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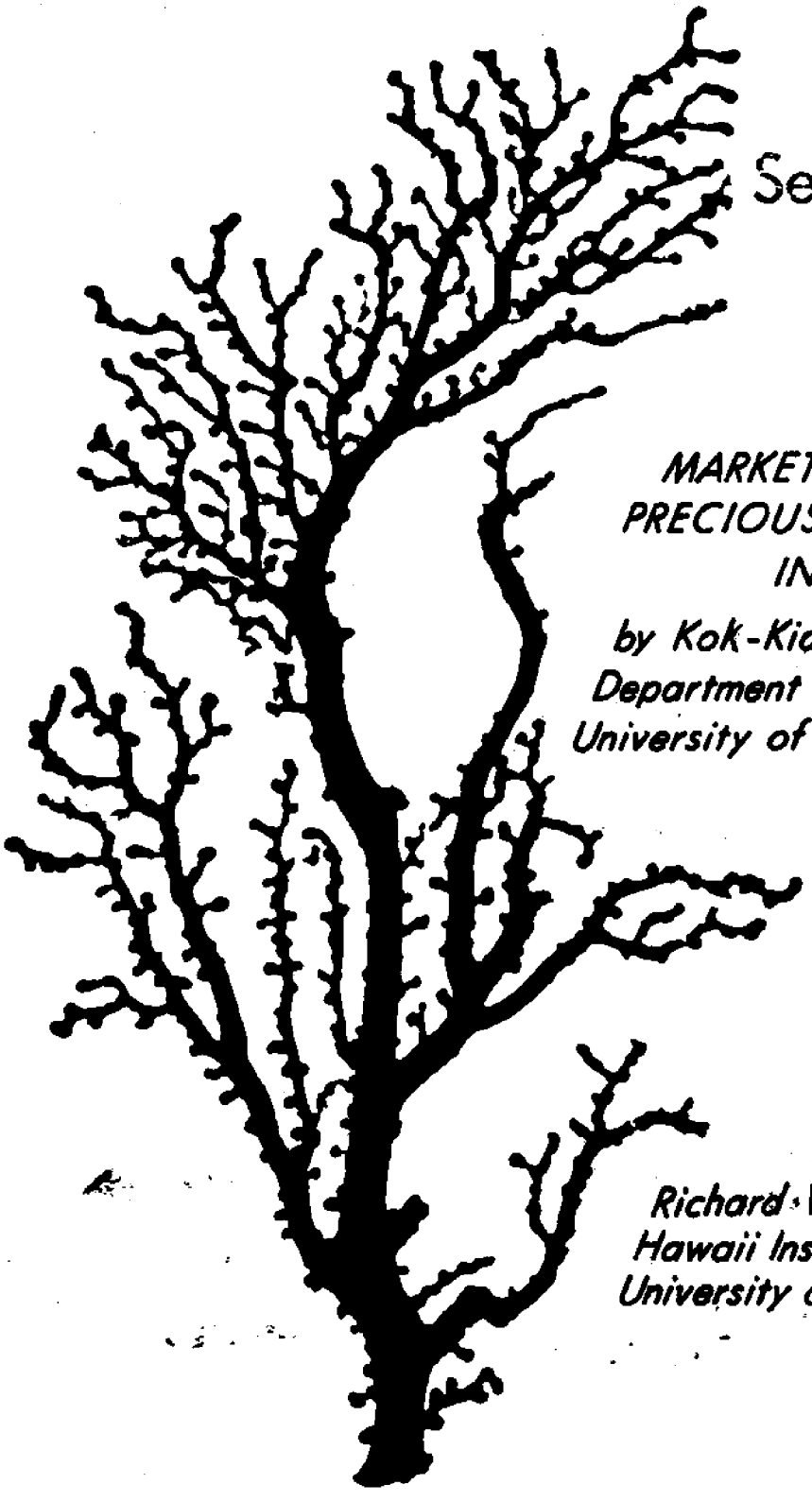

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ECONOMICS AND MARKET POTENTIAL OF THE PRECIOUS CORAL INDUSTRY IN HAWAII

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The University of Hawaii Sea Grant Program

