CIBJO The World Jewellery Confederation
est. 1926

CIBJO Guides

Precious Coral

"People Protect what they Love"

Jacques-Yves Cousteau

...and throughout the ages we have adored Precious Coral

Introduction

The jewellery industry defines precious corals are those that are used in jewellery and decoration, specifically red, pink and white varieties with porcelain like lustre after polishing. They are limited to few species belonging to the Corallidae family, consisting of the three following genera: Corallium, Pleurocorallium and Hemicorallium. They have a specific gravity of approximately 2.8 and a hardness of 3½ on Mohs scale.

This text serves as a simple guide for all those involved with coral and coral jewellery. The contents conform with accepted trade practices and nomenclature for the industry as recommended by CIBJO, The World Jewellery Confederation. This simple guide to precious coral does not constitute a gemmological manual for the testing of precious coral, nor for identifying the species of precious coral, but rather is designed as a support to educational programs. The identification of coral requires experience and scientific/gemmological skills. The conclusive identification of coral species is a complex task, usually requiring advanced testing techniques including trace-element analysis and DNA “fingerprinting”.

Importantly, this guide to Precious Coral does not substitute for, but rather compliments, the CIBJO Coral Book that is available as a free download at https://www.cibjo.org/the-blue-books/. It is recommended that readers also refer to the CIBJO Coral Book whenever uncertainty occurs.

Distinguishing between precious, common and reef coral

Precious coral species live in a different ecosystem than reef and common coral species. Reef-building corals ("Coral reef") inhabit shallow water in specific ecosystems such as the Great Barrier Reef and the Caribbean, as well as deeper waters where they are known as mesophotic corals, found at depths of 30-150 metres and these corals are not considered precious corals or used the jewellery industry. Common corals of both calcareous and non-calcareous types are also not considered to be precious coral some being be found in coral reefs. Common corals Include species from the Isidae, Primonidae, Parazoanthidae, Helioporidae, Melithaeidae, Sylasteridae families and the Antipatharia order. These are only rarely found in jewellery but they have been used for the production of ornaments, typically after treatment by polymer impregnation, bleaching or dying. Nowadays, Precious corals are collected 50 meters below the surface of the sea/ocean See Figure 1.

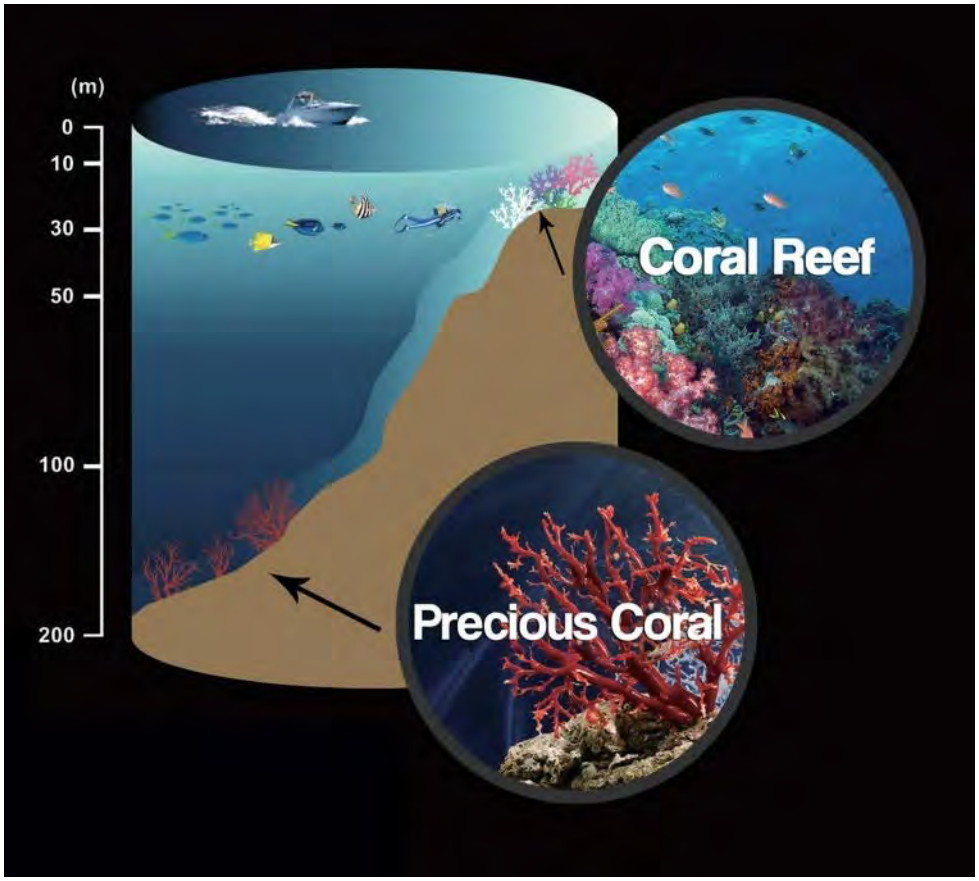


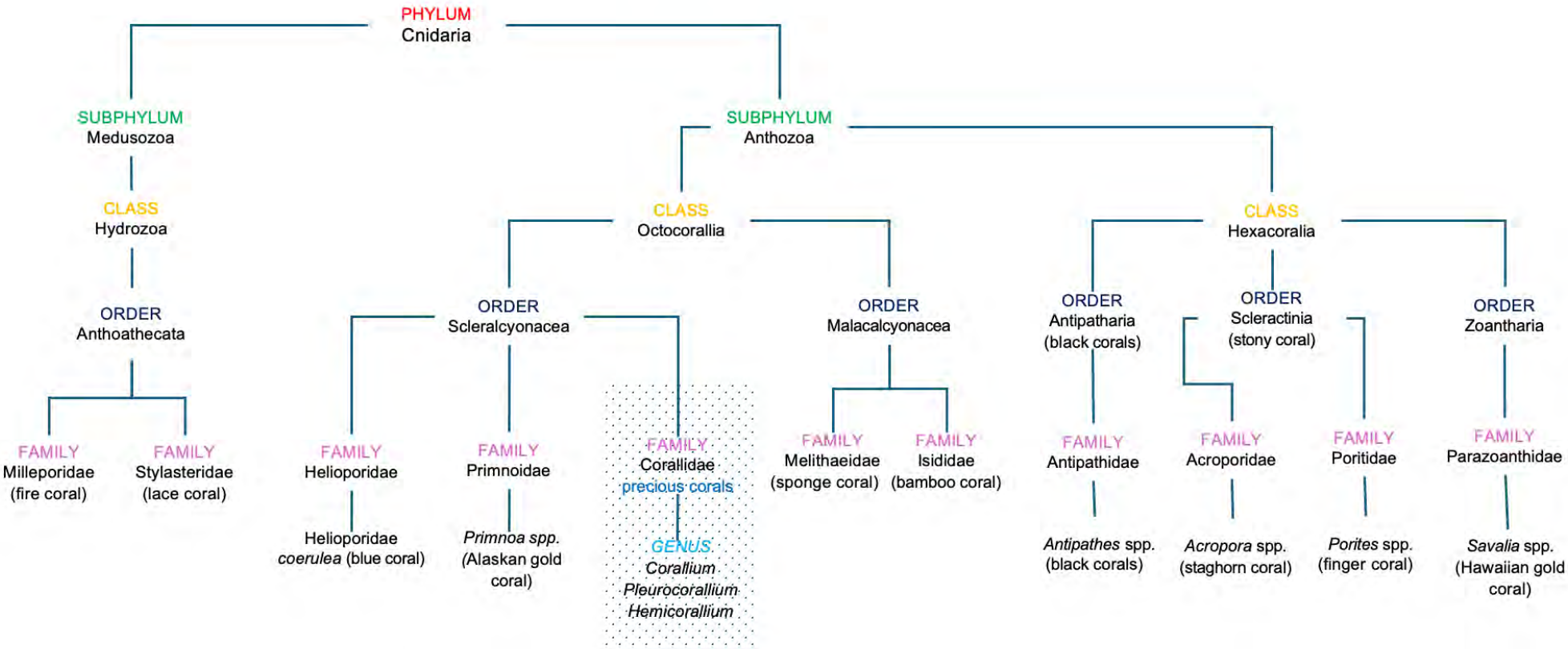
Figure 1: Most reef coral is located at approximate 8–20 m below sea level, whereas precious coral, such as "Aka" used in this example, is at depths of around 50–200 m and more.

