

# REEF ENCOUNTER

Newsletter of the International Society for Reef Studies

Number 15

March 1994

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# REEF ENCOUNTER No. 15 March 1994

## NEWSLETTER OF THE INTERNATIONAL SOCIETY FOR REEF STUDIES

Editor Sue Wells

Associate Editor Callum Roberts



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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:

- i. To hold meetings, symposia, conferences and other gatherings to disseminate this scientific knowledge and understanding of coral reefs, both living and fossil.
- ii. 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.
- iii. 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 full membership of ISRS is currently US\$60, provided renewal payments are made by 1st March each year. Full Members receive the journal *Coral Reefs*, the newsletter *Reef Encounter*, and other periodic mailings.

Spouse membership is US\$70.

Student membership costs US\$10 and benefits include all of the above except the journal *Coral Reefs*.

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).

Cover: Six species of the wrasse *Halichoeres*, from the Indo-Pacific. Adapted by Callum Roberts from Fowler: (1928). The Fishes of the Families Pomacentridae, Labridae and Calliodontidae, collected by the United States Bureau of Fisheries Steamer 'Albatross', chiefly in Philippine Seas and Adjacent Waters.

**EDITORIAL**

Charles Darwin developed his theory of coral reef formation before he had ever seen a reef in real life. Soon, other important contributions to reef science may be possible without ever leaving the desk. Within a few years the power to create and test new theories will lie at your fingertips. Reef scientists are entering the age of information technology and databases covering all aspects of reef science are proliferating rapidly. In Darwin's day, the sweep of knowledge on coral reefs could be encompassed in the space of a shelf. Today, our offices burst with articles, papers and books but still contain mere fragments of the whole. It is fortunate indeed that cheap computer memory and powerful desktop systems have arrived at a time when the volume of information available on reefs has begun to swamp the abilities of even the most assiduous to keep up. Before the numbers of databases available grows beyond the capacity of a brief review, we attempt in this issue to describe some of those underway or in development.

Databases will help to answer some of the questions posed at recent meetings on the global status of coral reefs. The 1993 meeting in Miami, *Global Aspects of Coral Reefs*, which was reported on in the last issue, sought to determine what the condition of reefs is worldwide. A second meeting in Florida last November tried to press further into the unknown, picking up where the Miami meeting left off (see p. 12). What will happen to reef ecosystem processes when we start losing species (as we are already doing locally and may suffer globally before too long)?

Since these meetings there have been further developments. The Year/Decade of the Reef has received popular support and we provide a short synopsis of the comments that were received. Taking many people by surprise, but re-affirming the need for action on a large-scale and potentially providing support at long last to scientific and NGO efforts, the U.S. Government has announced its own intention to develop a coral reef initiative. The form that this will take remains to be seen, but a number of consultations have taken place and ideas are being developed (see page 14).

The next issue of *Reef Encounter* will come out in October, but after that we hope to return to our normal publication schedule of July and December. There is plenty happening in the world of coral reefs at the moment, so please send in your news and views (although any more articles that mention 'false Cassandras' are likely to be refused!) – and we still need new contributors. If you do send us something, please have a quick look at the 'Notes for Contributors' on the back cover. It makes an enormous difference to have a contribution, however short, provided in the correct format. Many thanks to Margaret Roberts for further cartoons.

Callum Roberts  
Sue Wells

**ISRS COMMENT****FROM THE PRESIDENT****Bernard Salvat**

ISRS can congratulate itself on going into a new year with membership exceeding 500, a new constitution, an increase in the citation index of *Coral Reefs*, and a number of stimulating and enjoyable meetings to look back on.

There are new developments on the immediate horizon as well. The budget is now such that Council and the Officers are beginning to be able to fund the daily running of the Society. A new agreement is to be signed with Springer Verlag, which will be much more beneficial to the Society (this will be explained in the next issue of *Reef Encounter*), and we have another two meetings to look forward to this year. Particular thanks must go to Daphne Fautin, our Treasurer, who has done a magnificent job on the ISRS finances and put the Society on this new, much firmer, footing.

However, it is the President's job to goad the members on to even greater activity. We want more applications for positions on Council and as Officers from people who are genuinely willing to devote time for ISRS initiatives. It is an honour to be elected, but the positions carry responsibilities as well. And to all members, please think about spending even a small proportion of your professional life on ISRS – as in the long run this will benefit you, ISRS and the scientific community. Many thanks in advance!

**ISRS NEWS****REPORT OF THE GENERAL ASSEMBLY,  
VIENNA, 18 DECEMBER 1993**

One of the main events was the adoption of the new constitution: 85 ballots were received, of which three were invalid, leaving 82, all of which were in favour.

Most importantly, there has been a dramatic increase in membership, up 80% since the 7th International Coral Reef Symposium in June 1992 (even though about 60 members did not renew in 1993).

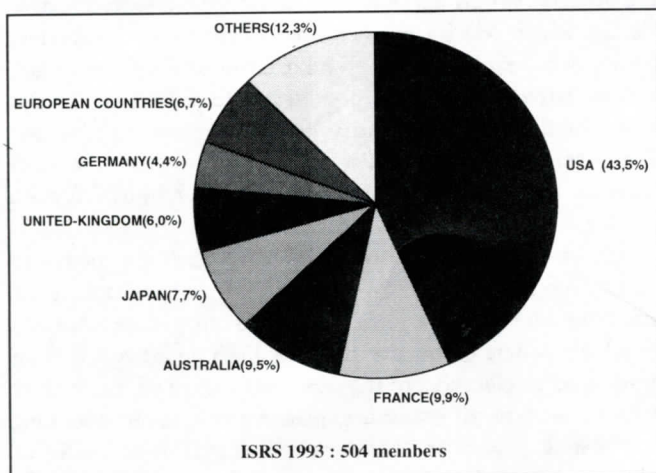
Members	Mid-1992	End 1992	End 1993
Honorary	4	7	6
Spouse	15	24	23
Student	39	78	77
Full	251	399	451
<b>Total</b>	<b>309</b>	<b>508</b>	<b>557</b>

It is possible that we may have reached a peak for scientific membership, and that further increases will require ISRS to attract the attention of managers and conservationists.

**COPY DEADLINE FOR REEF ENCOUNTER 16  
(due out October 1994) IS AUGUST 1ST 1994**

ISRS members should note that in the future, an additional US\$10 must be added to the dues if you wish to receive *Coral Reefs* by airmail. While this will delay the delivery of the journal to those opting for surface mail, institutional subscriptions are sent by airmail and so the journal will be available in a timely manner in libraries. It was found that in some cases, the cost of airmail postage was higher than the cost of printing by a factor of two. Mailing of *Reef Encounter* is to be improved. Up until now, we have relied on volunteers who have used their laboratory budgets, but we will shortly be instituting a direct mailing system.

René Galzin, Secretary



### BEST PAPER AWARDS

The winners of the award for Volume 10 of *Coral Reefs* are C.W. Wheeler and P. Aharon, from the University of Baton Rouge in Louisiana for their paper entitled 'Mid-oceanic carbonate platforms as oceanic dipsticks: examples from the Pacific'. This was published in a special issue on the theme 'Reefs as recorders of environmental changes' edited by Ian MacIntyre and myself.

The purpose of Wheeler and Aharon's article was to look again at the concept of atolls as recorders of sea level changes, using data from the Pacific Ocean. One of the main challenges for geologists today is to reconstruct sea-level changes through time, in particular those due to glacio-eustasy. Obtaining reliable sea level curves is fundamental to the interpretation of sedimentary deposits in terms of sequence stratigraphy. Unfortunately, on geological time scales, most areas of the Earth's crust undergo significant vertical motions, both uplift and subsidence. As a consequence, most of the sea level curves obtained integrate both sea level fluctuations and land motion. This is particularly the case for continental zones along both active and passive margins.

Located in the middle of the ocean, in an intraplate position, atolls escape the major tectonic constraints that

characterise the boundaries of lithospheric plates. Indeed, their underlying volcanic aprons are regarded as undergoing a continuous subsidence, due to regular cooling and thickening of the oceanic crusts that bear them. Successive emergences and submergences are reflected in the biological, sedimentary and geochemical features of atolls. If the subsidence rate of an atoll is known, it is possible to reconstruct sea level changes and give a reliable 'eustatic' sea level curve.

Using previously published data on various Pacific atolls and adding new geochemical results, notably on the environmental significance of strontium isotope composition of carbonates, Wheeler and Aharon demonstrate the great interest of drilled carbonate sequences for sea level reconstruction on a global scale from Neogene to Quaternary times. This is therefore a major contribution in the area of paleoceanography.

L. Montaggioni, Centre de Sedimentologie et Paleontologie, URA-CNRS 1208, Université de Provence, 3, Place Victor Hugo, 13331 Marseille Cedex 13, France. Fax 33-91-64-99-64.

The winner of the award for Volume 11 of *Coral Reefs* is Terry Scoffin for his paper 'Taphonomy of coral reefs: a review' which appeared in Volume 11(2). We hope to have a comment on this in the next issue of *Reef Encounter*.

### ELECTION OF ISRS OFFICERS: CALL FOR NOMINATIONS

In accordance with the newly-approved ISRS Constitution and Bye-Laws (see *Reef Encounter* 14), elections will be held in 1994 for all officers. In order to provide continuity, **councillors will not stand for election this year**, but half of them will be replaced in the election two years hence. In addition, to enact the newly-approved requirement for rotation of officers, the President, Vice President and Corresponding Secretary will be elected for a full term (four years) but the Recording Secretary and Treasurer will be elected for only two years (half the normal term). The following electoral procedures will be followed:

1. Nominations for President, Vice President, Corresponding Secretary, Recording Secretary and Treasurer must be made in writing by at least one member of the Society (who may be the candidate), and must include a statement **of no more than 150 words, written by the candidate**, stating his/her willingness to serve, qualifications for the position being sought, goals for the Society and anything else that he/she may deem appropriate. The statement shall also include disclosure of any financial arrangements the candidate may have with any publisher of scientific literature. This statement must be received by ISRS Secretary René Galzin **no later than Friday 29 July 1994**.

2. The nominations, statements by the candidates and details of the organisation of the vote will appear in *Reef Encounter* 16, which will be received by members in time for the ballot to be returned to ISRS Secretary René Galzin by the deadline of 15 December 1994. New officers will assume their positions on 1 January 1995.

## TREASURER'S REPORT

### FINANCIAL STATEMENT FOR 1993 – as of 4th January 1994

Income rose from US\$32,922.39 in 1992 to US\$44,316.38 in 1993; outgoings also rose slightly from US\$31,287.47 in 1992 to US\$35,577.04 in 1993. US\$8,739.34 was received in excess of what was expended in 1993. Cash assets at the beginning of 1992 were about US\$9,500, at the beginning of 1993 were US\$15,911.08, and currently are US\$24,845.55, and have thus increased about 40% since mid-1992. Without the profit from *Coral Reefs*, there would have been a loss of US\$1,601.66, and cash assets would have decreased about 20%.

Money to print the proceedings of the 7th International Coral Reef Symposium is being passed through the ISRS account. These funds do not appear in the accounting.

#### Income US\$

Dues	30,627.48
Profit from <i>Coral Reefs</i>	10,341.00
Other (proceeds from auction, sale of NGBR, etc.)	465.00
Subsidy for editorial expenses from Springer	2,126.10
Page charges	0
Interest	896.93
Donations from members	56.00
<b>Total</b>	<b>44,512.51</b>

#### Outgoing US\$

Springer-Verlag for <i>Coral Reefs</i>	27,483.00
<i>Reef Encounter</i>	4,012.00
Editorial expenses	2,738.12
Office supplies	31.67
Communications expenses (postage, help etc.)	1,301.48
Miscellaneous (awards, bank charges, etc.)	10.77
<b>Total</b>	<b>35,577.04</b>

### 1994 BUDGET

Both income and outgoing are projected to be less than in 1993 because of the new agreement with Springer-Verlag: instead of paying a profit to the Society, as was the practice, Springer will henceforth charge the Society proportionally less per member subscription.

The comparative rise in outgoing is for three reasons. One is that ISRS is beginning to pay its real expenses, which have been hidden because the institutions of the officers and councillors have been charged for postage, telephones, fax, photocopying etc. Another is that paid help is used to care for routine matters such as addressing envelopes, recording membership renewals etc. The audit required under the original constitution has not been done in at least five years. The new constitution requires one every three years. It is especially appropriate to have an audit this year, as we begin a new financial arrangement with Springer and begin operating under a new constitution.

#### Income US\$

Dues	31,000.00
Subsidy for editorial expenses from Springer	2,200.00
Page charges	1,500.00
Interest	700.00
Other (proceeds from sale of NGBR, etc.)	500.00
Donations from members	100.00
<b>Total</b>	<b>36,000.00</b>

#### Outgoing US\$

<i>Coral Reefs</i> (printing and postage)	18,000.00
<i>Reef Encounter</i> printing	4,000.00
<i>Reef Encounter</i> postage	2,000.00
Editorial expenses	2,200.00
Communications expenses (postage, fax etc.)	1,500.00
Office help	1,000.00
Audit	3,000.00
Office supplies	150.00
Miscellaneous (awards, bank charges etc.)	150.00
<b>Total</b>	<b>31,910.00</b>

**Daphne Fautin, Treasurer**

### DUES PAYMENT BY CREDIT CARD

We realise that it may be expensive and difficult for some of you to obtain US dollars for payment of ISRS dues, and we are working hard to find a solution to this problem, one faced by all international societies. In 1993, as a stop-gap measure, we instituted Deputy Treasurers who are authorised to collect dues in other currencies. This system is working well and is continuing this year, expanded to four currencies: yen, Australian dollars, £ sterling and French francs, and also Eurocheques.

Payment by credit card would be the next step, but we need a very large number of transactions, as well as a high transaction value, to make this arrangement financially viable. It seems that, even with a membership of over 500, ISRS would have too few transactions to be able to establish an account, unless dues were raised enormously. Some professional societies get round this problem by using an agency to collect the dues; the agency obtains the necessary volume by collecting dues for many societies.

We are looking into the possibility of affiliating with such an agency, although we would of course have to pay for the service this would provide. This may soon however be feasible, as the publishing arrangement for *Coral Reefs* that has been re-negotiated with Springer-Verlag will put the Society on a more secure financial footing. This will make dues payment much easier for many of you, and would probably increase ISRS membership. A side benefit would be that the address for dues payment would not change with the Treasurer. Watch these pages for further developments!

## FIRST EUROPEAN REGIONAL MEETING OF ISRS, VIENNA, AUSTRIA

What could be better than spending the week before Christmas in Vienna, relaxing in a cafe in this beautiful old city, sampling great Austrian wine and food, and discussing reef science, conservation and management with colleagues from around Europe and the world! This was the Christmas gift provided by Profs Fritz Steininger, Werner Piller, and Jrg Ott of the University of Vienna, the organisers of the First European Regional Meeting of the ISRS. Some 140 participants attended five days of presentations and discussions on reef biology, geology, management and issues in addition to several social events. Also, Prof. Salvat oversaw a lively general assembly meeting of the ISRS. Particular thanks go to Prof. Piller who managed to make last minute changes to the programme to accommodate new presentations and special technical needs. The social events at the beautiful Natural History Museum, the Vienna Town Hall, and the Viennese 'Heuriger' will not be forgotten.

Prof. Priska Schfer of Kiel, Germany, set the tone of the meeting with a thoughtful plenary talk on the challenges and limitations for Recent and fossil reef studies that emphasised the different time scales of observable variability between living and fossil reefs, and the need for understanding of non-tropical as well as tropical modern reef formation in formulating models of reef evolution from the fossil record. Seventy talks were presented over the following days that covered research and ideas about the evolution of modern and fossil reefs, biological communities and processes, reef organism behaviour, physiology, and ecology, and reef monitoring and management. These talks were complemented by a large number of poster presentations.

The diverse assemblage of presentations were linked by a series of discussions led by Bob Ginsburg from the University of Miami which focused on plans to dedicate a year or even a decade to coordinating global understanding of coral reefs. Significant input to the discussions was provided by a number of people working in the developing world to manage and protect threatened reef areas. I believe that Prof. Ginsburg, as well as all the participants, went away from Vienna with a better appreciation of the contribution of European reef research to global reef science and management.

The future of reef science in Europe was illustrated by the large number of students working on reefs that attended the meeting. Continuing to hold a regular European meeting

of the ISRS (as is planned) will provide these students and European reef workers in general the needed opportunity to build stronger ties with each other and with reef science, management and conservation throughout the world. The organisers and sponsors of the Vienna meeting are congratulated for initiating this effort.

