

8 CONCLUSION AND RECOMMENDATIONS

CONCLUSIONS

An Elusive Trade

The LRFF trade remains an elusive industry. Estimates of total production and the contribution of aquaculture to the trade vary widely. Government import data in Hong Kong, China are the main window on the trade, but they are admittedly underestimates to a still unknown degree; and they have been refined to show most species imported only from 1999.

Any conclusions that can be made about the size of and trends in the trade will be superficial until long-term and comprehensive data become available, not only for Hong Kong, China imports, but also for other importing countries, domestic trade, and for the source countries, for which export figures are often nonexistent, inaccurate, or incomplete. One thing is clear, however. Should the market in mainland PRC expand significantly, as predicted, the pressure on LRFF fisheries is expected to increase enormously.

Improvements in data collection are not likely to come quickly, given the size of other problems—ranging from general overfishing, to illegal fishing, to inadequate infrastructure, funds, and personnel to deal with these and other management issues—facing national fisheries authorities in many source countries around the region, particularly in Southeast Asia.

Part of both the mystique and the challenge of the LRFF trade has been its luxury nature; rarity and localized depletions of target fish populations will not necessarily lead to cessation in their trade. Consumers are willing to pay very high prices for these fish. Unless awareness programs can quench this desire to consume rare wild animals, the fisheries will continue until the last of the desired fish are gone—perhaps irreversibly.

However, consumers cannot always distinguish wild from cultured fish. Advertizing the qualities of cultured LRFF in retail outlets—for example, the absence of any threat of poisoning—could

well turn the tide in favor of cultured fish as well as discourage the capture from the wild of vulnerable species that can be cultured.

Trade Benefits Vary Widely

The benefit of the trade to fishers varies widely across countries. In some, the value added—the difference in selling price between live and dead reef food fish—is so great that it is easy to understand the incentives for overfishing to a high degree, for using illegal fishing methods, and for continuing to fish even when the target fish become rare.

However, the real nature of the value added to this often boom-and-bust fishery cannot be judged in terms of economics alone, or merely over the short “boom” period, especially if, associated with its operation, local fish populations are depleted, there is social inequity or conflict, and divers are injured or killed. Value adding must take into account the suite of changes and both positive and negative impact of the fishery in the longer term. There is a need for detailed and realistic socioeconomic analyses, factoring in both resource limitations and potential long-term ecological consequences as well as costs of and the challenge of effective management.

LRFF Catches Far Exceed Sustainable Levels

Biological knowledge of LRFF species in general and groupers, the main species in the trade, in particular is poor. The most basic need—to know how much can be taken each year sustainably—is almost completely lacking for many species. The present conclusions are based on various assumptions in analyses of the trade and of resource productivity, but it is believed that these provide a realistic starting point for future refinement.

Assessments to date of potential yields (catch per unit area per year) of LRFF groupers are vague, centered around a regionwide annual average yield for reefs in good condition of 0.5 t per km² per year for all types of fishery, including those for both live and dead fish. The present average regional yield of LRFF, 0.6 t per km² per year, may already be at a level of concern, because much of Southeast Asia’s reefs, which account for the majority of grouper production, are not in good condition. Importantly,

because the fisheries for live fish cover only a fraction of the Indo-Pacific region, the compelling conclusion is that the levels of catches in these fisheries far exceed what is sustainable.

While the trading base of LRFF fisheries may be stable in a country for many years, the fishing grounds are constantly shifting, possibly representing, in combination with subsistence and other small-scale fishing for the same species, overfishing to a degree only paralleled by other boom-and-bust fisheries, such as those for trochus and sea cucumber.