Precious Coral Commercial and Proper Names

Commercial name	Scientific name
Aka	*Corallium japonicum*
Angel's skin	*Pleurocorallium elatius (colour variation)**
Bello	*Corallium rubrum (colour variation)*
Bello di Sciacca	*Corallium rubrum (colour variation from Sciacca deposit)*
Bianco	*Pleurocorallium konojoi*
Bianco Rosa	*Pleurocorallium secundum*
Boké	*Pleurocorallium elatius (colour variation)*
Cerasuolo	*Pleurocorallium elatius*
Deep Sea	*Hemicorallium laauense*
"Garnet" coral"	*Hemicorallium regale*
Magai	*Pleurocorallium elatius (colour variation)*
Mediterranean	*Corallium rubrum*
Midway	*Pleurocorallium secundum*
Miss	*Hemicorallium sulcatum*
Missu	*Hemicorallium sulcatum*
Misu	*Hemicorallium sulcatum*
Momo	*Pleurocorallium elatius*
Moro	*Corallium japonicum*
Oxblood	*Corallium japonicum*
Peau d'Ange	*Pleurocorallium elatius (colour variation)**
Pelle d'Angello	*Pleurocorallium elatius (colour variation)**
Pure White	*Pleurocorallium konojoi*
Rosato	*Pleurocorallium secundum*
Sardegna	*Corallium rubrum*
Sardinian	*Corallium rubrum*
Satsuma	*Pleurocorallium elatius*
Sciacca	*Corallium rubrum (from Sciacca deposit)*
Shinkai	*Hemicorallium laauense(cryptic species)*
Shiro	*Pleurocorallium konojoi*

* rarely, the commercial name may be also used for colour variation of *Corallium rubrum* and *Corallium japonicum*.

Simplified Coral Taxonomy



Common Coral Species

Bamboo coral

A common coral from the large, flexible and segmented species of the *Isididae* family composed of white calcitic internodes and dark keratinous gorgonian nodes, including species of the genera *Isis*, *Lepidsis* and *Acanella*. The white calcite component is commonly bleached and then dyed pink or red to imitate precious coral. Occurs practically worldwide, notably in Tasmania, New Zealand and USA waters. Also known in the trade as “mountain coral”, “Chinese coral”, “sea bamboo coral”, “king coral”, “tiger coral” and “jointed coral”.

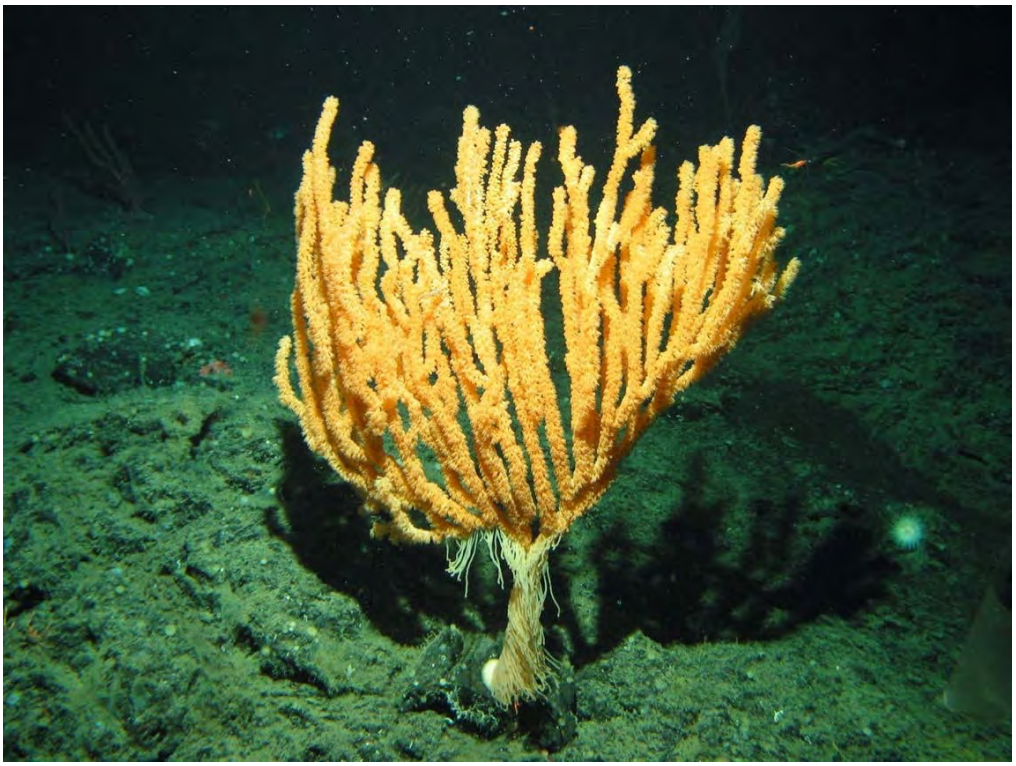


Figure 2: A specimen of Bamboo Coral; https://commons.wikimedia.org/wiki/File:Isidella_tentaculum_-_NOAA.jpg

Black coral

The generic designation of the colonial common coral belonging to the order *Antipatharia*. This forms quite flexible, spiny, tree like, unbranched or branched colonies composed of protein and chitin (non-calcareous skeletons) with very dark brown to black colour. Bleaching is common to obtain golden coloration. Common commercial names include accarbaar, akabar, horn coral and king coral. Black coral occurs almost worldwide, especially in strong current environments at depths up to 6000 meters, namely in the Caribbean, Hawaii and Oceania. All corals belonging Antipatharia order, including the *Antipathes* genus (*Antipathes* spp.) are listed in Appendix II of CITES.

Figure 3: A specimen of Black Coral: Black coral https://commons.wikimedia.org/wiki/File:Aphanipathes.jpg

Blue coral (*Heliopora coerulea*)

A reef building coral of calcareous composition belonging to the family *Helioporidae* specially the *Heliopora coerulea*. It has a distinct blue colour, with a rough and porous skeleton that usually requires resin impregnation to be used as ornament. Occurs in Indo-Pacific shallow waters and, as a reef building coral, is protected and hardly seen as a gem material today. This species is listed in the Appendix II of CITES. Also known in the trade as blue ridge coral, blue sponge coral and denim coral.

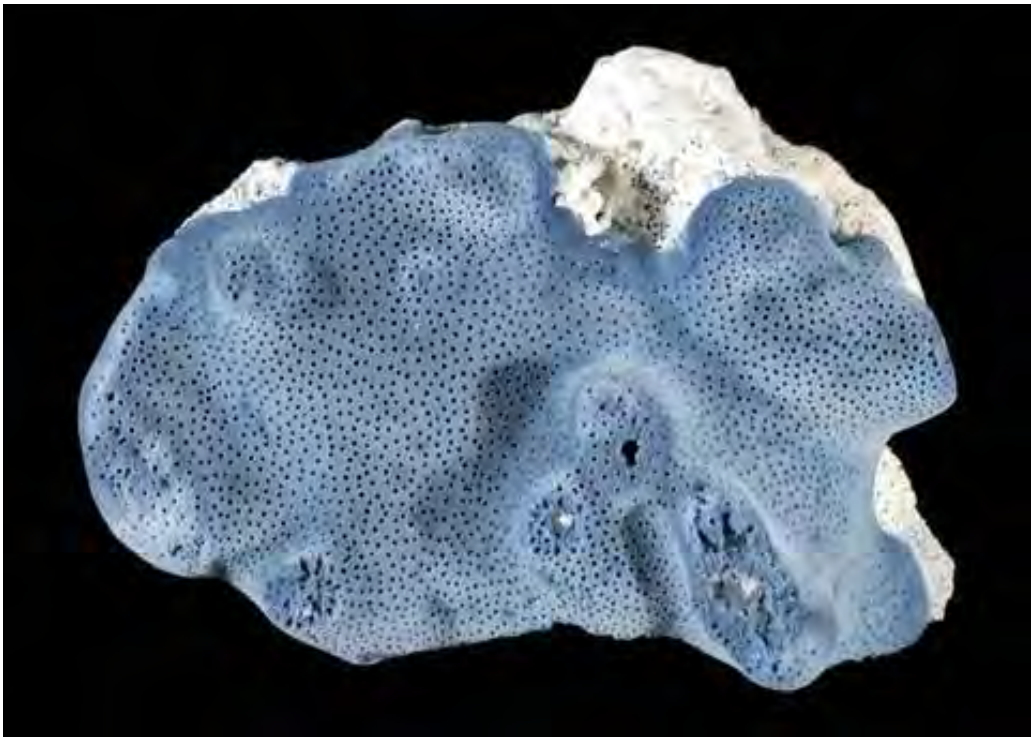


Figure 4: A specimen of Blue Coral: By Eric A. Lazo-Wasem - Gall L (2019). Invertebrate Zoology Division, Yale Peabody Museum. Yale University Peabody Museum. Occurrence dataset https://doi.org/10.15468/0lkr3w accessed via GBIF.org on 2019-08-31. https://www.gbif.org/occurrence/1039258522, CC0, https://commons.wikimedia.org/w/index.php?curid=81751518

Sponge coral

A common coral belonging to the family Melitidae of the order Malacalcyonacea. Its name is derived from its similar appearance to sponges. Until recently sponge coral was not used for jewellery because it has too many holes. As such, to be used in jewellery today, it relies on being filled with resin or a polymer and being polished. In addition to being filled, some material is also dyed, and a small amount of sponge coral has reportedly been “pressed” (crushed up), and mixed with epoxy to be formed into desired shapes. Sponge coral is often sold as natural Congi or “red spongy coral”.

