# Evaluation of Policy Options for the Live Reef Food Fish Trade:

## Focus on Calamianes Islands and Palawan Province, Philippines, with Implications for National Policy

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## Executive Summary

The live reef food fish trade (LRFFT) is an important industry with an estimated annual retail value of US$1 billion in the Asia-Pacific region, at least US$30 million in the Philippines and US$18 million in Palawan. Three primary problems associated with the live reef fish trade (LRFT) are: (1) destructive fishing methods; (2) overfishing; and (3) targeting of spawning aggregations and immature fish. The LRFFT has grown rapidly in the last 10 years in the Philippines. The high price for live food fish is the most significant factor in encouraging the industry. The methods of capture were the initial issue emanating from the LRFFT because of the use of sodium cyanide to stun fish for easy capture with the assistance of compressed air rigs. Although the capture methods are still a prime issue because of the reef habitat damage caused, there is increasing incidence of overfishing of selected species because of the high prices and demand for the fish. The catchers are also being affected by poor safety controls and lack of awareness about sustainability of the resource, and are being implicated in the use of prohibited drugs to increase their diving stamina. While the LRFFT operates throughout the Philippines, the Calamianes Group of islands in the northern part of Palawan is the center of the trade in the country. Palawan accounts for as much as 55% of the country's total export of the commodity.

This policy brief represents policy analyses undertaken on the various management strategies available for LRFFT in the Calamianes Islands and Palawan Province, with implications for national policy. The policy goal is for a sustainable fishing industry in Palawan Province that ensures viable fish stocks, ecosystems and livelihoods for present and future generations. The short-term (1-4 years) policy objective is the development of a sustainable live reef food fish (LRFF) industry through the reduction of threats associated with destructive fishing and overfishing. The long-term (5-10 years) policy objective is the protection and conservation of fish resources and marine ecosystems in Palawan through implementation of an integrated coastal management that promotes sustainable capture fishing and mariculture; marine ecosystem conservation and rehabilitation; and viable livelihoods and community and economic development for coastal communities. Three evaluative criteria – ecological, institutional and economic – were used to assess the various policy options for achieving the short-term policy objective.

Before any consideration can be given to policy options for developing a sustainable LRFFT in Palawan, five overriding issues must be addressed. These are the need for: (1) effective monitoring and enforcement mechanisms; (2) active industry support; (3) viable alternative and/or supplemental livelihood opportunities for fishers; (4) a LRFF management plan that must be developed for the province; and (5) political will. Any policy option must be simple, cost-effective and enforceable. While all LRFF species in the trade are considered for management

under the policy options, of primary importance however are the leopard coral grouper, orange-spotted grouper, humphead wrasse and brown-marbled grouper.

Four policy options to address the short-term objective are presented: (1) maintenance of the status quo; (2) provincewide ban in LRFFT; (3) regulated LRFFT – 1 (ban compressor fishing, ban nonresident fishers from municipal waters, close spawning aggregations, impose size limitations on selected target species, set up a cyanide detection-testing laboratory in Coron, and establish a monitoring team and network); and (4) regulated LRFFT – 2 (do not allow trade in municipalities with more than 50% coral reef cover in poor condition: Coron, Cuyo, El Nido and Taytay.

The four policy options and associated analyses were presented to stakeholders concerned about the LRFFT in the Calamianes Islands and Palawan at three separate policy fora. The first was a policy conference held on 8 March 2005; the second was a meeting with Palawan Provincial officials held on 9 March 2005; and the third was a presentation to the Palawan Council for Sustainable Development (PCSD) on 27 May 2005.

The consensus of the participants at the policy conference was to maintain the LRFF industry in Palawan. However, they wanted a sustainable industry. There were both an expressed political will and an industry will for change. The participants reached a consensus that a regulated LRFFT (option 3) was the most sensible option to sustain the LRFFT in Palawan. Among the priority activities that need to be undertaken in view of this option is the development of a management plan for LRFFT, banning use of compressed air in all its forms, and strengthening coastal law enforcement.

The meeting with provincial officials resulted in two additional policy options: (1) option 5 would give the industry players 90 days from an established date to be accredited by PCSD and to organize themselves to be represented in management decision making; and (2) option 6 would ban LRFFT through a moratorium for 1 year, during which time the industry is required to be accredited by PCSD and to organize themselves. If the requirements are met for either option 5 or 6, a regulated industry would be implemented. If the requirements are not met, the moratorium would continue. Both of these options emanated from the concern for a more responsible and accountable industry and industry players.