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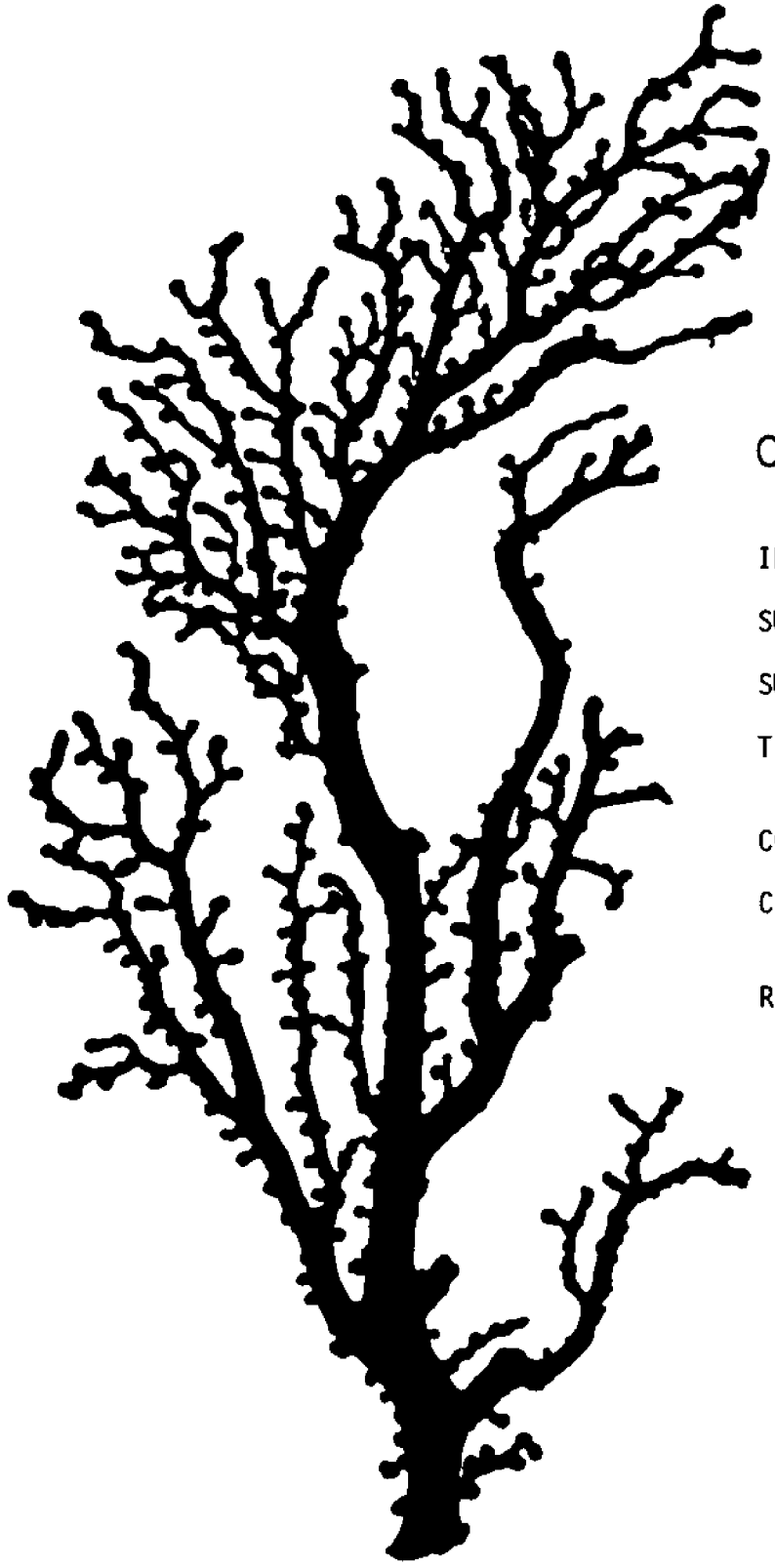
Appreciation is also extended to the coral divers in Lahaina, Maui, to coral jewelry manufacturers, and to retail jewelry store managers and sales-girls in Lahaina and Honolulu for their cooperation during the study.



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INTRODUCTION

Although the State of Hawaii has limited land resources, the waters surrounding the islands provide great potential for the exploitation of resources. This paper is concerned with the economic aspects of one of these resources: precious corals.[1] Off the islands of Maui, Lanai, and Kauai, beds of black coral exist at depths between 35 and 200 meters. These beds are currently harvested by divers and support a small retail industry in Hawaii valued at about $1.7 million per year. The discovery of pink coral beds off Makapuu Point in 1966 has added a new dimension to the precious coral industry in Hawaii. In 1970 the local precious coral (both pink and black) jewelry industry was estimated to have a retail value of more than $4 million. Although most of Hawaii's supply of pink coral is presently imported from Japan, harvesting of pink coral beds in the Hawaiian Archipelago is beginning. A local coral jewelry industry based on local resources in not envisioned as becoming a significant source of revenue for the state; but rather, as resulting in further diversification and stability of the state's economy.

Brief History

The use of red coral (*Corallium rubrum*) for personal adornment dates back to pre-Christian times. The Chinese, Japanese, Indians, Tibetanese, Persians, and Italians regarded the red coral as commercially valuable not only because of its color and luster but also because of its supposed mystical powers as a charm or medicament. Prior to 1830, most red precious coral came from the Mediterranean Sea, being worked by the Italians. In the last century however, Japan, Okinawa, and Taiwan have become the major producers of red and pink precious coral (Grigg, 1970).

