# GEOGRAPHY AND RESOURCE ANALYSIS

BRUCE MITCHELL · SECOND EDITION

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Second edition

**BRUCE MITCHELL**


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**To my wife, Joan**

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# PREFACE TO THE SECOND EDITION

In preparing this revised edition, I have considered comments from faculty and students, especially the latter since the book was conceived and written for them. The overall orientation and structure of the first edition have been maintained, since both undergraduate and graduate students have indicated that the approach is useful. Effort also was taken to provide an extensive set of references, since again students have indicated that this feature is valuable.

In terms of changes, several considerations guided the revisions. First, changes in research activity and emphasis since publication of the first edition have been noted. Second, new examples have been introduced throughout to reflect work in resource analysis during the 1980s. Third, in providing new examples, explicit attention has been given to broadening the range of studies from Third World or developing nations. Fourth, as new material was added, some of the work in the first edition has been condensed or removed in order to avoid making the second edition excessively long and thereby too expensive. The publisher's guidelines in that regard were that the second edition should not be more than ten per cent longer than the first edition.

The following specific changes have been made. Chapter 1 has been shortened by removing from the first edition the section which covered general trends in geographical research. The second chapter is longer, with new material on ethical considerations in research. This discussion has been strongly influenced by the work done with Dianne Draper and published by Longman as *Relevance and Ethics in Geography* (1982). This addition is viewed as important as it emphasizes that in research, as well as in other aspects of their work, resource analysts must balance concern for technical efficiency against ethical questions.

The substantive chapters (3 to 12) have been altered in various ways. In Chapter 3, new material is presented regarding remote sensing and geographic information systems as well as end-use forecasting methods. The concept of backcasting also is introduced.

There has been a reduction of some of the discussion in the fourth chapter, especially related to the technical details of diffusion research. New examples are presented.

Chapter 5 begins a group of chapters which are based in the ecological or man-land research tradition. In the fifth chapter much more attention is devoted to public participation regarding both conceptual and practical issues. From the resource manager's perspective, public participation is one of the key practical consequences associated with recognition of varying perceptions, attitudes and behaviour. Chapter 6, on landscape evaluation, is updated by incorporating some of the debate among investigators regarding theoretical and conceptual foundations. The seventh chapter focuses on carrying capacity. The first edition focused exclusively upon carrying capacity research in developed nations and emphasized recreation. In revised form, this chapter includes consideration of carrying capacity as it relates to population–food relationships. This issue has been of great concern and practical significance in the Third World, and many geographers in such countries have been conducting research on it.

The eighth chapter has been renamed and substantially rewritten. The original discussion on natural hazards has been condensed so that research associated with technological hazards (noxious industrial wastes, pesticides and herbicides, nuclear radiation, biotechnology) can be reviewed. Substantial changes also appear in Chapter 9. Administrative aspects of environmental impact assessment are explored. In addition, the development of social impact assessment is discussed more fully compared to the first edition.

Chapter 10 incorporates some of the more recent ideas associated with evaluation research, and includes a more complete review of benefit–cost analysis. A much wider range of examples is provided in the eleventh chapter on institutional arrangements, which was the shortest chapter in the first edition. There still are difficult research issues to overcome in the research on institutional arrangements, but the growing number of studies indicates that its significance has begun to be recognized. The basic ideas and models of policy making remain intact in Chapter 12. However, new material has been added regarding bargaining, negotiation and mediation. This reflects the emergence of 'environmental mediation' during the 1980s as an alternative to the legalistic and adversarial approach which has been so influential, especially in the United States.

The concluding chapter has been totally reorganized. In the first edition, Chapter 13 was a summary and review of the accomplishments by geographers and others. It was primarily retrospective. In this revised edition, the final chapter traces the evolution of resource analysis in geography and highlights major achievements. However, it also considers where current and future

effort might be directed. In that sense, it is more future-oriented than in the first edition.

I believe that the reader will find the second edition to be substantially different from the first, even though on the surface it may appear to be similar because of the decision to maintain the original orientation and structure. This revised edition is appearing about two years later than originally had been planned by both the author and the publisher. The reason for this delay was a serious accident in February 1985 which made it initially impossible and subsequently difficult for me to work. Four operations over a nineteen-month period created a situation in which regular progress on the revisions was difficult to sustain.

