A COLLABORATIVE STRATEGY TO ADDRESS THE LIVE REEF FOOD FISH TRADE

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TO ADDRESS THE LIVE REEF FOOD FISH TRADE

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with

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Abbreviations

APEC	Asia-Pacific Economic Cooperation
CITES	Convention on the International Trade in Endangered Species of Wild Flora and Fauna
FAO	Food and Agriculture Organization of the United Nations
LRFFT	Live reef food fish trade
PRC	People's Republic of China
SPC	Secretariat of the Pacific Community
SPF	South Pacific Forum
SPREP	South Pacific Regional Environment Programme

Foreword

Despite the undisputed value of coral reefs for food production, tourism, and shoreline protection, estimated by some at hundreds of billions of dollars annually, they are facing unprecedented levels of degradation caused by habitat destruction, resource depletion, nutrient and sedimentation loading, and coral bleaching linked to increase in ocean temperature. In Southeast Asia and the Western Pacific, reefs face an additional and unique threat from overharvesting and destructive fishing methods associated with the live reef food fish trade (LRFFT).

United by concern about the impacts of the LRFFT on coral reef biodiversity, fishery stocks, and livelihoods of fisher communities, a group of scientists, resource managers, and representatives from industry and private foundations met in Hawaii to develop a strategy to address the industry.

The workshop was convened and hosted by The Nature Conservancy, the International Marinelife Alliance, and the World Resources Institute, and sponsored by the MacArthur Foundation. Participants included representatives of the three host institutions, the David and Lucille Packard Foundation, the MacArthur Foundation, the Hong Kong Chamber of Seafood Merchants, the Secretariat of the Pacific Community, the Governments of Tonga and the Solomon Islands, and private consultants with direct experience in different countries affected by the trade. Drawing from the participants' wide range of perspectives and experience, the workshop provided the opportunity, to critically evaluate the impacts and issues surrounding the LRFFT and formulate a collaborative strategy designed to transform the industry and link it closely with effective conservation action in the seas. Discussions focused on transformation of the industry—from its current state as an industry relying heavily on unsustainable fishing practices that destroy the environment, deplete the resource, and diminish biodiversity, to one employing sustainable practices that conserve biodiversity while ensuring survival of the industry and those who depend on it.

The participants represented organizations engaged in addressing different threats to marine biodiversity posed by the LRFFT. They provided a foundation of considerable institutional experience in terms of science-based methods and track records of pioneering innovative ways to address conservation problems and to finance conservation programs. Their collective presence and partnerships in many countries of the region allowed contribution of the perspectives of a wide range of stakeholders, including the traders and restaurants that drive the live reef fish market, government policymakers, resource management agencies, scientists, potential investors in mariculture, and dependent fisher communities.

In addition to providing a milestone opportunity for participants to learn what is being done by whom, and what specifically needs to be addressed within the LRFFT, the workshop enabled them to reach agreement on a number of important points.

The participants defined the steps in the market chain, from reefs to restaurants, and identified factors affecting the trade, primary partners, and management interventions for each step. They also indicated where interventions were being implemented or were planned.

The participants agreed on a strategy comprising an integrated set of activities covering protection and management. These include incentives, disincentives and control mechanisms to facilitate compliance, industry standards, research and monitoring, and communication and outreach. The strategy integrates activities in both the supply and demand countries and is based on the premise that the trade is here to stay and so needs to be transformed to incorporate sustainable practices versus its present destructive methods.

Recognizing that there are similarities and differences in the dynamics of the food and aquarium fish trades, and to avoid interference with progress made by the Marine Aquarium Council and its partners to address the latter, the participants agreed to focus this strategy exclusively on the LRFFT. The geographic focus for the strategy was established as Greater China, the center of demand for live reef fishes, and the surrounding countries in Southeast Asia and the Western Pacific that currently supply this market and where marine biodiversity is acutely threatened by the trade.

The resulting strategy is comprehensive and beyond the capacity of any one organization to implement—though this would be a novel and useful approach—and its value lies in the opportunities for partnerships offered by it. In the interest of promoting wide-ranging partnerships, the strategy does not articulate clear priorities. Defining these would be too limiting and possibly alienate organizations that have something to contribute outside of a prescribed priority area. The specific mission of the different collaborating organizations should establish the priorities for each partner.

The strategy will help those wishing to participate in addressing the LRFFT to focus their interventions around their areas of strength and to identify potential partners. Among regions and partners, it will promote collaboration and the sharing of lessons learned, including good and bad practices, and should help avoid duplication of effort.

How to Use this Strategy

The strategy lays out the LRFFT market chain from reefs to restaurants (figure 1). It shows which organizations participate at various points along the chain, together with the factors that influence each segment of the trade. Also identified are the management strategies for each link in the chain. These are then listed together with the organization that has a direct ongoing or planned activity in one or more countries in Southeast Asia and the Western Pacific.

Any organization wishing to address the LRFFT can refer to the market chain and identify where to contribute depending on its core competencies and areas of comparative advantage (geographic, thematic, or both). Referring to Figure 2 (see page!!) will help in the choice of public and/or industry partner(s) and target group(s). Figure 3 (see page!!) identifies internal market factors and external factors influencing the trade. Specific strategies can be selected from Figure 4 (see page !!), where they are provided in overview relative to the market chain. These

strategies are described in greater detail in the text and should be used as a guide for important interventions, but not seen as the definitive list.

Reference to Table 1 (see page !!) is a critical next step following the identification and selection of strategies of interest. Table 1 shows which organization, if any, is already planning or actually implementing that strategy and where. If nothing is being done in the country of interest for a particular strategy, the field is wide open for entry. If a prospective entrant into the program finds that another organization is already doing or planning a strategy at the location of interest, there are two choices: make another selection or approach the active organization about pooling resources and entering into a partnership. Table 1 also helps by indicating which other organizations are already implementing strategies of interest in other geographic locations and opens the avenue for dialogue and the sharing of lessons learned and effective approaches for implementation of those specific strategies.

The contributors to the formulation and review of this strategy have been engaged in addressing aspects of the LRFFT for varying lengths of time and with different degrees of commitment. Many have been drawn into related activities as much by their presence in concerned countries as by design and could well be open to partnership or to passing the baton to others with longer term commitments. Many, too, have established a field presence in various key countries involved in the supply or demand for live reef food fishes, and have developed strong working relationships with governments and non-governmental organizations in these nations. In such cases, partnerships could greatly facilitate entry into these countries and the implementation of interventions identified in this strategy. Other contributors have good working relationships with major regional organizations and could help provide access to them.

Finally, many collaborating organizations have long involvement in community-based activities in the region. Their wealth of experience can be greatly beneficial in efforts to make local villages and fishers aware of the impacts of destructive fishing practices. As well, it can aid in identification of sustainable resource management approaches that are compatible with local needs and traditions, and help establish appropriate incentives and alternative income sources to draw people away from destructive practices.

Hopefully, this strategy opens the way for implementation of a concerted, multi-facetted, and collaborative program of action that will lead to conservation of coral reef biodiversity in this richest of areas through effective management of the LRFFT where this is viable, and strict protection for recovery where it is not.

Rodney V. Salm, Vaughan R. Pratt, and Charles V. Barber

Introduction

A workshop was held 22-24 February 2001 in Honolulu to discuss current and planned activities of some of the organizations with a broad conservation interest in the Asia-Pacific live reef food fish trade (LRFFT) and to formulate strategies for taking better advantage of the relative strengths of these and other organizations and agencies.[1] The workshop included representatives of international non-governmental organizations, private donor organizations, producer-country national governments, an intergovernmental organization, an industry association, and a university. This document is essentially a synthesis of the existing strategies of those organizations, further shaped by the recommendations made during the workshop.

Each of the organizations and agencies with an interest in the LRFFT has its own mission or mandate. This strategy is not intended to address all those missions and mandates. Its scope is limited to addressing threats stemming from destructive fishing methods and overfishing, including the loss of biodiversity and threats to food production, food security, and livelihood opportunities in the communities and countries that supply the trade.

There is substantial overlap between the region's fisheries for live food and live ornamental products, including common players and common problems. But because the structure and dynamics of the two trades are quite different and because considerable progress has already been made in addressing problems associated with the trade in ornamentals, this strategy addresses only the live food fish trade. Notwithstanding the limited scope of this strategy, there are certainly areas where approaches to the two fisheries can be productively integrated, and several organizations are doing just that.

Overview of the Trade

The amounts and types of live reef food fish produced, traded, and consumed in the Asia-Pacific region are only very roughly known. The general patterns of production and trade are illustrated in Figure 1, which shows the flow of market-size fish and seed (fry and fingerlings used for grow-out) from producer-countries to consumer-countries. Because of the lack of reliable data for most components of the trade, the diagram in its present form does not indicate either absolute or relative volumes—only the presence or absence of production and trade. Below are a few quantitative estimates that collectively provide a rough picture of the trade.

[1] Addressing Threats to Marine Biodiversity from the Live Reef Food Fish Trade: Developing a Collaborative Strategy, 22-24 February 2001, Honolulu, Hawaii. The Nature Conservancy, The John D. and Catherine T. MacArthur Foundation, International Marinelife Alliance, World Resources Institute.

Trade Volume and Trends:

Imports of market-size live reef food fish—both wild and cultured—to Hong Kong were estimated to be about 32,000 mt in 1997 (Lau and Parry-Jones, 1999). Hong Kong and Mainland China comprise the most important markets for live reef food fish, and at least until late 2000, virtually all imports to Mainland China moved through Hong Kong (P. Chan, Hong Kong Chamber of Seafood Merchants (HKCSM), pers. comm., 2001). The approximately 32,000 mt imported into Hong Kong in 1997 therefore constituted the bulk of the regional trade. Johannes and Riepen (1995) estimated that imports into Hong Kong and Mainland China made up about 65 percent of the total regional trade. That percentage is believed to now be higher, but by how much is not known (F. McGilvray, International Marinelife Alliance-Hong Kong (IMA-HK), pers. comm., 2001), and a comprehensive trade survey is needed to revise the outdated statistics. If it is assumed that in 1997 Hong Kong imports comprised between 65 and 80 percent of the total regional trade and if the 1997 import estimate is accurate, then the total regional trade in 1997 was 40,000 to 50,000 mt.

1997 was the peak of the trade after a period of rapid growth. Trading activity declined markedly after the onset of the Asian economic crisis in 1997. Hong Kong government figures indicate imports of about 17,000 mt of live *marine* fish in 2000, fairly close to an estimate of 18,000 mt of live *reef* fish that can be derived through a combination of official statistics and 1997 interviews with importers.[2] If the latter figure accurately reflects the trend in Hong Kong imports between 1997 and 2000—that is, a decrease of 44 percent—and if it is assumed that in 2000 Hong Kong imports again comprised between 65 and 80 percent of the total regional trade, then the total regional trade in 2000 was 22,000 to 28,000 mt.

There is also a large trade in seed—both wild and hatchery-produced—used in grow-out operations. Sadovy (2000) estimated the regional seed trade to amount to hundreds or thousands of millions of fish.

Modes of Production:

There are three modes of production of market-size live reef food fish: wild-capture, grow-out of wild seed, and full-cycle mariculture. The proportion of the regional trade that consists of wild-caught fish was estimated at "more than one-half" (Johannes and Riepen, 1995:16), or two thirds (Sadovy, 2000). The Hong Kong market was recently estimated to consist of about 50 percent wild fish (P. Chan, HKCSM, pers. comm., 2001). Most full-cycle, maricultured product is produced in Taiwan. Full-cycle production of grouper in Taiwan was estimated to be about 7,000 mt in 1999, about one- half of which was exported to Hong Kong (Cesar et al., 2000).

[2] Official—but partial—import figures for "live marine fish" in 1997 represented about 66 percent of total live reef fish imports as estimated through interviews with importers (Lau and Parry-Jones, 1999). The comparable import figures for 2000 were 57 percent of those for 1997, implying total live reef fish imports of about 18,000 mt in 2000.

These estimates suggest that full-cycle, maricultured product has in recent years made up roughly 10 percent of the total trade, grown-out wild seed 20 to 40 percent, and wild product 50 to 70 percent. In terms of total production—not just traded production—the relative contribution of wild product is probably less, as the annual production of grown-out and full-cycle live reef fish in Mainland China alone has been estimated to be as great as 150,000 mt or more (P. Chan, HKCSM, pers. comm., 2001).[3]

Markets and Trade Routes:

The bulk of the imports of market-size live reef food fish to Hong Kong are sent on to Mainland China, which appears to be the largest market, followed by Hong Kong. Estimates of the proportion of Hong Kong imports that are shipped on to Mainland China have ranged from 10-20 percent (Lau and Parry-Jones, 1999) to 55-60 percent (Chan, 2000a). Taiwan is the next largest market for market-size fish, but imports of market-size product are becoming less important as Taiwan increases full-cycle and grow-out production locally (F. McGilvray, IMA-HK, pers. comm., 2001). Other important markets for live reef food fish in the region include Singapore, Japan, and communities scattered throughout the Pacific rim—including western USA, where temperate reef species are increasingly being marketed live (Sadovy and Vincent, in press).

