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BLACK CORALS - POST HARVEST ASPECTS

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1. The post-harvest treatment, processing and marketing of black corals are discussed.
2. Factors that define the quality of black coral include; the colour, hardness, degree of parasitization, the density of seasonal rings, the size and the number of blemishes and imperfections.
3. The market for black coral items can be divided into low value basic jewellery and carvings, high value basic jewellery and carvings, and high value designer jewellery and sculptures. Quantitative data on the black coral industry are difficult to obtain because of its relatively small size and dispersed nature of the production and processing sectors.
4. However, the Taiwanese processing industry uses perhaps ninety percent of all production, turning out finished products in the order of four-fifths beads, and the balance carved jewellery.

Black Corals - Post-harvest aspects

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1. Introduction This short paper considers the marketing and processing of black corals. It largely consists of extracts from the May, 1987 FFA report "A study of the Marketing and Processing of Precious Coral Products in Taiwan, Japan and Hawaii." by C.Carleton and P.W.Philipson (FFA 87/13). Copies of the full report, which covers in addition pink (precious) corals and other aspects of a more general nature and contains recommendations for future developments focussed particularly on the Pacific Island region, can be obtained on request from FFA.

As indicated above, this paper is made up principally of extracts from the earlier FFA report. This is because no further work has been done by FFA in this area since then, so there is no supplementary information to add. However some additional information that was gathered at the time of the preparation of the original report, but was not incorporated in it for various reasons is included here, in the hope that it might be of some relevance.

The assistance and contributions to the sections on black coral made by Dr. R.W.Grigg, Institute of Marine Biology, University of Hawaii and Mr. P. Frey, Black coral master carver, Fiji is gratefully acknowledged.

2. Immediate post-harvest treatment. Harvested coral should be brought to the surface and anchored in a secure shallow water area, preferably of fresh or brackish water, to cause the death and decomposition of the coral. After a day or more the coral should be removed from the water, roughly cleaned and trimmed, and hung or stacked in a sheltered, well ventilated position to season for 3 - 12 months. As with wood, fast curing will encourage undue separation of the layers of horny material, and complicate processing.

It should be noted that all corals are armed with stinging cells or "nematocysts". The poisons carried within these cells vary considerably and cause mild to severe irritation if applied to the skin. In the case of both tree coral and whip coral, the poison can cause major discomfort, severe skin rashes and stimulate fits of sneezing (a hazard underwater). Great care should be taken to minimise exposure of bare flesh to live coral.

When dealing with whip coral the slimy, tissue layer should be removed immediately as it hardens within minutes of being exposed to the air. This is achieved by running the back of a knife along the coral, avoiding breaking the under surface during removal, which results in unnecessary extra polishing at a larger stage.

Storms, siltation and heavy freshwater run-offs can all cause considerable damage to coral beds. Since dead or dying colonies are quickly attacked by worm and encrusting and parasitic organisms, their value as an ornamental material also deteriorates quickly. Coral

picked up on the beaches is therefore normally of little to no commercial value.

3. Harvesting outside the Pacific Island region. Black coral harvesting is in general highly dispersed and undertaken by small numbers of largely independent divers. The recent rise in importance of Philippine supplies to Taiwan may indicate a more structured approach to harvesting and trade, but this has not been confirmed.

Typically, the harvesting of black coral is seen as a ready source of cash to augment more regular forms of income or to add a cash component to an otherwise subsistence way of life. In these instances harvested, and usually seasoned, black coral is taken to a local trader or store owner in return for cash. The trader or store owner will then collect a shipment on his own behalf, or trade down the line to other traders who collect sufficient to make up an acceptable export quantity - 100 kgs. to several tonnes.

In Hawaii and the Philippines, companies have been set up to harvest and process black coral. These companies actively seek supplies of coral, either purchasing direct from divers and local traders, or undertaking the harvesting themselves. Prices are set by negotiation, but it should be noted that what passes as the international price for black coral is in fact set between the Filipinos and the Taiwanese.

The small scale and lack of structure to the industry has encouraged considerable opportunism in the exploitation of known resources, and in profiteering at the expense of subsistence and semi-subsistence communities.

4. Quality considerations - Raw black coral. The factors that define the quality of black coral are :-

- colour
- hardness
- parasitization
- seasoning/calcareous rings
- diameter
- length
- blemishes and imperfections.