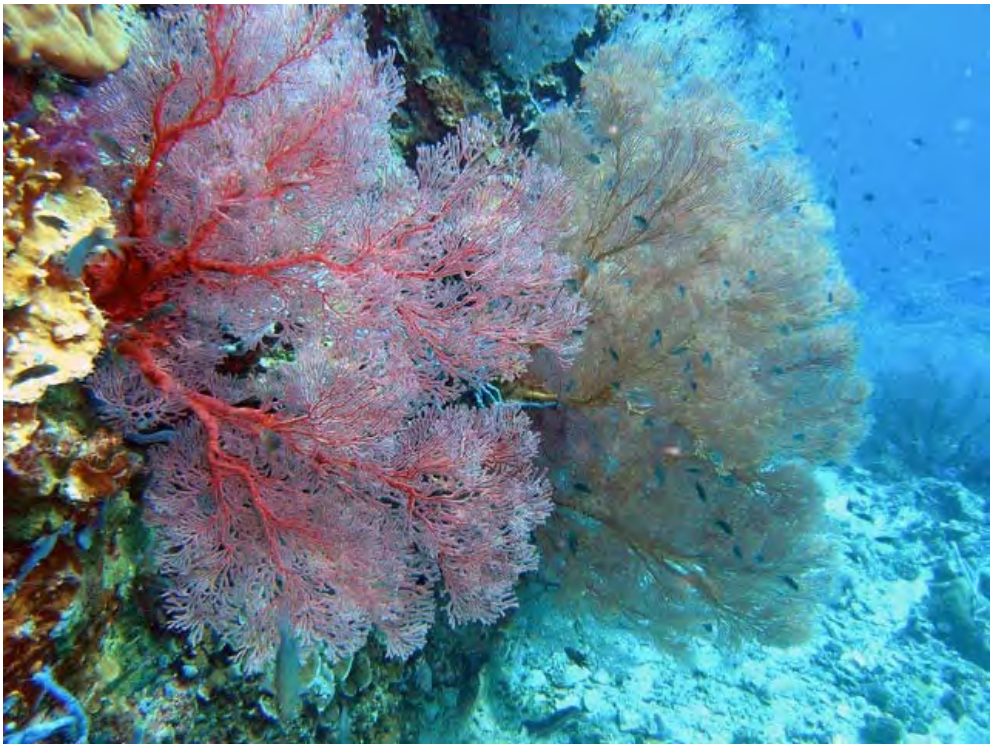


Figure 5: A specimen of Sponge Coral: By Anders Poulsen, Deep Blue (http://www.colours.dk/) - http://www.colours.dk/anders/diving/corals/gorgonian/gorgonian.html, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=1843988

Golden coral

Natural golden colored non-calcareous varieties belonging to the Primnoidae family with characteristic ring growth structures that occur at various depths, up to 1000 meters or more, in Alaskan waters, USA, and to the *Zoanthidae* family, notably *Kulamanamana haumeaae*, also with characteristic growth structures that lives at depths of 340-580 meters in Hawaiin waters that, after polishing may acquire a characteristic sheen effect. Black coral may be treated to obtain golden colour.

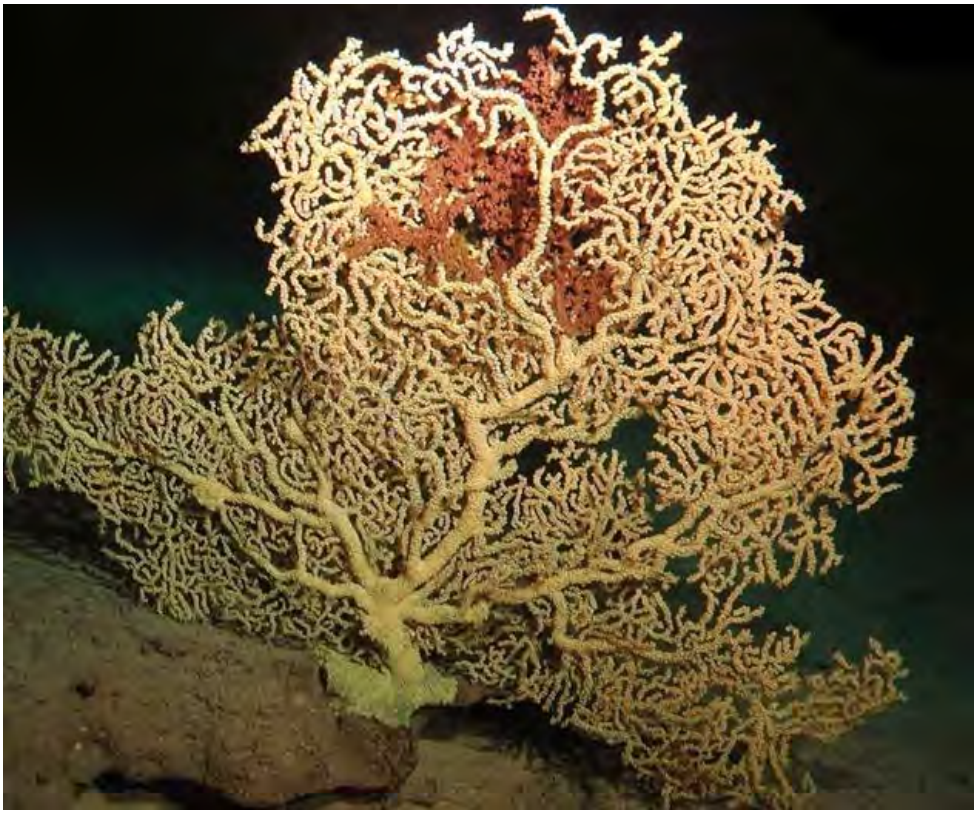


Figure 6: A specimen of Golden Coral: by Sinniger, Frederic; Ocaña, Oscar V.; Baco, Amy R. (2013). Diversity of Zoanthids (Anthozoa: Hexacorallia) on Hawaiian Seamounts: Description of the Hawaiian Gold Coral and Additional Zoanthids (Report). 8. PLOS ONE. pp. e52607. Bibcode:2013PLoSO...852607S. doi:10.1371/journal.pone.0052607. PMC 3541366. PMID 23326345., CC BY 2.5, https://commons.wikimedia.org/w/index.php?curid=137419670

Lace coral

Pink-to-red branches of the common coral of the Stylaster genus from the Stylasteridae family, with similar visual characteristics to some precious corals. Apart from a totally different taxonomy and geographic distribution, these have a different compositions (aragonitic skeleton, compared with the calcitic skeleton of Corallidae species) and are usually dyed and impregnated to imitate precious corals. All of these species belonging to the Stylasteridae family have been listed in Appendix II of CITES since 1990.

Figure 7: A specimen of Lace Coral: By Seascapeza - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=27719491

Washington Convention CITES

The Convention on International Trade in Endangered Species

The Washington Convention — CITES, entered into force in 1975, in response to concerns that many species were becoming endangered because of international trade. Because this trade crosses national borders, international collaboration and cooperation is crucial to ensure this trade is sustainable and controlled and does not threaten or endanger wildlife.

CITES regulates international trade in species by including species on one of three Appendices.

Appendix I — species that are threatened with extinction that cannot be traded internationally for primarily commercial purposes, unless permitted in exceptional circumstances (e.g. scientific research).

Appendix II — species that are not necessarily threatened now, but that may become so unless trade is controlled. They can be traded internationally for commercial purposes, but within strict regulations, requiring determinations of sustainability and legality.

Appendix III — species that are not endangered and that have been included at the request of a country which then seeks the cooperation of other countries to help prevent what considers to be unsustainable or illegal exploitation. The main objective is monitoring.

Coral groups included in the CITES Appendices II

Black coral (*Antipatharia* spp.) see Figure 3
Blue coral (*Heliopora coerulea*) see Figure 4
Stony corals (*Scleractinia* spp.)
Organ-pipe corals (Tubiporidae spp.)
Fire corals (Milleporidae spp.)
Lace corals (Stylasteridae spp.) see Figure 7

Coral groups included in the CITES Appendix III

Red and pink coral (*Corallium elatius, C. japonicum, C. konojoi, C.secundum*), at the request from China.

Coral groups which are NOT included in the CITES Appendices

Mediterranean coral – *Corallium rubrum*
"Garnet" coral – *Hemicorallium regale*
Deep sea coral – *Hemicorallium laauense*
Misu coral – *Hemicorallium sulcatum*
Bamboo coral (Isididae)
New coral (Not classified)

International regulation

Information for traders, customs and shipping agencies

Commercial name and Scientific name	CITES Appendix	Note and Comment
Mediterranean Sardinian Sciacca *(Corallium rubrum)*	Not included in any CITES Appendix	Can be exported and imported in every country
"Garnet" coral *(Hemicorallium regale)*	Not included in any CITES Appendix	
Deep sea *(Hemicorallium laauense)*	Not included in any CITES Appendix	
Misu Missu Miss *(Hemicorallium sulcatum)*	Not included in any CITES Appendix	
Midway *(Corallium secundum)*	CITES Appendix III	Requested by China, but lives only in the Pacific Ocean
Aka Moro Oxblood *(Corallium japonicum)*	CITES Appendix III	Requested by China
Cerasuolo Momo Satsuma *(Corallium elatius)*	CITES Appendix III	Requested by China
White *(Corallium konojoi)*	CITES Appendix III	Requested by China
Angel skin Boké Magai *(Corallium elatius)*	CITES Appendix III	Requested by China

Coral included in Appendix III:

Enacted in 2008, expired in 2013 and extended until 2016, when CITES must pronounce definitively to include in Appendix II or exclude it from the Washington Convention.