The final presentation of this policy brief to PCSD resulted in several observations that helped refine the recommendations. These are the need to: (1) determine the source of sodium cyanide and finally contain it; (2) engage more fully the LRFF industry players in the adoption of best practices that they themselves promote and enforce to improve their own image and record; and (3) implement fishers registration and ultimately licensing so that nonresident fishers cannot operate

freely in Palawan coastal waters. It is thus intended that these three needs be addressed in the pending provincial ordinance on LRFFT, as well as in the immediate thrusts of PCSD in linking with coastal projects operating in Palawan.

Any policy option will need to balance ecological, institutional and economic considerations. Any policy option, to be effective, must be simple, cost-effective and enforceable. It is felt that a regulated industry supporting a sustainable LRFFT is a more viable option than banning the trade. Banning the trade will lead to social and economic disruption for the fishers involved in the trade, increased illegal fishing activity and indeterminate impacts on coral reef condition and fish resources. On one hand, banning the trade will require high levels of enforcement, which do not currently exist, and more costs for government. A regulated trade, on the other hand, in which industry players are actively involved, will be more cost-effective and lead to long-term improvement in coral reef and fishery resources.

Among the key activities to be considered is to develop a management plan specific to LRFFT in close collaboration with the industry stakeholders. In particular, the industry players have to take upon themselves greater responsibility and accountability for their actions by putting more stakes in the management and development of the industry. While there have been a number of well-intentioned laws and policies, the attempts at management have been plagued by lack of coordination among government agencies and local governments. A key rallying initiative is the development of a management plan specific to LRFFT in close collaboration with the industry stakeholders. The vision is to develop a provincial and national innovation system that will enable the industry to compete and survive in the global market while empowering local coastal communities. The strategic management plan for the trade should include all stakeholders and promote active participation of local communities and stakeholders for effective monitoring and enforcement to implement the plan. Any change that will occur in LRFFT in Palawan calls for strong political will. This will be shown by national, provincial, municipal and barangay leaders supporting the selected policies with resources and action. Several research studies should be undertaken to provide further information on key areas that include: (1) the relationship between market size demand and the biological characteristics of the individual target species; (2) aggregation areas and spawning times of the target species; (3) sizes of target species for harvest restrictions; and (4) overall stock assessment.

Key management measures to be instituted include banning of the use of compressed air for fishing and closed fishing seasons during spawning times and at aggregation sites within the context of municipal coastal resource management (CRM) plans. Marine protected areas (MPAs) must be established at grouper spawning aggregation areas and that cover larger areas of critical coral reef and seagrass habitats. Each municipality should develop CRM plans that include active

local participation in the planning and operation of CRM best practices including MPAs and reef rehabilitation.

This policy brief is currently used as a reference in drafting the Palawan Live Reef Fish Ordinance of 2005 concerning the sustainable fishing regulation of the live reef fish species. The policy options contained herein may also be useful in crafting a national policy for the LRFFT, given that there are other coastal provinces – such as Tawi-Tawi – where fisheries have a considerable proportion of LRFF. The results of the Palawan case study will also be useful in revising the 1998 Fisheries Code, particularly Section 61 on live fish issues.

The immediate next step is to put the selected policy in place and to make each local government unit responsible for its implementation. The policy should be reflected in the coastal resource management, integrated coastal management and/or fisheries management plan of each local government unit.

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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| **AO** | Administrative Order |
| **BAS** | Bureau of Agricultural Statistics |
| **BFAR** | Bureau of Fisheries and Aquatic Resources |
| **CDT** | cyanide detection test |
| **CI** | Conservation International |
| **CITES** | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| **CPUE** | catch per unit effort |
| **DA** | Department of Agriculture |
| **ECAN** | Environmentally Critical Areas Network |
| **ELAC** | Environmental Legal Action Center |
| **FARMC** | Fisheries and Aquatic Resources Management Council |
| **FISH** | Fisheries Improved for Sustainable Harvest Project |
| **FOB** | freight on board |
| **IMA** | International Marinelife Alliance |
| **ISDA** | International Swaps and Derivatives Association |
| **IUCN** | The World Conservation Union |
| **LGU** | local government unit |
| **LRFF** | live reef food fish |
| **LRFFT** | live reef food fish trade |
| **LRFT** | live reef fish trade |
| **MPA** | marine protected area |
| **NGA** | national government agency |
| **NGO** | nongovernment organization |
| **NIPAS** | National Integrated Protected Area System |
| **NSO** | National Statistics Office |
| **PAMB** | Protected Area Management Board |
| **PCSD** | Palawan Council for Sustainable Development |
| **PNNI** | Palawan NGO Network, Inc. |
| **PNP** | Philippine National Police |
| **PO** | Provincial Ordinance |
| **RAP** | rapid marine biodiversity assessment |
| **SEP** | Strategic Environmental Plan |
| **TWG** | technical working group |
| **WWF** | World Wide Fund for Nature |

