

Ground Water Bioengineering For Erosion Control

This book has been prepared to embody the major and efficient applications of the different duties and roles of grasses in our life, as well as offered a solid concept for this kind of science. The book aims to illustrate various ideas, methods and how it is treated in the agronomic process for different forms of grasses in human life.

Computers in Earth and Environmental Sciences: Artificial Intelligence and Advanced Technologies in Hazards and Risk Management addresses the need for a comprehensive book that focuses on multi-hazard assessments, natural and manmade hazards, and risk management using new methods and technologies that employ GIS, artificial intelligence, spatial modeling, machine learning tools and meta-heuristic techniques. The book is clearly organized into four parts that cover natural hazards, environmental hazards, advanced tools and technologies in risk management, and future challenges in computer applications to hazards and risk management. Researchers and professionals in Earth and Environmental Science who require the latest technologies and advances in hazards, remote sensing, geosciences, spatial modeling and machine learning will find this book to be an invaluable source of information on the latest tools and

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technologies available. Covers advanced tools and technologies in risk management of hazards in both the Earth and Environmental Sciences Details the benefits and applications of various technologies to assist researchers in choosing the most appropriate techniques for purpose Expansively covers specific future challenges in the use of computers in Earth and Environmental Science Includes case studies that detail the applications of the discussed technologies down to individual hazards

This book provides an example of the successful and rapid expansion of bioengineering within the world of the science. It includes a core of studies on bioengineering technology applications so important that their progress is expected to improve both human health and ecosystem. These studies provide an important update on technology and achievements in molecular and cellular engineering as well as in the relatively new field of environmental bioengineering. The book will hopefully attract the interest of not only the bioengineers, researchers or professionals, but also of everyone who appreciates life and environmental sciences.

Ground and Water Bioengineering for Erosion Control and Slope Stabilization
Science Pub Incorporated

Over the past few decades, the frequency and severity of natural and human-

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induced disasters have increased across Asia. These disasters lead to substantial loss of life, livelihoods and community assets, which not only threatens the pace of socio-economic development, but also undo hard-earned gains. Extreme events and disasters such as floods, droughts, heat, fire, cyclones and tidal surges are known to be exacerbated by environmental changes including climate change, land-use changes and natural resource degradation. Increasing climate variability and multi-dimensional vulnerabilities have severely affected the social, ecological and economic capacities of the people in the region who are, economically speaking, those with the least capacity to adapt. Climatic and other environmental hazards and anthropogenic risks, coupled with weak and wavering capacities, severely impact the ecosystems and Nature's Contributions to People (NCP) and, thereby, to human well-being. Long-term resilience building through disaster risk reduction and integrated adaptive climate planning, therefore, has become a key priority for scientists and policymakers alike. Nature-based Solutions (NbS) is a cost-effective approach that utilizes ecosystem and biodiversity services for disaster risk reduction and climate change adaptation, while also providing a range of co-benefits like sustainable livelihoods and food, water and energy security. This book discusses the concept of Nature-based Solutions (NbS) – both as a science

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and as art – and elaborates on how it can be applied to develop healthy and resilient ecosystems locally, nationally, regionally and globally. The book covers illustrative methods and tools adopted for applying NbS in different countries. The authors discuss NbS applications and challenges, research trends and future insights that have wider regional and global relevance. The aspects covered include: landscape restoration, ecosystem-based adaptation, ecosystem-based disaster risk reduction, ecological restoration, ecosystem-based protected areas management, green infrastructure development, nature-friendly infrastructure development in various ecosystem types, agro-climatic zones and watersheds. The book offers insights into understanding the sustainable development goals (SDGs) at the grass roots level and can help indigenous and local communities harness ecosystem services to help achieve them. It offers a unique, essential resource for researchers, students, corporations, administrators and policymakers working in the fields of the environment, geography, development, policy planning, the natural sciences, life sciences, agriculture, health, climate change and disaster studies.

Promoting the use of bamboo for livelihoods, enterprises, and land management is a recent trend in bamboo growing countries. The book 'Bamboopreneur' is a ready reckoner for the bamboo fraternity. It will create interest and will motivate

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everyone to participate in a bamboo development journey in various capacities. The book covers the sociology of bamboos and the unknown or un-captured stories in Southeast Asia and Africa. Some of the topics included are: • Understanding the bamboo myths and culture • Growing and managing bamboo • Bamboo bioengineering • Scanning the business for enterprise development • Process costing, pricing, value chain, and cluster development • Bamboo enterprise models

The idea of information on research and development carried out on bamboo has emerged with the paradigm shift in the area of utilization of natural fibres in various industries. Technological advancements in bamboo sustenance have involved chemical and physical modification that has led to products of high-performance index. This book provides the latest research developments in many aspects of bamboo process, manufacture and commercialization potential. Apart from the interest to facilitate a complete assessment of bamboo as well as assist readers in achieving their goals, this book is intended to be of value to both fundamental research and also to practicing scientists and will serve as a useful reference for researchers, agricultural practitioners and organizations involved in the bamboo-based industry.

