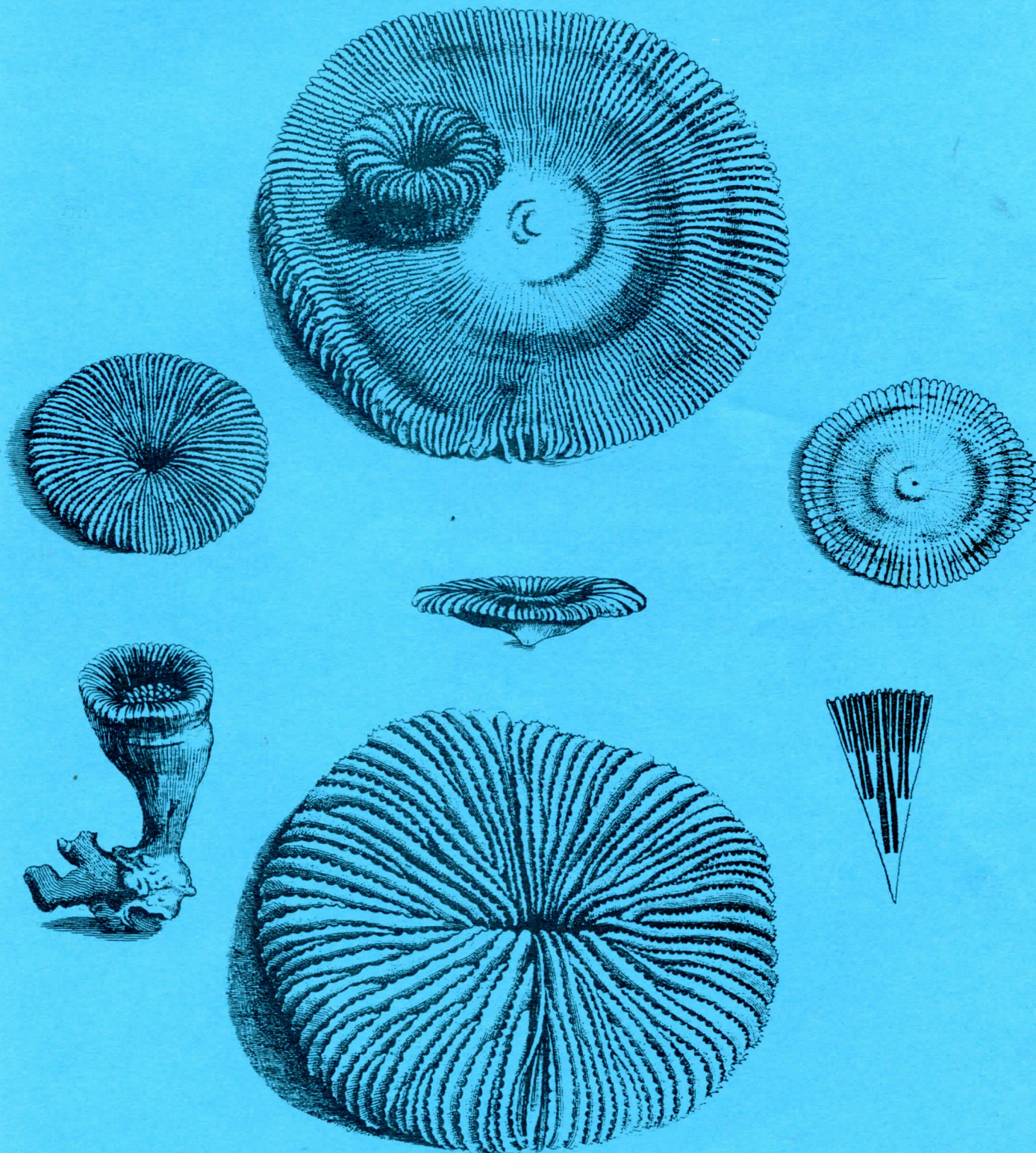


REEF ENCOUNTER

Newsletter of the International Society for Reef Studies

Number 7

July 1990



REEF ENCOUNTER No. 7 July 1990

NEWSLETTER OF THE INTERNATIONAL SOCIETY FOR REEF STUDIES

Edited by Sue Wells



CONTENTS

Page	
3	Editorial S. Wells
3	ISRS Comment From the President: P. Sale <i>Coral Reefs</i> - the ISRS journal C. Wilkinson
5	ISRS News Report on the 1989 Annual Meeting of ISRS B. Kiene The role of scientists in environmental issues
8	Currents Research and training in developing countries M. Borel-Best
9	Upwellings
12	Features Outline of Somali Quaternary Coral Reefs F. Carbone and R. Matteucci Reef Survey, Mafia Island, Tanzania G. Gaudian
15	Student's Voice
16	Country Profile Coral Reef Science in Egypt C. Roberts and J. Hawkins
18	Who's Who? Intach A & N Chapter and SANE South Pacific Regional Environment Programme (S.P.R.E.P.)
18	Book Shelf
19	Diary

President	Secretary	Treasurer
Peter F. Sale University of New Hampshire Dept Zoology Durham, NH 03824, USA Tel. (603) 862-2105 Fax. (603) 862-2030	Betsy Gladfelter West Indies Laboratory Fairleigh Dickinson University Christiansted St Croix, USVI 00820 Tel. (809) 773-9339	Pat A. Hutchings Australian Museum 6-8 College St Sydney NSW 2001 Australia Tel. (61) 2339-8243 Fax. (61) 2360-4350

Council

R. Bak (Netherlands)	C. Birkeland (Guam)	F. Bourrouilh-le Jan (France)
B. Brown (UK)	P. Davies (Austr.)	R. Galzin (France)
R. Ginsburg (USA)	E. Jordan (Mexico)	Y. Loya (Israel)
I. MacIntyre (USA)	L. Muscatine (USA)	J. Ogden (USA)
V. Paul (Guam)	B. Rosen (UK)	D. Stoddart (USA)
J. Taylor (UK)	S. Wells (UK)	K. Yamazato (Japan)

The International Society for Reef Studies was founded at a meeting in Churchill College, Cambridge, UK in December 1980.

Its aim under the constitution is to "promote for the benefit of the public, the production and dissemination of scientific knowledge and understanding concerning coral reefs, both living and fossil."

In order to achieve its aim, the Society has the following powers:

- To hold meetings, symposia, conferences and other gatherings to disseminate this scientific knowledge and understanding of coral reefs, both living and fossil.
- To print, publish and sell, lend and distribute any papers, treatise or communications relating to coral reefs, living and fossil, and any Reports of the Proceedings or the Accounts of the Society.
- To raise funds and invite and receive contributions from any persons whatsoever by way of subscription, donation or otherwise providing that the Society shall not undertake any permanent trading activities in raising funds for its primary objects.

The Society collaborates with Springer-Verlag in producing the quarterly journal *Coral Reefs*. This large-format journal is issued free of charge to all members of the Society, and concentrates on quantitative and theoretical reef studies, including experimental and laboratory work and modelling.

Membership

The annual subscription for membership of ISRS is currently US\$50 or £35. Under the constitution, subscriptions are due by January 31st each year. Members receive the journal *Coral Reefs*, the newsletter *Reef Encounter*, abstracts of papers of Annual Meetings and other periodic mailings.

Student membership costs US\$8 or £6 and benefits include all of the above except the journal *Coral Reefs*.

Spouse membership costs US\$58 or £41 (i.e. one full + one student membership) and entitles the couple to one copy of each issue of the journal and other mailings.

Institutional subscriptions to *Coral Reefs* must be placed directly with Springer-Verlag.

Subscriptions to the Society should be addressed to the Treasurer (address given above).

DEADLINE FOR THE NEXT ISSUE OF REEF ENCOUNTER IS 1ST OCT 1990.

Produced by: The Nature Conservation Bureau, 36 Kingfisher Court, Hambridge Road, Newbury RG14 5SJ, UK.

Printed on recycled paper.

EDITORIAL

With this issue we come to the end of the backlog of material that had accumulated for publication in *Reef Encounter*. It is now up to you to ensure that the newsletter keeps going, assuming that everyone thinks it is a worthwhile publication. At the moment we are receiving very little unsolicited material for publication. Please think of writing a short note for *Reef Encounter* if you are involved with an interesting project, have some exciting news, or ideas and thoughts that you can't incorporate into your more serious publications. There is no shortage of material but we need more writers. And please think of writing book reviews and sending illustrations.

Of course the current economic climate may be part of the problem. The future of the West Indies Lab may have been decided by the time you read this (see p. 4). The Natural History Museum in London (former British Museum (Natural History)) is undergoing another series of major staff cuts. At the same time, there are calls for more research - on biological diversity, impact of climate change, sustainable utilization of natural resources. Can ISRS help in resolving this paradox?

This issue does not pretend to have a theme, but it might motivate contributors if we suggest one for the next issue. Following on from the workshop held in Marseille (p. 6), perhaps a focus on 'economic values of reefs' and 'alternative reef livelihoods' would be appropriate. Case studies, opinions, reviews of other work etc., would all be welcome. Some material for this issue was received at the last minute; I am holding all material on global warming and sea level rise over to the next issue, so do send updates on this topic.

Deadline October 1st 1990.

Sue Wells

THE COMPLEAT REEF ENCOUNTER

No. 7

"Class Holothuroidea sea cucumber
bahay-bahay (Cebuano)
balat (Ilonggo)

For errant husbands. The sea cucumber is dried, then placed in the trousers (inside pockets or seams) of the husband. This is believed to cause impotence."

From: Aliño, P.M. *et al.* (1990). *The Use of Marine Organisms in Folk Medicine and Horticulture: a Preliminary Study*. SICEN Leaflet 1, 8 pp. Seaweed Information Center (SICEN), Marine Science Institute, University of the Philippines.

ISRS COMMENT

From the President:

Peter Sale

This is my first opportunity, as the incoming president, to address the membership of ISRS. There are several topics I wish to share with you - some fundamentally important, some critically important to the future of this organization. On page 6 you will find a report of last December's Marseille meeting - a great success scientifically and socially, despite the dreaded influenza which put so many participants to bed, and announcements of the next ISRS meeting in New Caledonia, and the Seventh International Coral Reef Symposium in Guam. So let me get to these other items of concern.

We have not been growing fast enough

In fact, we seem to be stuck at around 300 members. We are too small to survive at that size considering our membership is scattered around the globe. We all know coral reef scientists who have not become members. Each of us needs to recruit one new member this month. Today, if possible. We particularly need members outside North America, but don't you North Americans ignore the chance to get your colleagues to join!

What do you get for being a member? *Coral Reefs* is now published regularly with four issues a year. In addition, this newsletter, twice a year, provides an effective medium for informal exchange. Annual meetings are held, usually in conjunction with other groups, and members can anticipate reduced registration fees for the Seventh and subsequent symposia. I know there are some scientists who never join any organization. But for the joiners among you, there are plenty of reasons to choose ISRS. For those of us who are already members, adding new members will help to keep subscriptions as low as possible. Anyhow, do your bit and get at least one colleague to join as soon as possible. (Note that although our Treasurer is in Australia, our accounts remain in \$US and £sterling and by next year we hope it will be possible to pay by MasterCard or Visa).