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## LIST OF EXCHANGE RATES (US$1 = PhP)

| Year | PhP |
|---|---|
| 1990 | 24.30 |
| 2001 | 51.00 |
| 2002 | 51.60 |
| 2003 | 54.20 |
| 2004 | 56.00 |
| 2005 | 55.00 |

# 1. BACKGROUND

## 1.1. General Background

Like coral reefs the world over, the reefs of Southeast Asia and the islands of the Western Pacific (hereafter referred to as the Indo-Pacific) are an important source of goods and services to the people living there. However, the coral reefs of the Indo-Pacific are distinctive in two very important ways. First, they represent the epicenter of global marine biodiversity, containing 45% of all the world's coral reef species (Burke et al. 2002). Second, they are also at the epicenter of the most destructive fishing practices in the world, particularly the use of explosives and cyanide (Barber and Pratt 1997). Given current trends, nearly 80% of the coral reefs in Southeast Asia (Burke et al. 2001) and 60% in the Pacific (Bryant et al. 1998) are considered at risk of being lost in the coming years. At the same time, increasing human populations in the Indo-Pacific region are creating growing demand on coral reefs for food, livelihoods and other benefits. This pressure has driven exploitation methods and rates to the point of widespread destruction, which has been documented at local and national scales (GCRMN 2000; Burke et al. 2001).

But it is not only people in the Indo-Pacific who are driving the destruction of the world's largest and most diverse coral reefs. The people of North America, Europe and East Asia are fueling the rate of Indo-Pacific coral reef loss through their consumption of live organisms that inhabit these reefs. In particular, two kinds of international trade in live reef organisms presently account for the majority of overseas consumption of wild reef organisms and coral reefs in the Indo-Pacific: (1) trade in live reef food fish (LRFF), primarily groupers (*Serranidae*), wrasses (*Labridae*) and snappers (*Lutjanidae*), which markets live fish for consumption in restaurants and markets, largely in Asia (Barber and Pratt 1997) and (2) trade in live marine ornamentals, which markets live corals, fish and other reef-associated organisms for use in marine aquaria, largely in the United States (Green and Shirley 1999; Wood 2001).

Three primary problems associated with live reef fish trade (LRFT) are: (1) destructive fishing methods, (2) targeting of spawning aggregations and (3) overfishing. These problems lead to a number of other adverse effects including loss of biodiversity, decreased food production and food security, and decreased livelihood opportunities in coastal communities. Among the destructive practices used to harvest live reef organisms is the use of cyanide, which fishers often squirt on a reef to stun the fish and make them easier to capture. This practice not only stuns the fish, but also severely degrades the reef (Johannes and Riepen 1995). In addition, LRFT often targets spawning aggregations and selectively overfishes certain high-demand species. The overfishing of valuable reef organisms means that on many reefs there are now too few adults to replenish stocks. For some species, the entire breeding population has been virtually eliminated. These destructive fishing techniques have imperiled an estimated 56% of the Indo-Pacific's reefs (Burke et al. 2001). A recent global assessment of some 200 fisheries around the world concluded that the Indo-Pacific's live reef fisheries represent some of the most threatened fisheries on the planet, due in large part to the growing and lucrative trade in live reef fish and the associated destructive fishing techniques (Weber 1998).

Social conflicts between those involved in the trade and local resource users and resource managers and conservationists, as well as corruption at various levels beset the trade. Enforcement of laws is difficult. A large percentage of economic benefits accrue to relatively few. The degradation of coral reefs and overfishing for the trade threaten the livelihood of already marginalized fishing communities. Because of the wide range of sources being used to satisfy the demand of LRFFT, areas are sometimes inadvertently fished where ciguatoxic fish occur.