According to government figures, important suppliers to Hong Kong of market-size live *marine* fish include Thailand, Mainland China, Taiwan, Indonesia, the Philippines, and Malaysia, but the contribution of Mainland China in terms of live *reef* fish is relatively minor.[4] Indonesia is the most important producer of *wild* live reef fish, estimated to be supplying "about 50 percent of live reef fish" to Hong Kong (Chan, 2000a:3), "more than 50% of the total wild-caught live reef fish … to Hong Kong and Singapore" (Johannes and Riepen, 1995:35), or "about 60% of the live reef food fish harvested from Southeast Asia" (Bentley, 1999:25). Australia and Vietnam are also substantial suppliers of wild product to Hong Kong, and another 10 to 15 countries of Asia and the Indo-Pacific are relatively minor suppliers.

The most important producers of market-size, live reef fish grown-out from wild seed are Thailand, Malaysia, Taiwan, Mainland China, Vietnam, and Hong Kong. Taiwan, Mainland China, and Hong Kong import substantial quantities of wild seed. The most important sources of wild seed are the Philippines and Thailand, followed by Indonesia and Malaysia. Taiwan supplies the majority of hatchery-produced seed in the region (Sadovy, 2000).

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[3] If the production of live reef food fish in Mainland China is indeed this great, groupers appear to make up only a small percentage. Production of grown-out and full-cycle grouper in Mainland China was estimated at 8,300 mt in 1997 (NACA, 1998).

[4] 1997 Hong Kong import figures, which did not include imports by Hong Kong-registered vessels, indicate Thailand and Taiwan as the top two suppliers of live marine fish, but the figures include an unknown amount of non-reef fish species (Lau and Parry-Jones, 1999). The comparable figures for 1999 and 2000 show Thailand and Mainland China as the top suppliers, but the latter exported primarily non-reef species (McGilvray and Chan, 2001).

Total Harvest:

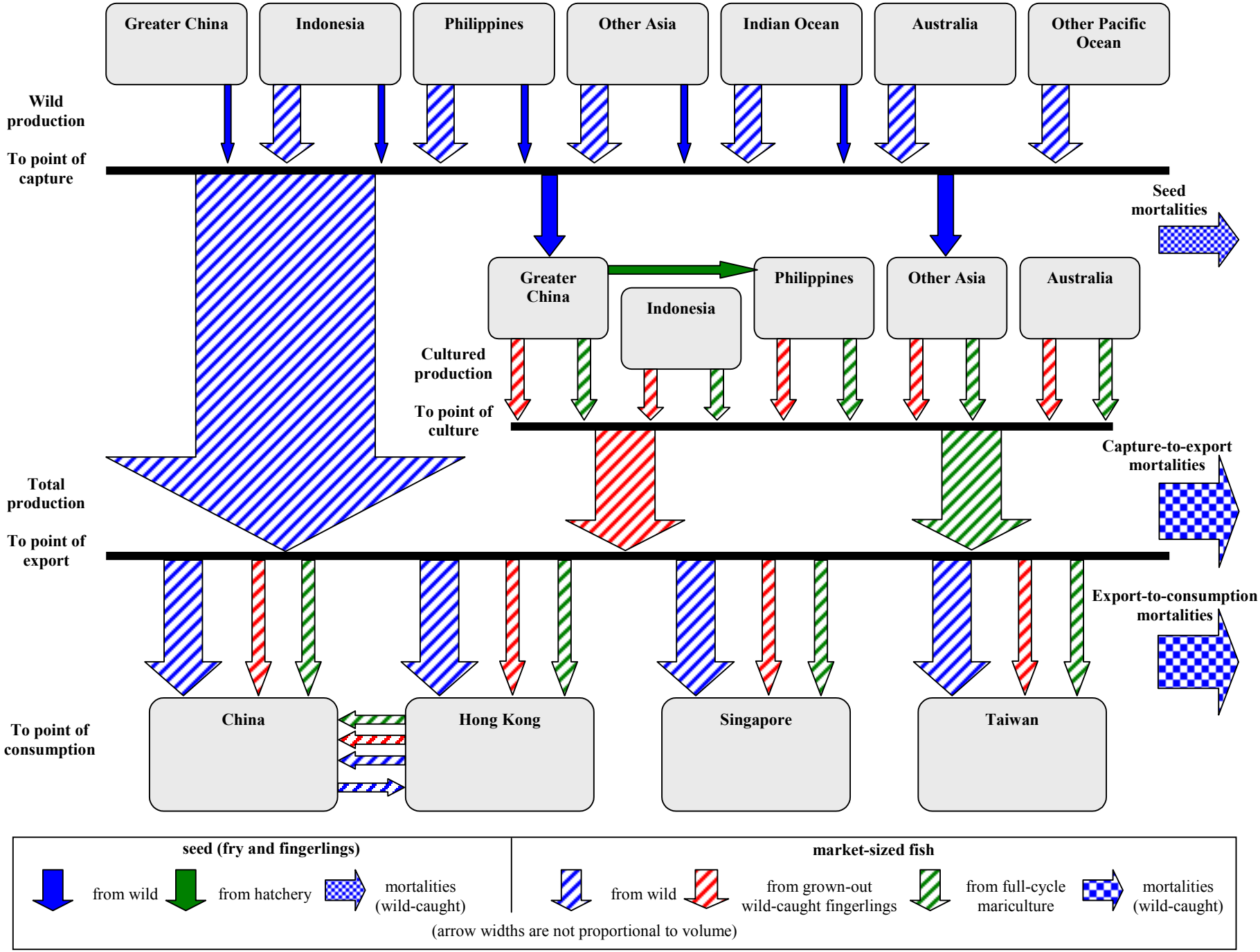
The total harvest of wild live reef food fish is the sum of the international trade (described above), domestic consumption in producer-countries, and losses incurred between the points of capture and consumption (although some of those "losses" are converted to marketable chilled or frozen product). The amount of wild live reef fish consumed domestically in the region is difficult to gauge but is almost certainly less than the amount traded internationally. The number of wild live market-size reef fish lost is probably on the same order of magnitude as the number that survives (Sadovy and Vincent, in press). The number of wild seed that is lost is at least one and probably two orders of magnitude greater than the number that is grown-out and ultimately consumed (Sadovy, 2000).

A likely range of market-size wild live reef food fish harvested annually in the region during the 1997-2000 period is estimated at 18,000 to 240,000 mt based on the following assumptions:

Hong Kong imports:	18,000-32,000	mt/yr
Hong Kong imports as proportion of regional trade:	65-80	%
Proportion of regional trade that is wild fish:	50-70	%
Domestically consumed production as a proportion of traded production:	10-40	%
Survival rate:	20-70	%
Annual regional harvest:	18,000-240,000	mt/yr

In addition, the number of wild live reef food fish seed harvested annually has probably been in the billions.

Figure 1. Flow of fish in the live reef food fish trade



Problems and threats

For the purposes of this strategy, three primary problems of the trade are identified:

1) Destructive fishing methods
2) Targeting of spawning aggregations
3) Overfishing

These problems lead to a number of adverse effects, three of which are identified here as being the threats of the trade that this strategy aims to reduce or eliminate:

1) Loss of biodiversity
2) Decreased food production and food security in coastal communities
3) Decreased livelihood opportunities in coastal communities

Destructive fishing methods—particularly the use of cyanide and intentional breaking of coral that goes with it—degrade habitat, reduce the biodiversity associated with affected habitat, and reduce the capacity of the ecosystem to produce fish used for food and for income.

Targeting of spawning aggregations—can lead to elimination of a breeding population in only two to three years of intensive fishing. The indications are that these spawning aggregations will not be reestablished for some species.

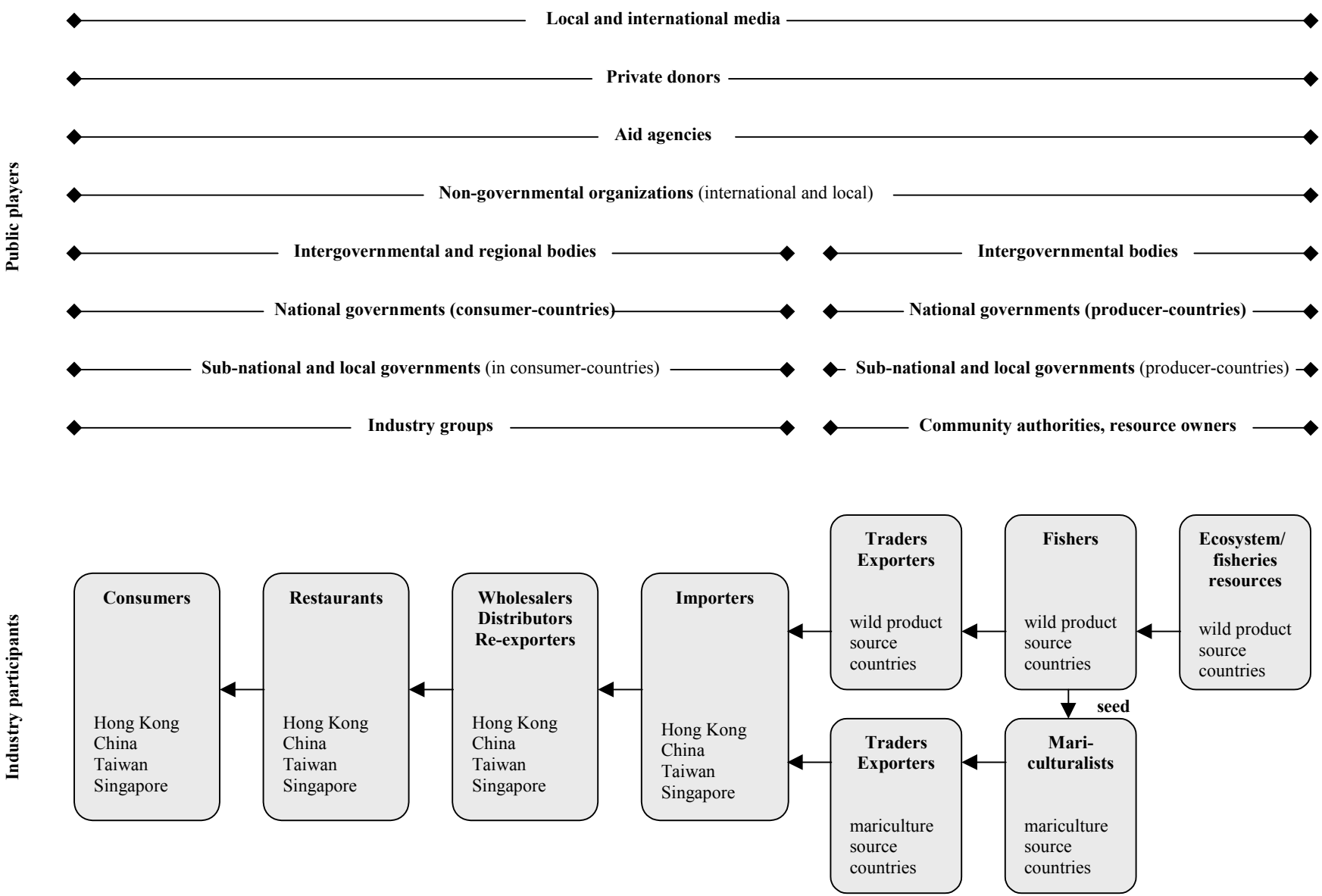
Overfishing—which is often facilitated through the targeting of spawning aggregations and exacerbated by high levels of bycatch and post-harvest mortality—decreases the productivity and threatens the viability of affected fish populations. To the extent that ecological overfishing occurs, such as through the elimination of reef predators such as groupers, overfishing also reduces the productivity of the ecosystem—again, reducing the capacity of coastal communities to produce food and generate income.

It should be noted that these threats and problems are not necessarily the only or most important ones for all stakeholders in the LRFFT. For example, from the perspective of live reef fish consumers and the traders that supply the product, more important threats might include the risk of ciguatera poisoning or a reduction in the continuity of supply. Although important from those perspectives, these threats are not addressed in detail here—this strategy does not have the explicit goals of achieving a continuous or safe supply, stable prices, or a prosperous industry. From the perspective of fishers and fishing communities in producer-countries, important threats might include safety during fishing, the threat of being arrested for illegal fishing, or the unfair distribution of benefits. Although these threats are treated secondarily to destructive fishing and overfishing in this strategy, they are important elements in any attempt to transform the live reef food fish trade and they are central to the missions of some of the organizations that will implement this strategy. To the extent that destructive fishing and overfishing and their underlying factors contribute to these threats, they are likely to be mitigated through implementation of this strategy.

