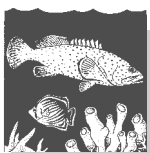


which violate a set of rules stored in the computer. Exception and alert reports are generated accordingly by the computer and sent to the FFA member country in whose EEZ the vessels are operating.

The FFA Secretariat and each FFA member country is equipped with a graphical monitoring facility to view the exception and alert reports and other position data against a display of the member country's defined geographical areas. It is also capable of securely transferring vessel positions to each FFA member country, as required, enabling individual FFA member countries to track the movements of vessels in their EEZs.



Live reef fish operations in Kiribati

by William Sommerville¹ & Derrick Pendle²

Negotiations for setting up a live fish venture in Kiribati, selling to Hong Kong, started in early 1996. Since Kiribati is in the middle of nowhere, far from any international port, it is extremely difficult to export marine products that will 1) give a reasonable return to the exporter and 2) give a price to the harvester/fisherman which makes the venture worthwhile.

Many ventures have been started by local and overseas businessmen which have soon foundered with nobody benefiting as a result. The only way to make a profit is from high-value products such as shark fin, and sea cucumber. Exporting live or chilled products usually costs more for the transport than the value of the product on the world market.

Despite the fact that it takes 50 days sailing on a round trip from Hong Kong to Kiribati, plus loading time for fourteen tonnes, because of the relatively high value of live fish, all parties involved in the operation can realise a profit. After looking at potentials and drawbacks for exporting live fish we initiated a small trial, the aims being:

1. To see if the required species of fish were present in Kiribati.
2. To find out if the local fishermen, using their traditional methods, could catch and keep the fish alive.
3. To find out if we could keep the fish alive for two months after we purchased them.

Application of the FFA VMS to tracking of live reef fish carrier vessels

Although the FFA VMS was developed for the purpose of tracking tuna fishing vessels, it could easily be applied to tracking other vessels, such as those that transport live reef fish from the western and central Pacific to markets in Hong Kong. This would enable MCS officers in FFA member countries to determine whether such vessels travelled directly from the port where they cleared customs out of the EEZ or whether they stopped off en-route at remote locations, perhaps to illegally take on board extra live reef fish (see Johannes & Lam, this issue, page 8).

We began the trial in March 1996, and took it through to August 1996. After a few teething problems we discovered that we could keep alive 100 kg of cods, coral trout and wrasse for two months. We soon learnt that the old fishermen remembered that Chinese traders had kept fish in cages for their own consumption prior to World War II and this idea was not new to them.

We reckon that to start our live fish business cost close to AU\$ 150 000 including the cost for the first ten tonnes of fish and somewhat more than that before it becomes profitable. We did not have this sort of cash at the time so we tried banks, aid project funds, and venture capitalists. Banks thought it was too risky, aid donors thought it was too environmentally sensitive and venture capitalists wanted too great a share of the profit. We decided, in conjunction with our marketing agents (Asil Group Ltd in New Zealand) to start it alone.

On a wing and a prayer and very short of capital we started in Tab North Island in the Gilbert Group. Apart from the small trial we had no other experience but were forced to start up earlier than originally planned as we found that a Chinese fishing company had just been given a licence to start the same business. Having had ten years experience of Chinese traders in the Pacific, we knew that we had to start before them to prove that such an operation could be environmentally friendly and give a fair return to the fishermen.

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2. Managing Director of Marine Products Kiribati (MPK).

Kiribati had very limited hardware and fishing equipment available on the main island of Tarawa, and nothing on the island for the proposed development. We therefore had to build the first fish cages with chain link fencing. This resulted in the first cages breaking up and sinking as they were towed out to the site. We managed to salvage and repair the cages and began buying fish three days later. The local fishermen had all attended the workshops we had run to show them the species we wanted and the techniques used to handle the fish, including catching, use of a decompression needle (if required), holding and transportation of the fish. The fishermen were extremely keen and had already arrived at the cages with fish to sell before the cages had been anchored into position.

The average income for an 'I Kiribati' on an outer island is AU\$ 40 per week. We now offered them the possibility of AU\$ 250 per week, which most have reached and a few surpassed. This is only fishing for one full tide approximately 8–9 hours per day. The fish that we were targeting, especially 'cods', are not species traditionally targeted by the local people. Fishermen move away from an area if they can only catch cods, and they traditionally fish at night for the snapper species that they like to eat. The technique used by the local fishermen is hook and line fishing from a canoe, or from the surface while floating with a mask and snorkel. Usually there are two people floating in the water, with a third in the canoe. The fishermen guide the hooked bait to the fish they wish to catch and, once the fish is hooked, hand the line to the fishermen in the canoe to pull it in. At present these are the only methods used, and they have been very successful with our first two shipments of fish exported and the third, which is currently being harvested.

MPK does not own any fishing boats nor employ any fishermen, only station workers to buy and care for the fish. Fishermen bring their catches to the station in their own boats. The fish that are accepted are weighed and the fishermen are paid the same day. The majority of fishermen use sailing canoes which are less expensive to run than canoes with engines. There are only three middlemen from the fishermen to the customer in the restaurant: the exporter, the importer, and the restaurant owner.