*Dr. William E. Kiene, Geologisch-Paläontologisches Institut, J.W. Goethe-Universität, Senckenberganlage 32, D-60054 Frankfurt am Main, Germany. Tel. +49 69 798 8598 Fax.+49 69 798 2958 E-mail. kiene@informatik.uni-frankfurt.de.*

**Papers presented at the Vienna meeting will be published at the end of 1994 in a special volume of *Beiträge zur Paläontologie*.**

## FUTURE ISRS MEETINGS

**N.B. Please note new organiser/contact point for Townsville meeting and new dates and fax and phone numbers for the organiser for Luxembourg meeting.**

9-11 July 1994

### 1994 ANNUAL ISRS MEETING

James Cook University, Townsville, Queensland

This will be held jointly with the Australian Coral Reef Society and has the theme 'Reef Science, Management and Sustainability of Reefal Habitats in the 21st Century'. The meeting will follow the format of the regular annual ACRS meetings. On the first day there will be a couple of keynote addresses, followed by papers on the theme of the conference. The next two days will be available for papers either on the theme or on other aspects of reef science. Informal gatherings will be arranged in the evenings to maximise discussion time.

A large number of marine scientists will be in Townsville over this period. Prior to the meeting, the Pacific Congress on Marine Science and Technology (PACON) will be held from 4-8 July, and the Australian Marine Sciences Association will be meeting from 8-10 July. Overseas scientists wishing to participate in the ACRS/ISRS meeting should contact ACRS who will try to arrange billets, although a wide range of accommodation is available in Townsville.

Further information available from: Ms Raewyn Dooley, Conference Manager, ACRS Scientific Meeting, P.O. Box 1630, Townsville, Qld 4810, Australia. Tel (61) 77 212 377; Fax (61) 77 214 936.

6-9 September 1994

### 1994 EUROPEAN REGIONAL MEETING OF ISRS

Centre Universitaire, Grand-Duchy of Luxembourg

The dates of this meeting have been postponed by one week to allow participants to attend the 29th European Biology Symposium which takes place in Vienna 29 Aug - 2 Sept. The ISRS meeting will have the theme 'Coral Reefs in the Past, Present and Future'. The meeting is being jointly organised by Jörn Geister (Universität Bern, Switzerland), Bernard Lathuilière (Université de Nancy I, France), Alain Faber (Musée d'Histoire Naturelle, Luxembourg) and Robert Maquil (Service Géologique, Luxembourg).

## THE COMPLEAT REEF ENCOUNTER

No. 15

**'Natural' is the way you think of a system from your formative years in ecology. Everything bad happened after you published your first paper!**

**Jeremy Jackson, SCOPE Meeting on Ecosystem Function and Biodiversity on Coral Reefs, Key West, 1993.**

The meeting will cover a range of topics including Fossil and Recent reefs and reef organisms, non-anthozoan reefs, sclerochronology, taxonomy of scleractinian corals, reef degradation and prospects for long-term reef survival, and coastal zone management. Deadline for submission of abstracts July 1, 1994. The proceedings will be published as a special volume of *Publications du Service Géologique de Luxembourg* and will be sent to all registered participants. Manuscripts must be delivered during the meeting.

The programme includes a visit to and dinner at the medieval castle of Bourglinster and sightseeing in Luxembourg. The meeting will be preceded by a two day field trip (3–5 Sept) to the spectacular outcrops of Middle and Upper Jurassic coral reefs in Lorraine and southern Luxembourg. Following the meeting (Sept 9–18), there will be a snorkelling trip to the recent and Pleistocene coral reefs of the Sinai Peninsula (Egypt) 'Reefs and Coral Degradation along the Sinai Coast', led by J. Geister and A. Antonius.

For further information and copies of the second circular contact write immediately to: *Jörn Geister, Geologisches Institut der Universität Bern, Baltzerstr. 1, CH-3012 Bern, Switzerland. Tel. (41) 31 631 45 67; Fax (41) 31 631 48 43.*

Seven workshops will be held in the course of the meeting. If you wish to participate in any of these, please contact the individual organiser direct:

1. Worldwide Reef Degradation: the fossil record, present state and the future of modern coral reefs. Contact: *A. Antonius, Kupelwiessergasse 5, A-1130, Vienna, Austria. Tel. (43) 1 87-75-935. Fax (43) 1 31-336-700.*
2. The potential and limits of sclerochronology. Contact: *J. Patzold, Universität Bremen, Fachbereich Geowissenschaften, Postfach 330440, D-28334 Bremen, Germany. Tel. (42) 1 218 3135, Fax (42) 1 218 3116.*
3. Non-Anthozoan reef construction. Contact: *H.-M. Hüssner, Institut und Museum für Geologie und Palaontologie, 72076 Tübingen, Germany. Tel. 07071-297377. Fax 07071-296990.*
4. Volunteer Programmes in Applied Marine Research and Coastal Zone Management. Contact: *P. Mumby, Coral Cay Conservation, The Ivy Works, 154 Clapham Park Road, London SW4 7DE; Tel (44) 71 498 6248. Fax (44) 71 498 8447.*
5. Second Meeting of the 'International Working Group on Scleractinian Corals'; Sept 8, open to all. Contact: *H. Loser, PF 192409, D-01282 Dresden, Germany. Tel. (49) 351-30951. Fax. (49) 351-335203/4592555.*
6. Octocoral Biology (assuming sufficient interest). Contact: *Micaela Hellström, Australian Institute of Marine Science, Townsville, Australia, Fax (61) 77-725852.*
7. Assessing the health of coral reefs. Contact: *Dr Peter Spencer Davis, Dept of Zoology, The University, Glasgow G12 8QQ, UK. Fax: (44) 41-330-5971.*

There are also plans for a 2–3 day field trip to the Palaeozoic mud-mounds of Belgium before the meeting, before the field trip to the Jurassic reefs. Information on this can be obtained from: *Hansmartin Hüssner, Institut für Geologie und Palaontologie, Universität Tübingen, Sigwartstr. 10, D-72076 Tübingen, Germany. Tel. (49) 7071-297377; Fax (49) 7071-296990.*

June 1996

#### 8th INTERNATIONAL CORAL REEF CONGRESS

This will be held in Panama, and further details will be provided in the next issue of *Reef Encounter*.

## THANKS TO ISRS FROM IABO

The organising committee of the 7th International Coral Reef Symposium expressed its thanks to the ISRS, and especially to the treasurer Dr Daphne Fautin. By acting as an established, substantive international sponsoring organisation, ISRS served as a conduit for international dealings. The ISRS provided a credible base for laundering money!

### ANDRÉ GUILCHER 1913–1993

**For over 40 years, André Guilcher was an eminent coastal geomorphologist and marine geographer. He was born in Brest, France, received his PhD from the Sorbonne in 1948, taught in several French universities and retired from the University of Brest, with which he was affiliated, in 1981. He served on many national and international editorial boards and scientific committees, received numerous awards and honours and had been proposed for the last Darwin Award.**

**He started work on coral reefs in the early 1950s, taking part in the first *Calypso* expedition in the Red Sea. The discovery of reefs was one of immense excitement for Guilcher, and permanently marked his future research work. Subsequent field expeditions took him to Madagascar, Mayotte, New Caledonia, French Polynesia, the Solomon Islands, Kiribati, Vanuatu, Lord Howe Island, Florida, Sinai, the West Indies, Brazil, Kenya and elsewhere. The results of his work were published in over fifty books and articles. One of his later works was *Coral Reef Geomorphology* (Wiley, 1988), the first global synthesis of the morphology and typology of reefs, and a thorough review of the evolution of modern regional variations in reef structure and development. This book was also significant in introducing into the international literature important examples of reef geomorphology found in areas that are seldom visited by English-speaking workers.**

**Guilcher assisted and influenced many people in the course of his long academic career and was a model for many of his students. His scientific and leadership skills and his integrity earned the respect of all his colleagues. These and his many friends will greatly miss him.**

*Paolo Antonio Pirazzoli, Laboratoire de Géographie Physique, C.N.R.S., Universités de Paris I et IV, 1, Place Aristide Briand, 92195 Meudon Cedex, France. Fax 33-1-45-07-58-30.*

**We also regret to announce the deaths of Professor Ray Fosberg and Dr John Wells. Obituaries will be printed in the next issue of *Reef Encounter*.**

## THE YEAR/DECADE OF THE REEF

Many people have written in with helpful suggestions concerning the 'Year/Decade of the Reef', the initiative launched last June by Bob Ginsburg and described in the last issue of *Reef Encounter*. These confirmed the real sense of concern that has developed within the scientific community about the health of reefs on a global scale and provided strong support for Bob's suggestion.

Disappointingly, there were few contributions from scientists of developing countries, but this is perhaps not surprising – these are the very people who are stretched to the limit dealing on a day-to-day basis with the issues of scarce financial resources, limited trained personnel and immediate management problems and have little time to spare. The comments that were received were remarkable for their uniformity and consistency. Scientists may not yet have reached a consensus on why reefs are in a bad way, but there is strong agreement over the types of action that are required in a Year or Decade of the Reef.

Suggestions for activities were all international in approach; for example, involving networks of laboratories and international teams of scientists. Several people noted that an initiative would have to be closely linked to the many activities already underway at national, regional and international levels, but most people see the 'Year of the Reef' as complementary to existing initiatives, providing a focus for other programmes and encouragement and stimulus for many current activities. There is already interest and offers of support from UNESCO, the UNEP Global Task Team, ICLARM (ReefBase), and major NGOs such as The Nature Conservancy.

High on the agenda, for scientists and managers alike, is education of the public, policy makers and politicians. The specifics of how this can be achieved need working on. There will have to be involvement of educators, NGOs and organisations already involved in aspects of education and public awareness. There are numerous possibilities: an international public road show, media involvement, more educational kits, PR films through TV networks, etc. The aim should be to build more 'government-researcher-user bridges' of the type that now exists in Australia. Training of reef scientists and technicians was considered equally urgent, but again the specific actions to implement this need further thought and experts and organisations already involved in this must be contacted.

Although it is recognised that a key aspect of such an initiative must be to address the **implementation** of science-based management, there were few suggestions of how this could be achieved. Most comments on this topic related to protected areas: research to provide information to improve siting and management of reserves; the possible establishment of international coral reef reserves in areas such as the Spratly Islands and Chagos Archipelago, etc. Since most of the comments received were from scientists, it was not surprising that research suggestions were rather more specific. More and better assessment and monitoring of reefs were considered priorities.

Picking up on one of the main themes of the Miami meeting, many people stressed the need for a special effort to survey reefs at scales so far only attempted in a few places like the Great Barrier Reef, to provide the baseline information that is so clearly lacking for any statement to be made on the global status of reefs. Rapid Assessment Programmes have been developed for carrying out broad surveys over large areas of tropical forests, and thought should be directed to finding methods for similar assessments to be made on reefs. One popular idea is to form international teams of experts, to include geologists, biologists and scientists from other relevant disciplines. Using an agreed methodology, such teams could visit different areas to assess reef status, possibly from a research vessel. An activity such as this would of course have to be organised in association with other relevant programmes at national or regional level, with the participation of local researchers and would need a major training element to ensure that methodologies are handed on to local researchers. The data collected could be fed into the various databases that are being set up (page 15); 1996 is scheduled for the release of the first version of ReefBase which will provide further indications of the gaps in our knowledge.

The establishment of a global network of permanent monitoring sites was also thought to be urgent, an idea that has been explored extensively through the UNEP-WMO-IOC-IUCN Global Task Team and which is planned under the Long-term Monitoring Programme for Coral Reefs. The Global Task Team is likely to be able to make an initial report on the results of the monitoring programme by 1996 and the Year of the Reef could provide the impetus needed to fully launch this and other proposed monitoring programmes. It was pointed out that one focus could be those reef sites that were intensively surveyed several decades ago, provided comparative methodologies could be used: American Samoan reefs were surveyed early this century by Mayor and then again by Dahl in the 1970s; reefs in Palau were studied by the Japanese; and there are a number of reefs in the Caribbean which were studied early this century.

Other suggestions for relevant research topics included: development of simulation models of coral reefs specific to different regions; broad-scale tracking of the fates of larvae at regional scales, involving the collaboration of many countries and fairly sophisticated logistical support; physiological tolerance studies of common pollutants and sedimentation for a cross section of reef organisms and life stages.

Whether the initiative will be for a Year or for a Decade will probably depend on the final objectives. Several people pointed out that a Year will be best for focusing attention, will have the greatest impact in terms of public awareness, and will provide the necessary drive for funding and institutional commitment. Declarations of this kind tend to lose their impact over time, and Decadal programmes require major commitment from international and national agencies. Everyone recognised, however, that many of the research programmes that will start under the initiative will last several years and even a decade. A compromise solution would be to launch the initiative as a 'Year', with the aim of



informing the public and politicians of areas of ignorance and potential solutions, and mark it as the beginning of ten years of more intensive research, monitoring and management programmes. (N.B. 1998 has been proposed as the UN 'Year of the Ocean').

An Organising Committee is in the process of being established, convened under ISRS and reporting to the President, with Bob Ginsburg as Chairman. A 'planning grant' is being sought and thought is being given to the composition of the Committee. Subsequent developments will depend partly on the outcome of the US Coral Reef Initiative (see page 14), which has many of the same aims, and on whether or not a permanent office or secretariat for supporting and implementing international reef research and management initiatives is set up.

Unfortunately it has not been possible to publish the case histories that were presented at the Miami meeting last June in a special issue of the *Bulletin of Marine Science* as originally intended. Instead they are being published as *Proceedings of the Colloquium on Global Aspects of Coral Reefs: Health, Hazards and History*, price US\$30.00 (plus 15% postage; all international orders will be sent surface mail; 10% discount on orders of 10 copies or more; cheques and money orders, made payable to the University of Miami, must accompany all orders).

Further information, and copies of the proceedings, from: Dr R. Ginsburg, RSMAS, University of Miami, Division of Marine Geology and Geophysics, 4600 Rickenbacker Causeway, Miami, Florida 33149-1098. Tel. (305) 361-4875; Fax (305) 361-4094; e-mail: ginsburg@rcf.rsmas.miami.edu.

## UPWELLINGS

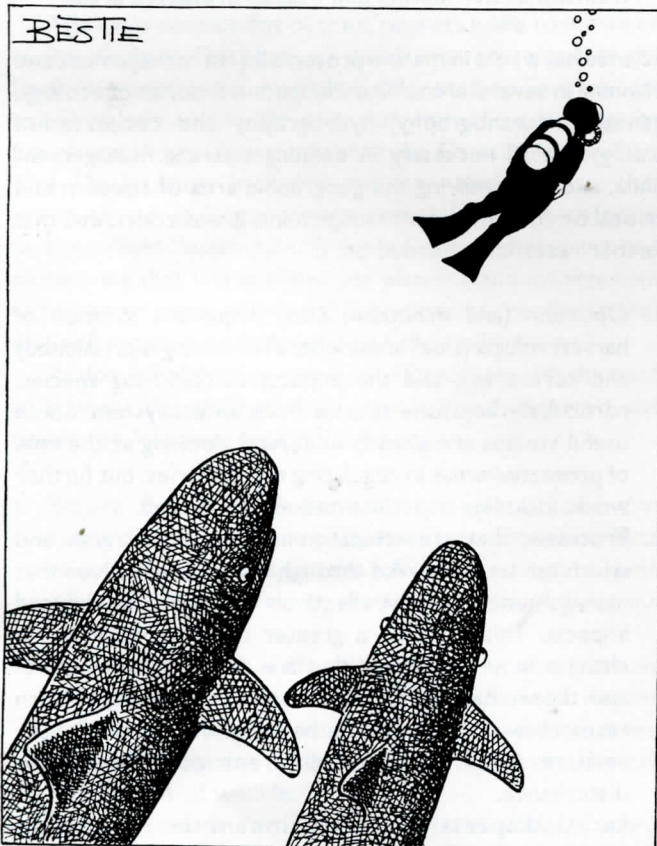
### CORAL REEF ENVIRONMENTAL SCIENCE: TRUTH VERSUS A FALSE DICHOTOMY

It was with a twist of logic that Charles Sheppard suggested in *Reef Encounter* 14 (Sheppard, 1993) that I set out a false dichotomy in my paper 'Coral reef environmental science: Truth versus the Cassandra syndrome' (Grigg, 1992). Sheppard's case is basically predicated on the Precautionary Principle which encompasses the idea that erring on the side of caution is better than suffering the consequences of acting too little, or too late. Sheppard then claims that I caution scientists against predicting serious problems unless the evidence is 'overwhelming'.