Water and ground bioengineering techniques combine the expertise of civil engineers, landscape architects, botanists and ecologists, and increasingly are being used to protect and restore the natural environment. This practical handbook shows how vegetation can be used for the protection, stabilisation and ecological enhancement of riverbanks and shores. It covers

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a range of techniques from wholly vegetative 'soft' techniques to 'semi-hard' or composite structures with vegetative inclusions. A chapter on bioengineering techniques in earth dam and floodbank construction is also included. Together with its companion book, *Ground Bioengineering Techniques*, this handbook on water bioengineering provides a rare opportunity to gain insight into the approach of its chief proponents--Professor H.M. Schiechl and his colleague, Dr R. Stern--in the use of vegetation for the engineering and ecological and visual enhancement of waterways and shorelines. *Water Bioengineering Techniques* will be of interest to geotechnical engineers, botanists, ecologists and to those concerned with landscape planning, land and catchment management.

This book provides us the knowledge about various geomorphological attributes and the various degradational processes of land in and around Subarnarekha Basin. This book will be of great help to geographers, planners, policy maker etc.

This Special Issue includes manuscripts about soil erosion and degradation processes and the accelerated rates due to hydrological processes and climate change. The new research included in this issue focuses on measurements, modeling, and experiments in field or laboratory conditions developed at different scales (pedon, hillslope, and catchment). This Special Issue received investigations from different parts of the world such as Ethiopia, Morocco, China, Iran, Italy, Portugal, Greece, and Spain, among others. We are happy to see that all papers presented findings characterized as unconventional, provocative, innovative, and methodologically new. We hope that the readers of the journal *Water* can enjoy and learn about hydrology and soil erosion using the published material, and share the results with the scientific community, policymakers, and stakeholders to continue this amazing adventure,

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facing plenty of issues and challenges.

This book is one out of 8 IAEG XII Congress volumes, and deals with Landslide processes, including: field data and monitoring techniques, prediction and forecasting of landslide occurrence, regional landslide inventories and dating studies, modeling of slope instabilities and secondary hazards (e.g. impulse waves and landslide-induced tsunamis, landslide dam failures and breaching), hazard and risk assessment, earthquake and rainfall induced landslides, instabilities of volcanic edifices, remedial works and mitigation measures, development of innovative stabilization techniques and applicability to specific engineering geological conditions, use of geophysical techniques for landslide characterization and investigation of triggering mechanisms. Focuses is given to innovative techniques, well documented case studies in different environments, critical components of engineering geological and geotechnical investigations, hydrological and hydrogeological investigations, remote sensing and geophysical techniques, modeling of triggering, collapse, run out and landslide reactivation, geotechnical design and construction procedures in landslide zones, interaction of landslides with structures and infrastructures and possibility of domino effects. The Engineering Geology for Society and Territory volumes of the IAEG XII Congress held in Torino from September 15-19, 2014, analyze the dynamic role of engineering geology in our changing world and build on the four main themes of the congress: environment, processes, issues, and approaches. The congress topics and subject areas of the 8 IAEG XII Congress volumes are: Climate Change and Engineering Geology. Landslide Processes. River Basins, Reservoir Sedimentation and Water Resources. Marine and Coastal Processes. Urban Geology, Sustainable Planning and Landscape Exploitation. Applied Geology for Major

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Engineering Projects. Education, Professional Ethics and Public Recognition of Engineering Geology. Preservation of Cultural Heritage.