Depletion of coral beds in Japanese waters has led to wide-ranging exploration by the Japanese fishermen and their discovery of an enormous bed at 400 meters on the Milwaukee Banks, 500 miles northwest of Midway Island in the Hawaiian Archipelago.

In 1966 Dr. Vernon E. Brock and Dr. Theodore C. Chamberlain of the University of Hawaii discovered a sizeable pink coral bed at 1,200 to 1,500 feet in the Molokai Channel, 6 miles off Makapuu, Oahu. Since then, the pink coral jewelry industry has been flourishing in Hawaii, although temporarily dependent on imported pink coral.

The history of black coral (*Antipathes* species) also goes back several thousand years. As its generic name suggests, it was considered a panacea for many ills. Apparently the supply of black coral was rather limited until the advent of scuba in the early 1950's. In 1958 a large bed of black coral (*Antipathes grandis*) was discovered off Maui by Jack Ackerman and Larry Windley of Maui Divers of Hawaii. Since that time a vigorous, although small, black coral jewelry industry has flourished in Hawaii.

[1] Includes pink, red, white, and black coral.

Discoveries of pink and black coral in the Hawaiian Archipelago suggest that there are abundant precious coral beds along the entire 1,800-mile chain. Thus the following questions are raised: Should these resources be exploited? Can the Hawaiian market absorb more precious coral? Can we harvest pink coral as economically as the Japanese? Can precious coral jewelry be introduced more extensively into the world market? A recent preliminary survey of the industry indicated a rapid growth in the precious coral industry, but can it persist as a viable industry? This problem is especially serious for black coral, since black coral jewelry is erroneously regarded as tourist merchandise, with no potential for national and international markets.

This study is an attempt to help answer these questions. Its major objectives are:

a. To study local and foreign supplies of precious coral to the Hawaiian industry.

b. To examine the demand of the industry in Hawaii.

c. To estimate and project the market potential of the industry in Hawaii and the mainland.

d. To determine the feasibility of establishing a viable precious coral industry in Hawaii based on local resources.

Methods

In order to assess the economic potential of the precious coral industry in Hawaii, it is essential to examine several aspects of the industry including exploitation, fabrication, and sales. Briefly, these aspects fall into the areas of supply and demand. Supply includes imported coral, as well as local production; demand for precious coral consists of intermediate requirements by jewelry manufacturers, wholesalers, and retailers, and final demand by consumers. Since there appear to be different markets for black coral and pink coral, each was investigated separately.

Practically all information was collected by personal interviews with local coral divers, fishermen, major manufacturers, and persons related to the industry, such as professors, jewelers, store managers, and salesgirls. An attempt was also made to survey consumer attitudes. Governmental agencies either do not have the information or have incomplete data.

SUPPLY OF BLACK CORAL

Distribution

The black corals (Order *Antipatharia*) are found in all oceans. Although 150 species have been described, only 4 have been commercially exploited for jewelry manufacture. In Hawaii, large beds of *Antipathes grandis* exist off Lahaina, Maui, and the southwestern coast of Kauai. Smaller beds have been reported off Sandy Beach, Oahu, and South Point and Mahukona on Hawaii, while scattered colonies have been found off almost all coasts at depths below 30 meters.

Commercial quantities of black coral are also known to occur in the Pacific in the Philippines, New Zealand, Australia, and Korea; in the Caribbean off Cozumel and Mexico; and in two extensions of the Indian Ocean: the Persian Gulf and the Red Sea. It is likely that many new areas will be discovered; thus on a world scale the supply of black coral appears to be quite large.

Since 1958, most of the black coral used locally has been harvested locally. This has been due to both the abundance and high quality of local resources. Local supply, however, appears to be approaching a limit. At the present rate of harvest, most divers consider that in 10 to 20 years the local coral beds will be exhausted. Such estimates must be regarded as guesses, since no field studies of growth rate have been carried out. Extrapolations of the growth rate of 3 branches of *A. grandis* maintained in the laboratory indicate a linear growth on the order of 3 cm per year (Grigg, 1964). Even though this estimate is most certainly conservative, it does permit an estimate of maximum longevity of about 100 years. If this estimate is at all realistic, some regulations of the fishery will be necessary if local resources are to be conserved.

Harvest

Black coral in Hawaii is obtained by scuba divers, at depths between 40 and 80 meters. There are no government regulations restricting the number of coral divers; nevertheless the job, because of its dangerous nature, has not been a competitive one. There are about 10 to 12 regular divers in Hawaii, in addition to an unknown number of amateur divers who dive for coral only occasionally.

Most coral divers work in teams of two or more out of small boats, each costing from $4,000 to $15,000--depending on size. Other required equipment includes the following:

Air tanks (2) @ $65	$130
Regulator	100
Depth gauge	25
Fins	15
Mask	5
Sledge hammer	10
Hatchet	6
Decompression meter	60
Total Initial Investment	$351

There is no regular diving season. The number of days suitable for diving depends on the weather and, thus, varies from month to month, ranging from 0 to 30 days and averaging about 10 days per month.

