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THE CCOP/SOPAC PRECIOUS CORAL PROGRAMME IN THE SOUTH PACIFIC

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INTRODUCTION

History of CCOP/SOPAC work

In 1976 at the 5th Annual Session of CCOP/SOPAC members attention were drawn to the profitable precious coral industry in the North Pacific, especially in Hawaii. It was recommended at this meeting that, a precious corals activity be added to the CCOP/SOPAC Work Programme, as nothing was known about Corallium in the South Pacific, and as its Technical Secretariat (Techsec) had the basic expertise and equipment (echosounders, dredges, and underwater cameras) to carry out Corallium resource assessment surveys. Four countries, Cook Islands, Kiribati (then known as Gilbert Islands), Tonga, and Western Samoa, incorporated the "Assessment of Precious Coral Potential" as one of their projects, and requested their Techsec carry out reconnaissance surveys for Corallium in their waters at intermediate depths (100-500 m) to assess its potential as a "mineable" resource.

The first surveys were carried out in 1977 but these suffered from a lack of information on Corallium, especially collecting methods. In 1978 the services of Dr. R. Grigg, University of Hawaii, were obtained as consultant adviser and three informative sessions were held on the Peacesat network, followed by a workshop in Tonga (Eade 1978, Eade 1980b). During 1978-1982, dredgings were carried out searching for Corallium on rocky seabed areas at 100-500 m in member countries waters using CCOP/SOPAC charter vessels and local vessels provided by member countries. In 1978 and later years other members added Corallium projects to their part of the CCOP/SOPAC Work

Programme, and today all island member countries have projects whose objectives are to promote the search for Corallium and assess its potential in their waters. Today CCOP/SOPAC is continuing the search for Corallium in "deepsea" areas (1000-1200 m) and seeking funds for vessel charters to explore some of the remaining unexplored areas.

In 1976 Tonga included black coral in its precious coral project. Subsequently Kiribati and Tuvalu have also added black coral to their projects and requested CCOP/SOPAC assistance with the assessment of this resource in their waters. In 1978 some preliminary observations were made looking for black coral off Nuku'alofa, Tonga, and off Rarotonga, Cook Islands. The only substantial survey of black coral made by CCOP/SOPAC has been a reconnaissance survey in the Gilbert Islands Group of Kiribati made in 1985.

RESULTS OF CCOP/SOPAC SURVEYS

Corallium in the South Pacific

Almost all of what we know about Corallium in the South Pacific has been derived from surveys conducted by CCOP/SOPAC Techsec, with considerable advice and assessment of samples by Dr R. Grigg in his capacity as consultant to CCOP/SOPAC (Grigg 1980, 1981). The results of CCOP/SOPAC's work, including the work done by Dr Grigg evaluating and assessing the samples collected, has been reviewed by Eade (1980b) and Harper (in press), and summarised by Carleton and Philipson (1987) and below.

Occurrence:

More than 500 tangle-net dredgings have been successfully made by CCOP/SOPAC at potentially suitable sites for "intermediate depth" (100-500 m) Corallium in the South Pacific. The results of these surveys are summarised in Table 1, which also includes an attempt to quantify, in simple terms, the relative abundance of Corallium in the countries surveyed. The highest recovery rates of dredgings with Corallium against total number of dredgings successfully made, are found in a zone stretching across the South Pacific at low latitudes from Solomon Islands and Northern Vanuatu to Western Samoa and Northern Cook Islands.

Most of the work done by CCOP/SOPAC has been concentrated along the island chains of Solomon Islands, Vanuatu, and Tonga,

TABLE 1: DREDGINGS MADE AND RECOVERIES OF INTERMEDIATE DEPTH CORALLIUM IN CCOP/SOPAC MEMBER COUNTRIES

	Successful Dredgings Made	Dredgings with Corallium	Percent Recovery
Papua New Guinea	2	0	0
Solomon Islands (New Georgia - Makira)	181	34	19
(Santa Cruz Islands)	38	6	16
Vanuatu	73	8	11
Fiji	16	1	6
Tonga	50	3	6
Western Samoa	34	6	18
Cook Islands (Northern)	35	4	9
(Southern)	2	0	0
Kiribati (Gilbert Islands)	73	0	0
(Phoenix Islands)	7	0	0
TOTAL	511	62	

and on island slopes in Western Samoa, Northern Cook Islands, and Gilbert Islands, Kiribati. There are large areas of the CCOP/SOPAC region which have not been sampled. These include areas of Papua New Guinea, the Northern Melanesian Borderland (between Eastern Outer Solomons and Western Samoa), Tuvalu, and Line Islands.