This is very different from what I actually said. What I do is admonish scientists for predicting serious problems when the evidence is **meagre** (Jokiel and Coles, 1990) or **equivocal** (Chesher, 1969). I called these prophets false Cassandras because they were wrong, as opposed to the real Cassandra who was right. The point of my paper was to compare reef science of 25 years ago to today and to estimate that coral reef science had 'come of age'. In 1970, the *Acanthaster* problem was sensationalized beyond what was reasonable. Richard Chesher predicted the extinction of all corals in the Pacific Ocean. This was an extreme claim for the time given the evidence of outbreaks. While I admit that hindsight is 20/20, the fact is, not one species of coral in the Pacific is extinct today. This should give some idea as to the reasonability of Chesher's warning. But, my point was not to fault Chesher for being wrong. All of us have been guilty of that. No, it was the tactics of the time that I took issue with them, and take issue with now; sensationalising the problem and exaggerating the consequences far beyond what most scientists would consider reasonable. No responsible scientist can afford to cry wolf, be it for research grants, publicity or some noble sense of saving the environment.

I agree with Sheppard that we should sound an alarm if the evidence and interpretations are reasonable, and many times we cannot afford to wait for research to give us certain answers. Certainty in science went out with the Heisenberg Principle, but responsibility did not. I am not suggesting that truth be based on irrefutable proof. Reasonability must be based on objectivity and probability. Science has wrestled with this problem for centuries. Normally, a random element is included in the research design, such as random stations. As for probability, scientific convention is to accept the 5% level as significant, or the 1% level to be more conservative. Science has not accepted just any level, no matter how remote, based solely on precaution. Neither has science accepted opinions in place of carefully weighed conclusions based on hard data.

There are many very real problems facing coral reefs associated with or caused by human beings. Why not focus on the most serious of these such as overfishing, sediment



"DON'T EAT THE HARD BIT ON IT'S BACK,  
THEY MAKE YOU FART!"

Cartoon by Steve Best, Paperlink Ltd.

run-off and eutrophication? Global warming is new, trendy, big science, and a big attention getter; it might even be real and we might know it in ten or twenty years. But for now, I would say we need to worry more about stemming population growth and helping developing world societies cope with resource over-exploitation. In Rio de Janeiro, they gave up on the population problem; the only reference in Agenda 21 was 'adopt appropriate demographic policies'. I think we need to talk more about what the real problems are and focus on responsible, objective science. I still believe that coral reef science has 'come of age', even though there are apparently some who resist getting on board.

**REFERENCES**

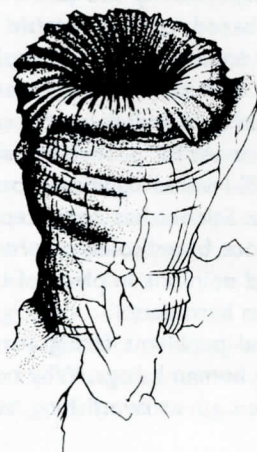
Chesher, R.H. (1969). Destruction of Pacific coral reefs by the sea star *Acanthaster planci*. *Science* 165: 280-83.  
 Grigg, R.W. (1992). Coral reef environmental science: truth versus the Cassandra syndrome. *Coral Reefs* 11: 183-186.  
 Jokiel, P.L. and Coles, S.L. (1990). Response of Hawaiian and other Indo-Pacific reef corals to elevated temperature. *Coral Reefs* 8: 155-162.  
 Sheppard, C. (1993). Coral reef environmental science: dichotomies, not the Cassandras, are false. *Reef Encounter* 14: 12-13.  
 Richard W. Grigg, Dept of Oceanography, University of Hawaii, Honolulu, Hawaii 96822, USA. Fax: +1 808 956 9225.

**NORTHERN GREAT BARRIER REEF OFFER LIVES ON...**

ISRS has for sale copies of 'THE NORTHERN GREAT BARRIER REEF: A Royal Society discussion organised by D.R. Stoddart and Sir Maurice Yonge, F.R.S., led on the 28 and 29 January 1976', which was published in 1978. Copies are available for US\$20 from the ISRS Treasurer, Daphne Fautin (address on inside cover). The price includes shipment by surface; for airmail please add US\$10.

**AND A NEW OFFER HAS COME UP...**

ISRS members are being offered discounts on diskette sets of three catalogues (*Mysidacea*, *Pycnogonida* and *Indo-Pacific Pontoniine shrimps*) by Hans-Georg Müller; see Bookshelf, page 26.



Fossil coral (*Ketophyllum*).  
 Illustration from William Gray's  
 'Coral Reefs and Islands'  
 (see bookshelf).

**CURRENTS**

**THE SCIENCE OF MANAGEMENT IN THE COASTAL ZONE: REPORT OF A WORKSHOP**

Sue Wells

The role of science in management is a current 'hot' topic (see articles by Jamie Oliver and John McManus in *Reef Encounter* 13, and the call for papers on 'Science in Management' for *Coral Reefs* in *Reef Encounter* 14). Readers might therefore be interested to know that the 4th World Congress on National Parks and Protected Areas, held in February 1992 in Caracas, Venezuela, included a workshop at which this issue was discussed. One of four workshops held to develop ways to conceive and implement better marine protected areas, the workshop on 'The Science of Management in the Coastal Zone' aimed to:

1. Identify the kinds of science important to the design planning, implementation and long-term monitoring of effective multiple-use marine protected areas.
2. Begin to translate that scientific information into a language both understandable by and useful to planners and managers.
3. Generate guiding statements on how to create and maintain better marine and coastal protected areas.

Science has a role in marine protected area management and planning in several areas. Knowledge and theories of ecology, genetics, oceanography, hydrography and conservation biology are all necessary in defining discrete management units, and in identifying the geographic area of concern and critical or core areas for management. It was concluded that further research is needed on:

1. Optimum (and minimum) size, shape and location of harvest refugia (small areas where harvesting is prohibited) and core areas, and the impacts of removing species, particularly keystone species from an ecosystem. Some useful studies are already underway, looking at the role of protected areas in regulating reef fisheries, but further work, including experimentation, is required.
2. Processes that are critical in maintaining an area and which can be conserved through management, given that management can most effectively tackle human-induced impacts. This requires a greater understanding of the changes in an ecosystem that are due to natural events and those that are the result of human activity. Such research will also provide a better understanding of the relative vulnerability of different communities to disturbance.
3. Larval dispersal and recruitment in relation to oceanography. The planktonic larvae and eggs of most marine fish and invertebrates, and the dependence of these species on water currents for their dispersal, means that special consideration should be given to sites that

- are 'up-stream', and conversely, where a site is being protected for some other reason, consideration must be given to how this area is replenished; areas that are sources for recruits need to be identified.
4. The effectiveness of the core/buffer strategy and other zoning systems for marine protected area management. The successful delineation of different zones and of core and buffer areas requires not only knowledge of the human activities in the area but also a thorough understanding of the population dynamics of species within the area.
  5. Good case studies of the establishment and management of ecologically based and scientifically rigorous marine protected areas that will provide demonstration models.
  6. Long-term monitoring of marine protected areas and their surroundings to assess management and its impact on the ecosystem. Methods should be standardised to allow comparison between different areas, different management strategies etc.

The need for better two-way communication between scientists and managers, and for the involvement of social scientists was also discussed. Marine protected area managers should provide more guidance to researchers on the scientific information that they require to solve management problems or improve management. Scientists working in marine protected areas should make their data available to managers and local communities, in a clear and understandable form.

The main conclusions of the Congress were summarised in the 'Caracas Declaration', which was presented at the Earth Summit (United Nations Conference on Environment and Development) in Rio later that year, and a strategy for future action was drawn up called the Caracas Action Plan. The Declaration included the recommendation that governments and appropriate national and international bodies should 'foster publicly funded scientific research and monitoring that will improve the planning and management of protected areas, and to use such areas as sites for studies that will improve understanding of the environment.'

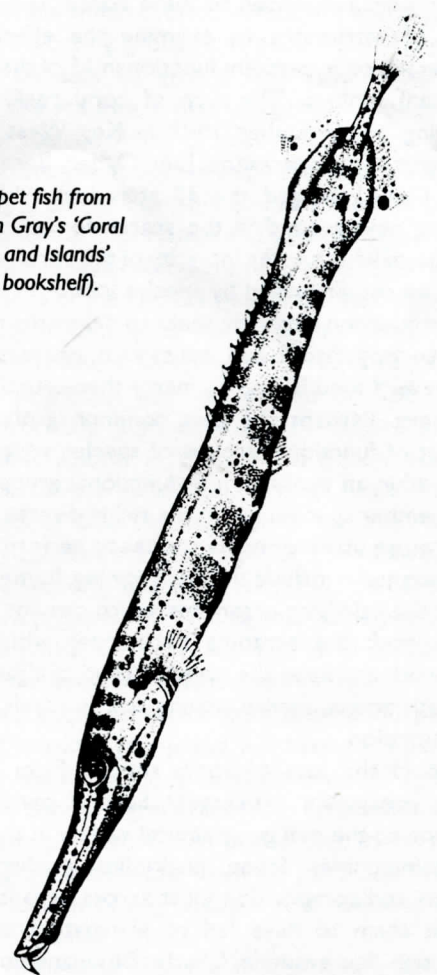
Action 3.4 of the Caracas Action Plan deals with the need to improve the application of science to management and makes the following recommendations:

1. Ensure that management is science-based, and that research carried out in protected areas can contribute effectively to management. Where feasible, extend research results to assist surrounding communities and resource users.
2. Give priority to research on acute and chronic management problems, including land-based marine pollution and other pollution outside protected areas, control of exotic species and management of small populations of wildlife.
3. Develop means for harmonizing the work of many institutions active in information gathering and management. Establish or strengthen global, regional and national protected area documentation centres, and improve linkages between them.

4. Provide basic infrastructure for scientific research in appropriate categories of protected areas, including staff assigned to co-ordinate scientific research programmes within protected areas.

A publication entitled 'Guidelines for Applying Science to the Establishment and Management of Marine Protected Areas' will shortly be published by IUCN. The proceedings of the Congress, with the Declaration and the Action Plan have been published by IUCN (*Parks for Life: report of the IVth World Congress on National Parks and Protected Areas*) and are available from: *IUCN Publications Services Unit, 219 Huntingdon Road, Cambridge CB3 0DJ, UK or IUCN Communications Division, Rue Mauverney 28, CH-1196 Gland, Switzerland, price US\$20/£10.*

Trumpet fish from  
William Gray's 'Coral  
Reefs and Islands'  
(see bookshelf).



**Ecological modeller wanted for study of the design and function of marine reserves. Post is for one year and is based in St Thomas, US Virgin Islands. MSc or PhD required, SCUBA diving qualification an advantage. Closing date 30th April 1994. Further details from: Dr Callum Roberts, Eastern Caribbean Center, University of the Virgin Islands, St Thomas, USVI 00802, USA. Fax: 809 779 6104.**

## MEETINGS REPORTS

### SCOPE WORKSHOP ON BIODIVERSITY AND ECOSYSTEM FUNCTION ON CORAL REEFS: 'DECONSTRUCTING' CORAL REEFS

A general consequence of pollution is a reduction in the biological diversity of ecosystems. Globally, the scale of human impacts has escalated to the extent that many scientists believe we are on the verge of an extinction pulse to rival any in the geological record. Will the loss of biodiversity disrupt ecosystem processes, undermining the very fabric of existence?

The Scientific Committee on Problems of the Environment (SCOPE) has responded to these concerns by supporting a series of workshops to examine the effects of loss of biodiversity on ecosystem function in 15 of the world's most important biomes. The turn of coral reefs came at the beginning of November 1993 in Key West, Florida. The organisers of the workshop, John Ogden, Bernard Salvat and Terry Done, charged the 30 attendees with the task of breaking new ground in the search for an answer to the question of whether the integrity of the coral reef ecosystem would be compromised by species loss.

The question explicitly seeks to define the nature of links between population and ecosystem processes. Biologists have never found it easy to marry these puzzlingly separate disciplines. Perhaps the best common ground lies in the concept of functional groups of species which fulfil similar roles within an ecosystem. A functional group could have a lone member species, but in the richly diverse reef system it seems more usual for many species to perform similar roles. Good examples include the fast-growing, framework-building corals; the calcifying organisms which cement this structure into a reef; the scraping herbivores which erode the framework and keep the standing crop of algae low; and the symbiotic zooxanthellae which provide corals with much of their nutrition.

Would the loss of some species from these groups impair ecosystem processes? Several participants drew attention to the rich geographical variety in the structure of reef communities. Steep longitudinal gradients in species richness and composition exist across oceans and seas but do not seem to have led to elimination of reefs as an ecosystem. For example, Charles Birkeland pointed out that there are no feather stars (Crinoidea) in French Polynesia or Hawaii but reefs still thrive. From patterns like this it can be argued that we need not fear the disappearance of some species.

But are all species equal or will loss of certain 'keystone' species have widespread effects? Peter Glynn showed that net calcification rates did not differ significantly on reefs having widely different numbers of coral species. This suggests that coral diversity *per se* is unimportant to reef growth. However, look beyond the statistics to the key players and it becomes clear that the majority of calcification is performed

by a handful of species. Knock them out, as the 1982-83 El Niño did to reefs of the Galapagos, and there can be a rapid shift from net accretion to erosion.

Such observations have led to the notion of redundant species, ones which play only bit parts on the stage of life. To many scientists the very thought of redundancy is anathema, a view much in evidence at this workshop. When we understand so little of the workings of nature, how can we claim to be sure that a species has little more than decorative value? A species may, for example, significantly affect ecosystem processes only sometimes and in some places. There is always a risk that we will only find out how important it was after it has gone.

Nevertheless, there are plenty of examples of species all but disappearing without noticeably affecting the way reefs work. Large groupers have nearly vanished from many reefs throughout the world due to fishing, yet their loss has had no clear effects. This is not to say that groupers have no role. More probably their predatory activities have been taken over by other species. Perhaps then high diversity can provide insurance against the effects of species loss at the level of ecosystem processes. The more species capable of filling a role, the more resilient will be reef processes to species loss. Whilst complexity does not beget stability within populations and communities, it may do so for ecosystem processes.

As John McManus pointed out, much of the difficulty in tracing the linkage between biodiversity and ecosystem processes is that while there is a strong connection between the presence of various functional groups and processes, there is only a weak correlation between biodiversity and the presence of functional groups. Some groups have many members, others few. Even in very diverse systems, the most vulnerable links are those where keystone roles are filled by only a single species.

So can coral reefs persist in the face of some biodiversity loss? The answer is yes, probably, with the disappearance of some species having broader repercussions than others. Perhaps the greatest service the present series of SCOPE workshops will provide is to clarify the extent of our ignorance. The coral reef workshop ended with a call for more effort to study reefs as whole systems, bridging the simplistic divide between population and community biology and ecosystem science. Our attempts to understand the roles of species within ecosystems will outlast the lifetimes of those who read this. In the meantime prudence dictates that we do our utmost to stem losses of diversity lest we unwittingly undermine the pillars upon which coral reefs and other ecosystems rest.

**The above report, by Callum Roberts, is reproduced with the permission of *Marine Pollution Bulletin*. Further details of the discussions at the workshop will be published as a chapter in a SCOPE volume which will be forthcoming from a conference in Asilomar, California last February. This volume will synthesise the findings of each of the biome workshops. (See Diary section for information on forthcoming conference on 'Marine Biodiversity: Causes and Consequences'.)**

## INTERNATIONAL WORKING GROUP ON SCLERACTINIAN CORALS FIRST MEETING

On 25–26 June 1993, in response to a general invitation, 25 colleagues from ten countries met at the Muséum National d'Histoire Naturelle in Paris to discuss the setting up of a joint project to revise the Scleractinia. It was decided that an *ad hoc* international working group should be set up to organize and coordinate activities. We envisage that membership of the working group will be open to anyone interested, although it will be essential to have a core of more permanent members who are able and willing to commit themselves to particular tasks.

Louise Beauvais (Paris), Gabriel Gill (Paris), Hannes Löser (Dresden) and Brian Rosen (London) are willing to act as an *ad hoc* committee for the group and to organize its next meeting. This will take place at the Second European Meeting of ISRS when the existence of the group will be formalized through the election of a committee to handle organisational matters, and a working plan for the period up to September 1995 (Seventh International Symposium on Fossil Cnidaria and Porifera in Madrid) will be drawn up. Anyone not present in Paris who would like to be involved should contact Hannes Löser.

At the Paris Meeting, the following priorities were identified:

1. Standardisation of morphological terminology
2. Development of a plan to produce a systematic revision of the Scleractinia
3. The pooling of information (literature, taxa, sites of type material needed for further study, addresses, etc.)

### 1. Standardisation of morphological terminology

Before attempting a systematic revision and description of genera it is first necessary to agree on the morphological terms to be used. It was therefore decided that a draft list of morphological elements and forms, prepared for the Paris meeting by Louise Beauvais, Christian Chaix, Bernard Lathuilière and Hannes Löser (*Termes morphologiques utilisés pour décrire les sclérectiniaux: liste préliminaire*), should be elaborated in greater detail and circulated to colleagues who did not attend the meeting for feedback. Suggestions received will then be discussed and the final version adopted by the working group as a basis for the proposed revision of Scleractinia.

