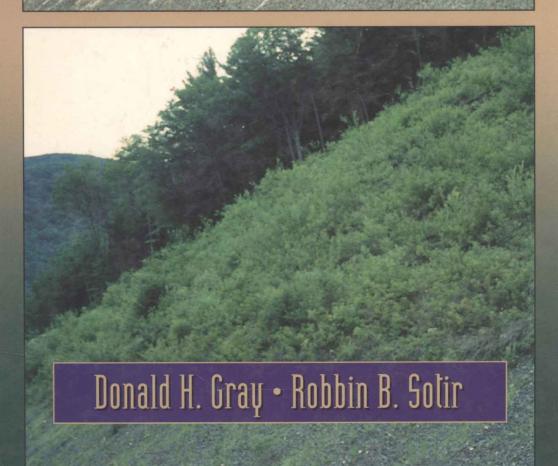
Biotechnical and Soil Bioengineering SLOPE STABILIZATION

A Practical Guide for Erosion Control



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 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, brushlayering, live crib walls, branchpacking, 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 (rip rap), and gabion and open-front crib walls
- Summarizes the findings of the National Science Foundationsponsored 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, land-scape architecture, environmental horticulture, and restoration ecology, this book offers thorough, up-to-date coverage that is not available from any other single source.

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Cover Photos: Courtesy of Donald H. G

WILEY-INTERSCIENCE

John Wiley & Sons, Inc.
Professional, Reference and Trade Group
605 Third Avenue, New York, N.Y. 10158-0012
New York • Chichester • Brisbane • Toronto • Singapore



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A Wiley-Interscience Publication

JOHN WILEY & SONS, INC.

New York

 Chichester
 Brisbane
 Toronto
 Singapore

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Library of Congress Cataloging in Publication Data:

Gray, Donald H.

Biotechnical and soil bioengineering slope stabilization: a practical guide for erosion control/Donald H. Gray and Robbin B. Sotir.

p. cm. Includes bibliographical references and index.

ISBN 0-471-04978-6 (cloth : alk. paper)

1. Slopes (Soil mechanics) 2. Soil stabilization. 3. Soil erosion. 4. Soil-binding plants. I. Sotir, Robbin B. II. Title. TA710.G6286 1995

624.1′51363—dc20 96-10211 CIP

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

BIOTECHNICAL AND SOIL BIOENGINEERING SLOPE STABILIZATION

PREFACE

Biotechnical and soil bioengineering stabilization provide attractive, cost-effective, and environmentally compatible ways to protect slopes against surficial erosion and shallow mass movement. This guidebook discusses the general principles and attributes of biotechnical/soil bioengineering stabilization and describes specific soil bioengineering measures that can be employed on slopes, such as live staking, live fascines, brushlayering, branchpacking, live crib walls, and slope gratings. The conjunctive use of plants and earth-retaining structures or revetments is also described. This biotechnical approach includes plantings on slopes above low toe-walls, on benches of tiered retaining walls, and in the frontal interstices, or openings of porous retaining structures, such as crib walls, gabions, and rock breast walls. It also entails the use of vegetation in porous hard armor revetments, such as rock riprap, gabion mattresses, and articulated blocks. The book describes recent developments with biotechnical ground covers or "reinforced grass" systems, which include the use of nets, mats, and other types of structural/mechanical reinforcement to improve the establishment and performance of grass cover on steep slopes or temporary waterways.

Biotechnical and Soil Bioengineering Slope Stabilization distills more than a decade of experience in this subject on the part of both authors into a useful reference handbook. Numerous illustrations from actual field applications and stabilization projects supplement the text. In addition carefully selected and well-documented case studies have been included to show how various soil bioengineering methods have been chosen for particular site conditions. We also include helpful background information on the nature of soil erosion and mass movement, the role and function of slope vegetation in the stability of slopes, and techniques for the selection, establishment, and maintenanceof appropriate vegetation.

Biotechnical and Soil Bioengineering Slope Stabilization is intended primarily as a reference handbook for practicing professionals. Information in the book should prove of value to practitioners in such diverse fields as geotechnical engineering, geology, soil science, forestry, environmental horticulture, and land-scape architecture. Although oriented toward professional practice, it is written in such a way that it can be understood by students, laypersons, and other interested parties as well. Analytical or somewhat technical material in some of the chapters can be skimmed over without loss of continuity or utility. Lastly, the book can be used as a reference text in college-level courses, extension courses, and workshops whose course content includes such topics as erosion control, slope stability, watershed rehabilitation, and land restoration.

vi PREFACE

We would like to acknowledge the assistance of several persons who helped in the preparation and review of the book. Jade Vogel, Karen Heiser, and Mark Huber, with the firm of Robbin B. Sotir & Associates prepared many of the drawings and assisted with compilation of the manuscript. Barbara Roberts helped to edit chapters 6, 7, and 8. Critical reviews of chapter 9 were provided by Deron Austin and Marc Theisen of Synthetic Industries, Inc. and by Tim Lancaster of North American Green, Inc.

DONALD H. GRAY ROBBIN B. SOTIR

October 1995

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