

MEMBERSHIP

The annual subscription for individual membership of **ISRS** is currently US\$80, provided renewal payments are made by 1st March each year. Individual and Family Members receive the journal **Coral Reefs**, the newsletter **Reef Encounter** and other periodic mailings. Family membership is US\$90. Student membership costs US\$25 and benefits include all of the above except the journal **Coral Reefs**.

The category—Sustaining Member—is for those supporting the society with a subscription of \$200. In addition to other benefits sustaining members will see their names printed in each issue of **Reef Encounter**.

Renewals received between 1 March and 30 April will cost US\$30 for a student member, US\$90 for a full member and

US\$100 for a family membership. Those received after 1 May will cost US\$32, US\$100 and US\$110 respectively. New memberships will be at the base rate of US\$25, US\$80 and US\$90 regardless of what time of year they join. Financial assistance may be available to prospective members with legitimate needs. Please contact **ISRS** Corresponding Secretary. E-mail raronson@jaguar1.usouthal.edu

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

Subscriptions to the Society should be addressed to: *International Society for Reef Studies, P.O. Box 1897, Lawrence, Kansas 66044-8897, USA.*

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, in that it provides an outlet for book reviews, discussion of issues of general interest 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, except by e-mail, and this 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 the 2,000 words in length, preferably by e-mail or diskette using Word or ASCII 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. Dia-

grams 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. References are to be styled in the format as prescribed by **Coral Reefs**. 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 systems, but contributors will receive a free copy of the relevant issue. We encourage contributors to join the society if not already members.

DEADLINE FOR COPY FOR REEF ENCOUNTER 29 (DUE OUT March 2001) IS JAN 1st 2001; please send to one of these addresses:

Maggie Watson, address temporarily unavailable
e-mail: ReefEncounter@bigfoot.com

Kristian A. Teleki, Cambridge Coastal Research Unit,
Department of Geography, University of Cambridge, Downing Place, Cambridge CB2 3EN United Kingdom
Fax: +44 1223 355674 Phone: +44 1223 339775
e-mail: kat1003@cus.cam.ac.uk

Maria João Rodrigues, School of Marine Biology & Aquaculture
James Cook University, Townsville QLD 4811, Australia
e-mail: Maria.Rodrigues@jcu.edu.au

APPLICATION FORM FOR MEMBERSHIP

Name:

Address:

.....

Title:

Fields of interest:

.....

.....

.....

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

- US\$80 for FULL membership
- US\$25 for STUDENT membership
- US\$90 for FAMILY membership
- US\$200 for SUSTAINING membership

Credit Card Payment: VISA/Mastercard

No. Expir. Date

Signature

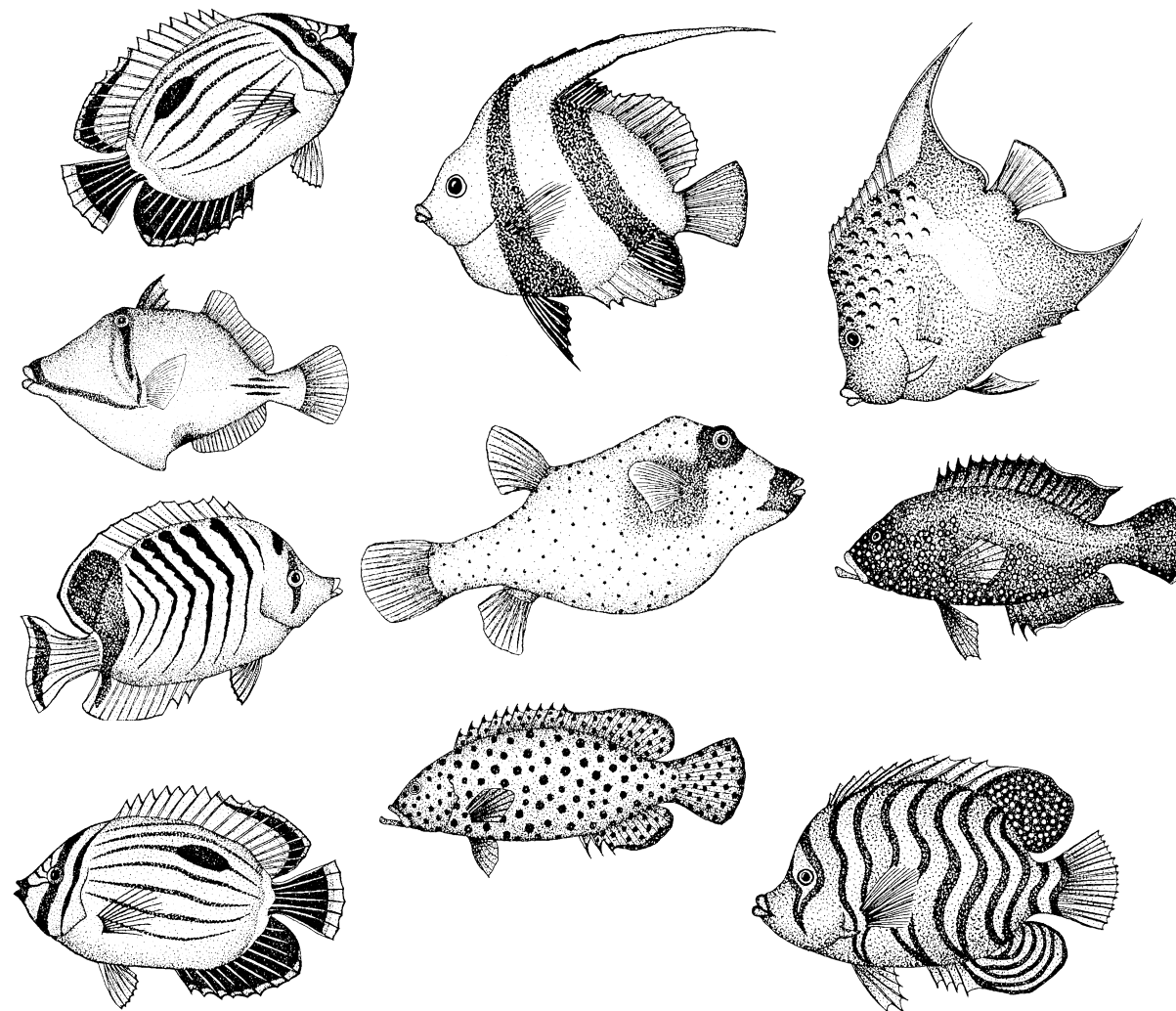
Bank drafts and cheques to be made payable to: INTERNATIONAL SOCIETY FOR REEF STUDIES. If a receipt is required, please request it at the time of payment.

Send completed application form and your cheque to:
International Society for Reef Studies, P.O. Box 1897, Lawrence, Kansas 66044-8897, USA



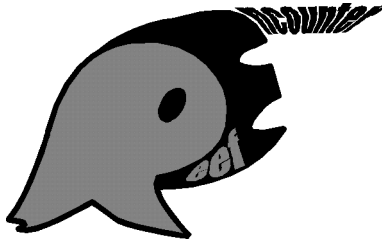
REEF ENCOUNTER

Newsletter of the International Society for Reef Studies



EDITORIAL

Welcome to the last December issue of Reef Encounter! We are about to move to a new schedule of March and September. This means we can bring you reef news earlier in the year, and will avoid the printer's rush before Christmas. However, for this issue it also means that the next copy deadline is very soon – 1st January. So if you have any material for us you'll need to send it right away to ReefEncounter@bigfoot.com. To add to the confusion, after four years in the Caribbean, Maggie is in the process of moving back to the UK. But don't worry – the email address will reach the editorial team wherever they are. Much of this issue had to



be prepared before the 9th International Coral Reef Symposium in Bali. Thanks to all of you who filled out questionnaires at the **ISRS** desk. We are constantly trying to improve Reef Encounter and value your feed back; although because of the shift in schedule it will be September before you are likely to see much in the way of changes. The Bali meeting itself will be covered in Reef Encounter 29 – which is even now being prepared.

Maggie, Kristian and Maria João
ReefEncounter@bigfoot.com

ISRS COMMENT

From the President

In this the first issue of **Reef Encounter** post – 9th International Coral Reef Symposium, Bali, it is time to offer heart-felt thanks to our Indonesian hosts. Through the tumultuous years since those fateful words uttered in Panama in 1996 '....and the winner is....Indonesia'... you maintained your resolve. The rest of us wondered, we worried, and we wavered, but in the end, we joined you in the Olympian sprint for the line that represented a wonderful occasion. And it was a significant one for coral reefs, for people who care for coral reefs, and for international cooperation and good will. In so far as the future of coral reefs is in the hands of wise and informed political leaders, Indonesia set an inspiring example to the rest of the world by including in the Symposium, Vice President HE. Magawati Soekarnoputri, and Ministers Keraf (Environment) and Sarwono (Maritime).

We were drawn together by our shared passion for coral reefs - and departed with enriched understanding of coral reefs themselves, of the cultures and lives of the people of coral reefs - those who abuse and use coral reefs, those who seek to manage, conserve and protect them, and those who study them. For one short week, we reminded the world that coral reefs are Nature's stellar marine

creations. We were inspired by new discoveries relating to those same issues that brought sixty coral researchers together for the First International Coral Reef Symposium in 1969: the fascinating intricacies of coral reef evolution, growth, symbioses, composition and ecosystem function. On occasions, we rejoiced in the management and conservation success stories, which give us hope that they can be repeated again and again worldwide: marine protected areas that work, resource utilization that is sustainable; restoration and mitigation that improve ecosystem qualities. But all too often, our discussions were the somber and anguished cataloguing of coral reef decline - coral reefs as innocent victims of local need, remotely controlled greed, of plain ignorance, or of that insidious side-effect of global population growth and the human propensity to strive for a good life - global climate change. It was important that we shared and aired all those issues - that we made our four yearly blip on the global media radar.

The completion of this major milestone also marks a time to reflect on the role that **ISRS** should and can play in the international coral reef sphere. Paraphrasing our Constitution, our objectives are

i)...production and dissemination of knowledge and understanding....ii) holding and sponsoring meetings, symposia, conferences or other gatherings to disseminate this knowledge and understanding...., iii) printing and publication.....iv) raising contributions from members and others to further the objectives.... as a not-for-profit organization. We are delivering well against all these objectives, through our individual and collaborative studies and awards to young researchers, through international and European meetings, through the journal *Coral Reefs* and the newsletter **Reef Encounter**.

Our role as a major partner in the International Coral Reef Symposium at Bali was a first for the Soci-

ety. As in all good scientific experiments, we should now review the partnership, the methods, the results and outcomes. As the Symposia get larger, the potential visibility and influence of **ISRS** as a major partner increases. That is a significant outcome for us and for the cause of coral reefs, but our capacity to deliver as a voluntary, not-for-profit organization needs to be assessed, and alternative Society structures considered if appropriate. This review will be an important activity for the Society for the coming months.

With my best wishes,

Terry Done
President

ISRS NEWS

ISRS Elections

The results of the 2000 **ISRS** election were announced at the 9ICRS in Bali in October. John Ware will be taking over from Daphne Fautin as Treasurer, and Peter Edmunds takes Steven Miller's role as Recording Secretary. The following councilors were elected: Robert van Woosik, Lucien Montaggioni, Kathleen Sullivan-Sealey, Helge P. Vogt, Jaime Garzon-Ferreira, Hajime Kayanne.

New Officers and Council Members begin their terms on January 1, 2001. On behalf of the current Officers and Council Members, congratulations, and we look forward to working with you. For their interest and participation in **ISRS**, we sincerely thank those who ran for Council but were not elected this time.

Joint Meeting - 7th International Conference on Coelenterate Biology (ICCB) and the European Meeting of the International Society for Reef Studies (ISRS).

Eilat, Israel, October 21-25, 2001

This joint meeting will be hosted by the Inter-University Institute for Marine Science at Eilat. Combining the two conferences will provide a unique opportunity to encounter a wide spectrum of disciplines, enabling fruitful discussions on cnidarians, ctenophores and the biology and geology of coral reefs. The main topics in cnidarian biology will include genetics and development, physiology and reproduction, evolution and ecology, toxicity and medical applications. The main topics in coral reef

science will include advances in the molecular biology of reef organisms, dynamics of reef ecosystems in space and time, ecosystem modeling, management of reefs and marine parks, corals as climate recorders, reef growth, carbonate production and the CO₂ debate, and the geological record of reefs and their diagenesis.

The scientific program will include plenary sessions, parallel sessions and poster sessions. Pre-conference workshops will take place. We encourage

colleagues to offer ideas for special sessions, and welcome participants who wish to organize symposia, workshops or satellite meetings.

Eilat is a year-round resort on the northern Red Sea, known for its clear waters and coral reefs with their worldwide reputation for high diversity. It is an ideal venue for a gathering of scientists, students, and environmentalists interested in cnidarians and coral reef science. Both pre- and post-meeting field trips are planned, including guided diving excursions to the rocky coast of the eastern Mediterranean Sea, and to the Red Sea coral reefs at Eilat, Aqaba (Jordan) and Sinai (Egypt). Tours also will be offered to major cultural and historical sites including Jerusalem, Nazareth, Galilee, the Dead Sea, nearby Petra in Jordan and the pyramids in Egypt.

7th ICCB

Chair: Yehuda Benayahu,
Email <denlit@ccsg.tau.ac.il>

Vice-Chair: Nanette Chadwick-Furman,
Email <furman@mail.biu.ac.il>

ISRS European Meeting

Chair: Christian Dullo, Email <cdullo@geomar.de>

Vice-Chair: Lucien Montaggioni,
Email <reef@newsup.univ-mrs.fr>

*Further information and registration forms are available at: <http://www.congress.co.il/liccb-isrs/>
Or from the congress secretariat: Dan Knassim LTD.
P.O.Box 1931, Ramat-Gan 52118, Israel
Tel: +972-3-6133340 Ext. 209 Fax: +972-3-6133341
Email: <team4@congress.co.il>*

A Student Travel Award Program (STAP) Award for the ISRS Meeting in Israel, October 2001

The organising committees and **ISRS** are pleased to announce a Student Travel Award for the **ISRS** meeting which is running alongside the International Conference on Coelenterate Biology in Eilat in October 2001 (see previous article). This program is designed to help graduate students from developing countries attend scientific meetings that enhance their education. Funds (up to US\$1200) are available from **ISRS** for round trip travel, with the student's food, lodging and fees covered by the meeting host. Applications accompanied by letters

from at least two major professors regarding the graduate students status and active involvement with coral reef research are required. Applicants must also submit an abstract of an oral paper or poster that they would present if selected. The meeting hosts will solicit and review all applications and select the award winner.

Interested students should contact Professor Christian Dullo, GEOMAR, Wischhofstrasse 1-3, Kiel D24148, Germany. Email <cdullo@geomar.de>

Subsidised Subscriptions to ISRS

Deadline 1st March 2001

There will be another opportunity to apply for subsidised subscriptions to **ISRS** in 2001. Prospective **ISRS** members with legitimate needs are invited to request financial assistance with membership fees. As before, applicants should write a letter (maximum 800 words, no supporting documents are required) identifying their parent institution, the nature of their work, the type of membership requested and their case for requesting financial assistance. The letter should be addressed to the Pres-

ident of the Society, Dr. Terry Done and to Richard Aronson **ISRS** Corresponding Secretary, Dauphin Island Sea Lab, 101 Bienville Boulevard, Dauphin Island AL 36528 USA, Email <raronson@jaguar1.usouthal.edu> by 1 March 2001. Successful applicants will be required to make some contribution to their subscription since assistance given by **ISRS** will be no more than half an individual, student or family membership. Normally up to three new awards would be made in any calendar year though the actual number of awards allocated will rest finally with the discretion of the sub-committee of Council

appointed to evaluate the applications. Awards would normally be held for a one year period with further extensions being considered by the sub-committee. The sub-committee will consist of the President, Treasurer and Corresponding Secretary of **ISRS**. Successful applicants will be notified by 30 April each year.