Coral Reefs needs a greater flow of manuscripts

The quality of our journal is currently high (both content and production) and our editors are working to ensure it remains so. But frankly at present it is difficult to fill the pages and retain these standards. We should not publish only in *Coral Reefs*, but each of

us should seriously consider *Coral Reefs* for some of our work. While manuscripts in all fields are sought, the editors report a particular lack of geological papers, including papers dealing with fossil reefs. Incidentally, the current rejection rate approaches 50% in some fields (I told you the editors had high standards!). This journal is growing in stature according to I.S.I. research. So use it, and encourage others to use it too.

As our journal grows in stature, demand for it also grows, reducing the unit cost. Think what will be possible for ISRS when the journal turns a profit (which we share with the publishers). A new source of funds to sponsor students, to run conferences, to provide a secretary for our hardworking newsletter editor..... The editors will also welcome suggestions for single topic issues which, at present, are appearing about once a year (see below).

We need to be more interactive

It is particularly difficult for a small international organization to set up effective communication among its members. Our newsletter provides one vehicle. But members should also write to Council members or to members of the Executive. Send us your thoughts and we'll try and respond. We are still young enough to be in a learning phase.

We also need greater participation in the electoral process. Hurricane Hugo didn't help last year (one nomination got lost in St Croix), but even without hurricanes, there were not sufficient nominations to require an election. I realize that the concept of nominating for a position, followed by an election from the competing nominees, may be a peculiarly Anglo-American way of doing business. But it does ensure the active involvement of the membership, and can prevent leadership by a narrow oligarchy. I'd like to see us have to run an election next time nominations are called for.

The above are concerns about ISRS, but I also want to briefly raise two issues of a more general nature.

West Indies Lab

This laboratory, one of the best-equipped facilities in the Caribbean, may have died before you read this. Betsy Gladfelter is waging a valiant effort to keep it alive as I write. If you have an interest in WIL, or simply in the need for facilities of this calibre in coral reef locations, and if you believe you can offer useful suggestions, or a source of operating funds, get in touch with Betsy (address on inside front cover). She needs our help. The hurricane did not do a great deal of damage, but sometimes a bad storm becomes a convenient excuse to stop running a field facility.

Coral reefs left behind?

My second point is that reefs are being left behind in the current environmental debate. Why do we never hear about coral reefs in discussions about reductions in biodiversity? Do they not harbour a wealth of genetic material? Why do they not feature in discussions of global warming and ozone depletion? Or of simple overfishing? True, there has been discussion of coral bleaching in the context of warming or ozone depletion, but the discussion has not got into the mainstream. I suspect that we coral reef scientists have been talking to each other rather than to the outside world.

It seems to me that although coral reefs are very important for food and foreign reserves from tourism in many, usually third world, countries, they are usually not well managed and are being degraded. Global warming, in particular, may accelerate the deterioration by causing coral death directly, and by altering climate and patterns of ocean circulation sufficiently to disrupt processes of larval dispersal and replenishment. Should we, in ISRS, not be doing all we can to get our concerns into the wider environmental discussion? Should we not be proposing major new research initiatives to establish what is happening on regional scales and what may happen in the future? I would welcome suggestions for how this opening up of the discussion might be accomplished.

CORAL REEFS - THE ISRS JOURNAL

Do you have anything to submit?

Coral Reefs, an international journal published by Springer-Verlag in Heidelberg, is the 'flagship' of ISRS. Its aim is to publish a wide range of papers on all aspects of coral reefs, both modern and fossil, for a readership that covers all coral reef disciplines. If you are a member of the society, you will receive four issues a year, hopefully soon to be increased to six. The journal is the main avenue for scientific interaction between members of ISRS outside the yearly meetings and four yearly symposia. The following material can be published:

Manuscripts: There is no limit to subject matter as long as it pertains to reefs (both modern and ancient); papers on conservation, pollution, fisheries and other more 'applied' issues are welcome. The only criteria are that they are valid scientific reports and pass the standard reviewing process. This process is generally rapid and there is currently no backlog of papers awaiting publication.

Reviews: These are popular as they help the reader to keep up to date on a particular topic. There is room for at least one in each issue, on any aspect of reef science, short or long. Reviews should be about 6-12 pages long with a maximum of 15 pages. They will be reviewed through the normal process. I like the idea of short reviews, so if you have finished some work and have something to offer, let me know.

Special issues: These give *Coral Reefs* a special appeal and we intend to have one per volume. To date we have had two: 'Halimeda', edited by Harry Roberts and Ian MacIntyre (Vol. 6, 3/4) and 'Coral Bleaching' edited by Barbara Brown (Vol. 8, 4). Two more are in the pipeline: 'Reefs as Models for Environmental Change' (MacIntyre and Montaggioni) and 'Acanthaster planci' (Wilkinson). We need suggestions for Volumes 10 (1991) and 11 (1992). The editors have suggested pollution, hurricane and cyclone effects, biogeography of the Coral Sea, and bioerosion. Do you have other suggestions?

Each issue of the journal has 3-5 blank pages which Springer are willing to fill with our news etc. We will publish the following:

Letters to the Editors: These will be critical or supportive comments on papers published in the journal. Normally we will invite the author concerned to publish a reply. Ideally both letters will fit onto a single page, although additional pages will be possible. Correspondence not relating to published papers is still to be sent to *Reef Encounter*.

Reef Sites: See vol. 8, pages 8 and 108. These pages have proved to be quite popular and we would like more. Good photographs or diagrams illustrating something of interest to reef scientists will be welcome.

Editors' and Society Page: This will contain news from the editors, Council and Executive of ISRS.

These pages can also be used for comments, hypotheses or calls for assistance or information. Do you have any other particular suggestions?

If you have anything to submit or any new ideas, please contact either Ian MacIntyre (Geological Editor - National Museum of Natural History, Smithsonian Institution, Washington D.C. 20560, USA), David Stoddart (Co-ordinating Editor - Dept of Geography, Earth Sciences Building, University of California, Berkeley, California 94720, USA) or myself.

Clive Wilkinson (Biological Editor), Australian Institute of Marine Science, Townsville, Queensland 4810, Australia.

ISRS NEWS

1990 ANNUAL MEETING OF ISRS

Nov. 14-18, 1990 Noumea, New Caledonia

The meeting will take place 14-16 November, with field trips 17-18 November, and will be hosted by the Université Française du Pacifique. It will be followed by an international workshop on 'Remote sensing and insular environments in the Pacific: integrated approaches' organised by IFREMER and ORSTOM, 19-21 November, also in Noumea.

For further information contact: *Professor Michel R. Ricard, Laboratory of Tropical Marine Ecology, Université Française du Pacifique, B.P. 4635 Papeete, Tahiti, French Polynesia. Phone and Fax: (689) 43 27 30.*

1991 ANNUAL MEETING OF ISRS

This will probably be held in the course of the 17th Pacific Science Congress in Honolulu, Hawaii, at which there will a symposium on coral reefs (see announcements).

7th INTERNATIONAL CORAL REEF SYMPOSIUM 1992

This will be held in Guam, organised by the University of Guam Marine Laboratory, in the last week of June. Field trips to the outer islands of Micronesia will take place in the weeks before and after the symposium.

BEST PAPER AWARD

The Best Paper Award for 1988 was given at the 1989 Annual General Meeting of ISRS in Marseille for the paper 'Late Holocene sea level indicators from twelve atolls in the central and eastern Tuamotus (Pacific Ocean)' by P.A. Pirazzoli, L.F. Montaggioni, B. Salvat and G. Faure. Lucien Montaggioni accepted the award on behalf of Paolo Pirazzoli who was unable to attend. This innovative study of the positions of pre-existing high sea level locations in the Tuamotu Islands used both biological and sedimentological data to reveal the overall history of the interaction of tectonic movements and sea level fluctuations for the central Pacific during the last 6,000 years.

ISRS NEWS

REPORT ON THE 1989 ANNUAL MEETING OF ISRS

The meeting (14-19 December), hosted by the Centre National de la Recherche Scientifique and the Station Marine d'Endoume in Marseille, attracted 134 reef scientists from 16 countries. Dr Bernard Thomassin organised three days of scientific and social meetings and three days of field trips, providing a very valuable and stimulating experience.

We were presented with a broad spectrum of biological and geological papers and posters dealing with reef ecology, stratigraphy and sedimentology, coral biology and bioerosion. Interesting unusual presentations were given by Arnfried Antonius, who showed a video on pollution and the development of black band disease in corals in the Red Sea, and Jean-Louis Patat and Genevieve Guillemin, who talked about the use of coral as a scaffold for bone grafts in humans.

The field trips, to several sites of ancient reef deposits around Marseille gave both biologists and geologists the opportunity to see and discuss spectacular formations (especially in the high wave activity experienced on the first field trip!) that lie along, and sometimes in the Mediterranean.

A special workshop held during the meeting discussed the role of reef scientists and the ISRS in the management and preservation of diversity on coral reefs. The importance of an annual venue like the ISRS meeting is exemplified by this workshop. The opportunity for biologists and geologists to interact and provide diverse perspectives on the past, present and future of coral reefs is essential for proper understanding and management of reef resources. It is unfortunate that at most meetings geological and biological presentations are separated into concurrent sessions. I am convinced that more integration of biological and geological sessions at reef meetings will be fuel for new research direction and understanding of reefs. I may have a biased view as I sit on the fence between biology and geology. Dr Thomassin and his colleagues are to be congratulated on making the meeting in Marseille interesting, fun and memorable for reef scientists from all disciplines.

Bill Kiene, 2013 N St., N.W., Washington D.C. 20036, USA.

THE ROLE OF SCIENTISTS IN ENVIRONMENTAL ISSUES

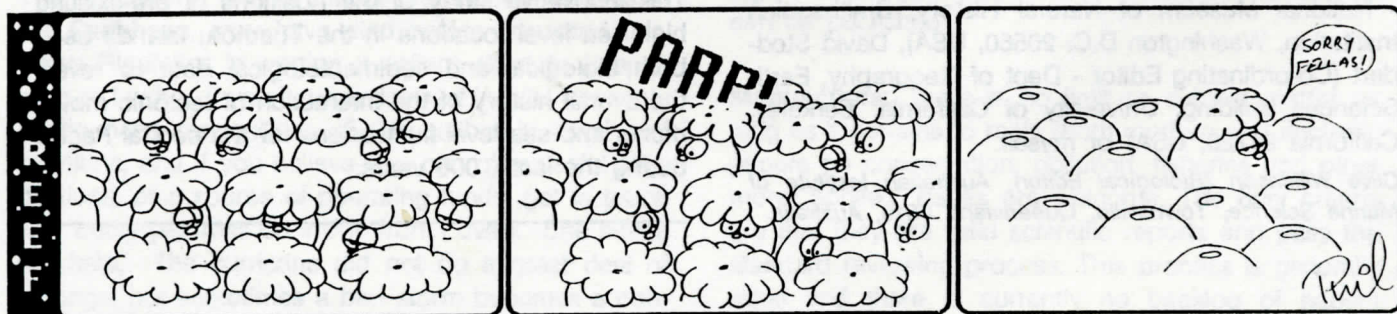
The workshop held during the 1989 Annual Meeting of ISRS in Marseille had the title "What should scientists be doing to effectively preserve coral reef biodiversity and improve reef management? What role should ISRS play in this?" With only an hour and a half to discuss such a broad subject, the idea began to seem crazily over-ambitious. Many people attended and the discussion ranged widely and at times fairly heatedly. Inevitably, it was impossible to come to many final conclusions, but several topics were usefully aired, and doors opened for more structured and clearly defined discussions and workshops in the future. An additional report of this meeting, by Chuck Birkeland, can be found in the PSA *Coral Reef Newsletter* No. 21, March 1990.

