operational parameters of biofiltration systems required for efficient operation of components ensuring system's sustainability. Chapter 8 -- Natural and inoculated microorganisms as important component for sustainability of biofiltration system. Chapter 9 -- The technologies of the sustainable environmental protection in real conditions in the case of biofiltration systems.

Sommario/riassunto

This book discusses the need for the development of sustainable environmental protection technologies to reduce the impact of environmental contaminants. Three levels of sustainable technologies are addressed. The first level involves the concept of sustainable technologies as natural technologies, or ecotechnologies, whereby contamination level is assessed based on the contamination footprint through the use of biogeochemical barriers (e.g. methods utilizing the bioaccumulation properties of plants). The second level concerns the use of sustainable natural materials, such as biochar, in environmental engineering systems, an approach that is used for analyzing the processes of adsorption and biofiltration, as well as immobilization of contaminants in soil. The third level discusses the optimal components necessary to achieve sustainability in environmental engineering systems, including system operation principles, structural solutions, and the synergies between various system components such as microorganisms. The book will be of interest to specialists of industrial enterprises engaged in environmental protection, as well as environmental system designers, stakeholders from environmental protection ministries and institutions, researchers, doctoral students and masters and bachelors of science in the field of environmental engineering.