This year we received very few applications for subsidised subscriptions - maybe **ISRS** members

could bring this advertisement to the attention of colleagues working in developing countries who they think will benefit from the scheme? Once again we should like to take this opportunity to encourage those who can, to renew their membership in the sustaining member category, so that the Society can maintain both this scheme and travel fellowship awards for those with legitimate needs.



International Society for Reef Studies and the Center for Marine Conservation 2001 Graduate Fellowship for Coral Reef Research



Background and Fellowship Goals

Coral reefs are among the most diverse ecosystems on the planet, they are globally distributed, and they support various aspects of coastal economies. Yet coral reefs are widely recognized to be in decline and studies are needed to provide information to manage and understand processes that cause coral reef change. Funds totalling US\$15,000 are available to support one Ph.D. student in the general area of coral reef ecosystem research. The focus of the Fellowship is to understand and predict coral reef response to management or disturbance-caused change (human-caused or natural). Research supported by the Fellowship should emphasize an ecosystem approach. For example, projects that focus on factors that control productivity, nutrient dynamics, carbonate accretion or erosion, fisheries, or the effects of exploitation of coral reef resources are suitable topics. Projects that address such issues within the context of marine reserves are especially suitable for Fellowship support. Projects are not limited to these topics, but research should increase understanding of reef functions that are relevant to management at local, regional, or global scales.

Who can apply?

The Fellowship is available to students who are already admitted to a graduate program at any accredited university worldwide. The intent of the

fellowship is to help Ph.D. students develop skills and to address problems related to relevant applications of coral reef ecosystem research and management. The Fellowship can be used to support salary, travel, fieldwork, or laboratory analyses. The student can work entirely at the host university, or can split time between developed and developing country universities.

Application materials

A three page proposal, using 12 font or larger, double spaced, in English, is required from prospective fellowship candidates. Proposals that do not meet these criteria may be returned. The proposal should include the following sections:

- **Overview:** The overview starts with the Proposal Title, Author Name, Author Address, Major Professor Name, Major Professor's Address (if different from the Author's), and total amount in the budget request. The overview places the proposed research within the context of existing literature and local needs.
- **Methods:** The methods section includes hypotheses, methods, and experimental design - including details of how data will be analyzed.
- **Results:** The results section discusses relevance of the work to host country management and sci-

ence issues. This section also includes evidence of host country coordination (e.g. identification of individuals or programs that will benefit from your results);

The following two sections are required but do not count against the three page limit:

- **Detailed Budget:** The budget must not exceed \$15,000. Details about cost sharing relevant to the project are included in this section.
- **Literature Cited:** Use a bibliographic format that includes full titles in the citations.

An electronic version (any standard word processing format is acceptable) and three written copies of the proposal must be provided. Electronic submission via email is acceptable but written copies must also be received by the deadline (see below). The student's major professor must submit a support letter for the project based on their knowledge of the project, and familiarity with the student's background and abilities. The major professor should also submit a short (3 page) CV. Electronic submission of the letter and CV is preferred, but written versions are acceptable. If work will be conducted at a second university, a support letter is required from the sponsoring professor. Applications will be reviewed by a panel with **ISRS** and CMC participants.

Evaluation Criteria

Evaluation criteria include: scientific merit, feasibility, the support letter from your major professor, cost sharing, host country coordination, and relevancy to the Fellowship guidelines.

SUBMISSION DEADLINE IS January 31, 2001

Administration of the Fellowship

The International Society for Reef Studies (**ISRS**) and the Center for Marine Conservation (CMC) support the Fellowship through professional and administrative contributions. The mission of the **ISRS** 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. The CMC is committed to protecting ocean environments and conserving the global abundance and diversity of marine life. Through science-based advocacy, research, and public education, CMC promotes informed citizen participation to reverse the degradation of our oceans.

Application materials should be submitted to:

ISRS Recording Secretary, Dr. Peter J. Edmunds, Department of Biology, California State University, 18111 Nordhoff Street, Northridge, CA 91330, Email: <peter.edmunds@csun.edu>. The award will be made by March 31, 2001. Please visit the **ISRS** homepage www.uncwil.edu/isrs for additional information related to the Society and the Fellowship.

Jeremy Jackson - Get Well Soon!

Many **ISRS** members know Jeremy Jackson as a personal friend. Others will know him through his work, and others still will remember his dramatic and fascinating plenary during the 8th ICRS in Panama, 1996. Having survived a melanoma in the summer of 2000 Jeremy is now fighting another serious illness.

Jeremy - we wish you the speediest return to health. Many friends and colleagues are thinking of you and Nancy at this difficult time.

Large Scale Dynamics of Coral Reef Systems

A Special Issue of Coral Reefs : call for manuscripts

Volume 20 of **Coral Reefs** will include a Special Issue entitled "Large-scale Dynamics of Coral Reef Systems." As the title suggests, the purpose of the issue is to provide an overview of current research and developing issues in this broad area which encompasses biogeography, biodiversity, epidemiology,

evolution, and the relationship of all these to contemporary issues of environmental variability and reef responses at global and regional scales. Manuscripts may be empirical or theoretical, long or short. Reviews, Notes and Reef Sites on an appropriate theme are also welcome.

Interested authors should contact one of the Guest Editors as soon as possible about their intend-

ed submission. General information will be posted and updated at: <http://water.kgs.ukans.edu:8888/public/CR/bigpicture.htm>

Guest Editor for the issue is:

Robert W. Buddemeier Tel: 1-785-864-2112, Fax: 1-785-864-5317, Email <buddrw@kgs.ukans.edu>; mail to Kansas Geological Survey, 1930 Constant Avenue, Lawrence, KS 66047 USA.

Associate Guest Editor(s):

Daphne G. Fautin Tel: 1-785-864-3062, Fax: 1-785-864-5321, Email <fautin@ukans.edu>; mail to Biological Sciences, Haworth Hall, University of Kansas, Lawrence, KS 66045 USA.

Additional Associate Guest Editors may be named.

Advice to prospective authors:

The issue (approximately 100 pages) will be published in 2001 as soon as 12 papers have been accepted. Additional submissions will be considered for publication in subsequent issues of **Coral Reefs**. Because of the inevitable uncertainties in the review and revision process, we will not stop sending appropriate papers out for review as soon as we have seen the proper number of candidates — acceptable papers that are in the works when the issue closes will simply be rolled over to the next available **Coral Reefs** issue unless the authors withdraw them. Similarly, papers appropriate for the journal but not on target for the special issue will be forwarded directly into the general submission process. The idea is to make it a no-risk process for people who would submit to **Coral Reefs** anyway, while encouraging them to develop their topics according to special issue guidelines. The only question that arises is for those whose alternative is some other journal if they don't get into the special issue.

Answers to FAQs

- Because of the nature of the topic, synthesis or review papers, rather than focused reports of experimental results, are expected to occupy a substantial amount of the available space.
- The lower end of 'large-scale' is decades and hundreds of km, but they are interactive — a multi-decadal study of an area with dimensions of a few hundred km is of a larger scale than either dimension alone.

- Small-scale studies are acceptable provided that they are well integrated into, and serve to illustrate or explain, processes operating at larger scales.
- Papers accepted for publication will contain explicit definitions of the key terms used (in particular "coral reef" and any variant of the term "community"), and quantitative specification of the scales addressed. No particular definition is required or preferred, but specification is essential. Examples, references, and identification of specific issues are available from the Guest Editors.
- The editors have identified the following topics as being of particular interest.
 1. Non-reefal occurrence of the biota normally associated with coral reefs: the role of such species in the biogeography, biodiversity, and adaptive responses of the organisms and communities.
 2. Reefs as self-seeding *versus* linked entities: taxonomic, geographic, and geologic patterns through space and time.
 3. High-latitude, deep-sea, and non-coral reefs: what their similarities to and differences from tropical, shallow-water coral reefs can teach us about coral reefs.
- Emphasize process and dynamics. Descriptions and inventories, even if quantitative, are of lower priority than offerings that explain or analyze how the inventories and patterns develop, persist, and change over spatial scales of (e.g.,) thousands of km and years.
- Draw attention to how the paper relates to or overlaps with the topical areas of interest indicated above.
- A large-scale Reef Site might be a location from which a long paleorecord is available, or a generic feature that reflects similarity of process at a wide range of locations.
- A large-scale Note might be an exposition of a hypothesis to be tested, a conceptual proposal for coordinated research, or simply a brief paper on observations with broad implications.
- Timing — Things may move fairly rapidly because some of the ICRS attendees have indicated an interest in placing their papers in this issue rather than the Proceedings.

R. W. Buddemeier and D. G. Fautin

ISRS Members Recognised by the Pew Charitable Trusts Award -Year 2000 Marine Conservation Fellowships

Two current and one former member of **ISRS** have been awarded \$150,000 each by the Pew Fellows Program in Marine Conservation in recognition of their contributions to marine conservation. They are Rodney Fujita, Callum Roberts and Amanda Vincent. Warmest congratulations from the Society to Rodney, Callum and Amanda.

An initiative of The Pew Charitable Trusts in partnership with the New England Aquarium - the fellowships are awarded annually to ten outstanding individuals to conduct interdisciplinary projects that apply sound science to urgent challenges in marine ecosystem conservation, fisheries management, marine pollution, and coastal conservation. With these awards, the Pew Fellows Program seeks to foster greater public understanding of the direct and crucial relationships between life in the sea and life on land.

RODNEY M. FUJITA, a marine scientist and ocean advocate, believes in proactive, rather than reactive conservation approaches. A specialist in coral reef ecology, global warming, and sustainable fisheries, he is a senior scientist at Environmental Defense where he examines emerging trends and promotes ecosystem-based actions and policies that address escalating problems. Fujita will explore two emerging topics. He will investigate the effects of deep-sea mining on deep-sea biota and report potential problems. He will also assess the potential for expanding applications of the Hawaiian ahupua'a conservation method that links land and sea in a united ecosystem. Fujita will communicate outcomes through publications that enlighten the public about critical ocean issues- and strategies to address them.

CALLUM M. ROBERTS, a marine conservation biologist, specializes in fisheries management and coral reef conservation. He is a senior lecturer in Marine Environmental Management at the University of York, UK, and is an emerging voice for the importance of marine reserves in ocean conservation. Through case studies of existing reserves in St. Lucia, Roberts will explore ways that marine reserves support increased fishery yields, and will identify the role of reserves in protecting migratory species and

managing offshore and deep sea regions. As a result he will produce a series of papers on problems at the forefront of marine reserve science and will publish education booklets and establish a website that share lessons with fishers and non-science resource managers.

AMANDA VINCENT, a marine biologist fighting to save overexploited seahorses, is an assistant professor at McGill University in her native Canada, and director of the non-profit conservation organization Project Seahorse. Vincent is an international expert in "extraordinary fisheries" - those that are not caught for food - specifically seahorses and related species. Collaborating with a team of subsistence seahorse fishers in Southeast Asia, she will develop a rapid assessment system to survey fished and unfished populations and document ecological and socio-economic impacts of fishing. Vincent will advocate conservation and management measures to mitigate damage to wild populations, caused primarily by seahorse trade for traditional medicine in Asia, and will build knowledge and capacity to empower community co-management and preservation efforts.

"As respected leaders in their fields, the 2000 Pew Fellows excel in their various disciplines, and are united by their problem-solving abilities and their capacity to apply sound science to effect positive change for the sea," said Cynthia Robinson, Associate Director of the Pew Fellows Program in Marine Conservation. "By supporting the ingenuity of these distinguished individuals the Program calls awareness to the critical state of our oceans and invests in viable solutions."

The fellowships are highly competitive awards targeted primarily to mid-career professionals. Nominations are made through an international network of environmental experts. A 12-member international advisory committee conducts evaluation and selection of Pew Fellows. Selection is based on the applied conservation merit of the-project, the individual's record of professional accomplishment, and the potential impact of the initiative.

Georg Scheer Celebrates 90th Birthday.

Some one hundred friends, colleagues, and reef enthusiasts met on the 16th of August 2000 to cheer Georg Scheer (honorary member of **ISRS**) on the eve of his 90th birthday. At the gathering in the Hessian State Museum, Darmstadt, near Frankfurt Germany, Georg, the nestor of German reef workers, acknowledged with special pleasure the presence of former field companions such as Hans Mergner. After the inspirational first International Coral Reef Symposium at Mandapam Camp, South India, in January 1969 Georg and Hans together elucidated reef zonation

Georg's reputation as coral specialist was founded during two expeditions of the famous "Xarifa" lead by Hans Hass in the early fifties. Unfortunately Hass himself was unable to come to Darmstadt, but other members of the team, such as Irenaeus Eibl-Eibesfeldt (ethologist), Wolfgang Klausewitz (ichthyologist), and Kurt Hirschel (camera) exchanged memories and recounted anecdotes from those legendary times for the benefit of younger generations.

At the time Hans Hass already had a reputation as the first to bring movies of underwater life to a broad public. During the expeditions the three-masted schooner Xarifa sailed through the Caribbean to the Galapagos (1953/54) and through the Red Sea to the Maldives, Nicobar Islands, and Singapore (1957/58). The team not only collected scientific data on the marine biota, especially coral reefs, but also produced the first TV-movie on reefs and reefworkers (long before Cousteau). In exchange for his berth on the Xar-



The team produced the first TV-movie on reefs and reefworkers (long before Cousteau).

ifa, Georg had to take responsibility for the scientific program (in his case the study of corals and birds), and also for technical aspects: Georg was the electrician on the ship. In fact, in his "first life" Georg had been an electrical engineer. He had served as assistant professor at the technical university of Darmstadt (1934-39) and then worked with Wernher von Braun's team developing rockets in Peene Muende (1939-45). After a postwar intermezzo as a designer of electric toys Georg's "second life" began with the study of biology. He received his Ph.D. in 1952. His professional base until he retired as vice director in 1975 became the Hessian State Museum. This was a prosperous time especially for the coral collection (founded by Gottlieb von Koch some hundred years ago). Important reports on the corals of the Maldives, Nicobar Islands, and the Red Sea – all coauthored by the congenial Gopinadha Pillai (Cochin) – were elaborated.

Until 1987, Georg regularly attended major coral reef meetings and was always an imposing figure in the auditorium as well as on the dance floor. At the Darmstadt celebrations he appeared as sportive as ever, not revealing his true age. The secret behind this admirable constitution might be Anneliese, Georg's wife of 63 years. In fact, the Scheers always stood out as a couple - and still do so. All who know Georg and Anneliese wish them many more happy years together with their 3 children, 8 grandchildren, and 4 great-grandchildren.

Helmut Schuhmacher and Hans Mergner

Reefs at Risk in Southeast Asia

Which reefs in Southeast Asia are particularly at risk -and how great is the threat? The World Resources Institute's 'Reefs at Risk in Southeast Asia' project (RRSEA) recently began working towards a stan-

dardized indicator of human pressure on coral reefs in the region. The work will provide more detail than the earlier global Reefs At Risk analysis (**Reef Encounter 24**, p 11-12).

