

BOOK REVIEWS

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Ocean Biogeochemical Dynamics

BY JORGE L. SARMIENTO AND NICOLAS GRUBER

xii + 503 pp., 28.5 × 22 × 3.25 cm, ISBN 0 691 01707 7 hardback, GB£ 48.95/US\$ 75.00, Princeton, NJ, USA/Woodstock, Oxon, UK: Princeton University Press, 2006

Ocean Biogeochemical Dynamics is a big book on a big subject written by two big names in the field. The publication of this book is very timely. It benefits from the Joint Global Ocean Flux Study, an international study of ocean biogeochemical fluxes that took place between 1987 and 2003. It is also timely because of the recent surge of interest in climate change. The oceans are a globally significant reservoir for carbon and the interactions between ocean, the atmosphere (a smaller and transient reservoir) and the terrestrial system (the other large reservoir) lie at the centre of understanding the natural processes involved in regulating climate.

The book covers the broad framework of ocean biogeochemistry and it does so in a comprehensive manner. The chapters in the book cover tracer conservation and ocean transport, which sets the physical framework for ocean biogeochemistry. Air-sea interaction is then covered before the main thrust of the book is presented. This is on organic matter production, its export and remineralization, followed by remineralization and burial in ocean sediments. Following this, there are chapters on the cycling of silicate, carbon and calcium carbonate. The final chapter is on the carbon cycle, CO₂ and climate. There are no chapters devoted to the cycling of nitrogen or phosphorus, which are nevertheless important elements in the biogeochemistry of the ocean. The book focuses on the key elements and their interactions within sea water and provides an excellent broad theoretical background on the subject complete with mathematic formulations for many of the processes involved. Understanding the mathematics, which is not complex, is not essential to understand the text

Ocean Biogeochemical Dynamics is intended primarily for those at postgraduate level and above, although it will also be used in advanced courses at undergraduate level. It is likely to be used as a reference book in the sense that there are few other texts that cover the topic so comprehensively.

The material selected is thorough and detailed, yet lucid and easy to read. It is clear that the authors have consulted widely, having commissioned their own reviews of individual chapters. This has achieved an excellent balance of the subject. The chapters on the biological controls on sea water chemistry are particularly well presented and were delightful to read. However, it would have been more satisfying (at least for this reviewer) to have had greater emphasis on the microbial realm and its dynamics, since it is this that drives much of ocean biogeochemistry. Bacteria are mentioned in passing, and newly emerging topics such as the biogeochemical role of viruses in the oceans are not mentioned. But these comments need to be weighed against the tremendous scope of the book.

Readers of *Environmental Conservation* with an interest in marine biogeochemistry and earth system science are encouraged to purchase or borrow this book. It is a comprehensive text on a complex and

timely topic, and is one that will enlighten students and professionals alike. The authors are to be congratulated on their tour-de-force.

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Stakeholder Dialogues in Natural Resources Management. Theory and Practice

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Public participation and stakeholder dialogues are not new issues in environmental decision-making processes. Nevertheless, this publication attempts to contribute new ideas to the broad range of existing literature. First, the volume discusses three different arenas, science, politics and management, in which stakeholder dialogues are used as a tool for communication and decision-making. Second, as the editors explain in their introductory chapter, the book attempts to provide a theoretical framework that may be used 'in guiding practice and in tool development'.

In the second chapter, Welp and Stoll-Kleemann introduce their Integrative Theory of Reflexive Dialogues, which combines elements of diverse fields of social theory, including social psychology, theories of organizational learning and formal approaches to modelling. Although the authors say that phenomena like 'culture' are important for the understanding of the dynamics of participation, their theory obviously has its roots in individualistic concepts of rational choice. Berghoefer and Berhoefer choose a completely different approach to the 'truism' of participation. Coming from the tradition of development thinking, they have a view of both sides, both the stacks of development papers that present participation as the 'magic bullet' that leaves only winners in the game as well as the huge number of disappointments when participation in practice turned out to be just another empty 'buzz word'. Clearly, the strength of this chapter is more in the important questions it asks than in its answers. In the chapter that follows, Oels asks how the success of participation and stakeholder dialogues could be evaluated. Special attention is given to the different approaches to identifying appropriate criteria for evaluation (theory-based, user-based, or goal-free). Presenting the main findings of her collection of evaluations, one result could disquiet those involved in and dedicated to stakeholder involvement: the most important factor in the failure of stakeholder dialogues may be the lack of implementation of the outcomes, a deficit that lies outside of the actual participation process. The next two chapters take a more practical view on the subject. Scheffran presents a collection of useful tools for the involvement of stakeholders, while Maarleveld *et al.* show how geo-information systems could be used in stakeholder dialogues as a visualization tool for different scenarios.

In its second half, the volume offers a number of illustrative case studies that cover a wide range of different scenarios. Welp *et al.* report on their experiences with science-based stakeholder dialogues initiated by the Potsdam Institute for Climate Change (PIK) which