Colour, hardness, level of parasites (related to overall age, environment and/or whether or not harvested live), and the quality of seasoning (fast seasoning causes separation of the growth rings and gapping), are consistent parameters of quality, regardless for what purposes the material is to be finally used.

The material should produce a jet black, highly polished surface when worked. Thus, the material should be black (and not brown), and should

exceed a minimum hardness criteria (different species, and the same species from different environments, have different levels of hardness), which can be judged by trial working. Softer material loses its polish quickly and poorly seasoned material if used in jewelry settings is prone to "move" in its setting.

Other colours of hard coral, such as brown (and gold) coral, can also be worked into jewelry items; the value of such coral, however, depends on the local marketability of such items. (Gold coral is highly marketable, sufficiently so as to encourage some unscrupulous manufacturers to produce false gold coral from black by dropping the material in liquid nitrogen).

Other quality criteria affect the value of the raw material according to final use. For the mechanised preparation of beads, for example, blemishless lengths of coral of constant diameter are preferred. The whip coral therefore lends itself well to bead products, as also do the fine branches of tree corals. The degree of calcareous intrusions in the form of annular rings also affects value in bead manufacture.

Similar qualities are sought in material used for the production of "cabochons" (ovals with one side flat), which are used in the manufacture of pendants and in ring and earring mountings.

Larger diameter material is needed for the carving of more intricate shapes, and the largest diameter pieces are usually used for sculpting, where much attention is paid to the particular shape of any piece of coral.

The degree of branching in a colony is also of interest, since this effects the amount of wasted material in any piece. Branching tends to differ from species to species, between possible sub-species, and according to the exact environment a particular colony is found in. It is therefore difficult to guarantee the value of a particular species of coral, regardless of origin.

5. Black coral processing. Black coral is processed to: beads; regularly shaped jewelry components such as cabochons; regularly carved jewelry components, such as animal figures; unique articles of jewelry, such as bracelets; and coral sculptures.

The process for bead production is as follows:

- clean the raw material of accretions and extraneous material.
- using a diamond saw, cut the raw material into regular "bead" lengths of coral i.e. equal to the diameter for a spherical bead, longer for "rice grain", ovals etc.
- using a "cup" lathe, place each piece between the two cups of the lathe and cut bead to shape; align the axis of the coral perpendicular to the cups.
- using a single or double bit drill, drill holes along the

natural axis of each bead.

- tumble the finished beads with increasingly finer grain compounds to smooth and polish the beads.
- finish by tumbling in a mixture of wax and wood/bamboo chips.
- string the beads accordingly to the customer's specifications.

For the production of other regular shapes, the basic form is cut from the appropriate raw material, is preformed where necessary using a grinding stone, and then filed to the required shape, if necessary mounting the piece on a grip for convenient handling. Delicate and decorative work is then undertaken using a series of hand tools and high speed hand drills. The shape is then smoothed and polished as for beads or, if appropriate, by hand using a range of chemicals, buffs and waxes.

Figures and sculptures are carved using a combination of the above tools and increasing levels of manipulative skills, craft and artistic talents.

These products are then mounted as appropriate using jewelry settings of precious, semi-precious or base metal. The simplest settings are of plated gold and silver, or sterling silver and 14 carat gold. Increasingly though, black coral is being used as only a minor component of a jewelry item designed to display an expensive mix of precious metal and gem stones.

Sculptures are mounted on chains as pendants, brooches etc. or as self standing ornaments. They are, however, relatively uncommon and public awareness of their beauty and value is limited, due in large to the small number of coral sculptors and correspondingly low levels of advertising and other marketing expenditure.

The centre of the black coral processing industry is Taiwan. In the past, processing industries, principally limited to cottage industries, have developed in places like the Philippines, Hawaii and Mexico, but today these are of minor significance.

The Taiwanese industry is a component of what may rank as the world's largest bead manufacturing industry. A relatively small number of entrepreneurs have set up large companies that buy raw material, subcontract the manufacturing and then sell the finished product. In this way beads are made from semi-precious and non-precious stone, from shell (mother of pearl), and from precious and semi-precious corals. The scale of purchases and production is at times staggering, but the core structure of the industry is the wealth of small factories located in and around Taipei, the Taiwanese capital, Kaohsiung, the industrial capital, and Tainan, Taiwan's third largest town, and also in additional shell and coral workshops in Su-ao and Penghu.