Colonies of black coral are dislodged from the bottom, generally by means of an ax and sledge. Less often, saws or power heads are used. Most divers tie the coral to lift-bags and float the colonies to the surface. During a dive...which lasts between 10 and 20 minutes, depending on the depth...generally one or two "trees" are collected by each diver. The daily harvest averages 9 pounds, but ranges from 0 to 100 pounds. With the present price of black coral at $7.50 per pound, a diver will average about $70.00 per day but can make as much as $750.00 in one day.

To date, supply has always been greater than demand; thus only a small number of divers depend on black coral as a steady source of income. Most of these divers, in fact, also depend on other resources (fish, turtles, *etc.*) or have other part-time jobs.

Production

Table 1 shows production data for black coral in Hawaii as recorded by the U.S. Bureau of Mines. However, because not all the divers report their harvest to the Bureau of Mines, it can be assumed that these figures are conservative.

TABLE 1. BLACK CORAL PRODUCTION

HAWAII, 1963 - 1969*

YEAR	BLACK CORAL PRODUCTION (lb.)
1963	6,000
1964	9,200
1965	2,300
1966	5,600
1967	4,300
1968	8,000
1969	6,500
1970	9,000**

*Mineral Year Books, 1963-1969, Bureau of Mines, U.S. Dept. of the Interior.

**Estimate based on interviews with divers.

The apparent variability in production between years probably is due to differences in the amount reported by the divers.

The coral divers do not have any specific buyers or buying agents. They sell their product to anyone who is willing to pay the price. In most cases, coral jewelry manufacturers buy the black coral from them individually.

To some extent, the group of black coral divers acts as a monopoly, since it is the only significant source of black coral. Though these divers have not become formally organized, they make joint decisions with regard to price. For instance, until 2 years ago the price of black coral had been $5 per pound. In 1968, the divers thought that they were being exploited and that living costs had increased, so they decided not to sell coral below $7.50 per pound, a price with which the buyers complied. On the other hand, there is a limit to which the divers can increase the supply price. Further increases in supply price may lead to a decrease in demand and/or importation of non-local resources. Such considerations have tended to stabilize the price of raw black coral; thus no large increase in price in the near future is expected.

The present relative market stability would, of course, break down if any large changes in supply or demand were to take place. To date, the method of harvest has produced relatively inelastic supply. This is because only a few divers are experienced and skillful enough to become coral divers. Furthermore, weather as well as the depth of the coral bed limits the amount of time any one diver can spend harvesting coral. Therefore unless there is a change in the method of coral fishing, any future large increase in demand may result in an increase in supply price, assuming of course, that non-local resources do not enter the market. Were the latter to occur, or if improved fishing techniques such as mixed-gas diving increased supply, then relative demand would be expected to decrease, leading to lower prices for raw coral.

Because unscrupulous exploitation of this common-property resource would upset price stability and lead to exhaustion of the resource, any change in supply or demand should be preceeded by careful planning which takes into account growth rates. The present Sea Grant study of the ecology of precious corals in Hawaii will provide growth data that can be used to solve this problem.

SUPPLY OF PINK CORAL[2]

Distribution

The distribution of the precious corals, all of which have been placed in the genus *Corallium*, is worldwide. *C. rubrum*, the ancient red coral of commerce, at one time was widely distributed in the Mediterranean Sea. Now, however, because of over-exploitation, the only known significant beds in the Mediterranean occur off the Islands of Sardinia and Corsica at depths between 30 and 300 meters. In the Pacific, large beds of *Corallium* occur primarily in the West Pacific between the Philippines and Japan, at depths between 100 and 400 meters. Exploitation and depletion have led to wide-ranging exploration and discovery, including banks in the Hawaiian Archipelago. Significant coral beds are known to exist at the present time (a) within the Hawaiian Archipelago, in the Molokai Channel off Oahu and the Milwaukee Banks northwest of Midway; (b) in Japanese waters off the Bonin Islands; (c) on many banks in the seas between Okinawa and Taiwan; (d) off the Pescadores Islands near Taiwan; and (e) on shallow banks in the South China Sea.

Recent History of Pink Coral in Hawaii

From 1966 to 1969 several firms were involved in the harvesting of pink coral in the Molokai Channel. The coral collected ranged from pink to pure white. Unfortunately, only about 10% of coral was of prime color, a shade of pink referred to as "Hawaiian angelskin". The collection of pink coral stopped in 1969, due to bad weather as well as high costs of operation. Unfortunately, there is no record of the amount of pink coral collected during this period, but estimates place the total amount at 4,000 pounds.

In 1970 the present Sea Grant program surveyed the bed with still and television cameras. These surveys indicate the bed covers about 2 square miles and is valued at $4 million. In addition, considerable quantities of gold and bamboo coral were discovered...two other gorgonians which are likely to be accepted as precious coral.

