
**RESEARCH ALONG A
POLE-TO-POLE TRANSECT**

Earth System Responses to Global Change: Contrasts between North and South America. Harold A. Mooney, Eduardo R. Fuentes, and Barbara I. Kronberg, eds. Academic Press, San Diego, CA, 1993. 365 pp., illus. \$85.00 (ISBN 0-12-505300-2 cloth).

The purpose of this book is twofold: to evaluate a scientific problem and to offer a potential research solution. The problem is the lack of information that credibly addresses the scientific understanding of the ecological consequences of global climate change. At best, it is difficult to determine with confidence how ecosystems, and all biological components, respond to climate change both past and future. This is a common problem in science, but it is highly visible as the scientific community attempts to provide policy and decision making officials with credible information on the likely consequences of climate change. It is obvious that we only poorly understand how ecosystems respond to climate change. It is not lack of

data alone, but lack of relevant data and understanding, that limit our ability to predict ecological changes due to climate change.

The solution addressed in the book is a research opportunity, perhaps unique, to conduct experiments to assess the effects of climate change. The longitudinal transect, especially the one along the west coast of North and South America, has long intrigued scientists as a vehicle for studying ecosystems and geophysical processes. There are many similarities between north and south, as well as some useful differences in terrestrial, marine, and atmospheric components. Here, perhaps, is the opportunity to produce particularly relevant data for solving portions of the climate-change problem.

The book clearly summarizes the available and relevant scientific information on North and South America. Areas covered in detail are the ocean, climate controls, hydrology and geomorphology, biogeochemistry, intertidal communities, terrestrial plants and animals, and human impacts. Each chapter synthesizes the available information on a topic. There are chapters on each of the major topics for both North and South America.

The chapter authors are well qualified and have produced quality contributions. The editors have effectively selected and organized the topics to create a book that is readable and flows well. Each chapter is a synthesis of what is known concerning the topic; in general, the authors step back from their own research and personal experience and review the literature. There are some exceptions, but not enough to detract significantly from the book. The chapters by South American scientists are especially valuable because the data they summarize are often less readily available to North American scientists.

As for the research opportunities and the solution offered by the authors, there are three general approaches to determining the response of ecosystems to climate change. The first is to study the processes of physiology, behavior, population dynamics, and community structure and function, and then apply this

information to hypothetical climate changes. This is the most common approach, has the most comprehensive data set, and is the one most scientists use. Much of the book covers this type of material.

The second approach uses historical reconstructions of climatic changes and their corresponding ecological effects. This approach has obvious appeal, but the database is relatively limited and very biased to characteristics that are preserved in the historical record. Also, the future conditions of interest may only be marginally similar to those of the past. The approach is extremely valuable in situations where it is possible to use it.

The third approach is to trade space or geography for time. Some of the current climate along the transect existed elsewhere in the gradient in the past and will exist elsewhere in the future. It may be possible to correlate past influences to current ecological conditions and to project current conditions at certain locations to future conditions elsewhere. This possibility makes the pole-to-pole transect along the west coast of North and South America attractive. The authors succinctly define why this approach could pay big dividends along this particular transect. The next challenge will be to design specific experiments to capitalize on the opportunity.

The primary users of this book will be scientists who deal with climate-change issues. Many of the individual chapters are well written and will interest scientists with backgrounds in areas such as wildlife, forestry, fisheries, and zoogeography.

This book makes a useful contribution by summarizing current understanding on the similarity and differences between climate and ecosystem structure and function along the west coast of North and South America. Further, the case is clearly made that the transect along the west coast has the potential to answer some very important scientific and policy-relevant questions.

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