Both kinds of trade in live reef fish — food fish and marine ornamentals — are quite lucrative. The trade in LRFF generates an estimated US$400 million to US$1 billion annually (McGilvray and Chan 2001). The trade in live marine ornamentals is estimated at US$28-44 million annually (Bruckner 2001; Wood 2001). At the national level, the livelihoods of untold thousands of fishers in source countries for LRFT, such as Indonesia and the Philippines, are utterly dependent on trade in these organisms. In-country buyers, wholesalers and exporters also provide important revenue streams to source countries. The trade in live reef fish has become a global industry, with sophisticated and well-funded harvesting and marketing structures and international trade arrangements. Most importantly, the demand for live reef products is on the rise globally (Moore and Best 2001). In general, source countries are tropical developing ones, while importing countries are in North America, Europe and East Asia. Given the economic importance to both source and import countries, it is not surprising that to date, calls to end the international trade in live reef fish have not been successful.

Live food fish capture and trade has grown rapidly in the last 10 years in the Philippines. Historically, most of LRFT was for ornamental fish and marine organisms. Since the early 1990s, the trade has increasingly been focused on live fish for food. The high price for live food fish was the most significant factor in the emergence of the industry. The methods of capture were the initial issue emanating from the live food fish trade because of the use of sodium cyanide to stun fish for easy capture with the assistance of compressed air rigs. Strong enforcement in some areas, such as the Komodo National Park in Indonesia, appeared to effectively reduce the incidence of blast and cyanide fishing (Erdmann 2002). Although the methods used to capture the fish are still a prime issue because of the damage caused to reef habitats, there is increasing incidence of overfishing of selected species because of the high prices and demand for the fish. The LRFFT has grown economically and is quickly solidifying its presence in the Philippines despite the increasing damage being inflicted on habitats and fish stocks. Fishers for live food fish are also being affected by poor safety controls and lack of awareness about sustainability of the resource, and are being implicated in the use of prohibited drugs to increase their diving stamina. While the LRFFT operates throughout the Philippines, the Calamianes Group of Islands in the northern part of Palawan is the center of the live food fish trade in the country. Palawan is a major supplier of live food fish, accounting for as much as 55% of the country's total export of the commodity.

### 1.2. FISH Project and the Policy Brief

The Fisheries Improved for Sustainable Harvest (FISH) Project, with funding support from the United States Agency for International Development, is a seven-year project assisting with coastal and fisheries management in four target areas of the Philippines, namely:

Calamianes Islands, Palawan; Danahon Bank, northern Bohol; Tawi-Tawi, Sulu Sea; and Surigao del Sur, Pacific seaboard. Three of the four sites support some form of live food fish trade activities, with the Calamianes Islands area being the largest. The FISH Project is tasked to assist in the development of improved policies and management practices for the live food fish trade in the Northern Palawan target area. The live food fish trade and its appropriate management is a national issue that needs to be addressed appropriately.

The issue of how to manage LRFFT is high on the decision agenda of the Palawan Council for Sustainable Development (PCSD), the provincial government and the fish traders. There is a need to move quickly with the development of a strategy to manage the trade in Palawan and nationwide. There is much to be decided and good information is needed to support decisionmaking.

In this regard, this policy brief represents policy analyses undertaken on the various management strategies available for LRFFT in the Calamianes Islands and Palawan Province, with implications for national policy. These policy analyses have been undertaken together with national government agencies, local government units (LGUs) (provincial, municipal/city and village or barangay), nongovernment organizations, industry representatives and other stakeholders (academic and research institutions) working on this issue. The policy analyses and resulting policy brief are meant to add value to the discussion and to inform the concerned stakeholders as they develop a management strategy.

## 2. OVERVIEW OF THE LIVE REEF FOOD FISH TRADE

### 2.1. International Context

The LRFFT in Southeast Asia has a long history, at least since the eighteenth century (Johannes and Riepen 1995). Countries, such as the Philippines, Indonesia, Thailand, Taiwan and Malaysia have supplied the primary demand center of Hong Kong and Singapore in small quantities for decades. However, LRFF entered the international trade in substantial numbers only in the late 1980s to early 1990s. In the early 1990s, areas near the demand centers became depleted and as a result capture source areas expanded both east into the Pacific Ocean and west into the Indian Ocean. The LRFF are currently sourced from more than 20 countries, including Australia, Bangladesh, Brunei, Cambodia, Fiji, Maldives, Marshall Islands, Myanmar, Nauru, Papua New Guinea, Seychelles, Solomon Islands and Vietnam. Even African countries, such as Kenya, Namibia, South Africa and Togo have become source areas. The number of countries and territories in the trade has grown quickly and the trade has become a regional industry and issue. Approximately 50-70% of the trade is supplied from wild capture; 20-40% from aquaculture growout of wild seed; and 10% from full cycle mariculture (mainly from Taiwan). The primary market for LRFF is Hong Kong (about 60-80% of the trade), with the rest destined mainly for China, Taiwan, Singapore and Japan. Approximately 50% of LRFF imported into Hong Kong is re-exported to mainland China. The increasing prosperity in China is expected to expand demand for LRFF.