The role of ISRS

The question was posed: 'What is the role of ISRS in efforts to preserve coral reef biodiversity and improve reef management?' i.e. should ISRS as an organisation be taking an advocacy or advisory role in such issues or should it confine itself to research issues only?

This issue stimulated heated debate, and has also been addressed through correspondence in *Reef Encounter*. The general consensus of the workshop was that societies such as ISRS are set up primarily to facilitate communication between scientists and for the dissemination of scientific information and results of research. It is up to individual scientists to take on advocacy or advisory roles if they are so inclined; the diversity of opinions held by members of ISRS would often preclude ISRS taking any particular stance on an issue. Where scientists are willing to advocate, this can of course be very powerful, but it is the choice of the individual. Furthermore, there are many organisations already established to take on advocacy roles; the most important role ISRS can play is to encourage the dissemination of sound objective scientific information.

It was felt that if ISRS is to become a more environmentally oriented society, this should evolve naturally, through changes in the contents of meetings, the



Cartoon by Phil Davis

journal and the research interests of members. It was noted that some societies are indeed moving in that direction (e.g. the Ecological Society of America) in order to meet the demand for scientific data for managing natural resources. The Biological Editor of *Coral Reefs* stressed that manuscripts concerning environmental aspects of coral reefs are as welcome as those dealing with pure science but to date few had been received.

Nevertheless, it was agreed that ISRS could play a valuable role as a forum for information exchange between scientists and environmental organisations or individual conservationists seeking advice. *Ad hoc* committees could be set up to deal with particular issues and recommendations could be presented to the Society for approval. (An ISRS 'information officer' was not thought to be necessary). There are already some areas where ISRS could be assisting in the provision of data:

1. Advice on the environmental policies of multi-lateral development banks (MDBs)

John Ogden raised this topic in the last issue of *Reef Encounter* and in his presentation at Marseille. Some MDBs are incorporating ecological principles into their development plans and aiming for sustainable development but the emphasis is largely on the terrestrial environment, particularly tropical forests. Since many MDB projects have major impacts on the coast, there is a need for incorporation of the ecological requirements of coastal ecosystems.

ISRS could urge countries with votes on the reviewing boards of MDBs to take marine environments such as reefs into account, and could, for example, have an input into the guidelines being produced by the Oceanic Society. Since the workshop, John has been organising input from ISRS members on this issue.

2. Advice to international environmental organisations

Arthur Dahl, on behalf of the Oceans and Coastal Areas Programme Activity Centre (OCA/PAC) of UNEP, pointed out that international bodies such as UNEP need information on a variety of aspects of reefs (vulnerability, degradation, regeneration etc.) in order to determine conservation priorities and to persuade governments of the need for reef management. Advice is required on the type of data to be collected for monitoring, how such data should be managed, how data from diverse research programmes can be standardised, what international co-operative efforts can be established, and what long term studies are needed and feasible. 'Monitoring' the status of reefs worldwide is a major problem, given the plethora of different types of data becoming available and the difficulty in distinguishing natural variability and disturbance from human impact.

A UNEP Task Force on climate change is currently being established and ISRS could have an input into this; in this particular instance financial support may be available.

Further information from Dr Arthur Dahl, OCA/PAC, UNEP, P.O. Box 30552, Nairobi, Kenya.

What do developing countries need from coral reef scientists?

The second issue discussed at the workshop arose partly as a result of a 1988 workshop in Bangkok, sponsored by the US National Science Foundation (NSF) and the US Agency for International Development (USAID), on funding priorities for research towards effective sustainable management of biodiversity resources in tropical Asia (see *Reef Encounter* 5). The questions posed were: How can scientists themselves contribute to conservation efforts for reefs? What do reef conservationists need from scientists? UNEP, NSF and Unesco provided funds to bring two coral reef scientists from tropical Asia to participate in the workshop.

The Bangkok workshop had outlined three research priorities for maintaining the diversity of coral reefs: a) economic assessment of reef resources and functions (value and sustainability of reef fisheries, role of reefs in shoreline protection, contribution of reefs to other fisheries, recreation and tourism, etc.); b) testing of hypotheses on the causes of reef degradation; c) long-term ecological research (for assignment of causes of degradation and elucidation of phenomena such as bleaching, predator outbreaks etc).

Helen Yap and S.U.K. Ekaratne presented the viewpoints of the Philippines and Sri Lanka respectively. Both stressed that although management techniques are now often available, most reefs are in developing countries where poverty may be the limiting factor - management programmes may be impossible to implement if there is no feasible option for providing reef users with an alternative source of income or of making their use of the reefs sustainable. These countries may also often suffer from lack of government control and apathy towards environmental issues. The Philippines is perhaps exceptional in its comparatively sophisticated reef research programme and large number of qualified scientists, but it is significant that even the most scientific components of the programme are management-oriented.

Three themes, highlighted by these speakers, were discussed further:

1. The need to increase public and governmental awareness of the importance and economic value of reefs: Well publicised case studies could illustrate the value of reefs and provide an economic incentive for their conservation. The economic value of biologi-

cal diversity has been tackled at the general level and for terrestrial systems, but has only recently attracted the attention of marine researchers. Could there be a role for ISRS in helping to put together a set of papers covering such issues?

2. Finding viable and attractive alternatives for reef users currently misusing reef resources: Mariculture, ecotourism, community-based reserves etc. are often put forward as solutions, but there are still too few documented case studies, and the socio-economic aspects of the problem is often over-looked. It would be very valuable to document successful (and unsuccessful) management strategies and to quantify indirect and long-term economic and social impacts of different management strategies.

3. Improving research and training opportunities within developing countries: This subject was discussed only briefly, but has been expanded by Maya Borel-Best in this issue. The main points raised were that a) training should focus equally or more on practical management of resources rather than pure research, so that students do not only develop an interest in theoretical issues and lab work; b) resource economics and socio-economics should be included in training programmes and research should be encouraged to be interdisciplinary. There was some discussion of the advantages and disadvantages of training being undertaken in Western countries such as the UK, compared with training in the home countries of the students; the former often provides greater exposure to modern research techniques, a broader perspective and useful contacts for the future; the latter clearly provides a closer focus on the practical problems that have to be solved.

PROCEEDINGS OF THE 6TH INTERNATIONAL CORAL REEF SYMPOSIUM, 1988

The three-volume set is now available from The University Bookshop, James Cook University of North Queensland, Townsville, Qld 4811, Australia at Aus \$200 for the set, postage included.

Volume 1 contains the plenary addresses and status reviews by leading researchers which were presented at each of the 22 mini-symposia. These introduce the theme of the mini-symposia and provide a synthesis of past and on-going research work on these themes. Volumes 2 and 3 contain more than 200 contributed papers presented during the symposium by researchers from 49 countries in the fields of reef biology, ecology, geology and management.

CURRENTS

RESEARCH AND TRAINING IN DEVELOPING COUNTRIES

At the 1989 ISRS Annual Meeting in Marseille, Chuck Birkeland asked the question: 'How can coral reef scientists be most effective?' As it is an important question, often considered by many of us, particularly those working in developing countries, I wrote a general letter to ISRS giving my views. In order to give the topic a rather wider airing, I have been asked to elaborate my ideas here.

Since 1978, I have co-ordinated multi-disciplinary reef research in south-west Sulawesi, Indonesia, through the Buginesia Programme which involves co-operation between several Indonesian and Dutch institutions. The research has evolved from inventorying, through a descriptive phase, to studies of functional aspects. The information gathered will now be applied in the development of a management strategy for the sustainable use of the Sulawesi reefs and their associated ecosystems. Future co-operation will include: strengthening the Indonesian institutions involved, e.g. developing the field station at Barang Lompo (Ujung Pandang) for pollution monitoring; increasing training and education of students and technicians; research, including further reef inventorying and monitoring, quantitative ecology, trophic relations between coral reefs and seagrass beds, studies on the impact of river discharge, and impact of various forms of pollution.

My experiences on this programme have led me to the conclusion that one of the most important things that scientists from developed countries should do - and what is so often not done - is to co-operate with scientists from the local universities in developing countries. The latter are responsible for their reef systems and, as nationals, know much better how to influence their political leaders. Scientists from developed countries should not give so much priority to their own, often very detailed, research ideas.

Experienced and responsible scientists must distinguish between fundamental and applied research and more detailed esoteric research, and should give priority to the first when tackling reef problems in developing countries. There is of course an important role for the second kind of research, but concentrating on this can obscure the greater issue of the long term survival of the reef ecosystem as a whole.

Identifying coastal environmental problems in developing countries (through careful observation and enquiry) and trying to provide solutions in a co-operative way is the first step towards effective action to save the reefs from slow deterioration. The reason for the deterioration of coastal ecosystems, and their

potential demise, is over-exploitation by the local population for food, building materials etc, compounded by increasing sedimentation from land erosion and pollution from industrial activities. (The potential impact of sea level rise is another issue and needs to be approached from a global basis).

As co-ordinator of the Buginesia Programme, I know how difficult it is to understand the complexity of the problem and to obtain the confidence of scientists and policy makers in a developing country. It takes many years, and progress is slow. Detailed scientific results cannot be expected in the course of research directed towards reef protection; rather one has to aim for slow understanding and increasingly effective political action, aimed at keeping the ecosystems in a balanced form in which they will supply food and energy for future generations. Tropical countries, where reefs protect coastlines and provide nourishment for people, are often aware of the problems but lack the basic scientific knowledge to deal with them. They thus turn to scientists from the developed countries for help; this help must include identifying the local problems and co-operating on their solution, as well as carrying out basic research and teaching.

The training of scientists from developing countries is also an important issue. Co-operative programmes must include good students and opportunities should be given for them to follow general courses in marine sciences in the universities of developed countries. In addition to the course in Tropical Coastal Management available at the University of Newcastle upon Tyne in the UK, there is a post graduate training course available in Brussels known as FAME - Fundamental and Applied Marine Ecology. This is a two year inter-university postgraduate training course for scientists from developing countries, hosted by the Free University of Brussels (V.U.B.) and sponsored by the Belgian Organisation for Development Cooperation (A.B.O.S). Having obtained a Masters Degree, it is envisaged that trainees return to their own country and take up employment in the field of marine ecological research and management.

For further details of the programme, registration, conditions, list of courses etc., please write to: V.U.B. (Fac. WE), Laboratory of Systematics and Ecology - V.U.B., Pleinlaan 2, 1050 Brussels, Belgium.

Maya Borel Best, National Museum of Natural History, Postbus 9517, 2300 RA Leiden, Netherlands.

UPWELLINGS

This column is for contributors who want to take issue with facts and views expressed in recent publications, including *Reef Encounter*, or to give vent to any other views on the subject of reefs, including ISRS.

ISRS Membership

Membership of ISRS is still small compared with the large number of practicing reef scientists. What is holding back this silent majority from joining, and how can the society improve matters to become the foremost in its field?