The first step towards identifying causes of reef degradation is to develop and disseminate a database. The project is integrating regional data sets on coral reef locations, mangrove locations, observations related to coral condition (this includes percent live coral cover, coral bleaching, coral diseases, and observed impacts to coral reefs from pollution, sedimentation, tourism, and destructive fishing), marine protected areas, land cover, elevation and bathymetry, hydrology, population and administrative districts, populated places and infrastructure. Over 20 international, national and local partner institutions have joined the WRI on the RRSEA project. The process of reviewing and improving the base data sets and refining the model of threats to coral reefs began at a workshop in Metro Manila last April. The preliminary modeling of threats was completed in time for the 9th International Coral Reef Symposium held in Bali 23-27 October 2000.

Reefs at Risk in Southeast Asia (RRSEA) has four primary goals:

a standardized indicator of human pressure on coral reefs

- 1) to examine threats to, status, value, and protection of coral reefs within Southeast Asia through the collection and integration of information to improve the available base of information;
- 2) to model threats to coral reefs based upon population and development patterns, and to identify the location and intensity of certain activities known to degrade coral reefs;
- 3) to develop a geographic information system (GIS)-based tool for more local-level evaluation of development scenarios and related implications for coral reef health and associated economic implications;
- 4) to raise awareness through wide dissemination of integrated data sets, model results, a published report, and the GIS planing tool.

For additional information on the Reefs at Risk project, contact: Lauretta Burke Email <lauretta@wri.org>

Remote Sensing Zooms in on Coral Reefs

When it comes to Coral Reef assessments, the U.S.A.'s National Oceanic and Atmospheric Administration (NOAA) is taking to the skies as well as the waves. Utilizing airborne Remote Sensing technology developed by a company called 3Di LLC, NOAA is recording a more detailed picture of coral reef health than is possible with traditional satellite imagery (see **Reef Encounter 26** p 27-32). The new technology offers high spectral and spatial resolution imagery collected from light aircraft. The data collection is navigated with satellite DGPS to achieve 5m accuracy without ground control. Flights can be arranged for particular place and time, enabling planning for weather conditions and other events rather than limiting data collection to a satellite overpass schedule. NOAA and 3Di have been working with several groups, including the National Park Service and a team from the University of Waterloo to evaluate the capabilities of hyperspectral remote sensing for coral identification and habitat health assessment. They have studied coral

reef environments of Puerto Rico and the U.S. Virgin Islands, including Buck Island Coral Reef National Park. A combination of remote sensing and ground truthing produced an in-depth analysis of the reefs. For instance, the imagery produced from 3Di's hyperspectral sensor can detect coral types, live versus dead coral, bottom types and could even be used to detect changes over time in the health of the coral reef. Results are available much faster than from traditional remote sensing techniques. As Bill Bernard, Remote Sensing Business Development Director with 3Di remarks: "Finding better, faster methods to determine the status of our coral reefs means we spend less time discovering the problem and more time finding solutions."

Compiled by M. Watson. For more information, visit 3Di's Buck Island Webpages at <http://www.3dillc.com/rem-hyper-buck-island.html> or Email <hyperspectral@3dillc.com>

Shoals Studies Succession

Since the 1997/98 bleaching event, four permanent monitoring sites in the Seychelles have been resurveyed by the *Shoals of Capricorn Programme* field team and original members of the *Shoals Baseline Project* (**Reef Encounter 25** p 16) in order to investigate succession on the reefs. Following a marine monitoring training course and diver training, a research team of Marine Parks Authority (MPA) rangers has established two additional monitoring sites in the vicinity of the Ste. Anne National Marine Park. All of the sites are now monitored regularly to assess the potential impacts from an adjacent large-scale land reclamation project on the East Coast of Mahé, the most populated island in the Seychelles.

As reported for other countries, branching *Acropora* and *Pocillopora* suffered the highest mortality during the bleaching event. The skeletons of these have now substantially broken down due to bio-erosion, reducing habitat complexity on the reefs. On the more exposed reefs, the skeletons have become cemented by coralline algae, whilst on sheltered reefs the skeletons still support filamentous algae and encrusting invertebrates. Encouragingly, *Acropora* and *Pocillopora* recruits, generally less than 20 cm high, are apparent at most sites, particularly those that are sheltered from the southeast monsoon.

The pattern of succession on sites close to the reclamation project is confounded by sediment induced degradation. Sedimentation is a problem in the Seychelles for massive and encrusting *Porites* and faviids. Layers of mucus, laden with sediment, are observed on most *Porites* colonies and noticeably some have recently died. Ironically, the monitoring site situated in very turbid waters close to Victoria Harbor, Mahé, retained high levels of coral cover and diversity following the bleaching event. However, this *Porites* and faviid dominated site has now been partially destroyed by dredging.



Encouragingly, *Acropora* and *Pocillopora* recruits are apparent at most sites

turbid waters close to Victoria Harbor retained high levels of coral cover following the bleaching event. However, this *Porites* and faviid dominated site has now been partially destroyed by dredging.

Shoals training programs, funded by the Darwin Initiative, continue to address reef monitoring capacity building. Following the MPA training model, personnel from other marine sanctuaries, such as Aride and Cousin special nature reserves, are learning to monitor their reef resources. On a national level, the personnel from the Seychelles Coral Reef Network are receiving training in order to expand their number of sites to cover a wider geographical area and representation of reef types. This monitoring feeds into the regional component of the Global Coral Reef Monitoring Network (GCRMN).

Overall, the Seychelles public and particularly school children are well informed about reef related issues. The *Shoals* education program aims to demystify marine science and raise awareness through its outreach activities. A Marine Discovery Center has been opened in the Seychelles Natural History Museum, and *Shoals* staff work closely with local environmental groups such as school WildLife Clubs. The *Shoals* Seychelles Education Programme is generously funded by Barclays Seychelles and Guinness through the Diageo Waters of Life Campaign.

The Royal Geographical Society (with the Institute of British Geographers) Shoals of Capricorn Programme has been operating in the Republic of Seychelles since October 1998 and in Mauritius and Rodrigues since March 1999. Shoals is committed to undertaking marine research, training and education in the western Indian Ocean region and has supported numerous reef initiatives through its field centers in the Seychelles, Mauritius and Rodrigues. Further details of Shoals, and information on how to take part, can be obtained from: www.shoalsofcapricorn.org

Martin Callow and Jan Robinson
Email <shoals@seychelles.net>

Listening to the Problem

How Do We Know We're Doing the Right Thing When It Comes to Fish Bombing ?

How do resource managers know how well they are doing in tackling a problem like blast fishing? Indeed, how do we know just how big the problem really is to start with? It seems all we need to do is listen.

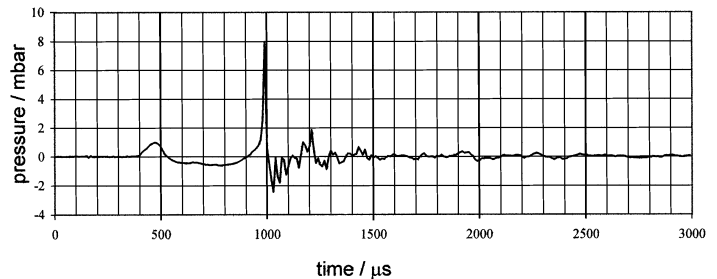
Using hydrophones to listen for underwater explosions is nothing new - the military have been doing it for decades. What is surprising is that these devices have not yet been used to probe blast fishing, where explosives are used to stun and kill coral reef fish. Blast fishing provides a short term profit for fishers, but at a huge cost to society (Short Sharp Shock – the economics of blast fishing in Indonesia **Reef Encounter 26** p9-10). To investigate hydrophones as a monitoring tool we conducted trials in Southeast Asia at a site where fish blasting was known to be rife (the exact location shall remain anonymous).

The standard explosive fishers use is a mixture of ammonium nitrate and kerosine, technically known as ANFO – and a favourite of terrorists around the world. It is packed into containers of various sizes ranging from beer bottles to 5 gallon drums. The containers are detonated by simple home-made fuses that end in a firing cap. All blasts that we monitored originated from small bombs of beer bottle size, and therefore lie at the least energetic end of the bomb scale. We found that the shock wave for this size explosion (i.e. the rapid rise and fall in pressure) attenuates within about 4km. However, the sound carries much further and although it changes its spectral characteristics as it is transmitted through water, it is still clearly distinguishable from background noise up to 30km away from its

the sound is still clearly distinguishable up to 30 km away

origin. Interestingly, the sound is most likely to be confused with the reef-dwelling snapping shrimps (Alpheidae) which produce a waveform very similar to the explosion, though obviously containing far less energy.

These findings mean it should be possible to pinpoint the source of an explosion. However, the loudness of the signal on it's own isn't enough because since the size of the charge varies by up to a factor of 40, estimating the range is impossible unless you know the size of the bomb. But with an array of hydrophones linked to a central recording and timing device it is possible to calculate the bearing of a signal to within about 5 degrees, depending on the waveform. Two or three such arrays located within 30km of each other would give enough information to triangulate the source of blasts to within limits that would be useful for management and could provide an important tool for enforcement and monitoring.



*Simon Wilson Email
<106422.2221@compuserve.com>
and George Woodman.*

Barrel Sponge Bows Out

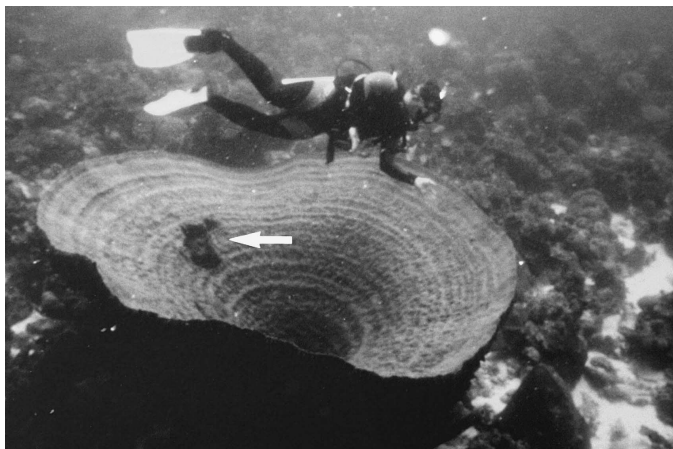
In 1997 a giant barrel sponge *Xestospongia muta* (Schmidt), almost 2.5 m in diameter and a celebrated tourist attraction, showed signs of necrosis and died within a few months on the Caribbean island of Curaçao. Recent studies have suggested an increase in diseases of coral reef organisms, especially in the Caribbean (HEED 1998; Harvell *et al.* 1999; Revista de Biología Tropical 1998). Corals have received most of the attention, yet incidences of diseases and mortality in sponges, especially direct time-series observations, are very scarce (Peters 1997). Although incidences of mortality are infrequent and

reports of diseases and mortality in sponges are very scarce

isolated it is important that any observations are recorded, and detailed descriptions of the disease or mortality made. Records of disease incidence and virulence is important for providing a better understanding of etiology in coral reef organisms.

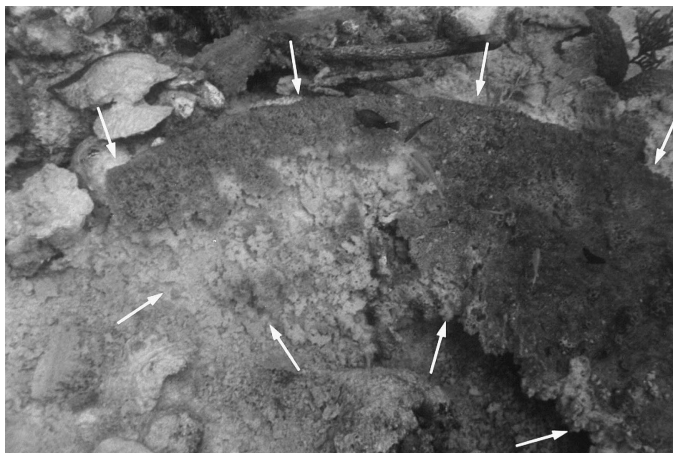
The sponge, located at the San Juan reef at 18 m depth, had been attracting SCUBA divers for about nine years. In January 1997, a brown spot was observed on the inside of the sponge. In the following few weeks the tissue at this spot turned white, became brittle and started to disintegrate. This resulted in the appearance of a funnel-shaped hole in the wall of the sponge (Figure 1), approximately 20 cm diameter on the inside and 2 - 3 cm on the outside of the sponge. During this time fish fed around the hole. By mid-March 1997, the tissue around the hole was no longer white and had started to regenerate. However, in mid-April, a new, large hole of 30 - 40 cm diameter was observed, but this time at the base of the sponge. None of the other barrel sponges in the immediate vicinity were afflicted with any lesions or signs of disease during the period of observation. As before the necrotic tissue around the hole was white while the dead tissue at the edge of the hole was brittle. Similar instances of white necrotic tissue have been observed in several cases of diseased sponge species in other areas of the Caribbean (Goreau *et al.* 1998). By mid-May only a large piece of the outer edge of the sponge remained (Figure 2). All of the sponge tissue was now dead and brittle, and fell to pieces when touched. Fish (parrotfish, wrasse and goatfish) fed on the dead tissue. A few days later the sponge was gone.

Sponge mortality has been related to high sea water temperatures (Vacelet *et al.* 1994) and blooms of cyanobacteria (Butler *et al.* 1995), but neither were observed before or during the mortality of the giant barrel sponge in Curaçao. One factor that may have possibly contributed to the sponge's mortality was the frequent touching by SCUBA divers, which may have caused lesions facilitating infection of the sponge tissue. From 1988 - 1993, the sponge was visited only once a week by about 10 divers (M. Feijts, Coral Cliff Diving, pers. comm.). After 1993 however, the giant sponge was widely known (even pictured in international dive magazines) and divers



E. Kardinaal

Figure 1. The first lesion (arrow) observed in the giant barrel sponge *Xestospongia muta*.



E. Kardinaal

Figure 2. Remaining edge of the sponge *Xestospongia muta* (between arrows), lying on the bottom of the reef and showing the disintegrating tissue (damage increasing from right to left).

visited it almost daily, greatly increasing its touch rate.