Since the first edition appeared in late 1979, many people have been helpful in providing comments and suggestions. I have found particularly useful the observations offered by undergraduate students at the University of Waterloo and other institutions. Visiting professorships at the University of Leeds in England, the University of Edinburgh in Scotland and the University of Madras in India, as well as Visiting Fellowships at the University of New England and the Australian National University in Australia have been of great value in exposing me to the ideas of students, faculty and resource managers from diverse cultures and in different environmental contexts. The experiences at each of those institutions have influenced my thinking and the second edition of this book, and I would like to acknowledge my appreciation to each of them.

Cathy Giesbrecht, a Master's student in geography at the University of Waterloo, participated as a research assistant in the work of preparing the revised edition. She searched literature, provided critical assessment of work in several areas, verified sources and reviewed the manuscript. I am grateful for her contributions, especially in helping to ensure that the material is presented in a way that is appropriate from the students' perspective.

Several people typed various drafts of the manuscript for the second edition. At the University of Waterloo, word processing was done efficiently by Jacky Forabosco, Susan Friesen, MaryLynn Reinhart and Jay Van Laar. At the University of New England, similar work was done by Megan Wheeler.

At Longman Scientific and Technical, prompt, thoughtful and constructive advice was given by their staff.

The first edition was dedicated to my wife, Joan. I would like to rededicate this revised edition to her. She continues to support me in my various endeavours, and simultaneously has always ensured that they are kept in proper perspective.

**Bruce Mitchell**
Waterloo, Ontario
*September 1987*

# PREFACE TO THE FIRST EDITION

Several experiences and principles have influenced my ideas and approach in this book. The first of these concerns my search for a textbook which could be used in a resource management course for advanced undergraduate students.

Existing books seem to fall into one of several categories. First, are books which are mainly *content-oriented.* They focus upon the distribution and use of a variety of resources. Such texts are rich in facts and information, but offer little in the way of principles and concepts. Furthermore, they do not encourage examination of the adequacy of the research upon which the information is based. A second type might be labelled as *crisis-oriented.* These books draw attention to problems of resource and environmental management, and were particularly prominent in the early 1970s. While increasing awareness of problems, they give little attention to fundamental research issues, questions, and strategies which must be handled prior to identifying alternative solutions.

A third type is *perspective-oriented*, emphasizing ecological, economic, political, social or other aspects of resource management. Each provides an in-depth treatment of a fairly narrow range of material. While principles and concepts are emphasized, little explicit attention is given to research issues. In geography courses, it is necessary for students to acquire a number of these books, which is expensive. It also assumes that the students have the necessary background in the respective disciplines to understand and appreciate the material, which is not always the case. A fourth category is *integrative-oriented*, in which an attempt is made to touch upon two or more perspectives. The emphasis is upon principles rather than information. These books usually assume a broad familiarity with the resource management literature, which most undergraduates do not have. They also are selective in coverage. Furthermore, few explicitly consider the problems to be overcome in the research process.

Simply stated, I could not find a text which adequately covered the material which I thought necessary for advanced undergraduates.

In my view, such a book would demonstrate the relevance of work in both physical and human geography, would illustrate the relevance of different research thrusts (ecological, spatial and regional) in geography, would identify fundamental research issues, and would relate geographic research to policy needs and problems.

A second aspect is closely tied to a principle. I believe that an interdisciplinary approach is desirable and necessary for analysis of many resource management problems. At the same time, if an individual is to participate on an interdisciplinary team, he must be able to define his area of competence. Thus, one of my concerns has been to ensure that geography students become aware of their disciplinary heritage, without being overly concerned about disciplinary boundaries.

Experience at the University of Waterloo emphasized the importance of this belief. I began teaching in the year that a Faculty of Environmental Studies was established. The faculty consists of four units, two 'academic' departments (geography, man-environment studies) and two 'professional' schools (architecture, planning). My classes normally had a mix of students from the different units, but with a majority of geography students. In talking with the students, it became clear that many were searching for an 'identity' from which they could relate their work to a faculty commitment to interdisciplinary study.

The third consideration behind this book relates to a principle. In all of my courses, my ultimate goal has been to encourage development of a critical but constructive approach to problem-solving. If students were to develop this approach, they required a framework against which they could judge the adequacy of research. In brief, they had to be able to identify a *problem*, to evaluate *evidence*, and to appraise *arguments*. One of my roles as an instructor was to draw students' attention to the considerations, some of which conflicted, involved in appraising and conducting research.

