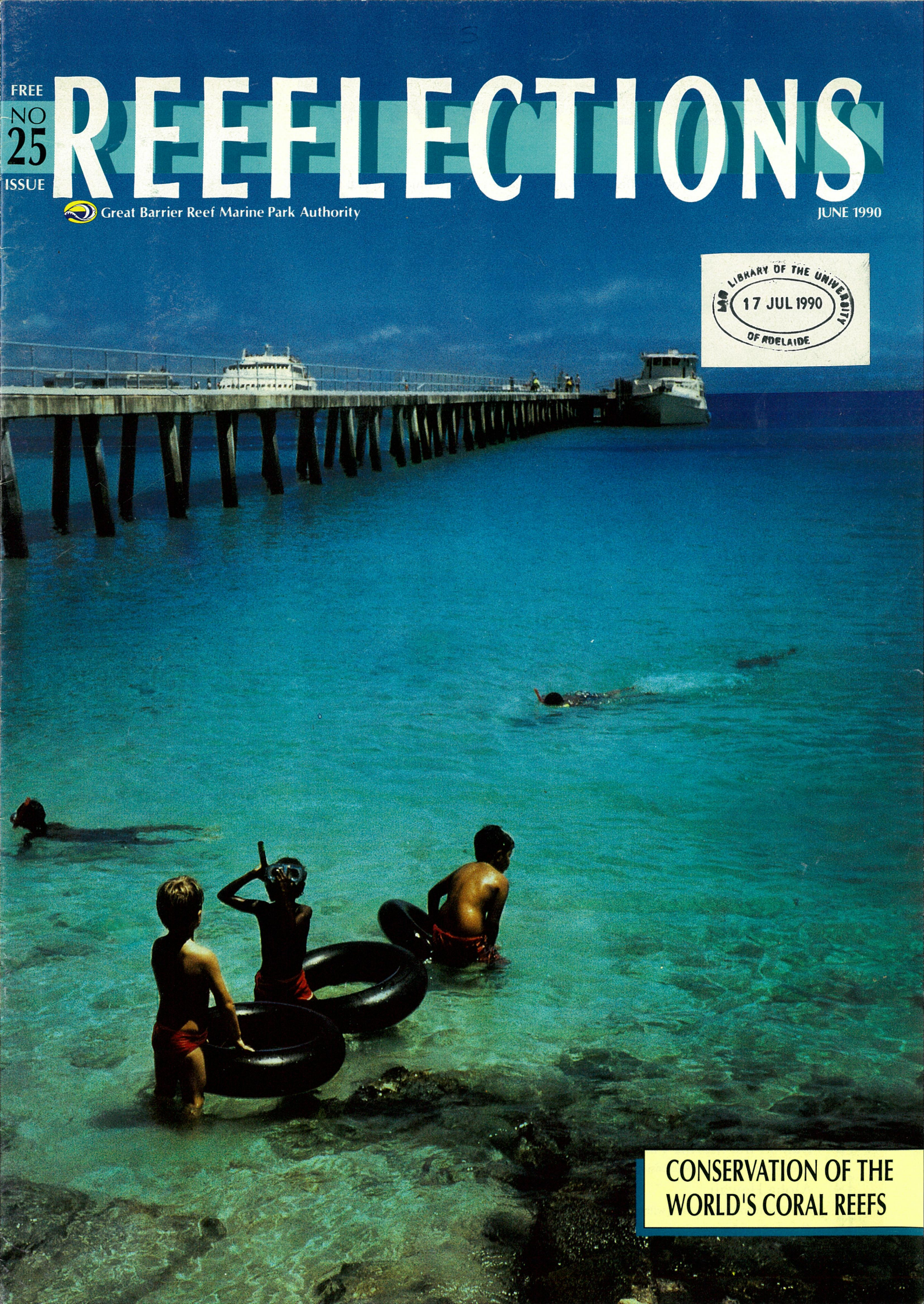
FREE

NO 25 ISSUE

REEFLECTIONS

Great Barrier Reef Marine Park Authority

JUNE 1990



CONSERVATION OF THE WORLD'S CORAL REEFS

NO 25

REEFLECTIONS

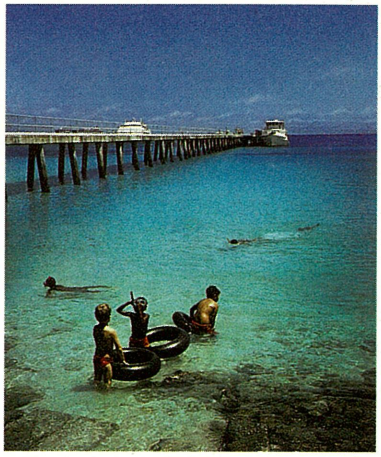
ISSN 0314-6510

This first issue of our new look **Reeflections** for the nineties takes a timely look at the protection of coral reefs and marine park management around the world. Back in September 1977, the first **Reeflections** announced the steps being taken to manage people's use of the reefs in the newly established Great Barrier Reef Marine Park.

Over the past decade, this huge Marine Park has been zoned for management and, as interest in its progress has grown both in Australia and overseas, so has the readership of **Reeflections.** We have reached a 'reef mark' where we can take advantage of technological advances to bring you the beauty and diversity of the Reef in living colour without major cost increase.

The environment, both global and local, is now a major focus of attention. The **World Conservation Strategy** released in 1980 is currently being revised. At home, the **1990 Year Book Australia** features a nature and environment theme and the Prime Minister issued a major statement on the environment 'Our Country Our Future' in July 1989. Australia has a growing international reputation in conservation and sustainable use of marine resources as a consequence of setting up and managing the Great Barrier Reef Marine Park, the world's largest marine protected area. GBRMPA continues to receive requests from other countries for assistance in developing marine conservation programs.

Chairman, Graeme Kelleher, has provided assistance in Indonesia, Belize and Canada. Mr Kelleher has been president of the Australian Committee for the World Conservation Union (UCN) and vice-chairman (Marine) of the Commission of National Parks and Protected areas of the International Union for the Conservation of Nature (IUCN). GBRMPA's chief planning officer, Richard Kenchington, has worked with the Government of Ecuador to develop a marine protected area plan for the Galapagos Islands, with the Republic of the Maldives, and with the Malaysian Department of Fisheries in training marine park managers. Planning and Management officer Peter McGinnity provided assistance in India in 1989. In April 1990, Planning and Management officer John Baldwin helped the French Polynesians with a marine protected area plan for Bora Bora Lagoon. Dan Claasen and Dr Leon Zann have left GBRMPA to work as advisers with the United Nations, assisting countries in the South Pacific to manage their marine resources.



Front Cover: Children from the Ngoonbi Co-op Society and the Freshwater Family Group Home in Cairns enjoy their first snorkelling experiences on the reef at Green Island. More on this community initiative on page 7.

Reeflections is published twice a year by the Great Barrier Reef Marine Park Authority. It does not necessarily represent the views of the Authority.

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Readers are invited to submit material for publication. Material may be reproduced with acknowledgment.The theme for next issue is human impact on the Reef.

CONTENTS

CAIRNS ZONING UPDATE

The period of public response to the proposed new zoning plan for the Cairns Section ended on the 28 February. The draft plan was released for comment in November 1989.

Project Coordinator for the GBRMPA planning team, Jon Day, said the team had received 710 written representations plus a further 185 form letters or petitions. Most respondents chose to use the mail-back brochure but submissions ranged from short letters to a 50-page document.

The planning team are now analysing all the comments before preparing a revised plan for the Authority to consider.

Mr Day said it was too early to predict how the revised plan would look but it was likely the planning team would recommend a number of changes to the Authority.

The current Cairns Zoning Plan will stay in place until the revised plan receives Parliamentary approval, expected to be early in 1991.

QUICKSILVER HELPS REEF AQUARIUM

A sponsorship of $50,000 has been made by Quicksilver Connections to the Great Barrier Reef Aquarium. At the Aquarium in January, Quicksilver Connections' managing director, Mr Mike Burgess, and GBRMPA chairman, Mr Graeme Kelleher, jointly unveiled a plaque acknowledging Quicksilver's $50,000 sponsorship.

To be paid over a five-year period, the sponsorship has enabled the Aquarium to fit out and equip the Discovery Room with specimen tanks, microscopes and display materials.

As the name implies, the Discovery Room is a reef-related classroom where visiting children and adults can learn more about the intricate wonders of the Reef.

Mr Kelleher congratulated Quicksilver Connections on its responsible attitude to the conservation of the Great Barrier Reef.

'Apart from its generous support of the Aquarium, Quicksilver's own education programs conducted on board its vessels are a model which should be followed by other operators,' Mr Kelleher said.

CROWN - OF - THORNS STARFISH - THE LATEST SURVEYS

Only two crown- of- thorns starfish were found during the latest survey of 45 reefs between Lizard Island and Innisfail.

The survey, carried out by the Australian Institute of Marine Science (AIMS) between November 1989 and January 1990, reported only slight coral damage to the reefs looked at.