References

- Butler MJ, Hunt JH, Herrnkind WF, Childress MJ, Bertelsen R, Sharp W, Matthews T, Field JM, Marshall HG (1995) Cascading disturbances in Florida Bay, USA: cyanobacteria blooms, sponge mortality, and implications for juvenile spiny lobsters *Panulirus argus*. *Mar Ecol Prog Ser* 129:119-125
- HEED (1998) Health Ecological and Economic Dimensions of Global Change Program. Marine Ecosystems: Emerging Diseases as Indicators of Change. Health of the Oceans from Labrador to Venezuela. Year of the Ocean Special Report. NOAA- OGP and NASA Grant number NA56GP 0623. Epstein PR, Sherman BH, Siegfried ES, Langston A, Prasad S, McKay B (eds). The Center for Conservation Medicine and CHGE Harvard Medical School, Boston, 85 pp
- Goreau TJ, Cervino J, Goreau M, Hayes R., Hayes M, Richardson L, Smith G, DeMeyer K, Nagelkerken I, Garzon-Ferreira J, Gil D, Peters EC, Garrison G, Williams EH, Bunkley-Williams L, Quirolo C, Patterson K, Porter JW, Porter K (1998) Rapid spread of diseases in Caribbean coral reefs. *Rev Biol Trop* 46 Suppl 5:157-171
- Harvell CD, Kim K, Burkholder JM, Colwell RR, Epstein PR, Grimes DJ, Hofmann EE, Lipp EK, Osterhaus ADME, Overstreet RM, Porter JW, Smith GW, Vasta GR (1999) Emerging marine diseases – Climate links and anthropogenic factors. *Science* 285:1505-1510
- Peters EC (1997) Diseases of coral-reef organisms. In: Birkeland C (ed) Life and death of coral reefs. Chapman and Hall, New York, pp 114-139
- Revista de Biologia Tropical (1998) Coral diseases in the Caribbean. *Rev Biol Trop* 46 Suppl 5:145-208
- Vacelet J, Vacelet E, Gaino E, Gallissian MF (1994) Bacterial attack of spongin skeleton during the 1986-1990 Mediterranean sponge disease. In: van Soest RWN, van Kempen TMG and Braekman JC (eds) Sponges in time and space. Balkema, Rotterdam, pp 355-363
- I. Nagelkerken, Laboratory of Aquatic Ecology, Section Aquatic Animal Ecology, University of Nijmegen, Toernooiveld 1, 6525 ED Nijmegen, The Netherlands.
E-mail <I.Nagelkerken@sci.kun.nl>
- L. Aerts and L. Pors, Carmabi Foundation, P.O. Box 2090, Piscaderabaai z/n, Curaçao, Netherlands Antilles.

the sponge was widely known (even in international dive magazines) and divers visited it almost daily

AGRRA Assesses Jamaican Reefs

Following a training workshop last August, 20 researchers including representatives from Jamaica's Natural Resources Conservation Authority (NRCA), the University of West Indies, and the Negril and Montego Bay Marine Parks assessed stretches of reef along Jamaica's northern and western coast using the Atlantic and Gulf Rapid Reef Assessment (AGRRA) protocol. Forty-five deep (>5m) and 11 shallow (<5m) sites were assessed over two weeks (Figure 1). This comprehensive assessment revealed the following general findings:

- Live hard coral cover remains low along the north and west coasts, averaging 5% on shallow reefs (<5m), and 12% on deeper reefs (>5m).

reefs on Jamaica's north and west coasts remain degraded

- Coral mortality was moderately high (mean 42%), with higher levels (52%) observed at shallow sites than at deep sites (41%). The highest levels of mortality have occurred in the massive, reef-building corals *Acropora palmata* and *Montastrea spp.*
 - Macroalgae were abundant throughout the study area, composed predominately of fleshy varieties, but with calcareous algae (e.g. *Halimeda spp.*) common at all sites.
- Coral recruitment was low (mean = 3.6 individuals/m²), particularly on the east coast (1.8 individuals/m²).
- Bleaching was noted in <3% of the colonies, and diseases were detected in < 2% of colonies.
- *Diadema antillarum* distributions were patchy

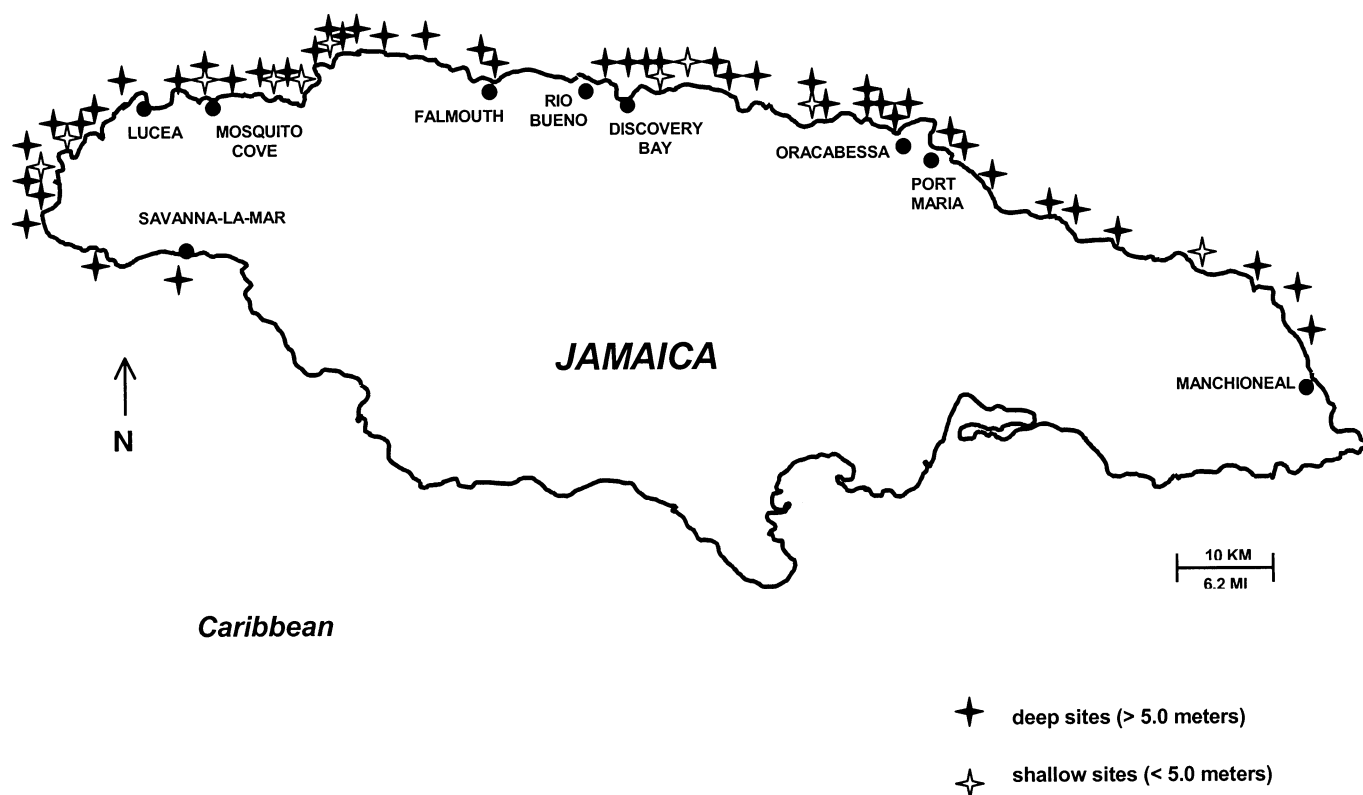


Figure 1. Site locations. Text refers to the 13 sites from Savanna-La-Mar to Lucea as **West Coast**; the 16 sites from Mosquito Cove to Falmouth as the **Northwest Coast**; the 17 sites from Rio Bueno to Oracabessa as the **North Coast**; and the 10 sites from Port Manchioneal as the **East Coast**.

(average density of 4 individuals/10m²), and reached densities of 40 individuals/10m² at some shallow sites west of Oracabessa.

- Densities of commercially valuable fishes (i.e. haemulids, lutjanids, serranids) were low whereas densities of grazing, herbivorous fishes were highly variable, particularly for scarids and acanthurids.
- Fish sizes were uniformly small across all sites. Individuals greater than 25 cm in length were scarce and terminal phase parrotfish were uncommon.

High levels of coral mortality, high macroalgal coverage, and low levels of coral recruitment reported along the entire stretch of coast surveyed, suggest that the condition of reefs on Jamaica's north and west coasts remain degraded, including areas not heavily impacted by human development (e.g. east coast). Intense fishing is practiced routinely at virtually all sites, and contributes to low

fish densities and small fish sizes. Isolated patches of abundant *D. antillarum* indicate a growing population of these urchins and offers hope for improved conditions.

The Jamaica assessment is one of several large-scale assessments conducted since 1998 as part of AGRRA's work to determine the regional condition of reefs in the western Atlantic. Financial sponsors for the Jamaica workshop/assessment include USAID, Jamaica NRCA, UNEP-CEP, The Henry Foundation, Ocean Research and Educational Foundation, University of the West Indies, Air Jamaica, and American Airlines. Information about the AGRRA program, past assessments, and workshops can be found on the AGRRA website: www.coral.aoml.noaa.gov/agra

Prepared by Kristi Klomp for the AGRRA organizing committee. For more details of the results of the AGRRA assessment in Jamaica contact Kristi
Email: <klompkri@voyager.net>

"...what looks like a clear drop of water is in fact as red in tooth and claw as Nature on the macroscale. I have seen plump phytoplankton, spinning and care-free, suddenly shredded by the voracious pseudopodia of rampaging foraminifera too tiny to see with the naked eye. I have observed the flailing arms of radiolarians engaged in mighty battles for supremacy. I have watched diatoms gently rowing along, maintaining station in a current created by the passing of my breath. I stood wide-eyed in amazement as the death and rebirth of several generations played out while I digested my breakfast. I have felt the constant beat of protozoan vacuoles, a heart of sorts, vital yet fragile....."

Yoikes! You turn around for a moment, and suddenly six months has passed. Still, Spyhopper can be excused- he has been hard at work on his latest project, which seems to have occupied several lifetimes. As indeed it has. Yes, you read it right. After his brush with death and the subsequent triumphant creation of the Nemastoblast® Spyhopper, supercharged with effulgent enthusiasm, dusted down the microscope and became planktogenic. Trying to view everything from a new perspective, he spent days simply floating about with no real intent other than to soak up the sunshine and avoid predation.

Not many folks take the planktonic view, and why should they? But have you ever wondered just what a rarity it is to be big? Of all the world's creatures, a mere handful are larger than a few millimetres and heavier than a few milligrams. Yet *Homo sapiens* is so macrophilic one might be forgiven for imagining that to be small, microscopic, teensy-tinesy, is most peculiar. Yet consider this - if ecosystems are driven from the bottom up (as Spyhopper considers to be the case), aren't many of our efforts to safeguard reefs incomplete? Could it be that there is no point in protecting the glamorous macro-systems from



have you ever wondered what a rarity it is to be big?

damage unless we are sure the soup that washes over them in tides and currents can feed them, sustain them and protect them?

Is it a valid point? Could the balance be tipping, planktonic webs stretching and snapping? It isn't out of the question. Consider the great *Acanthaster* plagues of the 80s and 90s on the GBR - like nothing else seen in history they chewed away at the foundations of the only natural structure that can be seen from space. Might there have been a problem in the plankton balance? Might *Acanthaster* larvae have flourished at the expense of others, or in the absence of predators, be they fish or other? And what of the diseases rampaging like inexhaustible B-movie monsters through the world's reefal regions? Could these virulent strains of white-band, black-band and whatever-else-band have got out of control due to an absence or sickness of natural predators? Has anyone looked? Should they?

Hyperbole or prescience? Whichever, Spyhopper proposes that this problem should be addressed, and that plankton needs to be taken out of the backwater. Let us celebrate "Plankton Day"! After all, we have had the Year of the Reef, the Year of the Ocean, the Day of the Jackalfish (**Ed: er, actually, not**), so what would be one day in your lives to celebrate humble plankton? It is Spyhopper's ambition to get a jar of seawater on each and every desk, to enable every child to embrace the glory of the microscopic creatures. It is time to rediscover the delicate workings of the meniscal layers of the sea!

See you next year Hopperholics,

Spyhopper.

Outraged by the presumptuous Spyhopper? Reply to the editors at ReefEncounter@bigfoot.com



Seeing the Global Oceans from the Reefs

What do the corals say when you ask them for a consensus on past climate variability? Corals are one of the few sources of paleodata from the tropics, and their stable isotope ratios in annual growth bands are an essential key to understanding tropical ocean variability. Generally, the oxygen isotopic composition ($^{18}\text{O}/^{16}\text{O}$ ratio or $\delta^{18}\text{O}$) of aragonite formed by reef-building corals depends on the temperature, the isotopic composition of the seawater (itself a function of the net freshwater flux into the mixed layer), and coral metabolic processes. These ratios can therefore indicate past surface temperatures, which can be 'read' from coral cores. The high extension rates of many massive species of coral, such as those from the genera *Porites*, *Platygyra*, *Pavona* and *Montastraea*, mean many sequential samples per annual growth band can be retrieved from 2.5 - 5 cm diameter cores. This provides temporal sampling resolution of weeks to years and can also provide estimates of interannual, decadal, and even century scale variability in near-surface tropical conditions at a range of locations spanning the tropical oceans. By providing observations from the tropical oceans for both the pre-industrial and greenhouse (i.e. pre and post-1850s) eras these data may illustrate the role that the tropics play in processes of climate change and natural climate variability.

However, just as weather forecasts require a network of monitoring stations, paleoclimate analysis requires a network of paleodata. The World Data Center for Paleoclimatology (WDC-Paleo), established in 1992 at the U.S. National Oceanic and Atmospheric Administration (NOAA) National Geophysical Data Center (NGDC) in Boulder, Colorado does just that. A primary mission of the data center is to provide the paleo-environmental data needed by the international research community to advance our understanding of Earth system dynamics at different timescales. Within the U.S., most funding agencies (e.g. NOAA, National

Corals are one of the few sources of paleodata from the tropics

coral data may illustrate the role the tropics play in climate change and natural climate variability

Science Foundation, U.S. Geological Survey), and especially the U.S. Global Change Research Program, already require that research results (data) are made available to the public within a reasonable period of time. WDC-Paleo is committed to expanding publicly available data holdings throughout the international paleoclimate research community and making these freely available via the internet, diskettes and CD-ROMs.

Now easily accessible via the WDC-Paleo, coral $\delta^{18}\text{O}$ data are helping to quantify variability associated with large-scale climatic phenomena. Consider Figure 1, which shows the locations where researchers have constructed thirteen coral $\delta^{18}\text{O}$ time series. Overlain contours show the gross annual features of instrumental sea surface temperature (SST) anomalies attributable to El Niño Southern Oscillation (ENSO). Clearly many corals, especially those in the equatorial Pacific and Indian Oceans, should be able to tell us not just about local conditions, but about the full ENSO pattern as well. Corals may tell if, for instance, the apparently unusual activity of ENSOs in the past few decades is truly unusual, or occurred during other epochs in the recent past. And the normally overlooked, short but well-characterized pilot records from the last fifty years or so can help us determine what a "best-possible" paleoclimatic reconstruction might look like (R.B. Dunbar, pers. comm., 1998).

Analysis of the thirteen Indo-Pacific coral $\delta^{18}\text{O}$ time series by Evans *et al.* 2000 revealed the primary patterns of variability that affected most of the corals simultaneously (Figure 1) (for details see: rainbow.ideo.columbia.edu/~mevans/preprints.html). These patterns correspond to important climatic patterns and are shown in Figure 2. The first of these resembles an ENSO, as we might expect. A second pattern is a trend showing small regions of cooling in the central, eastern and North Pacific. The researchers showed that this limited network of

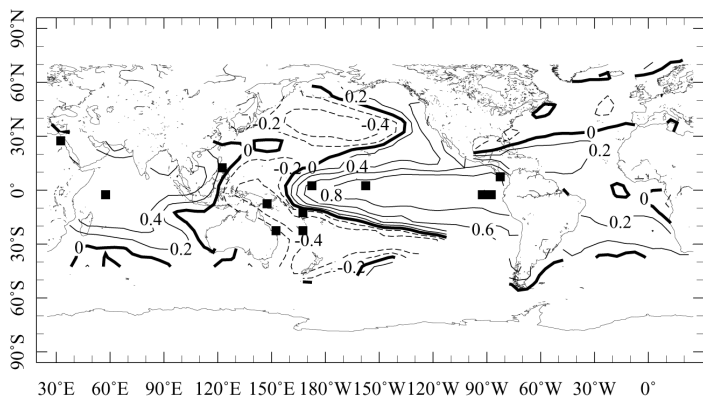


Figure 1. Locations from which researchers have constructed thirteen coral $\delta^{18}\text{O}$ time series (see www.ngdc.noaa.gov/paleo/corals.html for references). Overlain contours show the correlation of the instrumental NINO3 sea surface temperature anomaly index with the Pacific Basin SST field (dimensionless units).

coral data together could tell us more about historical SST variability than could any single coral time series alone. Ongoing work will apply these patterns and the available coral $\delta^{18}\text{O}$ data to reconstruct SST variations into the past. For us to make these results more precise and accurate, we will need to incorporate new and different kinds of coral data into the analysis. Your collaboration on these efforts is eagerly sought, and can be coordinated via the WDC-Paleo.

