

# SCOPE 51 - Biogeochemistry of Small Catchments

## Preface

The International Council of Scientific Unions (ICSU) established the Scientific Committee on Problems of the Environment (SCOPE) in 1969. Since its establishment SCOPE seeks to identify environmental problems of global concern and to contribute to the understanding and solution of these problems. Emphasis is laid on the stimulation of new approaches, synthesizing existing information and indicating research needs. SCOPE stresses genuinely international and interdisciplinary activities. It does not, however, engage directly in research in the laboratory or in the field. The extent and quality of its endeavours are evidenced by more than 50 already published SCOPE reports.

Among SCOPE's five problem areas, one of the most extensively studied is that of biogeochemical cycles. The 1988 General Assembly of SCOPE in Budapest, Hungary decided to add another initiative, "Biogeochemistry of Small Catchments", to the family of running projects. It did so on the basis of a proposal made by Bedrich Moldan of the Geological Survey, Prague, and submitted by the Czechoslovak Academy of Sciences. The proposal was based on the recommendation of an ad hoc committee created on the occasion of the International Workshop on Geochemistry and Monitoring in Representative Basins (GEOMON) held in Prague, Czechoslovakia, in 1987.

From the very early stages of the project preparation we had close working contacts with UNEP, the United Nations Environment Programme. Apart from the conceptual help and preparation of this volume through extensive review, UNEP covered the main body of project expenses. SCOPE funds were raised from the Andrew Mellon Foundation. Both UNEP and the Andrew Mellon Foundation are gratefully acknowledged for enabling our work.

The SCOPE General Assembly created a Scientific Advisory Committee (SAC) consisting of B. Moldan (Czechoslovakia, chairman), V. Bashkin (USSR), H. Hultberg (Sweden), K. Mavuti (Kenya), Sun Shuncaï (China), T. Vegas (Venezuela) and D. Whelpdale (Canada). There were two SAC meetings. The first one took place in Prague, Czechoslovakia, in October 1989. The agenda of the first SAC meeting was devoted mainly to identification of the content of the project, the outline of a "Biogeochemistry of Small Catchments" Workshop, and the workplan of the project. The importance of a Final Workshop was stressed.

One month after the first SAC meeting, the communist regime in Czechoslovakia fell in what is frequently called the "velvet revolution". Bedrich Moldan became Minister of Environment of the first post-communist Czech government and traded problems of the small catchment research for the problems of the big environmental cleanup of the Czech Republic. The main responsibility for running the project was transferred to his co-worker Jirí Cerný.

The SCOPE Workshop took place in Most, Czechoslovakia in November 1990. The city of Most lies in a heavily polluted area of northwestern Czechoslovakia affected by open-pit coal mining, soft-coal burning in numerous power plants and other industrial activities. Extensive forest dieback has occurred in this region. The Czech Ministry of Environment organized a field trip for the participants of the Workshop to make them familiar with the extent of the environmental damage in North Bohemia. A small catchment investigated by the Czech Geological Survey since 1977 heavily affected by forest dieback was among the sites visited during this trip.

The Most Workshop was well attended-there were 86 participants from 20 countries (see the List of

Participants following the Preface). Individual working groups dealt with different aspects of small catchment research, structured almost in the same fashion as this report.

It was agreed throughout the Workshop that investigations of small catchments are widely undertaken in developed countries for study of a variety of environmental problems, the most prominent examples of which are acidification, forest management and land-use changes. Small catchments should be established in developing countries, as they have proved to be very efficient in gathering important information with modest funding. The SCOPE Workshop and the book synthesizing current understanding of the topic aim to promote these efforts.

During the Workshop a second SAC meeting was held. Based on adopted outlines, manuscripts of individual chapters were prepared following the Workshop and a timetable for preparation of this volume was agreed.

The Editorial Board, consisting of J. Cerny, C. Driscoll, P. Grennfelt, H. Hultberg, B. Moldan, B. Nihlgård, N. Peters, H. Ross and W. Swank reviewed submitted manuscripts of individual chapters. The Editorial Board met later (May 1991) in Sweden at Lake Gårdsjön, the renowned research site in the vicinity of Goteborg.

This volume summarizes the most important results of the international scientific endeavour in small catchment research and presents them to the public. We hope that readers will also include non-specialists and students. A summary of the results can be found at the end of each chapter and in [Chapter 1](#), where we have stressed the main findings elaborated in individual chapters.

The book is divided into two major parts. Part I- Fundamentals ([Chapters 1 to 8](#)) is a review of principal scientific disciplines involved in small catchment research. All chapters here have very similar structures. Theoretical concepts are first introduced. Then follows the methodology of the given discipline, stressing novel approaches and discussing problems.

Part I of this book starts with a general introduction ([Chapter 1](#)), hydrology of small catchments ([Chapter 2](#)), followed by a review of atmospheric deposition ([Chapter 3](#)) and evaluation of weathering and erosion processes ([Chapter 4](#)). [Chapter 5](#) covers interaction of soils with subsurface waters. A wide array of biological processes is reviewed in [Chapter 6](#). [Chapter 7](#) is devoted to an elucidation of the chemical composition of streamwater. Biogeochemical input-output budgets and ways of quantifying them are reviewed in [Chapter 8](#).

Part II ([Chapters 9 to 17](#)) we call "Issues". These are essentially case studies and reviews of important environmental findings obtained by small catchment research. An especially important topic is touched upon in [Chapter 15](#) which is a short overview of small catchment research in tropical and subtropical environments mostly in Latin America.

We wish to express our thanks to all who have contributed to the successful conclusion of the SCOPE Project "Biogeochemistry of Small Catchments": the members of the SAC, participants of the Most Workshop, members of the Gårdsjön Editorial Board and especially authors of the individual chapters. A valuable contribution was made by our Language Editor Martin Novak. We are grateful to the SCOPE President Professor J.B. W. Stewart, to the Executive Director Veronique Plocq-Fichelet and to all the other Officers and Members of the SCOPE Executive Committee and Secretariat for their sincere cooperation. The same applies in full to officials of the UNEP Headquarters, Nairobi, Kenya. We also wish to commend the Czechoslovak Academy of Sciences, both the leadership and our colleagues in the Czech Geological Survey on their kind support and the Swedish Environmental Institute on supporting the Gårdsjön Editorial Meeting.

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