The working group would like to receive comments from as wide a range of researchers as possible, including those who work mainly on living corals. The list has already been circulated to other newsletters and to individual coral specialists. The potential for translating the list, which is in French, was discussed and Brian Rosen agreed to translate it into English. The group felt that translations into other languages should be left until a final version was completed.

**A copy can be obtained by writing to Hannes Löser (address below); please return your comments to him by April 30th 1994.** He will collate them on behalf of the authors, who will incorporate straightforward corrections

and suggestions. Unresolved problems will be deferred for discussion at the Luxembourg meeting of the working group. The working group will decide in due course where the final version of the list (hopefully a fully illustrated glossary) will be published.

### 2. Systematic revision of the Scleractinia

A systematic revision of genera is envisaged as a second step. The working group committee will coordinate this work and approach colleagues for cooperation. All colleagues involved will be kept informed by a coordinating centre, which should also be able to answer queries about literature, taxa and material, or to procure such information or literature, if required. Publications, new insights and general information relating to the activities of the working group will be passed on to the committee for dissemination.

The revision of the Scleractinia is an ambitious task that will only be possible within the framework of a well organized and committed working group. It is hoped that the people involved will be able to give a high priority to their commitment. We are aware that recognition of systematic palaeontology has declined in many organizations and countries in recent years, but we hope that active members of the working group will be able to draw the attention of their institutes to the importance and value of this project.

The present initiative coincides with the need for revision of several sections of the *Treatise on Invertebrate Paleontology, Part F* (Geological Society of America and University of Kansas Press). Professor Dorothy Hill (1981) revised the Palaeozoic coral groups, but the sections on Scleractinia, Octocorals, Hydrozoa, Scyphozoa and medusoids all date back to the first edition in 1956. Brian Rosen has been invited by the *Treatise* organisation (through Roger Kaesler, Director) to act as Coordinating Author for this revision. He is currently concentrating on organizing possible authors for some of the sections, and in due course will be developing a research grant proposal for funding this work, jointly with the *Treatise* organisation, with the aim of producing the revision using the latest information technology.

The revision of Scleractinia for the *Treatise* is independent of the present working group and will have to work to its own priorities and timetable. Clearly however, progress on the *Treatise* will benefit a great deal from collaboration with the working group. Brian Rosen hopes that there will be scope for integration between them for particular tasks, to avoid the production of two independent revisions of the Scleractinia at the same time.

At the Paris meeting, Jean-Pierre Cuif spoke about the need for a phylogenetic revision of the Scleractinia, based on modern biochemical methods, and explained his current research programme. A summary of his talk is given on page 14.

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The addresses of other *ad hoc* committee members are: Louise Beauvais and Gabriel Gill, Muséum National d'Histoire Naturelle, Laboratoire de Paléontologie, 8 rue de Buffon, F-75005 Paris, France.

## **An experimental approach to determining the phylogenetic position of scleractinian families**

In spite of the research that has been carried out on living and fossil corals in recent decades, the phylogenetic history of the Scleractinia clearly needs major improvement. Over thirty years ago, the evolutionary scheme put forward by Wells (1956) remains the basic tool. In the French treatise by Chevalier (in Grassé T.III 1987), it states (p. 675) that knowledge does not allow us to present an equivalent picture. A new project, under the direction of J.P. Cuif, is underway in collaboration with the Museum National d'Histoire Naturelle in Paris, the Monaco Research Centre, and the Biochemical Laboratory of the University of Leiden. It is hoped that other interested workers will join the project as it progresses.

The project seeks to associate three distinct methodological approaches, based mainly on the organo-mineral structure of the coral skeletons. It starts with a study of living species, from which a correlation between biochemical criteria and skeletal characteristics will be established, allowing a more efficient use of morphological and microstructural features in fossil forms. The main goals of the project are to:

- improve our understanding of the septal growth pattern in scleractinian corals, in order to elaborate a more accurate and adequate terminology for microstructural units ;
- increase the number of characters used in the determination of the phylogenetic position of the studied species.

It is now well established that skeletal fibro-crystals are 'matrix-mediated structures', the cells of the basal ectoderm secreting the specific glyco-proteic compounds responsible for the biomineralisation process. Since these organic compounds remain entrapped in the calcified units, a three-way research programme can be proposed.

### *1. Improvement of microstructural analysis*

Using an enzyme solution, it is possible to reveal the successive positions of the secretory epithelium during the growth of the fibro-crystals by controlled removal of the intracrystalline organic matrix. Description of microstructural features is thus greatly improved, providing basic data for a new microstructural terminology.

### *2. Biochemical analyses and immunological reactivity*

The organic compounds can also be extracted, purified and biochemically studied, providing a first set of data which allows comparison between genera or families. The glyco-proteic organic matrices can also be used as substrates for preparation of specific antibodies. The reactivity of the resulting antisera (each of them containing antibodies for a definite species) against organic compounds extracted from other species can be measured, giving a 'grid of reactivity'. The pattern of these multiple crossed reactions provides an expression of the phylogenetic distance.

### *3. Molecular biology*

The third step in this study involves using the cells of the polyps from selected species for sequencing RNA or DNA (after removal of the symbiotic zooxanthellae). The efficiency of this method is now well demonstrated and, in this first attempt, the small number of species chosen from clearly distinct families may provide the basis for a step-by-step revision of the evolutionary history of scleractinian corals.

### REFERENCES

Wells, J.W. (1956). Scleractinia. In: Moore, R.C. (Ed). *Treatise on Invertebrate Paleontology. Part F. Coelenterata*. Geological Society of America and University of Kansas, Lawrence, Kansas.

Jean-Pierre Cuif, Bâtiment 540, Paléontologie, Faculté des Sciences, Université d'Orsay, Orsay, F 91405 France. Tel: (33) 1 69 41 67 41; Fax: (33) 1 69 41 61 23.

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## **CORAL REEF CONSULTATION DAY – US DEPARTMENT OF STATE**

The U.S. Department of State held a day of consultations with representatives from state and local governments, environmental and industry organisations and the scientific community on 10 January 1994 to discuss the potential and feasibility of developing a 'U.S. Coral Reef Initiative' through the U.S. Administration. Three panels were established to discuss the topics that would comprise the principal themes of the initiative, and the following is a brief summary of their reports.

### **1. Panel on Research and Monitoring (Facilitator: John Ogden)**

The panel concluded that reef research is 'distinctly over-planned and underfunded by the numerous agencies who have put much effort into these plans', and that greater effort must go into funding research as well as planning it. Recommendations are available in the reports of numerous meetings that have taken place in the last few years (many reported on in *Reef Encounter*). Taking these as a starting point, the panel defined broad research themes that should be emphasised through a U.S. initiative:

1. Survey and inventory work to improve knowledge on global distribution and status of reefs, with particular emphasis on improving aerial and satellite techniques for regional and global scale mapping and survey.
2. Research into biodiversity and ecosystem function, including more emphasis on taxonomy and systematics, process-oriented studies, and work aimed at improving understanding of the ecology and physiology of species that play pivotal roles in the maintenance of diversity (see also report of SCOPE meeting above).
3. Research into global change, including human impacts and climate change.

### **2. Panel on Partnerships for Effective Coral Reef Management (Facilitator: Lynne Zeitlin Hale)**

This panel reviewed existing international and national

initiatives in reef management, both at policy and site level, and professional training and public education. These included activities underway through US Government agencies, NGOs, universities, aquaria and museums, the private sector (especially the tourist industry), and multilateral banks. At the international level, most activity is underway in the Caribbean, Asia and the Pacific, although there are a growing number of initiatives being developed in East Africa and the Indian Ocean. Most current activity is in terms of protected area management. Recommendations included the following:

1. Management of reefs must move beyond protected areas, to address land-based sources of pollution, watershed management and integrated coastal zone management;
2. Training, public education and technical assistance are essential components of any initiative;
3. There must be improved communication between all the organisations involved; and innovative partnerships, including co-operative international efforts based on long-term commitment, trust and shared objectives, should be developed to tackle some of the more difficult issues.

### 3. Panel on Domestic Coral Reef Management (Facilitator: W.J. Harrigan)

This panel concluded that the programmes established under the Coastal Zone Management Act are not currently effective and that there needs to be better funding and enforcement, as well as improved legislation and policy specifically for coral reefs. A variety of activities and projects were recommended, covering coral reef fisheries, implementation of CITES and regulation of the coral trade, and management of reefs outside as well as within marine protected areas.

The next stage would be the development of a strategy to promote stewardship and sustainable development of reefs, aiming for modest action and clear evidence of early success. The Coastal Resources Center of the University of Rhode Island is taking the lead in collating information on existing reef-related activities underway in the U.S.A. and through the major international institutions, which will help to ensure that duplication of efforts do not occur. It is also synthesising the suggestions that have been made for the form of the initiative in a report that will be submitted to the Department of State in March.

Further information from: *Lynne Zeitlin Hale, Coastal Resources Center, University of Rhode Island, Narragansett, RI 02882-1197, USA. Tel. (401) 792-6224; Fax. (401) 789-4670.*

## FEATURES

### DATABASES RELEVANT TO CORAL REEF RESEARCH AND MANAGEMENT

Where is the wisdom?  
Lost in the knowledge.  
Where is the knowledge?  
Lost in the information.  
*T.S. Eliot*

Where is the information?  
Lost in the data.  
Where is the data?  
Lost in the database.  
*From 'Database Programming and Design'*

There has been such a proliferation of databases in recent years that we thought it might be useful to provide a quick guide to some of the regional and international ones that are most relevant to reef researchers and managers. Efforts are now underway to ensure that good links are developed between these. If you know of other databases that you think might be of interest to readers, please let us know.

Numerous national databases are also being set up to collate information on a whole range of topics relevant to reefs. For example, the Reef Ecology Database developed at AIMS covers about 420 reefs on the Great Barrier Reef and holds a number of datasets on reef ecology, some of which are time series tables dating from 1982 (Baker *et al.*, 1991). A database set up by Coral Cay Conservation, a UK-based NGO working in Belize, holds information on location, physical parameters, species abundance and distribution and other ecological factors for the reefs on which it has worked, and will be linked to the Belize Government's GIS (McCorry *et al.*, 1993). Salm (1993) prepared a coral database for the Sultanate of Oman which holds data on coral species occurrence for 185 sites, with a general description of each site, its uses and threats. We do not have the space to describe all these but please feel free to contribute information on interesting approaches to database design, useful software, innovative uses etc. We need to make sure no knowledge is lost in all these efforts; as for the wisdom, we won't comment on that!

### GLOBAL DATABASES

#### ReefBase

ReefBase, a global database on coral reefs, is being developed at the Manila-based International Center for Living Aquatic Resources Management (ICLARM), with an initial two years funding from the Commission of European Communities. The aim is to gather information that will help to answer basic questions such as 'what is the total area of coral reefs in the world?' and 'what is the contribution of reefs to the world's fisheries?' It will also aim to document the contribution

of reef resources to the economy of developing countries, gathering information on current and potential yields of different reef species, sustainable yields that might be extracted from different reef types, how yields are affected by declining reef health and loss of productive capacity, and the value of non-extractive uses of reefs such as tourism.

The preliminary focus will be on obtaining estimates for reef areas, which in many cases will necessitate literature searches and correspondence with a wide range of individuals. Initial figures may well be approximate but will be replaced with more reliable data as the project progresses. Information on other aspects will be entered on a more *ad hoc* basis, the emphasis being on linking with other data collection programmes, rather than collecting and inputting raw data. Each data entry will be flagged according to its reliability, and will be referenced and acknowledged.

ReefBase users, through a global map on their computer screen, will be able to focus in on any country, reef system or individual reef to obtain details of reef area, species composition, coral cover, catch rates and composition of reef fish and invertebrates, recreation and other forms of resource use, human impacts, management efforts and indigenous knowledge. Current discussions among reef scientists on common methodologies and terminology are being used as a starting point for designing the data entry fields.

ReefBase will provide data from which it should be possible to quantify changes in reef health at national and global levels, thus providing conservation organizations, governments and the media with the statistics and information that are needed to implement policy changes. ReefBase will also be useful in identifying future research priorities and could serve as a framework for the development of analytical tools.

In order to accomplish these objectives, ICLARM will develop a global network of collaborating scientists and

institutions, and will link with national and regional databases and other data-gathering programmes as they are developed. It is already collaborating closely with the coral reef mapping project underway at the World Conservation Monitoring Centre (see below). In developing countries, means will also be sought to provide technical assistance in data acquisition and to enable developing country scientists to develop their skills by further training or appropriate linkages with advanced research laboratories and universities. It should be possible for researchers who can obtain appropriate funding to work on particular areas of ReefBase, benefiting from the global context that the database will provide and augmenting and contributing themselves to the information that is stored, an activity for which they will be fully credited.

The software (ACCESS) will run on IBM compatible computers, and experience gained in the development of FishBase (see below) will be used. The first version of ReefBase will be distributed to all collaborators in about 1996. Subsequent revised and updated versions will be distributed at nominal cost to all relevant national and international research and management institutions and individuals.

Further information available from: *John McManus, Coastal and Coral Reef Resource Systems Program, ICLARM, MC P.O. Box 2631, Makati, Metro Manila 0718, Philippines. Fax (63) 2 816 3183.*



### Global coral reef mapping programme

Closely linked to the ReefBase project, the World Conservation Monitoring Centre (WCMC) is embarking on a major coral reef mapping initiative. WCMC already has projects that involve the mapping of other marine and coastal features such as protected areas, coastal wetlands, mangroves and turtle feeding and nesting sites.

Using a base scale of 1:250,000, reefs will be mapped using a GIS package. The Centre already holds a global coral reef coverage at a scale of 1:1,000,000 that shows emergent reef crest as mapped on the Operational Navigational Charts of the US Defense Mapping Agency, and this provides some baseline information. Linked features will be incorporated, notably bathymetric contours, and 20m, 50m and 100m depth contours will be included where this information is available. The ultimate aim is the publication of a World Atlas of Coral Reefs, assuming further funding can be obtained.

Information on the best available maps for all coastlines with reefs, including charts, GIS datasets, coastal resources atlases, etc. is now being gathered. The mapping process will be a collaborative exercise. Individuals and institutions who can provide hard copy maps and charts suitable for digitising will receive these in digital format in return. All collaborators will also receive copies of the final maps for the whole world on a simplified GIS that will be developed for ReefBase.

If you would like to become involved or can provide maps, GIS datasets, other information, or advice please contact: *Mark Spalding, WCMC, 219 Huntingdon Road, Cambridge, CB3 0DL, UK. Tel: (44)-223- 277314, Fax (44)-223-277136. e-mail: spalding@wcmc.org.uk*



Scientists at ICLARM perfect the virtual reality coral reef



## FishBase

This database is also produced by ICLARM, with European Community funding, in collaboration with FAO. It contains information on nomenclature (including museum types), distribution, ecology (e.g. habitat and food types), morphometrics (including graphs), population dynamics (including growth parameters, natural mortality etc.), reproduction, diseases and parasites, genetics and aquaculture systems etc. There is an extensive bibliography. Images are included in many instances, and distribution maps are available for all species. The FishBase network of collaborators is providing the model for that to be set up for ReefBase. Data have been gathered from a wide range of sources including FAO programmes, museum collections, published material and contributions from individual scientists.

The project was initiated in 1990 and data on some 8,600 species, including most coral reef species, have been entered. Version 1.0 has been released on diskette, using DataEase, a powerful relational database which allows fast development of large applications without any programming. Users access information through windows that combine information from several of the 60 linked tables. A manual is also available. The aim is to include all 24,000 of the world's fish species.

Further information from: Rainer Froese or Deng Palomares, ICLARM, MC P.O. Box 2631, Makati, Metro Manila 0718, Philippines. Fax (63) 2 816 3183.



## Coral Reef Fish Biodiversity Database

There are at least 4,000 species of fish commonly found on coral reefs, roughly 25% of all marine fish species. Coral reefs support densities of fish species about two orders of magnitude greater than the average for the world's oceans. A project has been underway since 1986, through the auspices of the IUCN Species Survival Commission Coral Reef Fish Specialist Group, to map reef fish distributions at a global scale and input the data into a GIS. The aim is to determine the distribution of reef fish and thus the diversity of fish on different reefs: overlaid maps will reveal 'hot spots' of high diversity as well as areas of high endemism.

Over 1300 species have now been mapped and data exist for a further 500 species to be plotted with reasonable accuracy.

The main data sources are taxonomic monographs and species collections, as well as field records and species lists published in the scientific and grey literature. Records are entered into the GIS as latitude-longitude points. The data are almost all based on records from particular reefs or narrowly defined reef systems. To ensure accuracy, following mapping, distributions are checked by experts in the groups.

