

1996 Annual Report of SCOR Working Group 104: Coral Reef Responses to Climate Change: The Role of Adaptation

Submitted by Robert W. Buddemeier, Chair, 13 August 1996

Introduction:

The 1995 annual report addressed the background, formation, membership and organization of WG-104. Only changes or further developments to these areas will be discussed in this report.

Membership developments:

An updated membership and contact list is appended.

Dr. Kiyoshi Yamazoto was added to the membership of WG-104. His interests include coral calcification and reproduction with particular reference to environmental controls.

Inquiries were received from Dr. Annamarie Hatcher concerning affiliation as a corresponding member. Her interests are in the area of ecophysiology.

Dr. Juergen Paetzold advised us that he has been unable to contribute to WG-104 activities because of an extremely heavy load of ongoing professional responsibilities.

In connection with the workshop held at the 8th International Coral Reef Symposium (ICRS8 - see below), Dr. John Benzie of the Australian Institute of Marine Science assisted us as discussion and working group leader. His area of specialization, genetics and evolution, is important to the WG-104 topic and only incompletely covered by existing members. If he is able and willing to continue to work with us, he will be proposed for corresponding membership.

Organizational developments:

Dr. J. C. Pernetta, former Director of the Land-Ocean Interactions in the Coastal Zone (LOICZ) Core Project of the International Geosphere-Biosphere Programme (IGBP), has extended an offer of LOICZ co-sponsorship of WG-104. As a coastal ecosystem that is at once an active component of the carbon cycle and a significant factor in coastal biogeomorphology, coral reefs are of substantial interest to the LOICZ project. During the current year, the LOICZ CPO paid all of Buddemeier's travel, conference, and incidental expenses (including direct costs for the WG-104 meeting) associated with the Panama meeting -- an amount of approximately US\$3,500. LOICZ has budgeted the sum of US\$10,000 for calendar 1997, and offers an avenue for publication of reports (see below).

External developments:

Both coral reef issues (e.g., the International Year of the Reef, the International Coral Reef Initiative) and climate/environmental issues (e.g., the debate surrounding the IPCC reports) are currently high-profile issues in the areas of marine and environmental science.

Plenary presentations at the ICRS8 stressed the strong and growing reliance of the paleoclimate community on coral-based records, and also pointed out the uncertainties and range of scientific issues involved in coral taxonomy and responses to environmental factors.

These developments presage considerable interest in and application of the findings of the Working Group.

Activities:

ICRS8 Workshop: An open scientific workshop was held at the 8th International Coral Reef Symposium (Panama, June 1996). The Workshop, chaired by R. Buddemeier, was held from 9 a.m. to 3:30 p.m., including working lunch sessions. The major objective was to obtain input from the wider scientific community to SCOR Working Group 104 (most members of which were present). Average attendance

was about 40 individuals. Following introduction of topics and individuals, and clarification of the fact that the term "adaptation" in the title included the subject of acclimation as well, the morning was devoted to a structured brainstorming session to identify issues, questions, and sources of information. Comments were recorded and transcribed.

Four topical areas were addressed, with discussions introduced and led by appropriate volunteers and/or draftees. Participants broke into informal discussion groups for lunch, and summaries of key issues and ideas were presented in the afternoon.

Discussions were spirited, wide-ranging, and there was an evident high level of interest in the topics. At the conclusion of the session, participants were asked to indicate if they were willing to continue to participate in discussions and reviews, and/or to make substantive contributions if appropriate. In addition to those already associated with WG-104 in some capacity, 23 people signed up.

Working Group Meeting: Following the workshop and Symposium, the first formal meeting of the Working Group was convened. It was attended by all WG members except A. B. Pittock, who was unable to attend because of health problems. Corresponding members in attendance included C. B. Castro, B. N. Opdyke, and R. Rowan.