Industry Participants and Public Players

Participants in the live reef food fish trade include fishers, dealers, and consumers. The market chain diagram in Figure 2 depicts the main categories of "industry participants" and the flow of fish among them. Shown above and parallel to the market chain, roughly according to where they have influence, are what are termed here "public players." These are the social (but not necessarily purely public sector) institutions that play some role in guiding and controlling the industry and the behavior of individuals within the industry. Ultimately, transforming the trade will require shifts in the behavior and practices of industry participants. Such behavior and practices are driven both by market factors (or "forces") and factors that are external to the market, including those shaped by the natural environment and the social environment. Changing the behavior and practices of industry participants will require manipulation of those factors and, therefore, interventions by and through the public players depicted in Figure 2. The public players can be considered instruments of change through which transformation of the industry can be accomplished and threats can be reduced or eliminated.

Figure 2. Industry Participants and Public Players



Factors Affecting the Trade

Countless factors drive the trade, acting on participants along the entire market chain. In Figure 3, some of these factors are listed along the market chain, positioned approximately where they act or have the potential to act. They are roughly categorized as being either "market factors" or "external factors." External factors include those associated with the social environment, including cultural values and social norms, and the institutions and mechanisms used to enforce those norms. These are expressed through governments, communities, and other agents and are shaped by players such as conservation and donor organizations. External factors also include factors shaped by the natural environment, such as the productivity of fisheries resources.

Recognition of these factors is essential to affect positive change, and interventions are necessary at multiple points along the chain of influential factors (e.g., teaching a fisherman how to catch groupers by hook-and-line may be useless without giving him incentives to do so).

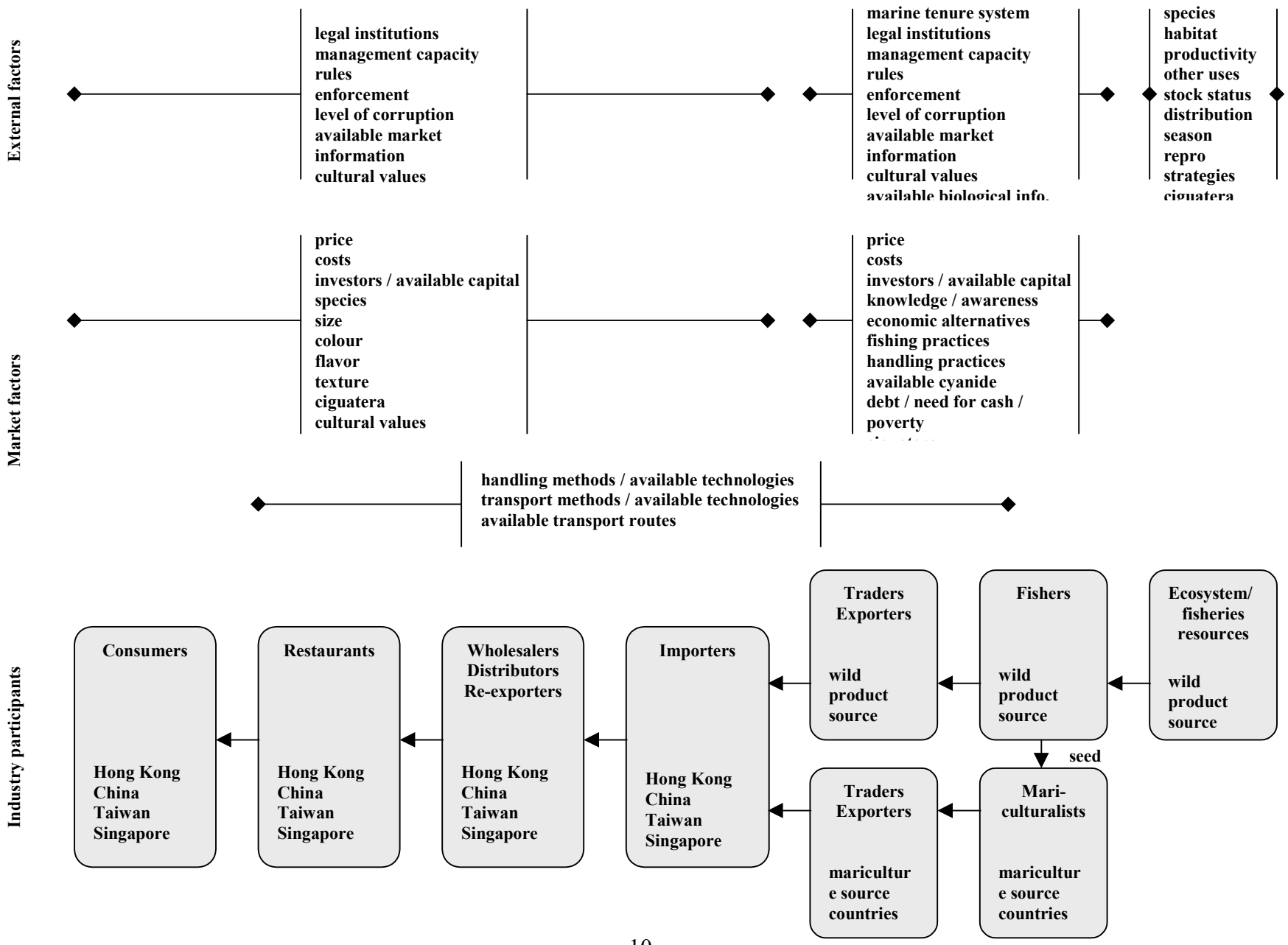
No detailed discussion of the factors that drive the trade is included here. But it is worth emphasizing two characteristics of the trade—its volatility and its geographical expansion. These are not reflected in the snapshot diagram in Figure 3, but they are critical to keep in mind when addressing problems caused by the trade.

On the demand side, prices and consumption vary substantially by season, especially with the arrival of important holidays. Less predictable factors that have strongly impacted demand in recent years include the state of the economy, the occurrence of ciguatera poisoning cases, and the occurrence of red tides in the vicinity of fish holding and culture facilities.[5] On the production side, there have been gradual shifts in supply between wild and cultured product and more rapid shifts in output from particular source countries. Fisheries have started and stopped multiple times for various reasons, including decisions by governments and communities, and civil unrest, as in Maluku, Indonesia. Traders are constantly checking out new sources, and there is a clearly discernible frontier of the fishery that has gradually expanded during the last 25 years from the South China Sea. Fishing and export operations often start before the host government is even aware of the operations' presence. It is clear that the expansion has been driven in part by the fishery's own depletion of target resources.

The rapid geographical shifts in the fishery, combined with a volatile market, result in a trade that is difficult to keep up with and problems that are difficult to address proactively. These characteristics call for the establishment of rapid response mechanisms and effective communication systems, common themes in the strategies listed in the following section.

[5] The Asian financial crisis that began in 1997 led to a drop of about 50 percent in Hong Kong prices. They dropped an additional 15-20 percent for several months in the wake of several shipments that included large numbers of ciguatoxic fishes (Chan 2000b).

Figure 3. Factors affecting the trade



Objectives and strategies

The objectives and strategies listed below are a compilation of the existing strategies of the organizations represented at the workshop, with modifications and additions following the recommendations made during the workshop.

There is little reference in these strategies to particular countries or sites so this list alone will not be sufficient for determining geographical priorities, and this document does not include a plan for implementing these strategies. But as a first step to identifying roles for particular players and areas for collaboration, Section G provides a rough picture of the current and planned activities of organizations with a broad conservation interest in the LRFFT—particularly those represented at the workshop. Further consultation among interested organizations and agencies will be necessary to formulate specific actions, timelines, and funding means.[6]

The strategies are organized under five categories, as follows:

1. **Fisheries and site-based management:** Transforming live capture and culture fisheries through local and national policies and controls, and relieving pressure on fisheries resources through the development of alternative enterprises and other incentives.

2. **Demand-side controls: Controlling** the import and trade of live reef food fish through national and regional mechanisms in consumer-countries.

3. **Industry development: Transforming** trade and fishery practices within the industry and through the market.

4. **Research and monitoring: Collecting** and analyzing information needed to better inform industry participants and public players.

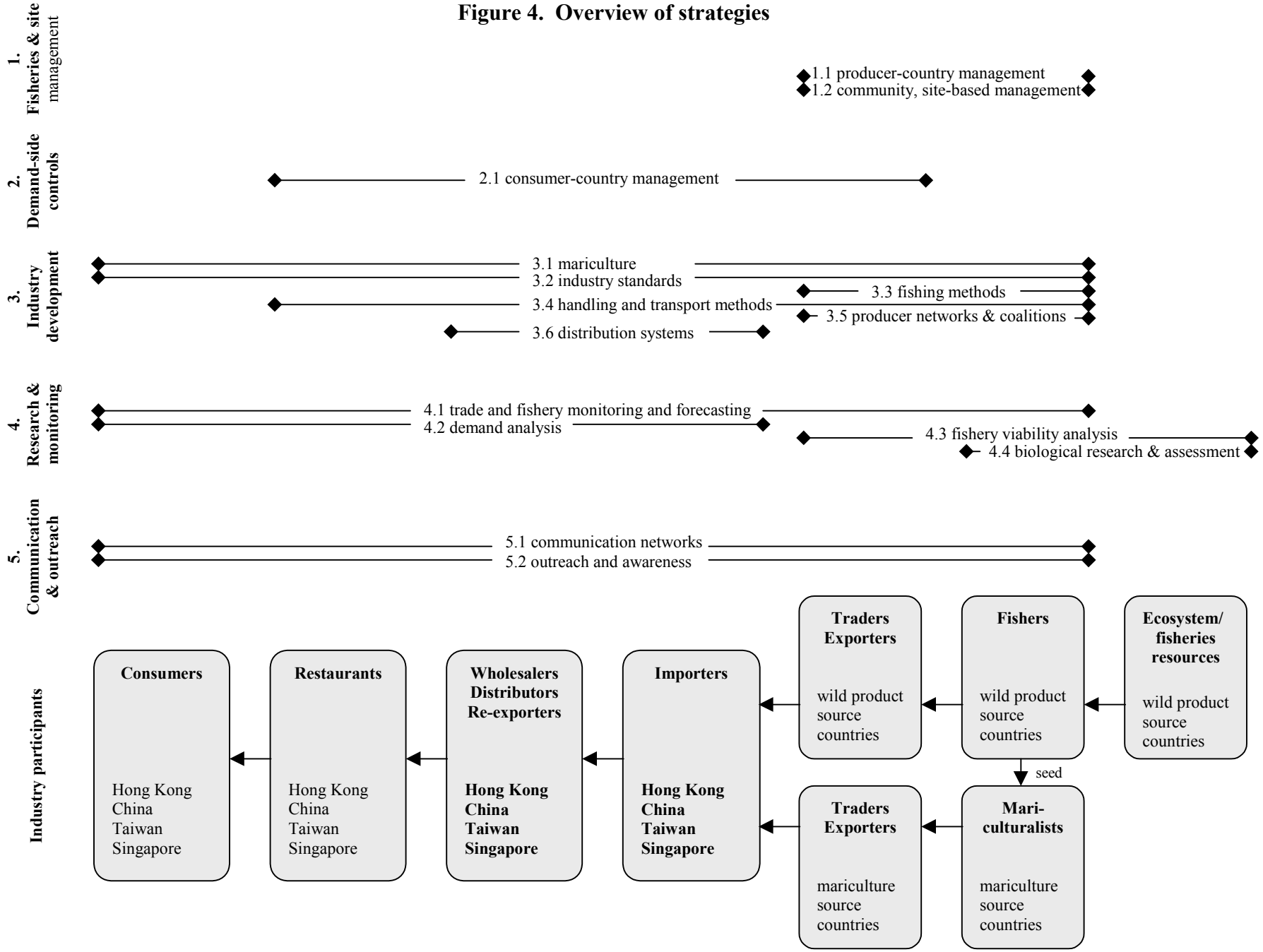
5. **Communication and outreach:** Enhancing the flow of information among industry participants and public players.

Within the five categories are fifteen general strategies, each of which has a specific objective. As an overview, these general strategies are listed in Figure 4, where they are shown parallel to the market chain according to where they are or should be directed. Within each of the general strategies are a number of specific strategies. These are described in this section and summarized in Section G, but they are not included in Figure 4.

There is considerable overlap and linkages among the strategies. Some of these are indicated in their descriptions.

[6] As an example, the workshop produced "Areas for Collaboration in Addressing the LRFFT," a plan for immediate action by certain organizations in four specific areas of work.

Figure 4. Overview of strategies



1. Fisheries and Site-Based Management

1.1 Producer-Country Management

Objective:

To achieve development and effective implementation of producer-country national and sub-national government policies and laws needed to substantially reduce the threats associated with destructive fishing and overfishing.