The GIS used for the reef fish maps is Axys Software's QUIKMap, which runs with FoxPro programs. The advantage of this is that it is quite powerful, runs on a PC, is cheap (US\$845) and the FoxPro data files are convertible to most other kinds of database files. The fields we have at present are family, genus, species, latitude/longitude, and data source. For analytical purposes we use an equal-area grid system,

which is a custom-developed overlaid module of the GIS. Analyses can also be performed using any of the other methods available on GIS, for example based on polygonal species range maps generated from the point records.

When complete, it is hoped that an atlas of coral reef fish distributions will be produced so that the data are accessible to all interested parties. The data will also be made available on diskette.

Further information from: Callum Roberts, Eastern Caribbean Center, University of the Virgin Islands, St Thomas, US Virgin Islands, 00802, USA. Fax: 809 779 6104.

Information about the Coral Reef Fish Specialist Group from: Don McAllister, Centre for Biodiversity, Canadian Museum of Nature, P.O. Box 3443, Station 'D', Ottawa, Ontario, K1P 6P4, Canada. Fax: 613 990 8818.



## CoralBase

This database is being developed at the Australian Institute of Marine Science (AIMS) and contains all available data on coral taxonomy and biogeography. It includes a comprehensive bibliography, several thousand images and a number of utilities for plotting distributions, viewing images, and carrying out some basic analysis and graphing functions. Much of the information in CoralBase has been collected personally by Dr J.E.N. (Charlie) Veron of AIMS and this is entered at species level (Veron, 1993). Other data are taken from literature records and may be at species or genus level. Each species and site is linked to a bibliography, an image base and a distribution plotting utility.

Over 900 coral species names from about 350 locations worldwide and 3300 synonyms have been entered. Coral species data include family, genus and species names. Biogeographic data include site name, latitude/longitude and, in the case of Eastern Australia, the Great Barrier Reef Marine Park Authority gazetteer reef ID Code. Taxonomic data for species in the monographs *Scleractinia of Eastern Australia* by Veron will be included with a link to the AIMS reference specimen collection.

CoralBase consists of a number of modules written for the Windows environment. It is controlled from a master module, CoralBar, which contains controls to activate other modules: CoralDat, the coral database; CoralMap, a species distribution plotting programme; Corallmg, an image display module; CoralBib, a bibliography interface; CoralUty, which will contain a number of basic analysis and graphing utilities; and CoralKey, which allows a user to identify corals using a selection of characters displayed visually on the screen.

CoralBase is designed so that the species currently displayed is the 'active' species. Choosing the image display button, for example CoralBar, will display the appropriate images for that species. Each module can also be used independently; for example, the Corallmg module can be used to browse the image base or to search for a particular image without the database being open.

It is expected that CoralBase Version 1.0 will be released for distribution on CD-ROM by the end of 1994. Because of the complexity of the CoralKey module, it will probably not be available in the first release.

Further information from: Kim Navin, Australian Institute of Marine Science, PMB No.3, Townsville MC, Queensland 4810. Fax (61) 77-72-5852. e-mail: K-Navin@AIMS.GOV.AU.



### UNEP/IUCN Islands Database

This database, developed in 1989/90, contains information on nearly 2000 oceanic islands less than 17,000 km<sup>2</sup> in area. A very broad range of data are included, from basic descriptive information, geology, climate, ecosystem types (including coral reefs) and flora and fauna, to various indicators of threat to and conservation status of each island. A rating system has been developed and the database can be used to identify priorities for conservation action. An Island Directory (Dahl, 1991) has been published as an interim product. The database is designed to use dBase III+ or Foxbase, and discussions are underway at present on where and how it should be maintained.

Further information from: Jeremy Harrison, Protected Areas Data Unit, WCMC, 219 Huntingdon Road, Cambridge, CB3 0DL, UK. Tel: (44)-223-277314, Fax (44)-223-277136



### WCMC Protected Areas Database

WCMC maintains a FoxPro database on all protected areas of the world (some 40,000 terrestrial and marine sites). It contains information on physical and biological features, legal protection, management systems and threats; for some 4000 of these there are detailed data sheets. A simple habitat classification scheme allows sites to be flagged if they contain 'coral', 'mangrove', 'littoral', 'estuarine' or 'marine' communities (about 400 sites contain coral habitat) but this is to be developed further.

Further information from: Jeremy Harrison, Protected Areas Data Unit, WCMC, 219 Huntingdon Road, Cambridge, CB3 0DL, UK. Tel: (44)-223-277314, Fax (44)-223-277136



### ODA Coral Reef Fisheries Literature Database

This was developed by the Marine Resources Assessment Group at Imperial College in London, through the Fish Management Science Programme of the UK Overseas Development Administration. It is designed for storing and organising references concerning coral reef fisheries around the world and offers facilities for adding, editing, printing and deleting selected references, using selected data fields for yields, catch-per-unit-effort, gear type etc. It contains 355 references which are intended as a start up, and comes with a review of coral reef fisheries (also published as Medley et al., 1993). The database application is written in R:BASE Runtime software (a registered trademark of MICRORIM Inc.).

Further information from: D. Evans, Marine Resources Assessment Group (MRAG) Ltd, 27 Campden St, London W8 7EP, UK. Tel. (44) 71-225-3666. Fax. (44) 71-823-7916.

### Others under development

A central database will be set up to collate the data gathered through the UNEP-IOC-WMO-IUCN Monitoring Coral Reefs for Global Change Programme (UNEP/AIMS, 1993). About 25 countries have now expressed interest in taking part in this. The site of the database has yet to be finalised.

The International Society for Mangrove Ecosystems is setting up a database which is likely to complement ReefBase quite well. The primary unit is 'any contiguous area of mangrove which can be identified as a complete ecosystem unit and which has, or should legally have, its own overall management plan'. Where possible the tables will share common fields with those in the ASEAN-Australia LCR database (see below). A prototype has been produced for Indonesia, Malaysia and Thailand but has not yet been structured into a fully relational database (Clough, 1993).

## REGIONAL DATABASES

### ASEAN-Australia Living Coastal Resources Project

This regional monitoring programme for the ASEAN countries has a Data Management Centre at Chulalongkorn University, in Thailand. A country manager maintains each country's database and backup copies of this are forwarded to the Centre about every three months. The database uses dBase IV, and data are collated into a series of linearly arranged files (Chou and Wilkinson, 1992). A directory and dictionary of the data available will be published shortly.

Further information from: Supichai Tangjaitrong, Department of Marine Science, Chulalongkorn University, Bangkok, Thailand 10330. Fax (66) 2-255-3381.



### The Nature Conservancy's Marine Conservation Science Center Coral Conservation Database

This covers the tropical Western Atlantic and holds information on 147 species of coral (distribution by country, density of colonies, sensitivity of pollutants, etc.; some site specific information; 12,000-14,000 references). The primary aim is to evaluate the rarity of coral species (Sullivan et al., in prep.).

Further information from: Kathleen Sullivan, TNC Marine Conservation Science Center, Department of Biology, University of Miami, P.O. Box 249118, Coral Gables, FL 33124, USA. Fax. (305) 284-3039.



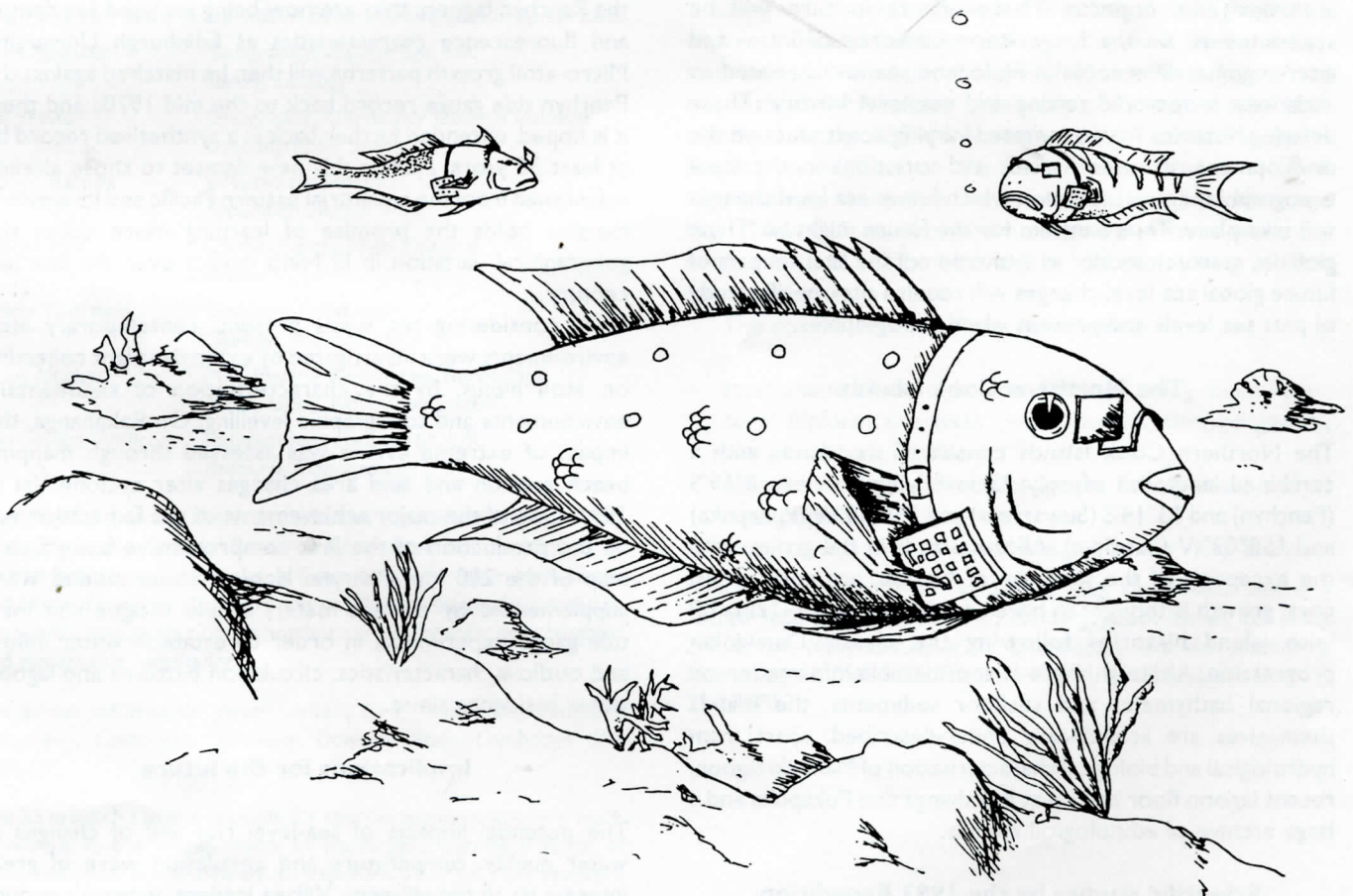
### Other regional databases

CARICOMP, the Caribbean monitoring programme for coral reefs, mangroves and seagrasses, is currently setting up a Data Management Center at the University of the West Indies in Jamaica. An Eastern African Coastal and Marine Environment Resource Database and Atlas is being set up through the UNEP Regional Seas Programme (with support from the Belgian government and national institutions) and will collate data on natural resources and link with a GIS. Along the same lines, SPREP (South Pacific Regional

Environment Programme) is developing a Pacific Environment Assessment and Management Information Systems (PEAMIS) capability and regional network. A number of regional fisheries programmes are also setting up databases that will contain information relating to coral reefs, such as the South Pacific Commission's Inshore Fisheries Project and the CARICOM Fisheries Resource Assessment and Management Programme.

#### REFERENCES

- Baker, V.J., Moran, P.J., Mundy, C.N., Reichelt, R.E. and Speare, P.J. 1991. *A Guide to the Reef Ecology Database. I. Description of Data*. AIMS, Townsville.
- Chou, L.M. and Wilkinson, C.R. Eds. 1992. *Third ASEAN Science and Technology Week Conference Proceedings*. Vol. 6. Marine Science: Living Coastal Resources.
- Clough, B.F. 1993. *The Economic and Environmental Values of Mangrove Forests and their Present State of Conservation in the South-east Asia/Pacific Region*. Technical Report. International Society for Mangrove Ecosystems, Japan.
- Dahl, A.L. 1991. *Island Directory*. UNEP Regional Seas Directories and Bibliographies. No. 35. Nairobi, Kenya.
- McCorry, D., Mumby, P.J., Raines, P.S. and Ridley, J.M. 1993. *South Water Cay Marine Reserve: Draft Management Plan. 2nd Draft*. Prepared for CZM Unit, Fisheries Dept, Government of Belize. Coral Cay Conservation Ltd, London, UK.
- Medley, P.A., Gaudian, G. and Wells, S. 1993. Coral reef fisheries stock assessment. *Rev. Fish Biol. Fish.* 3: 242-285.
- Salm, R.V. 1993. Coral reefs of the Sultanate of Oman. *Atoll Res. Bull.* 380. 85 pp.
- Sullivan, K.M., Roca, R., Peters, E.C. and Chiappone, A. in prep. *Conservation Status of Corals in the Tropical Western Atlantic: guidelines and assessment*. UNEP/AIMS 1993. *Monitoring Coral Reefs for Global Change. Reference Methods for Marine Pollution Studies* No. 61, UNEP, Nairobi, Kenya.
- Veron, J.E.N. 1993. *A Biogeographic Database of Hermatypic Corals*. AIMS Monograph Series Vol. 10., AIMS, Townsville, Australia.



Market tests suggest huge sales of the Australian Institute of Marine Science's underwater computer

## NEWS

## NORTHERN COOK ISLANDS SCIENTIFIC EXPEDITION 1993: SEA LEVELS PAST, PRESENT AND FUTURE IN THE ATOLL WORLD

Downwards revision of projected rates of sea level rise for the next century, from best estimates of 100–150 cm a year in the mid-1980s to the IPCC's 1992 estimate of < 50 cm, requires some reassessment of the likely impacts of future sea level rise on coral atoll ecosystems. Rather than simple *in situ* drowning and loss of island area, reefs may show more complex responses to environmental change where the relative rates of different reef-forming processes and the net effect of a range of controls on reef health become of critical importance. There is a need to understand in more depth the interactions between i) rates of reef growth and rates of sea level change; ii) sea surface temperatures, coral physiological response and reef accretion and iii) modified atmospheric and ocean circulation systems and changing patterns of storm incidence, frequency and magnitude.

These changes in reef functioning and boundary conditions will take place across i) a range of atmosphere – oceanographic settings and ii) a spectrum of differing forms and degrees of anthropogenic impacts. These effects in turn will be superimposed on the longer-term backdrop of intra- and inter-regional differences in Holocene sea levels related to variations in tectonic setting and sea level history. These differing histories have generated varying constraints on the development of modern reefs and variations in the fossil topographies against, or over, which future sea level changes will take place. Thus a maxim for the future might be 'Think globally, research locally' as evaluation of the likely impact of future global sea level changes will require site-specific study of past sea levels and present island topographies.

### The Northern Cook Islands

The Northern Cook Islands consist of six islands with a combined land area of only 25 km<sup>2</sup> lying between 8°59'S (Penrhyn) and 13°14'S (Suwarrow) and 165°49'W (Pukapuka) and 158°02'W (Penrhyn). All the islands in the group, with the exception of the sand cay of Nassau, are coral atolls; coral growth is thought to have commenced at 14–22Ma BP with island histories following the classic Darwinian progression. Although there is considerable information on regional bathymetry and seafloor sediments, the islands themselves are scientifically under-described, apart from hydrological and biological characterisation of Manihiki lagoon, recent lagoon floor drilling at Rakahanga and Pukapuka and a large archive of ethnological studies.

### Scientific studies by the 1993 Expedition

Using as its base the yacht *Evohe*, the Expedition completed an eight week, 1700 mile anti-clockwise circuit from

Rarotonga, visiting four of the six islands (and calling also at Palmerston atoll on the return leg). Research was concentrated at Penrhyn, Manihiki and Rakahanga as examples of atolls with differing degrees of ocean – lagoon water exchange: Penrhyn's extensive lagoon is characterised by three substantial passages whereas at Manihiki exchange is restricted to shallow *hoa* between the reef rim *motus*. Rakahanga's small (5 km<sup>2</sup>) lagoon is even more closed and has no coral patch reefs, a characteristic which implies poor lagoonal circulation.

At each island, research was undertaken into the record of past sea level changes over thousands of years by establishing the relationships between *in situ* fossil reef deposits, such as microatolls in abandoned *hoa*, cemented boulder ramparts and contemporary reef flats and algal ridges. Fossil corals are now being submitted for radiometric dating to establish a Holocene sea level curve for these islands: unlike the Southern Cook Islands it should not contain a tectonic component which results from the processes of lithospheric flexure and atoll island uplift evident near the young volcanic island of Rarotonga.