Consumer preference is for attributes, such as size, color, rarity and species of live food fish in restaurants and markets. Demand is highest during the holiday season from December to February. About 59 different species of live reef fish are imported in Hong Kong. Important species in the LRFFT include giant grouper (*Epinephelus lanceolatus*), humpback grouper (*Cromileptes altivelis*), humphead wrasse (*Cheilinus undulatus*), leopard coral grouper (*Plectropomus leopardus*), spotted grouper (*Plectropomus maculates*), squaretail coral grouper (*Plectropomus areolatus*), brown-marbled (tiger) grouper (*E. fuscoguttatus*), green grouper (*E. coioides*), flowery grouper (*E. polyphekadion*), Malabar grouper (*E. malabaricus*), mangrove snapper, snook, bass, wrasse and parrotfish. *E. lanceolatus* and *C. undulates* are listed as vulnerable in the IUCN Red List of Threatened Animals. *C. undulates* was recently included in Appendix II of CITES.

The lure of LRFF trade is the potential for high economic gains. The average wholesale live price was US$17-22 per kilogram in the late 1990s. In the retail market, LRFF can command a price ranging from US$5 to US$180 per kilogram, a great deal more than the price of similar species of dead fish. However, the economic gains are often uneven for fishers and various middlepersons.

The market channels for LRFF are complex. Fish are caught by local fishers or by fishers working for foreign businesses, and/or are cultured in growout or full-cycle aquaculture operations. The fish may pass through several levels of middlepersons in the supply country including first and secondary level buyers, fish assemblers, transporters, wholesalers and exporters. Many of these market functions are carried out by a vertically integrated business. Fish are air-shipped or carried by boat, depending on the source country and its proximity to the consuming country. The fish are handled by an importer, who may or may not also be a wholesaler. The wholesaler will sell the fish to a distributor or directly to a retailer. Fish may be re-exported to another country, such as from Hong Kong to mainland China. Cui (2001) noted the rapidly expanding imports of live food fish in mainland China is due to increasing wealth and demand for LRFF.

Aquaculture also supplies the trade. Small fry or fingerlings may be fed in floating cages, called growout, in the source country for several months until market size. Alternatively, live food fish may be reared from eggs in a hatchery and held and fed in confinement until reaching market size, called full-cycle aquaculture. Cultured fish are typically up to 60% cheaper at retail compared with wild-caught fish, because of the perceived intrinsic value of wild-caught fish (Sadovy and Vincent 2002). Blind taste tests between cultured and wild-caught fish revealed that they are indistinguishable by all but the most discriminating consumer (Sadovy 2001).

The international LRFFT was worth around US$350 million / year during 1999-2002. At its peak in 1997, the volume of fish in the trade was estimated to be about 50,000 t at the retail end. Since that time, the volume has declined to about 22,000 t in 1998 and further to 13,000 t in 2002 due to depletion in traditional fishing grounds. This depletion has brought shifts to other source areas (Sadovy et al. 2003). King (1995) reported that there is severe depletion of fish stocks on the Great Reef Barrier in Australia due to harvesting of undersized fish to the Chinese and Hong Kong merchants. The actual quantities of fish captured, however, are probably much greater, given the sometimes considerable proportion of fish (averaging about 50%,) that die before reaching the market (Sadovy and

Vincent 2002). Mortalities can be high due to cyanide use, holding prior to shipment and transportation stress.

The LRFF trade is not well-monitored nor is there accurate data on the trade. In most countries, export figures are either unavailable or unreliable. The same concern about data and data accuracy is also encountered for coral reef organisms for the aquarium and curio trade (Bruckner 2001). On the import side, the Government of Hong Kong provides reasonable estimates of imports of each of the major fish in the trade, although there is substantial underreporting because vessels licensed in Hong Kong are not required to report their landings, and these account for a significant proportion of imports. The government collects data informally from this exempt subsector, but imports by exempted vessels are still underreported by a significant factor (50% by government estimates). However, government data are only available from 1997 and re-exports to mainland China are not recorded.