Taiwanese factories or workshop consist of only one or two rooms using

between two and five sets of machinery and a labour force of between five and twenty. For carved items, jewelry and the like - those procedures requiring time, precision and skill - most factories rely on out-workers. While such factories are financed to some degree by the buyers or by outside financiers, the principal in each factory has complete control over production and operating procedures, is normally responsible for selling on to the buyers (or more normally fulfilling contracted orders for the buyers) and is himself a craftsman/engineer/technician who can do most of the tasks he asks his labour force to undertake.

Some of these factory concerns - groupings of workshops - are organised in such a way as to be sufficiently financially independent to undertake their own export sales. More commonly, however, it seems to be a precondition of a factory's financing that they do not sell on their own behalf outside the country, but must rather sell a minimum quantity of product to one or more of the export houses responsible for financing the operation. This then gives the factories only limited freedom to take orders from other export houses for production over and above this quantity. The difference between this type of financing arrangement and common ownership of processing and exporting companies is often blurred.

On the other hand, the smaller export houses who do not own or finance their own factories and workshops must buy-in from or through the production departments of vertically integrated concerns (i.e. the largest buy-in and export companies in the business), or contract products from the independent factories, or buy off-the-shelf from stock. Thus the bead industry is dominated by about six big companies, and supports a further thirty or forty smaller traders who offer a diverse range of necklaces, beads, jewelry and the like.

By comparison to gem-stone bead-work, or the processing of pink coral, black coral is seen as attracting relatively low margins at wholesale, and therefore comparatively fewer companies are prepared to engage in its process or export. The industry is, in this black coral sector, dominated by two large financing and exporting companies, perhaps as many as a dozen independent exporters, and a dozen manufacturing entrepreneurs.

It should be said that black coral is sold at lower prices than lapis lazuli, jade, malachite etc., and is perceived as providing for a cheaper market with lower profit-taking opportunities.

Several other countries undertake black coral processing, normally on a small scale, for sale locally to residents and visiting tourists. In most cases the processed items, and finished carvings, are crude and poorly executed, and consequently of low value. Exceptions are where modern manufacturing techniques are used - as in Hawaii - or where a high level of personal quality control is exercised - as in Papua New Guinea - or a craftsman sculptor exercises his art and appropriate quality control in equal measure - as in Fiji.

To correct some popular misconceptions, the bulk of black coral jewelry sold in Hawaii is not manufactured in Hawaii but by Taiwan. Hawaii's

processing companies consumes relatively small quantities of black coral in the manufacture of jewelry using up-to-date high tech processing and management techniques. The demand for raw material was somewhat higher during the Seventies when the jewelry manufacturing process was much less sophisticated.

Japan has next to no interest in the processing of black coral, although it may prove a small but significant market for high value finished jewelry.

6. Black coral markets. In temperate areas the market is poorly developed, with black coral items usually marketed as special art jewelry, or as components of the necklace, bracelet, ring or bangle market. As such, black coral represents just another material and colour from which to chose alongside precious and semi-precious stone, glass, plastic, wood, seeds and the like.

Even in the tropics black coral items are poorly known, with the market dependent on highly visible presentation in jewelry or souvenir shops. The market exists in tourist areas where local sales staff have the ability to relate the substance to the mysteries and traditions of the tropics and successfully promote black coral as a "local", "traditional", "romantic", "tropical" and "natural" product against the competing products such as sophisticated imported jewelry, time pieces, and other coral, mother-of-pearl and shell jewelry and souvenir items. Invariably visitors to such areas are aware of the romantic association of coral beaches, moonlit nights and the like - the "coral" association is strong and is relatively easy to capitalise on.

This tourist connection extends itself round the world with what might be called "basic" black coral jewelry - necklaces, pendants, ear rings, rings, etc. - sold at tourist spots. Almost without exception such items have been imported from Taiwan or the Philippines; they are supplied of a standard quality and finish, at a predetermined price, with guaranteed delivery and of the required quantity. Only Taiwan and the Philippines can guarantee this level of service. What a number of countries are able to do, is supply pieces of unique and locality specific jewelry and carvings. These do not need to be of standard quality or finish, available in large quantities or at fixed prices - in fact all these factors work against the acceptability and value of such articles.