On decadal time-scales, it was apparent that the reefs of Penrhyn atoll are subjected to large inter-monthly variations in water level, assumed to be associated with different phases of the El Niño – Southern Oscillation phenomenon. To reconstruct these variations, coral slices were extracted from two large *Porites* micro-atolls on the northern rim of the Penrhyn lagoon; they are now being analysed for density and fluorescence characteristics at Edinburgh University. Micro-atoll growth patterns will then be matched against the Penrhyn tide gauge record back to the mid 1970s and then, it is hoped, extended further back in a synthesised record by at least 30 years. Adding this new dataset to those already established from the equatorial eastern Pacific and its western margins holds the promise of learning more about the geographical variation in El Niño events over the last half century.

In considering sea levels present, contemporary atoll environments were investigated by extensive plant collecting on atoll *motus*, by the characterisation of sedimentary environments and topographic levelling. On Rakahanga, the impact of extreme events was assessed through mapping beach erosion and land area changes after cyclone Val in 1991. One of the major achievements of the Expedition will be the production of the first comprehensive bathymetric map of the 280 km<sup>2</sup> Penrhyn lagoon. These studies were supplemented by current meter, simple drogue and local tide gauge experiments in order to establish water inflow and outflow characteristics, circulation patterns and lagoon water residence times.

### Implications for the future

The potential impacts of sea-level rise and of changes in water quality, temperature and circulation were of great interest to all the villagers. Village leaders, women's groups and fishermen on Penrhyn and Manihiki atolls were interviewed about their use and management of marine resources, with particular emphasis on cultural values, market

opportunities and the impact of environmental change. Open-ocean and lagoon fishing takes place at a subsistence level in both atolls, as storage and shipping facilities are still limited and unpredictable. Fishery resources were perceived to have changed little and continue to be abundant. Tridacnid clams are a popular export to Rarotonga.

The main influences on the resource use and socio-economics of the atolls over the last two decades have been: (a) the decline of the copra industry in the late 1970s leading to a dependence on national subsidy, reduced copra plantation activity, and out-migration of villagers to urban centres; and (b) the introduction of pearl-oyster farming in the late 1980s. Pearl oyster farming was just starting on Penrhyn, but was intense on Manihiki where extensive facilities had been constructed on patch reefs throughout the semi-enclosed lagoon. Both the decline in the copra industry and the increase in pearl farming had direct impacts on cultural values, village relationships and land and reef tenure systems.

Discussions were held with the Island Council on each island, and talks given to the High School, Penrhyn, and at an open meeting on Rakahanga to repudiate some of the wilder predictions of future sea level change and to point out some of the complexities involved in the sea level question. As the Expedition works up its field studies, we hope to provide realistic scenarios of future environmental change for the strategic planning needs of the Cook Islands Government.

The 1993 Northern Cook Islands Scientific Expedition comprised:

Tom Spencer	Geography, Cambridge, UK <i>Survey, Geology</i>
Jon French	Geography, University College London <i>Oceanography, Survey</i>
Robyn Barnes	Weymouth Hospital, UK <i>Expedition Doctor</i>
Bill Sykes	Christchurch, New Zealand <i>Botany</i>
Sandy Tudhope	Geology, Edinburgh <i>Geology, Sedimentology</i>
Tony Utanga	Min. Marine Resources, Rarotonga <i>Local Liaison, Navigation Systems</i>
Meriwether Wilson	Independent consultant, UK <i>Resource Management</i>

The Expedition would like to thank Sandra Carrod and Stephen Kafka of *s/v Evohe*, the National Research Committee and the Ministry of Marine Resources, Cook Islands Government for their enthusiastic and efficient support of the Expedition. We are especially grateful to the memorable people of the northern atolls for their help, laughter and remarkable hospitality.

For further information please contact: *Dr T Spencer, Department of Geography, Cambridge University, Downing Place, Cambridge CB2 3EN, UK.*

The 25 m ketch *Evohe* is available for appropriate expeditionary work anywhere in the world, takes 14 passengers, carries a range of equipment and is manned by an experienced crew. The standard charter fee is about US\$1000 a day and covers all running costs of the boat, including food, fuel and the use of tenders and diving equipment. Scientists must be prepared to work with volunteers who also participate in the daily running of the boat and who make a financial

contribution which helps to keep the charter fees low. The boat does not operate at a profit, but costs, domestic chores, etc. are shared. Further information available from: *Sandra Carrod, c/o Jane Cheriford, 35 Cornwall Road, Cheam, Surrey SM2 6DU, UK. Tel. (44) 81-642-5787.*

## IOC-UNEP-SPREP TRAINING COURSE ON CORAL REEF MONITORING AND ASSESSMENT

The first training course to be carried out through the UNEP-IOC-WMO-IUCN Monitoring Coral Reefs for Global Change programme took place on Rarotonga, Cook Islands, 23 Feb – 13 Mar 1994. Funding for the course was made available by SPREP, UNEP and IOC, and the course was hosted by the Cook Island Conservation Service (CICS). The aims were to:

- train participants from the Pacific in methods of assessing coral reef status and fish abundance;
- emphasise the importance of constructing a database to ensure accuracy and to enable basic statistical analyses;
- assess the status of reefs around Rarotonga for the CICS;
- develop a training procedure for the global monitoring programme and assess its effectiveness.

Training was carried out with the assistance of two groups with considerable experience of assessing reefs: the Australian Institute of Marine Science Reef Monitoring Team; and scientists at the National University of Singapore who have taken part in the ASEAN-Australia Living Coastal Resources project. In addition to the six trainees from the Cook Islands, there were three each from Fiji, the Solomons and Papua New Guinea, all of whom are government or university employees and will be involved in reef monitoring in their own countries.

The course covered three main topics:

- assessment of benthic communities using manta-tow, coral lifeform transects (with identification to genus), and permanent quadrats;
- estimation of abundance of target fish species, and of total populations along transects;
- entry of data into the database and preliminary analysis.

Further information from: *Mr Wayne King, Conservation Service – Tuanga Taporoporo, P.O. Box 371, Rarotonga, Cook Islands, Tel. (682) 21256; Fax. (682) 22256; or Dr C. Wilkinson, Australian Institute of Marine Science, PMB No.3, Townsville MC, Q. 4810, Australia. Fax (61) 77-72-5852.*

## FURTHER NEWS ON CORAL REEF RESEARCH IN MADAGASCAR

Following on from the news item on Madagascar by Andrew Cooke in Reef Encounter 13, Pierre Vasseur has sent some additional information on past and current French initiatives in this country.

A continental island in the south-west Indian Ocean, Madagascar has nearly 5000 km of coast, with coral reefs fringing or lying off some 1400 km. Scientific information about almost all these reefs is almost non-existent, despite their biological richness and their potential economic importance to the country for fishing, mariculture and tourism. The only two areas where reef research has been undertaken are the south-west coast, mainly in the region of Toliara, where the 'Station Marine' of University of Toliara (then Tulear) was established in 1961, and the island of Nossi-Be off the north-west coast, where ORSTOM (Institut Français de Recherche Scientifique pour le Développement en Coopération) had a base until 1974 (now the Centre National de Recherches Oceanographique).

Most research has been carried out in the Toliara region. The marine station was set up here with the specific aim of studying the reefs and associated habitats such as beaches, seagrass beds, and mangroves. Work has so far been restricted to a 70 km long strip comprising Toliara Bay, the 'Grand Récif' and Ranobe Bay. As mentioned in the previous article, from 1961 to 1972, most scientific work was carried out by researchers from the university of Aix-Marseille II. Nearly 400 scientific articles were published, covering hydrology, marine geology, plankton and benthic communities, and ichthyology (Thomassin, 1987).

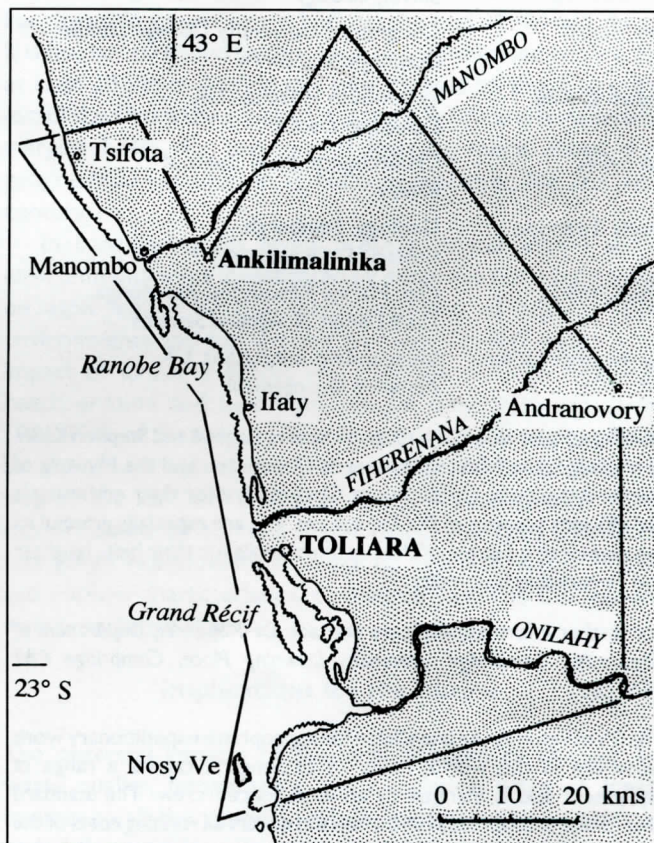
After French field work ceased in 1973, the marine station lay almost dormant for 12 years, due to the economic, political and social problems in the country. Uncontrolled exploitation of marine and coastal resources increased, and widespread deforestation inland began to have an impact on the coast. The threat posed to the reefs and mangroves finally led to the realisation of the need for training and research.

In 1984, as a result of an initiative by the Director of the marine station (Dr H. Rabesandratana), a marine studies course, leading to the 'Diplôme d'Etudes Approfondies (DEA) en Océanologie Appliquée', was set up jointly with Aix-Marseille III University, through Professor Vicente. Since 1988, DEA students have been taught by Malagasy teachers and researchers as well as technical residents and visiting scientists. A second research and training programme, the 'Unité de Formation Supérieure Halieutique' (UFSH) was set up in 1986 with assistance from FAO and UNDP. UFSH work was principally concerned with the exploitation of lobster stocks, monitoring of traditional fishing, fish aggregation devices (in collaboration with the Tuna Association of the Commission de l'Océan Indien (COI)), and production of the crustacean *Artemia* for aquaculture. Between 1984 and 1992, 74 students received research diplomas through these two courses.

In 1991, the UFSH, led by Dr Ralijaona and Dr Rabenevanana, signed an inter-university agreement with the 'Ecole Nationale Supérieure Agronomique de Rennes/ Département Halieutique' and in 1992, the marine station and UFSH merged into a single institute, the Institut Halieutique et des Sciences Marines (IHSM), described in the previous article. The staff are predominantly Malagasy, with six visiting scientists from Aix-Marseille, Bordeaux and La Réunion universities. A new training programme is now being developed (Brevet de Technicien Supérieur de la Mer, Baccalauréat +2), which will be funded by the Fonds d'Aide et de Coopération in Madagascar. The new institute is adopting a strong inter-disciplinary approach to training, research and education.

Early research resulted in the amassing of much useful data but did not tackle the major environmental problems on the coast: sedimentation caused by deforestation, over-exploitation of reef flats, shell collecting, destructive fishing methods such as poisons and beach-seine netting, over-exploitation of mangroves, and the increasing urbanisation of Toliara, the main harbour in southern Madagascar.

In 1985, at a conference on conservation and development in Madagascar, held under the auspices of IUCN, WWF, FAO and UNDP, Prof. Salvat (from the University of Perpignan) and Dr Rakotovao (from the Ministère de la Recherche Scientifique et Technique pour le Développement in Antananarivo) both stressed the urgency for action to be taken in the Toliara region. Since there was insufficient data



The Nosy Ve/Toliara/Ifaty/Tsifota area showing the limits of the proposed biosphere reserve

to develop a management plan for the area, a general survey was carried out in 1987 (Vasseur *et al.*, 1988), which led to a number of proposals.

The proposals developed by Rakotovoao and Vasseur (1987) and Vasseur *et al.* (1988) were not followed up, but two other projects are now underway with French collaboration. The European Commission programme 'Sauvegarde de l'Environnement dans les cinq pays Etats membres de la COI du Sud-Ouest de l'Océan Indien' includes a project, to be carried out in collaboration with the universities of Aix-Marseille III-I and of Perpignan aimed ultimately at the establishment of a biosphere reserve in the Toliara region (see map). This will be an experimental investigation of integrated coastal zone management and covers inland, coastal and reef areas (Muller *et al.*, 1990). A second project, 'Ecosystèmes littoraux et ressources marines du Sud-Ouest de Madagascar' is being carried out under the programme Coopération avec l'Afrique et Madagascar pour la Promotion Universitaire et Scientifique (CAMPUS) with a team of reef scientists from the University of Perpignan (Gioan *et al.*, 1992).

Both projects will run for 3–5 years and result in a full ecological survey of the reefs and mangroves, actions to combat pollution and other forms of coastal degradation, management of the fishery resources, an evaluation of potential new marine resources (such as *Eucheuma* culture), development of aquaculture, and the creation of marine reserves. These projects, combined with the work underway through the World Wide Fund for Nature (described in Reef Encounter 13) should ensure that Toliara and its reefs get the attention they deserve.

#### REFERENCES

- Gioan, P., Laroche, J., Mollion, J., Vasseur, P., *et al.* 1992. Projet 'CAMPUS': milieux littoraux du Sud-Ouest de Madagascar (recherche, développement, formation). Etude et gestion des récifs coralliens et mangroves. Evolution et valorisation des ressources côtières et marines. Ministère de la Coopération et du Développement/Mission de Coopération et d'Action Culturelle à Madagascar, 19 pp. + annexe, 34 pp.
- Muller, J., Vasseur, P., Porcher, M. *et al.* 1990. Etude préparatoire d'un programme de sauvegarde de l'environnement dans les cinq pays de la Commission de l'Océan Indien (COI). Rapport définitif. Commission des Communautés Européennes/Direction Générale du Développement, 212 pp., + 3 annexes.
- Rakotovoao, L.H. and Vasseur, P. 1987. Projet de recherche de la zone côtière de Tuléar (S.W. de Madagascar): étude des écosystèmes récifaux et des mangroves à but de gestion, de protection, de développement et de formation. Association des Institutions de Recherche et de Développement de l'Océan Indien (AIRDOI), 18 pp.
- Vasseur, P., Gabrié, C. and Harmelin-Vivien, M. 1988. Tuléar (S.W. de Madagascar): gestion rationnelle des récifs coralliens et des mangroves dont des mises en réserve. Rapport définitif. Rapp. EPHE/Centre de Biologie et Ecologie Tropicale et Méditerranéenne- Université de Perpignan, no. RL 31, 213 pp.
- Thomassin, B.A. 1987. Bibliographie des travaux sur la géologie et le bios marin de la région de Tuléar (S.W. de Madagascar). Atelier AIRDOI 'Récifs coralliens', Univ. de la Réunion, 29 pp.
- Pierre Vasseur, 'Ecologie des Récifs Coralliens et Environnement Littoral', Université de Provence (Aix-Marseille I), Case courrier 73, 13331 Marseille Cedex 3, France. Tel: (33) 91 10 63 93; Fax: (33) 91 10 60 06.
- Further information from: Drs C. Ralijaona, Man-Wai Rabenavanana or H. Rabesandratana, IHSM, BP 141, 601 Toliara, Madagascar. Tel. 261 9 41500/42130.

## DREDGING AND CORAL REEFS IN HONG KONG

The Hong Kong Government is funding a multi-million dollar environmental programme to study the effects of dredging on Hong Kong marine life. Over the next five years, up to 75% of the world's large trailer dredging fleet will be moving several hundred million cubic metres of sand around Hong Kong to be used to build a new airport platform and to reclaim large areas of Victoria Harbour. Part of the environmental programme involves baseline surveys, environmental impact assessments and monitoring of extensive hard and soft coral stands off the east coast of Hong Kong and the New Territories.

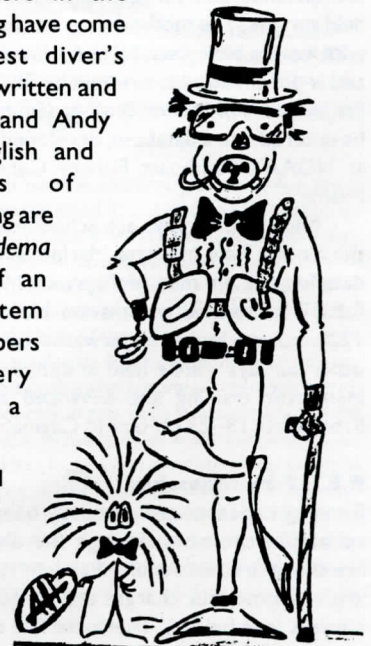
Although sporadic coral reef research has been conducted in Hong Kong, this will be the first time that all of the territory's coral reef resources will be surveyed. The results will be stored on a GIS and will be used along with data on tidal currents to plan and manage dredging operations in order to prevent damage to coral reefs. The results of ongoing survey work and an EIA have already been successful in persuading the government to permanently cancel dredging in Mirs Bay, an area rich in corals, despite the existence of millions of dollars worth of sand deposits.