Harvest

The method employed in Hawaii for harvesting pink coral is similar to the Japanese technique which utilizes tangle nets attached to stones. The gear is dragged across the bottom where the stones serve to dislodge the coral, after which it is entangled in the nets. This method obviously is a hit-and-miss operation; however, the primary reason it has not proved to be economically successful is because dredging vessels locally have employed only one line per haul. Japanese vessels, in contrast, lower up to 16 lines at one time. Obviously, U.S. vessels must increase their fishing effort by using more lines if they are to become competitive.

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[2]Includes white and red corals in the genus *Corallium*.

The University of Hawaii is planning to study the economic feasibility of collecting coral with a submersible. This technique will allow selective harvest and probably will necessitate management to conserve the resource. Growth studies using radioactive C^{14} as a tracer are being conducted to determine the growth of the coral. These data will allow management recommendations.

Imported Pink Coral

Except for the period between 1966 and 1969 when a small amount of pink coral was harvested locally, the precious coral jewelry industry in Hawaii has depended totally upon imported resources. Imports include three categories of pink coral: crude or raw coral; coral polished, but unset; and coral jewelry. During the survey, it was found that the first and third categories of imports are insignificant. The second category (polished, but unset) is favored because of the high cost of local labor for cutting and polishing coral, and because of import taxes which range between 24% and 30% on finished coral jewelry. Polished, unset coral constitutes more than 90% of imported coral.

Table 2 shows annual import data for coral of the second category for the years 1966 through 1970. These data indicate a consistent and substantial increase in the amount of precious coral imported. Except for a small amount imported from Okinawa and Italy, all imported precious coral comes from Japan, Taiwan, and Hong Kong, with the Japanese coral constituting about two-thirds and the Hong Kong and Taiwanese corals sharing the other third.

TABLE 2. ANNUAL IMPORT OF CORAL POLISHED, UNSET

HAWAII, 1966 - 1970*

YEAR	TOTAL VALUE ($)
1966	13,366
1967	58,578
1968	122,253
1969	133,990
1970	140,000**

*Foreign Trade Report No. IM154, 1966-1970, Custom District 32 - Hawaii, U.S. Department of Commerce, Bureau of Census.

**Estimate based on local survey.

Raw coral is sold at auctions...generally in Kochi or Kobe, Japan.[3] The wholesale price for coral of prime size, state, and color is about $200 per pound at the Japanese auctions. Prices for prime red coral and white coral are about $150 per pound and $3 per pound, respectively. Polished coral is sold by the *momme*, a unit which is equivalent to 3.75 grams or 0.13 ounces. According to the grades and color, the prices range from less than $2 per *momme* to more than $20 per *momme*.

FIGURE 1. SYSTEM FOR GRADING PINK CORAL

POOREST GRADE	C	B	A	PRIME GRADE	A	B	C	POOREST GRADE
WHITE ◄	DECREASING DARKNESS ◄			MEDIUM PINK "ANGELSKIN"	►	INCREASING DARKNESS	►	LIGHT RED

Future of Pink Coral Supply

If extensive pink coral beds are discovered in the Hawaiian waters, it will probably require about a year to develop a fishery. Therefore, for the next year imported polished coral should continue to be the major supply input for the pink coral jewelry industry in Hawaii. Grigg, in his study of the status of the precious coral industry in the Orient, reported that production of pink coral had been declining, and prices were going up (Grigg, 1971). Manufacturers in Hawaii also claim there has been a considerable increase in import prices in recent years. Thus, it would appear that coral jewelry manufacturers must increase factory efficiency or be forced to raise product prices. Future discoveries of coral, of course, could easily change this trend.

Discovery and exploitation of pink coral beds in local waters are important in securing a steady supply, so as to insure the future stability of this young industry.

[3]The price of the coral depends on size, state, and color. Size as measured by branch diameter is sorted into 5 classes, the largest being the most valuable. State refers to the living condition of the coral, ranging from colonies which were collected alive to those which had fallen to the bottom and are in various degrees of decomposition. Traditionally, light pink or angelskin coral is considered to be prime color, darker and lighter varieties being progressively less valuable (Fig. 1).

THE INDUSTRY IN HAWAII (INTERMEDIATE DEMAND)

Today in Hawaii there are at least fifteen jewelry manufacturers involved in the manufacturing of precious coral jewelry, and 150 to 200 stores which retail coral jewelry. At the present time more than 10,000 pounds of black coral are consumed annually, producing jewelry valued at $1.7 million retail. The retail value of pink coral is estimated to be about $2.5 million.

Through the survey of the coral manufacturers in Honolulu, it was discovered that many bigger factories have realized a significant increase in productivity (more than 10% annually). The main reasons for this are improved labor skills and the use of more efficient machinery. Thus, in spite of the fact that the supply price for pink coral has been increasing, the major manufacturers have been able to maintain product price.