Fish and wildlife

Any importer in Switzerland and the United States requires a Fish and Wildlife licence to import coral.

Coral Value Criteria

Understanding the value of precious coral requires the full acknowledgment of the value factors associated with the various types and species of precious coral, these are; colour, colour distribution, lustre, surface quality, size and symmetry.

Considerable practical experience is required to be able to classify precious corals in terms of their value. Precious corals do not have an internationally accepted grading system for any of those factors, let alone an holistic classification.

Colour

The most valued colour differs from species to species. For example, reds are much more appreciated than oranges in Mediterranean coral, *Corallium rubrum*. Darker saturated reds are much appreciated in oxblood coral, *Corallium japonicum*, and a flesh light pink hue is high popularity in the angel skin variety of *Corallium elatius*.

Colour distribution

The greater the uniformity of the colour, the higher the value. In Mediterranean coral, colour is almost always uniform. In oxblood coral, for example, the presence of the large whitish core, although a valid diagnostic feature, is not commercially desirable. In other precious corals, especially in angel skin, it is very rare to obtain uniform pink colours throughout the bead or cabochon. This value factor related to the coral variety in question, but, in general, any contrasting streak or spots as well as veins or colour zoning have implications on the value of the coral.

Precious coral regulations for harvesting

“We, the jewellery industry, have experience of joining hands with civil society to show that the precious objects we produce are a force for good, and while we may create non-essential products, we are an essential industry,” Dr Cavalieri said. “People need to associate coral jewellery with good environmental management. Environmentally conscious consumers should go out of their way to purchase precious coral jewellery, and certainly not avoid it.”.

“The CIBJO’s president’s proposal was received warmly by attendees at the Pacific Precious Coral Forum, and was supported by Ming-Li Hung, President of the Taiwan Jewellery Industry Association, who agreed to seek full membership as a national association in CIBJO, and work toward the establishment of the CIBJO Precious Coral Commission at the 2014 CIBJO Congress in Moscow“.

The Promise of Sustainability

According to Vona, Sciarelli and Turriziana (see appendix A) the coral sector represents a clear example of integrated sustainability, in which the protection of the marine environment is accompanied by economic development and the preservation of cultural traditions. Through responsible resource management and the adoption of innovative technologies, this sector not only contributes to the conservation of marine ecosystems, but also enhances the cultural and intangible heritage of local communities, demonstrating how sustainability can be pursued holistically, while fostering economic growth and community resilience.

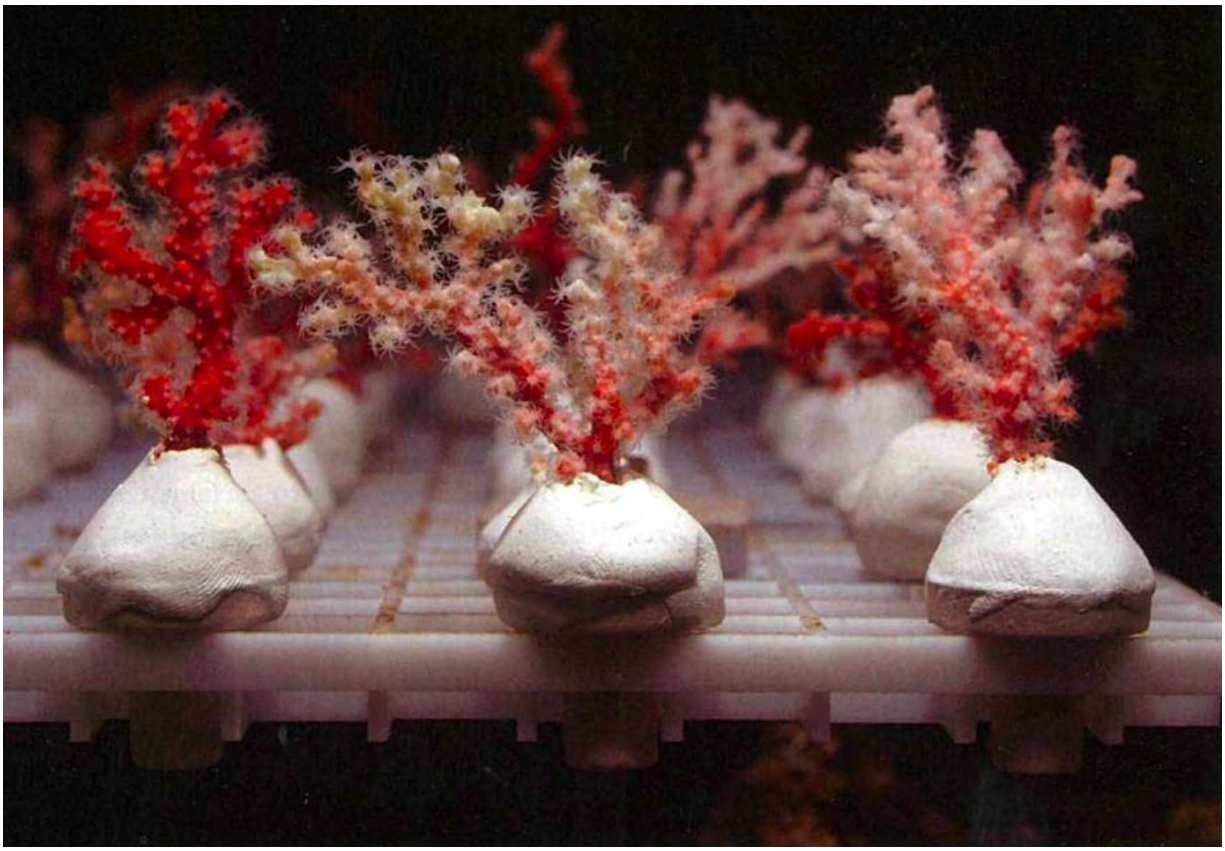


Figure 8: Precious coral transplantation

Taiwan

Strict regulations for precious coral fishing have been in force since February 2009. Taiwan has adopted a restrictive approach towards precious coral fisheries. Only vessels with precious coral fishery licenses are allowed to fish for coral.

These vessels must abide by the following rules:

1. Vessels must be fitted with Vessel Monitoring Systems which reports the location by the hour;
2. Vessels can operate only in five designated regions;
3. 220-day operation limit for each year;
4. Annual quota of 6 tons for each vessel.
5. Fishermen must record and submit fishery logbooks on a daily basis;
6. Subject to random inspections.

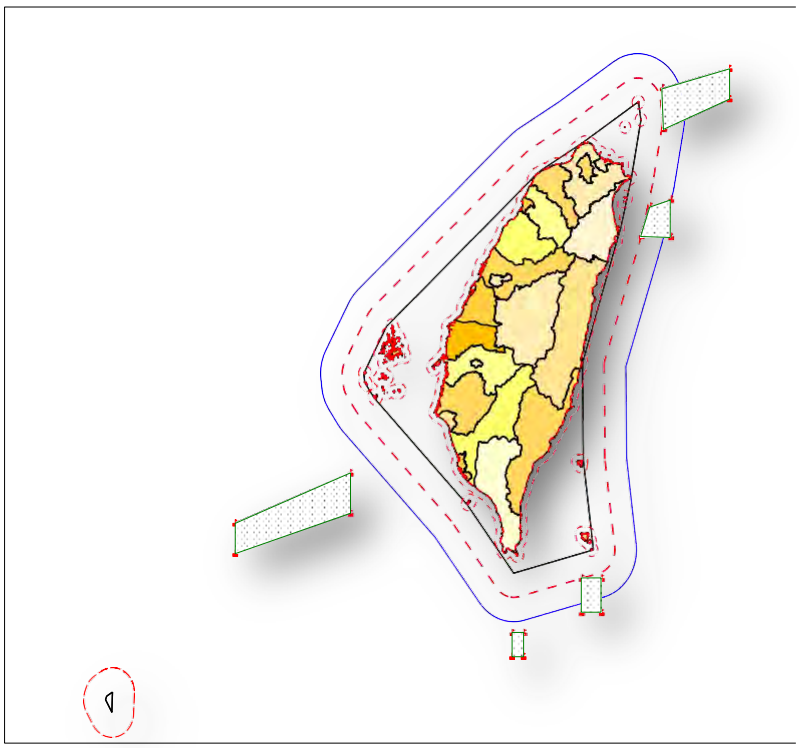


Figure 9: Figure 8 Illustration of the operating areas of coral fishing vessels. The white squares indicate the 5 designated coral fishing areas.