Transport Infrastructure Asset management in transport infrastructure, financial viability of transport engineering projects/ Life cycle Cost Analysis, Life-Cycle Assessment and Sustainability Assessment of transport infrastructure/ Infrastructures financing and pricing with equity appraisal, operation optimization and energy management/ Low-Volume roads: planning, maintenance, operations, environmental and social issues/ Public-Private Partnership (PPP) experience in transport infrastructure in different countries and economic conditions/ Airport Pavement Management Systems, runway design and maintenance/ Port maintenance and development issues, technology relating to cargo handling, landside access, cruise operations/ Infrastructure Building Information Modelling (I-BIM) / Pavement design and innovative bituminous materials/ Recycling and re-use in road pavements, environmentally sustainable technologies/ Stone pavements, ancient roads and historic railways/ Cementitious stabilization of materials used in the rehabilitation of transportation infrastructure. Transport Systems Sustainable transport and the environment protection including green vehicles/ Urban transport, land use development, spatial and transport planning/ Bicycling, bike, bike-sharing systems, cycling mobility/ Human factor in transport systems/ Intelligent Mobility: emerging technologies to enable the smarter movement of people and goods/Airport landside: access roads, parking facilities, terminal facilities, aircraft apron and the adjacent taxiway/ Transportation policy, planning and design, modelling and decision making/ Transport economics, finance and pricing issues, optimization problems, equity appraisal/ Road safety impact assessments, road safety audits, the management of road network safety and safety

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inspections/ Tunnels and underground structures: preventing incidents-accidents mitigating their effects for both people and goods/ Traffic flow characteristics, traffic control devices, work zone traffic control, highway capacity and quality of service/ Track-vehicle interactions in railway systems, capacity analysis of railway networks/ Risk assessment and safety in air and railway transport, reliability aspects/ Maritime transport and inland waterways transport research/ Intermodal freight transport: terminals and logistics.

Native plants are a foundation of ecological function, affecting soil conservation, wildlife habitat, plant communities, invasive species, and water quality.

Establishing locally-adapted, self-sustaining plant communities can also support transportation goals for safety and efficiency. Past obstacles to establishing native plant communities on roadsides have been technical, informational, and organizational. Effective strategies and practical techniques for revegetating the disturbed conditions with limited resources must be made available to practitioners. Multiple disciplines, ranging from engineering to soil science, ecology, botany, and wildlife science, must be able to work cooperatively, not in isolation. This report offers an integrated approach to facilitate the successful establishment of native plants along roadsides and other areas of disturbance associated with road modifications. It guides readers through a comprehensive process of: 1) initiating, 2) planning, 3) implementing, and 4) monitoring a

roadside revegetating project with native plants.

Physical Modelling in Geotechnics collects more than 1500 pages of peer-reviewed papers written by researchers from over 30 countries, and presented at the 9th International Conference on Physical Modelling in Geotechnics 2018 (City, University of London, UK 17-20 July 2018). The ICPMG series has grown such that two volumes of proceedings were required to publish all contributions. The books represent a substantial body of work in four years. Physical Modelling in Geotechnics contains 230 papers, including eight keynote and themed lectures representing the state-of-the-art in physical modelling research in aspects as diverse as fundamental modelling including sensors, imaging, modelling techniques and scaling, onshore and offshore foundations, dams and embankments, retaining walls and deep excavations, ground improvement and environmental engineering, tunnels and geohazards including significant contributions in the area of seismic engineering. ISSMGE TC104 have identified areas for special attention including education in physical modelling and the promotion of physical modelling to industry. With this in mind there is a special themed paper on education, focusing on both undergraduate and postgraduate teaching as well as practicing geotechnical engineers. Physical modelling has entered a new era with the advent of exciting work on real time interfaces

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between physical and numerical modelling and the growth of facilities and expertise that enable development of so called 'megafuges' of 1000gtonne capacity or more; capable of modelling the largest and most complex of geotechnical challenges. Physical Modelling in Geotechnics will be of interest to professionals, engineers and academics interested or involved in geotechnics, geotechnical engineering and related areas. The 9th International Conference on Physical Modelling in Geotechnics was organised by the Multi Scale Geotechnical Engineering Research Centre at City, University of London under the auspices of Technical Committee 104 of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE). City, University of London, are pleased to host the prestigious international conference for the first time having initiated and hosted the first regional conference, Eurofuge, ten years ago in 2008. Quadrennial regional conferences in both Europe and Asia are now well established events giving doctoral researchers, in particular, the opportunity to attend an international conference in this rapidly evolving specialist area. This is volume 2 of a 2-volume set.

The book is a comprehensive treatment of the application of geotechnical engineering to site selection, site exploration, design, operation and closure of mine waste storage facilities. The level and content are suitable as a technical

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source and reference for practising engineers engaged both in the design and operational management of mine waste s

With climate change and deforestation, debris flows and debris avalanches have become the most significant landslide hazards in many countries. In recent years there have been numerous debris flow avalanches in Southern Europe, South America and the Indian Subcontinent, resulting in major catastrophes and large loss of life. This is therefore a major high-profile problem for the world's governments and for the engineers and scientists concerned. Matthias Jakob and Oldrich Hungr are ideally suited to edit this book. Matthias Jakob has worked on debris flow for over a decade and has had numerous papers published on the topic, as well as working as a consultant on debris flow for municipal and provincial governments. Oldrich Hungr has worked on site investigations on debris flow, avalanches and rockfall, with emphasis on slope stability analysis and evaluation of risks to roads in built-up areas. He has also developed mathematical models for landslide dynamic analysis. They have invited world-renowned experts to joint them in this book.