Increases in the present yields of high-value LRFF species from the wild are unlikely, because of biological constraints on total grouper production. Thus, there are three options to increase production: finding new sources, diverting subsistence to live export, or further supplementing wild-caught with hatchery-reared fish. In terms of the first, traders constantly seek new sources, increasingly distant from most demand centers. However, continuing depressed prices over the last 4–5 years mean that transporting fish to market from these more remote locations may not be financially viable, especially in the case of the medium-priced groupers that tend to dominate in these areas. Many subsistence or small-scale local fisheries are heavily exploited and careful decisions must be made regarding the best social and economic use of fish that are also desired in the live fish trade; however, there is typically little management of such fisheries and adjustments in allocation may not be possible in practice. An increase in hatchery production probably carries more hope but is subject to a suite of problems (discussed below) that suggest it can never completely supplant wild sources.

LRFF Fisheries, to be Sustainable, should be Small Scale and Closely Managed

Most countries in the region do not yet have in place the policies or controls needed to deal adequately with the aggressive and intensive nature of LRFF fisheries. In some countries and areas, the capacity to manage a LRFF fishery is so limited and the prospects for strengthening that capacity are so bleak that at least in the near future, the only realistic management objectives are to minimize habitat degradation and fish stock depletion. In those cases, it is not a matter of determining whether a LRFF fishery is a

good option, but rather merely coping with it. Emphasis would continue to be on curbing the use of cyanide; discouraging compressor diving, which is associated with cyanide use, overfishing, and accidents; stopping the export of especially vulnerable species; implementing trade and resource monitoring programs; and safeguarding at least a few areas from fishing, particularly areas that include spawning aggregation sites.

But is an extensive management regime practical? Although there are clearly wide variations in the amount of LRFF supported by reefs, according to, for example, reef size, habitat type, and reef condition, the sustainable amount on all reefs is negligibly small. The average attainable yield of 0.5 t per km² for all types of grouper fisheries, for example, means an average of 500 1-kg fish per year (less than 2 fish a day!) per km² of reef area. Managing a LRFF fishery that small could not be cost effective (and the existing commercial and subsistence reef fisheries would at least have to be monitored), even if efficient and fully effective measures were available and enforceable.

A management regime might also have to consider the pressures on resources from demand for fish feed and coastal waters for holding or grow-out of fish. Overall, these different activities would be vying for a profitable share of a small resource under intense pressure.

Simple “data-less” approaches may be, in practice, the most appropriate ways and the only tools needed to control LRFF fisheries; indeed to control reef fish fisheries in general. Examples include permanent closure of a significant part of the total reef area and export controls. In the case of a protected area approach, which in essence is risk-based, the integrity of some reefs is given up to the fishery while those considered more critical are conserved, with the knowledge that the fishery may move on after a few seasons. Of course, it is highly desirable to prevent LRFF fishers from using such destructive techniques as cyanide and to stop them breaking apart the coral in their quest for target fish, but recent history suggests that this is hardly possible. From the point of view of conserving reef ecosystems, a safer approach would be to reverse the standard approach of closing certain areas to (LRFF) fisheries, and instead consider all areas closed except for designated fishing zones.

Controls on exports, while not quantitatively linked to resources available, recognize that reef resources in general cannot withstand the high rates of exploitation often engendered in export fisheries, and assign realistic value to their local use in trade and consumption.

The issue of enforcement could be addressed through cooperation between a country's fisheries/agriculture department and its navy or coastguard. Although marine resources are major parts of the economies of many Indo-Pacific nations, the general availability of funds suggests that it may be more logical to support extra naval or coastguard patrols (both by air and sea) than to undertake surveys and fine-tune regulations that, like most other fisheries regulations, would be unenforceable and of little use when the fishery moves on. An aggressive stance, such as through the presence of patrol vessels, that is well known to the players in the industry, could become a major "management" measure to ensure the integrity of the bulk of a country's marine resources.

The overall conclusion, however, is that LRFF fisheries, as currently practiced, are highly undesirable to most source countries from all points of view—ecological, economic, health, and social—unless strictly controlled, as in the case of Australia. The evidence strongly implies that to be sustainable, an LRFF fishery has to operate on a very small scale and be closely managed. A risk-averse country or community would be wise to protect its communities and reef resources by preventing an LRFF fishery from starting and keeping reef resources for local use.