My experience with both undergraduate and graduate students was that, with some exceptions, they did not know how to systematically evaluate the adequacy of research. In my first class of a term, I often asked the students to write an essay on 'What constitutes excellence in research?'. A great majority did not know how to address that question. This raised concern. In my view, the enduring value of a university education is the cultivation of a critical and constructive mind. Such a mental framework, modified through time, would have value long after the details of a specific resource management program had become dated or forgotten.

As a result, in my resource management classes with both undergraduates and graduates, I have attempted to integrate concern about fundamental research issues with attention to resource management problems. Initially, this approach has generated confusion for many students. They have had difficulty in linking these different

considerations, and in developing their personal research framework. In the longer run, however, the students seem to find this a challenging and worthwhile exercise. Indeed, in an age when 'relevance' and 'utility' seem to be watchwords, most students acknowledge that this approach is 'relevant'.

From the above experience and principles, the form of this book emerged. The basic approach has evolved over a nine-year period of teaching and conducting research in the field of resource management. Undoubtedly, my ideas and approach will continue to evolve. Despite future modifications, the basic objectives are believed to have long-term merit. First, students should become aware of the contributions by geographers and those in related disciplines to resource management. To this end, students should be aware of the major research thrusts in geography, and how these have been influenced by and have had influence upon other issues in the discipline. Second, students should be able to identify basic research issues, and to judge how well these have been handled by geographical studies in resource management.

The book is organized to meet these ends. The first chapter identifies some key ideas as well as discusses research thrusts and issues in geography. The second chapter then outlines some of the issues which arise in research. Based upon personal values and ethics, it is hoped that each student will use this material as a departure point to identify a position relative to the various issues which are identified. The subsequent chapters are each devoted to a substantive area of inquiry in resource analysis. Each chapter concludes with a discussion of the implications for resource management and the conduct of research. The concluding chapter offers more general implications and speculations.

The book is oriented to advanced undergraduate students in geography. It may also be of use to graduate students, as well as to students in related disciplines interested in resource analysis and management. It assumes a background in both physical and human geography. Although an understanding of research methods and quantitative techniques will be helpful to the student, it is not essential. A conscious effort has been made to discuss such material in relatively non-technical and non-jargonistic terms. Where reference to technical aspects could not be avoided, references are provided so that the student can seek clarification and elaboration.

The metric system of measurement (International System of Units) has been emphasized in the text. This approach required the changing of the data in some studies from non-metric to metric equivalents. A metric conversion table is provided in Appendix I.

Considerable help has been received during the preparation of this book. A Canada Council Leave Fellowship and a sabbatical leave from the University of Waterloo provided the opportunity to reflect on teaching and research experience, to complete further reading, and to start writing. Funds from the Leave Fellowship allowed Rob Cook,

Shirley Fenton, Karen Kubis and Barbara Veale to serve as research assistants. Further financial support came from the University of Waterloo Research Grant Subcommittee and the Faculty of Environmental Studies which both provided funds to cover the typing and editing of the manuscript on the computer SCRIPT system.

A number of colleagues read one or more chapters. These included Novia Carter, Chad Day, Dianne Draper, Dave Erb, Jim Gardner, Len Guelke, Ralph Krueger, Geoff McBoyle, Gordon Nelson, Roy Officer, George Priddle, and Geoff Wall. Other colleagues who provided suggestions about ideas, approaches or material were Kiyo Izumi, Richard Preston, Sally Lerner and Sally Weaver. Further suggestions were received from undergraduate and graduate students who were exposed to the ideas and approach during seminars and lectures. Valuable comments and criticisms were offered, not all of which I was able to respond to adequately. Any errors or weaknesses remain my responsibility.

Typing was done with accuracy and speed by secretaries in the geography department. While Rosemary Ambrose and Susan Friesen did most of the typing, others included Jean Fraser, Pat Forgett, Bonnie Roth and Karen Steinfieldt.

Encouragement and support was offered continuously by the Longman Group Ltd. Their cooperation and interest was and is much appreciated.

My wife, Joan, was an active participant in the preparation of this book. In addition to taking on additional responsibilities to provide me extra time for writing, she served as a sounding board and critic. This book is dedicated to her.

**Bruce Mitchell**
Waterloo, Ontario
*October 1978*

# ACKNOWLEDGEMENTS

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