

ASSESSMENT OF CORAL FRAGMENTATION AND GROW-OUT METHODOLOGIES FOR THE AQUARIUM TRADE IN POHNPEI, FSM

CONSULTANCY REPORT

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LIST OF ACRONYMS

LPS	Large Polyp Scleratinian
MMME	Micronesia Management & Marketing Enterprises
MERIP	Marine and Environmental Research Institute of Pohnpei
MIMF	Marshall Island Mariculture Farm
NGO	Non-Governmental Organisation
ORA	Ocean Reefs and Aquarium
PNI	Pohnpei, Federated States of Micronesia
RMI	Republic of Marshall Islands
SCUBA	Self-Contained Underwater Breathing Apparatus

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INTRODUCTION

Background

In August 2014, The Secretary of Foreign Affairs of the Federated States of Micronesia, submitted an official request for SPC technical assistance to undertake a scientific and community assessment to inform the development of a marine aquarium export industry. The request included a total of 9 specific objectives focusing largely on aquarium fish stock assessments (addressed in a separate report) and resource management options. One of the listed items asked to “assess coral fragmentation and grow-out methodologies against environmental impact, ecological or species specific”.

The Marine and Environmental Research Institute of Pohnpei (MERIP)

Fr. Gregory Muckenhaupt S.J. originally established MERIP in 1997 with the goal of providing education and income generating opportunities for rural Micronesians. At the time, the organization ran a number of community-based extension and aquaculture research and development projects. The institute was also used for teaching students in the Ponape Agriculture and Trade School (PATS) marine science/agriculture program. Marine science education at the high school level and applied research into coral and pearl farming was the primary work carried out from 2000-2005.

PATS closed in 2005, with MERIP becoming a stand-alone NGO. The MERIP's current director is Simon Ellis. The MERIP has been instrumental in leading all cultured marine ornamental activities in Pohnpei over the last few years. Its strategy is to culture and trade products that are in demand on the global aquarium market using a framework and approach that is suitable to and effective in the rural context of Pohnpei in particular, and Micronesia as a whole.

The MERIP has been successful in developing side activities for up to a hundred farmers (Fig. 1) mostly through sponge and soft coral mariculture activities, but also clams, and a good number of other assorted coral species (hard and corallimorphs). Coral extraction in Pohnpei (PNI) is forbidden and, to preserve the reef's integrity, it is recommended this law remains in place. However, coral farming initiatives, have a minimal to insignificant impact on the reef ecosystem, and provide sustainable revenue generation for rural communities where options for income earning are often limited. MERIP currently holds a government exemption permit to extract coral broodstock for their farming activities.



Figure 1: farmers at low tide in Pohnpei lagoon

Methods

All surveys and required visits and activities were undertaken between the 5 and 11 October 2014. The consultant used the following methods to achieve his objectives:

- Conduct rapid coral diversity assessments at sites visited by the fish survey team – these included reefs inside and outside Pohnpei lagoon and on Ant atoll;
- Visit MERIP and take part in their farm routine checks and inventory;
- Snorkel various lagoon areas to assess potential farming site locations and coral species distribution and abundance; and
- Meet with fisheries people and MERIP staff to acquire further information of coral extraction and aquaculture.

SNAPSHOT OF MERIP'S ACTIVITIES

Corals and farmers

Over the course of this study, coral farming activities were visited specifically in the context of this report's objectives. There are currently 14 coral farmers. They all have a varying number of coral racks that are placed at 5 farm sites. Four of these sites are more appropriate to grow hard corals and one of them is a soft coral site.

Coral farming is usually a side activity held by both men (80%) and women (20%), with fishing and agriculture being the main activities. However, coral farmers conceded that this activity now contributes significantly to household income, especially when looked at in conjunction with other forms of mariculture (sponges for example).

While each farmer used to grow a range of species, it was recently decided that each farmer would concentrate on one species only to not overstock markets for a single species (for example a fast growing or easily cultured one) and to limit competition amongst themselves. Allocation was partitioned according to site as each site is usually best suited for a given species.

MERIP also runs its own backup farm in order to be able to supply products to market when private small holders do not have (sufficient) stock to fill orders.

Species traditionally cultured at MERIP were green polyp sarcophyton, but over the last 10 years, the stock list has grown to over 30 species (Fig 2-5), including:

- *Acropora* spp. (20 species)
- *Montipora* sp. (2 species)
- *Turbinaria* sp.
- *Plerogyra sinuosa*
- *Physogyra* sp.
- *Euphyllia ancora*
- *Euphyllia glabrescens*
- *Goniopora* sp. (2sp)
- *Sinularia* sp. (2specoies)
- *Sarcophyton* sp. (2 species)
- *Zooanthids* polyps

The list of species cultured by local farmers is still growing. The existing focal species were selected in consultation with the main buyer, Oceans Reefs and Aquariums (ORA). ORA is based in Florida and is currently recognized as a world leader in cultured marine ornamentals. They move most of PNI's stock and advise on market demand in terms of species and volumes. The company also operates a giant clam farm that also grows some corals in the Republic of the Marshall Islands, the Marshall Island Mariculture Farm (MIMF).