This volume brings together papers from geotechnical and civil engineers, biologists, ecologists and foresters. They discuss current problems in slope stability research and how to address them using ground bio- and eco-

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engineering techniques. Coverage presents studies by scientists and practitioners on slope instability, erosion, soil hydrology, mountain ecology, land use and restoration and how to mitigate these problems using vegetation.

"In the United States it is estimated that 75 percent of all roads are low volume roads maintained by some 35,000 local agencies. Low volume roads often omit surface slope protection, and this can lead to slope failure, erosion, and maintenance, safety, and ecological issues. This report presents information on cost effective and sustainable road slope stabilization techniques, with a focus on shallow or near surface slope stabilization and related erosion control methods used on low volume roads. To fully address this topic, planning and site investigation are discussed, as well as erosion control techniques, soil bioengineering and biotechnical techniques, mechanical stabilization, and earthwork techniques. Information presented in this report was obtained through an extensive literature review, and from survey and interview responses. From the survey responses, 30 individuals were interviewed based on the information they made available in the survey. A total of 25 interviews were conducted over the phone, and in two cases written responses were received"--Preface.

The need for effective measures to protect soil and water resources has risen dramatically. This volume focuses on bioengineering technology that utilizes

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vegetative and vegetative-structural solutions to prevent erosion and stabilize sites disturbed by infrastructure and development.

Phytotechnologies: Remediation of Environmental Contaminants highlights the use of natural and inherent traits of plants and associated microbes to exclude, accumulate, or metabolize a variety of contaminants, with the goal of efficiently and sustainably decontaminating the biosphere from unwanted hazardous compounds. Contributed by an international team of authors, the book ensures a balance between theory and practice without compromising the basic conceptual framework of Phytotechnologies. Divided into three major sections, the book: Introduces contaminants and contaminated sites, and also highlights the significance of genus Brassica and vetiver grass species for varied environmental contaminants' remediation Presents an exhaustive exploration of potential strategies for enhancing plants and associated microbes-mediated environmental contaminants' remediation Overviews major physiological, biochemical, and genetic-molecular mechanisms responsible for plant tolerance and adaptation to varied environmental contaminants A one-stop source of cutting edge answers and time-saving access, Phytotechnologies: Remediation of Environmental Contaminants is a common platform for engineers, environmental microbiologists, plant physiologists, and molecular biologists with the common

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aim of sustainable solutions to vital environmental issues. In short, the book provides a conceptual overview of ecosystems approaches and phytotechnologies, and their cumulative significance in relation to various environmental problems and potential solutions.

This book, the first of a pair of volumes on bioengineering techniques, shows how vegetation can be used for the engineering and ecological enhancement of earth structures. Vegetation provides protection and stabilisation of both natural and manmade slopes along transportation routes (such as motorways) and for industrial, housing and leisure facilities.

This document is a cooperative effort among fifteen Federal agencies and partners to produce a common reference on stream corridor restoration. It responds to a growing national and international interest in restoring stream corridors.

In view of the grave consequences of soil degradation on ecosystem functions, food security, biodiversity and human health, this book covers the extent, causes, processes and impacts of global soil degradation, and processes for improvement of degraded soils. Soil conservation measures, including soil amendments, decompaction, mulching, cover cropping, crop rotation, green manuring, contour farming, strip cropping, alley cropping, surface roughening,

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windbreaks, terracing, sloping agricultural land technology (SALT), dune stabilization, etc., are discussed. Particular emphasis is given to soil pollution and the methods of physical, chemical and biological remediation of polluted soils. This book will lead the reader from the basics to a comprehensive understanding of soil degradation, conservation and remediation.

This book, with contributions from international landslide experts, presents in-depth knowledge of theories, practices, and modern numerical techniques for landslide analysis. Landslides are a reoccurring problem across the world and need to be properly studied for their mitigation and control. Due to increased natural and anthropogenic activities, chances of landslide occurrence and associated hazards have increased. The book focuses on landslide dynamics, mechanisms and processes along with hazard mitigation using geo-engineering, structural, geophysical and numerical tools. The book contains a wealth of the latest information on all aspects of theory, practices and modelling tools and techniques involved in prediction, prevention, monitoring, mitigation and risk analysis of landslide hazards. This book will bring the reader up to date on the latest trends in landslide studies and will help planners, engineers, scientists and researchers working on landslide engineering.

