

# Management suggestions for the sustainable development of live reef fish food fisheries in the Pacific Islands region

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There is an increasing awareness within the Pacific Islands region of the potential for negative impacts as a result of uncontrolled or inappropriately managed live reef fish operations. These impacts have been documented for a number of our South-East Asian neighbour countries, and are beginning to be encountered within this region (see Johannes & Riepen, 1995; and previous issues of this Information Bulletin). The expansion of this fishery into this region is being driven by the increasing demand for live reef fish (LRF)—especially in Hong Kong, Taiwan and southern China—and the diminishing supply of target fish from South-East Asian waters due to over-exploitation and habitat degradation. Having rapidly depleted the target species to a point where commercial fishing is no longer viable in large areas of South-East Asia, the live reef fish operators are now shifting their focus to the reef fish resources of the western and central Pacific.

Despite the problems associated with the uncontrolled LRF fishery, there is the potential for 'adding value' to the region's reef fish resources if the resource is sustainably exploited and exported live to the markets in Hong Kong and Taiwan. However, for this fishery to be sustainably developed, it will require careful and separate management and strict enforcement to alleviate any potential negative impacts.

It appears that in many of the Pacific countries where these LRF operators are established, or attempting to become established, there are rarely management strategies in place to adequately and effectively manage this specific fishery. In addition, most countries do not have the necessary resources, financial or human, to strictly enforce and manage these fisheries.

With these realities in mind, this article attempts to provide some suggestions for managing LRF operations in Pacific Island countries. It is not intended to be comprehensive, and I would certainly welcome any comments, ideas or criticism on the suggestions to assist in making them more relevant to

those responsible for fisheries management within the region. Due to the variation in fisheries legislation and regulations within the region, these suggestions will need to be modified as appropriate. They could also be categorised into 'immediate/short-term measures' and 'less-immediate/medium-long-term measures,' but again this would vary from country to country based on capacity to manage and urgency.

The following suggestions are based on the assumption that the fisheries and marine resources agencies in the region want to develop *long-term, sustainable* fisheries, that will provide the *maximum return* to the respective countries and citizens for the exploitation of their marine resources, while *minimising environmental impacts*. They primarily focus on the use of licensing agreements as the principal regulatory instrument.

## General management suggestions

Pacific Island countries need to recognise the live reef fish food fishery as distinctive, and requiring separate licensing, management and enforcement, from other reef fisheries and especially pelagic fisheries. This will be the only means by which it can be managed and conducted on a sustainable basis and with minimal impacts. The regulatory agencies should, at a minimum (see Johannes & Riepen, 1995, for further details):

- Require a separate licence for fishing for live reef fish, as opposed to combining the licence with other fishing activity licences, or issuing a general fisheries licence;
- Require carefully worded contracts between the fishing company and the governments (national, state/municipal/provincial, local) and the resource owners to ensure environmentally and economically sound operations;
- Develop a catch-and-export monitoring programme; ensure all vessels and their live-fish cargoes are checked for compliance with licence

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agreements before clearing for Hong Kong or other markets; ensure that catch-effort and purchasing logs are maintained by the company and submitted regularly to the relevant government agency;

- Ban any transshipment of live reef fish at sea; require all live fish transport vessels to clear from a recognised port (where monitoring can occur) before leaving for Hong Kong; or where live fish exports are permitted by air they should only be from designated airports;
- Establish an effective observer programme, or expand the current pelagic fishery observer programmes to include LRF operations. Government agencies should aim to have observers present on all fishing trips and have access to all other related operations of the LRF companies. The observers should monitor compliance with the licence agreements. The cost of the observers while on the vessels should be borne by the fishing companies;
- Place spawning aggregation sites of target species off limits to commercial fishing, or close commercial grouper fishing entirely during the spawning season;
- Ban the possession, use, storage and/or transportation of any explosives, noxious substances (including sodium cyanide) for the purpose of killing, stunning, disabling or taking fish or in any way rendering fish more easily taken, on all fishing boats, fish transport vessels and LRF operators' facilities;<sup>2</sup>
- Ban the possession, use, storage and/or transportation of compressed air equipment (e.g. SCUBA or hookah) on live reef fish fishing boats and fish transport vessels;
- Provide advice and awareness materials to local fishermen/communities concerning the problems associated with live reef fishing and how to minimise them, using actual examples of problems experienced elsewhere;
- Provide advice to any resource owner or local businessman who wishes to enter into a formal agreement with a live reef fish export company, including basic economic and marketing data on the LRF trade, to ensure they have strong negotiating positions when dealing with foreign operators;