The Data Center has enabled a whole new generation of paleoclimatic data analyses. Data from corals, tree-rings, marine and lake sediments and others are providing indices of large-scale climate variability (Cole and Cook 1998; Dunbar and Cole 1999). Other examples of targeted phenomena include the Indian Monsoon, volcanic eruptions, and not-yet-well-defined decadal-scale patterns such as the Pacific Decadal Oscillation, as well as trends toward base climate states different from today's.

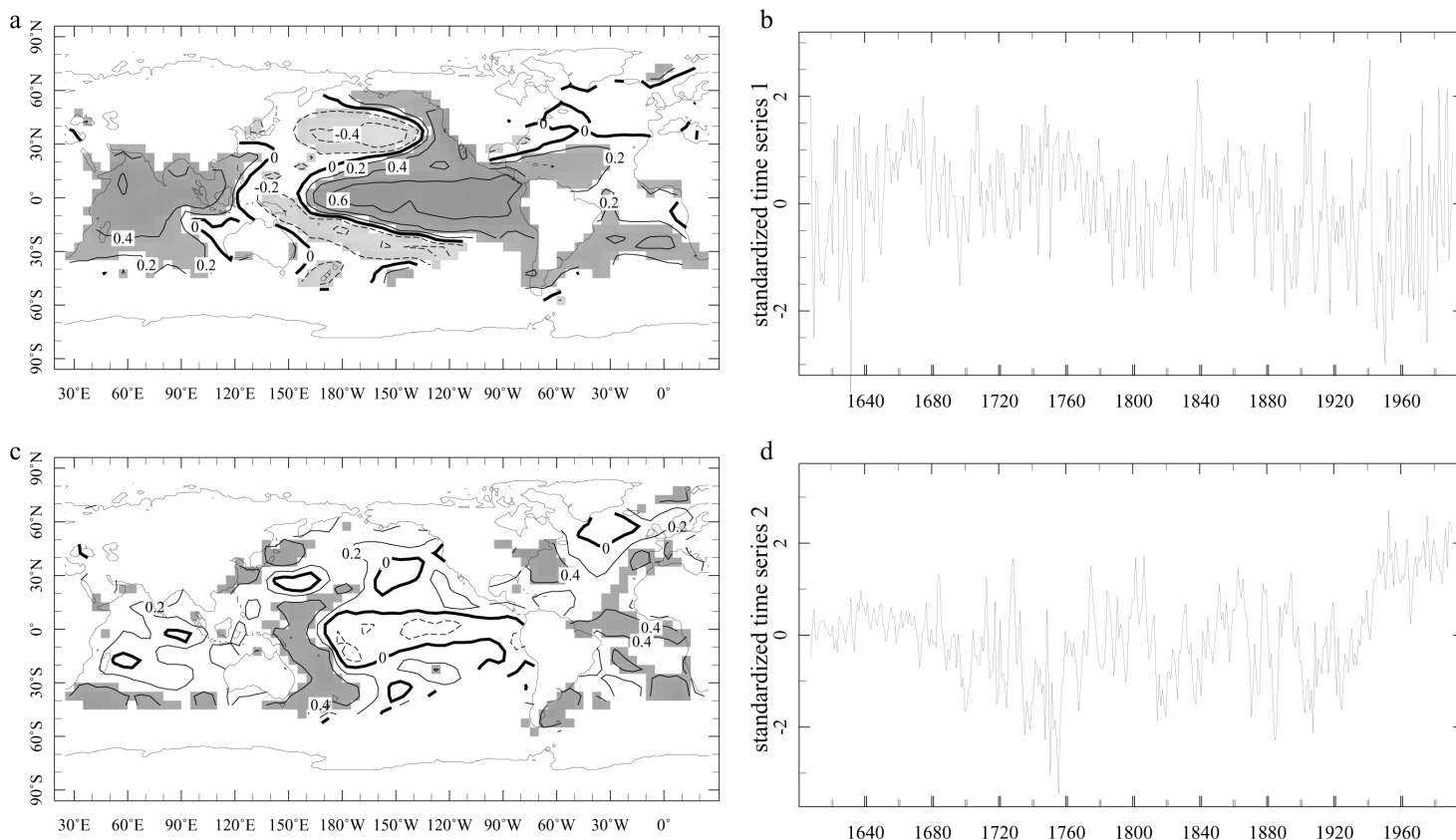


Figure 2. (a) Leading spatial pattern observed in the coral data (in dimensionless units); greys indicate 90% significance. (b) The time series of that pattern (degrees C). (c) As in (a) except for second spatial pattern. (d) As in (b) except for time series of second pattern. After Evans et al. (2000).

Several recent advances in the study of the global climate of the last several hundred years owe their success to analysis of multiple sources of paleoproxy observations (e.g. Mann *et al.* 1998) primarily available through the public data archives at WDC-Paleo. Certainly, the project described here would not have been possible without the generous contributions of data by many coral paleoclimatologists to the WDC-Paleo. The continued contribution of data to the WDC-Paleo is essential for extending this work. You can help in this and other efforts to consolidate our understanding of past climates. Surf over to www.ngdc.noaa.gov/paleo today!

C. Mark Eakin, NOAA/NGDC World Data Center for Paleoclimatology Email <mark.eakin@noaa.gov> and Michael N. Evans, UCAR/Harvard University Email <mevans@fas.harvard.edu>

References

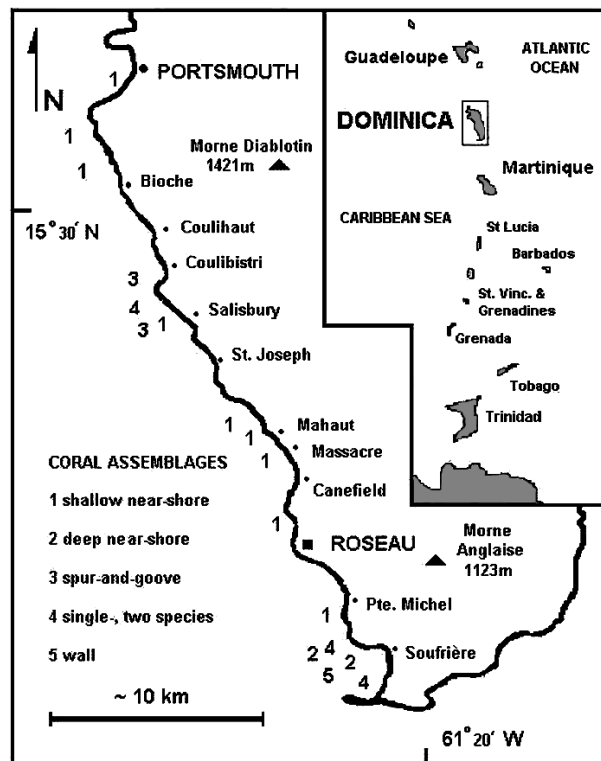
- Cole JE, Cook ER (1998) The changing relationship between ENSO variability and moisture balance in the continental United States. *Geophysical Research Letters* 25:4529-4532
- Dunbar RB, Cole JE (1999) Annual Records of Tropical Systems (ARTS): Recommendations of Research. PAGES Workshop Report Series 99-1
- Evans MN, Kaplan A, Cane MA (in press) Intercomparison of coral oxygen isotope data and historical sea surface temperature (SST): Potential for coral-based SST field reconstructions. *Paleoceanography*
- Mann ME, Bradley RS, Hughes MK (1998) Global temperature patterns over the past five centuries: Implications for anthropogenic and natural forcing of climate, *Nature* 392(6678):779-787
- NOAA NGDC World Data Center (2000) www.ngdc.noaa.gov/paleo/paleo.html

COUNTRY PROFILE

Coral Assemblages of Dominica, West Indies: an Introduction

Dominica lies in the central Eastern Caribbean, between Guadeloupe to the north and Martinique to the south. It is one of the younger volcanic islands of the Lesser Antilles, formed in the late Miocene approximately 25 million years ago. With 750 square kilometers and several mountain peaks above 1000 meters, Dominica is one of the high-relief islands of the region. Suitable habitats for hermatypic scleractinian corals are limited to the shallow end of Dominica's narrow and steep shelf. Present coral assemblages off the West Coast grow primarily on volcanic rocks. Carbonate base frameworks are rare as are "coral reefs" in the strictest sense. To date, only West Coast "reefs" have been examined.

From 1964 to 1968 the Bredin-Archbold-Smithsonian expeditions to Dominica were joined by a few marine biologists who examined burrowing sponges (Rützler 1971), archiannelids (Kristeuer 1967) balanomorph Cirrpedia (Ross 1968), decapods (Raymond 1970), and echinoids (Porter 1966). Since that period, scientific reports on benthic organisms have been scarce. Qualitative descriptions are



found in dive magazines and governmental, as well as non-governmental reports focusing primarily on Soufrière Bay (Goodwin 1985; Summers 1985; Evans 1997). Formed by a volcanic crater, Soufrière Bay is surrounded by steep walls and remains Dominica's main diving attraction.

Quantitative studies on live cover of coral species and other sessile cnidarians, sponges and macroalgae, as well as the occurrence of bleaching and coral diseases are currently being carried out by resident and visiting researchers at the Institute for Tropical Marine Ecology. Thirty-one coral species have been identified *in situ*. *Porites astreoides*, *Porites porites*, *Meandrina meandrites*, *Agaricia agaricites* and *Siderastrea siderea* are the most dominant corals. The average live coral cover is approximately 15 %, and in a few locations above 50 %, for the following types of coral assemblages.

Shallow near-shore assemblages (between 0-5 m) are located on boulder fields or cliffs lining the shore. These assemblages have low coral cover and low species richness, with *Porites astreoides* being the most dominant coral. Despite runoff from the rainforest and agricultural areas, as well as low numbers of grazing fishes, counts of macroalgae are also low. An overall average presence of one *Diadema antillarum* per square meter may also be contributing to this situation. Only at exposed, high-energy locations, and in the absence of *D. antillarum*, does algae form a greater proportion of the benthos.

Deep near-shore assemblages (5-20 meters depth) grow along the northern edge of Soufrière Bay where the shelf edge is between 25-200 m from shore. Species richness and coral cover are above average, but few signs of reef accretion exist. The substrate is composed of rock and pebbles loosely cemented by encrusting calcareous algae and invertebrates. *M. meandrites* is the most common coral in this assemblage. The macroalgae component is higher than in the shallower assemblages and *D. antillarum* is less frequent.

Low profile spur-and-groove formations (10-40 m) have been documented for the central western region between Coulibistri and Salisbury, where the shelf edge is between 300 and 800 m from shore. Sediment accumulation is high and spurs are approximately 1 m high. Mound-like and hemispheric

Carbonate base frameworks are rare, as are "coral reefs" in the strictest sense.

...local human impacts on coral habitats are primarily terrestrial runoff and fishing.

colonies of *Montastraea spp.* and *Siderastrea siderea* on the shallow spur, and *Colpophyllia natans* on the deeper end, provide a loose framework in conjunction with *Demospongia* such as barrel sponges. These formations are the most diverse in terms of coral species richness, with *Meandrina meandrites* being the most common species. On the shallow end of the spurs, macroalgae are more prevalent than in any other type of coral assemblage examined to date.

At various locations along the western coast in waters between 2-25 m deep, single and two species assemblages are composed of *Montastraea faveolata*, *Porites porites* and *Madracis mirabilis* respectively. *Montastraea faveolata* forms large assemblages (approximately 30-50 m²), with individual colonies ranging from 1 - 3 m in diameter. *Madracis mirabilis* forms thicket-like aggregations, often in conjunction with *Porites porites*. Such two-species assemblages reach sizes of 300-500 m², rising 1-1.5 m above the surrounding sediments.

Wall assemblages around Soufrière Bay between 5 and 50 m have a typical zonation in terms of the vertical distribution of coral species and growth forms, as well as live coral cover. *P. astreoides*, and *M. meandrites* are the most abundant corals in shallow water and are gradually surpassed by *Agaricia*, *Madracis*, and *Mycetophyllia* species. Foliose morphotypes of *Montastraea faveolata* and *Colpophyllia natans* occur on some ledges and constitute the largest calcareous frameworks that are visible in this setting. Many of these formations are overgrown by the brown alga *Lobophora sp.*

Aside from regional climate related disturbances such as hurricanes and their direct and indirect effects on coral assemblages, local human impacts on coral habitats are primarily terrestrial runoff and fishing. Raw sewage, and agricultural runoff are funneled into the sea via Dominica's many rivers and a yearly precipitation of 3800 - 7600 mm in the central region. Terrestrial sediments, from mining sand and gravel, are also transported in the runoff into the near shore waters. Though fishing is artisanal, seine nets and traps are common. Recreational diving is partially regulated with buoys and mooring lines installed at all frequently visited dive sites. Nevertheless, large groups of divers (10-20 per boat) are difficult to supervise

and increased coral fragmentation is evident at popular dive sites.

Coral bleaching has been recorded since the initial reconnaissance surveys in May 1999. Bleaching "levels" across all sites were generally low, predominantly affected were *Montastraea annularis* and *M. faveolata*, both of which exhibited a patchy bleaching distribution. The frequency of coral bleaching observations did not appear to change from May 1999 to August 2000. However, despite seasonally cool temperatures of approximately 26° C in February, 30-35% of a large (~50 m²) "mono-specific" aggregation of *M. faveolata* was affected by bleaching at one site. Though bleaching is considered a generalized stress response that may or may not cause mortality, it is typically associated with elevated seawater temperatures. In Dominica, factors other than temperature seem to be contributing to the coral bleaching observed.

A general survey of the prevalence of scleractinian coral diseases and conditions was carried out in March, June and August of 2000. All conditions and anomalies were recorded, and at the lowest levels of disease prevalence (March 2000) there was an average of 1 colony affected with various conditions and/or diseases per 10 m² of reef. The levels of disease prevalence in March were generally low and served as a background for comparisons during the months of June and August. The diseases recorded at five reef sites along the West coast of the island included Dark Spot Disease, White Plague Type II and Black Band Disease (Richardson *et. al.* 1998; Peters and McCarty 1999). The most frequently affected species were *Siderastrea siderea*, *Meandrina meandrites*, *Colpophyllia natans* and members of the *Montastraea* species complex. Both Black Band Disease and White Plague Type II increased dramatically in prevalence at selected reefs from March to June, while seawater temperature increased moderately by ~2 °C. It is believed that disease prevalence is tightly linked to an increase in seawater temperature, typically encountered during the months of summer and early fall (e.g. Antonius 1981, 1985; Peters 1984; Santavy and Peters 1996). The overall levels of disease occurrence remained stable from June through August. White Plague Type II appears to cause the largest total loss of tissue surface area when compared to all other diseases and conditions.

factors other than temperature seem to be contributing to coral bleaching.

