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THE ROLE OF CORAL CAY CONSERVATION IN MARINE RESOURCE MANAGEMENT IN BELIZE.

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ABSTRACT

The Great Barrier Reef of Belize is the second largest of its type in the world. It is unique on account of its size, its array of reef types and the luxuriance of corals thriving in pristine condition. The Belize barrier reef is coming under increasing pressure from tourism and pollution. The Coral Cay Conservation Programme is a large, UK-based, non-profit making organisation, which since 1986, has been working closely with the Belizean Government on their Coastal Zone Management initiative.

This paper describes how Coral Cay Conservation is helping to establish Belize's largest marine reserve, by combining large teams of volunteer divers with sophisticated survey techniques such as remote sensing and Geographical Information Systems. To date, large sections of the proposed marine reserve have been surveyed and data essential for the management of this area is currently being entered onto a computerised database. Education and training programmes provided by Coral Cay Conservation for Belizeans are discussed.

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1 INTRODUCTION

1.1 Belize and The Atlantic Barrier Reef

Belize is a small independent state situated on the Caribbean Sea between Mexico and Guatemala (15-19° N latitude). With a land area of 22,936 km² and a population of less than 200,000, the human population density of Belize is one of the lowest in the world (Nicolait et al, 1984).

Running throughout the entire length of the coastline of Belize lies the world's second largest barrier reef system, which is described as "unique in the Western Hemisphere on account of its size, its array of reef types and the luxuriance of corals thriving in such a pristine condition" (Dahl et al., 1974; Perkins, 1983). Approximately 250 km long and 32 km wide (Purdy, 1974; James et al 1976), the Belize reef is the largest uninterrupted reef system in the Atlantic (Smith, 1948).

Few countries can boast territorial ownership of such a diverse and highly productive coastal marine resource which includes coastal lagoons, mangroves, seagrass beds and coral reefs. The occurrence of a nearly continuous barrier reef perched on the edge of a narrow continental shelf, the large number of patch reefs and faroes present in the deep shelf lagoon areas, and the unusual diversity of reef types found within a relatively small area, are amongst some of the geophysical features that make this reef system particularly interesting.

The physical and biotic zonation patterns of the barrier reef appear to be similar to those described for other reefs in the Caribbean (Rutzler and McIntyre, 1982). There are approximately 450 sand and mangrove cays confined inside the barrier reef and atolls. The cays range in size from small, ephemeral sand spits to larger, permanent islands capable of sustaining human settlement.

The first major study on the reefs and cays of Belize was carried out by the 'Cambridge Expedition to British Honduras' in 1959-60 (Thorpe and Stoddart, 1962). Work prior to that had been largely confined to personal collecting trips made by visitors and inhabitants of the colony. Stoddart continued to study many aspects of the biology of the cays (Stoddart, 1962 a & b, 1963, 1969, 1974). A team from Rice University carried out a series of studies throughout the 1960's, focusing primarily on the geology of the barrier reef complex (Wantland and Pusey, 1975). The establishment of a field station on Carrie Bow Cay by the Smithsonian Institution in 1972, has spawned a steady supply of publications on the physical and biological characteristics of the reef system. This work has been brought together in a volume by Rutzler and Macintyre (1982), and the Smithsonian regularly publishes an annual report of its work in the area. In addition organisations such as the Wildlife Conservation International (WCI), the New York Natural History Society and expeditions from numerous universities have added to the scientific study of the Belize reef (Perkins and Carr, 1985; UNEP/IUCN Report, 1988).

1.2 Factors Leading to Degradation of the Belize Barrier Reef.

In 1983 Perkins study concluded that the small population of Belize had placed fairly modest demands on the coastal resources of Belize: an artisanal fishery, a small but growing tourist industry, small-scale shipping and oil exploitation were its principal users during the year of the study. Since 1983, the contribution of the Fisheries sector to the foreign exchange economy of Belize has been increased significantly with the commercial fishing of Conch (*Strombus gigas*), Spiny lobster (*Panulirus argus*) and Grouper (*Epinephelus* spp.), and there is now evidence to suggest that the populations of these commercially important species are being adversely affected by overfishing.