- Ban the export of fingerlings of live reef fish, and place size limits on adult target fish species;
- Place an export ban on wild-caught *Cheilinus undulatus* (humphead wrasse/ Napoleonfish/ Maori wrasse) and *Cromileptes altivelis* (Barramundi cod/ pantherfish/ polkadot grouper). These two species are the prime targets for the live reef fish trade and are the first to be overfished. They are also species about whose biology and life history little is known. Until stock assessments are initiated and completed for these species within any designated fishing areas, it is strongly recommended that their harvest be permitted only in the subsistence and artisanal fisheries and only for the domestic market;
- It is recommended that an Environmental Impact Assessment (EIA) be prepared for each live reef fish export operation. The costs of preparing the EIA should be borne by the LRF operator.

Most countries require foreign and/or new businesses to submit an application for relevant business, foreign investment and/or fishing permits. Where such requirements exist, I would strongly suggest that as much detail as possible on any proposed LRF operation be requested from the applicant at this early stage. At a minimum, the proponent should provide the following information in the form of an operational plan:

- a detailed description of the proposed operation;
- ownership, control and management of the operation/company;
- target species;
- where the fishing and fish buying are to occur;
- how fishermen will be hired and/or used;
- a summary of the negotiations for access to any fishing area with the customary owners/stewards/controllers and any agreements and terms reached;
- the specific methods, equipment and treatments (e.g. antibiotics) to be used;
- infrastructure requirements (existing and proposed);

2. Some operators use antibiotics and/or anesthetics to treat fish prior to shipping/transporting. If this is the case, the specific chemicals and usage should be documented and strictly controlled.

- human resource requirements (clearly identifying where foreign or non-citizens will be required, what they will be doing, and for how long);
- training components (a detailed plan);
- record keeping (what records will be kept and how; minimum requirements should be set by the management agency);
- fish storage, processing and transportation mechanisms;
- proposed marketing;
- operational budget;
- any other items deemed necessary (e.g. an EIA).
- Where appropriate, customary tenure, use rights and compensation issues need to be resolved prior to issuing a licence designating or authorising an area for commercial live reef fish operations. The responsibility for resolving these issues should primarily be the licence applicant. The applicant must produce a signed agreement with the recognised customary owners/stewards in which the terms of access and usage are explicitly set out. Any terms of the agreement must not conflict with national, state/municipal/provincial laws and policies. This agreement must be endorsed by the relevant state/municipal/provincial authorities, and confirmed or authenticated by officers of the relevant regulatory agency (or preferably signed in the presence of the officer) prior to the issuing of a licence;

### **Suggested minimum conditions for Live Reef Fish Fishing Licence Agreements**

The minimum conditions that should be considered for inclusion in any Live Reef Fish Fishing Licence Agreement are summarised below. Each country's regulatory agencies concerned with issuing licences will need to assess these in terms of their existing laws and regulations. Where necessary, modifications to current legislation or the introduction of new legislation may be required for this fishery. In general, these suggestions are based on a form of limited entry/access fishery, to be implemented through issuing annual conditional licences for fishing/fish buying in specific areas only. They are also directed at encouraging the greatest level of local participation in the fishery and thereby gaining the maximum return of benefits to the reef owners/stewards.