Dominica's shelf is narrow and reefs show few signs of accretion. Scleractinian corals and coral reefs are part of a dynamic benthic community and remain comparatively limited marine resources. The proximity of coral habitats to human settlements make them susceptible to anthropogenic disturbances. While the paucity of baseline data on Dominica's coastal marine habitats hampers conservation efforts, the recently established Institute for Tropical Marine Ecology now offers a permanent base of operations for marine studies, such as the ongoing coral surveys introduced here.

References

- Antonius A (1981) Coral reef pathology: a review. Proceedings of the Fourth International Coral Reef Symposium, Manila 2:3-6
- Antonius A (1985) Coral diseases in the Indo-Pacific: A first record. *Marine Ecology* 6(3):197-218
- Evans PGH (1997) Dominica Nature Island of the Caribbean. A guide to dive sites and marine life. 28 pp
- Goodwin M (1985) Feasibility study on the establishment of artificial reefs. Technical report for UN Food and Agriculture Organization Project TCP/DMI/4402 FAO Regional Office, Barbados
- Kristeuer E (1967) Bredin-Archbold-Smithsonian Biological Survey of Dominica. 3. Marine archiannelids from Dominica. *Proceedings of the United States National Museum*, 123(3610):1-6
- Peters E (1984) A survey of cellular reactions to environmental stress and disease in Caribbean scleractinian corals. *Helgoländer Meeresunters* 37:113-137
- Peters E McCarty H (1999) The Coral Disease page. ourworld.compuserve.com/homepages/mccarty_and_peters/coraldis.htm
- Porter KM (1966) Bredin-Archbold-Smithsonian Biological Survey of Dominica. 1. The Echinoids of Dominica. *Proceedings of the United States National Museum*, 121(3577):1-10
- Raymond MB (1970) *Mithrax (Mithraculus) commensalis*, a new West Indian spider crab (Decapoda, Majidae) commensal with a sea anemone. *Crustaceana*, 19(2):157-160
- Richardson LL, Goldberg WM, Kuta KG, Aronson RB, Smith GW, Ritchie KB, Halas JC, Feingold JS, Miller SL (1998) Florida's mystery coral-killer identified. *Nature* 392 (6676):557-558

Ross A (1968) Bredin-Archbold-Smithsonian Biological Survey of Dominica. 8. The intertidal balanomorph Cirripedia. Proceedings of the United States National Museum, 125(3663):1-23

Rützler K (1971) Bredin-Archbold-Smithsonian Biological Survey of Dominica; Borrowing sponges, genus *Siphonodictyon* Bergquist, From the Caribbean. Smithsonian Contributions to Zoology, 77:1-37

Santavy DL and EC Peters (1996) Microbial pests: coral disease in the western Atlantic. Proceedings of the Eighth International Coral Reef Symposium, Panama 1:607-612

Summers P (1985) A survey of the coral reefs off Scotts Head, Dominica, West Indies. Fisheries Div. GOCD, Roseau, Dominica

Sascha C. C. Steiner * and Jill L. Borger.**
*Institute for Tropical Marine Ecology Inc., P.O. Box 944, Roseau, Commonwealth of Dominica, West Indies, Tel. (767) 449 3725 Email <admin@itme.org>.
**R.S.M.A.S., University of Miami, 4600 Rickenbacker Causeway, Miami, FL 33149 U.S.A. Tel. (305) 361-4145 Email <jborger@rsmas.miami.edu>

MEETINGS

First International Symposium on Deep Sea Corals

**Science and conservation of deep sea corals, July 30 - August 3,
2000, Halifax, Nova Scotia, Canada**

'In the last two years the number of described species of azooxanthellate corals has for the first time overtaken the number of zooxanthellate corals.' This was how Stephen Cairns of the Smithsonian Institution (USA) opened the first ever international meeting focussing on deep-water corals. The conference was initiated in Canada by the Halifax-based Ecology Action Centre who brought participants from north America, Europe and Australasia to Nova Scotia for the three day symposium. The meeting was structured into sessions covering coral biology, mapping, ecology and conservation and was concluded by a fourth day conservation workshop. But as soon as the meeting had got underway it became clear that these disparate research groups had many scientific and conservation concerns in common.

John Wilson (Royal Holloway University of London, UK) gave the symposium an historical perspective on deep-water corals in his talk '*Lophelia* 1700 to 2000 and beyond'. Boldly starting with the first records of this widespread deep-water coral species

A controversial hypothesis - that these deep-water reefs are fuelled by light hydrocarbons that seep from the seabed to support a chemosynthetic food chain

in the mid eighteenth century, Wilson outlined the major developments in our understanding of *Lophelia's* distribution from early dredging studies up to the 1990s, when oil and gas exploration in the deep waters of the north east Atlantic Frontier generated great public concern over environmental sensitivity. Pioneering investigations of deep-water coral communities by the oil and gas industry were described by Martin Hovland (Statoil, Norway). When Statoil first detected these strange seabed structures on acoustic surveys in the early 1980s, cold war paranoia kicked in. But when these acoustic targets were filmed by remotely operated vehicles they turned out not to be Soviet mines but large mounds of bright white corals. Martin also outlined what remains a controversial hypothesis - that these deep-water reefs are fuelled by light hydrocarbons that seep from the seabed to support a chemosynthetic food chain. Other delegates maintained that deep-water corals feed on zooplankton that in turn rely on primary production in surface waters.

Other presentations covered topics varying from skeletal chemistry, molecular genetics, reproduction, biodiversity, and habitat mapping and included a comparison of deep and shallow water reef systems by Bruce Hatcher (Dalhousie University, Canada). A spectacular poster and video from Kim Conway (Pacific Geoscience Centre, Canada) and co-workers described a different type of deep-water reef habitat – the vast glass sponge reefs formed by hexactinosean sponges in the deep troughs on the western Canadian continental shelf.

An over-riding theme in Halifax was that these largely unexplored habitats have been and are still coming under ever increasing pressure from human activity. Just as Jan Helge Fosså from the Institute of Marine Research in Norway had finished describing the giant 14 km long Sula Reef complex in the Norwegian Sea, he went on to estimate that between one third and a half of all deep-water coral reefs in Norwegian waters have already been damaged by fishing activity. On the other side of the Atlantic, the news wasn't much better. The organisers of the meeting at the Ecology Action Centre have been working closely with local fishermen and their reports of the damage caused by draggers (bottom trawls) to the gorgonian 'forests' in the waters of Nova Scotia were similarly worrying. From Tasmania, Tony Koslow of CSIRO described the total removal of benthic fauna by trawls targeting the deep-sea fish populations found around seamounts.

Following the three-day symposium a group of 40 delegates and other interested parties met for a day-long workshop to discuss the conservation of deep-water corals. At the workshop a consensus statement was prepared and this is now being circulated to raise awareness of the threats currently facing these poorly understood ecosystems. An embryonic Deep Water Coral Forum was established with a steering committee led by Martin Willison (Dalhousie University, Canada) and comprising Andre Friewald (University of Tübingen, Germany), Susan Gass (Ecology Action Centre, Canada), Derek Jones (Canadian Ocean Habitat Protection Society), Tony Koslow (CSIRO Marine Research, Australia) and Murray Roberts (SAMS, UK). As well as this, an e-mail discussion group on deep-water corals was initiated and will be running soon. There's no doubt that the world of deep-water coral research is growing rapidly. In Europe, the Atlantic Coral Ecosystem

between one third and a half of all deep-water coral reefs in Norwegian waters have already been damaged by fishing activity

Study (ACES) is one of six European Union supported research projects forming an Ocean Margin Deep-Water Consortium. Co-ordinated from Germany by Andre Friewald, ACES has five 'flagship' European coral areas extending from the coasts of Norway to Portugal. Across these areas, ACES is investigating the structural and genetic variability, longevity and framework construction of deep-water reefs; the hydrographic factors affecting particle supply; the dynamics and functioning of the coral ecosystem. Overall, ACES aims to develop our understanding of the environmental sensitivity of deep-water reef habitats.

The First International Symposium on deep sea corals showed the level of concern world-wide for the future of deep-water coral ecosystems. Let's hope that the familiar phrase of '*too little too late*' won't ever be applied to our actions to protect deep-water coral reefs.

The First International Symposium on deep sea corals showed the level of concern world-wide for the future of deep-water coral ecosystems. Let's hope that the familiar phrase of '*too little too late*' won't ever be applied to our actions to protect deep-water coral reefs.

Consensus statement

- Corals are now recognized to be as diverse in the deep seas and oceans as in shallow tropical waters. They form reefs and other benthic structures, often in association with complex topography, along continental margins, on seamounts and ridges, through much of the world's oceans.
- Deep-water corals typically exhibit slow growth and extreme longevity. The coral species and their associated communities may have highly localized distributions. As a consequence of these features, they are exceptionally vulnerable to disturbance.
- Seamounts and other coldwater coral habitats are today subject to growing anthropogenic pressures, in particular as a result of the rapid spread of deep-water trawl fisheries into new regions and new grounds, aided by the explosive development of mapping, navigational, fish-finding, and other technologies.
- The role of deep-water coral species and reefs in forming essential habitats for fishes and other species, and their potential for biotechnology and pharmaceuticals, are still poorly understood, but their exceptional diversity, uniqueness and vulnerability necessitates that their conservation be given high priority.
- Steps to conserve and restore deep-water coral and reef environments need to be taken at the

national, regional and international levels to protect deep-water coral reefs and areas of high biodiversity associated with corals, both within areas of national jurisdiction and on the high seas. The establishment of deep-water reserves should follow the best principles of ecology and of sustainable, precautionary management, such that a global and representative system of marine protected areas is established which is adequate for the long-term conservation of deep-water biodi-

versity. It is essential that existing national laws and international conventions for the protection of biodiversity and the regulation of fisheries be extended to cover these unique and vulnerable deep-water habitats.

J. Murray Roberts researches deep water corals at the Scottish Association for Marine Science. Email: <m.roberts@dml.ac.uk>

BOOKSHELF

GCRMN Socioeconomic Manual for Coral Reef Management

L. Bunce, P. Townsley, R. Pomeroy and R. Pollnac. 2000. Australian Institute of Marine Science, Townsville, Australia, pp. 250.

The Global Coral Reef Monitoring Network has just released the GCRMN Socioeconomic Manual for Coral Reef Management, the companion to GCRMN's Survey Manual for Tropical Marine Resources (English *et al.* 1997), which focused on the biophysical attributes of coral reefs. The socioeconomic manual provides practical guidelines on how to conduct socioeconomic assessments of reef stake-

holders and is targeted for reef managers in developing nations. A proportion of the print run of 2000 was distributed at the 9th International Coral Reef Symposium as part of the mini-symposium on socioeconomic issues.

To request a copy contact Wendy Ellery by Email <w.ellery@aims.gov.au> or Fax 61 7 4753-6138.

Carbonate Platform Systems: Components and Interactions.

E. Insalaco, P. W. Skelton and T. J. Palmer. (Eds.) Geological Society Special Publication no. 178. Publication due November 2000. List price: £60.00 / US\$100.00 **Offer price: £29.00 / US\$48.00.** ISBN 1-86239-074-6 Hardback 240 pages.

Aimed at Sedimentologists, Palaeontologists, Marine Ecologists, Petroleum Exploration / Production Geologists and Marine Environmental Conservationists, *Carbonate Platform Systems: components and interactions* is a collection of 31 papers, with an introduction, concerning the effects of organism-environment interactions in modern and ancient carbonate platforms. The book arises from the Lyell Meeting on 'Organism-Environment Feedbacks in Carbonate Platforms and Reefs' held at the Geological Society, UK.

This book contains an integrated approach to carbonate platform development, emphasizing dynamic interactions at all hierarchical levels, and limitations of uniformitarian analogy in biotically influenced sedimentary systems.

Contents:

- Skelton, P. and Palmer, T. Introduction
- Naylor, L. A. and Viles, H. A. A temperate reef builder: an evaluation of the growth, morphology and composition of *Sabellaria alveolata* (L.) colonies on carbonate platforms in South Wales
- Steuber, T. Skeletal growth rates of Upper Cretaceous rudist bivalves: implications for carbonate production and organism – environmental feedback
- Perry, C. T. and Bertling, M. Spatial and temporal patterns of macroboring within coral reef systems in the Mesozoic and Cenozoic
- Wright, D. T. and Altermann, W. Microfacies development in Late Archaean stromatolites and oolites of the Campbellrand Subgroup of South Africa

- Riegl, B. and Piller, W. E. Reefs and coral carpets in the northern Red Sea as models for organism - environment feedback in coral communities and its reflection in growth fabrics
- Nebelsick, J. and Bassi, D. Diversity, growth-forms and taphonomy: key factors controlling the fabric of coralline algal dominated shelf carbonates
- Gili, E. and Skelton, P. W. Factors regulating the development of elevator rudist congregations
- Glynn, P. W. El Niño-Southern Oscillation mass mortalities of reef corals: a model of high temperature marine extinction's?
- Gischler, E. and Lomando, A. J. Isolated carbonate platforms of Belize, central America: sedimentary facies, late Quaternary history, and controlling factors
- House, M. R., Menner, V.V., Becker, R. T., Klapper, G., Ovnatanova, N. S. and Kuz'min, V. Reef episodes, anoxia and sea level changes in the Frasnian of the southern Timan (NE Russian platform)
- Stössel, I. and Bernoulli, D. Rudist lithosome development on the Maiella Carbonate Platform Margin
- Kiessling, W., Flügel, E. and Golonka, J. Fluctuations in the carbonate production of Phanerozoic reefs
- Schlager, W. Sedimentation rates and growth potential of tropical, cool-water and mud-mound carbonate systems

Early Purchase Special Offer

Carbonate Platform Systems: Components and Interactions is available at a reduced price (down from £60.00 / US\$100 to £29.00 / US\$48.00) for 'early bird' purchases, until 31st January 01. Please Fax, Tel. or Email your order quoting ref. 17801 to Fran Clarke, The Geological Society Publishing House, Unit 7, Brassmill Enterprise Centre, Brassmill Lane, Bath, BA1 3JN, UK. Tel: +00 1225 445046 Fax: +00 1225 442836 Email <fran.clarke@geolsoc.org.uk> Webshop: <http://bookshop.geolsoc.org.uk/>

Management of Bleached and Severely Damaged Coral Reefs

Westmacott S, Teleki K, Wells S and West JM (2000) IUCN, Gland, Switzerland and Cambridge, UK. 36 pp.

Available from: IUCN Publications Services Unit 219c, Huntingdon Road, Cambridge, CB3 0DL, United Kingdom, Tel. 44 1223 277894, Fax. 44 1223

277175, Email: <info@books.iucn.org> Webpage: www.iucn.org

BOOK REVIEW

Caribbean Reef Plants

An Identification Guide to the Reef Plants of the Caribbean, Bahamas, Florida and Gulf of Mexico
Diane Scullion Littler and Mark Masterton Littler. OffShore Graphics, Inc., Washington, DC. 2000. 542 pp., 722 colour photographs, 1,645 black-and-white line drawings. US\$ 89.95 hardcover. <http://www.erols.com/offshoregraphics>

Coral reefs are renowned as repositories of marine biodiversity. Reefs and adjacent habitats, including seagrass beds and mangroves, are threatened by a litany of natural and (mainly human-caused) stresses that have been amply documented. Unfortunately, Caribbean reefs are in the vanguard of environmental deterioration and marine biologists are in a race to document the wealth of their flora and fauna even as ecological threats mount.