About half of the reefs surveyed were affected by substantial numbers of crown-of-thorns starfish between 1979 and 1984. One of the worst hit reefs, Green Island, had an estimated 1.5 million starfish during the peak of the outbreak there in 1980. Green Island and many other reefs are now showing noticeable regrowth of corals.

No one is sure where the starfish which have plagued northern reefs have gone. Dr Peter Moran, senior scientist in charge of crown- of- thorns research at AIMS, presumes the adults die as their food supply runs low but he is still mystified as to why the surveys found no trace of dead starfish.

One possible explanation is that the starfish are being killed by a parasite similar to the sporozoan which wiped out huge colonies of the creatures in Fiji.

It is no longer thought that the same starfish move from reef to reef because few are picked up in fishing nets. The theory is that their larvae are washed south by the prevailing currents to set up new colonies.

Crown-of-thorns starfish outbreaks have been reported over recent months from reefs between Ayr and the Whitsundays. The AIMS survey team will be assessing the situation in that area in April.

CHAIRMAN REAPPOINTED

In December 1989, the Minister for the Environment, Senator Richardson, announced the reappointment of Mr Graeme Kelleher as GBRMPA Chairman for the next five years.

Senator Richardson said the Authority had made remarkable achievements under the leadership of Mr Kelleher who was first appointed in 1979. Under his chairmanship, a detailed management regime for the entire Marine Park, an area of 348,000 square kilometres, has been completed. 'Mr Kelleher has helped establish a world-class marine park of which Australia can be proud,' Senator Richardson said.

MARRYING ECONOMICS & ECOLOGY

The 'most important piece of legislation of the 1980s' was introduced into the Commonwealth Parliament in 1989. The Resource Assessment Commission Bill, according to Dr Tor Hundloe (President of the Environment Institute of Australia), is the 'first clear indication that the Australian Government had recognised the fact that economic growth and environmental protection had to go hand-in-hand and not be seen as conflicting social goals'.

Dr Hundloe said the Bill is the first response by the Australian Government to the United Nations call for all nations to work towards sustainable development.
The Resource Assessment Commission Bill will introduce a social cost-benefit analysis system to consider the total positive and negative environmental and economic effects of tax and subsidy policies.

Dr Hundloe said that the environment profession supported the concept underlying the Bill and hoped that industry, conservation bodies and state and local governments would support the Bill. Further information is available from Dr Tor Hundloe, President, Environment Institute of Australia, telephone (07) 275 7444. (from Australian Parks and Recreation Journal, Sept 1989)

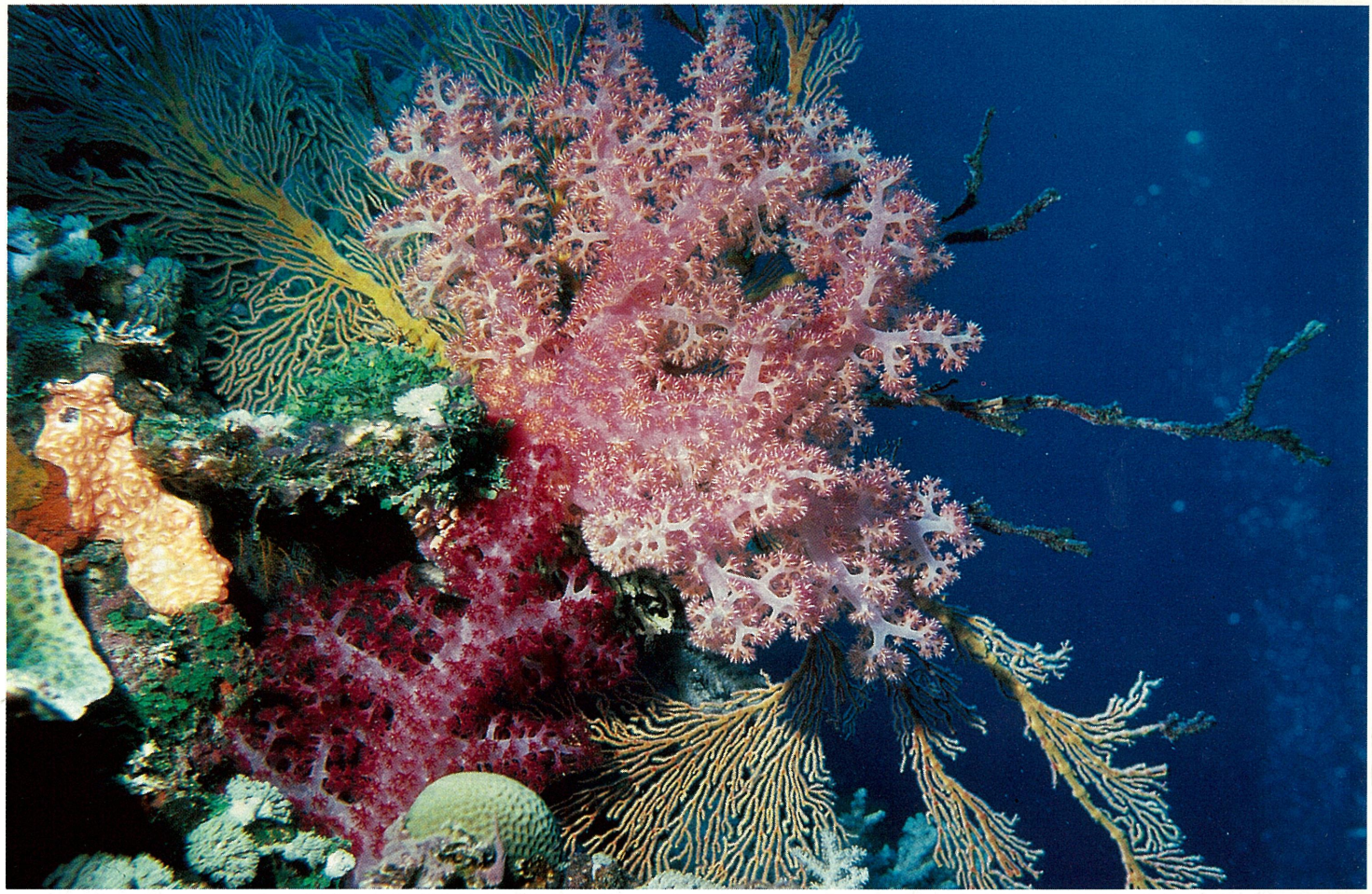
MEETINGS / CONFERENCES

ISLANDS IN THE SEA - See page 14.

INTERNATIONAL ENVIRONMENTAL EDUCATION CONFERENCE
23-28 Sept. 1990 - Adelaide University.
Further information from Rick Sautter,
SA Department of Environment and Planning
on(08)216 7840, Fax (08) 231 9058

MANAGING CONFLICT IN PARKS AND RECREATION
30 Sept.-4 Oct. 1990 - Adelaide Convention Centre
The International Federation of Parks and Recreation Administration First Pacific Region Conference, also the 1990 Royal Australian Institute of Parks and Recreation National Conference. Further information from LRM Australia, Leisure and Recreation Management Consultants on (08) 268 7000, Fax (08) 268 7010.

THE REEF



AND

CONSERVATION STRATEGIES

GRAEME KELLEHER

The World Conservation Strategy was developed in 1980 because of growing international awareness that human activities are progressively reducing the earth's life-supporting capacity and that conservation of living resources is a prerequisite for **sustainable development**. It is currently being revised and a new version is in preparation for the nineties.

The 1980 Strategy was endorsed by many nations, including Australia. The basic proposition of the World Conservation Strategy (WCS) is that:

'Human beings, in their quest for economic development and enjoyment of the riches of nature, must come to terms with the reality of resource limitations and the carrying capacities of ecosystems, and must take account of the needs of future generations. This is the message of conservation. For if the object of development is to provide for social and economic welfare, the object of conservation is to ensure Earth's capacity to sustain development and to support all life.' (WCS p.1)

Essential action components of the strategy are to encourage community participation and to educate the community about the interdependence of sustainable development and conservation. (WCS section 13)

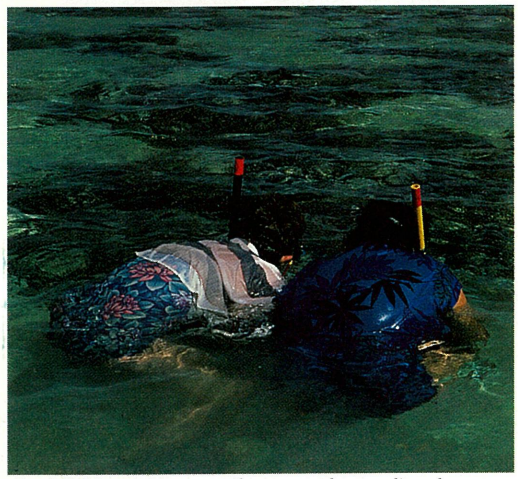
The Great Barrier Reef: Conservation and Management

The concept that development should be sustainable is not new. It has existed in virtually every group of humans who have lived and depended on the earth's natural bounty. One of the most important factors in eroding the commitment to sustainability in theory and practice in the 20th century has been the application of modern economic analysis incorporating the methods of benefit-cost analysis, net present worth and discount rates. Taken together, these methods tend to lead to decisions which state tacitly or explicitly that anything that happens more than twenty years hence is irrelevant.