Discussions with MERIP's staff revealed that the main problems faced by the NGO are due to (i) natural conditions such as bleaching and rough weather and (ii) inconsistency in farm maintenance.



Figure 2: Cultured torch coral



Figure 3: cultured *Montipora* sp.

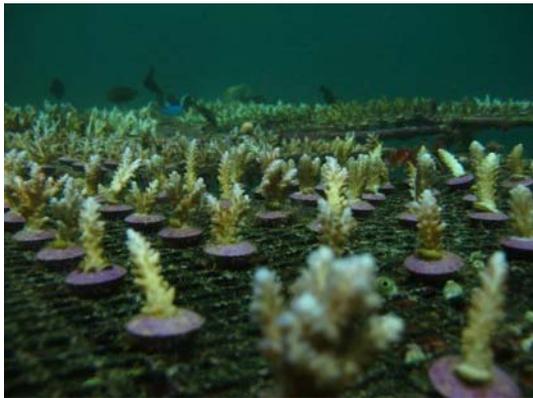


Figure 4: cultured *sp.*



Figure 5: cultured green leathers

Business and markets

MERIP organises one shipment a month (with > 1000 cultured coral pieces) to ORA (through the MIMF) and occasional shipments to Kosrae (Micronesia Management & Marketing Enterprises - MMME) and to Korea. Local collaboration between companies through the consolidation of cultured corals shipments at a regional scale supports small-scale initiatives and the provision of income to rural communities. While MERIP's primary goal is to support Pohnpei-based small holders, it also aims to support regional Micronesian businesses through exports to RMI and Kosrae, mostly at very competitive prices.

RAPID ASSESSMENT OF LOCAL REEFS FOR SPECIES OF INTEREST

A number of dives were conducted, sometimes alongside the fish survey team, at as many sites as possible within the allocated time. Surveys were done using snorkelling and SCUBA and covered outer reefs as well as lagoon sites including at Ant atoll.

Pohnpei lagoon and outer reefs present very varied reef environments (from shallow to deep, clear to murky, hard-bottom to soft bottom) and as such very different habitats allowing for a wide range of species to thrive. Overall we found that coral populations in Pohnpei lagoon were very dense. Of note is that bleaching was observed at a number of different locations while surveying.

A wide range of *Acropora* sp. branching corals with interest for culture were observed, along with some very interesting colour morphs of *Goniopora* sp. Bubble corals (*Plerogyra sinuosa* (Fig. 6) and *Physiogyra* sp.) seemed abundant and several colours were seen (a green morph was particularly remarkable). Some other large polyp hard corals, such as *Pectinia* sp., were observed several times, some with good colouration. Other large fleshy polyp corals such as *Euphyllia ancora* (Fig. 7) and *E. glabrescens* were also present. These latter two species are particularly sought after in the aquarium trade. The author also came across the largest colony (1m diameter) of *Catalaphyllia* sp. he's ever encountered in the region; this is also a highly sought after species.



Figure 6: *Plerogyra sinuosa* (bubble coral). When of colour like this green morph it is a particularly sought after coral for the aquarium trade



Figure 7: *Euphyllia ancora*, hammer coral or anchor coral is in high demand in the trade

Soft corals and corallimorphs (Fig. 8) were seen in good numbers, but there was not enough time to look for areas that may harbour a lot of colonies. Polyp corals are in high demand, particularly hardy and could be a very good export product out of Pohnpei.



Figure 8: Example of corallimorph.

Acquiring broodstock did not seem to represent a legally challenging issue, as it is currently subject to an exemption permit. From surveys conducted around the atoll and in the lagoon, and based on current demand/practices, obtaining broodstock does not represent an ecological concern given the abundance and size of colonies observed during surveys and which are targeted for farming activities.

The surveys also showed that there are a large number of sites in Pohnpei lagoon that have good condition for growing corals, including:

- close proximity to land;
- good flushing rates;
- sufficiently shallow to allow good access and easy working conditions; and
- optimal nutrient conditions for the growth of target species.

POSSIBLE ECOLOGICAL IMPACT AND FUTURE DIRECTIONS

Overview of potential environmental impacts

Based on current practices and production rates observed during the field visit, we did not note any environmental impact of mariculture activities on the environment. Specifically:

- The methods used for fragging and growing corals are non-detrimental (numbers of cuttings are relatively small and most the time F1 colonies are used as donors) ;
- No medicines used to grow corals;
- No chemicals used to grow corals with the exception of small quantities of glue to stabilise the frags into their bases – but only small quantities are used and its impact is negligible;
- Coral farming requires no external sources of feeding (such as pellets)
- Farm perimeters are very small and set up in rubble or sandy areas thus with no impact on live reefs;
- Broodstock for fragging are collected in small quantities and farmers try to establish mother colonies from which to derive frags subsequently (i.e., use F2 corals for exports as much as possible);
- The overall scale of operations is very small and insignificant in terms of environmental impact. This would still be the case even if operations were to expand; and
- Coral farms actually act as mini reefs and therefore aggregate fish and other fauna (Fig. 9 and 10), which could be considered of benefit overall.