The LRFFT has attendant negative environmental repercussions. Barber and Pratt (1998) documented that cyanide fishing in the Indo-Pacific Region has resulted in the destruction of the coral reef ecosystem. Cyanide is used in Southeast Asia to capture coral reef fish and supply marine aquarium hobbyists in the United States and Europe (Simpson 2001). Bryant et al. (1998) mapped out the global scale of cyanide fishing, as well as its associated threats and impacts concerning the degradation of the world's coral reef ecosystems. Johannes and Riepen (1995) looked into the interwoven environmental, economic and social factors of LRFT in Asia and the Western Pacific which heavily impacts on the world's marine biodiversity.

### 2.2. Philippine Context

The LRFT in the Philippines began in the late 1950s when an entrepreneur began to export aquarium fish. The industry grew throughout the 1960s and 1970s, but by the early 1980s export volume began to decline. By the mid-1980s, many of the aquarium fish exporters were also handling live reef fish for food. The collection of live fish for food started in Guiuan in the southern tip of Samar in the 1980s. It spread to other parts of the Philippines as the trade proved to be financially lucrative. Other major areas in the country include Polillo Island, Virac, Surigao and Balabac, as well as 34 minor areas.

A Filipino fisher can earn up to US$22 for a live coral trout, approximately five times that of a dead fish. It is reported that a trader's markup could reach up to 100%, including holding and transport. In the 1980s, live fish transport vessels from Hong Kong were making regular trips to Palawan to collect groupers and wrasses. Unlike other Southeast Asian countries, most of the catch in the Philippines was taken by national, rather than foreign, fishers. The close proximity of the Philippines to Hong Kong, Taiwan and China, however, meant that illegal fishing by foreign vessels also occurred. Since the early 1990s, there has been a total ban on foreign fishing vessels in Philippine waters, except for special permits given for pelagic fishing. Increased patrols by the Philippines Navy, particularly in the area west of Palawan, has reportedly greatly reduced the incidence of illegal foreign fishing. The crackdown on foreign vessels, along with low airfreight rates to Hong Kong, has resulted in a shift towards live food fish exports by air.

In the early 1960s, the use of cyanide to collect aquarium fish began (Barber and Pratt 1997). Like the aquarium fish industry, by the mid-1980s, cyanide started to be used for the live food fish trade. Padilla et al. (2004) examined the origin, extent of use and impacts of cyanide fishing in the Philippines, particularly in LRFFT. Ride (2000) looked into the use of such chemical to catch live food and aquarium fish, including the consequent destruction of coral reefs. Barber and Pratt (1997) identified several factors that predispose the Philippines to the use of cyanide: (1) cyanide use has become a tradition in many fishing communities; (2) cyanide fishing technology is easy to obtain; (3) the poverty in most fishing communities makes the quick cash from using cyanide irresistible to many fishers; (4) the Philippines lies close to Hong Kong, the main market for live food fish; (5) demand for live food fish is increasing; and (6) there is a legacy of weak and corrupt government institutions which can be easily controlled by cyanide fishing enterprises.

The LRFFT in the Philippines is dominated by a few companies that are highly vertically integrated. The companies have collection points for fish scattered throughout the country and the fish are sent to company-holding facilities in Manila before being exported. Most fish are shipped by air from the collection points to Manila. In addition, some fish are taken directly by boat to Manila. Live food fish from southern Luzon are taken by truck to Manila.

The quantity of LRFF exports increased rapidly during the early 1990s, peaking in 1995, and declining ever since. Between 1991 and 1998, export value was estimated to be US$7.2 million per year on average (1.74% of the country's total fishing export value). In 2001-2003, export earnings increased to a yearly average value of US$11.1 million (BAS 1991-2003). Almost all of the LRFF exported from the Philippines goes to Hong Kong and Taiwan, with Hong Kong accounting for the vast majority of exports. Both adult reef fish and grouper fry (used in aquaculture growout operations) are exported. Small quantities of live food fish are exported to Malaysia and Singapore.