Aquaculture Offers Great Prospects, Many Challenges

Aquaculture, in the wider sense, has always played a large part in the LRFF trade. However, there has been misplaced optimism about aquaculture at least as it is currently practiced in the region as a means of avoiding the overfishing of wild fish populations. The majority of present culture operations rely on catching seed—the very small fish—and other bigger but less than market-size fish, mainly groupers, from reefs, thus adding to rather than subtracting from fishing pressure on the fish populations. And most grouper grow-out continues to depend on large amounts of other wild-caught fish for fish feed. Moreover, it is only possible to culture a very few of the species preferred in the trade; much

greater diversity in hatchery reared species is necessary if aquaculture is to replace a significant wild-caught component.

The large numbers of LRFF produced annually from grow-out of wild-caught sub-market-size fish represent an invisible and unquantified element of the overall present LRFF catch. If it is not taken into account somehow, it could make management measures for all grouper fisheries hopelessly optimistic. From the rough estimates that can be made, the contribution of these fish to total live grouper production is greater than that of wild-caught market-size groupers. In such cases as the threatened humphead wrasse, although several countries protect the species, they inexplicably have exemptions for grow-out culture of juveniles, which will further exacerbate its heavily exploited state.

The aquaculture subsector could expand until profit levels become marginal, given the opportunity costs of labor in many countries in the Indo-Pacific region. Such expansion would depend in part on growth in LRFF markets, both local and export, while in the case of grow-out operations, it also depends on the source of young fish—an expanding fishery for wild-caught juvenile fish would, before it collapsed, cause long-term damage to the adult populations, with flow-on effects in other fisheries and the reef ecosystems.

Even sustainable (hatchery-based) aquaculture will provide only a restricted range of species to live fish markets, both because of farmers' preferences in their choice of species—related in part to grow-out times—and technological problems in hatchery development of some high-value species. Large-scale aquaculture may also lead to localized environmental impact, particularly where wild fish are used as the feed source, and the high demand for such fish feed continues to cause concern. Nevertheless, it seems certain that as the industry matures, there will be increasing reliance on hatchery-reared broodstock and, in the longer term, selective breeding programs for such traits as faster growth, and pelleted feeds that require less wild fish.

Most importantly, if cultured fish become a larger proportion of the LRFF market, hatchery-based aquaculture holds the prospect of increasingly involving and benefiting coastal communities as grow-out farmers. The challenge remains to foster sustainable LRFF farming and take measures to reduce environmental impact while simultaneously providing socioeconomic benefits.

Regional Cooperation would be Advantageous to all Stakeholders

Regional cooperation among Pacific-island producing countries in the LRFF trade has provided some initial management recommendations. Such cooperation needs to be extended to all producing countries so that a greater body of expertise and experience can be brought to bear on important issues and mutually agreeable solutions be considered. Such an initiative is particularly important because there are no regional management authorities that deal with reef fisheries in general, and the LRFF trade in particular. Involvement of representatives of the chain of trade—fishing companies, brokers, importers, etc.—is necessary to ensure that all stakeholders have a voice and take part in making decisions that affect them; otherwise they may not respect such decisions.

The role of assistance agencies should be primarily at the regional level. Research, training, and most other activities at this level can benefit all the producing countries because the same target fish, by and large, are found throughout the region. A new focus is suggested: assisting the trade to move toward hatchery-based aquaculture in those countries where it is feasible, rather than continuing to focus on the fishery per se.

RECOMMENDATIONS

The statements and conclusions above point to many areas where research and/or surveys could help countries in the Indo-Pacific region make decisions on how to use their reef fish resources to best advantage and determine what additional information may be needed for this purpose. In fact, the LRFF trade provides an ideal impetus—a wake-up call—for these countries to look at how best to use and sustain not only their reef fish resources, but also their entire reef ecosystems. Some ways to accomplish this joint goal follow.