Figure 9: Example of a coral farm



Figure 10: Coral farm acting as 'mini reef'. Note all the fish above the coral frags

Growth

Given the size of the island and the scope of coral farming exports it is recommended that growth be explored by consolidating existing operations and not in promoting the development of new enterprises. Thus, based on current practices and activities, coral farming was seen as having the potential to grow in Pohnpei in 2 probable ways:

- By seeking different markets to sell current products without impacting current customers;
- By expanding the species selection to more varied colour ranges, different species etc... to keep servicing current customers (B).

We would also recommend developing concerted efforts to “brand” and “build upon” MERIP’s existing reputation to support A and B.

Advances in aquarium technology in the last decade has meant that a greater diversity of corals can be kept in captivity and that doing so is easier than it was several years back. Consequently, the coral market for aquaria has undergone a dramatic rise in recent years. However, wholesalers would rather see a greater variety in products (i.e., number of species) than great numbers of the same item. On the ground however farmers typically opt to consistently produce a species that is easy to culture, grows fast, and provides good results and returns. As a trade activity, to be successful, coral farming needs to be a compromise that satisfies both parties.

To increase its sale of products, farmers in Pohnpei could:

- raise the production of species that are already on the market, but given that MERIP currently deals nearly exclusively with one company it is unlikely that this would really provide a marked increase in sales;
- lobby other customers such as in Europe or Asia and sell products at cost-effective prices without impacting its current North-American market.

MERIP has recently invested significantly, and worked in close collaboration with farmers, to diversify in the corals it exports. This work should be encouraged and further expanded upon. This is a great way to sell more products and create more revenue while servicing the same customer.

A search on the internet yielded that corals cultured in Pohnpei are known as 'POHNPEI CULTURED CORALS'. This is an indication that the American-based wholesaler is doing a good job at promoting those products and this work should be further promoted.

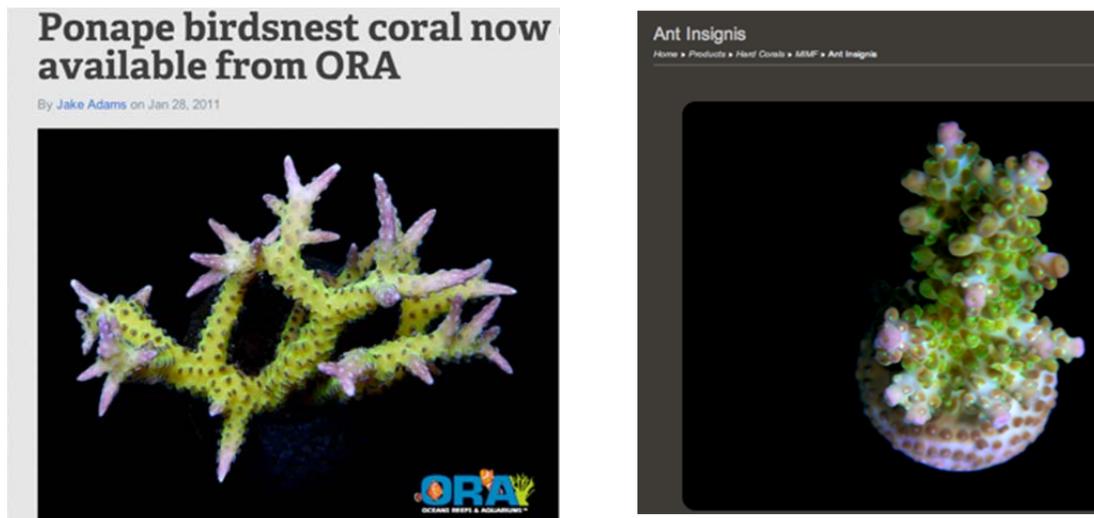


Figure 11: Marketing of Pohnpei cultured corals at the importer's end. (pictures found online)

CONCLUSIONS

Presentation to fisheries and governors

The work undertaken in the field was presented to fisheries staff and governors on the last day. Despite relatively limited time on location, personal observations together with registered successes by MERIP, led us to conclude that coral farming activities in Pohnpei lagoon warrant further support and expansion if, where and when possible.

MERIP's current plans to further develop this activity are sound and sustainable and will hopefully lead to more demand, in turn consolidating the activity from an economically viable standpoint.

Recommendations

While by no means meant as an exhaustive list, we would make the following recommendations:

- Given the size of the island and the scope of coral farming exports, "growth" of the coral farming business should be explored by consolidating existing operations and not in promoting the development of new enterprises.
- Further expand the existing customers list to distribute pohnpei corals (if possible);

- Increase the product line by:
 - developping trials on new hard coral (LPS) species such as *Pectinia sp.*, *Catalaphyllia sp.* etc;
 - continuing and expanding current activities on corallimorphs (in high demand);
- Provide support to the local farming structures where possible as they create additional income to rural families and have helped foster among them a greater understanding of the natural world as well as developed greater knowledge about Pohnpei's local resources; and
- Maintain giant clam production as they are still in high demand and being able to offer cultured clams in conjunction with cultured corals is a marketing advantage on the aquarium trade market.