Table 3 gives an example of cost breakdown for a piece of pink coral jewelry. Note that for a piece of coral jewelry set in gold, the gold and its casting constitute a significant fraction of the total cost...in this case, 28%...while the coral stone itself is less significant in terms of cost. Generally, for a piece of pink coral jewelry set in gold, the cost of coral stone varies from 5% to about 20% of the total cost. In the case of black coral jewelry, the fractional value of the black coral stone sometimes is as high as 40%, since black coral jewelry often is not set in gold. However, the value of the coral stone itself is not important. Rather, it is the presence of the coral which determines whether or not the whole piece of jewelry is sold.

Labor cost is another important factor in production cost. Naturally, any innovation in providing more efficient methods of stone cutting will help the industry greatly. In 1971, approximately 200 people in the state were employed manufacturing coral jewelry. Future growth of the industry will provide new job opportunities, especially for unskilled female labor.

TABLE 3. COST BREAKDOWN FOR A PIECE OF PINK CORAL JEWELRY

ITEMS	PERCENTAGE OF TOTAL*		COST	
1. MATERIALS				
Coral	10.0		$1.50	
Gold	20.0		3.00	
Box	5.0		0.75	
SUBTOTAL		35.0%		$ 5.25
2. LABOR				
Casting	8.0		1.20	
Assembly	5.0		0.75	
Management	5.0		0.75	
Other indirect labor	15.0		2.25	
SUBTOTAL		33.0%		$ 4.95
TOTAL PRODUCTION COST		68.0%		$10.20
3. OTHER COSTS				
Selling Expense	10.0		1.50	
Overhead	12.0		1.80	
TOTAL OTHER COST		22.0%		$ 3.30
PROFIT		10.0%		$ 1.50
WHOLESALE PRICE		100.0%		$15.00
RETAIL PRICE		200.0%		$30.00

*The wholesale price is taken as 100%.

CONSUMER DEMAND

Historically, both black and pink coral have been used for personal adornment, but pink coral is better known than black coral as a gem stone. Although both have been listed in the Jewelers' Manual as semi-precious stones, some jewelers still do not accept black coral as a gem stone. It may also be noted that black coral is softer than pink coral.

Consumers of precious coral jewelry in Hawaii can be categorized as either local residents or tourists. How do these two groups of consumers view black coral and pink coral? Three attitudes can be distinguished: (a) coral jewelry valued purely for its precious stones; (b) coral jewelry representing jewelry-cum-souvenir from Hawaii; and (c) coral jewelry as purely a souvenir item. The first attitude characterized all local consumers, since a local product may be assumed to have no souvenir value to local people. The attitudes of the tourists, of course, are more diversified and undoubtably include all three views.

Black Coral Jewelry

Very few people in Hawaii knew about black coral until its discovery in 1958. When the first black coral jewelry was made, the manufacturer's attention was toward tourists. The tourists bought black coral because it was an exotic product from Hawaii found in the deep sea. However, as the local people got more exposure to the new product, many began to consider black coral as a scarce, natural precious stone. A recent survey in the shops selling black coral jewelry in the Ala Moana Shopping Center disclosed that about 30% of the black coral jewelry is sold to the local people. However, since there are coral jewelry stores in many tourist areas, such as Waikiki, it is estimated that only about 15 to 20% of the total black coral jewelry is bought by local people. Among local consumers some older people seem to prefer black coral to pink coral. Among tourists, Japanese seem to prefer black coral because it is not found in Japan, while pink coral is readily available in Japan. For those tourists who consider black coral as a souvenir item from Hawaii, low-price black coral jewelry is available, such as some branch-pins, tie-tacks, and cuff-links which are not set in 14 kt. or 18 kt. gold, but are set in gold-filled material; these are very popular because they cost as low as $3.00 per piece. Some gift shops even sell small bags of raw black coral as souvenirs for tourists to take home. Thus, though there is considerable local demand, the "souvenir" element seems to be quite strong in the demand for black coral jewelry.

Pink Coral Jewelry

Though pink coral can be considered as an established semi-precious stone for many centuries, the pink coral jewelry industry started in Hawaii in a manner similar to black coral, with a strong orientation towards tourists. For instance, the phrase "Hawaiian angelskin coral" was used to attract the attention of tourists. Throughout the world, of course, pink coral has maintained a position as a semi-precious stone. One of the main reasons is that its supply price is high. The fact that a small piece of

unpolished pink coral branch costs about $20.00 will scare away most tourists who wish to keep it as a souvenir. Another reason is that it is quite hard. Also, its color is generally accepted by most people of the world. Of course, the fact that it has been highly valued in other parts of the world for many centuries also affects consumer attitude. The survey conducted for stores selling pink coral jewelry in the Ala Moana Center showed that more than 40% of the pink coral jewelry was sold to local people. In general, local people prefer pink coral to black coral. Most pink coral is set in either 14-karat or 18-karat gold. Thus most pink coral jewelry costs from $20.00 to over $60.00 per piece.