"Bio-Stabilization Case Studies: Treatment and Performance Evaluation"

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describes and evaluates 30 projects from across the United States where bio-stabilization was employed to address a detrimental naturally occurring process or byproduct of the built environment. Bio-stabilization (or soil bioengineering) refers to the use of plant materials, primarily live cuttings, arranged in the ground in different arrays to reinforce soils and protect upland slopes and/or stream banks against surficial erosion and shallow slope failures. Examples included in the collection represent different regions of the country and their specific conditions and challenges. Each project is illustrated with a number of distinctive photographs to support the reader's understanding and showcase the wide scope of projects and techniques presented. The volume is ideal for civil and environmental engineers and environmental scientists working on watershed, infrastructure projects, and municipal scale installations.

This book is an up-to-date review of research and practice on the use of vegetation for slope stabilization and control of surface erosion caused by water and wind. From a basic understanding of the principles and practices of vegetation growth and establishment, it describes how vegetation can be treated as an engineering material and used to solve erosion and slope stability problems.

This book aims to assist in choosing ecotechnological solutions for slopes that

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are prone to a variety of mass movements e.g. shallow failure or erosion. The book reviews the types of problematic slopes that may occur and describes briefly the nature of mass movements and the causes of these movements. There is focus on the use of vegetation to stabilize soil on slopes prone to mass movements. The book also introduces new ecotechnological methods, and case studies are discussed.

The first comprehensive, practical guide to the selection, construction, and installation of soil bioengineering and biotechnical slope protection. Here is the ultimate guide to physically attractive, environmentally compatible, and cost-effective methods of protecting slopes from erosion and mass wasting.

Lavishly illustrated with more than 150 photographs and supplemented with scores of charts and tables, this book covers the entire subject from general principles and background on the nature of soil erosion and mass movement to detailed information on root strengths, treatment selection, unit costs, critical tractive stresses, methods for harvesting and handling live cuttings, and more. Four illustrated case studies, each addressing a different set of problems and solutions, demonstrate both the application of particular technologies and the site investigation, planning, scheduling, and organization required to complete these projects successfully. This unique reference handbook * Reviews the horticultural

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and engineering underpinnings for biotechnical and soil engineering treatments * Documents and explains the role of woody plants in stabilizing slopes against both surficial erosion and mass movement * Provides details on a broad range of soil bioengineering methods, including live staking, live fascines, brush layering, live cribwalls, branch packing, and live slope gratings * Describes various biotechnical methods and materials, including the incorporation of vegetation in erosion control blankets, flexible mats, cellular revetments (geocells), rock armor (riprap), and gabion and open-front crib walls * Summarizes the findings of the National Science Foundation-sponsored workshop to assess the state of the art and determine research needs For practicing professionals, researchers, and students in geotechnical engineering, geology, soil science, forestry and forest engineering, landscape architecture, environmental horticulture, and restoration ecology, this book offers thorough, up-to-date coverage that is not available from any other single source.

The Clean Water Act (CWA) requires that wetlands be protected from degradation because of their important ecological functions including maintenance of high water quality and provision of fish and wildlife habitat. However, this protection generally does not encompass riparian areas—the lands bordering rivers and lakes—even though they often provide the same

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functions as wetlands. Growing recognition of the similarities in wetland and riparian area functioning and the differences in their legal protection led the NRC in 1999 to undertake a study of riparian areas, which has culminated in *Riparian Areas: Functioning and Strategies for Management*. The report is intended to heighten awareness of riparian areas commensurate with their ecological and societal values. The primary conclusion is that, because riparian areas perform a disproportionate number of biological and physical functions on a unit area basis, restoration of riparian functions along America's waterbodies should be a national goal.

This two-volume work is an effort to provide a common platform to environmental engineers, microbiologists, chemical scientists, plant physiologists and molecular biologists working with a common aim of sustainable solutions to varied environmental contamination issues. Chapters explore biological and non-biological strategies to minimize environmental pollution. Highly readable entries attempt to close the knowledge gap between plant - microbial associations and environmental remediation. Volume 1 focuses on important concepts such as biological remediation strategies to enhance soil quality at contaminated sites; synergistic influences of tolerant plants and rhizospheric microbial strains on the remediation of pesticide contaminated soil, and the role of plant types such as

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hyperaccumulator plants in the cleanup of polluted soils. Readers will discover mechanisms and underlying natural inherent traits of various plants and microbes for tolerating, excluding, remediating, accumulating, or metabolizing a variety of pollutants.

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