Due to a sagging economy in the mid 1980's, the Government of Belize was forced to increase it's hard currency income by several initiatives, one of which is the development of its tourist industry. Only two hours flying time from the USA, Belize currently attracts over 200,000 tourists each year. This has stimulated overseas investment in tourist facilities, which include airport expansion, hotel and resort development, and the improvement of the transport infrastructure. Coastal and off-shore mangrove stands are vital nursery grounds for reef fauna, and the clearance of these areas for the development of beachfronts and hotels has caused serious shoreline erosion. The coral reef itself is also under serious threat from pollution (including untreated sewage effluents) and from physical damage caused by cruise ships and careless scuba diving practices. At present tourism is most developed in the northern region of the reef and on adjacent atolls, but there is increasing pressure to develop sites on the southern, virgin reefs of Belize.

1.3 Management of the Coastal Marine Resources of Belize

The Government of Belize fully realises the importance of the country's coastal marine resources in it's economy, and is aware of the pressing need to establish firm management plans for the protection and sustainable use of these resources. In 1982 the Government established the Half Moon Cay Natural Monument, the first protected area to be designated under the National Parks System Act of 1981. The Monument is administered by the Forestry Department, and managed through the Belize Audubon Society, a non government organisation (NGO). Full implementation of the management plan is not yet possible due to lack of funding, although some infrastructure has been provided.

In 1987 the Hol Chan Marine Reserve was established under the Fisheries Ordinance. Hol Chan has good day-to-day management with funding from US-AID and the World Wild Fund for Nature to provide for a visitors centre and reserve staff. Laughing Bird Cay and it's associated faroe has been designated a critical habitat (Belize Centre for Environmental Studies, 1990) and last year this area was declared a national park. This year it is expected that the Government will declare the Glovers Reef Atoll a marine reserve: a management plan has already been drafted and funding secured (for established and future marine protected areas see Fig 1).

In 1989 the Coastal Zone Management Unit was established within the Department of Fisheries, and in August of that year the Belize Coastal Zone Management Workshop was held at Ambergris Cay. Fifty-five participants from nine countries drafted recommendations for

action by the Government of Belize. These recommendations included a programme of research involving small scale marine habitat mapping and status assessment, plus the study of the biology, ecology and life history of threatened and endangered species. This was followed in April 1990 by a Draft Planning Document, produced by the World Conservation Union (IUCN), WCI and the Belizean Department of Fisheries, entitled "Guidelines for Developing a Coastal Zone Management Plan" (Price, Heinanen and Gibson, 1990). The authors presented a framework for the development of a Coastal Zone Management Plan for Belize: Phase 1 of this framework entitled, "Data Collection and Compilation", stresses the need to gather in-depth "ecological, socio-economic and related information about the coastal zone".

2 CORAL CAY CONSERVATION

Coral Cay Conservation (CCC) is an independent, non-profit making organisation established in 1986 to provide the Government of Belize with the scientific expertise and resources to assist with the development of management initiatives for the protection and sustainable use of the country's coastal marine resources.

Between 1986 and 1989, CCC periodically visited Belize to undertake baseline studies of the marine resources of the reef throughout its geographical range. As a result of the success of these initiatives, and the good relations established between CCC and the Government and NGOs of Belize, in 1990 CCC made a five year commitment to assist the Coastal Zone Management Unit with data acquisition and compilation.

Since 1990, CCC has been undertaking comprehensive surveys of the marine resources in a 180 km² area surrounding South Water Cay (Fig 2), an area identified as a critical habitat (Belize Centre for Environmental Studies, 1990). This area has the potential for attracting large numbers of tourists in the near future and has been recommended as the site for one of the country's largest marine reserves. This area encompasses a wide range of marine habitats including sand and mangrove Cays, seagrass beds, patch reefs, and expansive sections of uninterrupted barrier reef which are representative of the entire barrier reef system (Rutzler and Macintyre 1982).

