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Watershed Resources Management

**Studies from
Asia and the Pacific**

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ISEAS Environment and Development Series

Watershed Resources Management

Studies from Asia and the Pacific

edited by
K. William Easter
John A. Dixon
Maynard M. Hufschmidt



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Foreword

The impacts of upper watershed land-use practices on resource systems lower in the watershed or river basin have long been recognized as a major problem area: siltation of the river bed, reservoirs, and irrigation systems; impacts on estuarine mangroves and coastal fisheries; increased severity of flooding and drought; and deposition of chemical residues. The watershed is thus comprised of a sequence of linked resource systems, but the linkage is one way. This complicates the integrated management of watershed resources, for not only do different agencies typically have responsibility in different parts of the watershed and for the management of different resources, but the private parties in the upper watershed are not motivated to take into account the costs they impose on the lower watershed.

In addition to the traditional problems, the “Green Revolution” is now spreading to the upper watershed: the search is on for ways of increasing the productivity and population carrying capacity of the higher elevation lands. This requires consideration of nontraditional patterns of land use and even greater integration of upstream and downstream considerations. This will require institutional innovation to overcome traditional barriers to interagency cooperation and to manage watershed activities from a basin-wide viewpoint. It will require open reviews of interagency rivalries and not just the passing of another law.

This volume discusses all of these complexities within a unified conceptual framework, which is followed by interesting case studies. The book should be of great utility to watershed and river basin managers, consultants, and scholars doing further work on the biophysical, economic, social, and institutional aspects of watershed and river basin management.

Charles W. Howe
General Editor

Charles W. Howe is professor of economics at the University of Colorado, specializing in water resource development and related topics.

Preface

This book is the outgrowth of independent and collaborative work on water resources and watershed management in developing countries at both the East-West Center and the University of Minnesota. Researchers at these institutions have worked extensively on irrigation problems, techniques for planning and evaluating projects, and the biophysical aspects of tropical watersheds. After studying the broad questions of water resource management, it became clear that some important aspects of watershed management research had been neglected. These gaps included the socioeconomic aspects of watershed use and methods for integration of these aspects with the biophysical elements.

Three workshops held at the East-West Center helped highlight the effects of watershed mismanagement on soil erosion, slope stability, and channel and reservoir sedimentation. The first of the workshops held in January 1983 focused on how technical information and knowledge can be used to help generate alternative policies for soil and water conservation research and monitoring activities. The workshop participants concluded that one of the greatest problems facing policymakers is the translation of soil and water conservation principles into effective policies. Such translation requires a thorough assessment of the nature, extent, and impact of soil erosion and an evaluation of its effects. The necessary information is often sparse or absent; therefore, the policymaker must rely on strategies that keep options open.

The second workshop held in early May 1984 was on the "Effects of Forest Land Use on Erosion and Slope Stability." Workshop speakers emphasized forest removal and road construction as causes of the serious increase in landslides and accelerated erosion rates. Most of the research on these problems has been done in moist temperate stepland forests in western United States, Japan, and New Zealand; thus, a serious research gap exists regarding tropical forests in much of Asia.

At the third workshop held at the East-West Center during the third week of May 1984, the participants presented a wide range of papers on river and reservoir sedimentation and associated watershed management questions (many of which have been published in the December 1984 and March 1985 issues of *Water International*). Hufschmidt pointed out that there has been no rigorous analysis of the root causes of the failures in implementing watershed management projects. Such evaluations require carefully constructed case studies of the Asian watershed management experience based on an integrated framework of analysis.

In an effort to stimulate research to help fill some of the gaps identified in the earlier workshops, a fourth workshop was held, with support from USAID, at the East-West Center in January 1985 on "Research for Integrated Watershed Management in Developing Countries." As a key part of this workshop, six papers were prepared by the Environment and Policy Institute (EAPI) staff working closely together to develop an interdisciplinary approach to watershed management. These papers were revised to provide the framework of analysis presented in this book.

We hope that this book captures the exciting interaction that went on as the conceptual papers were being written. Even more important, we hope that this book will provoke discussion and further research into the complicated but fascinating and important area of watershed management.

Many people contributed to the creation of this book. Valuable comments on both the substance and organization of the book were received from Prof. Herbert H. Stoevener, Department of Agricultural Economics, Virginia Polytechnic Institute and State University; Prof. Charles W. Howe, Department of Economics, University of Colorado; and Prof. Samir A. El-Swaify, Department of Agronomy and Soil Science, University of Hawaii. We owe special thanks to many colleagues at the East-West Center: Helen Takeuchi, EAPI editor, and Joan Nakamura and Betty Schweithelm, typists, carefully handled the many revisions of the manuscript. Louise Fallon, research fellow, helped edit and rework several chapters. The authors of the various chapters responded quickly to the suggestions of the editors for revisions and requests for additional material.

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