Recently I read an account of the history of the British Ecological Society (Sheail, J. 1987, Blackwell Scientific Publications, Oxford) which provides an interesting perspective. Today the society is extremely successful with nearly 5000 members and assets of more than £750,000 sterling. It currently disperses around £60,000 sterling a year in the form of grants for ecological work, attendance at meetings etc. The BES is clearly viewed as an 'essential' society by a great majority of British and many overseas ecologists. Why is this so? Benefits of membership include cheap rates on four large society journals, a quarterly Bulletin, many meetings annually, and the possibility of applying for funding for numerous ecological activities. The financial success of the society appears to be founded mainly on strong, well-respected journals. This has allowed it to produce an excellent newsletter and provide so many fringe benefits for members.

I would like to see ISRS as the 'essential' society for reef scientists, providing an umbrella organisation for local and international meetings and a forum for rapid transfer of new ideas and opinions. To do this, more members are required and these must be attracted by more obvious benefits of membership. Clearly, increases in the size and frequency of the newsletter provide one improvement, and this has been previously discussed in *Reef Encounter*. However, the journal *Coral Reefs*, whilst of good quality, is very small. The editor reported at the 1988 AGM (I was unable to attend the most recent) that rejection rates were high. Would it not be better to expand the journal, thus improving its coverage and appeal? I'm sure that this would be possible without reducing quality and would make the journal, and hence the society, much more attractive to subscribers. An expanded journal would also bolster institutional subscriptions which would provide a stronger foundation for the society's finances.

I understand that Springer-Verlag is an expensive publisher and that this has acted to restrict the size of *Coral Reefs* in the past. A move to a cheaper publisher would allow the necessary expansion. I for one would prefer a less glossy journal but one with more

The shell trade

meat in it. For example, *Animal Behaviour* is produced very well, but far less flashily than *Coral Reefs* and yet each monthly issue contains 15-20 papers and short notes. Over the year I get excellent value for my subscription. In contrast, *Coral Reefs* provides only around 30 papers a year of which I read up to ten. This works out very expensively, and is, I am sure, a major disincentive to membership, especially since many reef scientists must have access to institutional copies.

I believe that a larger, and so more useful, journal would act as a key to improving the fortunes of ISRS. A useful goal would be to double the number of papers produced a year. Increased revenues and a larger membership would feed back to provide funding for a larger newsletter which would further improve membership. Perhaps the society might eventually reach a position where it could provide small grants for research. This is the path which has been followed by the British Ecological Society. Perhaps a good point to begin would be to review the value for money provided by Springer-Verlag, and compare this with several competing companies known to produce good society journals.

Callum Roberts, c/o Tropical Marine Research Unit, Department of Biology, University of York, York YO1 5DD, UK.

Clive Wilkinson, Biological Editor of *Coral Reefs*, gives the latest plans for the journal on p. 4.

The newsletter is very topical, bringing up the many problems associated with reef conservation. I have had an opportunity to see a fair number of tropical reefs in areas where they are under stress from fishing, coral and shell collecting, and spent much of my childhood in a tropical environment close to reefs.

I do not collect any live coral and avoid collecting live shells, but I am very ambivalent about what to do in relation to local people who collect shells for sale. For example, at Port Blair in the Andamans, there is an active trade in shells for the production of curios which are locally cut, polished and assembled into lamp shades, ash trays, buttons, junk necklaces and bric-a-brac, and then sold elsewhere in India. Like many other travelling scientists, I have seen the same in the Caribbean, Thailand, Indonesia, New Guinea etc. Usually I ask where the shells come from, how they are caught and so on. I try to find the original 'harvesters'. **And I buy their largests and best shells to save them from the subsequent massacre in their workshops.** I also try to point out that this resource is limited and that they should contact regional experts to help them preserve it. At the rate shells are being taken from the sea bed in many places, often in mountainous tons a year, many localities must be nearly exhausted. Am I contributing to the decline by these museum specimen purchases? I don't think so: it is perhaps more like saving rare antiquarian books before they perish in libraries or on the scrap heap.

Perhaps members of ISRS can be issued with several hundred pamphlets a year, like the ones produced by the UK-based Marine Conservation Society, which we can distribute to local shell dealers when we encounter them. I would be prepared to pay towards their cost.

Paul Copper, Laurentian University, Sudbury, Canada P3E 2C6.

There are plenty of anecdotal reports of over-exploitation of molluscs as a result of the shell trade, but very few good scientific studies to show what is really happening. We need to encourage work on this topic. If any ISRS members think they could usefully distribute some of the leaflets produced by the Marine Conservation Society, please get in touch with Sue Wells.

Clippings from
The Independent
February 1990

The free treasures of the seashore

THE income has been a sou... artists and design... centuries.

Shells can be seen in porcelain... pottery and bronze; they turn up in elegant clusters on plaster ceilings, on chairs or the cresting of cabinets. Still-life painters have used every variety, from the common water snail to the oyster and the cowrie.

Phillips auctioneers spent two days last week dispersing a collection of shells in pottery and porcelain owned by Colin Harper, a Jersey-based tax lawyer.

Mr Harper had been planning to open a shell museum in Jersey and had formed a spectacular collection of shell-related objects to accompany his established collection of 20,000 shells.

The objects included a Derby porcelain figure of Neptune on a shell-encrusted stand (sold for £4,290), Chinese scallop-shaped pickle dishes made for the British market in the early eighteenth century (about £100 each) and a nineteenth-century cameo glass vase decorated with coral and shells (£2,970).

Mr Harper decided to sell his shell-related artifacts after discovering the prohibitive cost of establishing a museum. Their sale netted him £350,000. But Mr Harper, one of the most decorated of a large band of shell collectors, has passed on his passion, developed during childhood - sparked by a visit to a Royal Scottish Museum shell exhibition.

The appeal of shell collecting, for children and adults alike, is that most shells can be picked up for free on the seashore. Rare or more spectacular varieties, how-

The variety, not beauty, is the most popular shell... decorative arts is the scallop, which the fishmonger will provide free of charge if you buy some for supper.

The scallop shell can hardly be considered a collector's item, but it is useful as a cooking utensil (ovenproof), an ashtray or as a tiny container. And it always looks attractive.

"It is the sheer beauty of shells that makes them so popular with collectors," says Colin Harper. Enthusiasts who get seriously "bitten" by the hobby buy, sell and exchange shells to improve their collections, but the market is not wide enough to be predictable.

"The problem with shells at auction is their fluctuating value," says Harper. "A shell might be given an estimate of £400, only to be worth £4 should a hundred more be discovered the next day."

Unusual finds are generally made in deep water during scientific research.

Avid collectors become just as animated over spectacularly-coloured or well-formed shells of a known variety as they do over rare specimens which hide, uncatalogued, deep below the ocean surface.

For this reason, perhaps, Colin Harper describes shell collecting as being "a purer form of collecting than ceramics or paintings".

lect... year-o beauty. 6,000 sh.

The ci each year, London members to tion and shel their collection

"The aim of t an interest in t age membersh people," says Mr He urges you contact the club. lists and informat cifically for children. buy a beginner's book. learn as they go along.

Shells are collected i based on size, color... habits

... restrict damage co-proprietor of Eatons shell shop in London's Covent Garden and the author of a pocket guide on shells, says that the majority of shells are by-products of various native diets, and would go to waste without the attention of collectors.

"We are aware of the need for conservation," he says. "Problems arise when Third World countries realise the marketing potential of a specific shell and over-cull their area."

Kate Bernard finds that collectors of shells are motivated by a love of beauty

Price of treasures

From Dr Elizabeth Wood

Sir: I am as concerned as much with what is missing from Kate Bernard's article on "The free treasures of the seashore" (Collecting, 3 February) as with some of the sentiments expressed. It was not made clear that most shell collectors will not make do with beachworm (dead) shells, but insist on specimens being taken alive. Only these have perfect, shiny shells.

It is true that some are eaten and the shells then made available for collectors. But this does not necessarily mean there are no conservation problems. The famous Queen Conch from the Caribbean is exploited mostly for food, but also for the curio trade. An estimated 12 million animals are collected annually and popula-

tions are seriously overfished and declining.

Perhaps most worrying was the way the article catalogued the virtue of collecting rare shells. These are particularly at risk because many of the species concerned exist only as isolated populations. Shell collecting is mostly an unregulated free-for-all which is moving ahead faster than the management programmes many developing countries are trying to introduce to control the exploitation.

Shell collecting involves killing living animals. It should not simply be portrayed as a harmless hobby suitable for young people to take up.

Yours faithfully,
ELIZABETH WOOD
Coral Reef Conservation Team
Marine Conservation Society
Roas-on-Wyc, Hertfordshire
6 February

Preservation of Biodiversity

Following up on the letter from Jeremy Woodley in the last issue of Reef Encounter, written in response to the article by Chuck Birkeland last year, William Allison, project leader of the CIDA funded project on fisheries management in Discovery Bay, adds this:

My work so far leads me to believe that, as was stated (by Chuck Birkeland), the essential requirements for preservation of biodiversity and the prevention of resource over-exploitation are: a) collective commitment and action by the users; b) education to build organization, win commitment and give direction to action; and c) most critically, alleviation of poverty. Education can give appropriate direction to action, but if action costs anything (and it will) then nought will come of education unless the economic manacles can be removed. Thus the development of alternative income earning activities must be a community development goal paralleling the education goal. And this economic relief must be in the short run - not a promise of a brighter future. As a Jamaican proverb puts it 'While the grass grows, the horse starves.'

William Allison, Fisheries Project, Discovery Bay Lab, P.O. Box 35, Discovery Bay, Jamaica, W.I.

Monitoring reef health

It seems to me that we are not using enough of our medical expertise to resolve problems at the base of the ecosystem. For instance, with some notable exceptions, there is comparatively little known about the bacteriology and virology of reef communities. Yet, by implication, they are obviously critical to the welfare of a reef, on both an interstitial and macro-scale. With changing water levels as a result of coastal urbanisation and deforestation, this can be of domestic importance.

There is clearly a need for sound physiological monitoring of the tolerance of a range of indicator species. In so far as these taxa calcify, such work would also have its use for geologists. Time-markers have been employed in freshwater systems using diatoms as indicator species. But this data is largely in the form of taxonomic lists rather than metabolic markers. We are beginning to acquire quite a good database but it still requires personal searching before much use of it can be made by the legislator wishing scientific support for practical decisions.

Has the time come for appointing a full time reef scientist to prepare rigorous scientific reports for sale to interested parties, much as the *Economist* publishes *Economic Reviews* of selected regions on an *ad hoc* basis? Could UNEP be persuaded to fund such a posting? If the World Wildlife Fund is able to

consider marine matters, they might be persuaded of the importance of supporting such research into coastal areas marginal to popular tourist venues.

Julia Hubbard, *The Geological Studies Group, King's College London, The Strand, London WC2R 2LS.*

See report of the Marseille workshop (p. 6) for further ideas on these topics; funding from UNEP and WWF is difficult to obtain unless projects are closely tied in with the conservation programmes of these organisations, but UNEP is certainly concerned with coral reef issues.

PROTOTYPE SPATIAL DATABASE FOR THE WIDER CARIBBEAN

This project is being developed to support the UNEP Regional Seas Caribbean Action Plan. It will be capable of relating a variety of data essential to identifying environmentally sensitive areas and other issues in the Wider Caribbean, including the Gulf of Mexico. Two protocols of the Plan, the Specially Protected Areas Protocol and the Land-based Sources of Pollution Protocol, will employ information from the database.