For those interested in dredging and sedimentation effects on corals, a conference paper on the Environmental Impact of Marine Dredging in Hong Kong is available from: Gregor Hodgson, Binnie Consultants Ltd., 111F New Town Tower, Pak Hok Ting Street, Satin, New Territories, Hong Kong. Tel: 852 601 1000, Fax: 852 601 3331, e-mail [binnie@hk.super.net](mailto:binnie@hk.super.net)

## CORAL REEF ETIQUETTE – THE HONG KONG WAY

Hong Kong's reefs cover a tiny area, and are clearly at risk, but they are greatly appreciated by the large numbers of enthusiastic SCUBA divers in the territory. WWF Hong Kong have come up with one of the best diver's awareness guides around, written and illustrated by Jo Ruxton and Andy Hinks. With text in English and Chinese, the rules of environmentally sound diving are described by a cartoon *Diadema setosum*, an indicator of an imbalanced reef ecosystem when present in large numbers as in Hong Kong. Every country should have a booklet like this!

Further information and copies from: Jo Ruxton, World Wide Fund for Nature Hong Kong, GPO Box 12721, Central, Hong Kong. Fax: (852) 845-2734.



## WHO'S WHO

### R.E.E.F. – THE REEF ENVIRONMENTAL EDUCATION FOUNDATION

The parallels between scuba divers and bird watchers are striking: both travel great distances to seek unique critters and marvel at their behaviour. They can do it alone, in pairs or groups. They discuss endlessly what they have observed. Unfortunately, the parallels end there. North American and European birdwatchers can join organizations dedicated to observing birds and collecting bird activity and population data. While they initially count species for their own personal records, they have had a marked success accumulating bird population statistics, producing invaluable information for environmental monitoring.

During their 25 years of underwater photography and research for their three comprehensive marine life identification guides to Florida, the Caribbean and the Bahamas, author/photographer Paul Humann and publisher Ned DeLoach became increasingly disturbed by the marked decline of reefs. In 1991, figuring it was time for divers to do a little more, they established a non-profit organisation, R.E.E.F – The Reef Environmental Education Foundation. Trained in basic identification skills, interested divers, armed with easy-to-use bubble sheets developed in collaboration with The Nature Conservancy (TNC), can record species and effectively gather data which will be stored and analysed in R.E.E.F's central computer bank. From these efforts, Humann and DeLoach believe that environmental groups and scientists will build on the existing knowledge of the region's fish distribution, population trends and behaviour.

Although it is only in the last decade that limited-harvest or no-harvest management strategies have been implemented, enforced and documented, the results from Florida's conch moratorium and red fish limits have been impressive. Unfortunately, influential lobbies, including developers and commercial and recreational fishermen, are vocal opponents of government regulations, especially those aimed at establishing replenishment zones. To convince the sceptics in future negotiations on regulations, marine parks need extensive species surveys compiled by an independent, non-governmental agency.

R.E.E.F is already at work in the Florida Keys and activities will eventually be organized on a wider scale. Divers are trained in fish identification and survey methods in the course of 5-day R.E.E.F field surveys. The methodology has been formulated in consultation with marine biologists, NOAA officials and other interested bodies and is documented in a report by TNC and the University of Miami Department of Marine Biology (Schmitt *et al.*, 1993). Records will be entered into a database, developed in conjunction with biologists at NOAA's Southeast Fishery Center and at the University of Miami.

Nine field surveys are scheduled for 1994. Five will be within the Florida Keys National Marine Sanctuary to collect the baseline data for the 200 mile reef system. More than 80 volunteer divers, R.E.E.F personnel, and marine biologists are expected to spend 1200 survey hours underwater to complete the project. Four other surveys will be held in Bimini, Turks and Caicos, Belize. An Instructor training and advanced survey seminar will be held September 19–23 on Grand Cayman.

#### R.E.E.F Membership

Running expenses are currently being met by contributions from corporate sponsors through the diving industry. Individual dues are therefore not required to join R.E.E.F, although contributions are welcome, but charges are levied for participation in the field surveys (see below). There are five classes of membership:

- **Member** Join by sending a letter to R.E.E.F requesting membership. Applicants receive instructions for carrying out individual surveys, a survey scansheet, a membership card with the volunteer's research ID number, and the newsletter, *REEF Notes*. Retain status by completing at least one R.E.E.F survey form a year.
- **Contributing Member** Contribute a minimum of US\$30 with a membership letter. Retain membership by contributing the following year.
- **Survey Volunteer** Your name is sent to R.E.E.F by the instructor after completing a reef fish identification course, or similar reef ecology course. Retain status by completing at least six R.E.E.F survey forms a year.
- **Survey Specialist** Participate in a five-day R.E.E.F field survey. Retain status by completing at least twelve R.E.E.F survey forms a year.
- **Reef Instructor** Participate in a five-day R.E.E.F field survey and attend a one week R.E.E.F instructors seminar and field study. Retain status by a) completing at least twenty R.E.E.F survey forms; b) teaching a minimum of two reef fish identification courses; c) attending at least one R.E.E.F field survey.

Land-based field surveys planned for Bimini, Turks and Caicos and the Florida Keys National Marine Sanctuary will cost US\$290 per diver; this includes classroom instruction and 12 dives, but not transportation, food or lodging.

May 16–20	Bimini
June 6–10	Key Largo, Fl.
July 4–8	Turks and Caicos
August 1–5	Islamorada, Fl.
August 15–19	Marathon, Fl.

Two liveboard trips are also planned, but the price has not yet been determined.

June 20–24	Dry Tortugas on the <i>Spree</i>
September 3–10	Belize on the <i>Wave Dancer</i>

#### REFERENCE

Schmitt, E.F., Semmens, B.X., and Sullivan, K.M. 1993. Methods for censusing coral reef fishes using recreational divers. Preliminary report, The Nature Conservancy International Program, Florida and Caribbean Marine Conservation Science Center, University of Miami.

Further information from: R.E.E.F., P.O. Box 246, Key Largo, FL 33037, USA. Thanks to Ken Smith for supplying the article.

**Note: There are a growing number of programmes being set up that use volunteers, amateurs and other non-professionals to collect data on reefs and a workshop is being planned, to take place during the ISRS European meeting in September 1994, to discuss this topic.**





## BOOK REVIEWS

### A BIOGEOGRAPHIC DATABASE OF HERMATYPIC CORALS: Species of the central Indo-Pacific. Genera of the World.

J.E.N. Veron

AIMS Monograph Series 10. 1993. 432pp. ISBN 0 642 19194 8. A\$35 plus postage (\$10 Australia, \$20 overseas) from the Publications Officer, Australian Institute of Marine Science. PMB No. 3, Townsville 4810, Queensland, Australia. Fax: +61 77 725 852.

This is a superb compilation of species' distributions, the culmination of Charlie Veron's taxonomic work over a substantial period of time and across a central portion of the world's tropical oceans. While field workers have found the taxonomic monographs of Veron and co-workers of immediate and obvious use, I predict that biogeographical information of this kind will become just as valuable as the taxonomic work itself. One might assume that such a biogeographic account would evolve easily from the earlier taxonomic work, but this is almost certainly not the case; a compilation of this quality has involved a great deal of effort.

A key part of the work is presented in tabular form. Tables 1, 2 and 3 are summaries of hermatypic coral distribution (to species level) in three regions: Southern Papua New Guinea and Eastern Australia; Western Australia; and the Philippines and Japan. The second part, forming the bulk of the monograph, consists of an account of reliable records for each species. The final section is a collection of generic distribution maps for all hermatypic corals (Atlantic as well as Indo-Pacific).

This is an essential reference work for all those who are interested in marine biogeography but, useful though it is, in one sense it is just a stepping stone. There are two areas in which expansion will certainly take place. First, data from other regions will be incorporated. Caution will be required as species lists compiled by other researchers will need careful checking to ensure that they are compatible in terms of synonymy, accuracy and interpretation of species names. The fact that this volume is part of an on-going programme of work rather than a completed account is emphasised by the fact that there are very few dots between Australia and the Japanese islands on the location map, with only one in the Philippines and one in southern Papua New Guinea. Indonesia and the other South-east Asian countries are not yet represented in the main tables, although many records of species occurrences are noted in the accounts for each species and the distribution maps (to genus) show global distributions.

Second, this type of biogeographic compilation lends itself to distribution as a database file on diskette. Such a project is already underway in the form of CoralBase, a database being developed at the Australian Institute of Marine Science and described on page 17. This looks like becoming a *tour de force* in its own right, and will complement if not supersede the hard copy publication. The latter, nevertheless, draws a summarising line in what is a very long term study, and this is certainly a suitable point at which to produce a monograph. The small but important AIMS monograph series has had an impeccable record, which is added to by this volume.

Charles Sheppard, Warwick Research Institute, University of Warwick, Viscount Centre, Milburn Hill Road, Coventry CV4 7HS. Tel. (44)-203-524620, Fax (44)-203-524619.

### PALACES UNDER THE SEA: A GUIDE TO UNDERSTANDING THE CORAL REEF ENVIRONMENT

Joe Strykowski and Rena Bonem

Star Thrower Foundation, Florida, USA, 1993. ISBN 1 882533 00 3. \$25 hardback.

I tried very hard to like *Palaces Under the Sea*. With the apparent collapse of many coral reefs around the world, there is surely a great need for an accurate, informative and readable book about them. *Palaces* is not that book.

I ignored the cover (tacky, but don't judge a book by its cover) and table of contents (overly detailed) and sped to the index to look up my speciality, gorgonian corals. As I checked through each of the listings, I was dismayed to discover that almost half were wrong in some way; either no mention of gorgonians on the page cited, or mistaken information in the text, or important references missing in the index. When I checked the colour plates, the situation got worse: the gorgonians were misidentified (pl. IV 1, is not *Junceella*, misspelled *Juncella* here, but *Ilciligorgia*), their names spelled wrong (pl. IV 3 is a photo of a sea plume, *Pseudopterogorgia*, not *Pseudopterogorgia*), or no name was given at all (pl. XI 4 and pl. XIII 4 are both the easily identifiable *Ilciligorgia*

*schrammi*, already pictured and named earlier). Given the strong Caribbean bias of the book, and the fact that gorgonian corals are an abundant and diverse component of Caribbean reefs (hundreds of species), it was a disappointment that only two species were photographed and included.

A casual survey of other plates on other subjects confirmed my growing suspicions: I found careless misspellings (*melanostigma* for *melanostigma*, stomatolites for stromatolites), misidentifications (*Chloea viridis* for *Hermodyce carunculata*), and worse, poor choices to illustrate important points (not a vertical air root in sight, pl. VII 8).

I turned wearily to the Preface. Here it became obvious that this book desperately needed a good editor. The authors describe the reef 'fantasy land' of 'diminutive creatures' (twice on the same page), 'glimmering' (twice, in succeeding paragraphs). Often, their prose is so purple that it detracted from rather than enhanced their message and plea to reverse the trend of decline of coral reefs.

As I read chapter through chapter, on nearly every page I made several notes (mistakes, poor style), until I was tired and bored. Erroneous statements like: 'If severely stressed, the corals can... even feed on their algal guests', and 'tiny planula, less than .001 inch' (1-2mm planula are .04 to .08 inches) and symbiotic dinoflagellates are '*Zooxanthella* (*Gymnodinium* is the correct genus) *microadriaticum*', 'within the tissue lining the polyp's stomach' are too frequent. A statement in the text, 'All living corals laid side by side cover an area bigger than Asia, Africa and Europe' contradicts one in the preface which stated they only cover 1% of the ocean floor. I especially take issue with the authors' style, because it is often misleading: 'before a coral reef can take root and grow the sea floor must be prepared'. With the numerous specialist reports on coral reefs readily available in the literature, I was aggravated to find statements like 'it is generally agreed', and 'one reef scientist...'. Another complaint: the most recent entry in the bibliography is from 1989, already four years old at the time of publication. Maps are difficult to read and sometimes inaccurate. Illustrations are too often poorly chosen and captioned: for example, under sea level changes, the authors provide a photo of a clownfish which 'seems unaware of sea level rise in the Maldives'; 'nutrient cycle' is hopelessly incomplete in a section on eutrophication, and a photo of red mangrove roots underwater is totally unexplained in the section on human impact.

Clearly, the authors' intentions were good, as is their devotion to their subject. It is even more clear that a book about coral reefs, suitable for high school, college or older non-specialists is greatly needed. As the authors' state, the restoration of ocean resources depends on education. That's why I am disappointed by *Palaces*. The result of their efforts is quite unlike the words in the advertisement accompanying the book: 'benchmark text... comprehensive... very readable'. In fact, it is the opposite. I would not buy the book, nor recommend that anyone else buy it.

Katy M. Muzik, Research Associate, Bernice P. Bishop Museum, Honolulu, Hawaii, USA. Fax: 617 266 4505 (Boston, USA).

### CHECKLIST OF FISH AND INVERTEBRATES LISTED IN THE CITES APPENDICES

compiled by the World Conservation Monitoring Centre

Joint Nature Conservation Committee, 1993. 2nd Edition. 183 pp. ISBN 1-873701-47-0. Available from JNCC, Publications Branch, Monkstone House, City Road, Peterborough PE1 1JY, UK. £16.00 + postage (£3.00 within UK; 10% of order value within Europe; 15% of order value for surface mail outside Europe, 30% for airmail).

The stated aim of this checklist is to 'provide a summary of basic information on all species of fish and invertebrates listed in CITES (the Convention on Trade in Endangered Species)'. This review is mostly from the point of view of the coral biologist and indeed, since all Antipatharia, Milleporina, Stylasterina and Scleractinia are listed in Appendix II of CITES (with only a comparatively small selection of fish, molluscs, other invertebrates and insects on either Appendix I or II), corals make up the bulk of the volume.

The authors have tried to provide an up-to-date compilation of information on taxonomy and nomenclature and, on the whole, coral workers will be very pleased with the results, which give easy access to names and authors from disparate sources. Lists for all groups, including deep-water hermatypes, are as complete as possible. One could be a bit picky on a few points: for example, with such a strong emphasis on nomenclatural completeness, the list should have given the name of the type species for each genus (in at least one case this is left off the species list altogether). Also, the lists are a mixture of available names and valid names: for some genera, names now in synonymy and thus not currently valid are listed alongside their senior synonyms - a somewhat confusing circumstance.

The great detail and length of these lists highlights a certain element of absurdity in the use of CITES to regulate the international coral trade. The identity of coral species is rarely of concern, as traders (sometimes requesting permits for container loads of mixed species) have little or no interest in individual species and blanket listing of corals on Appendix II means that even new and undescribed species are listed (as I have discovered). For corals used for jewellery and handicrafts, Customs officers or specialists called on to identify imports, often find themselves looking at a worked product rather than a biological specimen. I found the references to the trade significance of the genera incomplete; for example, there was no reference to the fact that *Heliopora* is usually traded as beads or to any products made from black coral at all. Most often, in my experience, the question asked by Customs officers is 'is it black coral or black plastic?' and embarrassingly enough, the answer is not usually clear cut. Also, many biologists must be scratching their heads, wondering why barely-known and rarely-disturbed species of deepwater solitary scleractinians are listed while numerous commercially exploited precious Gorgonacea are not listed. Can we be blamed for occasionally thinking it's all a plot to slow down our biogeographic research?

Carden Wallace, Museum of Tropical Queensland, 70-84 Flinders St, Townsville Q4810, Australia. Fax 077-21-2003.

(Note from editor: an attempt was made to list the commercially exploited Gorgonacea or precious corals a few years ago, but was overturned as a result of strong lobbying by the precious coral industry).

## BOOK SHELF

### CORAL REEFS AND ISLANDS: THE NATURAL HISTORY OF A THREATENED PARADISE

William Gray

David and Charles, Newton Abbot, UK. 1993. 192pp. ISBN 0 7153 0077 6. £17.99. Distributed in the US by Sterling Publishing Co. Inc. at US\$29.95.