Strategies:

a) Develop generic guidelines for managing fisheries that target groupers and other species favored in the LRFF market. The guidelines should be based on the potential productivity of targeted resources and their vulnerabilities (including, for example, identification of species that are too vulnerable to be targeted in the trade at all). They should include general management strategies that are likely to promote efficient and sustainable fisheries, where they are viable, and discourage their development where they are not (links to fishery viability analysis and research and monitoring).

b) Develop generic management models, including policies, laws, plans, and licensing agreements, that can be rapidly adapted to the specific needs of, and adopted in, producer-countries.

c) Establish and operate a rapid response system to address country- and site-specific threats posed by the dynamic and expanding trade, particularly in response to or proposed operations. This rapid response system should include mechanisms to rapidly:

- monitor by location the activities of live reef food fish operations in the region (link to trade and fishery monitoring)
- assess ongoing and proposed live reef food fishing operations in particular areas and their immediate threats
- perform stock assessments in certain areas for immediate, preliminary management needs
- assess management capacity
- raise the awareness of affected communities, governments, non-governmental organizations (NGOs), and other public players regarding the issues and threats associated with the operations
- prepare and disseminate to affected public players basic guidelines and proposed interim measures for managing the operations
- link affected public players to regional and international information networks (link to producer networks and coalitions)
- monitor live food fishery and market developments in other parts of the world and their actual and potential connections to fisheries and markets in the Asia-Pacific region (link to communication networks)

d) Work with national and sub-national governments in wild-product producer-countries to develop and implement cost-effective laws, policies, and management programs for export-based live reef fish fisheries and reef fisheries in general. The broad objectives of such collaboration would be to preclude development of fisheries that are not viable and beneficial, prevent overfishing and destructive fishing, and encourage efficient fisheries where they are viable. Some mechanisms to achieve these objectives include, as appropriate:

- close live reef fish or for-export reef fisheries where they are not viable (link to fishery viability analysis)
- control the export of live reef food fish, such as through prohibitions or limits on amounts, species (e.g., particularly vulnerable species), and sizes (e.g., seed versus market-size fish)
- control access (e.g., through permitting)
- control fishing methods, with particular regard to discouraging the use of cyanide (e.g., through prohibitions on use and possession) and other destructive methods
- control fishing effort and catch—such as through restrictions on catch, area, season, species, and size
- protect spawning aggregations through seasonal closures, total protection, or other methods as appropriate for each site
- control participation in the industry, such as through restrictions on the nationality of fishers
- strengthen institutional and personnel capacity to manage the fishery
- effectively enforce controls on the fishery (e.g., on-water, export, cyanide testing)
- encourage efficient transportation modes and routes
- ensure fair returns to local interests
- internalize within the industry the management, environmental, and other costs of the fishery, such as through access and impact fees
- monitor fishing and export activity, such as through reporting requirements, vessel observer programs, and vessel monitoring systems
- perform stock assessments and biological impact assessments (link to biological and ecological research, assessment, and monitoring)

e) Work with national and sub-national governments in cultured-product producer-countries to develop and implement cost-effective laws and policies to address the for-export live reef fish mariculture industry and the mariculture industry in general. These would include mechanisms to minimize environmental impacts of mariculture development—such as genetic pollution, effluent pollution, and degradation of coastal and marine habitat—and impacts associated with seed fisheries, including overfishing, excessive post-harvest mortality, and bycatch (link to mariculture).

f) Work with national and sub-national governments in producer-countries to develop, test, and refine innovative management strategies for marine resources in general, including:

- strengthening local tenure and authority
- mechanisms for co-management between local and central authorities (link to community and site-based management)
- designing protected areas

g) Strengthen the institutional capacity of the Secretariat of the Pacific Community (SPC) to provide technical assistance in LRFF management to its member countries in the Pacific Islands and to serve as a regional communications center (link to communication networks).[7]

1.2 Community and Site-Based Management

Objective:

To achieve effective implementation of management regimes and the development of sustainable fishing practices and viable alternative enterprises or other incentives in particular communities and sites such that threats are substantially reduced locally and successful models are adopted elsewhere.

Strategies:

a) Strategically select communities and sites in producer-countries where the benefits of intervention, the chances of success, and the value as demonstration sites are relatively great.

b) Work with selected communities and sites to develop and implement cost-effective management regimes for local marine resources and live reef fish fisheries in particular—with the general objectives of preventing overfishing and destructive fishing and encouraging efficient fisheries, including as appropriate:

- marine protected areas
- mechanisms to control access to fishing grounds (e.g., through customary law pertaining to tenure, access and resource use rights, and permitting controls)
- strengthening of local management capacity—including enforcement
- mechanisms for ensuring fair returns to local interests
- internalizing within the industry the management, environmental, and other costs of the fishery (e.g., through access and impact fees)
- monitoring fishing activity and exports

[7] SPC is the intergovernmental body in the Pacific Islands charged with providing technical assistance to member states on LRFT[ROD: I'm assuming this is supposed to be LRFT and not LRFFT?] issues. Because of the limited institutional capacity of small island states, regional institutions and approaches are particularly crucial in the Pacific Islands.

c) Work with communities and at sites to develop, test, and refine innovative management strategies for marine resources in general, including:

- strengthening customary law, local tenure and resource use rights, and authority
- mechanisms for co-management between local and central authorities (link to producer-country management)
- designing protected areas

d) Increase community awareness of the benefits, costs, and risks associated with for-export live reef fisheries and options for engagement and management in order to facilitate informed decisions (link to outreach and awareness).

e) In communities engaged in for-export live reef food fishing, provide extension and training in non-destructive and efficient fishing, handling, and transport methods and practices, and encourage the provision of infrastructure and supplies (e.g., boats, fishing gear, and pens), and credit facilities necessary to support sustainable fisheries.

f) Where appropriate, conduct the market, technical, and socio-economic analyses necessary to select the most feasible alternative enterprises and locations for pilot enterprise development projects.

g) In strategically selected communities conduct pilot projects in which new economic opportunities are shared, tested, and demonstrated.

h) Conduct the extension and training necessary to expand successful site-based and pilot projects to other areas.

2. Demand-Side Controls

2.1 Consumer-Country Management

Objective:

To achieve the development and effective implementation of national and sub-national policies and laws in consumer-countries—particularly controls on imports of live reef food fish, such that a substantial reduction in threats is achieved region-wide.

Strategies:

a) Work with consumer-country governments and through multilateral forums such as Asia-Pacific Economic Cooperation (APEC) to raise the profile and consideration of LRFFT issues on national and sub-national agendas in consumer-countries (link to outreach and awareness).

b) Formulate model controls over the import of live reef food fish and work with consumer-country governments to see the enactment and implementation of such controls at the national and sub-national levels, particularly in China, Hong Kong, Taiwan, and Singapore. Such controls might include:

- prohibitions on the import of fish captured or transported in violation of producer-country laws
- prohibitions on the import of fish captured with destructive methods or transported with inefficient methods
- prohibitions or restrictions on the import of particularly vulnerable species
- restrictions on the import of particular sizes (e.g., seed versus market-size fish)
- restrictions on points of entry and distribution routes
- reporting requirements (link to research and monitoring)
- cyanide and ciguatera testing systems and requirements

c) Work with consumer-country governments and through multilateral forums such as APEC to see the development and implementation of national policies that are conducive to the development and application of industry standards for the LRFFT (link to industry standards).

d) Work with consumer-country and producer-country governments and through regional bodies such as APEC, SPC, South Pacific Forum (SPF), and South Pacific Regional Environment Programme (SPREP) to harmonize national policies regarding the LRFFT. To the extent possible, such collaboration should also aim to develop and enact regional and international agreements regarding the LRFFT (particularly provisions for monitoring and reporting) and controls over the export and import of live reef food fish. The latter could be accomplished through the listing of certain species under CITES, the Convention on the International Trade in Endangered Species of Wild Flora and Fauna.

3. Industry Development

3.1 Mariculture

Objective:

To guide development of the mariculture industry such that threats associated with destructive fishing and overfishing are reduced without causing undue adverse environmental, economic, or social impacts.

Strategies:

a) Assess the potential for mariculture to displace wild product in the market, provide alternative livelihood opportunities, and reduce threats without undue adverse impacts, and use the findings to develop strategies to encourage appropriate mariculture development,

such as towards the identification of model mariculture modes and best practices and the development of model government policies. The assessment should, for example:

- evaluate, given available culture technologies and economics, the potential for particular species to be cultured and to displace wild product in the live food market
- evaluate the opportunities, constraints, and environmental, social, and economic impacts of various types and modes of mariculture—such as intensive "industrialized" operations versus small-scale "backyard" operations in coastal communities—and full-cycle culture versus the grow-out of captured or purchased wild seed, and, in particular, analyze for each the opportunities for, and effects on, fishers and fishing communities—particularly those that supply live reef food fish markets—including the likelihood of their transitioning from capture to culture occupations
- assess the markets and marketability of cultured product relative to wild product through analysis of differences in quantities, prices, and market channels and through investigations of consumer perceptions and preferences, consumer ability to distinguish cultured from wild product, and identification of the specific attributes of cultured product that are relatively undesirable (e.g., species, flavor, texture, size)
- research and synthesize the best available mariculture practices

b) If and where determined to be appropriate, encourage the development of appropriate mariculture enterprises and the contribution of cultured product to live reef food fish markets, including, for example:

- develop markets for both inputs to, and outputs from, mariculture operations
- improve the quality (and thus marketability) of cultured product through encouragement of improvements in culture technologies and methods
- improve the marketability of "appropriately produced" cultured product through marketing campaigns and other outreach activities—possibly including the application of industry standards, including making buyers and consumers more aware of any positive environmental and other attributes associated with cultured product (links to industry standards and outreach and awareness)
- promote the development of efficient mariculture methods for species important in the market, overcoming constraints and problems associated with breeding, feeding, disease, handling, water quality, the harvest of adults for broodstock, the harvest of juveniles for grow-out, and the harvest of non-target species for feed
- conduct community-based mariculture pilot projects and evaluate their impacts on the communities, environment, and live reef food fish markets (link to community and site-based management)
- conduct the extension work needed to promote the use of best available mariculture practices among actual and prospective investors and operators, policy-makers, and developers of industry standards (links to producer-country management, industry standards, and outreach and awareness)
- develop model policies for live fish mariculture—drawing from guidelines of the Food and Agriculture Organization of the United Nations (FAO) and other similar sources—that address adverse environmental and social impacts, and promote those policies in mariculture producer-countries; example impacts include those associated with genetic

pollution, effluent pollution, and destruction of coastal and marine habitat, impacts associated with seed fisheries—including overfishing, excessive post-harvest mortality, and bycatch—and various socioeconomic impacts on producer communities (link to producer-country management)

- develop model policies and best practices for seed fisheries (harvesting wild juvenile fish for grow-out) and promote those policies and practices among industry participants and producer-country governments (link to biological and ecological research and producer-country management)
- promote government policies that provide incentives to invest in appropriate mariculture of target species in both producer- and consumer-countries (link to producer- and consumer-country management)

c) Periodically assess the contribution of cultured product to the market (e.g., in terms of species, quantity, price, source, and production method) and the effects that intensive and extensive mariculture activities in the region have or may have in reducing threats (link to trade and fishery monitoring), and revise these mariculture-related strategies accordingly.

3.2 Industry Standards

Objective:

To achieve the development and wide application of industry standards,[8] expressed through codes of conduct, certification standards and procedures, or other means, such that threats are substantially reduced region-wide.

Strategies:

a) Through consumer demand analysis (link to demand analysis) and working with consumer-country governments and through multilateral forums, assess the feasibility of applying various models of industry standards and procedures in the major markets. Assessments could include those of consumers' and traders' willingness to pay for environmentally advantageous product attributes and of governments' willingness to provide any necessary policy and legal support.

b) Develop a model code of conduct for participants in the live reef fish food trade. Promote its adoption and application by industry groups such as the Hong Kong Chamber of Seafood Merchants and its members, and its consequent implementation by participants and players up the market chain, including producer-country governments, traders, and fishers. The code will build on the FAO Code of Conduct for Responsible Fisheries and could address the following product attributes:

    - mode of production (e.g., wild, wild seed grow-out, full-cycle culture)

[8] The term "industry standards" is used here as a generic descriptor of mechanisms to create market values for product attributes associated with sustainability, environmental impacts, and so forth. These new "markets" could be created at any point or points along the market chain.

- capture, culture, handling, and transport methods
- fishery management regimes and controls of the source country
- compliance with the laws of the source country
- fair trade practices with producer-countries and communities
- presence or absence of cyanide and ciguatera

c) Depending on the feasibility of applying a certification system, develop standards (e.g., from the code of conduct) and establish the necessary institutional links (e.g., endorsers, certifiers, governments) and procedures necessary for their wide application.

d) Conduct the outreach with consumers and other buyers along the market chain, as necessary, to gain wide acceptance and application of industry standards, whether expressed through codes of conduct, certification standards, or other means.

3.3 Fishing Methods

Objective:

To achieve a shift in fish capture and handling methods used in the LRFFT away from non-destructive and inefficient methods, such that threats are substantially reduced.

Strategies:

a) At the national, sub-national, and community levels in producer-countries, work with authorities to establish effective disincentives to use destructive methods (e.g., bans on the use of cyanide enforced in part through cyanide testing systems) (link to fisheries and site-based management).

b) In strategically selected countries and communities conduct the research necessary for understanding motivations for using destructive methods. Also, conduct the outreach and training necessary to give fishers the knowledge of the adverse effects of destructive methods and the skills and incentives to use non-destructive capture methods and efficient handling methods effectively (link to community and site-based management and outreach and awareness).