In order to carry out this work, each month CCC places at the disposal of the Coastal Zone Management Unit teams of thirty self-financing volunteer divers and research scientists. Each team is resident in a purpose built research station on South Water Cay and is provided with comprehensive training in marine identification and survey methods prior to starting fieldwork.

Survey methods used are based on those recommended by the South Pacific Commission (SPC) /United Nations Environment Programme (UNEP), (1984) and the Marine Nature Conservation Review of the Joint Nature Conservancy Council (Hiscock, 1990). All surveys are conducted along transects orientated in an East-West direction and spaced at known distances from each other: the positions of each transect are accurately fixed using Global Positioning Systems (GPS). At each survey site detailed information about the bathymetry and relative abundance of marine species is recorded.

To date, CCC has compiled detailed data sets on the bathymetry and biodiversity of marine habitats, which account for fifty-five percent of the proposed reserve area. Information gathered in the field is transferred to the UK and incorporated into a data base that has been specifically designed to handle this type of data.

The data gathered by CCC will be used to classify satellite images of the survey area. Remote sensing studies have been successfully applied to the inventory and management of coastal marine resources (Jupp et al, 1986). Some of the main advantages of remote sensing are the provision of rapid, current, and comprehensive assessments of habitat distributions within a reef system. Remote sensing also offers a non intrusive method of monitoring changes within and between habitats that may be subject to disturbance.

Classification and validation of remote sensing imagery using CCC data, will be carried out in association with the Department of Geography at the University of Edinburgh, which is recognised as a centre of excellence for Remote Sensing\Geographical Information Systems (GIS) applications in tropical environments and particularly in Belize. A GIS is currently being developed by the team at Edinburgh which will assist CCC in the handling, analysis and presentation of marine environmental information. This GIS system will be used as a tool to devise suitable management plans for the proposed reserve. CCC has been asked by the Coastal Zone Management Unit to assist with the development of a management plan for the South Water Cay marine reserve and expects to have a plan in place by September of this year. It is envisaged that by this date all surveys will be completed and permanent monitoring sites established. In addition, it is proposed that a water quality monitoring programme will also be developed in association with the Coastal Zone Management Unit and the Caribbean Environmental Health Institute.

3 EDUCATION AND TRAINING PROGRAMME

Coral Cay Conservation currently offers twenty four scholarships a year to provide advanced training to Belizeans who wish to become involved in coastal resource management. The training programme involves scuba training (to PADI open water level) and development of underwater survey skills. It is envisaged that as Coral Cay Conservation establishes closer links with educational establishments outside of Belize, Belizeans will be offered skill development courses in Europe and elsewhere. In order to facilitate this training programme, CCC has established a charitable trust fund which will attract funding for travel scholarships and training programmes for Belizeans. The trust is administered by Trustees from Belize and the UK.

4 CONCLUSIONS

The Belize barrier reef is threatened with exploitation by uncontrolled fishing and tourism. Aware of the need to protect this valuable resource, the Government of Belize has established the Coastal Zone Management Unit within the Department of Fisheries, the aim of which is to devise a Coastal Zone Management Plan for Belize.

Coral Cay Conservation is the main NGO that is assisting with the development of the Coastal Zone Management Plan. In the first instance CCC has been asked to provide detailed survey data for the proposed South Water Cay marine reserve and to submit a management plan for the reserve by September 1992.

CCC is unique in that it uses a large workforce of volunteer divers and research staff to achieve this, and has dedicated it's resources to Belize until the end of 1995. CCC is collaborating with NGOs in Belize, and with research establishments in the UK, including the Universities of London, Wales and Edinburgh.

CORAL CAY CONSERVATION EXPEDITIONS
BELIZE, 1990-95

Survey Site
(South Water Cay)

BELIZE

Reefs
 Approximate 100m isobath
 Park or protected area

☆ Proposed park or protected area
 — Park or protected area boundary
 - - - Proposed park or protected area boundary

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