Phase One work will include the creation of approximately 25 digital themes or map layers, including coral reefs, pertaining to the biophysical environment and human activities throughout the study region. This project is being undertaken under the sponsorship of the UNEP Regional Coordinating Unit in Kingston, with the financial support of the US EPA's Office of International Activities.

The data for this phase of work will be manipulated and displayed using the SPAN Geographic Information System (GIS) but database files in a variety of commonly used GIS and CADD formats will be available for future use by interested agencies. Final products of this phase will also include database documentation and paper maps.

For further information, contact: Eric Carlson, James Dobbin Associates Inc., Coastal and Ocean Planners, 110 North Royal St, Suite 300, Alexandria, Virginia 22314, USA.

FEATURES

OUTLINE OF SOMALI QUATERNARY CORAL REEFS

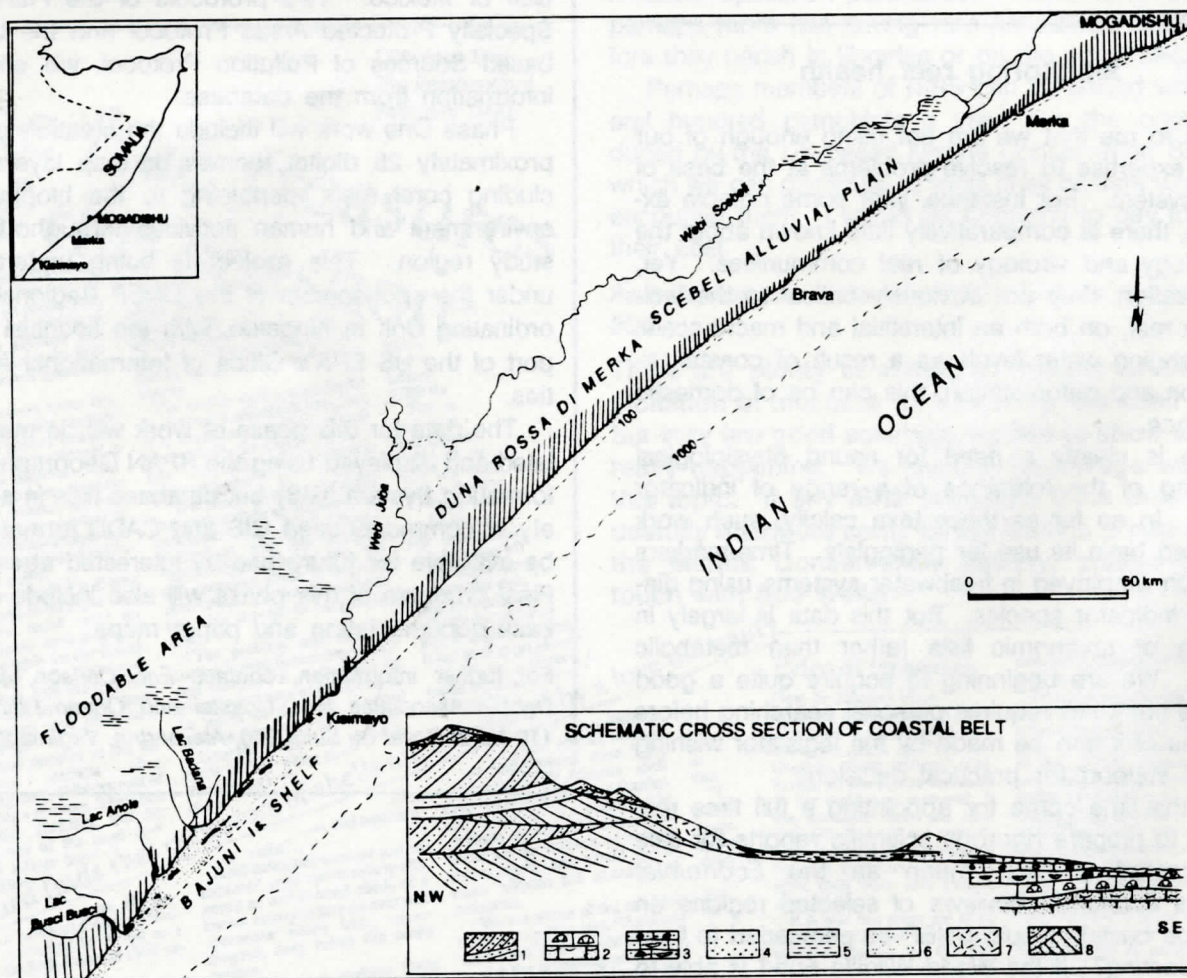
Federico Carbone and Ruggero Matteucci

The first International Meeting on Geology of Somalia and surrounding regions (Geosom 87) was held in Mogadishu in November 1987. Sponsorship was provided by the Ministry of Culture and Higher Education and the Ministry of Mines and Water Research of the Somali Democratic Republic, the Unesco Division of Earth Sciences, the Department of Cooperation for Development of the Italian Ministry of Foreign Affairs, the International Union of Biological Sciences, and the Geological Society of Africa. This was a suitable occasion to look at Quaternary reef evolution along the Somali coast. With the collaboration of the Department of Geology of the Somali National University, a field trip along the coast in the Mogadishu and Kisimayo areas and a boat excursion to the Bajuni Islands were organised. As the geology of the coastal raised reefs is poorly known, we think it useful to report on the current state of knowledge of this area, as discussed at Geosom 87.

Geological setting

The geological pattern of the Somali coastal region is mostly characterised by raised Quaternary reefs and eolian deposits. The outcropping lithofacies represent the last part of a Plio-Quaternary sedimentary sequence, described by Carbone and Carush (1981), Carbone *et al.* (1984) and Piccoli *et al.* (1986) as the 'Merca Formation'. This formation is characterized by marine (coral buildups, beach and bar sands) and continental (predominantly eolian sands and paleo-soils) deposits. The eolian deposits form sandy bodies of different composition, accumulated mostly by the action of the monsoons. Siliciclastic sands, derived through breakdown of acid igneous rocks inland, form a wide, thick and homogeneous sedimentary body which runs parallel to the coast, separating a narrow coastal belt from the wide alluvial plain of the

Fig. 1. Sketch of the southern Somali coast. 1: Reddish quartzose sandstone, 'Duna rossa di Merca'; 2: Transgressive sequence - quartzose beach and bar sandstone covered by reef grainstone-rudstone with branching and massive corals, often in growth position; 3: Regressive sequence - reef grainstone-rudstone, often rubble with many red algal nodules and sheety corals; 4: *Asaphis* beachrock; 5: Fine quartzose reddish soils; 6: Calcareous and quartzose sand, mobile or stabilized coastal dunes and eolianites; 7: Fans produced by accelerated erosion of 'Duna rossa di Merca'; 8: Quartzose mobile sand, dune fields.



Scebeli River. The sediment is always well sorted and is a deep red colour owing to the presence of a film of iron oxide covering the quartz grains. Within this important sedimentary unit, known in the literature as 'Duna rossa di Merca', cross-stratification and lamination are present, as well as surfaces due to erosional phases and variations in the direction of material transport. Between the 'Duna rossa' and the coastline, there are outcrops of more recent eolian deposits, consisting of white sands and eolianites generally overlying marine calcarenites and reef deposits. The latter are generally cut off at the top by a flat surface, dipping slightly seawards.

The wide, flat coastal region extending from Kisimayo to Kenya has two peculiar morphological elements: the Bajuni archipelago, and the three channels entering the sea through large mouths near the villages (from north to south) Istanbul, Kudai and Bur-gao. Landwards, these channels consist of braided streams: Lac Badana, Lac Anole and Lac Busci Busci. This region has a subendorheic regime, and extensive areas are flooded during the rainy seasons (May-July, September-October), when the channels drain large quantities of freshwater to the sea.

In contrast, the coast from Kisimayo to Mogadishu is rectilinear, without islands or river mouths, except the Juba River just north of Kisimayo. Coral buildups and skeletal limestones, well exposed along the shore line and in quarries near Kisimayo, are generally covered by ancient and recent carbonate and quartzose dunes. The ancient carbonates consist of well cemented eolianites often cross-bedded, while the recent ones consist of dunes, either mobile or stabilized by vegetation. Eolianitic deposits, some tens of metres above sea level, also make up the structure of the Bajuni archipelago.

Fossil coral reef facies and associated sediments

Scattered along the coast north and south of Mogadishu and in the Kisimayo region, fossil reef facies are exposed both in natural cuts along the current cliff line and on several walls of abandoned or active quarries (Carbone *et al.*, 1987; Carbone and Matteucci, 1987). These represent nearshore depositional environments, assuming that large parts of the reef complexes have been destroyed by present-day erosion.

The raised reef deposits outcropping near Mogadishu are represented by a set of mostly sandy biogenic facies, rich in coralline algae and hermatypic coral remains. A range of textures has been recognised, from skeletal grainstones and rudstones to true, often well preserved reef buildups. *Acropora* occurs in large thickets characterising backshore areas, while massive corals (poritids and faviids), sometimes associated with *Galaxea*, occur along the coast line. In some places, large colonies, 0.75 m high, occur in their growth positions.

Coralgal facies are also well represented, with red algae encrusting branches of *Acropora* or large masses of alcyonarian spicules. The lithofacies outcrops along the coastal cliffs and in various quarries in the outskirts of Kisimayo indicate different environments of a shallow water carbonate shelf. A reef complex, 1.5-2 m high, outcrops in different areas along the coast. The coral colonies are mainly encrusting-massive and massive (*Favia*, *Favites*, *Goniopora*, *Porites*) and are mainly in life position. These dome-shaped colonies are often covered with coarse skeletal sediment. The transition to eolian sediments is marked throughout the area by a thin reddish paleo-soil level. In the backshore areas a lagoonal sequence shows a clear regressive trend towards the top, with beach sands containing spherical concretions, probably coconut moulds, and shallow water oyster patches.

Sequence of events

The sequence of events cannot be definitely placed in the Pleistocene, as absolute time dating of the raised coral reefs is lacking. Nevertheless, assuming relative tectonic stability of this coast, a correspondence between the basal transgressive episode and a depositional event of the last interglacial stage (120,000 years b.p.) could be hypothesized. A more recent age cannot however be excluded, as raised reefs of younger ages have been recognised on other Indian Ocean coasts. In these cases, the reefs are interpreted as having been raised not only by tectonic uplifting but also by possible hydroisostatic adjustment of the ocean basin. On the other hand, it is more difficult to attribute the emerged reef of the Somali coast to the last but one interglacial stage, as the evidence of different depositional cycles is lacking.

The Holocene transgression is shown along the Somali coast by a sea level stand, 1-2 m above the current level over the last few thousand years. The evidence for this phase is found south of Kisimayo as old notches and beach rock along the islands, coast and inner channels. Traces of the same phase are also present near Mogadishu, represented by transgressive coastal deposits containing *Asaphis deflorata*, about 1 m above sea level. Thus uniform behaviour of the southern Somali coast during the Holocene transgression is a reasonable possibility.