Abundance:

It is very difficult to assess the amount of Corallium present at each dredge site where specimens were recovered. Presumably the largest beds, and those with the best commercial potential, will be found where the area of habitat favourable for Corallium growth is largest. This will be where bottom slopes are gentle rather than steep. The few hauls where more than 1 or 2 specimens have been recovered, are from steep slopes where bed size must be small. At other sites, where the favourable habitat appears large, recovery has been small. However, as the behavior of the net on the bottom is not known, and estimates of bottom area dredged are likely to be very approximate, the only way to usefully estimate the size and density of beds is from a detailed knowledge of the shape and character of the seabed. Such information is rarely available and there has been insufficient time on surveys to gather such data.

Quality:

A number of specimens collected are of commercial grade, and on the basis of quality have promising commercial potential. Quality is judged on colour and condition. Deep red (vermilion) and pure white specimens, alive when collected, have the highest value. Dead specimens that are chalky or bored by other organisms may have no value at all. The value of other specimens will vary depending on colour intensity and eveness, and state of preservation.

Living red specimens, with excellent commercial-grade colour have been found at nine dredge sites, seven in the Solomon Islands, including Santa Cruz Islands (Eastern Outer Islands), and in two in Vanuatu. Some of these red specimens are similar to Corallium japonicum, a commercial, Northwest Pacific species.

Pink and white specimens with commercial grade colour have been found at several sites in Solomon Islands, Vanuatu, Tonga, and Cook Islands. However the most promising of these were dead and bored when collected.

Non-commercial white specimens were found throughout the region.

Size:

Specimens less than about 15 mm in diameter are regarded as having little or no commercial value. Specimens larger than this have been collected at a total of four dredge sites, two in Solomon Islands, and one each in Vanuatu and Northern Cook Islands. However all of these were dead and bored when collected to the extent that they have no commercial value. In the Solomon Islands a few living specimens approaching commercial size have been collected. However apart from these all other specimens recovered are very small and only rarely approach 10 mm in diameter. In the Santa Cruz Islands gorgonian corals found in association with Corallium are 10-100 mm tall, whereas the same species in Hawaii are 100-1000 mm tall.

One of the more consistent results of the CCOP/SOPAC surveys is the diminutive nature of Corallium specimens found in the region. As size is directly related to the suitability of the habitat for coral growth, and mainly diminutive specimens have been found, it appears most habitats surveyed are only marginal for coral growth. Optimum conditions appear to be very rare in the South Pacific.

Summary of Corallium in the South Pacific

Corallium specimens with excellent commercial colour, of commercial size, and in excellent condition (living) have been found in the South Pacific. However no specimens have been found with all three of the above features. Of the specimens collected with commercial colour only four were of commercial size and all four were dead and bored. Most of the remaining good-colour specimens were in excellent condition when collected but are all far too small to be commercial.

Black Coral Resource Assessment

Surveys to assess the black coral potential have been carried out by CCOP/SOPAC in three countries. In 1978 preliminary checks were made in Cook Islands (Rarotonga), and Tonga (off Nuku'alofa) during work on other projects. During a bathymetric survey around Rarotonga (Lewis et al. 1978) several habitats suitable for black coral were identified. The best of these was investigated to 45 m and despite very good visibility no black coral was seen. While mapping sand bodies off Nuku'alofa (Hill et al. 1978) four sites were dived to check for black coral. Although some small black coral specimens were found it appears that the habitats near Nuku'alofa are not ideal

for black coral growth. More recently SPREP have conducted a survey of black coral resources in Tongan waters.

In 1985 CCOP/SOPAC conducted a reconnaissance survey of potentially favourable habitats at 8 atolls in the Gilbert Islands Group of Kiribati (Roy and Richmond 1987). Fourty nine dives were made and black coral was sighted at 12 sites. However specimens were common at only 3 sites. Three species of black coral (identified by Dr R. Grigg) were found at 10-32 m but most were small (less than 20 mm at the base). The commercial potential of this resource in the Gilbert Island Group appears to be limited.

Techsec have made no studies of black coral in Tuvalu, the only other country to request this work.

OBSERVATIONS ON THE CCOP/SOPAC PRECIOUS CORAL (CORALLIUM) PROGRAMME

Equipment Used

When CCOP/SOPAC started its Precious Coral programme dredging equipment used was not very efficient in collecting Corallium and therefore the earliest sampling was not very effective. With assistance from Dr Grigg tangle-nets made of stones and multifilament netting, similar to those used by the North Pacific coral industry, were assembled and used in the survey work from 1978. This standardisation of equipment resulted in sampling being more uniform and therefore a comparison of results more meaningful. Not all samples however are being collected by tangle-nets. Research vessels carrying out rock dredging are occasionally recovering precious corals and reporting these finds to CCOP/SOPAC. In recent years at least 3 interesting finds have been made this way.

Some variability in the results may have been introduced through the use of different vessels and different experts in carrying out the survey work. Some vessels used were certainly better equipped than others and the amount of experience of the experts has varied considerably.