The Great Barrier Reef Marine Park Act was one of the first pieces of legislation in the world to apply the concept of sustainable development to the management of a large natural area.

So far the approach has been successful and over-exploitation of the Reef has largely been prevented.

We are entering a new and more difficult phase. Direct use of the Marine Park is increasing; government expenditure as a proportion of Gross Domestic Product is decreasing; there are proportionately fewer resources for management; management agencies are being forced to recover costs from users who are reluctant to pay; and there is evidence that nutrient levels in the waters of some parts of the Marine Park are at times above those at which some corals can thrive.



Reef field activities contribute to understanding the Reef and the need for its conservation.

The next ten years will determine whether there is sufficient commitment in the minds and hearts of Australians to ensure that the Reef is protected from insidious degradation.

The Marine Park and Zoning System

The Great Barrier Reef Marine Park is not a National Park. It is a multiple-use protected area, fitting the definition of Category VIII of the classification system used by the International Union for the Conservation of Nature and Natural Resources (IUCN). The Reef has been inscribed on the World Heritage List as a natural site (Category X).

Through the use of zoning, conflicting activities are separated, areas are provided which are suitable for particular activities and some areas are protected from use. Levels of protection within the Park vary from almost complete absence of restriction on activity in some zones to zones within which almost no human activities are permitted. The only activities which are prohibited throughout the Park are oil exploration, mining (other than for approved research purposes), littering, spearfishing with scuba and the taking of large specimens of certain species of fish. The zones are fixed during the life of a zoning plan (generally five years). They are complemented by generally smaller areas which give special protection from time to time to animal breeding or nesting sites, to sites in general use and other zones which are required to be protected to allow appreciation of nature free from fishing or collecting and to sites suitable for scientific research.

Tourism

There has been a dramatic increase in the use of the Marine Park by tourists. The existing zoning system, which focuses on fishing, is proving inadequate. There is increasing competition for tourism use of particular sites. Usually these sites are near major areas of coastal development (e.g. Cairns or Townsville) or have particluar attributes which make them suitable for tourism (e.g. the Whitsunday Islands).Major Reef interest groups have agreed in principle to the need to incorporate a tourism strategy into the zoning system. This strategy would identify those areas which are particularly suited to tourism development and those that should be retained in their natural state, undisturbed by such development.The strategy is being implemented initially in the rezoning of the Cairns Section of the Marine Park. It will be extended to the other three sections as they are rezoned during the next five years.The major change proposed is to divide each of the zones other than the Preservation Zone into two categories:

Category 1 - no structures (for example, floating hotels, pontoons or mariculture) will be permitted.

Category 2 - such structures are permitted provided they meet environmental guidelines. A permit is required.

The adoption of the proposed new zoning scheme would allow a tourism strategy to be developed and implemented for the whole Reef, thereby ensuring that it will not become dotted with tourist and other structures while, at the same time, providing for careful development on reefs which are suitable for that purpose.

Sustainable Fishing

The major Reef fishery, prawn trawling, is experiencing declining catch-effort ratios. This problem is being addressed in two main ways.

Firstly, through the zoning system, some areas of the Marine Park are closed to trawling. They act as reference areas so that the long-term effects of trawling can be determined. They also protect the occupying creatures.

Secondly, the fishing industry itself is taking action to limit the total effort expended in the fishery. This includes the traditional fisheries management practices of seasonal closures and the protection of nursery areas.

Additionally, GBRMPA is working with the commercial fishing industry in a major study of the effects of all kinds of fishing on the reef ecosystem.

Crown-of-Thorns Starfish

The Federal Government and its agencies have already spent more than $5m on research into the starfish. We cannot yet, however, unequivocally answer the question of whether human activity is affecting the intensity and frequency of population outbreaks.

The sooner we can resolve this issue, the better. Until then, GBRMPA will maintain its existing policies of limiting control of outbreaks to areas of particular value to tourism or to science, and of pursuing support for continuing research on the starfish and its role in the Reef system.

Pollution Control

Monitoring has shown that the levels of toxic chemicals in virtually the whole Reef Region are very low - close to the limits of detectability. Such chemicals are not likely to be a problem in the medium term but monitoring will be continued.There is an ever-present risk of an oil spill in the Great Barrier Reef. Precautions taken to minimise this risk include the recommendation by the International Maritime Organisation that all ships using the Reef waters should be piloted, and the development of an oil spill contingency plan called 'Reefplan'. GBRMPA will continue to work with other agencies to reduce the risk of oil spills and to improve the response capacity to such events.

The great challenge

A more insidious, but potentially no less serious, concern is increases in nitrogen and phosphorus in Reef waters. Reef building corals are very vulnerable to increases in the levels of these nutrients. GBRMPA is already spending about a quarter of its annual research funds to define the seriousness of the problem.

We are seeking other financial support to establish a comprehensive Reef-wide monitoring program and to develop a complete understanding of the origins of these nutrients so that corrective action can be taken if necessary.

I believe that protection of the Great Barrier Reef from increasing nutrient levels may be the greatest challenge facing GBRMPA in the next two decades.

REEF ACTIVITIES

Lesley Murdoch

Exploration of management and conservation issues associated with the Great Barrier Reef Marine Park can be used to develop student understanding of key concepts stressed in the World and National Conservation Strategies. These concepts include the preservation of genetic diversity and the sustainable utilisation of species and ecosystems. An approach for analysing issues should begin with an identification of management questions and problems and research and data collection. It should include an analysis of values held by the different groups involved and allow for students to determine their own value positions.

Values Education

Various other strategies for clarifying and developing values are featured in **Project Reef-Ed,** a major curriculum project published by the Great Barrier Reef Marine Park Authority in 1988:

> 'In Great Barrier Reef studies, students are almost inevitably confronted with the environmental effects of actions that are based on people's values and with environmental issues in which values are a significant factor. These experiences can help students to become aware of the important role values and attitudes play in shaping people's decision-making and other behaviour. Students can be provided with opportunities to clarify and develop their own values in relation to environmental matters and they can develop enhanced skills in evaluation, the thinking process in which values are applied.
> A direct focus on values and attitudes can be seen as a critical part of any reef education program. Many of the now widely used strategies and techniques of values education can be applied readily to the reef system. A reef program can work towards developing a particular set of values and attitudes and can highlight various processes which involve values.'

Techniques employed in values education approaches include games, simulations, role play and techniques such as Likert scales, semantic differentials and ranking of choices. In the treatment of controversial issues, simulation and role play have proved to be particularly useful.

Activities from**Reef Ed** exemplifying particular values education techniques are:

- Simulation/Role Play
  User roles and zoning game (No. 143)
  Showing off (No. 147)
- Likert scale
  Decisions! Decisions! (No. 141)
- Semantic differential
  How do I feel? (No. 125)
  Reefscape aesthetics (No. 126)
  Arousal evaluation (No. 127)

Environmental Ethics

Environmental education and community involvement is one of the eight basic programs in the Conservation Strategy and in many ways provides the foundation for all others.
The notion that education for the environment should be a fundamental aspect of environmental education has led to great interest in values education strategies among environmental educators. It is widely recognised that merely increasing a person's knowledge about the environment is not sufficient to engender attitudes of environmental concern or ensure appropriate action towards the environment.
Many environmental educators now urge that greater direct emphasis should be given to education for particular conservation values and to development of an environmental ethic. Although attempts to instil values are often avoided by teachers in environmental education for fear of attracting the label 'indoctrination', the process of instilling is not regarded as a controversial one in the community when it involves values on which there is community consensus. With the publication of consensus statements such as the World Conservation Strategy and the National Conservation Strategy for Australia, it will perhaps be possible for teachers in the near future to identify more easily conservation values which are widely endorsed and which therefore seem appropriate to being fostered in the course of school education.

Reef-Ed Project Manager Lesley Murdoch accepted the AGTA award on behalf of GBRMPA and the project team of Ann Byrnes (Coordinator), Philip King, Jack Marsh, Bob Moffatt, Janet Oliver and Antoinette O'Neill.

PROJECT REEF-ED WINS SECOND AWARD

In early 1989 **Project Reef-Ed** was recognised as the best EXTERNAL PUBLICATION in the Society of Business Communicators' Serif Awards. At the January 1990 conference of the Australian Geography Teachers Association, **Project Reef-Ed** won the GOVERNMENT PUBLICATIONS category.
The judging committee commented:

> 'While **Project Reef-Ed** is primarily intended for use in the field by students in Years 10 to 12, in and around the Great Barrier Reef Marine Park, its design and overall quality make it a model for all geography teachers interested in the presentation and execution of field trips.
>
> The content is organised according to a useful conceptual framework, with each of the 159 separate activities stating the aims and requisites of the activity, and the concepts, skills and attitudes to be developed. Further practical helpful information includes the expected duration of the activity, the nature of the location and safety hints.
>
> Illustrations are carefully designed to provide information and to be used as field sheets by students. The text is clear and its black and white printing makes it suitable for photocopying.
>
> The book is specifically about the Great Barrier Reef and would be of most direct use for those able to plan visits there. However, this is an excellent and extremely practical publication, and the Committee believes that the format will provide a helpful guide to the design of student fieldwork in other parts of Australia.'