### 2.3. Palawan and the Calamianes Islands Context

The LRFFT in the Calamianes Group of Islands began in the late 1980s when the first fish were shipped to Hong Kong. The biophysical characteristics of the Calamianes Group of Islands (Figure 1), with more than 100 islands and abundant coral reefs, make it one of the most important sources of live fish in the country. Recent studies, however, point to a progressive decline in fisheries production in this area. Its fishing grounds, once sustained by large stocks of commercial species, are now in a severely depleted state (Werner and Allen 2000). Ingles (2000) estimated that the 1997 fish production estimate is only 50% of the 1991 level. Studies invariably attribute the worsening condition of fishing grounds in the Calamianes to destructive fishing practices, such as the use of cyanide. Despite the presence of the live food fish trade, some municipalities in northern mainland Palawan (like San Vicente) have overall good live corals estimated at 52% (Arquiza 1999). If viewed in the context of other unfettered destructive and depletive fishing activities, the current situation will signal the cataclysmic collapse of the entire fishing industry in the area (Dalabajan 2004). Further declines are anticipated if fishing activities continue on as currently practiced. Preliminary gross estimates of the value of the industry in the Calamianes Islands was PhP177.8 million in 2001 and PhP265.1 million in 2002.

According to Padilla et al. (2003), "Initially, fishermen from the distant provinces of Surigao, Bohol and Leyte were brought to the area to fish and to train locals in catching live fish. The activity slowly grew among fishing communities. Fish soon replaced lobster as the main live aquatic product in trade. By late 1990s, 60-70% of fishing communities were engaged in live reef fish collection". It is estimated that there are about 1,000 fishers that target live reef fish. Over time, hook and line replaced fish traps. Many fishers eventually shifted to using cyanide. It is estimated that up to 50% of the fishers use cyanide. There are three categories of fishers operating in the area (Pratt and Bentley 1999): (1) fishers who own their own boat and sell their fish to a dealer offering the highest price; (2) fishers who own their own boat but because of debt are obliged to sell to a certain dealer and accept the price offered; and (3) fishers who work on boats owned by dealers (about 80% of the fishers).

The live food fish trade in the Calamianes is characterized by dynamic arrangements between and among fishers, boat owners / operators, traders / middlepersons, financiers, and exporters. Most of the LRFF middlepersons in the area own multiple boats. Fishers are often indebted to them in a *suki* (regular customer) relationship. Transactions take place in four geographical stages – in the islands, in the town of Coron, in Manila and eventually in Hong Kong (Padilla et al. 2003). The majority of fish are shipped by air to Manila. Most live fish in the Calamianes are held in indoor "aquarium" tanks. Only undersized fish are impounded in floating cages.

Assessments of the trade in Palawan and the Philippines suggest that the industry is overfishing and degrading the resource base, greatly compromising its ability to maintain and regenerate itself, and becoming unsustainable in the future. Negative marine ecosystem impacts and loss of biodiversity are being felt as a result of the trade. In addition, food and economic security in many coastal communities is threatened.

## 3. KEY PROBLEMS AND ISSUES RELATED TO THE LIVE REEF FOOD FISH TRADE IN THE CALAMIANES ISLANDS AND PALAWAN

### 3.1. Fishery Resources and Marine Ecosystem

Groupers, the most preferred species in LRFFT, are relatively rare, slow-growing, long-lived and mature late in life. Reefs can be quickly depleted of groupers. Some grouper species form spawning aggregations, which are sometimes heavily fished, with a negative impact on the reproductive component of the population. The capture of a large proportion of juvenile fish or young adults (most groupers are females at this stage of their life and change sex as they grow larger) for mariculture growout also potentially reduces the reproductive population (Sadovy et al. 2003). Since the demand for and prices of fish between 0.8 and 1 kg (medium size) are higher than sizes below or above that range, size-selective fishing among cyanide fishers could result in overfishing of more fecund and larger individuals affecting the sex ratio of the grouper population. Exploitation rates of sexually mature and moderate-sized individuals seem to be high, which could lead to recruitment overfishing and, consequently, to the decline and depletion of the population. If one adds into the equation fish caught using hook-and-line and other methods, the grouper population faces an even greater risk of overexploitation and depletion (CI 2002). There is

some evidence of reductions in fish size for exploited species, with reports that groupers caught have become steadily smaller since the early 1990s (Sadovy and Vincent 2002).