LRFF Trade

Trade data. Monitoring the centers of production and export (or re-export) is needed to improve coverage of both fisheries and culture operations, preferably in a manner compatible with the Hong Kong, China commodity codes for live reef fish; on a regional basis, collation of national data and feedback to all concerned countries is a minimum requirement, possibly in collaboration with FAO to ensure there is no double counting from the different fisheries. Other information that would help to regulate the trade includes a registry of vessels and a vessel monitoring system.

Economic analyses. Analyses of the economic benefits and costs of all aspects of the trade in the long and short terms, including aquaculture components based on current and projected practices, are needed to examine the monetary advantages to exporting and importing countries within different time frames and sets of assumptions. Economic analyses, especially those that explore long-term scenarios, must factor in the reality that most of these fisheries are not managed, could be operating unsustainably, and may well compromise local (nonexport) fisheries.

Trade standards, outreach, and awareness. LRFF industry standards and best practices being developed to improve the conduct of the industry will provide a guiding mechanism that each country should adapt, based on its own management objectives, resources, and capacities. Implementation through legislation should be in close cooperation with source and demand country governments and through multilateral forums such as APEC. Outreach campaigns aimed at all industry stakeholders, including LRFF consumers, are needed to raise awareness of the adverse impact associated with the trade and to influence consumer eating habits. Such campaigns could promote sustainable aquaculture as an alternative source and discourage the purchase of threatened or vulnerable species.

Regional trade organization. An organization that includes all stakeholders in the LRFF trade could act as both a guiding force and watchdog on the industry. Regional and international donor

organizations would have a role in supporting the recommendations of such an organization, and close coordination with source countries would be needed to ensure that initiatives are properly developed.

Fisheries Resources

Population dynamics of target species. Knowing how many fish are available for capture without depleting the resource is a basic need. It is particularly important when different subsectors are exploiting the same resource, in this case, LRFF fisheries and subsistence and commercial reef fisheries.

Spawning aggregations and threatened/vulnerable species. Spawning aggregations and threatened or vulnerable species should not be exploited in the LRFF trade.

Training. Training programs for fishing communities are needed on maintaining reef ecosystems and sustainable fishing, appropriate (nondestructive) fishing practices, and handling methods to reduce fish deaths.

Aquaculture

Development of sustainable aquaculture. Donor assistance could be directed at further exploring the potential for sustainable full-cycle aquaculture, which shows promise of sustainable benefits for coastal communities in some countries, through feasibility studies, technology development, and training programs.

Fisheries Management

Alternative management measures. Modeling of standard and innovative approaches would help countries to make informed management choices with regard to developing LRFF fisheries and other resource uses. One example would be to limit live fish fisheries to certain areas on a trial basis and monitor the outcome, building on the results. Another might be to limit the ports of export or import to ensure a tighter control on international trade in live fish.

The Bigger Picture

Ecosystem analysis. A major unknown factor is the relationship of LRFF fish, especially groupers, with other components of the reef ecosystem. Analyses of what drives ecosystem production and maintains its stability should be undertaken—the software is available—to learn the short- and long-term effects not only of LRFF fisheries, but also of other reef fisheries.

Economic benefits of coral reefs. Urgently needed are studies of the relative economic benefits to fishing communities, resource owners, fishing companies, and countries of starting or maintaining LRFF fisheries vis-à-vis existing commercial and subsistence fisheries and alternative resource uses, particularly (eco) tourism.

Participatory management. Reef owners and fishing communities should be involved in the management of their reef resources—not only LRFF but also all other resources, especially other high-value trade commodities, such as pearl shell, sea cucumber, and trochus. Helping these people and communities to understand better their reef resources and the significance of these resources both to local and foreign interests, would assist them to make informed decisions on how best to use the resources into the foreseeable future.