The market for black coral items can be readily divided into low value, basic jewelry and carvings; high value, basic jewelry and carvings; and high value designer jewelry and sculptures. In the jewelry stakes, the higher the value of the item, the less the black coral material used and the greater the quantity of precious metals and stones. With carvings and sculptures this is not the case.

Intermediate markets exist for standard jewelry shapes, such as beads, cabochons, etc. which are supplied to jewellers or sculptors for incorporation in final items of jewelry, adding either standard jewelry fittings (standard value added content), or special show pieces of jewelry (high value added).

Comprehensive quantitative data on the black coral industry are impossible to obtain due to its relatively small size and highly dispersed production and processing sectors. Black coral, in any of its processed forms, is often not identified separately in trade statistics, and it is not in the interests of the industry to collate its own figures.

On informed guesswork, a current annual harvest of some 60t to 100t of raw material a year could be expected, with the bulk - say, at least 50t - coming in the form of whip coral from the Philippines. At this level of exploitation in the Philippines it would be unreasonable to expect production to continue at this level for more than a few years.

The Taiwanese processing industry uses perhaps ninety per cent of all production, turning out finished products in the order of four-fifths beads, one-fifth carved jewelry. The Hawaiian industry would currently be hard pressed to use more than a few hundred kilos; Papua New Guinea, Tonga and Fiji would use less than 100 kgs. of tree coral per year each. The Philippines' industry might use about 10t per year of both tree and whip coral.

	<u>Production</u>	<u>Processing</u>
Philippines	60t	10t
Sri Lanka	20t	5t
Hawaii	3t	1t
Fiji	1t	1t
PNG	1t	1t
Tonga	5t	2t
Taiwan	-	70t
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	90t	90t

As mentioned above, black coral statistics are normally absorbed within precious coral landings and production, or with stony corals. Since black corals are CITES listed, however, imports are monitored by the various member states. Since the United States is the single largest importer of *Antipatharia* carvings the US figures for imports from Pacific countries, as reported to CITES, are given below. (number of carvings)

	1981	1982	1983	1984
Taiwan	5,242	169,586	134,394	24,156
Philippines	6,869	4,726	198	619
Hong Kong	7,346	1,350		
Korea	2,500			13
Fiji	3			
Tonga				576

As a further result of CITES reporting, the importance of the whip corals in international trade has been revealed. *Cirrhopathes anguina* is a whip coral with a wide Indo-Pacific distribution which is found attached to coral reefs and rocky substrates at shallower depths than most other black corals. *C. anguina* accounts for most of the

international trade as it is used almost exclusively for the making of bracelets and beads. It is exported to the US in large quantities mainly from Taiwan and the Philippines but there is no information on collecting localities. Since the CITES listing of *Antipatharia* in 1982, the only data on *Cirrhipathes* comes from the US. The data below represents the number of *C. anguina* carvings imported into the US and reported to CITES 1982 - 84.

	1982	1983	1984
Taiwan	158,708	190,863	175,790
Philippines	1,073	202	5,820

It is unlikely that this reflects the complete picture as consignments of black coral are often reported to CITES under the general heading of *Antipatharia* and some of these may include whip corals.

With respect to prices, black coral sells at between US\$2 and \$25 per kilo for seasoned and trimmed peices. The lower prices are for poor grade whip coral (US\$2 - 10/kg.), going up to some US\$20 per kilo. Tree coral runs from about US\$10 per kilo for jewelry to US\$25 or more per kilo for large carving coral. All prices are by negotiation, and while prices for exported Filipino coral might be expected to be stable, shipments of between 3t and 9t can rapidly flood the processing sector and produce a weak market,

At the wholesale/export end of processing, strings of beads can be made available at

	<u>US\$/string</u>
3 mm x 16"	4.13
4 mm x 16"	2.60
5 mm x 16"	2.44
7 mm x 16"	3.66
9 mm x 16"	6.42
10 mm x 16"	7.64
12 mm x 16"	10.70
14 mm x 16"	13.75

Cabachons are available at between US\$ 0.17 and US\$ 1.80 per piece depending on required size. These prices are exclusive of shipment, tariffs etc. an are tied to a minimum value of order.