It is in this urgent context that Diane and Mark

Littler's unique identification guide to reef plants, the fruit of fifteen years of exploration in the waters of the Caribbean and adjacent seas, reaches the coral-reef research community. The book is a happy marriage of a user-friendly, photographic field guide and a scholarly monograph, with complete morphological and anatomical information for 565 species of macroscopic marine plants. It is the superb underwater colour photographs, more than 700 of them, that first catch the reader's eye. The

photos enable the user to "picture-key" specimens initially and then to make a positive identification using the dichotomous keys, along with the morphological and anatomical drawings. In addition to showing morphological features, the photos also convey important information about each species' habitat. The coverage of marine plants extends beyond the Chlorophyta (green algae), Rhodophyta (red algae), and Phaeophyta (brown algae) - macroalgae in the strict sense - to include sea-grasses among the flowering plants, and species of cyanobacteria that form structures large enough to be visible to the unaided eye.

Within each phylum, species are arranged by class, order and family following M. J. Wynne (1998. A checklist of benthic marine algae of the tropical and subtropical western Atlantic: First revision. *Nova Hedwigia* 116: 1-155). Artificial dichotomous keys are provided to the five marine plant phyla, to the genera within each phylum, and to the species within each genus. A practical feature for the more lengthy keys is the use of a double numbering system that enables the user to work the key backward as well as forward. Throughout the keys and descriptions, emphasis has been placed on vegetative characters that are more readily observed than ephemeral reproductive structures. Nonetheless, reproductive features are included when they aid in identification.

The species descriptions are crisply written and concise (three per page) and each species name is accompanied by the reference to its original publication. Wherever appropriate, the original name (basonym) and its reference are listed below the currently accepted species name. Synonyms for species names, their references, and supplementary notes appear in an appendix. The rare but essential literature that was consulted by the authors and listed in the bibliography is another indication of the painstaking research that went into this volume. The descriptions give typical shape, normal and extreme size-ranges, colour, blade features, and the characteristics of the stipe (when present) and hold-fast. Detailed anatomical structure is also illustrated in more than 1,600 exquisite, captioned line drawings. For ease of reference, all the information

marine biologists are in a race to document the wealth of their flora and fauna even as ecological threats mount

Intended not only for algal systematists, but also for ecologists, physiologists, chemists, geologists, coastal-zone managers and even amateurs

for each species (description, drawings, photos) is presented together on facing pages. For some species that have different varieties or forms, each receives its own treatment.

The abundance of each species is expressed as common, locally abundant, uncommon, or rare. Habitat information is also provided, including the living or non-living substrata on which each species occurs and its depth range. Species distributions are given according to a system of provinces that is pictured on the endpapers: Florida, Bahamas, Greater Antilles, Lesser Antilles, Southern Caribbean, Western Caribbean, and Gulf of Mexico. The designation of provinces recognises that marine habitats around the Caribbean are hydrographically interconnected and that the use of island occurrences would yield artificially disjunct distributions.

The book is further enlivened by 130 special sidebars, captioned photographs (with references) that depict interesting reef phenomena, including hidden algal habitats, photosynthetic symbioses, competition for space, herbivory, animal camouflage and gardening behaviour, and marine botanists at work. A complete systematic index lists Latin names at all taxonomic levels, including specific epithets, varieties, and taxa

featured in the ecological sidebars. Introductory material includes a brief history of algae collecting around the Caribbean and a commentary on the status of coral reefs. Finally, for a volume that will be heavily utilised (and abused) in laboratory, field and shipboard environments, it is worthwhile to note the high quality of the glossy paper and the sturdiness of the hardcover, "lay-flat" binding.

The book is intended not only for algal systematists, but also for ecologists, physiologists, chemists, geologists, coastal-zone managers and even amateurs, and the authors have striven to minimise the use of specialised terminology. Technical terms used in the text are defined in a glossary. Such user friendliness stands in contrast to the highly specialised terminology (and lack of a glossary) in W. R. Taylor's *Marine Algae of the Eastern Tropical and Subtropical Coasts of the Americas* (1960. University of Michigan Press: Ann Arbor. 870 pp. Out of print.),

which has been the standard work for identification of Caribbean macroalgae. Although Taylor's treatment included almost all the species reported up to its date of publication, later advances in algal taxonomy and nomenclature and the use of SCUBA for collecting specimens mean that this 1960 work is now out of date. Furthermore, in contrast to the wealth of photos and line drawings in *Caribbean Reef Plants*, only about a third of the taxa in Taylor's book were represented by some sort of illustration.

In a work of such scope, it is not unreasonable to wonder why the Littlers did not choose to treat all of the species reported from the broader Caribbean region.

Wynne's (1998) checklist lists 1,236 species of macroalgae for the western Atlantic from Virginia to Uruguay, an area that is much larger than the region covered by *Caribbean Reef Plants*. In some cases, as mentioned by the authors, only half of the species of a given genus reported from the Caribbean and adjacent seas are treated. However, because the species that were not included are quite rare and seldom observed (based on twenty years of diving throughout the region), the authors estimate that a specimen collected from such a genus actually has a 90-95% chance of being encountered in the text. Furthermore, when one con-

a photographic celebration of the beauty and phylogenetic diversity of marine plants.

siders how cumbersome the all-inclusive approach would make the artificial dichotomous keys, the user can only be grateful to the authors for their discrimination.

The marine plants depicted in *Caribbean Reef Plants* are, along with corals, the major primary producers and builders of reef systems. These plants are critical to the functioning of the reef ecosystem and are sources of food, industrial extracts, and potential pharmaceuticals. Research on coral-reef organisms, as well as effective reef management and efforts to understand the consequences of environmental changes for marine biodiversity, depend on sound taxonomic knowledge and inventories. Beyond the value of its up-to-date taxonomy, *Caribbean Reef Plants* is a photographic celebration of the beauty and phylogenetic diversity of marine plants. I have no doubt that this wonderful book will become indispensable to the broad scientific and amateur publics for which it is intended, and that it will inspire wider interest in the rich plant life of coral reefs.

Gene Rosenberg, Department of Botany, MRC 166, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560-0166 USA. E-mail <rosenberg.gene@nmnh.si.edu>

Tales from Tubbataha

Natural History, Resource Use and Conservation of the Tubbataha Reefs Palawan, Philippines. Second Edition. Yasmin D. Arquiza and Alan T. White. Published by Bookmark Inc. Manila. Assisted by the Sulu Fund for Marine Conservation, Foundation, Inc. and the Coastal Resource Management Project Cebu, Philippines. Available at \$15 + shipping from Bookmark, Inc., 264 Vito Cruz Extension, Makati, Metro Manila, Email: <bookmark@info.com.ph> or Sulu Fund for Marine Conservation Foundation Inc., No. 2 Topaz Street, Saint Michael Village, Banilad, Cebu City 6000, Philippines. Email: <sulufund@mozcom.com>

This book documents the natural and human history of the most important reef conservation area in the Philippines and perhaps Southeast Asia. This 33,200 hectare National Marine Park and World Heritage Site includes at least 10,000 ha of some of the most biologically diverse coral reefs in the world. The first marine surveys by the author, Alan White, in 1984 set a baseline for reef area change that is unprecedented in reef monitoring. The big changes in living coral cover between 1984 and the present are closely linked to human events both good and bad. Tales from Tubbataha was reviewed by Philippine environmental journalist Alfred A. Yuson Taken for

the Philippine Star, (Monday 3rd July 2000) and an edited version of his article is printed here with permission. Viewed within the highly political nature of Philippine reef conservation his review provides an interesting sample of the kind of "tales" described in the book.

At first glance Tales from Tubbataha looks and reads like the kind of scientific resource book that will be admired only by academics - full of charts, tables and data. But we soon discover a sense of popular environmentalism when we read on and learn about the real "tales" behind the preserva-

tion of perhaps the most important conservation site in our country.

Tubbataha Reefs have fascinated not only divers but naturalists, scientists and bird-watchers. Ernesto "Bebot" Santa Cruz, the acknowledged "Father of Tubbataha" and a Palwan diver and volunteer with Task Force Pawikan, was the driving force that allowed the Tubbataha Reefs to become the Philippines' first national marine park when President Corazon Aquino signed Presidential Proclamation 306 on August 11, 1988. In December 1993 Tubbataha was declared a World Heritage Site.

A private group, the Tubbataha Foundation, took over the management and protection of the park in 1989. Later President Fidel Ramos created the multi-sectoral Task Force Tubbataha in July 1995 and ordered the military to maintain year-round protective presence on the reef. Indeed, this book is dedicated to Santa Cruz and former President Ramos, thus honoring two of the good guys in this ongoing tale of opposing interests.

We get to know other environmental heroes such as journalist Vic Milan who headed the Tubbataha Foundation; and through this organization challenged nefarious commercial efforts to exploit the reefs, such as that launched by "Carageenan King" Benson Dakay's Shemberg Marketing Corporation. Surprisingly, we learn that a Palawanon and House

A crafty resolution that would allow seaweed farming in almost 3,000 hectares of the coral atoll

Speaker at the time, the late Ramon Mitra, weighed in with Dakay's attempts to bring in 6,000 families, or roughly 24,000 people to the remote coral atoll to cultivate seaweeds. Thankfully, despite the collusion among certain local officials, this imminent invasion

was thwarted when provincial board member Samuel Umandap unmasked the duplicitous participation of some of his colleagues in the scheme. Together with Mitra we count the Palawan Governor Victoriano Rodriguez

and Palawan Congressman David Ponce de Leon among those who endorsed board member Nelson Pereyra's crafty resolution seeking an amendment to Proclamation 306 that would allow seaweed farming in selected areas covering almost 3,000 hectares of the coral atoll.

In May 1990, the Tubbataha Foundation teamed up with the Department of Environment and Natural Resources and the military to evict the first wave of seaweed farmers. But the Tubbataha saga of conservation versus exploitation doesn't end here. As the book warns, "The seaweed farm controversy is a showcase of collaboration between government and business interest in attempting to exploit a unique marine resource. The important task for those concerned about the future of national parks is to prevent similar cases from happening again."

Alfred A. Yuson Taken

WHO'S WHO

Mahonia Na Dari: Research and Education in the Heart of Marine Biodiversity

The rich diversity in the waters off Papua New Guinea (PNG) and its coral reefs have remained largely untouched by the destruction visited upon reefs of neighbors to the west and north. A traditional land-tenure system that fosters sustainability is a key to the current healthy state of the marine environment. However, the cultural climate, particularly the relationship between humans and habitat, is beginning to change. Foreign exploitative concerns undermine traditional values and aggressively widen the gap between the old ways and the

new cash economy. To counter the influence of the short term profit driven logging companies, and to forestall large scale destructive fishing operations, a variety of nongovernmental organizations (NGOs) have stepped up their educational efforts in PNG.

One of the key players in promoting sustainable development of PNG's considerable terrestrial and marine resources is The Nature Conservancy. In collaboration with the European Union, with additional support from many international governments and NGOs, The Nature Conservancy operates the

Mahonia na Dari Research and Conservation Center as its primary marine research and educational facility in PNG. Located on the western shore of Kimbe Bay in sparsely populated West New Britain Province, the Center is a few minutes walk from famed Walindi Plantation Resort (whose owners were instrumental in the Center's 1996 genesis and provided its land and much of its infrastructure). Kimbe Bay has assumed legendary status among recreational divers and underwater photographers over the past two decades and includes reef systems that are pristine and vigilantly guarded even by Papua New Guinean standards.

Mahonia na Dari means "Guardian of the Sea" in the local Talasea language, and its educational mission is central to its overall role - as is hosting conservation related scientific research and monitoring activities. Large-scale cyanide fishing operations are salivating over the prospect of getting their hands on PNG's largely intact reef-fish fauna. The Center's educational outreach effort is aimed squarely at helping local people, particularly the young, realize the true value of what lies beneath their seas, and the threats those resources face. To some extent, the Center's educational programs, run by both Papua New Guineans and expatriates of other nations, teach the traditional environmental ethic to people who may have recently forgotten or abandoned that aspect of their own culture. As part of the Center's vital educational effort, visiting scientists are also recruited to present talks to area schoolchildren and to provide their own view of what they are doing in the Bay, and why it all matters.

Coral pinnacles and seamounts that rise from great depth to form shallow oases in the vastness of the Bay include Kimbe Bay's most characteristic "hallmark" sites, though fringing reefs, patch reefs, and other reef types are well represented in the area, including directly offshore from the Center. Kimbe Bay reefs are characterized by large sea fans and rich coral assemblages all adorned with the feathery arms of a staggering diversity of crinoids. There are probably more than 800 fish species on the Bay's reefs and a day's diving might yield anything from a tiny mandarin fish to a large hammer-

head or silvertip shark. Marine mammals are also particularly well represented in Kimbe Bay and a few times each year divers have had in-water encounters with killer whales, including times when the whales have toyed with carcasses of recently-killed sharks. Mean water temperature generally falls within the 28-31°C range and average visibility underwater, depending on site, usually runs 15-60 m horizontally.

Among Mahonia na Dari's facilities are an air-conditioned office block that includes the Center's office, library, microscope room, and laboratory. Researchers stay in self-contained bungalows

or a new dormitory, all of which are carefully constructed in traditional style with addition of overhead fans and mesh-screen windows. Accommodations are within a few meters of the Bay's shore, providing easy access and a spectacular backdrop to the everyday topside activities that accompany field research. Additional accommodations are scheduled to open by early 2001. Cooking and laundry facilities are provided, as are bed linen and cooking and eating utensils. Electric power at the Center, provided by diesel generators, is 240V at 50 Hz. Food is available from markets in Kimbe, 11 km from the Center, or alternatively rather lavish buffet meals can be purchased at Walindi Resort.

Two 5.5m boats with twin 40-hp outboard motors are available for research work.

The daily cost of using the facility is currently US\$40 per person. Included in this fee is full use of the facility including use of a research vessel and boatman to and from nearshore reefs and other habitats within a research area that extends over a 10 km stretch of the coast. Researchers who plan to work at more distant sites must negotiate additional fuel costs with the Manager. SCUBA tanks, weights, and air fills are also included in bench fees. Telephone and Fax services are provided on a user-pays basis.

Anyone who intends to conduct research in PNG must secure research permits and visas through their local PNG Embassy or Consulate. Several months lead time is usually required for processing the necessary paperwork. For further information or for reservations please contact The Manager, Ma-

Maintenance of a traditional land-tenure system that fosters sustainability is key to the current healthy state of the marine environment.

...large sea fans and rich coral assemblages all adorned with the feathery arms of a staggering diversity of crinoids

honia na Dari Research and Conservation Center, P.O. Box 697, Kimbe, West New Britain, Papua New Guinea Email: <mahonia@global.net.pg>. Mahonia na Dari has a new Worldwide Web page at www.mahonia.org and additional information on PNG is available at www.uga.edu/cuda/PNG.html.

Shane Paterson, Institute of Ecology, University of Georgia, Athens, GA 30602, USA Email <cuda@arches.uga.edu>

DIARY

Second Symposium on Marine Conservation Biology

San Francisco State University, June 21-26, 2001

In response to growing interest since the first *Symposium on Marine Conservation Biology* at the University of Victoria, British Columbia in 1997, the Marine Conservation Biology Institute (MCBI), with co-sponsorship of the Society for Conservation Biology (SCB), will hold the *Second Symposium on Marine Conservation Biology* next summer in San Francisco, California.

The *Second Symposium* will be a forum for established researchers and students in the natural and social sciences (including oceanography, marine biology, fisheries science and anthropology) and for science-minded managers and others interested in the science of protecting, restoring and sustainably using biodiversity in the world's estuaries, coastal waters, enclosed seas and open oceans. It will feature:

- invited papers, contributed papers and poster sessions
- skills workshops
- a participatory forum on funding for research and training, as well as other policy issues
- special accommodations for reporters to encourage coverage of emerging issues
- a popcorn and video night to showcase research-related footage by participants
- displays by publishers and other vendors

- sign language and foreign language interpreters upon request, and
- field trips that take advantage of the Bay Area's outstanding natural, scientific and cultural resources.