For the first two months of the operation, the fish purchased experienced 50–60 per cent mortality (we had been advised that the norm would be about 10 per cent). Much discussion and hair loss resulted, as we wondered why we were losing so many fish. We tried imported treatment chemicals and started bathing every fish in these, which succeeded in reducing the loss by only 1%. We therefore thought the species in Kiribati were too fragile

and we considered giving up this business. After more discussion with the fishermen and all concerned, we went out with the fishermen to see if they were doing anything wrong, as the fish looked perfectly healthy when they arrived at the station, but died 2–4 days later. Traditionally, once a fish is landed on the boat, it is held firmly by inserting the fingers into the gills, or by a very strong grasp of the fish body. Then, the hook is removed and the fish is thrown into the bottom of the boat and left there until reaching the beach for consumption. We immediately stopped all the above practice and explained that this was the way to kill fish, not to keep them alive. The problem was simply that the fish did not have enough water and oxygen whilst in the boat; in addition the water got very hot in the sun. The water needed to be changed every 30 minutes. By drilling holes in the bottom of the canoes the problems were fixed but it was extremely difficult to convince the fishermen to do this. Once we had fixed this problem the mortality fell to less than 10 per cent overnight.

It is our experience that bad handling is the single biggest cause of fish death. The only treatment that we give the fish now is a 5- to 20-minute (depending on size) bath in fresh water. Decompressing the fish is another source of fish death, as fishermen take time to gain experience in piercing the fish. The mortality now is between 3 and 10 per cent constantly and it is our belief that the chemicals are a waste of time and money, treating only the symptoms and not the cause. The single most critical factor is education of the fishermen.

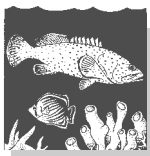
MPK works closely with the Kiribati Fisheries Department, so that we can monitor catch rates and sustainability. We are building a very large database on fish numbers, which is shared with the Department. As in most fisheries departments in the Pacific there is little or no information on the three species (coral trout, grouper, and wrasse) that we are targeting. Everybody needs this information if this type of export is to remain viable.

In May of 1998 our Hong Kong buyer, Brightfuture Industries Ltd. invited Gerry Reyes of The International Marinelife Alliance (IMA), Philippines, to travel with us on our second shipment to look at what we were doing and give us advice on any reef damage and fish stocks. The initial view from IMA was that there was no reef damage caused by our fishing techniques and that the reef area was wide enough for a live fish operation to successfully continue, with many of the target species being observed during stock assessments. Meanwhile the Chinese operation—which had brought its own Indonesian fishermen who used a compressor and the usual Indonesian fishing techniques—had its fishing licence

revoked by the Fisheries Department and the Kiribati Government.

In order to meet our target of 14 tonnes per shipment we have set up three bases on three separate islands to minimise the impact on the resources in any one location.

We are happy to share our experience in more detail, and possibly co-operate to some extent commercially with ventures in other parts of the Pacific. In the first instance contact should be made with our marketing associates (their contact number are given, bottom page 16).



Cyanide fisheries: Where did they start?

by Don E. McAllister¹, Prof. Ning Labbish Caho² & Prof. C.-T. Shih³

Ornamental fishes and cyanide

The marine aquarium or ornamental industry began in 1957 when Earl Kennedy began exporting fishes from the Philippines (Fleras, 1984). Fishes were caught with cotton nets and traps placed on coral reefs. In 1962, a little-known fish collector named Gonzales began to spray sodium cyanide on reefs to stun ornamental fishes, making them easy to capture (Rubec, 1988). That approximate date is supported by Ireland and Robertson (1974) who reported that Graham F. Cox (pers. comm., 1973) had stated that cyanide collecting had been used in the Philippines for the last 10 years. Ireland and Robertson (1974) also suggest that the widespread and virtually uncontrolled use of cyanide to eliminate unwanted fishes in milkfish ponds led to the application of this chemical in coral fish capture and cited a 1970 FAO review (Lennon *et al.*, 1971). When one of us (D.E.M.) was in the Philippines in 1986, it was reported that cyanide was still being used to clean milkfish ponds of unwanted fish before restocking. Cyanide was also used later as a fish eradicator to get rid of undesirable exotic fishes in lakes in Canada (Leduc *et al.*, 1973), but its use was discontinued.

The stunning of aquarium fishes with cyanide spread through the Philippines and its usage grew up to at least 150 000 kg per year (McAllister, 1988), and spread from there to Indonesia. The use of poisons, including cyanide, to capture fishes is illegal in the Philippines and Indonesia, as it is in most countries. For more information on the ornamental cyanide fishery and measures to introduce alternatives, consult reports of Ocean Voice International, the Haribon Foundation for Conservation of Natural Resources, International Marinelife

Alliance (IMA), and publications in the bibliography on cyanide toxicity to fishes and corals (McAllister, 1998).

Live food fishery and cyanide

While the use of cyanide in the ornamental fishery has been an open secret, little had been reported on the use of cyanide in the live food fish trade until the report by Johannes and Riepen (1995) and subsequent publicity by The Nature Conservancy and IMA. However, there were earlier reports. A fisheries and law enforcement report by Lt. Col. Rodante Joya mentioned the cyanide ornamental and live food fishery and was released at the 1987 Baguio Fisheries Conference in the Philippines. The first issue of the first volume of *Sea Wind*, published in 1987, showed photos of a seized ship and its live wells used to transport cyanided fish for the live food trade from the Philippines to Hong Kong. Steve Robinson prepared a manuscript report on the live reef food fish trade in 1986. Johannes and Riepen (1995) document the spread of the use of cyanide in this trade through Indonesia and elsewhere in Southeast Asian waters.

Origins of cyanide fishing

The reader will have noticed that the early records reported for cyanide use in ornamental and live food industries were in the Philippines. This might suggest that cyanide fisheries began in the Philippines as early as 1962 and spread out from there. Galvez *et al.* (1989) suggested that plant poisons were used for fishing in the Lingayan Gulf area of the southern Philippines, before the introduction and use of sodium cyanide. Cyanide was subsequently introduced there by two immigrant fishers from the Visayas, but who both learned the

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