Project Reef Ed is available from the Great Barrier Reef Aquarium Shop. Refer to Catalogue for details.

A day on Green Island

Eighty specially selected members of the Cairns community had the opportunity to appreciate and enjoy the Great Barrier Reef during March 1990.

Millions of tourists from all over the world visit the Great Barrier Reef. However many people who live close to the reef, for various reasons, have never had the opportunity to experience its wonders.

Aboriginals and Torres Strait Islanders and other community groups including the aged, disabled, intellectually handicapped and young people took part in a reef trip to Green Island. Activities included snorkelling, a glass bottom boat ride, an island walk, a visit to the Underwater Observatory, and Marineland Melanesia.

Cairns Community Reef Experience Project

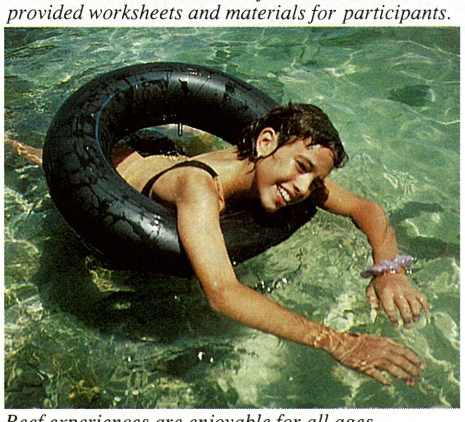
The program was organised by Ms Louise Mabbutt, a Cairns Reef Naturalist who is widely experienced in organising reef interpretation programs and who conducted the very successful Reef Awareness Program for the Cairns NQ Games in 1988.

'Not only did participants have a day experiencing the reef first hand but, before the outing, they also attended an audio visual presentation of highlights of the Great Barrier Reef, and its need for conservation,' said Lesley Murdoch, Education and Information Officer with the Great Barrier Reef Marine Park Authority which sponsored the educational reef trips and the consultancy program.

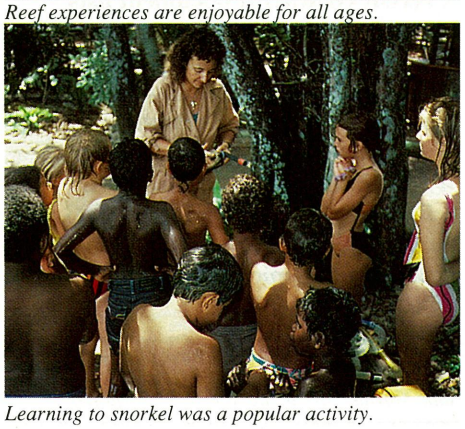
'This was a unique community initiative involving the cooperation of local, state and national organisations. SPAN (Social Planning Around Neighbourhoods) gave advice on selecting the participants for the reef trips subsidised by local tourist operator Great Adventures. Queensland National Parks and Wildlife Service also supported the project.'

'In Townsville, there is the Great Barrier Reef Wonderland Aquarium, "the coral reef on land" which makes a reef visit within easy access for everyone. This Cairns project is the first time that interpretive and field activities have been developed for special groups. This is a pilot program and its success will hopefully encourage other North Queensland community organisations to work together in providing similar reef experiences and activities.'

GBRMPA's Education and Information Section provided worksheets and materials for participants.

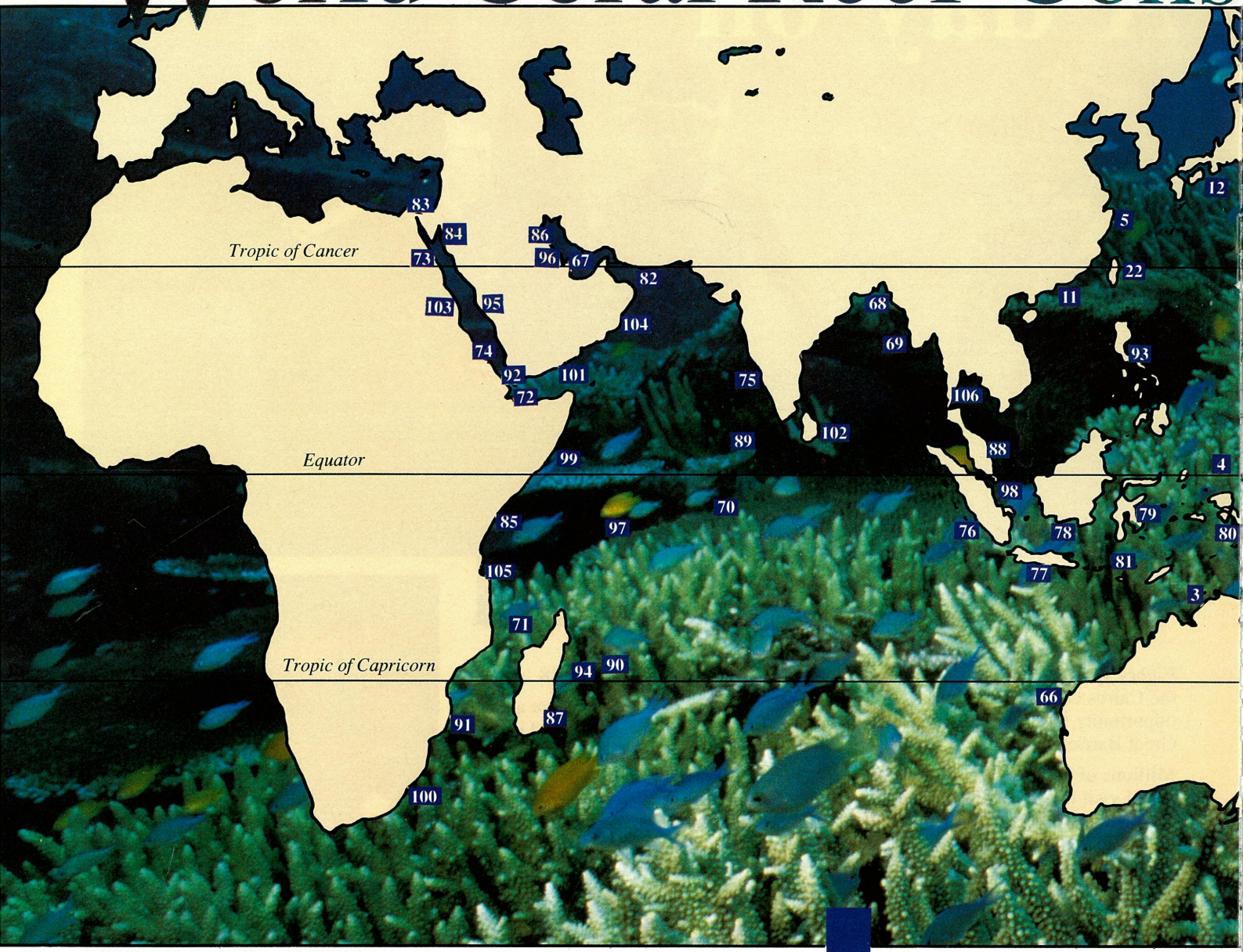


Reef experiences are enjoyable for all ages.



Learning to snorkel was a popular activity.

World Coral Reef Cons



Our map is compiled from information in *Coral Reefs of the World* Volumes 1 to 3 published by the United Nations Environment Programme and the International Union for Conservation of Nature and Natural Resources in 1988. These volumes include an inventory of parks and reserves containing coral reefs and the threats to reefs.