3.4 Handling and Transport Methods

Objective:

To achieve an improvement in the efficiency of fish handling and transport methods such that the mortality of fish between capture and consumption is substantially reduced region-wide.

Strategies:

a) Develop increasingly efficient handling (e.g., feeding, disease control) and transport technologies and promote their wide application (link to outreach and awareness).

b) Promote government policies and laws that facilitate the availability and use of air transportation (e.g., laws that prohibit shipping by sea), efficient air routes, and en route fish reconditioning facilities (link to producer-country management).

3.5 Producer Networks and Coalitions

Objective:

To improve the ability of producer-country industry participants to negotiate fair terms of access and trade.

Strategies:

a) Establish effective methods of communication among participants in producer-countries, including a system to rapidly and widely disseminate trade, industry, fishery, and biological information (links to research and monitoring and outreach and awareness).

b) Promote other methods for fishers and producer-countries to improve their bargaining position, such as facilitating (e.g., through intergovernmental bodies such as SPC) competition among buyers and the formation of marketing coalitions among producer-countries.

3.6 Distribution Systems

Objective:

To establish, if cost-effective, centralized systems in Hong Kong and possibly Mainland China through which the distribution and monitoring of live reef fish imports to Greater China would be coordinated.

Strategies:

a) Work with consumer-country governments, industry participants, and through multilateral forums such as APEC to assess the benefits (e.g., improved compliance with import controls and more complete monitoring), costs (e.g., loss in transport efficiency), and constraints to establishing centralized distribution and monitoring systems in Hong Kong and Mainland China.

b) If found to be beneficial, work with consumer-country governments and industry participants to establish centralized distribution and monitoring systems in Hong Kong and Mainland China (link to trade and fishery monitoring and forecasting).

4. Research and Monitoring

4.1 Trade and Fishery Monitoring and Forecasting

Objective:

To establish a permanent, efficiently linked, cost-effective system for monitoring and forecasting important aspects of the regional trade of live reef fish and the fisheries that support the trade.

Strategies:

a) Continue to develop the Hong Kong-based monitoring system as the central node for consumer-countries and work towards establishing it as a self-sufficient and industry-financed government function through the amendment of appropriate laws and the strengthening of institutional capacity (links to consumer-country management and distribution systems).

b) Develop effective monitoring systems in important provinces of China and in Taiwan, Singapore, and any other countries that become important markets. Work toward establishing them as self-sufficient and industry-financed government functions, and establish linkages between these systems and the Hong Kong central node (link to consumer-country management).

   The consumer-country systems should, at a minimum, continually monitor the following:

   - weight imported—by date, species, life stage (fry, fingerling, juvenile, or adult), source country, production mode (wild, full-cycle mariculture, or wild juvenile grow-out), shipping route, shipment mode (air versus sea), carrier, vessel identification, and importer
   - wholesale and retail prices (through sampling)—by species, size, source country, production mode, and shipment mode, with a temporal resolution of one month

   Additional aspects that are important but difficult to continually and accurately census should be monitored through sampling, including:

   - mortality rates and their causes—during export and between the points of import and sale in restaurants
   - feed rates and sources
   - fish size composition, by species and source country
   - enforcement activities and compliance levels

c) Work with relevant national, sub-national, and local authorities in producer-countries to establish cost-effective monitoring systems of fishing activities (e.g., catch and effort) and exports. To varying extents, the systems could rely on reporting requirements for fishers and traders, vessel observer programs, and vessel monitoring systems, all of which can be

valuable as enforcement as well as information-gathering tools (link to fisheries and site-based management).

The producer-country systems should, at a minimum, continually monitor the following:

- weight produced—by species, production mode, fishing area, fishing method, and principals (e.g., fishers and/or purchasing company)
- weight exported—by species, production mode, destination, shipment mode, shipper, and carrier and vessel identification

Additional aspects that are important but difficult to continually and accurately census should be monitored through sampling. These include:

- mortality rates and their causes—during capture and between the capture locations and points of export
- bycatch rates, species, and fate
- feed rates and sources
- catch-per-unit-effort
- proportion of harvest taken from spawning aggregations
- enforcement activities and compliance rates

d) Establish and maintain a regional register of export companies, import companies, carrier vessels, and mother vessels active in the region.

e) Establish and maintain an analytical, reporting, and communications system. In this system, trade and fishery information (including enforcement and compliance information) from consumer and producer-countries would be rapidly synthesized, key market and fishery indicators identified and tracked, trend and forecast analyses performed, and results rapidly and broadly disseminated (link to communication networks).

4.2 Demand Analysis

Objective:

To describe and monitor important characteristics of demand in the major LRFF markets.

Strategies:

a) Continue to investigate consumer preferences and the demand relationships among price, quantity, and product attributes (e.g., species, size, color, mode of production, source, and season) in the major Asian markets.

b) Develop indicators of important demand attributes (e.g., price differentials between wild and cultured product) and establish a system for monitoring them (link to industry development).

4.3 Fishery Viability Analysis

Objective:

To develop rapid, general, cost-effective methods for assessing the viability of export-based live reef food fisheries and to assist in applying those methods in countries that have or are considering having such fisheries.

Strategies:

a) Develop general methods for assessing the viability of live reef fish-based fisheries, including identification of key questions to be answered for a given location or country. Answers should shed light on the productivity, vulnerabilities, and competing uses of target resources, the needs and aspirations of local communities, and the local capacity to manage the fishery. The methods should be designed to be applied either proactively—where the output would be indicative price scales and fishery methods for cost-effective fisheries, or reactively—where the inputs would include the scale and characteristics of a proposed operation. In the latter, the output would be the conclusion that the proposal is "viable" or "not viable."

b) Make the assessment methods readily available and useable to producer-countries and localities, assist producer-countries to incorporate such assessment processes in their fishery management laws, perform the assessments, and interpret and apply the results.

4.4 Biological and Ecological Research, Assessment, and Monitoring

Objective:

To develop and apply cost-effective tools for assessing fishery productivity and for monitoring targeted populations and ecosystems.

Strategies:

a) More fully assess the productivity and vulnerabilities of target species in general (e.g., including identification of species too vulnerable to be targeted in the trade at all) through more detailed examination of the life history and biology of target species, the ecology of their supporting ecosystems, and trends and impacts of harvest. And, through regional investigations of distribution, relative abundance, ecological role, and population structure, geographically resolve that assessment as much as possible through the Indo-Pacific.

b) Develop rapid, general, cost-effective methods for assessing the productivity of target populations and ecosystems in particular locales or countries, and apply those methods proactively and reactively as needed.

c) Develop, test, and refine monitoring methods for targeted populations (e.g., visual censuses of spawning aggregations) and apply those methods, where cost-effective, to establish baseline data and measure the long-term impacts of heavy fishing on target populations.

d) Investigate the optimal design and effects on target populations of no-fishing areas and seasons, with particular regard to the maintenance of spawning aggregations.

e) Examine the biological and ecological effects of harvesting fry, fingerlings, and juveniles for grow-out purposes and develop generic best management and fishing practices for seed fisheries (links to producer-country management and mariculture).

f) Establish and maintain a communications system in which important biological findings and their implications and new research and assessment methods are rapidly and broadly disseminated (link to communication networks).

5. Communication and Outreach

5.1 Communication Networks

Objective:

To improve the flow of market and other information along the market chain and among public players in order to help internalize within the industry the environmental and other costs associated with the industry and to facilitate anticipatory management.

Strategies:

a) Establish effective methods of communication among participants and players in producer- and consumer-countries, including a system to rapidly and widely disseminate trade, industry, fishery, and biological information (links to research and monitoring, industry standards, and producer networks and coalitions).

b) Establish communication links with public players in other regions of the world in order to monitor international developments in live food fisheries and markets and their actual and potential connections to fisheries and markets in the Asia-Pacific region (link to producer-country management).

5.2 Outreach and Awareness

Objective:

To increase the awareness of all participants and players of the benefits and costs associated with the trade and to thereby achieve a substantial shift in individual and organizational behavior such that threats are substantially reduced.

Strategies:

a) Conduct outreach campaigns to raise awareness among consumers, consumer-country governments, producer-country governments, coastal fishing communities, and fishers of the adverse impacts associated with the trade, particularly the impacts of destructive methods and overfishing (links to all other strategies). Specific activities could include:

- community and country-specific public awareness campaigns
- industry awareness campaigns through participation in trade forums and other means
- government awareness campaigns, facilitated through APEC, SPC, SPREP, and other regional bodies, where appropriate

Current Interventions

In Table 1 the current and planned interventions of organizations with a broad conservation interest in the LRFFT—particularly those represented at the workshop—are indicated for each of the main countries involved in the trade. This table is not intended to fully describe all the relevant activities of these organizations or to identify all the agencies and organizations that are active in a particular country or area of work. For example, there is no explicit indication of the activities of governments, communities, local non-governmental organizations, or academia, including the relevant activities of the local partners of the indicated organizations. However, in order to help identify priority areas for interventions, there is a rough (and very subjective) indication for each strategy and country of whether or not there is "substantial engagement" of local players, including governments, communities, and non-governmental organizations.

The purpose of the table is to give a general idea of the scope of current interventions and to help identify the most critical gaps, both by country and strategy. This information should be helpful to organizations—including those not identified here—in identifying productive roles for themselves while avoiding unnecessary overlaps. It should also help stimulate consultations among organizations and lead to economical collaborative activities that take best advantage of each organization's strengths. Such consultations should apply not just to future planning efforts, but to the activities indicated in this table as ongoing or planned, as well.

Table 1. Interventions in the live reef food fish trade

Below is an explanation of the format and codes used in the table:

X Y *Z*

Indicates for a given strategy and country the **ongoing** or *planned* activities of organizations with a broad conservation interest in the LRFFT, particularly those organizations represented at the workshop, where:

F = World Wide Fund for Nature
H = Hong Kong Chamber of Seafood Merchants
I = International Marinelife Alliance
R = World Resources Institute
S = Secretariat of the Pacific Community
N = The Nature Conservancy
W = IUCN – The World Conservation Union

*

Indicates for a given country that the strategy is not applicable.

Indicates for a given country and strategy that there is substantial engagement by local public players, such as governments or NGOs (e.g., for "producer-country management" in Papua New Guinea it reflects the government's attention to the LRFFT through a moratorium and management plan development).

Countries not specifically included in the table that have been, are, or are likely to be involved in the trade include:

- Asia: Myanmar, Kampuchea, Japan, Bangladesh, Korea, and Brunei
- Pacific Islands: Vanuatu, Tonga, and the Commonwealth of the Northern Mariana Islands
- Indian Ocean and Red Sea: India and Sri Lanka, Seychelles, Comoros, Eritrea, Tanzania, and Madagascar

Table 1. Interventions in the LRFFT

1. Fisheries and site-based management (1 of 2)

	Entire region	Greater China			Southeast Asia							Other Asia
	General	China	Hong Kong	Taiwan	Singapore	SE Asia-General	Thailand	Philippines	Indonesia	Malaysia	Vietnam	Other Asia
1.1 Producer-country management												
a. generic management guidelines		*	*	*	*	*I*	*	*	*	*	*	*
b. generic management models		*	*	*	*	*I*	*	*	*	*	*	*
c. rapid-response system		*	*	*	*			**I**	*I*			
d. wild product management systems		*	*	*	*			**I**	**I N R**	*I*	**I**	
e. cultured product management systems	*R*	*	*I*	*	*				*N*		**I**	
f. general marine resource management		*	*	*	*				**I N**			
g. strengthen SPC capacity	*	*	*	*	*	*	*	*	*	*	*	*
1.2 Community and site-based management												
a. strategic community selection	*	*	*	*	*			**I**	**I N**		**I**	
b. local management regimes	*	*	*	*	*			**I**	**I N**		**I**	
c. general marine resource management	*	*	*	*	*			**I**	**I N**		**I**	
d. increase community awareness of LRFFT	*	*	*	*	*			**I**	**I N**			
e. fisheries extension and support facilities	*	*	*	*	*			**I**	**I**			
f. enterprise feasibility analysis	*	*	*	*	*			**I**	*I* **N**		**I**	
g. pilot enterprise development projects	*	*	*	*	*			**I**	*I* **N**		**I**	
h. extension and training beyond pilot projects		*	*	*	*				*I N*			

F	World Wide Fund for Nature
H	Hong Kong Chamber of Seafood Merchants
I	International Marinelife Alliance
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S	Secretariat of the Pacific Community
N	The Nature Conservancy
W	IUCN – The World Conservation Union