If the fishermen fail to comply with these regulations, their licenses will be retracted and will never be reissued again. In 2009, there were 96 legitimate coral fishery licenses. Currently, there are only 60 licenses left.

Coral boats can only dock at the Suao, Chijin or Magoong ports. Every boat must notify the government before heading out for coral activities. Upon their return, the customs will record details of the corals harvested.

Japan

To explore the possibility of a sustainable fishery of Japanese red coral *(Corallium japonicum,* also known as *Paracorallium japonicum*), the morphometry and the population structure of populations in a non-harvested area and in a harvested area were investigated using a remotely operated vehicle (ROV) off Amami Island, Southern Japan, in 2009. In the harvested population, the estimated average ages are 10 to 20 years. In contrast, the main mode in the non-harvested population extends widely from 20 to 40 years, with a small but distinct secondary mode between 50 and 60 years. Commercially collected specimens are mainly 30–40 years old. The difference in the modes of non-harvested and harvested populations suggests that harvested populations return to the pre-fishing level after at least 10–20 years of a biological rest period. This study indicates a rotational harvest is useful for sustainable management.

In Japan, the prefectural governments control the coral fishery.

The coral fishing regulations of Kochi Prefecture include:

1. Only the boats with coral fishing permit are allowed to harvest coral, and new permits are not to be licensed.
2. From January to February, and June to August, the period when corals are laying eggs, coral fishing is prohibited.
3. After the nets are placed in the deep sea, the boat must stay still and the engine must be turned off in order to prevent the dragging of the nets — minimising the possible damage of the seabed.
4. Corals from sizes less than 7mm and 3cm in length, must be put back in the sea.
5. Fishermen must record their daily activities in a logbook, which are to be submitted to the local government.
6. Maximum 500kg of living coral harvesting per year.
7. For protective reasons, there are only certain areas where boats can harvest coral.
8. In Kagoshima and Okinawa, the prefectural governments permit only fishing gear which can catch precious corals selectively, such as remotely operated vehicles (ROV).
9. Off Ogasawara Island, the coral fishing prohibited from January to April and June.

Italy and the Mediterranean

At the request of its members, the General Fisheries Commission for the Mediterranean (GFCM) has engaged in several actions over the past 4 years to develop a Regional Management Plan for Red Coral. Two recommendations have been issued in 2011 and 2012 as a temporary measure for the conservation of this highly valuable species from an ecological and economical point of view. In 2014 a document with Guidelines for the management of Mediterranean red coral populations in the Mediterranean was adopted by the GFCM members as a transitional measure towards the adoption of a Regional Management Plan which is under development. Members at the 38th Session agreed that this resource deserves a specific research program to fill important gaps on the knowledge of its actual status in the whole region and proposed a series of priority lines of research in which experts of the area should get involved. Fundraising is needed to launch a comprehensive program to improve the knowledge of red coral in the Mediterranean.

Rec. GFCM/35/2011/2 on the exploitation of red coral in the GFCM competence area.

This recommendation prohibits the harvest of red coral at less than 50 m depth until scientific studies indicate otherwise and establishes that the hammer used by scuba divers is the only permitted gear for harvesting. Until 2015, remotely operated vehicles (ROVs) can only be used for scientific purposes provided that they are not equipped with manipulator arms. The recommendation also states that fishers should record and report to national authorities daily catches and fishing effort by area and depths and make this information available to GFCM Secretariat so that it can be submitted to the consideration and advice of the SAC.

Rec. GFCM/36/2012/1 on further measures for the exploitation of red coral in the GFCM area

This recommendation establishes that the legal minimum size for red coral colonies to be harvested, retained on board, transhipped, landed, transferred, stored, sold or displayed or offered for sale as raw product should be at least 7 mm diameter at the trunk, measured within one centimetre from the base of the colony. A margin of tolerance of 10 % in live weight of undersized colonies is authorised and could be revised by the SAC on the basis of relevant studies.

According to this recommendation, GFCM members should submit, no later than 31st January of each year starting with the 2013-harvesting season, data on red coral harvesting by means of electronic forms, which have been developed by the GFCM Secretariat.

The adaptive regional management plan has been developed through several seminars and workshops, and may still be revised depending on various input from experts. It is, however, probable that this plan will be finalised, approved, and enforced during 2016. Then, the GFCM recommendations must be adopted by each Mediterranean country and only stricter measures may be implemented or maintained by a single country.

Hawaii & Midway's

The situation in Hawaii and Midway is that there has been very little harvesting, especially due to the high costs associated with such fishing. Thus, regulations are weaker than for the aforementioned countries and areas.

There is currently no fishing in Hawaii, but it is regulated by the Precious Corals Fishery Management Plan.
https://www.wpcouncil.org/precious/Precious%20Corals%20FMP.html

Geographic locations of precious coral harvesting

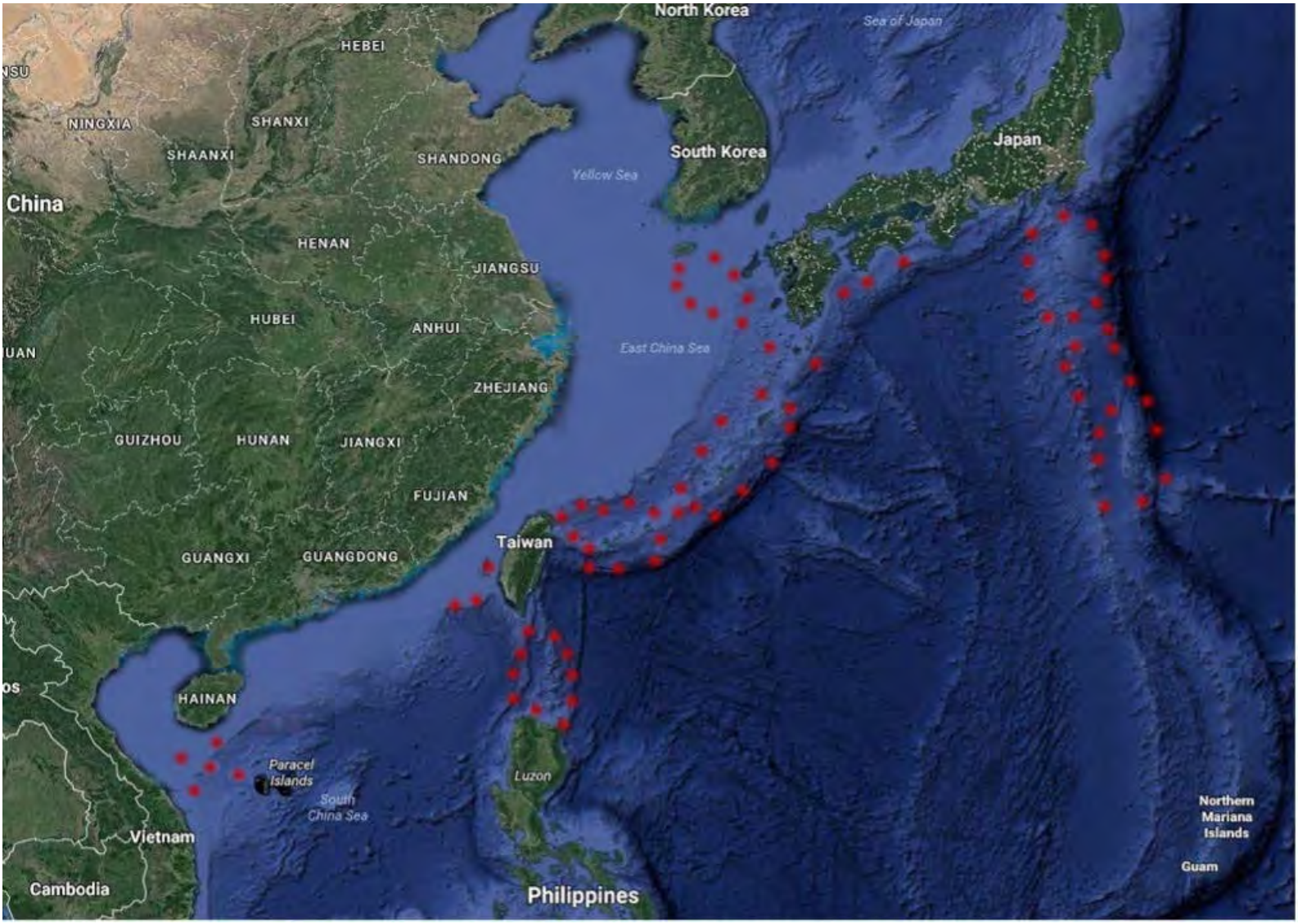
NOTE — These maps are based on recent data. However, they may or may not correspond to exact locations of specific coral.

NOTE — These maps show harvesting areas on Google Maps marked with red dots, based on actual data collected by E. Liverino from fishermen over 40 years. However, they may or may not correspond to exact locations of specific corals.