The Working Group first focused on the issues of definition of reef communities, assemblages, and organisms as a critical basis for undertaking a multidisciplinary assessment. It then discussed issues of scale, and the interactions of the "paleo," the biological, and the climatological specialties. Based on these discussions and the outcomes of the ICRS8 Workshop, plans were made for initial development, circulation, and review of outlines or drafts of papers directed toward aspects of the WG-104 product, with a proposed first-circulation target date of July 31, 1996. Although further refinements and additional contributions will be developed, an initial list of topics and contributors was assembled, along with suggestions for possible collaborators outside of the Working Group. A substantial amount of review and publication in the area of community metabolism, and CO₂ and carbonate saturation state effects has already been carried out by Gattuso, Smith, Hatcher, and Opdyke; this material is available for integration with the overall results of the proposed new reviews and syntheses:

Symbiosis Ecology -- R. Rowan; Biogeography and Population Genetics -- R. Rowan; Quaternary Rates of Environmental Change -- B. Opdyke; Ecology and Community Issues -- T. Done; Reproduction, Calcification and Bleaching in Marginal (High Latitude) Environments -- K. Yamazato; Physiological Responses in Stable and Variable Environments -- R. Gates; Quaternary Community Change and Relevance to Modern Communities -- J. Pandolfi; Case Study Comparison of Brazilian with Caribbean Reef Systems -- C. Castro, with R. Bak; Models and Integration -- B. Hatcher; Climate Change Scenarios and Effects -- A. B. Pittock; Introduction, Definitions, and Background -- R. Buddemeier.

Meeting and Publication Plans:

Symposium and journal articles: We are negotiating for a "centerpiece" session in a symposium at the Society for Integrative and Comparative Biology (SICB -- formerly the American Society of Zoologists, or ASZ) annual meeting to be held in Boston in January of 1998. The proceedings of that session would be published in the American Zoologist -- a refereed journal with a high citation index. I have already corresponded with the editor and he is aware of the requirements to group the papers, identify SCOR, etc. Publication would be during 1998. This will provide refereed publications (important because WG-104 has involved some younger people) and good exposure within the professional literature.

This symposium has the potential to provide substantial visibility to the Working Group and to SCOR (and LOICZ) -- SICB, like many organizations, has been working hard at tuning up and enhancing its public information activities, and as noted above, coral reefs and global change are both currently "hot" topics. The decision point is October, at which time the "final" symposium proposals will be considered by SICB.

Integrated report: At the WG meeting in Panama, two things became apparent to most of the members: one, that there will be many opportunities and stimuli for related, ancillary publications (see above), and two, that in order to tell a coherent and integrated story we are going to have to engineer some sort of stand-alone report in addition to a collection of papers. We are considering a writing workshop in the fall

of 1997 to draft such a report. Several WG members have indicated that they may be able to assist with travel funding for such an event. One possibility would be to "piggyback" that workshop onto the LOICZ Open Science Meeting, tentatively scheduled to be held in the Netherlands in October 1997

There are no specific plans for publication of the integrated report, but it can almost certainly be published and distributed as a LOICZ Reports and Studies series document (assuming the LOICZ offer of co-sponsorship is accepted). This can be produced at any level of desktop publishing sophistication, would be citable and retrievable, and, depending on the LOICZ budget for 1998, the costs of printing and distribution may be provided. If what we come up with is good enough and thorough enough, a "real" publisher can be expected to snap it up, but LOICZ or similar reports are a way to get the material out promptly without excessively compromising further, more formal publication.

Actions Requested:

The SCOR Executive Committee is requested to approve the proposed co-sponsorship of WG-104 by the LOICZ Core Project of IGBP, to approve in principle the proposed 1997-98 meeting and publication plans under development as described above, and to allocate funds in the amount of the attached budget. We specifically request authorization to divide the funds between two events, with the proviso that no individual would be supported for more than one trip from SCOR funds, and that the total cost would not exceed that required for a single full meeting of the Working Group. Feedback or suggestions from the Executive Committee will be welcomed.

Proposed Budget, 1997-98:

Support is requested to ensure the attendance of all members at the WG-104 meeting in association with the proposed Symposium in conjunction with the January 1998 meeting of the Society for Integrative and Comparative Biology, or, at a final report drafting workshop (see above). It is expected that one or both of these activities can receive full or partial outside support; as indicated above, US\$10,000 will be available during calendar 1997 from LOICZ. Because meeting and reporting plans are still being negotiated at the time of this report, the following budget is submitted as the maximum amount required to complete the Working Group activities, with expenditure to be completed no later than calendar 1998, and with the possibility of dividing the total into partial support for two activities.

Lodging and per diem, 9 people x 7 nights @ \$100 = \$6300

Travel costs (round trip airfares estimated for a meeting in North America or Europe) = \$17,000

Total: \$17,300

This amount is necessarily an estimate, and every effort will be made to minimize actual costs.