Bold: ongoing
Italics: planned

*
Not applicable

substantial local engagement

Table 1. Interventions in the LRFFT

1. Fisheries and site-based management (2 of 2)

	Pacific Islands										Indian Ocean	
	Pacific-general	**Australia**	**PNG**	**Solomon Islands**	**Fiji**	**Marshall Islands**	**FSM**	**Palau**	**Kiribati**	**Other Pacific**	**Maldives**	**Other Indian**
1.1 Producer-country management												
a. generic management guidelines	*I N R S*	*	*	*	*	*	*	*	*	*	*	*
b. generic management models	*I N R S*	*	*	*	*	*	*	*	*	*	*	*
c. rapid-response system	**N**											
d. wild product management systems		*I*	**I N R**	**N**	*I S*	*I S*	*I* **N**	**N**	*I S*			
e. cultured product management systems												
f. general marine resource management			**N**	**N**			***N***	**N**				
g. strengthen SPC capacity	*I N R*	*	*	*	*	*	*	*	*	*	*	*
1.2 Community and site-based management												
a. strategic community selection			**N**	*N*			*N*	**N**				
b. local management systems			**N**	*I N*			*N*	**N**				
c. general marine resource management			**N**	*N*			*N*	**N**				
d. increase community awareness of LRFFT							*N*	**N**				
e. fisheries extension and support facilities												
f. enterprise feasibility analysis	*I N R*											
g. pilot enterprise development projects	*I N R*											
h. extension and training beyond pilot projects												

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Bold: ongoing
Italics: planned

*
Not applicable

substantial local engagement

Table 1. Interventions in the LRFFT

2. Demand-side controls (1 of 2)

	Entire region	Greater China			Southeast Asia							Other Asia
	General	**China**	**Hong Kong**	**Taiwan**	**Singapore**	**SE Asia-General**	**Thailand**	**Philippines**	**Indonesia**	**Malaysia**	**Vietnam**	**Other Asia**
2.1 Consumer-country management												
a. raise profile of LRFFT issues	*I N R*	*I N*	**I N R W**	*N*	*N*		*	*	*	*	*	*
b. formulate, implement model controls	*N*						*	*	*	*	*	*
c. policies in support of industry standards	*I N*		*I*				*	*	*	*	*	*
d. regional and intl. agreements	*N*						*	*	*	*	*	*

2. Demand-side controls (2 of 2)

	Pacific Islands										Indian Ocean	
	Pacific-general	**Australia**	**PNG**	**Solomon Islands**	**Fiji**	**Marshall Islands**	**FSM**	**Palau**	**Kiribati**	**Other Pacific**	**Maldives**	**Other Indian**
2.1 Consumer-country management												
a. raise profile of LRFFT issues	*	*	*	*	*	*	*	*	*	*	*	*
b. formulate, implement model controls	*	*	*	*	*	*	*	*	*	*	*	*
c. policies in support of industry standards	*	*	*	*	*	*	*	*	*	*	*	*
d. regional and intl. agreements	*	*	*	*	*	*	*	*	*	*	*	*

F	World Wide Fund for Nature
H	Hong Kong Chamber of Seafood Merchants
I	International Marinelife Alliance
R	World Resources Institute
S	Secretariat of the Pacific Community
N	The Nature Conservancy
W	IUCN – The World Conservation Union

Bold: ongoing
Italics: planned

*
Not applicable

substantial local engagement

Table 1. Interventions in the LRFFT

3. Industry development (1 of 4)

	Entire region	Greater China			Southeast Asia							Other Asia
	General	China	Hong Kong	Taiwan	Singapore	SE Asia-General	Thailand	Philippines	Indonesia	Malaysia	Vietnam	Other Asia
3.1 Mariculture												
a. assess role of culture in threat reduction	**R**	*N*	**F N W**						**N**			
b. promote appropriate culture development	**R**	*N*	**I** *N*	*N*					**N**		**I**	
c. assess effects of culture on threats	**R**								*N*			
3.2 Industry standards												
a. assess feasibility of industry standards	**N**		**F**					**I**				
b. develop model code of conduct	**I**		**I**									
c. develop certification standards, procedures	**I N** *R*							**I**	*I*		*I*	
d. conduct outreach for standards acceptance	*I N R*							**I**				
3.3 Fishing methods												
a. disincentives for destructive methods			*		*			**I**	**I N**	*I*	**I**	
b. outreach and training for fishing, handling			*		*			**I**	**I**	*I*	**I**	
3.4 Handling and transport methods												
a. develop handling, transport technologies											**I**	
b. policies for efficient routes and methods												

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H	Hong Kong Chamber of Seafood Merchants
I	International Marinelife Alliance
R	World Resources Institute
S	Secretariat of the Pacific Community
N	The Nature Conservancy
W	IUCN – The World Conservation Union

Bold: ongoing
Italics: planned

*
Not applicable

substantial local engagement

Table 1. Interventions in the LRFFT

3. Industry development (2 of 4)

	Pacific Islands										Indian Ocean	
	Pacific-general	**Australia**	**PNG**	**Solomon Islands**	**Fiji**	**Marshall Islands**	**FSM**	**Palau**	**Kiribati**	**Other Pacific**	**Maldives**	**Other Indian**
3.1 Mariculture												
a. assess role of culture in threat reduction												
b. promote appropriate culture development												
c. assess effects of culture on threats												
3.2 Industry standards												
a. assess feasibility of industry standards	**N**											
b. develop model code of conduct	**I**											
c. develop certification standards, procedures	**I N** *R S*											
d. conduct outreach for standards acceptance	*I N R S*											
3.3 Fishing methods												
a. disincentives for destructive methods	*I N S*		**N**	*I* **N**	*I S*							
b. outreach and training for fishing, handling	*I S*											
3.4 Handling and transport methods												
a. develop handling, transport technologies												
b. policies for efficient routes and methods												

F	World Wide Fund for Nature
H	Hong Kong Chamber of Seafood Merchants
I	International Marinelife Alliance
R	World Resources Institute
S	Secretariat of the Pacific Community
N	The Nature Conservancy
W	IUCN – The World Conservation Union

Bold: ongoing
Italics: planned

*
Not applicable

substantial local engagement

Table 1. Interventions in the LRFFT

3. Industry development (3 of 4)

	Entire region	Greater China			Southeast Asia							Other Asia
	General	China	Hong Kong	Taiwan	Singapore	SE Asia-General	Thailand	Philippines	Indonesia	Malaysia	Vietnam	Other Asia
3.5 Producer networks and coalitions												
a. communication among producers		*	*	*	*			**I**	**I**		**I**	
b. competition and coalition-building		*	*	*	*							
3.6 Distribution systems												
a. assess feasibility of central dist. systems		*I*	**H I**				*	*	*	*	*	*
b. establish central distribution systems							*	*	*	*	*	*

a. Industry development (4 of 4)

	Pacific Islands										Indian Ocean	
	Pacific-general	Australia	PNG	Solomon Islands	Fiji	Marshall Islands	FSM	Palau	Kiribati	Other Pacific	Maldives	Other Indian
3.5 Producer networks and coalitions												
a. communication among producers	**I S**											
b. competition and coalition-building												
3.6 Distribution systems												
a. assess feasibility of central dist. Systems	*	*	*	*	*	*	*	*	*	*	*	*
b. establish central distribution systems	*	*	*	*	*	*	*	*	*	*	*	*

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Bold: ongoing
Italics: planned

*
Not applicable

substantial local engagement

Table 1. Interventions in the LRFFT

a. **Research and monitoring (1 of 4)**

	Entire region	Greater China			Southeast Asia							Other Asia
	General	China	Hong Kong	Taiwan	Singapore	SE Asia-General	Thailand	Philippines	Indonesia	Malaysia	Vietnam	Other Asia
4.1 Trade and fishery monitoring and forecasting												
a. develop HK trade monitoring node	**I R** *N*	*	**I F H R W** *N*	*	*	*	*	*	*	*	*	*
b. trade monitoring in China, Taiwan, Sing.	*	**I** *N W*	*		**I**	*	*	*	*	*	*	*
c. fishery monitoring in producer countries	**F**	*I R*	**I**		*			**I**	**I**	**I**	**I**	
d. regional register of companies and vessels	**I**		**I**									
e. analytical and reporting system												
4.2 Demand analysis												
a. investigate demand	**R**	*I N*	**I** *N*	*N*			*	*	*	*	*	*
b. develop, monitor demand indicators	**R**	*I N*	**I** *N*	*N*			*	*	*	*	*	*
4.3 Fishery viability analysis												
a. general methods for viability analysis	*I*	*	*	*	*							
b. incorporate, perform viability analysis	*I R*	*	*	*	*							

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Italics: planned

*
Not applicable

substantial local engagement

Table 1. Interventions in the LRFFT

4. Research and monitoring (2 of 4)

	Pacific Islands										Indian Ocean	
	Pacific-general	**Australia**	**PNG**	**Solomon Islands**	**Fiji**	**Marshall Islands**	**FSM**	**Palau**	**Kiribati**	**Other Pacific**	**Maldives**	**Other Indian**
4.1 Trade and fishery monitoring and forecasting												
a. develop HK trade monitoring node	*	*	*	*	*	*	*	*	*	*	*	*
b. trade monitoring in China, Taiwan, Sing.	*	*	*	*	*	*	*	*	*	*	*	*
c. fishery monitoring in producer countries	*I S*		*I R*		*I S*	*I S*						
d. regional register of companies and vessels	*I S*											
e. analytical and reporting system												
4.2 Demand analysis												
a. investigate demand	*	*	*	*	*	*	*	*	*	*	*	*
b. develop, monitor demand indicators	*	*	*	*	*	*	*	*	*	*	*	*
4.3 Fishery viability analysis												
a. general methods for viability analysis	*I S*											
b. incorporate, perform viability analysis	*I S*							**N**				

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Bold: ongoing
Italics: planned

*
Not applicable

substantial local engagement

Table 1. Interventions in the LRFFT

4. Research and monitoring (3 of 4)

	Entire region	Greater China			Southeast Asia							Other Asia
	General	China	Hong Kong	Taiwan	Singapore	SE Asia-General	Thailand	Philippines	Indonesia	Malaysia	Vietnam	Other Asia
4.4 Biological and ecological research, assessment, and monitoring												
a. productivity of target species generally	**I**	*	*	*	*							
b. develop, use rapid prod. assess. methods	**I**	*	*	*	*			**I**				
c. develop population monitoring methods	**I N**	*	*	*	*				**I N**			
d. investigate MPA effects and design	*I N R S*	*	*	*	*				**N**			
e. best practices for seed fisheries		*	*	*	*							
f. maintain biological communication system		*	*	*	*							

4. Research and monitoring (4 of 4)

	Pacific Islands										Indian Ocean	
	Pacific-general	Australia	PNG	Solomon Islands	Fiji	Marshall Islands	FSM	Palau	Kiribati	Other Pacific	Maldives	Other Indian
4.4 Biological and ecological research, assessment, and monitoring												
a. productivity of target species generally	**I**				**I**	*I S*						
b. develop, use rapid prod. assess. methods					**I**	*I S*			*I S*			
c. develop population monitoring methods	**I N**		**N**	*N*	**I**	*I S*	**N**	**N**				
d. investigate MPA effects and design	*I N R S*		*N*	*N*			*N*	*N*				
e. best practices for seed fisheries												
f. maintain biological communication system												

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Bold: ongoing
Italics: planned

*
Not applicable

substantial local engagement

Table 1. Interventions in the LRFFT

5. Communication and outreach (1 of 2)

	Entire region	Greater China			Southeast Asia							Other Asia
	General	China	Hong Kong	Taiwan	Singapore	SE Asia-General	Thailand	Philippines	Indonesia	Malaysia	Vietnam	Other Asia
5.1 Communication networks												
a. rapid, effective trade communication	**I**											
b. international fishery and trade information												
5.2 Outreach and awareness												
a. outreach campaigns	**W**		**F**					**I**	**I N**		**I**	

5. Communication and outreach (2 of 2)

	Pacific Islands										Indian Ocean	
	Pacific-general	Australia	PNG	Solomon Islands	Fiji	Marshall Islands	FSM	Palau	Kiribati	Other Pacific	Maldives	Other Indian
5.1 Communication networks												
a. rapid, effective trade communication	**I**											
b. international fishery and trade information												
5.2 Outreach and awareness												
a. outreach campaigns	**I N S**		**N**	**N**		*I R*	*I R*					

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Bold: ongoing
Italics: planned

*
Not applicable

substantial local engagement

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Appendix 2. Profiles of Contributing Organizations

Hong Kong Chamber of Seafood Merchants Limited

Organization Background:

The Hong Kong Chamber of Seafood Merchants (HKCSM) was established in 1997 when several cases of ciguatera poisoning cases occurred, resulting in hospitalization of more than 100 people. The business turnover of the industry dropped 70 percent overnight and fish prices dropped to record lows. Similar food poisoning cases have occurred each year but the seriousness of the 1997 incidents was exaggerated by the media, causing public panic. The industry felt that an organization should be set up that could speak on its behalf. HKCSM was consequently established as a non-profit organization. All the committee members are volunteers and the income of the Chamber is mostly generated from annual subscription fees from its 88 members. The Chamber is widely supported by the industry and nearly 95 percent of Hong Kong importers and wholesalers have joined as members.