REFERENCES

- Carbone, F. and Carush, M.C. 1981. Lithofacies map of the Quaternary deposits of the Benadir coast from El Adde to Gesira (Somalia). Università Nazionale della Somalia, Facoltà di Geologia. Somali Printing Agency.
- Carbone, F., Matteucci, R. and Carush, M.C. 1984. Schema geologico della costa del Benadir tra Gesira ed El Adde (Somalia Meridionale). *Boll. Soc. Geol. It.* 103: 439-445.
- Carbone, F. and Matteucci, R. 1987. Quaternary sedimentary sequence outcropping in the Kisimayo region. In: Carbone, F. (ed.). *Modern and Ancient Coral Reefs and Coastal Sediments along the Southern Somali Coast*. Guidebook Excursion C, International

meeting 'Geology of Somalia and surrounding regions. CO-TECNO, Rome. pp. 35-43.

Carbone, F., Matteucci, R., Russo, A. and Yusuf, S.M. 1987. Quaternary coral reefs along the Mogadishu-Jesira coast. In: Carbone, F. (ed.). *Modern and Ancient Coral Reefs and Coastal Sediments along the Southern Somali Coast*. Guidebook Excursion C, International meeting 'Geology of Somalia and surrounding regions. COTECNO, Rome. pp. 1-22.

Piccoli, G., Boccaletti, M., Angelucci, A., Robba, E., Arush, M.A. and Cabdulqaadir, M.M. 1986. Geological history of central and southern Somalia since the Triassic. *Mem. Soc. Geol. It.* 31: 415-425.

Federico Carbone, *Centro di Studio per la Geologia dell'Italia Centrale, C.N.R., P.A. Moro 5, 00185, Rome, Italy;*
Ruggero Matteucci, *Dipartimento di Scienze della Terra, Universita La Sapienza, P.A. Moro 5, 00185 Rome, Italy.*

onslaught of the Indian Ocean, preventing severe erosion of the eastern seaboard. In the areas surveyed so far, the reef slopes gently (about 10 degrees) to a depth of 20-25 m, the actual width of the reef varying from 10 m ('The Wall') to 180 m before generally prolific coral growth is replaced by sand and coral rubble. The lack of hard substrate prevents extension into deeper water.

There was little variation in reef topography. The evenly undulating aspect was interrupted by small drop offs, larger-sized coral bommies and areas with gullies and spurs. The reef crest is generally noted as the area of maximum wave action, where large ocean rollers (observed during the north-east monsoon - the effects of the south-east monsoon have not yet been seen) are the dominant effect on the coral community. Surveys from 2-6 m depth showed that in these white water areas the reef was predominantly covered with soft coral, encrusting algae and sponges and hardy corals such as small colonies of *Pocillopora*, *Porites* and *Favia*. Coral cover increased with distance from the reef edge and with depth, being generally highest at 10-17 m, after which cover became generally more scattered, interrupted by patches of sand and rubble. Soft coral cover increased in the deeper part of the reef, with colonies growing on rubble and dead hard corals.

Surveys at 43 sites along the outer south-east fringing reef were restricted to coral genera, as detailed *in situ* identification to species level proved impractical given the short time periods (maximum 60 minutes) under water. To date, 32 scleractinian genera have been positively identified, similar to the number reported in the existing literature, although it is expected that more will be identified. There is a prolific and diverse fish population associated with the reef, 123 species in 21 families having been recorded, and a large number still awaiting identification.

The inner waters of Chole Bay and 'Jujima' Bay were calmer but were subjected to rapid tidal flow in some areas. For example, the Ferry Channel experienced strong tidal currents and the bottom was covered in a rich variety of suspension feeders and sponges. The development of small coral outcrops and patch reefs in these bays was generally restricted to the availability of hard substratum. The southern end of 'Jujima' Bay, where a brief survey revealed large coral bommies up to 6 m in height, has not been explored in detail. Strong currents also made it difficult to survey the inner regions of Kinasi Pass. It is hoped to include these areas in a later survey, as they may reveal interesting biological adaptations to living in naturally adverse conditions.

The shallow intertidal zone off the south-east coast was both extensive in area and varied in community. The eastern coastline was mainly narrow and the lime-

REEF SURVEY, MAFIA ISLAND, TANZANIA

Gudrun Gaudian

Mafia Island (45 km x 12 km) is situated about 60 km south of Dar es Salaam, opposite the Rufiji Delta, and is one of three major islands along the Tanzanian coast. The island has a population of several thousand people who make a comparatively good living, mainly from artisanal fishing, as well as small scale husbandry and rice growing. In addition, large areas of Mafia are covered with coconut plantations, the harvest being exported to Dar.

A detailed marine survey of the southeastern shores of the island was conducted from October 1989 to March 1990 to collect baseline data with which to establish the zoning within a proposed marine park. It is envisaged that the whole southern section of Mafia Island should be protected under legislation allowing sensible management of traditional ways of life, tourism, conservation and research. Tutia Reef and Chole Bay within the study area have already been designated reserves, but have never been implemented due to lack of legislative powers, funds and facilities. Although there is local interest in protection of the reefs. A variety of habitats, including exposed fringing reefs, intertidal expanses, swamps, mangroves and areas subject to strong currents lie within a 200 sq km area.

Sponsored by the People's Trust for Endangered Species, several scientists from the UK surveyed 25 km of fringing reef and vast areas of intertidal flats including mangrove forests. A group of amateurs, mainly recently graduated students recruited by the Society for Environmental Exploration (Frontier) based in London, was trained to identify major taxa and to collect data using a customised version of the Reefwatch checklist for subtidal areas and a tabular format for intertidal areas.

The fringing reef stretches almost continuously from the northern tip of Mafia to Tutia Reef in the south and plays a vital role in protecting the island from the

stone bedrock along the shore gave rise to characteristic cliffs and wave-cut platforms. At the edge of these narrow flats a raised crest usually dammed the ebbing tide and allowed shallow lagoons to persist at low water. The fauna and flora of these shores differed in composition and abundance from those of the sheltered coasts. Where sand and sediment accumulated, seagrass dominated the benthos of the middle shore, extending up to 3 km from shore, and supporting a wide variety of invertebrate fauna. Mangroves were common along most of the sheltered shoreline, usually less than 200 m in width, except for some larger more complex areas.

The five month visit gave the general impression that the south-east part of Mafia is a relatively healthy ecosystem, with an apparently stable equilibrium between production and exploitation. None of the areas visited showed signs of gross destruction or pollution and, on the contrary, the reefs seemed pristine and the intertidal flats showed little sign of over-exploitation. However, there are threats from encroaching developments and it is important to forestall potential impacts from increasing tourism, improved fishery methods and growing demand for marine resources from the burgeoning population. This could be achieved by designing and implementing a management scheme, involving zonation of intertidal and subtidal areas for different activities.

The success of the survey showed that the concept of using amateurs to collect basic biological data is feasible. The remaining unexplored areas to be included in the proposed marine park will be investigated over the next six months, using similar methods and developing further research projects. It is also hoped that work will start on developing the park.

Gudrun Gaudian, TMRU Ltd, Biology Dept., The University, York, YO1 5DD, UK. Further details about the project can also be obtained from: Nicholas Payne, Frontier, 427 London Fruit & Wool Exchange, Brushfield St, London E1 6EL, 071-3752390.

REEF EXPEDITIONS PLANNED FOR 1990

The following expeditions have been planned by UK-based groups of students or other individuals:

Mollusc '90: An Expedition to the Coastline of Kenya and Tanzania

To assess the effectiveness of the National Marine Parks in protecting shell populations against collection for the commercial shell trade. July - September 1990. Contact: R. Thompson, 23 Chester St, Sanddyford, Newcastle-upon-Tyne, NE2 1AT, UK.

Continued on p. 17.

STUDENT'S VOICE

This column is for students - members and non-members alike. Write with news of your projects, requests for help and opinions on current reef research, ISRS or any other reef issues of interest.

Preaching to the converted?

I have been a student member of ISRS for two years and would like to make a few comments and suggestions regarding the society and *Reef Encounter*.

I first became aware of ISRS at the West Indies Laboratory where I was a student and then a laboratory supervisor. I understand the importance of marine ecosystems and feel that ISRS could be an important group not only for increasing our understanding of reef ecosystems, but in dispensing that knowledge and helping to create policies for the conservation of these environments. For all of these reasons I have remained a member even after 'leaving' the field for graduate school at Tufts University Medical School.

The December issue of *Reef Encounter* had several good articles concerned with the fragility of coral reef ecosystems and the need for further research and conservation efforts for the continued survival of these important ecosystems. Unfortunately these articles were directed at the wrong audience. The people who read them already understand the dangers that many reef systems are facing. The research done by members of ISRS must not only be communicated to other members, but to the policy makers (i.e. government leaders) and the general public. I would like to suggest that in the next issue of *Reef Encounter* members should be urged to write their government leaders as well as editorials for local newspapers. *Reef Encounter* should list the addresses of critical government leaders, especially those that head important committees. ISRS members are already involved in understanding the past and present of reefs and in this manner ISRS can begin to have an impact on the future of reefs.

As mentioned in the December issue there are large stocks of back issues of *Reef Encounter*. There are several undergraduate programs similar to the one at the West Indies Laboratory and they all draw students who have a keen interest in the marine sciences. Would it be possible to obtain lists of students attending these programs and send them a copy of *Reef Encounter*. This may increase student membership of ISRS which, as mentioned in the last issue, is badly lacking.

Scott Ogg, 28 Claremont Park, Boston, MA 02118, USA.

If you could make use of back issues of *Reef Encounter*, please contact Sue Wells.

COUNTRY PROFILE

CORAL REEF SCIENCE IN EGYPT

**Callum Roberts and Julie Hawkins,
and staff of the Marine Research Centre,
Sharm-el-Sheikh**

Egypt is fortunate to have over 2000 km of coastline bordering the Red Sea of which the majority is fringed by coral reefs. These are rich and well-developed in most areas except the northern two thirds of the Gulf of Suez and the far northern Gulf of Aqaba. In these latter areas, low winter temperatures, among other factors, restrict reef development.

Glorious past

The heyday of reef research was from 1930 to 1967 when the marine station at Al-Ghardaqa (Hurghada) was very active, first under the direction of Cyril Crossland and subsequently Hamed Gohar. Enough work was done to fill a house journal as well as providing contributions to international journals. Important early work was conducted on coral biology and taxonomy, fish taxonomy and physiology of dugongs. In the late 1960s, output from the station went into decline and has never recovered since. Following Gohar's retirement in 1967, nobody could be found who was interested enough to manage the station and today it is virtually unused.

Recent initiatives

Following the return of the Sinai from Israel in 1982, Suez Canal University took over a small part of a field school which the Israelis had established at Sharm-el-Sheikh. Four years later the university managed to obtain funding through the European Community to develop the school into a research centre and marine science department, with the collaboration of Liverpool University in Britain. In 1988 they took over the whole school. Lacking the personnel necessary to run this centre, the approach has been to provide training to those who will make up its future staff. Ten people have been appointed and are currently studying diverse aspects of reef science, including seagrasses and mangroves, for masters and doctoral degrees.

This programme has not been without its problems. In 1988 the site of the Research Centre was sold by the Government for tourist development. Despite prolonged and vigorous lobbying this decision has not been reversed. However, an agreement has been reached for the transfer of facilities to a new site 12 km away. These difficulties have meant that one of the goals of the project, to open the centre to international researchers, has been delayed. However, Suez Canal University hope to accept visiting scientists from 1991.