Pink coral, of course, has souvenir value, even though its value seems to be more as a precious stone than as a souvenir item. It is interesting to note that what is labeled "genuine Hawaiian angelskin" is pink coral imported from Japan, although it may well have been harvested in the Hawaiian Archipelago by Japanese fishermen.

High-price vs. Souvenir Jewelry

The question at issue here is how the consumers value black coral and pink coral. Both possess common characteristics of precious stones: being natural resources, each has a unique color and form with some aesthetic value, and most important of all, both are scarce and difficult to collect. In addition, the fact that both are from the ocean makes them different from other gem stones. There is little doubt that black coral is of less value as a gem stone than the pink coral, white coral, and red coral because of the differences in hardness, color, and historical use.

Besides the characteristics possessed by a gem stone which make it valuable, the producers...in this case the jewelry manufacturers...can change the value of the gem stone in many ways. This is especially true with semi-precious stone jewelry. To put it differently, the consumer attitude will vary according to the manner a semi-precious stone is presented. Precious coral can maintain its status as well as value as a semi-precious stone only if it is presented consistently in the form of high-priced jewelry. In this context, high-priced jewelry refers to coral jewelry that is set in gold, 14-karat or 18-karat, and may be also coupled with other precious stones such as diamonds, jade, and pearls, in contrast to low-priced jewelry which is set in gold-filled material. Today, in the Hawaiian market nearly all pink coral jewelry falls in the category of high-priced jewelry; however, some of the black coral jewelry items (some pins, tie-tacks and cuff-links) can be classified as low-priced jewelry. It should be remembered that the demand for coral jewelry does not mean the demand for precious coral *per se*; it is a demand for the whole package, including all components of the jewelry.

Thus, if any firm with the intention of popularizing precious coral as a souvenir item from Hawaii introduces a large quantity of low-priced precious coral jewelry, the value of precious coral as a semi-precious stone will gradually diminish. Fortunately, the survey indicated very little, if any, of this tendency in the case of pink coral jewelry. However, such a tendency was evident for black coral jewelry. In the short run such action may increase the total demand for precious coral in the local market and the

total profits, but in the long run the value of precious coral as a semi-precious stone will decrease and all manufacturers will suffer. Therefore if precious corals, both black and pink, are to maintain position as semi-precious stones in the world market, such action should be discouraged.

In summary, local consumers constitute about 15% to 20% of the local market for black coral and 20% to 30% of the local market for pink coral. The remaining 80% to 85% of the black coral market and 70% to 80% of the pink coral market cater to tourists. Hence, in projecting the future Hawaiian market for precious coral, one must look at the tourist market and the local consumer market separately, since each has a distinct demand curve.

Future Hawaiian Market

The tourist demand for coral jewelry will largely depend on total tourist expenditures in Hawaii, because a certain portion of these expenditures will be for jewelry and souvenirs. Table 4 shows that the Hawaiian tourist industry has flourished since 1959. The total visitor expenditure is predicted to continue to increase, although perhaps not at such a high rate. Therefore, the demand for coral jewelry is expected to increase slowly.

TABLE 4. TOTAL VISITOR EXPENDITURE AND PERCENTAGE OF CHANGE HAWAII, 1959 - 1969*

YEAR	TOTAL VISITOR EXPENDITURE ($ millions)	PERCENTAGE OF CHANGE
1959	109	
1960	131	+ 20.0
1961	137	+ 4.6
1962	154	+ 12.4
1963	186	+ 20.8
1964	225	+ 20.9
1965	265	+ 17.8
1966	302	+ 14.0
1967	400	+ 32.4
1968	460	+ 15.0
1969	576	+ 25.2

*The State of Hawaii Data Book, Department of Planning and Economic Development, Honolulu, Hawaii, 1970.

Future local coral jewelry consumption may be indicated by both the total jewelry consumption expenditure in Hawaii and the total personal income of the State. Table 5 shows that both jewelry consumption and total personal income have been increasing steadily from 1959 to 1968, and both are expected to continue to increase in the future. Therefore, the coral jewelry consumption by local residents can also be expected to increase, hopefully by more than the amount needed to offset inflation.

TABLE 5. TOTAL JEWELRY CONSUMPTION* AND PERSONAL INCOME**

HAWAII, 1959 - 1968

YEAR	TOTAL JEWELRY CONSUMPTION ($1,000)	TOTAL PERSONAL INCOME ($ millions)
1959	8,400	1,315
1960	9,000	1,478
1961	9,300	1,598
1962	10,000	1,680
1963	10,200	1,776
1964	11,200	1,912
1965	12,420	2,018
1966	15,380	2,225
1967	17,840	2,411
1968	20,280	2,705

*Sharp, Albrecht, & Ifuku. Hawaii's Income & Expenditure Accounts, 1958-1968, Economic Research Center, Univ. of Hawaii, 1970.