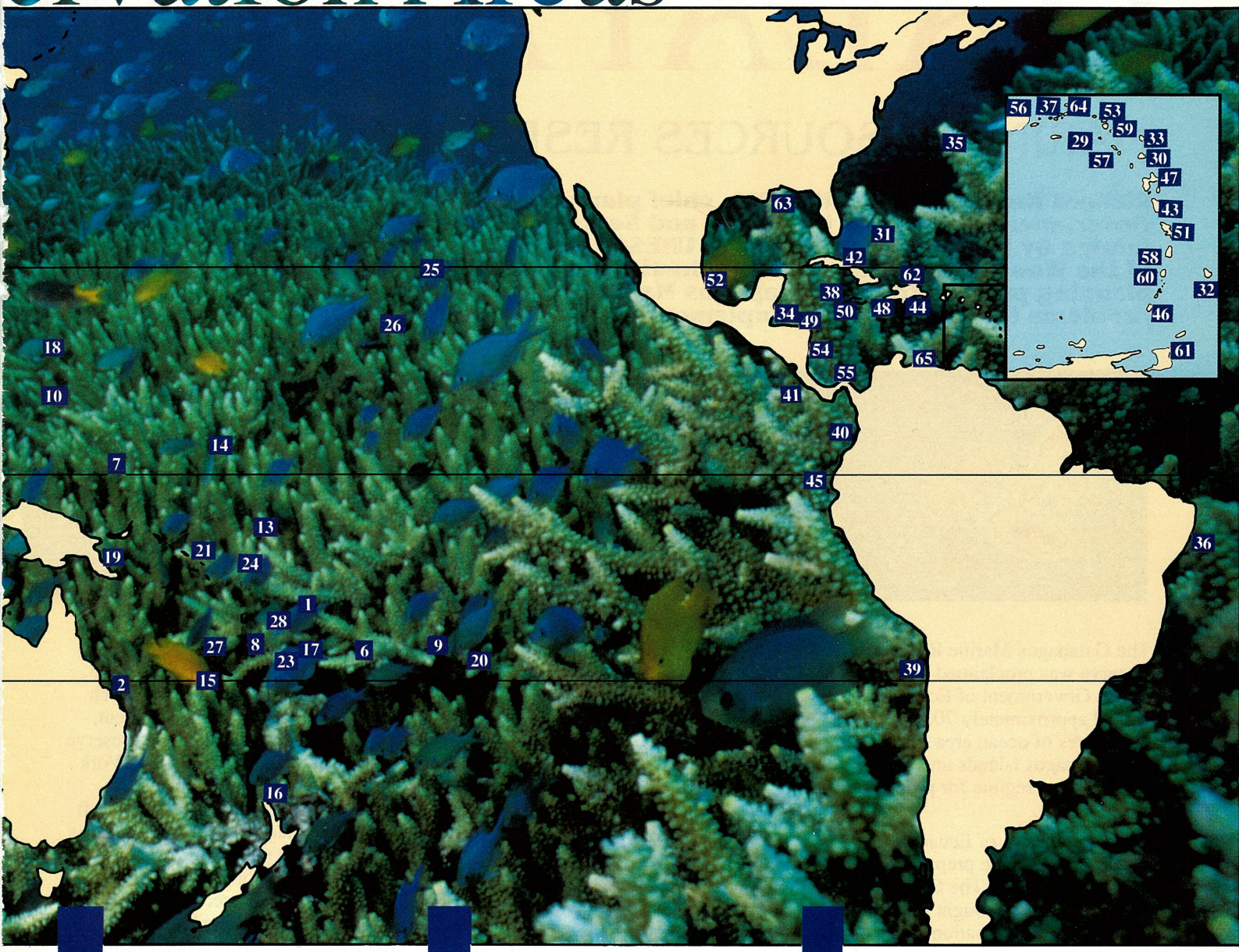
A recent GBRMPA document lists material published to December 1987 on marine parks and other managed areas around the world. Interested readers can obtain this publication free from GBRMPA. Ask for *Marine Parks and Protected Areas: A Bibliography*. Jean A Dartnall. Great Barrier Reef Marine Park Authority Technical Memorandum GBRMPA-TM-18.

NOTE: Some proposed areas have come into effect since this UNEP/IUCN list was compiled, e.g. the Saba Marine Park in the Netherlands Antilles.

PROTECTED AREAS ADJACENT TO OR INCLUDING CORAL REEFS

Map No.		
	Central and Western Pacific	
1	American Samoa	(2;9)
2	Australia - Eastern	(5;1)
3	Australia - Northern	(1;0)
4	Belau	(1;2)
5	China	(0;2)
6	Cook Islands	(1;3)
7	Fed.States Of Micronesia	(0;5)
8	Fiji	(0;many)
9	French Polynesia	(2;many)
10	Guam	(6;1)
11	Hong Kong	(0;4)
12	Japan	(15;2)
13	Kiribati	(0;1)
14	Marshall Islands	(0;1)
15	New Caledonia	(4:8)
16	New Zealand	(0;1)
17	Niue	(0;6)
18	Northern Mariana Islands	(1;7)
19	Papua New Guinea	(11;many)
20	Pitcairn	(0;1)
21	Solomon Islands	(0;2)
22	Taiwan	(5;1)
23	Tonga	(6;4)
24	Tuvalu	(0;1)
25	United States - Hawaii	(13;1)
26	US Nth. Pacific Islands	(4;1)
27	Vanuatu	(5;4)
28	Western Samoa	(1;8)
	Atlantic and Eastern Pacific	
29	Anguilla	(1;0)
30	Antigua	(1;2)
31	Bahamas	(5;many)
32	Barbados	(1;0)
33	Barbuda	(1;0)
34	Belize	(2;9)
35	Bermuda	(2;1)
36	Brazil	(2;2)
37	British Virgin Islands	(1;9)
38	Cayman Islands	(24;0)
39	Chile	(0;2)
40	Colombia	(4,9)

ervation Areas



41	Costa Rica	(3;3)
42	Cuba	(1;1)
43	Dominica	(0;1)
44	Dominican Republic	(2;2)
45	Ecuador	(1;0)
46	Grenada	(1;1)
47	Guadeloupe	(0;3)
48	Haiti	(0;2)
49	Honduras	(0;1)
50	Jamaica	(4;3)
51	Martinique	(0;7)
52	Mexico	(7;8)
53	Netherlands Antilles	(4;5)
54	Nicaragua	(0;1)
55	Panama	(1;2)
56	Puerto Rico	(0;many)
57	St Kitts	(0;2)
58	St Lucia	(1;4)
59	St Martin	(1;0)
60	St Vincent	(0;2)
61	Trinidad And Tobago	(1;4)
62	Turks And Caicos Islands	(0;8)
63	United States - South	(6;many)
64	US Virgin Islands	(2;4)
65	Venezuela	(3;0)

Indian Ocean, Red Sea & Gulf

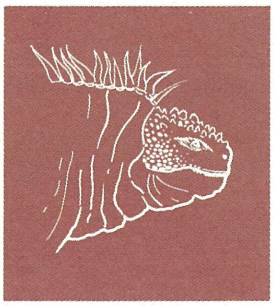
66	Australia - Western	(3;9)
67	Bahrain	(0;1)
68	Bangladesh	(0;1)
69	Burma	(0;4)
70	Chagos	(0;1)
71	Comoros	(0;5)
72	Djibouti	(2;0)
73	Egypt	(2;5)
74	Ethiopa	(0;1)
75	India	(2;6)
76	Indonesia - Sumatra	(1;many)
77	Indonesia - Java	(2;6)
78	Indonesia - Kalimantan	(2;4)
79	Indonesia - Sulawesi	(3;many)
80	Indonesia - Irian Jaya	(1;7)
81	Indonesia - other	(5;many)
82	Iran	(1;3)
83	Israel	(1;0)
84	Jordan	(1;1)
85	Kenya	(4;2)
86	Kuwait	(0;2)
87	Madagascar	(1;1)
88	Malaysia	(3;9)
89	Maldives	(0,8)
90	Mauritius	(0;many)
91	Mozambique	(2;4)
92	North Yemen	(0;6)
93	Philippines	(15;many)
94	Reunion	(4;0)
95	Saudi Arabia - Red Sea	(0;many)
96	Saudi Arabia - Gulf	(0;many)
97	Seychelles	(10;3)
98	Singapore	(0;1)
99	Somalia	(0;2) (0;2)
100	South Africa	(1;0)
101	South Yemen	(0;4)
102	Sri Lanka	(2;7)
103	Sudan	(1;7)
104	Sultanate Of Oman	(0;many)
105	Tanzania	(8;2)
106	Thailand	(9;1)

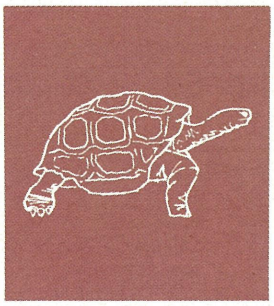
Key Country (no. existing ; no. proposed)

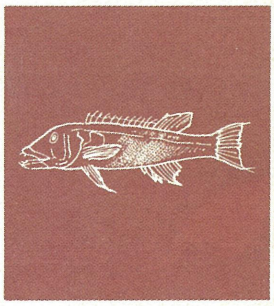
GALAPAGOS

MARINE RESOURCES RESERVE

Richard Kenchington, GBRMPA's chief planning officer, worked with the Government of Ecuador in August and September 1987. His visit was funded by the Heritage Division of UNESCO and the Marine Policy Center of the Woods Hole Oceanographic Institution. Richard writes about the planning process for the Galapagos Marine Resources Reserve and the problems facing successful implementation of management.







The Galapagos Marine Resources Reserve was proclaimed in May 1986 by the Government of Ecuador. It placed approximately 70,000 square kilometres of ocean area surrounding the Galapagos Islands under a special management regime for protection and conservation.

A technical team of Ecuadorian experts was assigned to the preparation of the management plan. The Ecuadorian Government also sought the assistance and advice of international organisations and national agencies including the US National Oceanic and Atmospheric Administration (NOAA) and Australia's Great Barrier Reef Marine Park Authority (GBRMPA) in the course of developing the management plan.

The Galapagos Archipelago

Part of the Republic of Ecuador, this chain of volcanic islands straddles the Equator some 1000 km to the west of the Ecuadorian mainland on continental South America.

The Galapagos Islands have a long history of occasional use from pirates in the 16th to 18th centuries to whalers in the 19th century. Charles Darwin recognised the scientific significance of the islands during his visit in 1835. He was struck by the large number of indigenous species and at the amount of creative force displayed on these small, barren and rocky islands. His observations of the variation in species separated on closely adjacent islands were important steps in the thinking which led him later to develop the concept of the origin of species.