South China Sea and Japan Sea

Corallium japonicum	Aka
Pleurocorallium elatius	Momo, Boké, Magai
Pleurocorallium konojoi	Pure White
Hemicorallium sulcatum	Misu

● - Coral Banks

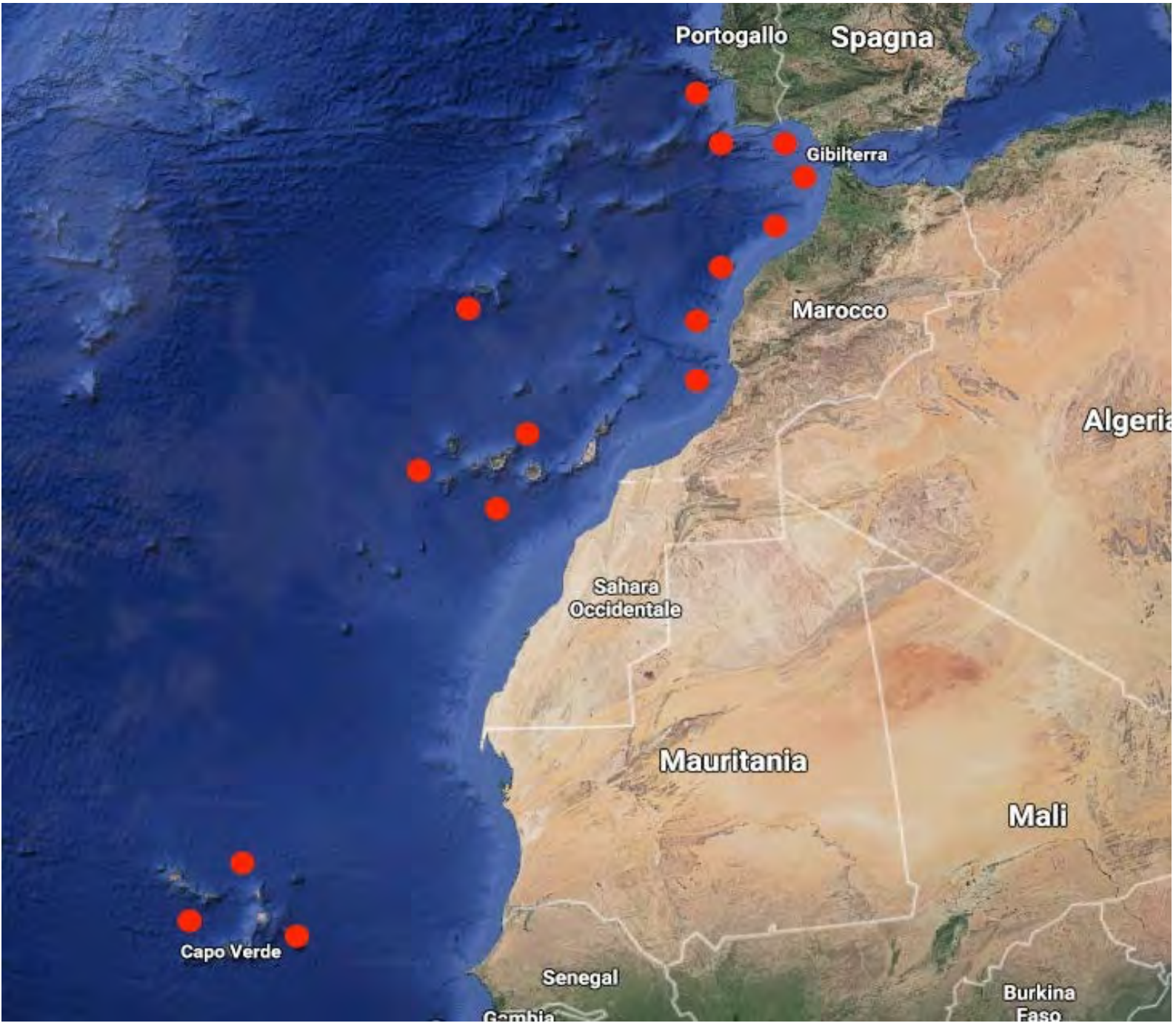


Mediterranean Sea and Atlantic Ocean

Corallium rubrum
- Coral Banks

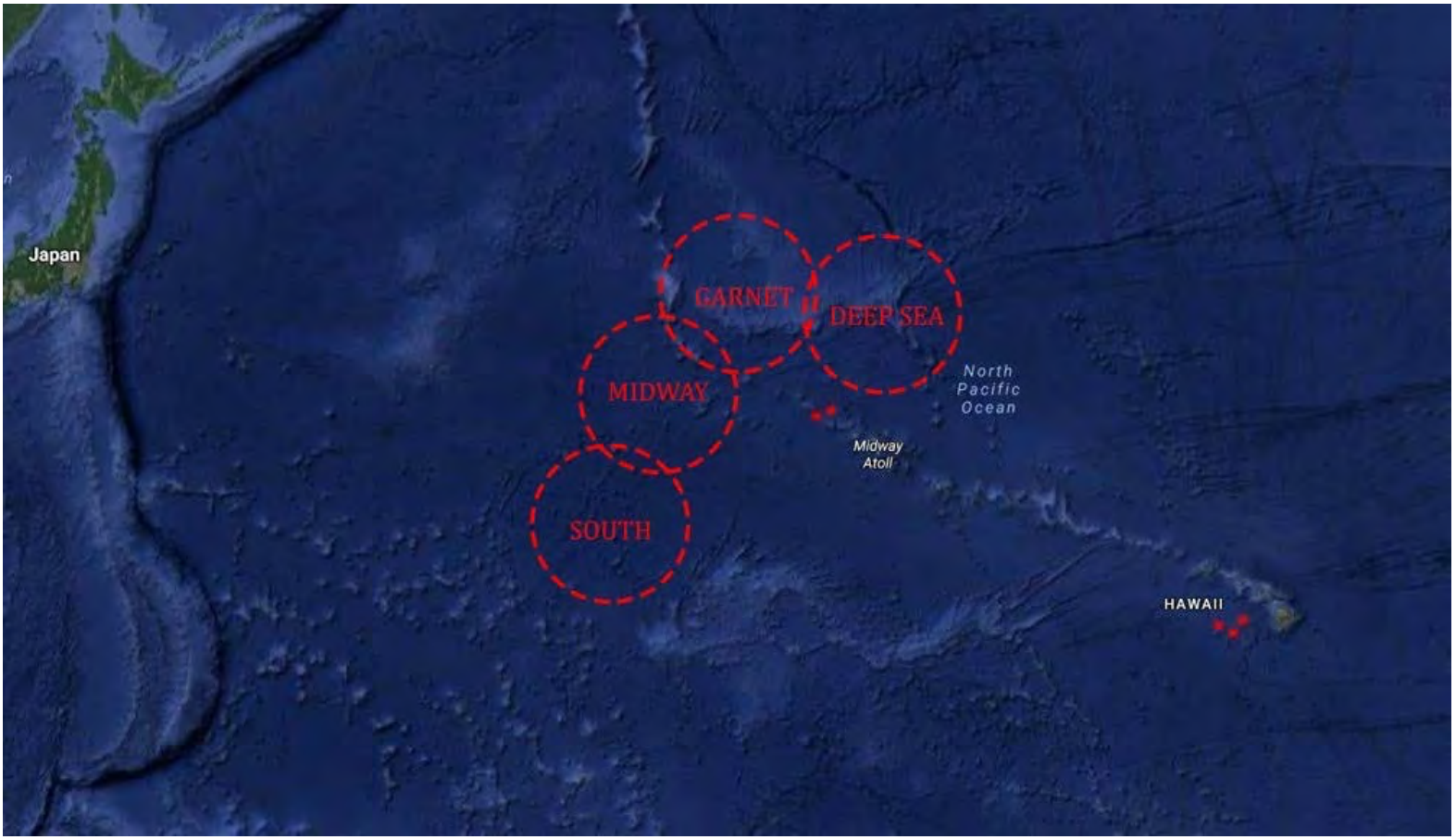
Sardinia, Sciacca
- Dead Coral Deposit (Sciacca and Alboran)

- Coral Banks


Portogallo
Spagna
Gibilterra
Marocco
Algeria
Sahara Occidentale
Mauritania
Mali
Capo Verde
Senegal
Gambia
Burkina Faso

Pacific Ocean

Pleurocorallium secundum Rosato, Midway & White/Pink Hawaii waters
Hemicoralium regale "Garnet coral" Hawaii and Midway waters
Hemicorallium laauense Deep Sea Midway waters



Precious corals — Image Summary

For commercial use (e.g., import and export) it is suggested to use CITES Classification

Figure 10: Precious coral parure made in Torre del Greco, Italy, ca. 1860s Liverino 1894.