Licence conditions for live reef fish operators should encompass, but not be restricted to, at least the following:

- Licences should be issued for specific locations or areas for a maximum of one year, renewable upon review. For the live reef fish export fisheries, it is recommended that only one operator per designated area be permitted until more is known about this fishery and its impacts. Short licence periods and area restrictions are necessary due to the real potential for rapid over-exploitation of the target species;
- It is preferable that licences be issued to national/local enterprises, rather than foreign companies, to ensure maximum involvement and return of benefits to the country;
- Where foreign vessels are used in joint-venture operations, the foreign crew numbers should be limited to the minimum required to operate the vessel and maintain the fish. This will discourage the use of foreign crews in fishing operations, while encouraging the participation of local fishermen. Most local fishermen fishing their own reefs tend to have a vested interest in ensuring that fishing is sustainable and impacts minimised;
- Foreigners or non-citizens should not be involved in the actual capturing of live fish products, except for the purposes of training (a time limit should be placed upon training, e.g. three to six months—shorter times are preferable);
- For live reef fish operations, company transport vessels should be limited to carrying the fish only and not be permitted to conduct fishing operations. Fish should be purchased from local fishermen once training has been completed. Such vessels operating in remoter areas should also be required to have facilities for storing iced/chilled fish and to purchase any commercially acceptable by-catch fish<sup>3</sup> for sale in urban centres. Fish should not be delivered or transshipped to another vessel without prior written permission;

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3. Johannes and Riepen (1995: 23–24) reported that in two studies of hook-and-line LRF operations in PNG, only 10 per cent of the catch consisted of target species. The LRF operators refused to purchase the by-catch or dead fish (even of the target species) and so the fishermen were left with fish they couldn't sell and more than their families could consume. Requiring LRF operators to purchase by-catch in such situations will reduce wastage and provide additional benefits to the fishermen.

- In some circumstances, it may be appropriate to limit the size and number of LRF transport vessels and holding pens/facilities. This is to reduce the potential for companies to extract as many target species as possible as quickly as possible—i.e. to encourage longer-term sustainable operations;
  - The licensee must permit a fisheries officer or official observer to board the vessel and must provide accommodation to such observers free of charge at any time while the vessel is operating under the licence;
  - Live fish exports should only be permitted from designated ports or airports to facilitate inspection and monitoring of the species and volumes being exported;
  - The use, storage and/or transportation of scuba or hookah equipment should not be permitted. With this fishery, the use of hookah is usually associated with the use of sodium cyanide or with fish traps—the former must be banned and the latter should be discouraged due to the damage to corals (often used to anchor the traps) and the damage to the fish (abrasions from the trap resulting in lower-quality fish);
  - The use, storage and/or transportation of any explosives, noxious substances (including sodium cyanide) for the purpose of killing, stunning, disabling or taking fish or in any way rendering fish more easily taken, should not be permitted;
  - Licensees must maintain detailed daily records of their catches or purchases, ideally including: time and location caught; species; number and weight of each species caught; capture method; price paid to the fishermen (include name and contact details of fishermen); mortality rates for each live fish species (at each stage of the operation); sale price received; export records, including copies of the shipment manifests and invoices; and any other data or information required by the regulatory agency for management purposes.<sup>4</sup> These records should be submitted to the regulatory agency monthly. All data submitted must be treated with strict confidentiality by the regulatory agency, and should be analysed promptly. The burden of proof for reporting must be on the operator.
- Local fishermen should be trained by the licensee to maintain basic catch records, and the recording of catch data made a prerequisite for purchasing fish from the fishermen;
- The vessel, its owners, operators and crew must ensure the protection of coral reefs from damage or degradation at all times during the fishing and vessel's operations (including anchoring). Destroying or damaging coral reefs, either directly or indirectly, deliberately or through negligence should result in prosecution and/or suspension of the licence. This also applies to using coral pieces to anchor traps, if used;
  - Fees for access to the resources should be included. As a limited-entry fishery is proposed, there is a degree of 'exclusivity' involved and it would be appropriate to require fees to be included as a licence condition. The mechanism of calculating fees and how the fees are used/distributed would need careful consideration (see discussion later concerning monitoring costs). If a number of companies are vying for licences, then a competitive bidding process may be appropriate;
  - Other conditions normally applied to fishing vessels operating in the fisheries waters of the country.