It shouldn't surprise any of the members of ISRS that coral reefs attract wide interest. Nevertheless, it is amazing that so many books are published covering more or less the same thing: what coral reefs are, how they work and what people are doing to them. This is the latest in the constant stream. It stands out from the crowd though in quality, and is all the more remarkable since the author is only 23, a graduate in zoology from the University of Durham in England. The book is beautifully produced and is illustrated entirely with the author's own paintings, drawings, photographs and diagrams (some of which are reproduced in this issue). Throughout, almost equal emphasis is given to life above water as to life below. The text is accurate enough for the intended general audience although scientists might find many errors in detail. This book will make a fine contribution to raising public awareness of reefs and their problems, and could well find its way onto the shelves of reef scientists for introducing students to the pleasures of studying reefs. Some of the proceeds from royalties will be donated to Coral Cay Conservation, the Wildlife Conservation Society and the Great Barrier Reef Marine Park Authority.

### THE SEA: A CELEBRATION

Peter Wood, ed.

Published for Greenpeace by David and Charles, Newton Abbot, UK. 1993. 128pp. ISBN 0 7153 0036 9. Distributed in the US by Sterling Publishing Co. Inc. at \$29.95.

This book is for those with coffee tables, eclectic tastes in art and a conscience. It contains paintings, drawings, photographs, poems and essays by over 100 contributors, many of them well-known. Few people will like everything in this book, but almost everybody will like something. Whether you like enough to feel the book worth buying is a different matter, but at least some of the words and images presented will remind the most jaded scientist why they enjoy working in the sea. All proceeds to Greenpeace.

### JOHANNES WALTHER ON REEFS: pioneering concepts of biogeology 1885-1910

Trans. L. Keith and G. Meyer, Ed. R.N. Ginsberg, E. Gischler and W. Schlager

145pp with original illustrations. Available from Comparative Sedimentology Laboratory, c/o R.N. Ginsberg, University of Miami, RSMAS/MGG, 4600 Rickenbacker Causeway, Miami FL 33149, USA. Price US\$25 plus 15% handling

charge and postage; all orders will be sent library rate domestically and surface mail internationally. 10% discount on orders of 10 copies or more; cashier's cheques and money orders in US\$ must accompany all orders.

For most geologists, Walther's name means Walther's Law or, more accurately as Gerard Middleton has explained, his rule of facies succession. Less widely known are Walther's fundamental contributions to what he termed lithogenesis and biogenesis, specialities that today we term sedimentology and paleoecology. This is largely explained by the fact that he wrote in German, and most of his works appeared in the 19th century and are not part of the reading of a modern geologist. The current expansion of research in these fields is precisely in the mainline of Walther's own geological interests and has stimulated the production of this translation. The publication includes the influential works on algal limestones, and reefs of the Sinai Peninsula and the Palk Strait in India. The introduction by David Stoddart, and commentaries by Heinrich Zankl, Gopinadha Pillai, Heinz Lowenstam and Eberhard Gischler provide a valuable modern perspective.

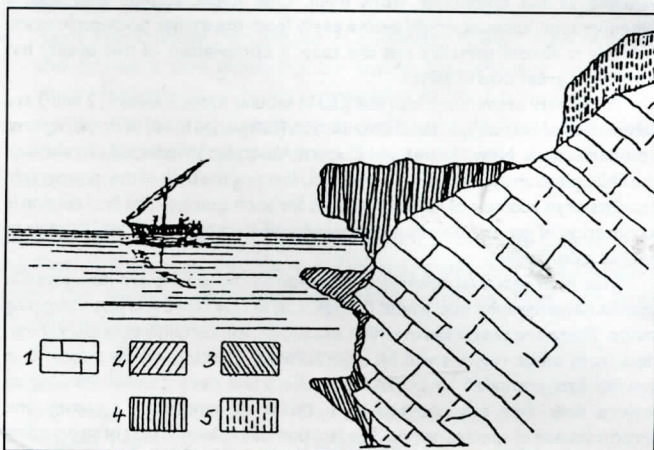


Illustration by Walther: 'Section through the eastern coast of Râs Muhâammed'.

### WORLD CATALOGUE AND BIBLIOGRAPHY OF THE RECENT MYSIDACEA

### WORLD CATALOGUE AND BIBLIOGRAPHY OF THE RECENT PYCNOGONIDA

### CATALOGUE OF THE INDO-PACIFIC PONTONINE SHRIMPS

Hans-Georg Müller

Available from Dr Hans-Georg Müller, Wissenschaftlicher Verlag, Laboratory for Tropical Ecosystems, Research and Information Service, P.O. Box 2268, D-35532 Wetzlar, Germany.

Three catalogues with comprehensive information on taxonomy, synonymy, distribution, vertical or depth range and habitat preference of species within these groups, many of which live on coral reefs. Each one has a substantial bibliography. Available on floppy disk (2 diskettes, WordPerfect 5.1) only, or as printed paperback or hardback sets including the diskettes. The diskette sets will be updated and made available at intervals. Prices: Floppy disk set (inc airmail postage): Mysidacea US\$79.00, Pycnogonida US\$69.00, Shrimps US\$49.00. Paperback set: Mysidacea US\$129.00, Pycnogonida US\$119.00, Shrimps US\$69.00. Hardback set: Mysidacea US\$144.00, Pycnogonida US\$139.00 (shrimps not available in this format). Prices for printed sets include surface mail postage; add US\$25.00 for airmail. ISRS members as listed in the July 1993 membership list have a US\$10.00 discount on the floppy disk sets, and members purchasing all three diskette sets will receive the forthcoming World Catalogue of Anthuridea free of charge on diskette. Payment should be made in US\$, by cheque or as a bank remittance (Bank Sparkasse Wetzlar, bank code 515 500 35, account no. 1700 1371).

### A NATIONAL CORAL REEF MANAGEMENT STRATEGY FOR THAILAND

#### Vol. I: Statement of Need

M. Lemay, L. Zeitlin Hale, S. Tridech, K. Sompong Ausavajitanon, K. Chawalit Sunthong

#### Vol. II: Policies and Action Plan

M. Lemay, L. Zeitlin Hale

Available from Coastal Resources Center, University of Rhode Island, Narragansett Bay Campus, Narragansett, RI 02882 USA.

## DIARY

### Conferences

#### 5-6 May 1994, The Linnean Society of London, London, UK THE BIOGEOGRAPHY, ECOLOGY AND PREHISTORY OF PITCAIRN ISLANDS

This meeting will report on the major scientific results of the Sir Peter Scott Commemorative Expedition to the Pitcairn Islands 1991-92, the first long-term, multi-disciplinary field-project on these islands. There will be a number of presentations on the marine environment, including a session on 'Structure, topography and vegetation on emergent reefs', chaired by David Stoddart. Further information from: Dr M. de L. Brooke, Department of Zoology, Downing St, Cambridge CB2 3EJ, UK. Fax: (44) 223-336676; Tel: (44) 223 3366 10/81 1059.

#### 16-20 May 1994, Chulalongkorn University, Bangkok, Thailand ASEAN-AUSTRALIA COASTAL FORUM ON THE COASTAL ZONE AND SYMPOSIUM ON LIVING COASTAL RESOURCES

These two meetings comprise the Final Symposium of Phase II of the ASEAN-Australia Marine Science Project, Living Coastal Resources (LCR) and will collate the results of ten years of resource assessment and research in the region. The Forum, on 16 May, is for senior decision makers in Asia and Australia who will develop an action agenda on sustainable management based on status summaries prepared by leading LCR participants. The Symposium (17-20 May) will feature sessions on coral reefs, mangroves, seagrass beds, soft-benthos communities and their associated fisheries. The latest findings and summaries of the data collected over the ten year project will be presented. A particular theme will be the use of remote sensing technology to assess living coastal resources and how database technology can be used to aid in decision making. A concurrent trade and technical display will feature marine equipment and technology for the food and diving industry. Further information from: Dr S. Sudara, ASEAN-Australia LCR Project, Dept Marine Science, Chulalongkorn University, Bangkok, Thailand 10330. Tel: (66) 2-255-3381/251-6968; Fax: (66) 2-255-3381/251-1951.

#### 16-20 May 1994, Dalhousie University, Halifax, Nova Scotia, Canada ECOSYSTEM MONITORING AND PROTECTED AREAS: SECOND INTERNATIONAL CONFERENCE ON SCIENCE AND THE MANAGEMENT OF PROTECTED AREAS

This conference will consider the science and management of whole system monitoring in both terrestrial and marine environments. Workshops and sessions will cover the following topics, among others: Protected areas, biosphere reserves and global change; Ecological monitoring programs and networks; Monitoring in ocean environments; Partnerships and volunteers in monitoring programs; Ecological and environmental indicators. A symposium on marine protected areas will be held within the conference. Further details available from: Neil Munro, Parks Canada, Historic Properties, Upper Water Street, Halifax, Nova Scotia, B3J 1S9, Canada. Fax: 902 426 7012.

#### 31 May - 4 June 1994, Puerto Rico WORLD CONGRESS ON TOURISM FOR THE ENVIRONMENT. PUERTO RICO AND THE CARIBBEAN

The third in a series of conferences bringing together conservation, travel, science and government leaders from around the world to explore the philosophies and mechanics of conservation through tourism. Focuses of the meeting will be 'Marine Issues Related to Tourism' and 'The Greening of Traditional Tourism'. Further information from: World Conference on Tourism for the Environment, P.O. Box 877, Silverton, Oregon, 97381, USA. Fax: 503 998 3781.

#### 4-8 July 1994, James Cook University, Townsville, Australia PACON '94. 6TH PACIFIC CONGRESS ON MARINE SCIENCE AND TECHNOLOGY

The biennial PACON congress brings together scholars and resource people to discuss key issues concerning marine technology related to the economic potential of the ocean in the region from a multi-disciplinary perspective. The 1994 meeting will be held under the auspices of the Australian Marine Sciences Association and other organisations. Technical papers will be presented on a number of themes, and there will be workshops on topics such as global positioning systems, mapping and Pacific Basin Marine Science Organisations.

Further details are available from: PACON '94 Organising Committee, c/o Sir George Fisher Centre for Tropical Marine Studies, James Cook University, Townsville, Qld 4811, Australia. Fax: 61 77 755429.

#### 30 August - 2 September 1994, University of York, UK MARINE BIODIVERSITY: CAUSES AND CONSEQUENCES

This conference, sponsored by the Marine Biological Association of the UK and the Scottish Association for Marine Science, will bring together marine scientists from all backgrounds with a common interest in the origins of the observed regional and global patterns of marine biodiversity and in the significance of biodiversity for marine ecosystem function. A plenary lecture on biodiversity will be given by Sir Crispin Tickell (Oxford University) before the Conference Dinner on the first day. The following three days will be devoted to posters and oral presentations, with two evening workshops: one on 'Research Priorities on Marine Biodiversity' which will include input from representatives of national and international funding agencies such as the European Community and UNESCO; and one on Conservation and Management of Marine Biodiversity, with contributions from national and international organisations such as the Marine Conservation Society and the World Wide Fund for Nature. It is intended that all presentations and posters (subject to refereeing) be published as short communications within a special edition of the Journal of the Marine Biological Association, with keynote and other selected contributions to be published in a book on marine biodiversity to be published by Cambridge University Press. The conclusions of the conference will be reported to the General Assembly of IUBS at UNESCO in Paris in September 1994. Final deadline for abstracts and booking forms is 2 May 1994. Further information from: Marine Biodiversity Conference, Institute for Applied Biology, University of York, York YO1 5DD, UK. Fax 44-904-432917; Tel. 44-904-432917.

#### 5-12 June 1995, International Convention Center, Beijing, China XVIII PACIFIC SCIENCE CONGRESS

Sponsored by a number of Chinese scientific institutions, this will have 'Population, Resources and Environment: Prospects and Initiatives' as its central theme. There will be six general symposia as well as scientific sessions organized by the Scientific Committee of the Pacific Science Association, including one on coral reefs. The first circular is available from: XVIII Pacific Science Congress Secretariat, c/o Institute of Atmospheric Physics, Chinese Academy of Sciences, P.O. Box 2718, Beijing 100080, P.R. China; Fax: 86-1-2562458.

#### 10-14 July 1995, Amsterdam, Netherlands 2ND INTERNATIONAL CONFERENCE ON PELAGIC BIOGEOGRAPHY (ICoPB)

Following several meetings of the SCOR Working Group on Pelagic Biogeography, this conference will be held to discuss new developments in biogeography of plankton and nekton, its relation to climate, hydrography and history and the results of the 1993 Working Group meeting. The meeting will be held in the Amsterdam area. The conference language will be English. The programme will probably include lectures, poster sessions and working groups, and proceedings will be produced. Further information from: S. van der Spoel, Institute of Taxonomic Zoology, P.O. Box 94766, 1090GT Amsterdam, Netherlands. Fax: 20-5255402.

#### 17-21 July 1995, Amsterdam, Netherlands 6TH INTERNATIONAL CONFERENCE ON COELENTERATE BIOLOGY (ICCB)

This will present new developments in ecology, symbiosis, morphology, taxonomy, biogeography, evolution, reproduction, population biology, behaviour, physiology, cellular biology, growth, genetics, natural products, biodiversity, palaeontology, conservation and pollution in relation to coelenterates. The conference language will be English. Visits to laboratories and museum collections will be organised. Further information from: S. van der Spoel, Institute of Taxonomic Zoology, P.O. Box 94766, 1090GT Amsterdam, Netherlands. Fax: 20-5255402.

#### 10-17 August 1995, University of Hawaii, USA XXIV INTERNATIONAL ETHOLOGICAL CONFERENCE

This conference will be of interest to coral reef scientists because, aside from its location, many studies of marine organisms are expected. Further details are available from: Prof. George Losey, Co-Chair XXIV IEC, Zoology Department, University of Hawaii, Hawaii, 96822, USA. Fax: 808 236 7443. E-mail: IEC@ZOO.GATE.ZOO.HAWAII.EDU.

**Courses**

**18-19 April, 1994. Escuela Superior Politecnica del Litoral, San Pedro, Ecuador**

**INTEGRATED COASTAL MANAGEMENT**

This course aims to provide participants with practical skills to design and implement integrated management plans for coastal environments. It is directed at resource management professionals and environmental planners in the Latin American Region but will draw on global experience in integrated management planning for coastal environments and how this can be applied to critical management issues for nations of the region (such as coral reef and mangrove habitat loss, water quality degradation, declining fish production, and rapid tourism development). The programme will be taught in Spanish and is being jointly organised by the Coastal Resources Center at the University of Rhode Island and the Escuela Superior Politecnica del Litoral in Ecuador. It is open to all applicants but participation will be limited to 25. Course fee is US\$1900 which includes course materials, food and lodging (but not transportation to and from San Pedro).

Further information from: *Director de Capacitacion, Centro de Recursos Costeros - Escuela Superior Politecnica del Litoral (Fax: 5934-354629) or The Training Coordinator, Coastal Resources Center, The University of Rhode Island (Fax: 401 789 4670).*

**30 May - 24 June 1994, Coastal Resources Center and Department of Marine Affairs, The University of Rhode Island**

**SUMMER INSTITUTE IN COASTAL MANAGEMENT**

The Summer Institute is for professionals responsible for planning or managing coastal management programmes for the whole range of agencies and institutions that work in this field. The aim is to provide participants with the practical skills required to design and implement coastal management programmes, particularly in developing nations. Instructors include faculty and staff at the University of Rhode Island and practitioners in coastal management with experience from around the world.

Course fees are US\$3,900 and cover meals, housing, field trips and reading materials. Further information from: *The Training Co-ordinator, Coastal Resources Center, The University of Rhode Island, Narragansett Bay Campus, Narragansett, RI 02882, USA. Fax: (401) 789-4670.*

**1994 J. Seward Johnson Marine Education Center**  
**SUMMER PROGRAM IN MARINE AND ENVIRONMENTAL SCIENCE**

The J. Seward Johnson Marine Education Center at the Harbor Branch Oceanographic Institution in Florida is running seven short summer courses on topics such as Reproductive and Larval Ecology of Marine Invertebrates, Global Environmental Problems and Solutions, and An Introduction to Ocean

and Environmental Science. There are also workshops for science educators and a limited number of Postdoctoral Fellowships and Summer Research Internships. Further information from: *Dr Susan Cook, J. Seward Johnson Marine Education Center, Harbor Branch Oceanographic Institution, 5600 U.S. 1 North, Fort Pierce, FL 34946, USA. Tel. 407-465-2400; Fax 407-465-5743.*

**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* is 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, preferably, on diskette using WordPerfect or DOS-text and in an IBM compatible format. 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 16 (due out October 1994) IS AUGUST 1ST 1994; Please send to:**

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**Eastern Caribbean Center**  
**University of the Virgin Islands**  
**St Thomas**  
**US Virgin Islands 00802, USA**  
**Fax: +1 809 777 8701**  
**Phone: +1 809 779 6103**

**or: Sue Wells**  
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**Cambridge CB4 3PW, UK**  
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*Dr Daphne Fautin, Treasurer, Dept of Systematics and Ecology  
University of Kansas, Lawrence, Kansas 66045-2106, USA.*