Figure 11: Hemicorallium. By NOAA - https://www.ncei.noaa.gov/waf/okeanos-animal-guide/Coralliidae025.html, Public Domain, https://commons.wikimedia.org/w/index.php?curid=104158074

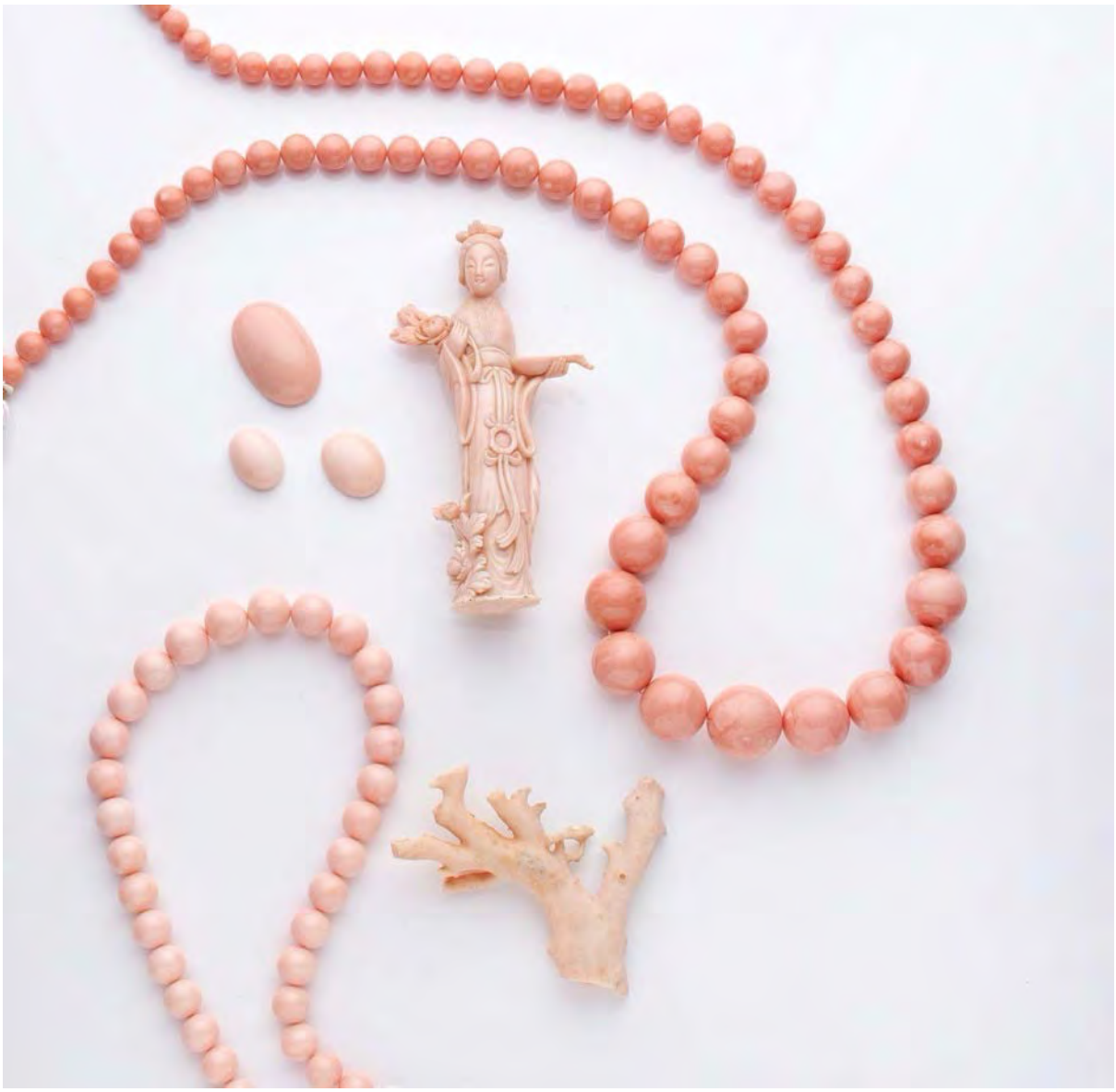
Aka (*Corallium japonicum*)

Scientific name (taxon)	*Corallium japonicum*
CITES	*Corallium japonicum* (Appendix III)
Commercial names	Aka, Moro, Oxblood Coral
Colour	Dark red and very dark red with lengthwise white "soul".
Fishing area	Japan
Depth	80 - 300 m
Shape	Fan-shape
Height	5-30 cm
Diameter of trunk	5-25 mm
Weight	100-500 g

Momo (*Pleurocorallium elatius*)

Scientific name	*Pleurcorallium elatius*
CITES taxon classification	*Corallium elatius* (Appendix III)
Commercial name	Momo, Cerasuolo, Satsuma
Colour	Bright red, salmon, orange, and flesh colour with lengthwise white “soul”
Fishing area	Japan, Taiwan
Depth	150 - 350 m
Shape	Fan shape
Height	15-40 cm
Diameter of trunk	10-50 mm
Weight	100-5,000 g

Angel skin (*Pleurocorallium elatius*)



Scientific name	*Pleurcorallium elatius*
CITES taxon classification	Corallium elatius (Appendix III)
Commercial name	Angel's skin, Pelle d'angelo, Peau d'ange, Magai, Boké
Colour	Light pink with different colour intensity
Fishing area	Japan, Taiwan
Depth	150 - 350 m
Shape	Fan shape
Height	15-40 cm
Diameter of trunk	10-50 mm
Weight	100-5,000 g

Pure white (*Pleurocorallium konojoi*)

Scientific name	*Pleurocorallium konojoi*
CITES taxon classification	*Corallium konjoi* (Appendix III)
Commercial name	Pure White, Shiro, Bianco
Colour	Milky white and red or pink speckled white
Fishing area	South China Sea and Vietnam
Depth	80–300 m
Shape	Fan-shape
Height	10-40 cm
Diameter of trunk	10-30 mm
Weight	100-700 g

Midway (*Pleurocorallium secundum*)

Scientific name	*Corallium secundum*
CITES taxon classification	*Pleurocorallium secundum* (Appendix III)
Commercial name	Rosato, Midway and White/Pink
Colour	Red speckled or veined white or pink; uniform clear pink
Fishing area	Hawaii and Midway Island (1965)
Depth	400–600 m
Shape	Fan-shape
Height	10-30 cm
Diameter of trunk	8-20 mm
Weight	50-300 g

Deep sea (*Hemicorallium laauense*)

Scientific name	*Hemicorallium laauense*
CITES taxon classification	Not classified (*Corallium secundum* is suggested)
Commercial name	Deep Sea
Colour	Bright white, clear pink, white pomegranate, red veined or spotted
Fishing area	Midway (1981). N/W around Emperor Seamount
Depth	1,000 - 2,000 m
Shape	Fan-shape and parallel trunks lacking primary and secondary branches
Height	10-40 cm
Diameter of trunk	5-15 mm
Weight	50-250 g

“Garnet” coral (*Hemicorallium regale*)

Scientific name	*Hemicorallium regale*
CITES taxon classification	Not classified the name *Corallium secundum* is suggested
Commercial name	“Garnet” coral
Colour	Pomegranate-colour with different intensity shades of uniform pink
Fishing area	Hawaii (1979)
Depth	350 - 600 m
Shape	Parallel shape
Height	10-20 cm
Diameter of trunk	4-10 mm
Weight	50-150 g

Missu (*Hemicorallium sulcatum*)

Scientific name	*Hemicorallium sulcatum*
CITES taxon classification	Not classified (*Corallium secundum* is suggested)
Commercial name	Misu, Missu, Miss
Colour	Pomegranate-colour with different intensity shades of uniform pink
Fishing area	North Philippines, Taiwan and Japan (Boso Peninsula)
Depth	100 - 300 m
Shape	Fan long shape
Height	25 cm
Diameter of trunk	15 mm
Weight	200 g

Mediterranean (*Corallium rubrum*)

Scientific name	*Corallium rubrum*
CITES taxon classification	Corallium rubrum (Not listed)
Commercial name	Mediterranean
Colour	Uniform red to dark orange
Fishing area	Mediterranean and adjacent west Atlantic areas
Depth	50 - 1000 m
Shape	Bush-shape
Height	10-20 cm
Diameter of trunk	8 mm
Weight	50-300 g

Sciacca (*Corallium rubrum*)

Scientific name	*Corallium rubrum*
CITES taxon classification	*Corallium rubrum* (not listed)
Commercial name	Sciacca
Colour	Orange, pink and darked “smoked” orange colour.
Collecting area	Mediterranean, southern Sicily.
Depth	30–60 m
Shape	Small branches
Height	7-10 cm
Diameter of trunk	5 mm
Weight	

Apprendix A

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SUSTAINABILITY REPORT OF THE FISHING AND PRECIOUS CORAL PROCESSING SECTOR[1]

Introduction

The fishing and processing of red coral (*Corallium rubrum*) represents one of the oldest and most significant economic activities in the Mediterranean basin, with deep cultural and social roots. Over time, this industry has proven to be able to combine tradition and innovation, playing a fundamental role in promoting sustainable practices aimed at the conservation of the marine environment and the economic development of coastal communities. In recent years, the introduction of stringent regulations, such as the *National Red Coral Management Plan*, has fostered a transformation of the sector towards more responsible management, minimizing the risks associated with fishing activity and promoting environmental, social and governance (ESG) sustainability.

This report focuses on the analysis of the positive externalities generated by the coral fishing and processing sector, highlighting how this activity can have a positive impact in the three ESG dimensions.

