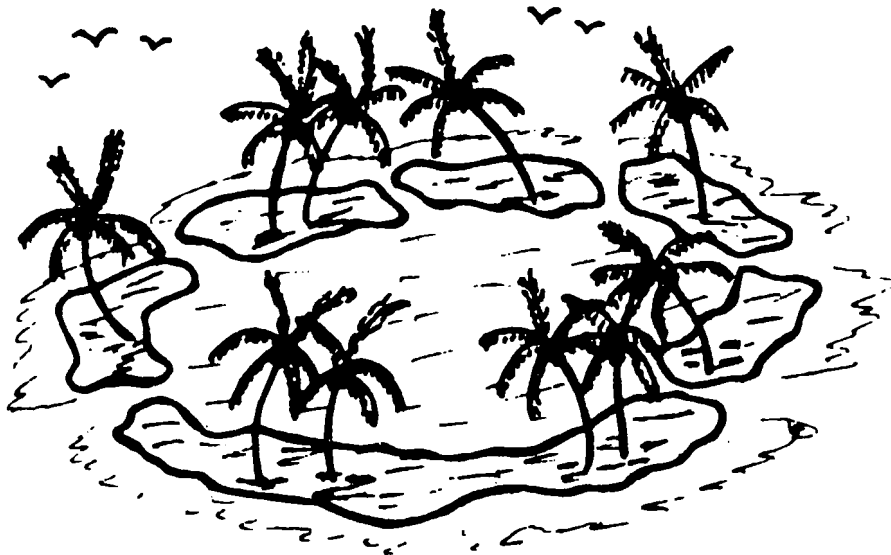


# ATOLL RESEARCH BULLETIN

220. *Coral Reef Ecosystems:  
Proceedings of Papers Presented  
at the 13th Pacific Science  
Congress, Vancouver*

*Edited by S. V. Smith*



Issued by  
THE SMITHSONIAN INSTITUTION  
Washington, D.C., U.S.A.

# ATOLL RESEARCH BULLETIN

220. *Coral Reef Ecosystems:  
Proceedings of Papers Presented  
at the 13th Pacific Science  
Congress, Vancouver*

*Edited by S. V. Smith*

Issued by  
THE SMITHSONIAN INSTITUTION  
Washington, D.C., U.S.A.

September 1978

## ACKNOWLEDGMENT

The Atoll Research Bulletin is issued by the Smithsonian Institution as a part of its Tropical Biology Program. It is co-sponsored by the Museum of Natural History and the Smithsonian Press. The Press supports and handles production and distribution. The editing is done by the Tropical Biology staff, Botany Department, Museum of Natural History and by D. R. Stoddart.

The Bulletin was founded and the first 117 numbers issued by the Pacific Science Board, National Academy of Sciences, with financial support from the Office of Naval Research. Its pages were largely devoted to reports resulting from the Pacific Science Board's Coral Atoll Program.

---

The sole responsibility for all statements made by authors of papers in the Atoll Research Bulletin rests with them, and statements made in the Bulletin do not necessarily represent the views of the Smithsonian nor those of the editors of the Bulletin.

---

### Editors

F. R. Fosberg  
M.-H. Sachet

Smithsonian Institution  
Washington, D. C. 20560

D. R. Stoddart

Department of Geography  
University of Cambridge  
Downing Place  
Cambridge, England

TABLE OF CONTENTS

	Page
Editor's Note . . . . .	ii
Biogeochemical Budgets in Coral Reef Systems S. V. Smith, P. L. Jokiel, and G. S. Key . . . . .	1
Spatial Modelling of Coral Reefs A. L. Dahl . . . . .	13
An Evaluation of Coral Reef Survey Methods by Computer Simulation R. A. Kinzie III . . . . .	21
Sclerochronology: A Data Source for Reef Systems Models R. W. Buddemeier . . . . .	25
Energy Exchange in Coral Reef Ecosystems A. A. Benson, J. S. Patton, and S. Abraham . . . . .	33
Differentiation in Coral Populations D. C. Potts . . . . .	55
Evidence from the Great Barrier Reef of Ancient <u>Acanthaster</u> Aggregations E. Frankel . . . . .	75
An Information Analysis Approach to Zonation Patterns of the Coral Genus <u>Acropora</u> on Outer Reef Buttresses Carden Wallace and M. B. Dale . . . . .	95

EDITOR'S NOTE:

A session entitled "Systems Modelling and Coral Reef Ecosystems" was held at the 13th Pacific Science Congress (18-30 August 1975, Vancouver, Canada). The papers in that session dealt with conceptual aspects of reef systems as well as with specific chemical or biotic components of those systems. It was decided during that session to collect as many of those papers as possible into a single number of the Atoll Research Bulletin.

This number of ARB represents the result of that decision. Eight of the original ten papers are presented here in their entirety, in somewhat altered format, or as expanded abstracts. The sequence of papers in this volume is the same as the order in which they were presented at Vancouver. It is anticipated that the other two papers will be published elsewhere.

I thank all of the speakers at the symposium session for their participation, and those who provided manuscripts for making this publication possible. To the editors of the Atoll Research Bulletin go my thanks for encouraging the publication of these papers in the Bulletin. Editing and typing of the manuscripts was undertaken through the auspices of the Hawaii Institute of Marine Biology, University of Hawaii.