The global significance of the Galapagos Archipelago was officially recognised by UNESCO when it was inscribed as the first entry on the Register of the World Heritage List in 1978.

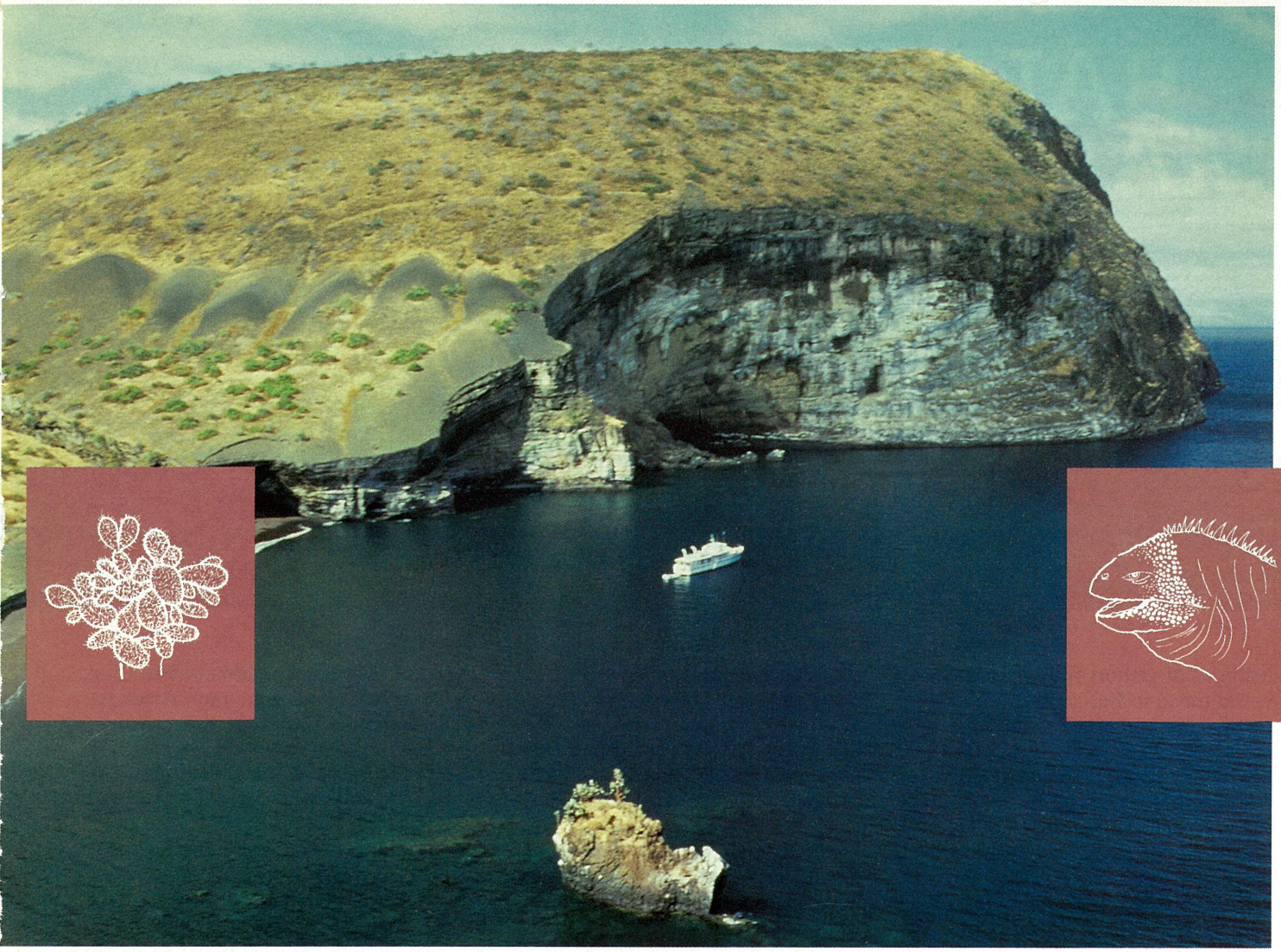
Visitors to Santa Cruz Island and the Darwin Research Station arrive in Academy Bay .

Peter Kenchington makes friends with a 'local' at the Darwin Research Station, Santa Cruz.

A Management Plan

The decree establishing the Reserve called for a management plan which would address policy, management, and development of the marine reserve to be prepared within one year. Work on the management plan began in January 1987 and by late 1987 a draft zoning plan had been prepared with an accompanying report suggesting approaches to resolving a range of legal, policy, resource, training and logistic issues, in order to establish effective and integrated management of the Marine Resources Reserve and the National Park. This stage was reached by a process which involved a high degree of interdisciplinary, national and international collaboration and support.

The essential issues in developing a plan were related to the problems of meeting the economic demands of an increasing resident population without unacceptable or unsustainable demands upon the fragile environment of the Galapagos. The population has increased from a few hundred in the 1940s to over 6000 by 1984. This has been accompanied by a dramatic increase in tourist visitation from a few hundred in the late 1960s to 20,000 in 1981. Agriculture and fisheries provide the main source of income derived from within the Galapagos as most of the economic activity associated with the tourist industry is conducted from cruise vessels operating from the mainland.



Buccaneers Cove on Santiago Island was once a haven for pirates but is now a heavily used tourist site.

The issues affecting the Galapagos Archipelago and the Great Barrier Reef are very similar. Both cover large areas which contain environments recognised by inclusion on the World Heritage List as being of global significance. Both support fishing and tourism at levels which are economically significant at the local and national level. Both have adjacent human populations which are growing rapidly. Both have been identified as areas which have the potential to attract increased numbers of tourists. For both there is a widely held view that all human activities should be regulated and coordinated to ensure that their distinctive ecosystems are not significantly damaged by human impact.

The first step towards development of the zoning plan was to develop a logical framework to guide decision making. The goal and aims of the Great Barrier Reef Marine Park Authority were adapted to take account of the different legal and consultative situations and direct consideration of the inter-tidal issues.

The second step was to discuss the management needs and the planning process with Galapagos residents and others who would be directly affected by introduction of management. Meetings were held with fishermen and local government representatives between August and November 1987 in all settlements on the Islands and also in mainland cities to brief officials of government departments and to seek their comments onmanagement issues and priorities.

A proposed zoning plan and regulations were prepared in November 1987. Each part of the Reserve is allocated to one of four zones - General Use Zone; 'Artisanal' and Recreational Fishing Zone; Marine National Park Zone; and Strict Nature Reserve. The zoning plan specifies the activities which may take place in each zone. Any activity not specified may not take place, although if it is consistent with the objectives of the zone, it may be allowed by permit.

Plans into Practice

Over the first three years, implementation of the zoning plan for the Reserve will involve further major cooperative activity to establish an effective management presence capable of meeting the management responsibilities of the various government agencies involved. This will require the employment and training of staff, purchase and commissioning of equipment and the development of specific site and activity management plans. These plans will be needed to cover day-to-day management of intensively used areas, and the management of activities such as tourism, fisheries and diving wherever they occur in the Reserve. Little is likely to be achieved without a sustained commitment of effort and funds to the management of the Galapagos. With an ongoing national commitment to long-term management, it is to be hoped that international support and expertise can be applied to provide training, equipment, research and monitoring and thus establish a secure basis for long-term management of the Galapagos Archipelago.

BALI'S FIRST MARINE PARK
PULAU MENJANGAN

Lesley Murdoch

A school of five-banded sergeant majors hovers off the reef slope.

Millions of visitors from all over the world travel to Bali to experience its culture and beaches. Surf beaches were discovered in the early sixties and places like Kutu, Legian and Ulu Watu became a mecca for all those in search of the perfect wave. The coral reefs, that surround and protect the island with The God of the Sea Bhatara Baruna, also provide a wonderful underwater realm for divers and snorkellers alike. Diving tours, mainly snorkelling, were based around the little fishing village at Benoa close to Sanur reefs and the island of Nusa Lembognan in the seventies. Scuba facilities and tours were introduced slowly by European operators visiting US merchant shipwrecks at Tullamben 100 km north-east of Sanur and Menjangan Island 120 km north-west of Sanur accessible only by boat. Despite its distance from the tourist centres and the necessity to obtain permits, Pulau Menjangan (Deer Island) is considered the divers' paradise of Bali.

Bali Barat

Bali's national park is located in the north-west corner of Bali, near the ferry crossing at Gilimanuk to Java.(8°10'S, 114°25'E).

Total area is 77,348 ha; comprising 19,559 ha Bali Barat Wildlife Reserve, 6220 ha of coral reefs and marine waters, and 51,569 ha of forest. The reefs extend from sea-level to a maximum depth of 28m (lower limit of 'abundant coral').

A fast south-bound current flows through the Bali Strait into the Indian Ocean, and its influence is felt in the north-eastern parts of the national park.

A strong current develops regularly along the north coast of Pulau Menjangan, and in the strait between the island and the mainland. The northern coastlines are the most exposed to wave action but, in general, conditions are calm.