Involvement in The Live Reef Food Fish Trade:

HKCSM has been recognized as a representative of the live seafood industry in Hong Kong and is consulted whenever there is a change in government policy that affects the industry. The Chamber has maintained close contact with the Agriculture, Fishery and Conservation Department and the Health Department. The Chamber includes a Fish Marketing Organization Committee. As members of the Chamber are involved in the day to day running of the industry, they have the most up-to-date knowledge of the market, including the situation in the People's Republic of China. Some of HKCSM's members are also involved in the trading of fish fry so the Chamber is well informed about the mariculture situation in Hong Kong, PRC, Malaysia, Vietnam, Indonesia, and Taiwan. The Chamber is also helping IMA and Hong Kong University to collect market information and improve the statistical system for imported live reef fish.

The Chamber's members are not able to devote much time to Chamber activities and the organization cannot afford to hire any full time employees.

International Marinelife Alliance

Organization Background:

The International Marinelife Alliance (IMA) is an international non-governmental organization (NGO) that promotes conservation and sustainable use of marine resources in the Asia-Pacific region, with a particular focus on monitoring and reforming the trade in live reef fish and other coral reef species and a strong commitment to working with local fishing communities. IMA headquarters are in Honolulu, Hawaii. Field offices are located in Fiji, Hong Kong, Indonesia, the Marshall Islands, the Philippines, and Vietnam. An office will also be opened in Queensland, Australia, by the end of 2001. IMA's regional Pacific Program is managed from Honolulu and its Integrative Biological Research Program is based at the University of Guam Marine Laboratory.

IMA's multinational staff of approximately 120 is strong in marine and fisheries sciences, coastal and marine policy analysis, community development, and marine conservation education and awareness. IMA's 105-foot research vessel, the *RV Alliance*, will be operational in the second half of 2001, and will serve as a key platform for IMA's marine research and fisheries management initiatives in remote reef areas of the region. IMA works closely with a wide range of partners, including government fisheries, environment, and rural development agencies; other international NGOs; local and regional scientific research institutions; and many local NGOs. IMA receives its funding from a mixture of private foundations, bilateral aid agencies, multilateral development banks, and individuals.

IMA's mission is to eliminate human-induced stresses on the marine environment through programs and initiatives that conserve marine biodiversity, protect marine habitats, and promote responsible and sustainable use of marine resources for the benefit of the local people. IMA takes a practical, hands-on approach to fulfilling this mission, combining practical science, on-the-ground work in fishing communities, policy research and advocacy, and public education.

IMA was established in the late 1980s in the Philippines, and for many years devoted most of its attention to combating the use of cyanide in that country's live reef fish trade). Working with the Philippine government's Bureau of Fisheries and Aquatic Resources in a unique NGO-government partnership, IMA initiated the Destructive Fishing Reform Program (DFRP) in the early 1990s. This multifaceted program was established to reduce cyanide fishing and promote sustainable catch limits and harvest practices in the live reef fish trade.

In 1997, IMA and the Washington, DC-based World Resources Institute (WRI) jointly published *Sullied Seas: Strategies for Combating Cyanide Fishing in Southeast Asia and Beyond*, a widely disseminated report highlighting the threat of cyanide fishing and its spread throughout Southeast Asia. The response to *Sullied Seas* and a variety of other articles published by IMA and WRI was a flood of requests for information and technical assistance related to the LRFT and other reef species trade issues from government agencies and NGOs from across the Asia-Pacific region. IMA therefore teamed with WRI and other partners to transform itself from a Philippine-based NGO focusing on cyanide fishing to a regional marine NGO addressing a broader range of conservation concerns related to the growing trade in coral reef species and commodities. In late 2000 and early 2001, IMA undertook an intensive strategic planning exercise, with support from

the David and Lucile Packard Foundation. IMA headquarters moved from the Philippines to Hawaii in June 2001 and as of mid-2001, the new IMA was up and running as the only international NGO wholly focused on marine conservation in the Asia-Pacific region.

IMA's strategic focus: While recognizing that the Asia-Pacific marine environment is subject to multiple threats and stresses, IMA focuses on three strategic objectives that are of particular importance for the Asia-Pacific and best fit with IMA's particular competencies:

- eliminate fishing practices that degrade coastal and reef habitats, reduce biodiversity, and result in overexploitation of species of commercial, subsistence or ecological importance;
- halt habitat destruction in reef and related systems at scales sufficient to maintain vital ecological relationships, protect *in situ* biological diversity, and sustain local fisheries;
- substantially reduce over-fishing of coastal resources to sustainable levels while improving the quality of life of coastal communities.

Thematic approaches: IMA seeks to attain its goal and implement its philosophy through six thematic approaches. Some of these thematic approaches are formal "programs," while others are less formalized but nonetheless distinct and coherent "toolkits."

- ***Fisheries Management and Community Development:*** Activities include training fishers in sustainable methods of capture, handling, and post-harvest care of live reef fish and other reef species; building local fisheries management capabilities, including testing live reef fish samples for cyanide; monitoring fishing activities and collecting samples for biological research; conducting participatory rural appraisal and assessment; community enterprise development to add value to collected reef species and to develop alternative sources of income and livelihood for coastal communities; promotion, where appropriate, of locally managed marine reserves, closed seasons, local tenurial rights and other spatial and temporal reef conservation regimes; and, where appropriate, development and promotion of reef mariculture at the local level.
- ***Integrative Biological Research Program (IBRP):*** The IBRP is headed by IMA's Senior Scientist (who also chairs the IUCN Specialist Group on Coral Reef Fishes) and is based at the University of Guam Marine Laboratory, although it carries out research throughout the region. IMA's laboratory in Manila is an important element of this program, as it has evolved from an initial focus on cyanide detection testing to a broader agenda of research in support of IMA's field programs. IMA's new research vessel, the *RV Alliance*, will be a central component of this program as well.
- ***Policy Research, Dialogue, and Development:*** IMA's toolkit for understanding, reforming and strengthening laws, policies and the institutions that make and implement them.
- ***Market Monitoring and Transformation:*** With respect to the LRFF market, which is based overwhelmingly in Hong Kong and neighboring cities of southern China, IMA maintains a formal program and office in Hong Kong. It also conducts parallel monitoring and market transformation activities related to the aquarium fish and coral market, and is currently exploring ways to apply its present capacity for reef species market monitoring to other reef species.

- ***Education and Awareness:*** IMA's education and awareness toolkit includes a variety of elements, including school curriculum development, non-formal conservation education and outreach, media campaigns, technical and popular publications, and sponsorship of International Coastal Cleanup in the countries where IMA works.
- ***Information and Database Development, Management, and Dissemination:*** Drawing on and supporting all of IMA's other thematic approaches, the organization is developing the following tools to bring together and make available data and information:

Involvement in the Live Reef Food Fish Trade:

Philippines: Comprehensive monitoring of all exports; cyanide detection testing; fishermen retraining; laboratory research on grouper reproductive ecology; policy development – 75 staff.

Indonesia: National status report on LRFT; development of National LRFT Strategy and Action Plan (with government fisheries agency); review of legal and enforcement issues related to destructive fishing in LRFT (for government and World Bank); establishment of pilot cyanide detection testing lab (planned) – 10 staff.

Fiji: Biological survey of Lau Islands (proposed for LRFFT operations); development of management and monitoring plan for LRFFT (with government) – 2 staff, backed by Pacific Regional Office (Honolulu) and Biological Research Program (Guam).

Vietnam: Development of national LRFT and destructive fishing strategy (with government); field projects to combat destructive fishing in the LRFFT in Khanh Hoa Province (ongoing) and Ha Long Bay (planned); establishment of a pilot cyanide detection lab (planned) – 10 staff.

Pacific Regional Program: Various ongoing and planned activities related to LRFFT in Kiribati, Papua New Guinea, Vanuatu, and Marshall Islands – 1 staff in Marshall Islands, 1 staff in Vanuatu, 1 staff in PNG, others managed by Honolulu office in collaboration with local and regional partners.

Hong Kong: Monitoring of LRFFT imports (species, volumes, countries of origin, wholesale and retail prices) into Hong Kong (ongoing) and southern China (planned); development of best practices code of conduct with industry – 2 staff (2-3 more to be hired in 2001).

Integrative Biological Research Program (based in Guam)**:** Development and implementation of comprehensive program of grouper research relevant for LRFFT management, as noted above – 1 staff in Guam, 4 staff in Philippines lab, numerous partners in regional research institutions; more staff to be added for *RV Alliance* field work in 2002.

Australia (planned for late 2001)**:** Monitoring of LRFFT exports and policies; application of Australian best practices to other Asia-Pacific countries – 1 staff, 1 more to be added (2002).

The Nature Conservancy

Organization Background:

The Nature Conservancy (TNC) is an international conservation organization with programs in 30 countries worldwide. Its mission is to preserve the plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. In Asia and the Pacific, the Conservancy works with local partners to conserve forest and coral reef habitats in six countries: China, the Federated States of Micronesia, Indonesia, Papua New Guinea, Palau, and the Solomon Islands.

Involvement in the Live Reef Food Fish Trade:

Recently, the Conservancy completed a five-year strategic plan for the Asia Pacific region. The plan focuses on the protection of critical forest and coral reef systems, and the reduction of region-wide threats to these systems such as destructive fishing practices. The Conservancy addresses destructive fishing practices at the local, national, and regional levels. Blast fishing and other destructive practices that supply local markets are addressed through local and national programs. The live reef fish trade, which supplies international markets, is addressed through integrated regional actions on both the supply (Indonesia, Papua New Guinea, the Solomon Islands) and demand (Greater China) sides of the trade.

The Nature Conservancy brings considerable experience to a regional strategy to address the threats to marine biodiversity posed by the live reef fish trade. The Conservancy's science-based methods and record of pioneering solutions to regional threats and conservation finance needs are particularly appropriate to the challenges of the live reef fish trade. A pragmatic, non-confrontational approach allows the Conservancy to work effectively with a wide range of stakeholders, including:

- the traders and restaurants that drive the live reef fish market;
- government policy makers and oversight agencies;
- scientists and researchers;
- potential private investors in mariculture enterprises; and,
- communities that depend on the trade for their subsistence.

The Conservancy has a field presence in several of the key countries involved in the supply and demand sides of the trade, and has developed strong partnerships with governments and non-governmental organizations (NGOs), as well as with major regional organizations. Through its work in community-based protected area management, it is working to increase awareness of the impacts of destructive fishing practices, identify sustainable resource management techniques that are compatible with local needs and traditions, and create incentives and alternative sources of income to draw people away from destructive practices.

The Conservancy first helped identify the live reef fish trade as a major threat to the world's marine biodiversity in 1995 when it sponsored the landmark study by marine biologist Dr. Robert Johannes and fisheries economist Michael Riepen entitled *Environmental, Economic and Social Implications of the Live Reef Fish Trade in Asia and the Western Pacific*. Since then, it has helped raise awareness of the trade and coordinate action among business, government, non-governmental, and scientific partners at both the national and regional levels.

Secretariat of the Pacific Community

Organization **Background:**

The Secretariat of the Pacific Community (SPC) is an intergovernmental technical development and networking agency founded in 1947. SPC headquarters are in Noumea, New Caledonia. The agency's work programs aim to develop the technical, professional, scientific, research, planning, and management capability of Pacific islands people and directly provide information and advice to enable them to make informed decisions about their future development and well-being. SPC work programs are based on the region's priorities as expressed by its 27 member governments and administrations (22 Pacific island countries and territories); they cover three broad areas land, sea and people. More specifically, the mission of the Coastal Fisheries Programme, within the Marine Resources Division, is to provide a regional support service that assists Pacific islanders in identifying the status, and optimizing the long-term social and economic value, of small-scale fisheries and aquatic resources in the Pacific island waters.

Involvement in the Live Reef Food Fish Trade:

In 1998 the SPC member countries and territories endorsed the Live Reef Fish Pacific Regional Strategy (jointly prepared by SPC, IMA, TNC, and WRI) as a new initiative with high priority, and urged SPC to secure partners and seek the resources necessary to implement the strategy. A central objective of this initiative is to strengthen the capacity of SPC to assist its members with live reef fish issues.

Towards the end of 2000, funding was approved by the Asian Development Bank under its Regional Economic Technical Assistance (RETA) program for this Live Reef Fish Pacific Regional Strategy. The strategy calls for the SPC Reef Fisheries Assessment and Management Section (within the Coastal Fisheries Programme) to take on a catalytic and coordinating role in assisting member countries and territories to address issues associated with the live reef fish trade and to initiate cooperation with international organizations possessing relevant expertise for that purpose. SPC is collaborating with IMA, TNC, and WRI through a Memorandum of Understanding to implement the Live Reef Fish Pacific Regional Strategy. Following the Strategy's priorities, SPC is providing assistance in seven main areas to its member countries and territories:

- live reef fish trade awareness
- assessment of live reef fish resources
- development of appropriate live reef fish trade policy and regulations
- development of live reef fish trade management plans
- development of sustainable live reef fish trade operations
- institutional strengthening and capacity building for live reef fish trade management
- live reef fish trade monitoring

TRAFFIC

Organization Background:

TRAFFIC was founded largely to assist in the implementation of CITES in the mid-1970s.While continuing to support the application of CITES, TRAFFIC has developed its role in addressing wildlife trade issues in a wider context, including major commercial sectors such as fisheries and timber trade and a wide range of regional and local issues. TRAFFIC has developed from a single office into a global network of 22 offices in eight regional programs around the world.