**The State of Hawaii Data Book, Department of Planning & Economic Development, Hawaii, 1970.

The above discussion implies that the total demand for coral jewelry in Hawaii will increase as long as both visitor expenditure and personal income in Hawaii increase. Time-series data for total coral jewelry sales in Hawaii are not available. However, coral jewelry sales indices for several coral jewelry manufacturing firms give some idea of the growth of the industry. (See Table 6.)

TABLE 6. CORAL JEWELRY SALES INDEX OF SEVERAL CORAL FIRMS

HAWAII, 1963 - 1969

YEAR	SALES INDEX 1963 = 100	PERCENTAGE OF CHANGE
1963	100	
1964	135	+ 35
1965	294	+ 118
1966	412	+ 40
1967	507	+ 23
1968	643	+ 27
1969	711	+ 11

Data in Table 6 represent sales of a relatively new industry in Hawaii. This fact suggests that the percentage of change during initial years is probably inflated and that future growth of the Hawaiian coral jewelry market will probably be limited by the rates of growth for visitor expenditure and the personal income of the State. Any attempt to expand demand further will probably require expansion of the local industry into mainland and world markets.

Mainland and World Market Potential

Last year, about one half of one percent of the total coral jewelry sales of Hawaii were to mainland markets. The fact that a large proportion of the coral jewelry consumers are tourists from the U.S. mainland does not necessarily mean that it has a great potential for the market on the mainland. However, because precious coral is a unique semi-precious stone does mean that it will be accepted by many people on the mainland if properly advertised. Except for the tourists and the jewelers, very few people on the mainland know anything about precious coral from Hawaii. Since 1969, precious coral jewelry, pink and black, has been shown at the annual International Jewelry Exhibit on the mainland; since then some interest in this new product has been expressed by some of the mainland jewelers.[4] Mainland consumers, however, still know very little about precious coral. Hence, it

[4]One Hawaiian jewelry store has been advertising annually in a national magazine. Hundreds of inquiries from the mainland have been received asking for more information about precious coral. Mail orders from the mainland were also received.

is up to the jewelers in Hawaii...or perhaps the State...to promote coral jewelry if mainland expansion is to come about. The mainland market will be the first step toward expansion into the world market.

Once the mainland market is established, some conflicts may arise and precautions should be taken. If Hawaiian coral jewelry is to enter the mainland market, its production efficiency and production costs must be at least on a par with those of the mainland jewelers, since the jewelers of the two markets will then be competing. Consequently, manufacturers with a large investment and capital may be able to expand, while smaller concerns may be gradually eliminated.

Other Precious Corals

Several other types of coral are also found in the Hawaiian waters together with the pink coral, such as the gold coral, bamboo coral, and gold-bamboo coral. Because of their uniqueness in color and forms, these species of coral have potential as semi-precious stones. Many coral jewelry manufacturers have indicated great interest in experimenting with these new products, provided a sizeable initial supply (at least several hundred pounds) is available.

CONCLUSIONS AND RECOMMENDATIONS

Future Market

The Hawaiian precious coral jewelry market, both black and pink, will probably increase at a rate parallel to the rate of increase of tourist expenditures and personal income of the state. Any large increase in supply of coral jewelry in the Hawaiian market will probably flood the market and lower the value of precious coral. However, there appears to be good market potential on the mainland as well as globally. By and large, pink coral seems to have a greater market potential than black coral. Obviously the future of the precious coral industry, whether or not its potential can be realized, will largely depend on the discoveries of coral beds and the development of an efficient method of collection and management.

Coral Bed Discoveries

The University of Hawaii, utilizing dredging, TV survey equipment, and a submersible, will play a continuing role in the discovery of new coral beds. This information will provide a guide both for coral bed management and for coral harvesting. The waters surrounding the Hawaiian Archipelago and the islands of the U.S. Trust Territories include large areas where conditions are judged to be suitable for the growth of precious coral.

Coral Bed Management

Utilizing estimates of the rate of growth of the precious coral species, and knowing the total coral reserves in the State of Hawaii, it will be possible to calculate an optimum rate of removal. New and more efficient means of harvest will necessitate enforced management of the resource.

Government Policy

The State should assist in the management of coral beds by regulatory measures. Once the coral fishery has become competitive, control of entry and fishing effort may be necessary. Regarding the legal aspects, the Department of the Interior should be urged to include precious coral as a creature of the Continental Shelf. In addition, if extensive beds are discovered in areas which geologically form part of the Hawaiian Archipelago but legally are excluded from the Continental Shelf, clarification of ownership will be necessary.

Promotion and Control of Product

Promotion of coral jewelry on the U.S. mainland should emphasize the genuine gem quality of the precious coral and should be aimed at the general public rather than the jewelers. Promotion funds might be obtained cooperatively from all interested manufacturers, possibly with matching funds from the State. In order to prevent value deflation of precious coral as a semi-precious stone, quality control may also be desirable.

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