Water temperature falls to approximately 25.5°C in August and increases to as much as 28.5°C in December. The wet season is from December to March with drier more stable weather from April to November.

Coral reefs are of the fringing type, and show varying degrees of development around the park. The best developed reefs are around Pulau Menjangan. On the south-east side of the island the reef is steep, while on the north-facing coast the upper reef is more rounded and there are shallow surge-channels on the outer reef flat.

Different Types of Corals and Fish

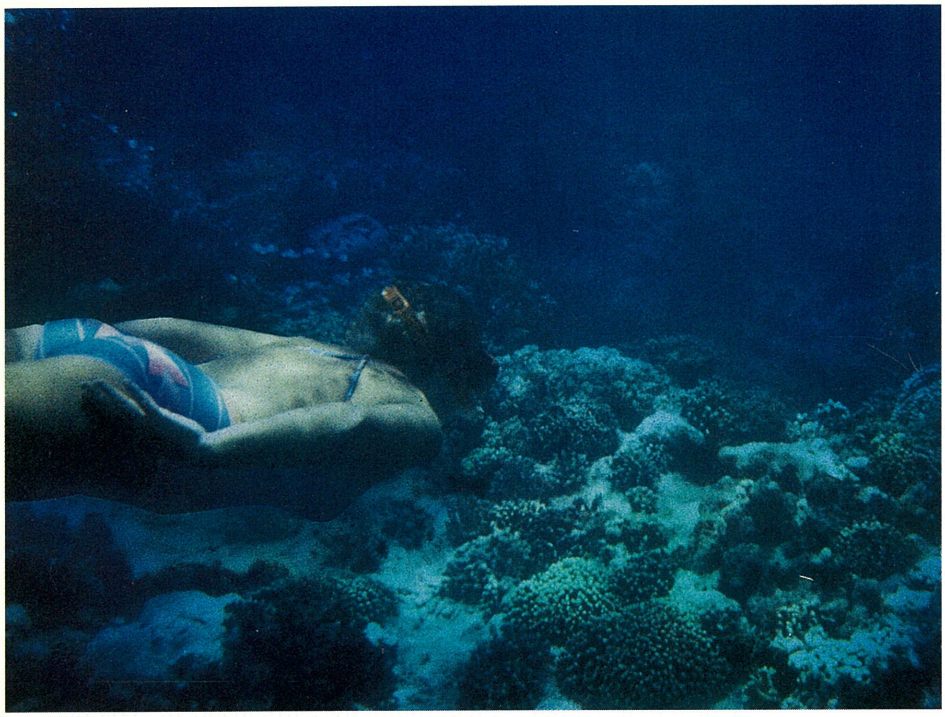
The reefs around Pulau Menjangan are rich in species and structure. Simple line transects have been made at several sites within the park. At the survey site on the north coast of Pulau Menjangan, the reef drops steeply into deeper water, after an extensive reef flat, about 200 m wide. The outer rim of the reef flat is covered with corals, mainly *Millepora* and different species of *Acropora*. Bush and table *Acropora* are particularly common. Bush *Acropora* continues down to about 6 m, while table *Acropora* goes nearly all the way down to 25 m, where hermatypic corals stop and gorgonians take their place. Gorgonians were found from 11m, but did not become common before 15 m. Other soft corals were rare. Amongst the other hard corals recorded were *Favia, Favites, Echinopora, Merulina,* and big heads of *Porites lutea*. A total of 35 species were recorded from this site.

As well as the diversity of corals many species of fish are found, especially around the island and sharks are also very common including the White-tip *Triaenodon obesus* and the Black-tip *Carcharhinus*.

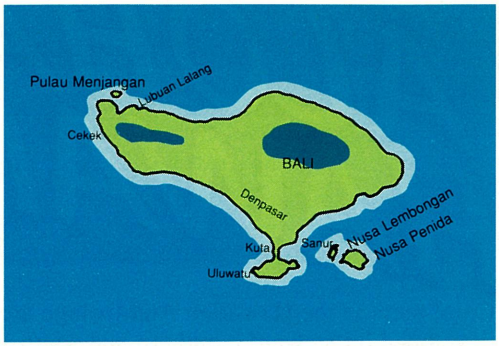
Fishing

In 1980 there were reported to be about 3000 people living within the boundaries of the park, but it was emphasised that these residents did not extensively exploit the marine resources of the area. With the exception of ornamental fish collection and milkfish fishing, the fisheries are on a small scale, being either for subsistence or for local sale. Ornamental fish are caught by collectors based in the area of Bangsril in East Java. Over 70 species of reef fish are exploited but these may not now be collected within the boundary. Milkfish fry are caught during October-November and April-May and are sold for rearing in brackish-water fish ponds.

Subsistence fisheries do not apparently have any detrimental effects on the coral reefs, except when explosives are used. Small craters have been found in rubble areas, for example in the strait at the western end of Pulau Menjangan. It is believed that these are a result of 'dynamite' fishing. Ornamental fish collectors are highly selective in the species they take, and it is reported that species of anemonefish, butterflyfish



A snorkeller explores the hard corals on the reef flat.



Damselfish and sea perch swim among Millepora *coral.*

and angelfish have been depleted. Incidental habitat damage has been caused by collectors using sodium cyanide or breaking corals.

Mining

Reefs in the area have been mined for limestone, but this activity has become less important in recent years. Those engaged in mining cross from east Java.
Mining of reefs for limestone has probably had the most serious impact in the area, but active patrolling by park staff has greatly reduced this activity since 1978. By 1980 it was confined largely to the western part of the park, the Bali Strait, and western end of the northern coast of Prapat Agung.

Human Impact

Domestic and industrial rubbish are a threat to the aesthetic value of the area. In February 1980 there was a large influx of rubbish into the park following heavy rains in east Java. Uncontrolled cutting of mangroves for wood and charcoal production has occurred in the area, especially in Teluk Terima. This could have a secondary effect on the health of neighbouring reefs, but apparently has been curtailed since 1978 by active patrolling of the park.

Tourism

Day visitors only are permitted on Menjangan island. Overnight accommodation can be arranged at Gilimanuk or Singaraja. Boats and national park guides must be hired at the departure point Labuan Lalang. The trip to Menjangan island takes approximately half an hour. Scuba equipment is not available for hire. The best way to visit the island is to book a tour with one of the many local dive companies in Sanur or Kuta.

Management Guidelines

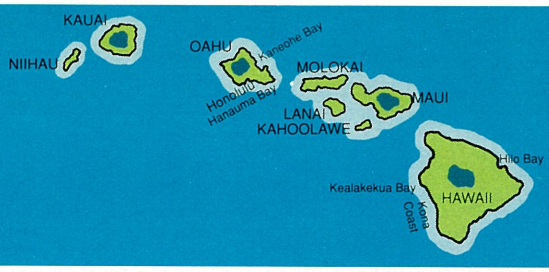
Bali Barat was originally created a Protection Forest, converted to a Wildlife Reserve on 9.8.47; Pulau Menjangan (Deer Island) was added in 1978. Declared a National Park in October 1982 but legislation enabling the establishment of national parks is still lacking. The fauna is fully protected. Spearfishing in any form is prohibited and traditional fishing is allowed only in certain areas. Aquarium fish may not be taken and collection of coral, shells, or other invertebrates (alive or dead) is prohibited.
Local administration is through the Chief Ranger/Superintendent, J1. Suwung, PO Box 320, Denpasar. Permits to enter the park can be obtained from the PHPA in Gilimanuk, Denpasar, or in Bogor (West Java). Existing headquarters and a field station are at Teluk Terima where permits are now available on site.
The 1980 management plan recommends the establishment of specific zones. The reefs around Pulau Menjangan would be within a wilderness zone, where people should be allowed entry provided they obtain an entry permit, and agree to abide by the regulations. Fishing or disturbance of any kind is prohibited within this zone. Outside the sanctuary and wilderness zones is a proposed marine buffer zone in which registered residents may fish using traditional methods or methods deemed by the National Park Superintendent as non-harmful to the protected marine systems and biota. Persons not registered for fishing but who are visiting the park as temporary recreational visitors would also be able to fish in this zone using specified methods, providing the fish taken are not sold or otherwise commercially used. Interpretive facilities are being planned, including a visitors centre. Plasticised identification cards for fish and corals could be made available, and guides on tourist boats could receive some instruction in reef interpretation.

Monitoring

Detailed monitoring and survey work on the coral reefs and mangroves should be continued so that visitor-related damage and other changes can be assessed. This would include studies of the effects of prohibiting collection of ornamental fish and the fry of milkfish. It is recommended that the National Institute of Oceanology (LON), based in Jakarta, and the National Institute of Geology and Mining (LGPN), with headquarters in Bandung, Java, should be encouraged to participate in such surveys. There is also an excellent opportunity for the Environmental Study Centre (PSL) at Universitas Udayana in Denpasar, Bali, to become involved in long-term studies.