Reef research is also undertaken by a small number of staff from Al-Azhar and Ain Shams Universities in Cairo, and the Institute of Oceanography in Suez does some work on reef-associated fisheries.

Environmental protection

Legislation was finally passed in 1983 declaring Ras Mohammed Egypt's first marine park. Initially, this and the military presence in the area were enough to ensure its protection. However, rapid tourist expansion has now demanded more active management of the area, which has been expanded and includes Tiran Island. Another European Community project was established in 1989 under the direction of Michael Pearson to produce a management plan and coordinate the development of the park's resources. A visitor centre and park headquarters are now under construction, and park wardens are being appointed. A monitoring unit is also being established to produce an inventory of the park's resources and ensure that management is effective. Future plans include extending protection northwards up the Gulf of Aqaba, within the framework of a coastal zoning scheme.

Threats to the area

The most serious threats to the Egyptian reefs are oil pollution and a proposal to bridge the Strait of Tiran from Saudi Arabia. Oil pollution is concentrated in the



Fig. 1. The north-eastern region of Egypt showing locations mentioned in the text.

Gulf of Suez where there are several oil fields. A major spill in 1982 affected a large area, extending down the mainland coast into the Red Sea proper. There have also been several recent spills from rigs. The problem is compounded by shipping accidents and tankers illegally washing their holds *en route* through the Gulf of Suez. A further European Community project is currently being developed to establish an oil spill response unit, the headquarters of which are likely to be within the Marine Park.

A recent proposal has been tabled to construct a bridge from Saudi Arabia across the Strait of Tiran. This area contains some of the best reefs in the northern Red Sea. All three proposed routes involve extensive infilling of reefs and would cause serious degradation. Patch reefs in the Strait are a major tourist attraction and bridge construction would destroy this amenity. Furthermore, damage to living communities caused by construction would be likely to weaken the very foundations of the bridge. There appears to be a general consensus that the bridge is not needed in any case. The fact that it would damage a large part of Egypt's only marine park must surely represent a major test of the government's commitment to marine conservation.

Tourist development

Egypt has been slow to develop the Red Sea coast, and construction is limited to a few small towns. However, recently there has been a very rapid expansion

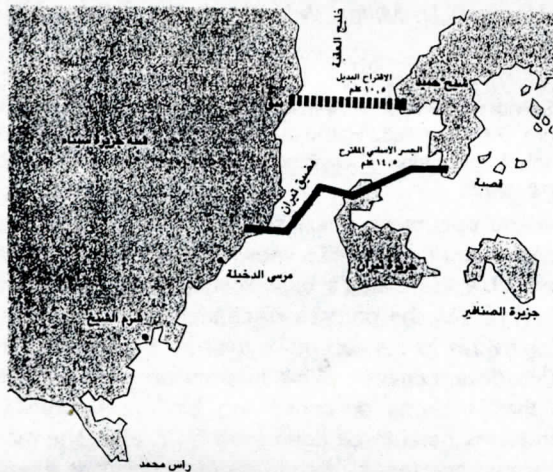


Fig. 2. Proposed routes for Saudi/Egypt causeway.

sion of tourism aimed primarily at divers. This has been concentrated in the Sinai, and at Sharm-el-Sheikh in particular. In the last four years eight new hotels and seven diving centres have been built in Sharm-el-Sheikh and further development over about 20 km of coastline is envisaged. At Dahab and Nuweiba, development has progressed more slowly, but here too increasingly large numbers of divers are visiting the reefs and extensive hotel development is

planned. Hurghada is the other main destination and here tourist facilities are well provided for. In addition, charter boats from Eilat, Hurghada and Sharm-el-Sheikh take people to dive on the reefs around Sinai and the northern Red Sea.

As a result of this increase in diving activity, reefs at some of the most popular sites are becoming degraded. For example, a conservative estimate suggests that over 75,000 dives are now made annually at only four sites at Ras Mohammed (over 50/dives/site/day). Research is now underway to assess the impact of this recreational diving, based at the Research Centre in Sharm-el-Sheikh. Preliminary data show that heavily-dived sites have more broken coral, more loose coral fragments, and more partially dead colonies than little-dived sites. It is already clear that there is a pressing need for proper management of diving.

Marine Research Centre, Environmental Institute, Sharm-el-Sheikh, Egypt.

Shortly after this article was written, the President of Egypt decided to move the Suez Canal University from the Marine Research Centre in Sharm-el-Sheikh to allow hotel construction to begin. This overruled a recent decision to allow the university to remain until a new Research Centre had been built, and so will interrupt the research programme and put into doubt the future conduct of reef research from Sharm-el-Sheikh.

Current address of Dr Callum Roberts: c/o Tropical Marine Research Unit, Dept Biology, University of York, York YO1 5DD, UK.

EXPEDITIONS continued from p. 15

Cambridge Mexico Reef Survey

To quantify the state of the Yucatan reefs with particular reference to sedimentation damage caused by recent hurricanes, mining activities and increased tourism. Collaboration with the University of Merida may lead to continued monitoring of the sites studied. July - September 1990. Contact: *Dr Neil Bourne, PCS, Cavendish Laboratory, Madingley Rd, Cambridge CB3 9E.*

Joint Services Expedition to the Chagos Archipelago 1990

A 10-month expedition to study the terrestrial and marine ecology of the Chagos Archipelago; military divers and support staff will assist scientists from a number of UK institutions. (There will be collaboration with the research project being organised by the UK-based Marine Conservation Society, see RE 6, p.18). November 1990 - September 1991. Contact: *Major Moody, ASU RAOC NEDIST, Piave House, Piave Road, Caterick Garrison, North Yorks, DL9 3LR.*

Liverpool University Diving Expedition

To survey the reef sites in the Cayman Islands which are particularly popular with recreational divers, and to investigate the impact of Hurricane Gilbert. July - August, 1990. Contact: *P. Jassar, 18 Amphill Rd, Aigburth, Liverpool L17.*

North Caicos Expedition 1990

To survey reefs off North Caicos Island, as part of an on-going programme to establish marine parks in the Turks and Caicos (see report p.xx). June - July 1990. Contact: *D. Meakin, Dept Applied Biology, University of Hull, Cottingham Rd, Hull HU6 7RX.*

WHO'S WHO?

INTACH, A & N Chapter and SANE

The Andaman and Nicobar Chapter of the Indian National Trust for Art and Cultural Heritage (INTACH) and the Society for Andaman and Nicobar Ecology (SANE) are aiming to survey the reefs of the Andamans and Nicobars with funding from NORAD, and have initiated an education program on marine conservation. Four educational booklets have been produced:

Dugong SANE Awareness Series 1, 1988

Corals SANE Awareness Series 2, 1988

Crown of Thorn SANE Awareness Series 3, 1989

Corals: Wandoor Marine National Park, SANE Awareness Series 4, 1989; report by Dr Elizabeth Wood.

Liz Wood paid a fact-finding visit to Wandoor Marine National Park, off South Island in the Andamans in January 1989, following reports of reef deterioration. Coral mortality was high in some areas as a result of Crown-of-Thorns and white-band disease; bleaching from elevated sea temperatures could also have occurred. Further research and survey work in this area is essential in order to propose management strategies.

Further information from: Samir Acharya, Co-convener, INTACH, A & N Chapter, c/o Tarangs, Middle Point, Port Blair, Andamans, India.

SOUTH PACIFIC REGIONAL ENVIRONMENT PROGRAMME (S.P.R.E.P.)

SPREP is the environment programme of the 22 Island Governments and Administrations of the South Pacific Region, supported by other South Pacific Commission member countries (Australia, New Zealand, France, USA, and UK). The SPREP Secretariat in Noumea consists of a programme co-ordinator, three project officers and secretarial staff. The 'Action Plan for Managing the Natural Re-

sources and Environment of the South Pacific Region', adopted by the Conference on the Human Environment in the South Pacific (1982) provides the mandate for SPREP's activities. The Action Plan is a regional strategy which identifies some 60 aspects of environmental assessment, management and law. SPREP undertakes coral reef management activities through its staff, scientists from the SPREP network of institutions based in the Pacific and Pacific Island counterpart personnel. These activities include:

- Research on coral reef/mangrove/seagrass system interactions, coral harvesting, dynamite fishing;
- Surveys of existing and proposed protected areas
- Management plan development for reefs and lagoons
- Production of videos, slide/tape shows and booklets on reef conservation for educational purposes
- Endangered species surveys e.g. dugong, turtles
- Training in coastal resource management planning
- Coastal pollution and water quality monitoring.

For further information contact: Paul Holthus, SPREP, South Pacific Commission, B.P. D5, Noumea Cedex, New Caledonia.

BOOK SHELF

CONSERVING THE WORLD'S BIODIVERSITY

J.A. McNeely, K.R. Miller, W.V. Reid, R.A. Mittermeier, and T.B. Werner

IUCN/WRI/WWF-US/World Bank, 191 pp. Available from IUCN Publications Services, 1196 Gland, Switzerland; World Resources Institute Publications, P.O. Box 4852 Hamden Station, Baltimore, MD 21211; World Bank Publications, P.O. Box 7247-8619, Philadelphia, PA 19170-8619. 1990

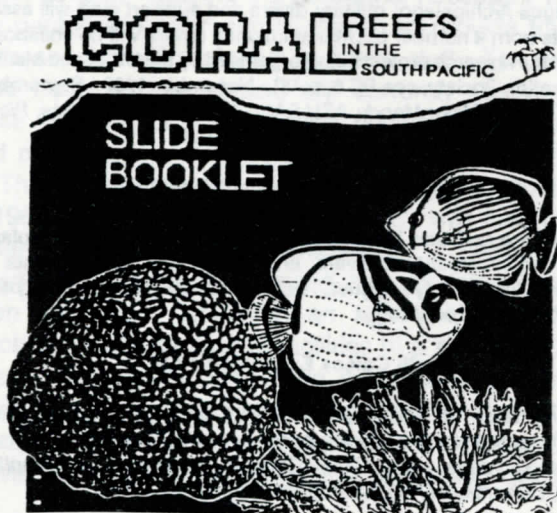
A general document which seeks to answer questions such as: How can the scientific knowledge be mobilized that will best enable the planet's biological diversity to be conserved? How can the process of change be managed so that biological resources can make their best contribution to sustainable development? What information is required to address the problems of conserving biological diversity? Which problems need to be addressed first?, etc. The main issues covered are: the values of biological diversity, threats to biodiversity, approaches to conservation of biodiversity, the information required and how to pay for it all. Marine biological diversity is mentioned specifically only briefly, but much of the general discussion is relevant.

COMMON REEF FISHES OF THE MALDIVES

C. Anderson and A. Hafiz

Novelty Printers and Publishers, M. Utility, Male 20-01, Rep. Maldives. 83 pp. 1987.

A photographic guide to about 80 of the commoner coral reef fishes of the Maldives.



CORAL REEFS

L. Holliday (with E.Wood)

Salamander Books Ltd, London and New York. ISBN 086101 463 4. 204 pp. Hb. 1990.

This is a lavishly illustrated popular book on reefs. Part 1 provides an introduction to the biology and conservation of reefs. Part 2, entitled 'Coral Reefs of the World' briefly covers reefs and dive localities and facilities in the Caribbean, Maldives, Red Sea, Kenya, Great Barrier Reef and Hawaii. There is much emphasis on invertebrate and fish life and aquarium care, as the publishers specialize in the aquarist market. But the book has a strong conservation message and should encourage the conservation ethic among divers.