Areas Surveyed

Solomon Islands, Vanuatu, Fiji, and Tonga lie along the active boundary between Pacific and Australian Plates. Here the

ridges and banks which are potential sites for Corallium are relatively close to ports and to each other. They are easy to get to and many of these areas are moderately well mapped. It has not been difficult to survey many of these areas using smaller vessels. However sediment washed down rivers and from active volcanoes in the high islands of these countries have thinly covered many of the apparently ideal ridges and banks making them poor Corallium habitats.

Kiribati, Western Samoa, and Cook Islands lie on the Pacific Plate far from large sources of sediment and may have some of the best sites for commercial beds of Corallium. Potential sites are terraces and banks on island slopes and the tops of seamounts. In Kiribati and Cook Islands the area to be searched, for seamounts and other potentially suitable sites, is vast. Potential sites are usually far from ports and from each other. Seamounts are mostly very poorly mapped with little reliable information on minimum depths, and many are unknown - new ones are being discovered each time vessels work in a new area. Although seamounts may prove to have the best potential they are the least explored for Corallium in the South Pacific because CCOP/SOPAC has not had the resources to mount major surveys to look for and sample them.

Much more bathymetric data is needed in the region. Prediction of seamounts from satellite imagery is assisting with the location of potential targets. Bathymetric swath mapping is also of considerable assistance. Vessels with Seabeam and SeaMARC systems are working in and crossing the region with greater frequency. These systems produce contour maps of a swath of the sea floor accurately defining the shape and depth of the tops of seamounts and other potential sites.

Depths Surveyed

Almost all work done has been done in the 100-500 m depth range. In the 1970's these were the most likely depths for finding Corallium based on information from the North Pacific. In the early 1980's CCOP/SOPAC were informed that Corallium beds were being worked at 1000-1200 m off Midway Island and it was recommended that potential sites at these depths be examined in the South Pacific. With the recent increase in manpower and resources at Techsec it has only become possible in recent months for CCOP/SOPAC to resume the search for Corallium, this time in deeper water at approximately 1000-1200 m.

CCOP/SOPAC Precious Coral Programme Development

The overall programme has developed differently in the different member countries, mainly due to the differing priorities each country has placed on its precious coral project. For example Solomon Islands, through its Fisheries Division, gave its Corallium project priority and provided people and resources to assist Techsec in conducting three major surveys. On the other hand Papua New Guinea and, until recently, Fiji, who have given this work low priority, have had little work done in their waters. Also those countries who instigated their projects in 1976 have had a greater opportunity to have their areas surveyed. Tuvalu, which joined CCOP/SOPAC in 1983, has had no opportunity to have its waters surveyed because Techsec has not had the resources in recent years to do the work requested.

Only three countries have requested surveys to assess the potential of black coral in their waters. Two of these countries have had their current requests fulfilled.

The region is not evenly surveyed and areas remain unsurveyed for Corallium and for black coral.

SUMMARY OF THE CCOP/SOPAC PRECIOUS CORAL PROGRAMME

Intermediate depth Corallium

Both commercial sized and commercial quality Corallium specimens have been found in the South Pacific in the "intermediate" depth range of 100-500 m. The quality appears to improve westwards across the region. Size appears to be greatest at lower latitudes. The ideal habitat has apparently not been found, at least not found in an area large enough to support a commercial sized bed. The region has not been evenly surveyed and while some areas have been thoroughly surveyed at a reconnaissance level, other areas remain unsurveyed.

The most promising of the unsurveyed areas appear to be Papua New Guinea, the Northern Melanesian Borderland, and seamounts on the Pacific Plate in Kiribati, Tuvalu, and Cook Islands. The emphasis of the programme should be to locate better habitats. Seamounts on the Pacific Plate appear to hold the greatest potential but much more information is needed on

their location, shape, and depth before sampling should be attempted. Bathymetric swath mapping provides the most useful information on potential habitats and such work should be supported whenever possible.

Deepsea Corallium

Apart from a very recent survey in Kiribati by CCOP/SOPAC, no potential sites in the South Pacific at 1000-1200 m have been surveyed. This is an obvious deficiency which CCOP/SOPAC member countries have recognised and many have requested Techsec assistance with work in these depths. Although there has been a recent increase in manpower and resources at Techsec progress is expected to be slow, hampered by the lack of funds to charter a vessel capable of working in open ocean for lengthy periods without port calls. CCOP/SOPAC is continuing to seek ways and means to do this work such as training fisheries personnel in survey techniques.

Black Coral

Although black coral has been identified in the waters of most island countries (Carleton and Philipson 1987), the limited amount of work done by CCOP/SOPAC has shown that as a marketable resource it is not universally widespread. From this it would seem that some countries could benefit from assistance in searching for commercial stands of black coral in their waters. Although Techsec resources will be focussed on searching for and assessing deepsea Corallium resouces in the immediate future, those member countries requesting black coral surveys will be assisted whenever possible.

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