(Information on Bali Barat National Park has been compiled from *Coral Reefs of the World* Vol.2 UNEP/IUCN 1988)

ALOHA HAWAII



Coral reefs in the Hawaiian Archipelago are generally best developed on leeward (southern and south-western) coasts or in bays sheltered from wave action but also grow well on some windward coasts, e.g. on the islands of Oahu and Kauai. Good reefs occur at many sites along the Kona Coast and Kealakekua Bay on Hawaii, Molokini 'lagoon', the southern coast of west Maui, the north coast of Lanai, the southern coast of Molokai, Kaneohe Bay, Hanauma Bay and many other sites on Oahu, much of Kauai's coastline, and the lagoons of the north-western Hawaiian Islands.

Most reefs are dominated by three genera of coral: *Porites, Montipora* and *Pocillopora*. The total Hawaiian list of reef-building corals may not exceed 40 species. Isolation of the Hawaiian Archipelago is generally considered to be the cause of this low diversity.

Marine Resource Management

Prior to western contact, the right to harvest seafood in local coastal waters was controlled by the chiefs. Since then these rights have largely been bought by the government but a few areas of coastal waters (konohikis) remain under nominal private control.

Efforts to regulate and control human impact on the marine environment are gradually improving environmental conditions for the growth of corals and other shallow water reef resources. Management of coral reef resources in the State is the responsibility of the Division of Aquatic Resources, Department of Land and Natural Resources. Regulations concerning resource use apply to all waters of the state except for special areas which are designated Marine Life Conservation Districts, Marine Fisheries Management Areas and Natural Area Reserves which have specific use restrictions and guidelines. The State Department of Health manages coastal water quality and the State Department of Economic Development manages Hawaii's Coastal Zone Management Program, both of which can have positive influence on coral reefs.

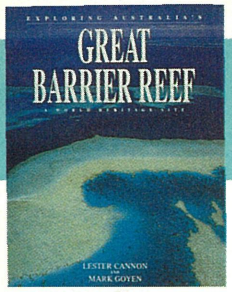
MARINE EDUCATORS CONFERENCE 1990 *'ISLANDS IN THE SEA'*

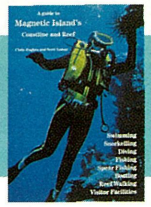
The Oceania chapter of the US National Marine Educators Association (NMEA) will welcome over 400 marine educators to the big island of Hawaii for its annual conference 'Islands in the Sea' from the 5-12 August 1990. This will be a unique opportunity for participants to explore island ecosystems - marine, fresh water and terrestrial. Convenor of proceedings is Ms Ann Coopersmith, leading reef educator who was special guest at our Marine Education Society's Conference in Townsville in 1988. Ann will also be conducting a two week field study for marine science teachers after the conference on topics including biology of coral reefs, and coral reef ecology.

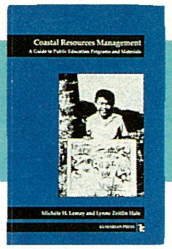
This conference will feature three mornings of symposia focusing on ISLANDS IN THE SEA, ADVANCES IN TECHNOLOGY, and GLOBAL CLIMATE CHANGE. Concurrent sessions on curriculum development, research and programs as well as informal poster sessions will take place in the afternoon. Resources will be available at the auction and flea market as well as a chance for participants to exchange items in the sea swap. Opportunities to explore the big island include field trips to the national park, scuba and snorkelling activities. Other highlights are a welcome LUAU and film, video, and photography festival.

In Australia, information about conference registration, accommodation and travel arrangements can be obtained from Chris Bell (Ansett International, Townsville) Phone (077) 273666; Fax (077) 213883.

This view of Kaneohe Bay, Oahu, is from Coconut Island, site of the Hawaii University Institute of Marine Biology.







REVIEWS

EXPLORING AUSTRALIA'S GREAT BARRIER REEF: A WORLD HERITAGE SITE

Lester Cannon and Mark Goyen
Watermark Press 1989
240 pages $39.95

I pushed aside the *Readers Digest Book of the Great Barrier Reef,* Isobel Bennett's *The Great Barrier Reef*, the Deacon's *Australia Down Under* and assorted fish and shell books to make room for *Exploring Australia's Great Barrier Reef: A World Heritage Site* by Lester Cannon and Mark Goyen. The coffee table groaned, its once insatiable appetite teetering on the brink of regurgitation. Another book on the Great Barrier Reef? Pretty-pretty pictures luring the reader into the briny world of beasts concocted by a divine Creator, or some hallucinating hedonist with a bent for beauty and the bizarre. Another book on the Great Barrier Reef?

How does *Exploring Australia's Great Barrier Reef* rate on the 3-P scale - Presentation, Photography and Penmanship?

Like all coffee table books, presentation and photography are paramount. This book will not disappoint any buyer on these counts. Both are superb. Flicking through the pages (many of which could be framed and housed in a top class photographic exhibition) leaves no doubt as to justification for the Reef's inscription on the World Heritage site listing, nor for its inclusion as one of the seven natural wonders of the world. The book is, as it claims, 'a study of beauty, captured in some magical photographs', walking a fine line between nature and art. One chapter of the book - 'Where Nature is Art' - denies any distinction. From the examples illustrated it's hard to disagree. I'd rate presentation and photography a P - not Pass, but Professional.

Penmanship is a little harder to assess. Certainly the subject areas are topical, educational and interesting: 'Evolution','History and Exploration','Marine Life','Where Nature is Art','The Life Above','Diving on the Reef', 'Fishing on the Reef, and 'Staying and Seeing'. The last three chapters will be particularly useful to those lucky enough to visit the Reef (and who knows the book offers sufficient incentive to do so). *Exploring Australia's Great Barrier Reef* is special in providing up-to-date information for anyone interested in fishing, diving and snorkelling, or in taking a relaxing holiday in the Reef Region. Places to go, the best times of year to visit, points of interest and available facilities are covered to help plan a trip so there can be no excuses 'If only I'd known...'.

Earlier chapters in the book are at times confusing and not always consistent, but then again the subject is an incredibly diverse and complex environment. Perhaps defying any author to describe it. But there's a wealth of information and, if the 'reader' takes the time to actually scan the print (do people read coffee table books?), there are ample rewards in knowledge to be gained, not just of the animals and plants to be found, but of the processes that operate to generate and maintain this dynamic world wonder.

Save for a second coffee table!

Dr Brian Lassig

A GUIDE TO MAGNETIC ISLAND'S COASTLINE AND REEF

Chris Hughes and Scott Lomax
Pentangle Publications Pty Ltd, 1989
48 pages $6.95

A Guide to Magnetic Island's Coastline and Reef is a revealing book, and will be a welcome resource for many Townsville watersports enthusiasts as well as visitors. For a start, the guide pin-points 23 wrecks strewn around the island, most in less than five metres of water, and most accessible from the shore.

When I first moved to Townsville just over two years ago, friends and colleagues were unable to recommend any good diving spots around Magnetic Island. Having visited the island (without diving gear) on two previous holidays, I found it hard to believe they didn't exist. Responses to my questions revealed none of my contacts had actually dived or snorkelled on the island's fringing reefs. It was the old story of dismissing the backyard for the sake of foreign climes. By definition, a good dive site has 'to be hard to get to and expensive to get there'. Magnetic Island contradicts both these criteria. Over the last two years I've discovered several of the island's hidden or unrecognised beauty spots for myself - the bommies in Florence Bay, the superb coral cover on the slopes of Nelly and Geoffrey Bays. Now, armed with this new guide, I've many more sites to explore.

The guide also provides a comprehensive directory of the services and facilities available on the island and the mainland - aquariums and museums; dive shops and sports equipment; ferry services and cruises; boat ramps; accommodation; local authorities, services and clubs. It has hints for boating, fishing, diving, snorkelling and reef walking that will help guarantee visitors get the most out of their stay. The detailed section about the Great Barrier Reef Marine Park around Magnetic Island will also help visitors familiarise themselves with the activities that are permitted, restricted and prohibited in the zones of the Park.

This book rates a 'C' - Compulsory reading for anyone planning to visit Magnetic Island.

Dr Brian Lassig

COASTAL RESOURCES MANAGEMENT: A GUIDE TO PUBLIC EDUCATION PROGRAMS AND MATERIALS

Michele H Lemay & Lynne Zeitlin Hale
Kumarian Press 1989
62 pages $US 9.95

Many people involved in coastal resource management in different countries will find this guide useful.

The contents are well organised into a compact book. As well as explaining how to use the guide itself, the introduction provides information on designing effective and locally appropriate programs for increasing public understanding of the importance of managing coastal resources.

The major part of the guide lists details of good sample materials (many free), and where to obtain them, in the eight categories: brochures and guides; school curriculum materials; audio-visual materials; educational posters; reading materials and activities for children; special events and mass media; education planning guides; and newsletters. The authors have included useful quick reference tables for comparing the advantages and limitations of four of the popular categories.

This international guide grew out of an innovative project of the US Agency for International Development (USAID) and the University of Rhode Island to assist selected governments in managing coastal resources and resolving conflicts in resource use. In developing public education programs it was found that access to a variety of materials produced in different cultural settings generated enthusiasm and ideas for locally produced materials and programs.

Elaine Eager

THE CHANGING FACE OF REEFLECTIONS

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Copies of Nos. 18 to 24 are still available.
Photocopies of other articles may be requested.