## Other management issues

### *Local empowerment*

For management of the fisheries to be effectively enforced, especially in the remoter areas where many of the LRF operations occur, it will often be necessary to rely on local enforcement, including traditional resource owners/stewards. Therefore any management strategy or plans should utilise the traditional mechanisms of marine tenure and resource control wherever feasible and practical. This should include mechanisms for reporting licence and/or access agreement infringements to the relevant fisheries officers. For this to be effective the traditional reef owners/stewards will need to be made fully aware of the conditions attached to the licences and the reasons for those conditions. In addition, there will need to be a system of checks and balances that ensure that the system is functioning effectively and those with vested interests are not attempting to manage themselves. This

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4. Such detailed data are required because to date very little information is available on this fishery and the target species. Therefore there are few historical data to assist managers in regulating the fishery. This level of data will help managers to identify problems within the fishery, such as falling catch per unit of effort, over-exploitation, etc. It will also provide data on the survival rates of the fish and the actual value of the fishery to the community and country—information valuable in assessing new LRF applications or LRF licence renewals.

could be partially achieved through spot checks by fisheries officers.

### ***Limited entry/access fishery***

Management through using the licensing conditions noted above (i.e. annual licences and requirements for access agreements with traditional reef owners/stewards) is effectively establishing a form of limited entry /access fishery. If such an approach is used, then local authorities and reef owners/stewards must be made aware and understand that this will reinforce their control over outside fisheries operations using their reefs. Additionally, where appropriate (e.g. remote areas), such access agreements should consider requiring outside operators to provide relevant aid services or infrastructure for the support and development of the local fisheries.

### ***Closed seasons and/or areas***

Local knowledge of fish aggregation sites should be used to identify areas and seasons where commercial fishing should not be permitted. Past experience in Palau and elsewhere has shown that it is possible to decimate reef fish stocks at aggregation sites in relatively short periods of time. Closed seasons and or areas will, however, only be effective if they can be enforced; this issue must therefore be resolved before imposing any closures or restrictions.

### ***Catch quotas***

At the current time, not enough is known about the biology or stock sizes of the target species for catch quotas to be used.

### ***Costs, fees and fines***

The costs of local monitoring and enforcement need to be taken into consideration. It will be important that where appropriate, the fishing company should cover the costs involved in directly monitoring its operations. Consideration should be given to promulgating regulations that a certain percentage of any fines levied on an operation go back to the community that assisted by reporting the infringement; it is important that communities be aware that the reporting of live reef fish operators' illegal activities will result in a portion of the

fine coming back to their community. This will be essential for effective monitoring and enforcement of operations in remoter areas.

### ***Monitoring activities***

The commercial live reef fish fisheries can only be managed effectively if the necessary data and information are collected, analysed and acted on. Suggested actions for effective monitoring of this fisheries sector include:

- The appointment of an officer at the national level to be responsible for overseeing the monitoring of catches, data collection, preparing reports and liaising with the licensing officers and with the relevant state/municipal/provincial and community authorities;
- A data collection system and database should be established by the relevant agency to collect, analyse and report the data from the fishery. Appropriate data collection forms or log books should be prepared for the commercial live reef fish fisheries and mechanisms for their distribution and collection established;
- National patrol boats should be enlisted to become more involved with the monitoring and enforcement of commercial live reef fish export operations, in addition to their more usual role of oceanic fisheries enforcement. This would be particularly relevant with the live reef fish operations that involve larger carrier vessels operating in remote locations.

### ***Costs of monitoring and data analysis***

The costs of monitoring and managing the commercial live reef fish fishery need to be shared with the industry. The imposition of a management fee, in addition to the licence fee, should be considered.

### ***Reference***

JOHANNES, R.E. & M. RIEPEN. (1995). Environmental, economic, and social implications of the Live Reef Fish trade in Asia and the Western Pacific. Forum Fisheries Agency, Honiara and The Nature Conservancy, Honolulu. 81 p.