The trade in wild plants and animals and their derivatives is big business, estimated to be worth billions of dollars and involve hundreds of millions of plants and animals every year. Most of the trade is legal but a significant portion of it is not. The trade is diverse, ranging from live animals for the food and pet markets to ornamental plants and timber. An array of wildlife products and derivatives, such as food, exotic leather goods, musical instruments and even medicines, can be found in markets around the globe.

Conservation Objectives:

TRAFFIC's mission is to ensure that trade in wild plants and animals is not a threat to the conservation of nature. Program priorities are set according to four conservation objectives addressing the relationship between wildlife trade and key biological and human concerns (species conservation, the integrity of priority ecoregions for biodiversity, and resource security) and the need for international cooperation, to ensure that trade does not exceed sustainable levels.

Conservation Methods:

TRAFFIC believes that four critical conservation methods must be employed to meet these objectives:

- **mobilization of knowledge:** ensure that decision makers at all levels acquire and apply sound knowledge about the scope, dynamics and conservation impact of wildlife trade and its response to different management measures and approaches;
- **effective regulation:** assist governments in enacting and implementing policies and legislation that ensure trade in wild animals and plants is not a threat to the conservation of nature;
- **positive economic incentives:** collaborate with governments and the private sector to develop and adopt economic policies and practices that provide incentives and benefits that encourage the maintenance of wildlife trade within sustainable levels and support effective wildlife trade regulation; and
- **sustainable consumptive behavior:** encourage users of wildlife commodities, at all levels of trade, to voluntarily adopt sustainable consumptive behavior that does not threaten the conservation of nature.

Involvement in the Live Reef Food Fish Trade:

In 1999, TRAFFIC Southeast Asia and TRAFFIC East Asia published two reports on the trade in the live reef food fish: *The Hong Kong Trade in Live Reef for Food*, by Patrick Lau and Rob Parry-Jones (1999), and *Fishing for Solution: Can the Live Trade in Wild Groupers and Wrasses from Southeast Asia be Managed?* by Nokome Bentley (1999). These studies were commissioned as a result of the impacts highlighted by The Nature Conservancy work carried out through Dr. Robert Johannes and Michael Riepen. TRAFFIC, in collaboration with the World Wide Fund for Nature (WWF) and other partners, carried out a study of the trade from both the producer and consumer sides, concentrating on key producer-countries—Indonesia, Malaysia, and Philippines—and main consuming areas in Hong Kong and Singapore. The studies made a number of important observations and conclusions on the trade and recommendations for controlling and managing the fishery and trade.

IUCN – The World Conservation Union

Founded in 1948, the World Conservation Union (IUCN), brings together 79 states, 112 government agencies, 760 NGOs, 37 affiliates, and some 10,000 scientists and experts from 181 countries in a unique worldwide partnership. Its mission is to influence, encourage, and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. Within the framework of global conventions IUCN has helped over 75 countries to prepare and implement national conservation and biodiversity strategies. The organization employs approximately 1,000 staff members throughout its 42 regional and country offices and at its headquarters in Gland, Switzerland.

IUCN's Marine Program:

Seventy percent of the earth's surface is water. Approximately 504,000 km of coastline fringes the world's landmasses, enough to circle the equator 12 times. Common estimates place over 50 percent of the human population, 2.7 billion people, within 100 km of the coastal zone, mostly concentrated in a small fraction of the coastal zone. The economic function of the oceans, not only as a medium for transportation, but also as the source for nearly two thirds of the "goods and services" from nature contributed to the global economy, is estimated to be over US $20 trillion *per annum*. This abundance of the seas is a function of the enormous productivity and diversity of the marine environment.

The tremendous human dependence upon the marine environment has predictably resulted in its degradation, to the degree that many, if not most, uses are no longer sustainable. A scoping exercise conducted by IUCN in 1998 identified drivers of loss of marine and coastal biodiversity, and organized them around three distinct but interlocking classes of response: protection of essential habitats, protection of the marine environment from land-based activities, and sustainable management of fisheries.

IUCN's Marine Program seeks to influence the international marine conservation agenda by addressing key decisions and policies affecting the biodiversity crisis, with policies and financial support agreed and implemented.

Involvement in the Live Reef Food Fish Trade:

Specific elements of IUCN's involvement in the marine agenda that are of both direct and indirect relevance to the LRFFT being developed or conducted in the Indo-Pacific region include:

- Development of a program on sustainable seafood use in the South China Sea (Regional Marine Programme – Asia); a particular focus of this program will be to improve monitoring of seafood trades in Southeast Asia.
- The work of the IUCN Specialist Group on Groupers and Wrasses(GWSG), major components of the LRRFT. This currently involves several aspects with particular focus on one of the most valuable species traded, the humphead wrasse, *Cheilinus undulatus*.

A trade and species synopsis on this species is being completed and funds obtained for a project aimed at raising awareness and promoting management of this particularly vulnerable species. Many exploited reef fish in the LRFFT aggregate to spawn and the aggregations are especially vulnerable and sought for exploitation. The GWSG and the newly formed Society for the Protection of Reef Fish Aggregations are compiling a global database for raising awareness of, and lobbying for, the protection of fish spawning aggregations. The use of wild seed supply for grouper culture is being evaluated. GWSG is working with NGOs, government and industry in Hong Kong to improve the import monitoring system.

- The development of a global network of ecologically representative, well-managed marine protected areas designed to conserve areas of high importance for biodiversity and productivity.
- Several initiatives directly relevant to the application of ecologically sustainable approaches to fisheries management. IUCN is working with governments, academia, and civil society to promote a better understanding of the relationship between free trade and sustainable fisheries management. As part of its contribution to this process, IUCN has produced *Net Gains: Linking Fisheries, Trade and Sustainable Development* (2000), an overview of the issues and concerns. Along with the FAO, IUCN has also produced two volumes on ecolabelling. It has also catalysed a partnership with top fisheries institutes around the world to collectively address the problem of fishing overcapacity world-wide through data collection, analysis, and formulation of technical advice for managing fleet size and addressing binding factors in overcapacity such as subsidies and access arrangements.

The World Resources Institute

Organization Background:

The World Resources Institute (WRI) is an independent center for policy research and technical assistance on global environmental and development issues, founded in 1982 and based in Washington, DC.

Because people are inspired by ideas, empowered by knowledge, and moved to change by greater understanding, WRI provides—and helps other institutions provide—objective information and practical proposals for policy and institutional change that will foster environmentally sound, socially equitable development. WRI's current areas of work include economics, forests, terrestrial and marine biodiversity conservation, climate change, energy, sustainable agriculture, resource and environmental information, trade, technology, national strategies for environmental and resource management, business liaison, and human health. Some 110 people are members of WRI's international staff, strong in the sciences, anthropology, economics, law, information and communications technologies, and public policy.

WRI's policy research and technical assistance work is aimed primarily at policymakers and resource managers around the world who are looking for fresh ideas and practical solutions with which to reconcile the demands of economic development and environmental sustainability. WRI fills this need with both timely and accurate policy research, and hands-on direct engagement in policymaking and implementation with government and non-government partners around the world.

WRI's work in the coastal and marine environments follows its Global Marine Strategy 2000-2003, which is based on priorities logically and systematically formulated from both internal discussions with WRI staff and contributions from peer groups consulted (conservation groups, research centers, academic institutions, development agencies, donors). This collaborative planning and priority setting process ensured the development of an appropriate institution-wide, global marine strategy that is both logical and objective.

Three overarching focal areas, or directions for future action, have arisen for WRI:

- the human dimension of marine issues;
- the coastal environment; and
- preliminary (i.e., 2001-2003) geographic priorities that emphasize the Western Central Pacific and wider Caribbean Basin inclusive of the Central American corridor.

The goal of WRI's global marine strategy is to improve management and conservation of coastal and marine resources while enhancing and strengthening the security of people who depend upon them, through the development and dissemination of knowledge, practical solutions, and policy recommendations. The intermediate objectives of WRI's global marine strategy are to:

- reverse the rapid worldwide overexploitation and degradation of coastal and marine resources and ecosystems and preserve aquatic biodiversity;

- increase and sustain the productivity of fisheries resources (such as fish, mollusks, crustaceans and aquatic plants) and coastal ecosystems (including coral reefs, mangroves, sea grasses, and wetlands);
- innovate and disseminate appropriate policies and strategies for management and conservation of coastal and marine resources and ecosystems and to have them adopted and implemented in focal regions and countries; and
- foster improved food security, livelihoods, and quality of life of those people dependent upon coastal and marine resources.

Overall, WRI's global marine strategy is generating new knowledge, practical policy solutions, increased capacity of partners and decision-makers, and engagement and convening of international stakeholders for change.

Involvement in the Live Reef Food Fish Trade:

WRI's specific work on the live reef food fish trade (LRFFT) is largely part of its close partnership with the International Marinelife Alliance (IMA), the premier organization working on the LRFFT in the Asia-Pacific region. Recognizing that IMA's pioneering Destructive Fishing Reform Program (DFRP) in the Philippines was a key model for addressing destructive fishing and other problems in the LRFFT and aquarium trade—but was largely undocumented and little-known outside the Philippines—WRI joined with IMA in 1997 to publish *Sullied Seas: Strategies for Combating Cyanide Fishing in Southeast Asia and Beyond*, a widely disseminated report highlighting the threat of cyanide fishing and its spread throughout Southeast Asia, analyzing the Philippines' response, and setting out recommendation for action in neighboring countries. The response to *Sullied Seas* and a variety of other articles published by IMA and WRI was a flood of requests for information and technical assistance related to the LRFT and other reef species trade issues from government agencies and NGOs from across the Asia-Pacific region.

WRI and IMA responded in turn by launching the Indo-Pacific Destructive Fishing Reform Initiative, an effort to expand IMA's approach to other countries in the region. At the same time, WRI played a major role in assisting IMA with its expansion from a Philippine-focused national NGO to a major regional marine-focused NGO. As part of that process, WRI was contracted by IMA in 2000, with funds from the David and Lucile Packard Foundation, to conduct a strategic planning process for IMA, completed in mid-2001.

As a part of WRI's marine strategy, discussed above, WRI is currently engaged in the following activities specifically related to the LRFFT:

- continuing to implement joint work with IMA on the LRFFT under the DFRI initiative noted above (WRI's Charles Barber serves as co-director of this effort);
- completing the *Reefs at Risk-Southeast Asia* report, a map-based indicator of human pressures on the region's reefs, including cyanide fishing for the LRFFT; and
- conducting a comprehensive survey and analysis of the science, economics and socio-economic impacts of reef aquaculture, with a strong emphasis on LRFFT grouper species.

World Wide Fund for Nature

Organization Background:

The World Wide Fund for Nature (WWF) is one of the world's largest independent organizations dedicated to the conservation of nature. Its ultimate mission is to stop the degradation of the planet's natural environment and build a future in which humans live in harmony with nature. WWF now operates in more than 90 countries and regions, with more than five million supporters worldwide. The organization is currently carrying out about 1,200 projects a year, employing more than 3,700 people and investing some US$280 million in its global conservation programs and campaigns. The six major areas of the organization's long-term conservation work are: forest, freshwater, oceans and coasts, species, climate change, and toxic chemicals.

Involvement in the Live Reef Food Fish Trade:

WWF Hong Kong, together with the Agriculture, Fisheries and Conservation Department of the Hong Kong Special Administrative Region, published *Identification Guide to Fishes in the Live Seafood Trade of the Asia-Pacific Region*.[9]

WWF Hong Kong has been carrying out public awareness and education programs. These programs aim to educate and increase public awareness regarding conservation concerns associated with LRFF consumption and the problems of overfishing and cyanide fishing. WWF Hong Kong will continue these consumer awareness and education efforts.

WWF Hong Kong is also actively participating in development of a comprehensive LRFFT monitoring system in Hong Kong through policy initiatives and collaboration with other organizations such as TRAFFIC East Asia, International Marinelife Alliance – Hong Kong, and the Hong Kong Chamber of Seafood Merchants.

In addition, WWF Hong Kong is assessing the feasibility of applying a certification system to the LRFFT.

Currently, WWF Hong Kong has one full time staff working on LRFFT issues.

WWF is planning to expand its efforts in the region to protect reef fish spawning aggregations and it is developing a strategy to address LRFFT-issues in Malaysia.

[9] Lau, P. and L.W.H. Li. 2000. *Identification Guide to Fishes in the Live Seafood Trade of the Asia-Pacific Region*. World Wide Fund for Nature Hong Kong and Agriculture, Fisheries and Conservation Department, HKSAR. (An online version will be available at: http://www.wwf.org.hk/conseration/wl_trade/reef_fish/online_guide/index.html.)