Unlike the first Symposium on Marine Conservation Biology, the *Second Symposium* will not be at SCB's annual meeting (which is to be held July 30 - August 4, 2001 at University of Hawaii in Hilo). SCB's 2001 annual meeting will include selected marine themes.

Scientific conference coordinator Julie Morrison will be handling logistics. For more information, please contact Julie at Email: <juliem@selway.umd.edu> or at her toll-free phone number: 1-877-712-3777.

Don't forget the joint meeting of the 7th International Conference on Coelenterate Biology (ICCB) and the European Meeting of the International Society for Reef Studies (**ISRS**). See **ISRS NEWS** or <http://www.congress.co.il/iccb-isrs/> for more details!

Student Opportunities in Wallacea

If the idea of three to five months of reef related research in Indonesia appeals to you, read on. You could join WWF-Wallacea's reef fisheries project and help combat the threat of over exploitation in the Wallacea Ecoregion of Indonesia. The project aims to create tools and incentives for sustainable management of reef fisheries.

General background to the WWF-Wallacea fisheries project

Exploitation of fishery resources in Indonesia poses an increasing threat to the sustainability of marine and coastal organisms and their habitats. WWF-Wallacea has initiated a reef fisheries project with the major objective of creating tools and incentives for well-managed coral reef fisheries in the Wallacea Ecoregion of Indonesia. Knowledge and understanding of biological, technical and socio-economic features of reef fisheries is necessary in order to find consistent arguments for management of fishery resources. You will help us gather this knowledge through a number of assessments (most of which entail fieldwork), including testing the suitability of assessments for groups with different backgrounds such as fisher communities and fisheries officers. WWF-Wallacea hopes to establish good relationships with local communities and organisations. Ideally these relationships will result in shared responsibility for sustaining the monitoring and the status of the various fishery resources. Local participants may be trained to continue monitoring the result of eventual management interventions.

Field studies

A total of six focal areas are selected for the project: West Bali, North Sulawesi, East Kalimantan, Nusa Tenggara Timor, Aru Islands and South Sulawesi. Assessments will provide information for each area on:

- The condition of reef fish stocks
- The status of key habitats
- The location of reef fish spawning sites
- The type of threats to fish stocks and habitats

- The threats to ecosystem functions
- The indicators of disturbance, degradation and recovery
- The impact of global climate change on reef fish stocks and their habitats
- The distribution of reef fishery effort
- The threats to stocks and habitats from specific fishing gear
- The catch composition per gear
- The social organisation of fisher communities
- The economic arguments for fishing behaviour
- The trade chain of fisheries products and its finance flow
- The management capacity of institutions and communities
- The market structure for reef fishery products

Data will be collected through underwater visual census, interviews, frame surveys, and different rapid assessment techniques.

Desk studies

A number of desk studies are also planned to review and analyse information on:

- The status of existing protection measures (E-Kalimantan, N-Sulawesi)
- The threats to habitat and ecosystems from reef fisheries
- Marine diversity patterns and key oceanographic features
- The impact of ENSO events on key reef fisheries and reef ecosystems
- The threat of and economic damage from destructive fishing practices and over-exploitation of reef fish stocks
- The suitability of various monitoring methods for use by experts, communities and officials.
- The suitability of monitoring methods for use by groups with different backgrounds

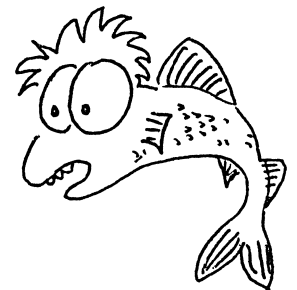
These studies will draw upon literature, lessons learned by WWF and other organisations from marine and coastal zone projects in Indonesia, and on results from the field assessments.

The work will take place between January 2001 – December 2001. Indonesian and foreign students will have an opportunity to participate in the field studies during periods of 3-5 months in Indonesia. You will gain experience working in the field within a multi-disciplinary and multi-national environment. Help is available with logistics and organisation of paperwork needed to study in Indonesia. During the fieldwork periods, accommodation and field materials will be provided. For the remaining period the team will assist you in finding affordable accommodation. Technical supervision will be provided during the entire period. Help with data analysis and reporting will be provided when needed. For desk studies you may not be required to visit Indonesia and work in the field. However there may opportunities to do so in agreement with WWF-Wallacea and your own supervisors.

Requirements

To participate in the biological assessments you must have sufficient and official dive training. You need to be computer literate and in the final phase of your studies. You need to find your own funds for travel to Indonesia and to support yourself when not in the field.

For further information or to express an interest, send a CV and cover letter indicating the field of interest and proposed period of participation to Dr. Lida Pet-Soede at Email <Lidapet@attglobal.net> or Fax +62 361 236866 WWF-Wallacea is an Indonesian-based NGO, striving to protect Indonesia's rich terrestrial and marine biodiversity. More information at www.wallacea.org



Compleat Reef Encounter

'A sensitive and sensible development'

Those were the words of Britain's Prince Andrew as he laid a foundation stone for the new Beef Island International Airport terminal building, British Virgin Islands, Eastern Caribbean. The development, close to several important reefs areas, exposed 20 acres of soil to the wind and rain at the beginning of the 2000 hurricane season. Astoundingly, despite funding from international agencies such as the Caribbean Development Bank and the European Economic Community, no erosion or sedimentation control measures were put in place for this >10 million dollar project until pressure was brought to bear by the Association of Reef Keepers, a local NGO. As if that were not enough, 30,000 m³ of topsoil were piled up from the 'cut and fill' operation instead of the 7000m³ expected. Topsoil is a valuable commodity in BVI, and the government and contractors began months of arguments over who owned this resource. Meanwhile, 'Mount Topsoil' reared above the existing airport and was slowly colonized by sunflowers and marijuana plants sown there by a local artist.

Within a couple of weeks of the Prince's visit, the foundation stone was unceremoniously ripped out to make way for the real foundations (the plaque awaits remounting somewhere more visible). The engineers dumped the stone at the back of the site. It was last seen in a ditch where, appropriately enough, it was holding down a section of recently installed silt curtain. Credit where it's due – after pressure from conservationists, the BVI government spent an estimated 500,000 dollars on environmental controls. Perhaps it is possible to move mountains after all.

Source—Association of Reefkeepers website

6th Indo-Pacific Fish Conference, 21st-25th May 2001

The 6th Indo-Pacific Fish Conference will be held in Durban, South Africa in May 2001. The conference will cater for most aspects of the ichthyology of Indo-Pacific fishes (e.g., systematics, evolution, genetics, ecology, biology, behaviour and biogeography). Symposia with the usual themes of pelagic, deep-sea, chondrichthyan, larval, coastal, reef and estuarine fishes will be held. In addition, symposia on marine aquarium fishes, systematics of western Indian Ocean fishes, diversity of reproductive mechanisms in fishes, fish tagging and conservation of Indo-Pacific fish diversity by use of marine protected areas, are planned.

You can register on-line at <http://www.seaworld.org.za/>. Register by 28th February at a cost of US\$300 - full participant, \$250 - students and \$100 - accompanying persons.

Fees can be paid by one of the following methods:

1. Bank transfer to: Oceanographic Research Institute, Standard Bank of South Africa, Beach branch code: 04292601, Account Number: 05 855 7601 - 003
2. Bank draft to: Oceanographic Research Institute
3. International money order to: Oceanographic Research Institute
4. By credit card (VISA, MASTER CARD and DINER'S CLUB only). Note that a surcharge of between 3 and 5% will be levied on all credit card payments. Cancellations should be confirmed by fax or

email. Note that cancellation between 1st March and 30th April will incur a charge of 10% and no refund is available after 30th April.

Registration desks will be available on Sunday 20th May at the Oceanographic Research Institute which is close to the conference venue - the Holiday Inn Durban Elangeni Conference Centre on the Durban beachfront.

The conference will include oral and poster presentations. The abstract deadline was 30th of November, but contact Dr. Lynnath Beckley (address below) if you want to ask about late submissions. Abstracts must be submitted in advance to Dr. Beckley in RTF or Word 97 (further details on the website). Please indicate on the registration form whether you intend to submit your paper for publication in the proceedings, which will be a special issue of *Marine and Freshwater Research*. Proceedings costs are included in the registration fee and each delegate will receive a copy in due course. Presentations will not be included in the scientific programme without payment of the registration fee by 28th February 2001.

6th IPFC secretariat, Oceanographic Research Institute, P.O. Box 10712, Marine Parade, 4056, Durban, South Africa. Tel: +27 31 337 3536 Fax: +27 31 337 21 32. Email <seaworld@dbn.lia.net> Web page: www.seaworld.org.za

Second International Conference on Marine Bioinvasions, 9th-11th April 2001

<http://massbay.mit.edu/exoticspecies/conf2/>

The conference focus is on the incidence, effects, and management of exotic species in coastal, estuarine, and marine ecosystems. The meeting seeks presentations from current scientific research as well as management theories and practices that will contribute to answering two questions:

- How and under what circumstances do invasive species succeed in the marine and estuarine environment?
- How can we better predict and respond to marine bioinvasions?

You are invited to share your research and experiences (posters and oral presentations) with others

striving to understand, monitor, and manage invading species. Selected papers from the conference will be published in *Biological Invasions*. Abstracts from all participants will be published in the conference program.

Register before 28th February for \$225 full participant or \$125 student. After February, prices are \$275 and \$125 respectively.

See the webpage for more details, or contact Dr. Judith Pederson, MIT Sea Grant College Program, Massachusetts Institute of Technology, 292 Main St. E38-300, Cambridge, MA 02139, Email <jpederso@mit.edu>



REEF ENCOUNTER No. 28 December 2000

Newsletter of the International Society for Reef Studies

Editor Maggie Watson
Associate Editor Kristian Teleki
Contributing Editor Maria João Rodrigues

ReefEncounter@bigfoot.com

CONTENTS

- 03 Editorial**
- 03 ISRS Comment**
From the President *T. Done*
- 04 ISRS News**
ISRS election results.
Joint ICCB and **ISRS** meeting in Eilat, October 2001
STAP award for **ISRS** conference
Student Dellowship 2001
Financial support for ISRS membership. *B. Brown*
Large-scale Dynamics of Coral Reef Systems. *R. Buddemeier*
Pew Charitable Trusts Award
- 10 News**
Georg Scheer celebrates 90th Birthday. *H. Schuhmacher, H. Mergner*
Reefs at Risk in Southeast Asia. *L. Burke*
Remote Sensing Zooms in on Coral Reefs. *M. Watson*
Shoals Studies Succession. *M. Callow, R. Robinson*
- 13 Currents**
Listening to the problem. *S. Wilson, G. Woodman*
Barrel Sponge Bows Out. *I. Nagelkerken, L. Aerts, L. Pors*
AGRRA assesses Jamaican Reefs. *K. Klomp*
- 17 Spynapper**
More crazy convictions
- 18 Features**
Seeing the Global Oceans from the Reefs. *C.M. Eakin, M.N. Evans*
- 20 Country Profile**
Coral Assemblages of Dominica, West Indies: An Introduction. *S. Stiener*

President

Terry Done, Australian Institute of Marine Science, PMB #3 Mail Centre, Townsville Qld 4810, Australia Tel. 61 7 47 534 344 Fax 61 7 47 275 852 Email: tdone@aims.gov.au

Vice President

Barbara Brown, Centre for Tropical Coastal Management Studies, Dept. Marine Sciences, Ridley Building, University of Newcastle NE1 7RU. UK. Tel. + 44 (0)191 22 6659 Fax. + 44 (0)191 222 7891 Email: 101515.1267@compuserve.com

Treasurer

Daphne Fautin, Kansas Geological Survey, Univ. of Kansas, Lawrence, Kansas 66045-2106, USA Tel. (1) 785 864 3965 Fax. (1) 785 864 5317 Email: fautin@ukans.edu

Corresponding Secretary

Richard Aronson, Dauphin Island Sea Lab., P.O. Box 369-370, Dauphin Island, AL 36528, USA. Tel. 334-861-7567 Fax. 334-861-7540 Email: raronson@jaguar1.usouthal.edu

Recording Secretary

Steven Miller, Natl Undersea Res. Ctr, 514 Caribbean Drive, Key Largo, Florida 33037, USA Tel. 305 451 0233 Fax. 305 453 9719 Email: smiller@gate.net

Newsletter Editors

M. Watson (British Virgin Islands), K. Teleki (UK), M. J. Rodrigues (Mozambique)

Coral Reefs

Coral Reefs: Managing Editor: T. Hughes (Austr.), Geological Editor: R. Dodge (USA), Biological Editor: A. Szmant (USA), Environmental Editor: B. Hatcher (Canada), Ecological Editor: P. Sale (Canada).

Council

R. Bak (Netherlands), Loke-Ming Chou (Singapore), H. Guzman (Panama), G. Hodgson (Hong Kong), T. Hughes (Austr.), M. Pichon (France), N. Polunin (UK), D. Potts (USA), R. Richmond (Guam), P. Sammarco (USA), Suharsono (Indonesia), B. Thomassin (France), C. Wallace (Austr.), M. Watson (BVI)

ISRS Sustaining Members

M. Shulman, W.E. Kiene, A.J. Hooten, S. Miller, R.N. Ginsburg, R. Halley, D. G. Fautin & R.W. Buddemeier, D.R. Stoddart, K. Yamazato, T. McClanahan & N. Muthiga, S. Wells, H. Holden, L. Chen, B.E. Brown & R. Dunne, Y. Maeda

ISRS Honorary Members

J. I. Tracey Jr, J. Connell, J. E. Randall, D. W. Kinsey, G. Scheer, S. Kawaguti

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

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

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

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

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

Reef Encounter is produced by Allen Press, Inc., 1041 New Hampshire, Lawrence, KS 66044, USA. Printed on recycled paper.

- 23 Meeting Reports**
Science and Conservation of Deep Sea Corals. *M.J. Roberts*
- 25 Bookshelf**
GCRMN Socioeconomic Survey Manual.
Carnonate Platform Systems: components and interactions.
- 26 Book Review**
Caribbean Reef Plants. *Reviewed by G. Rosenberg*
Tales from Tubbataha. *Reviewed by A.A. Yuson Taken*
- 29 Who's Who**
Mahonia na Dari. *S. Paterson*
- 31 Diary**
Marine Conservation Biology June 2001
- 32 Announcements**
Student opportunities in Wallacea
- 33 Compleat Reef Encounter**
'A sensible and sensitive development'
- 35 Correction**

CORRECTION

The article *Fish kill in the South Eastern Caribbean Reef Encounter 26* p.7 should have referred to sciaenids rather than siganids (which are found only in the Indo-Pacific). Thanks to Jeff Leis for his polite inquiry about this 'important new range extension'!

Several attendees of the 9ICRS were onboard Singapore Air Flight 006 from Taipei to Los Angeles which crashed on takeoff in late October. As Reef Encounter goes to press we are not sure how many friends and colleagues were aboard, or the details of who survived. However, one confirmed loss was Ms. Ladan Mohajerani of the Reef Check program. Sincere sympathies go out to all those touched by this tragic event.

COPY DEADLINE FOR REEF ENCOUNTER 29
(due out Mar. 01) IS JAN 1 2001