Environmental Dimension

The coral sector is particularly sensitive to environmental sustainability, given the close connection with marine ecosystems. The introduction of innovative practices and the adoption of specific regulations have made it possible to mitigate the risks associated with the overexploitation of natural resources and to protect marine biodiversity.

- *Protection of marine biodiversity*: Red coral is an endemic species of the Mediterranean, with a crucial role in biodiversity. The sustainable management of coral harvesting, as set out in the National Red Coral Management Plan, has implemented key measures such as regulating harvesting areas and imposing limits on the minimum diameter of harvestable colonies. These measures ensure that only the most mature specimens are harvested, allowing coral populations to regenerate. In addition, the plan prohibits harvesting in marine protected areas and establishes minimum depths for collection, thus protecting the most vulnerable areas.

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- *Development of non-invasive fishing techniques*: The manual ice axe harvesting method, currently required by the legislation, represents a selective and low-impact technique that has replaced more invasive practices of the past. This approach allows only the most mature corals to be collected, thus preserving the most delicate marine ecosystems and allowing the natural regeneration of resources. While this technique has proven effective, the possibilities of integrating new technologies into the fishing process could further improve efficiency and reduce environmental impact.

Research and development of advanced technologies could complement the manual method, allowing for more accurate mapping of the seabed and precise identification of coral colonies ready for harvesting. The use of underwater drones (ROVs), advanced detection tools, and real-time monitoring systems could help make coral fishing even more targeted, minimizing disruption to surrounding ecosystems. These innovative technologies would make it possible to better identify sensitive areas to be protected, while ensuring that only fully developed corals are collected.

In addition, the adoption of these technologies could improve operator safety, reducing the risks associated with diving. Supporting technologies, such as lightweight exoskeletons or automated guidance systems, could make divers' work easier, reducing fatigue and the time required for extraction. This integrated approach would promote more responsible management of coral resources, safeguarding both the marine environment and the health of operators.

In summary, the development of cutting-edge technologies, combined with the expertise and precision of manual harvesting, represents a promising direction for the coral industry. This combination could ensure even more sustainable fishing, minimising environmental impact, increasing operator safety and improving the sector's ability to adapt to future challenges.

- *Conservation and adaptive management*: Genetic monitoring of red coral populations, as demonstrated by studies conducted in Sardinia, provides crucial data to assess the state of resources and guide management decisions. This adaptive approach, which is based on scientific evidence, makes it possible to implement management plans that take into account the dynamics of populations, ensuring their resilience in the long term.

Social dimension

The coral sector is not only an economic activity, but also represents a social and cultural pillar for many coastal communities in the Mediterranean, especially in Italy, France and Spain. Coral harvesting and processing practices have deep historical and cultural roots, and the sector actively contributes to the preservation of these traditions, while ensuring the economic development of local communities.

- *Economic support and development of coastal communities*: The coral processing sector provides stable employment opportunities for thousands of people in coastal areas. Through artisanal coral processing, communities can benefit economically from a local resource while promoting sustainable practices.

- *Preservation of cultural heritage*: The art of coral processing has a thousand-year history, especially in Southern Italy, where the tradition is handed down from generation to generation. The sustainability of the industry ensures that this artisanal tradition can continue to thrive without compromising natural resources. The National Plan sets precise limits on the amount of coral that can be harvested each year, allowing communities to exploit this resource without depleting it.

- *Training and skills transfer*: Recent vocational training initiatives promoted by the sector aim to improve the skills of local artisans, integrating modern technologies to ensure more efficient and sustainable processing. This not only increases the competitiveness of products on international markets, but also ensures the transfer of skills between generations, reinforcing the principle of intergenerational solidarity.

Governance Dimension: Sustainable and Responsible Management

The governance of the coral fishing and processing sector is characterized by a strong commitment to transparency, regulation and compliance with international and European standards. The measures adopted by the National Red Coral Management Plan aim to ensure that the activity is carried out in accordance with the highest standards of sustainability.

- *Strict regulation*: The national plan imposes strict regulations on the quantities of coral that can be harvested, setting daily limits for each collector and defining the areas where harvesting is allowed. In addition, protocols are established for the continuous monitoring of the resource, with the possibility of temporarily stopping harvesting activities in overexploited areas, ensuring the conservation of natural resources.

- *International collaboration*: Red coral management benefits from collaborative agreements between several Mediterranean countries and the General Fisheries Commission for the Mediterranean (GFCM), which coordinates efforts for the protection of marine resources. This collaborative approach ensures that harvesting practices are aligned with international sustainability standards and that common measures are taken to protect ecosystems.

- *Traceability and transparency*: The industry is characterized by high traceability standards, which ensure that every piece of coral harvested is legally certified and complies with current regulations. The monitoring system makes it possible to trace the entire coral supply chain, from the moment of harvesting to sale, ensuring that there are no illegal or undeclared practices.

Sustainable Coral Fishing Techniques in Japan and Hawaii

In Japan, fishing for Japanese red coral (*Corallium japonicum*), also known as "Aka", and Cherry Coral (*Corallium elatius*), is regulated by strict policies that aim to preserve this precious marine resource. Japanese coral fishing techniques have evolved considerably in recent years, thanks to the introduction of technological innovations such as remotely

operated underwater vehicles (ROVs), which allow for more precise and selective harvesting. ROVs allow you to fish for corals without damaging the delicate ecosystem of the seabed. This approach minimizes the environmental impact compared to traditional methods, such as trawls, which can cause irreversible damage to coral habitats. Japanese prefectural authorities impose strict restrictions on when and where coral fishing can be conducted. Fishing is prohibited during coral spawning periods, such as January, February, June and August, to allow for the regeneration of populations. In addition, only corals larger than 7 mm can be harvested, and fishermen must return smaller specimens to the sea. These conservation measures are complemented by a rotating harvesting system, which provides for fishing cycles and biological rest periods of at least 10-20 years to allow the recovery of exploited populations. Studies show that in regulated harvesting areas, commercially fished corals have an average age of 30-40 years, while in unexploited areas the average age can be as high as 50-60 years, highlighting the importance of these sustainable management practices.

Another significant example of sustainable coral fishing comes from Hawaii and the Midway Islands. Here, fishing for precious coral, such as pink coral (*Pleurocorallium secundum*) and garnet coral (*Hemicorallium regale*), has been regulated through the Precious Corals Fishery Management Plan, which sets specific rules for harvesting in the deep waters of the Pacific. Coral fishing in Hawaii is limited due to high operating costs and strict regulations, which include limits on the amount that can be fished and protection zones. This has significantly reduced the impact of fishing activity, while ensuring the conservation of local marine ecosystems.

In particular, in the waters of Midway, precious corals are collected at depths ranging between 400 and 2,000 meters. Unlike other areas, harvesting in these areas is sporadic, mainly due to the high cost of operations and regulatory restrictions. However, when it does, fishing is conducted using methods that minimize damage to surrounding habitats, such as the use of specialized equipment to catch corals selectively.

Regulations in place, both in Japan and Hawaii, reflect a global commitment to the sustainable management of marine resources. Thanks to these efforts, precious coral populations, which play a critical role in marine ecosystems and local economies, can be protected and conserved for future generations.

Conclusions

The fishing and processing sector of precious coral, in particular red coral, has shown a remarkable ability to evolve towards increasingly sustainable practices, combining the protection of marine ecosystems with the socio-economic development of coastal communities. The integration of new technologies has played a crucial role in this process, reducing the environmental impact and ensuring that the collection activity is selective and less invasive.

This transition to a more sustainable approach is not limited to the environmental dimension, but also extends to the social and cultural dimension. Coral harvesting and processing practices, rooted in millennia-old traditions, continue to thrive in local

communities, preserving the so-called "material culture". This concept refers to the intangible heritage linked to the art of coral processing, a skill handed down from generation to generation that contributes not only to the local economy, but also to the cultural identity of entire communities.

The social sustainability of the sector is highlighted by the strong positive impact it has on the economic fabric of coastal areas, creating stable jobs and contributing to local economic growth. The induced activities generated by the coral sector, ranging from fishing to craftsmanship, support thousands of families and keep alive centuries-old traditions that enrich the cultural heritage of the regions involved. The industry's commitment to training new generations of artisans, through skills transfer programs, further strengthens this link between innovation, sustainability and tradition.

In summary, the coral sector represents a clear example of integrated sustainability, in which the protection of the marine environment is accompanied by economic development and the preservation of cultural traditions. Through responsible resource management and the adoption of innovative technologies, this sector not only contributes to the conservation of marine ecosystems, but also enhances the cultural and intangible heritage of local communities, demonstrating how sustainability can be pursued holistically, while fostering economic growth and community resilience.

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Figure 12:. Inexplicable sculptures of a group of Chinese knights, complete with armour, in just ten centimetres.Representing the 8 noble thoughts (Eightfold Path) corresponds to the last of the Four Noble Truths, a key element of Buddhist doctrine. Understanding them, represents the first step to address the topic of the five powers, which are nothing more than 5 faculties, latent in man, but forgotten.

End page