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SECURITY PROBLEMS WITH RESOURCE SURVEYS OF BENTHIC MARINE ORGANISMS

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1.0 TEMPTATION

Munro (1986) surveyed the giant clam stocks of Kiribati and made the following comment:

It therefore seems likely that an efficiently organised group using two skiffs...could conceivably strip an atoll of the size of of its entire stocks of the larger species of clams in about 6 weeks and take the main part of the resources from the best areas in a much shorter time.

At there are an estimated 6907 *T. gigas* of which 2825 might be greater than 60 cm shell length. At current market prices for adductor muscle (reported to be currently around US\$25-30 in Taiwan) these 2825 clams could conceivably have a retail value in the range of US\$71,000-85,000. To this could be added the somewhat speculative value of the approximately 9300 *H. hippopus*, averaging around 35 cm, estimated to be in the Lagoon. At \$15/kg these might have a value of US\$21,000.

When I read that I immediately wondered about the chances of survival of the clams at atoll. After all, six weeks of diving for two skiffs yielding about US\$100,000 would sorely tempt a great many people in Kiribati as well as elsewhere. There are no laws to prevent Kiribati fishermen from harvesting them and even if there were, the harvest could easily be blamed on illegal foreign poaching. If the document were to be read by foreign interests who actually did make a living poaching marine resources, so much the worse for the giant clams.

If that seems paranoid, consider this. In 1974 Hester and Jones published "A Survey of Giant Clams, Tridacnidae, on Helen Reef, a Western Pacific Atoll". The article was in Marine Fisheries Review. They gave population estimates for *T. gigas* of 49,800 and for *T. derasa* of 32,800, plus 44,600 *Hippopus hippopus*. They pointed out:

"Helen Reef is uninhabited and distant from most population centers and the reef and its associated flora and fauna are nearly untouched, being subject to only occasional visits by Trust Territory field trip ships and foreign fishing vessels."

They then presented exact data, with a map, on the location of the giant clams and recommended that "a moderate fishery for these two species could be prosecuted."

A year later Bryan and McConnell resurveyed Helen's Reef and found:

"*Tridacna gigas*-4 live 206 dead; *T. derasa*- 6 live 168 dead; *H. hippopus*-22 live, 485 dead. The reduction in population numbers of these three species is attributed to human exploitation."

The "human exploitation" was blamed on foreign fishing vessels, and perhaps they were to blame. The question is whether the publication of the map and population data helped focus fishing activities on the uninhabited atoll.

2.0 UNTAPPED RESOURCES?

Large, commercially valuable coral reef invertebrates such as giant clams, green shell, black coral, pearl oysters, and even lobsters are constantly thought of as untapped resources; like loose cash waiting just offshore for some enterprising entrepreneur. Vast stocks of these are imagined by fishery departments in many island countries. Surveys have been conducted to try and locate these stocks with the hope of large scale commercial development.

In 1978, for example, the Fisheries Department of Papua New Guinea asked The Marine Research Foundation to conduct a survey of Pearl Oysters in the Milne Bay District. It was believed, based on a brief diving survey by an economist, that huge populations of Gold Lip Pearl Oysters existed there. Chesher (1979) conducted an extensive deep water survey using remote video and SCUBA and reported a population of between 20,000 to 30,000 specimens. The populations were localized in three areas with no Gold Lip at all outside the boundaries of the stocks.

The populations identified by the survey were within view of villages and it is unlikely foreign fishing efforts could be conducted without the people alerting the Government. The oysters live in more than 30 meters of water in rapidly flowing tidal currents which effectively prevents local harvesting. If not for these two facts, the populations could quickly be harvested based on the survey maps.

What's wrong with harvesting them? As Munro (1986) points out:

"The most important point is that such harvests would not be repeatable other than at intervals of 5-6 years and if the harvesting were highly systematic there might not be sufficient brood stock left to ensure continuing recruitment."

He might be optimistic in expecting reharvesting intervals of 5-6 years for giant clams. He presupposes restraint in the taking of specimens less than 60-cm shell length. Which is unlikely.

3.0 SECURITY VERSUS AID

In 1984 Chesher conducted a black coral survey for the Kingdom of Tonga using deep water remote video and SCUBA. More than 64 kilometers of prime habitat in depths between 30 and 60 meters was surveyed using video and sonar. At depths between 30 and 60 meters divers using SCUBA would require between 60 and 120 days to survey the same area. Limitations on the duration a diver can remain at over 30 meters make searching for the black coral a time-consuming and dangerous task.

The survey results, including maps and identification of concentrations of black coral colonies, would thus have great economic interest to people harvesting them. At the time of the survey there were no regulations controlling harvesting or sale of black coral in Tonga. Since black coral grows very slowly (about 1-mm per year in stem diameter) overharvesting is a severe problem, only partly relieved by the difficulty of finding the colonies in deep water. As a security measure, therefore, the Kingdom of Tonga refused permission for the South

Pacific Regional Environment Programme to publish the report. While this is a reasonable precaution, the survey report was valuable to the region as a conservation document, and regional funds paid for the survey. Shouldn't the information be available to the other members of the SPREP? The Tongan Ministry of Lands, Survey and Natural Resources solved the problem by using selected extracts of the survey report in a presentation at the International Parks Conference in Western Samoa the following year.

4.0 fL + sG + rS - eM = DESTRUCTION

The basic formula which worries me is given above, where fL stands for fixed location, sG for slow growth, rS for reliable survey and (-)eM for lack of effective fisheries management.

Commercially valuable coral reef invertebrates are very susceptible to overfishing. Because they inhabit fixed locations and because their populations are clumped in circumscribed areas, a successful survey probably endangers the continued existence of the stocks. Most commercially valuable invertebrates rely upon a reasonably dense population of large adults for continued breeding success. If the population density is lowered below a certain (undefined) point local extinction is almost assured.

Surveys are generally paid for by foreign aid and these agencies often wish the results published to account for the expenditure of funds. Survey equipment often is much more sophisticated than locally available to fishermen. Experts in the particular organism being searched for are usually (but not always) in charge of the activities and have a much better chance of finding the species than local fishermen. The results are mapped and thus present many people with the opportunity to know where the stocks are.

Prior to such a survey, a few local fishermen in nearby villages probably know about the existence of the population of organisms. But they normally don't tell anyone and have no means to harvest or sell large numbers of the invertebrates and thus do relatively little damage to the stock. When the location of the stock becomes available to a wide spectrum of people, the possibility of someone becoming interested in large scale commercial harvesting (even if it is only a one-shot exercise) is quickly escalated. Because of the general lack of regulations or effective controls on fisheries in most Pacific Islands the stocks can be eliminated quickly and perhaps destroyed permanently.

Researchers, Aid Agencies, and Governments in Pacific Islands should take security measures to be sure exact locations of stocks of commercially important invertebrates do not become general knowledge until such time that mature and realistic fishery regulations are in effect for proper resource management. The irony of the situation is that proper resource management depends entirely on accurate survey information.

5.0 LITERATURE CITED

Bryan, P.G. and McConnell D.B. 1976 Status of Giant Clam Stocks (*Tridacnidae*) on Helen Reef, Palau, Western Caroline Islands, April 1975. *Marine Fisheries Review* 38(4):15-22

Hester, F.J. and Jones, E.C. 1974 A survey of Giant Clams, *Tridacnidae*, on Helen Reef, a Western Pacific Atoll. *Marine Fisheries Review* 36(7):17-22

The exact references to the unpublished literature cited above are withheld to protect the stocks.