Two mini-reviews by Brian Rosen:

A LOOK AT WILDLIFE OF THE GREAT BARRIER REEF

N. Coleman

Bay Books Pty Ltd., 157-167, Bayswater Road, Rushcutters Bay, NSW 2011, Australia. 128 pp. Hb., ISBN 0-85835-201.X, 1978.

This is a picture identification guide for common forms of underwater, shore and island wildlife. Young *Homo sapiens* ♀ in bikinis also feature, looking more domestic than wild (as interesting company for turtles, ghost crabs and seagulls). For those who are not yet sure of their diagnostic features, they are clearer here than for some of the other organisms. The author hopes that 'one day the larger marine flora and fauna of Australia will be readily identifiable in their own environment', so ending the need for museums full of natural history collections. How far down this road can we really go? Write to RE and tell us. By the way, I don't know why we received this book so long after its publication date. *B.R.R.*

MARINE FAUNA AND FLORA OF BERMUDA. A SYSTEMATIC GUIDE TO THE IDENTIFICATION OF MARINE ORGANISMS

W. Sterrer and C. Schoepfer-Sterrer (eds)

John Wiley & Sons, New York. 742 pp., Hb US\$95.45. ISBN 0-471-82336-8, 1986.

Well, at this price, you'd better ask Santa Claus to bring you one in his next delivery, but this really is a most thorough and impressive effort. For all that Bermuda is something of a coral reef outpost, it has long been an important landmark for reef studies, some of them absolute classics of the coral reef literature. In any case, this book will not only interest those who work from Bermuda, but also anyone whose studies are based in the Bahamas and the Caribbean too, as many of the organisms are common to all these regions. The book is organized systematically, starting with Bacteria and ending with cetaceans, but with over 4500 marine organisms recorded to date, the editors had to cut down to a selection of about 1500. The text is formal taxonomic, but morphological terms are explained in introductory sections to each group, and over 60 specialist authors of international standing have contributed their expertise. Not only is this a major reference work, probably without anything comparable in scope or treatment for any other reefal locality in the world, but the abundant line diagrams and colour illustrations also make it very attractive. *B.R.R.*

DIARY

Please send contributions for the Diary section as soon as possible for the next issue.

Conferences

23-30 August 1990, Yokohama, Japan

V INTERNATIONAL CONGRESS OF ECOLOGY, 'INTECOL 1990'

The congress has the theme of 'Development of ecological Perspectives for the 21st century'. Within the session on 'Resource use and man-made ecosystems', there are nine invited papers on coral reefs. Further information from: *Dr Makoto Kato, Biological Laboratory, Yoshida College, Kyoto University, Kyoto 606, Japan.*

3-6 October 1990, Kanagawa, Japan

INTERNATIONAL SYMPOSIUM ON THE COASTAL ZONE

Sponsored by the SURF '90 Association, and in collaboration with the American Shore and Beach Preservation Association and the Coastal Zone Foundation, this meeting will cover a wide variety of issues concerned with coastal zone management. It is being held concurrently with an 'international competition of proposals for better management of the coastal zone'. Further information from: *SURF'90 Association, Isomi Samariya Bldg. 8th Floor, 1-12-17, Katase-Kaigan, Fujisawa, Kanagawa, 251 Japan.*

4-7 October 1990, St Petersburg, Florida

DIVING FOR SCIENCE, 1990

The 10th Annual Scientific Diving Symposium of the American Academy of Underwater Sciences will cover a wide range of topics with a focus on diving in temperate and tropical waters. There will be an opportunity to participate in workshops on diving technology, scientific methods and recreational adventures in the Florida Keys, Gulf of Mexico and Cayman Islands. Further information from: *Walter Jaap, Florida Marine Research Institute, 100 Eighth Avenue S.E., St Petersburg, Florida 33701-5095, USA.*

21-24 October, 1991, San Antonio, Texas

OUR COASTAL EXPERIENCE - ASSESSING THE PAST, CONFRONTING THE FUTURE; 12TH INTERNATIONAL CONFERENCE OF THE COASTAL SOCIETY

This brings together coastal professionals from a wide variety of disciplines to examine and discuss important issues in coastal resource use and management. The conference will feature critical assessments of the policies, techniques and knowledge that have shaped efforts to manage activities on coasts over the past 25 years. Further information from: *William M. Wise, TCS 12 Conference Coordinator, Marine Sciences Research Center, State University of New York, Stony Brook, NY 11794-5000.*

28 October - 3 November, 1990, University of Hong Kong

INTERNATIONAL CONFERENCE ON THE MARINE BIOLOGY OF HONG KONG AND THE SOUTH CHINA SEA

Will include sessions on ecology, fisheries and mariculture, conservation, pollution and fouling. Further information from: *Professor Brian Morton, Dept Zoology, University of Hong Kong, Hong Kong.*

27 May - 2 June 1991, Honolulu, Hawaii

XVII PACIFIC SCIENCE CONGRESS

Entitled 'Towards the Pacific Century: the Challenge of Change' and sponsored by the University of Hawaii, East-West Center and the Bishop Museum, with the US National Academy of Sciences, the 1991 congress of the Pacific Science Association will include symposia on 1) Global Environmental Change - Pacific aspects, 2) Population, Society and Health, 3) Science and Culture, 4) Biological Diversity and 5) Emerging Technologies and Development. The PSA Scientific Committee on Coral Reefs is organising a session on 'Coral Reefs and Environmental Change: the next 100 years'. A session on the 'Role and Function of Biological Diversity in an Ecosystem Context' will include

Diary continued

the topic 'Behaviour and Ecology of Coral Reef Fishes'. Further information from: *XV11 Pacific Science Congress Secretariat, 2424 Maile Way, Fourth Floor, Honolulu, Hawaii 96822, USA.*

8-12 July, 1991, Long Beach, California

COASTAL ZONE 91 - 7TH SYMPOSIUM ON COASTAL AND OCEAN MANAGEMENT

The permanent theme of this meeting is 'A Spotlight on Solutions', and presentations concern detailed technical data-gathering, research and evaluation studies, policy development, case histories and implementation. The 1991 meeting also has the specific theme of 'Global Concerns: Multi-level Responsibilities', in order to link coastal and ocean-related topics to the emerging resource issues of society. Sessions will include one on coral reef processes. Further information from: *Orville Magoon, Coastal Zone 91, P.O. Box 279, 21000 Butts Canyon Rd, Middletown, CA 95461, USA.*

9-14 September, 1991, Munster, FRG

FOSSIL VI CNIDARIA - 6TH INTERNATIONAL SYMPOSIUM ON FOSSIL CNIDARIA INCLUDING ARCHAEOCYATHA AND PORIFERA

Organised by the International Association for the Study of Fossil Cnidaria and Porifera, in collaboration with the Westfälische-Wilhelms-Universität, Munster. The planned scientific programme includes Evolution of Corals, Intraspecific Variability and Fossil Races, Diagenesis and Microstructure of Fossil Cnidaria and Porifera, Evolution of Reefs, Porifera, Coral Research History and Computer Supported Palaeontology. Further information from: *Fossil VI Cnidaria, Westfälische-Wilhelms-Universität, Forschungsstelle für Korallenpaläozoologie, Pferddegasse 3, D-4400, Munster FRG.*

4-8 November 1991, Honolulu, Hawaii

THIRD GLOBAL CONGRESS

Sponsored by Heritage Interpretation International, Eastern Michigan University and several University of Hawaii units, this is tentatively entitled 'Interpretation, Preservation and the Travel Industry'. Further information from: *Ray Tabata, Congress Co-chairman, Sea Grant Extension Service, 1000 Pope Road, Room 205, Honolulu, Hawaii 96822.*

17-22 November, 1991, Jerusalem, Israel

INTERNATIONAL SYMBIOSIS CONGRESS

The programme will be arranged to encourage comparative discussions on different symbiotic systems and will be planned according to topics rather than types of symbiosis. There will be plenary lectures, parallel symposia, workshops, poster sessions and commercial exhibits. Further information from: *Prof. M. Galun, dept of Botany, The George S. Wise Faculty of Life Sciences, Tel Aviv University, Ramat Aviv, Tel Aviv 69978, Israel. Fax 972-8-5413752.*

NOTES FOR CONTRIBUTORS

The aim of *Reef Encounter* is to provide a magazine-style newsletter on any aspect of reefs, the livelier the better. In addition to news, meeting and expedition reports and announcements, we aim to have discussions and debates about particular issues concerning ISRS or the broader field of reef science in general. *Reef Encounter* does not publish original scientific data, so please do not submit such papers. The newsletter aims to complement the journal which carries scientific papers only, in that it provides an outlet for book reviews, discussion of papers in the journal and a correspondence column (**Upwellings**). It also carries short reviews of recent trends and developments in reef research or events that bear on reef studies. In the tradition established by the first editor, *Reef Encounter* will continue to be cheerfully illustrated, with cartoons, newspaper cuttings and other entertaining material.

Please note that *Reef Encounter* is an entirely voluntary effort. We do not have funds to pay authors, and the editors are also unpaid. Please help ISRS by submitting material on a regular basis and in a form that does not require too much editing.

To save time and postage, we shall not normally acknowledge submitted material and material will not normally be refereed or returned for corrections. Opinions expressed and errors of fact will have to remain largely the authors' responsibility. No published item should be taken as ISRS opinion unless indicated.

Please help by sending items of not more than 2,000 words in length and in double-spaced typescript, or on diskette using the Multimate word-processing package (we hope eventually to have other options available). You can expect some gentle editing for flow and sense and to address our readership as appropriately as possible. Illustrations should be of a size compatible with our format. Black line drawings are preferable at present, although we hope eventually to be able to afford photographs. Diagrams should have legends and/or captions to explain all symbols, abbreviations and shading patterns etc. Maps should have a scale and indication of orientation. Use *World List* abbreviations in references. Please use metric, or imperial-with-metric units, but not imperial units on their own. Do not forget to give your name and full address, or any other contact address where applicable.

We have no regular reprint system, but contributors will receive a free copy of the relevant issue.

DEADLINE FOR COPY FOR REEF ENCOUNTER 8 (due out Dec 1990) IS OCT 1ST 1990.

*Barbara Brown
Centre for Tropical Coastal
Management Studies
Department of Biology
The University
Newcastle upon Tyne
NE1 7RU, UK*

*Fax: (091) 261 1182
Telex: 53654 (UNINEW G)
Phone: (091) 232 8511*

*Sue Wells
56 Oxford Road
Cambridge
CB4 3PW, UK
Fax: (0223) 277136
Telex: 817036 SCMU G
Phone: (0223) 350409*

APPLICATION FORM FOR MEMBERSHIP

Name:.....

Address:.....

.....

Title:.....

Fields of interest:.....

.....

I/we enclose a cheque (in US\$ or £ sterling ONLY please) of:

-US\$50 or £35 for FULL membership
-US\$ 8 or £6 for STUDENT membership
-US\$58 or £41 for SPOUSE membership

Cheques to be made payable to:
INTERNATIONAL SOCIETY FOR REEF STUDIES

Send completed application form and your cheque to:
Dr Pat Hutchings, Australian Museum, P.O. Box A285, Sydney South, New South Wales, Australia 2000.