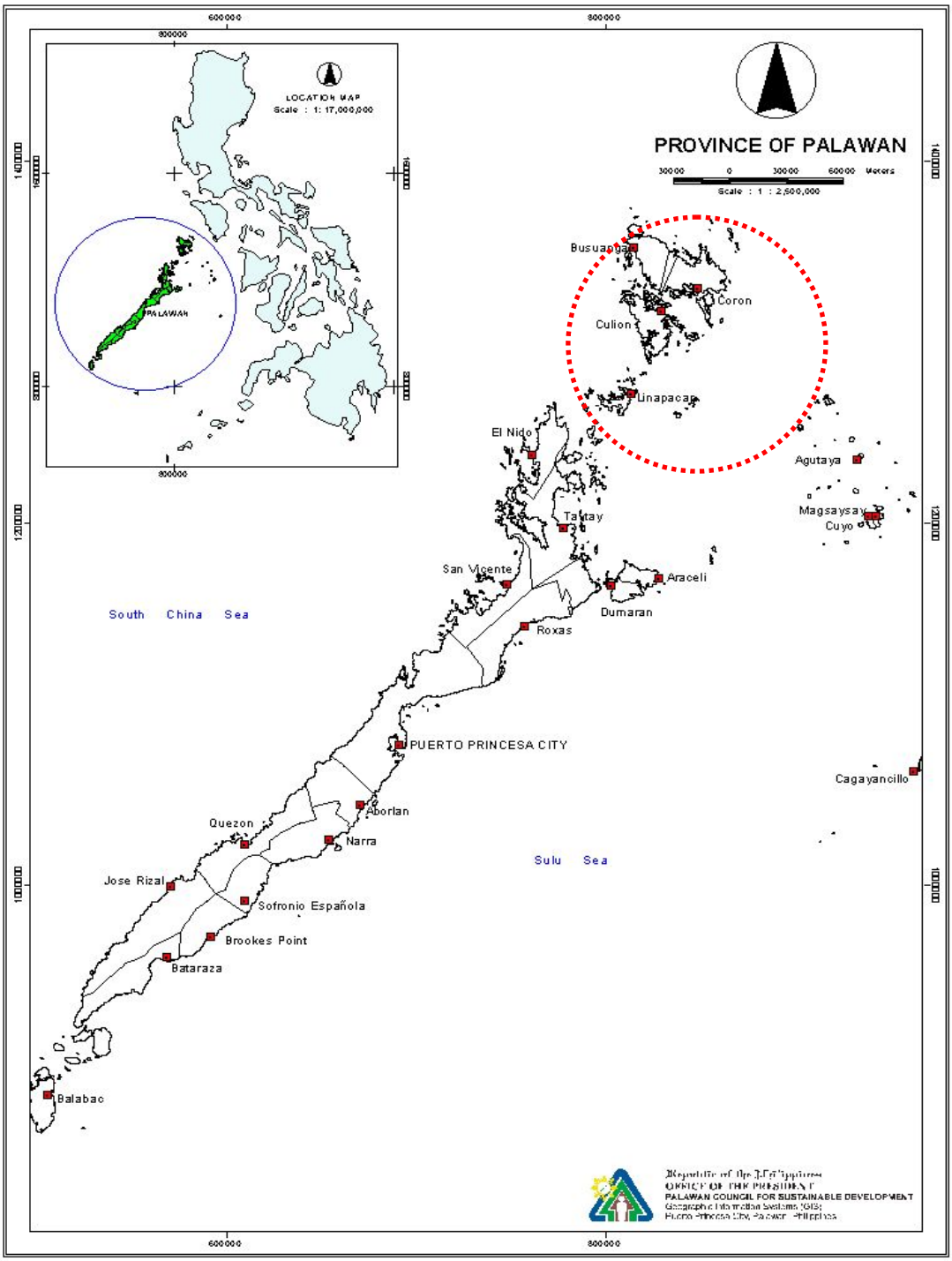


Figure 1. Location map of Calamianes Group of Islands and the Province of Palawan.

The trend in production suggests that the overall grouper fishery has not yet reached maximum catch level and that yield, therefore, can still rise (this assertion can be supported by the production estimate versus the total area of the reefs). However, possibly much of the increased catch in recent years is from expansion of fishing areas rather than yield increases. Indeed, most live fish landed in Coron have not been harvested in the traditional Coron Bay area. Supplies at the moment come from "*largo viaje*" fishers operating farther out in fishing grounds, such as southern Linapacan and western Culion. Concerning the status of live fish stocks in the traditional Coron Bay, most fishers agree that these have been severely depleted but the cause of decline is also largely attributed to loss of reefs due to rampant dynamite fishing. There is every indication that wherever a live reef food fish fishery occurs, it is usually associated with localized heavy depletions, and demand is expected to grow (Sadovy et al. 2003). Certain reef species are taken as nontarget species as part of the operation of LRFFT. Nontarget species are taken to provide bait or to feed groupers during growout mariculture. Nontarget species may also be caught accidentally since many of the fishing methods for live reef fish are indiscriminate.

Scientific studies have established that groupers generally spawn during the lunar cycle, i.e., three days before and after a new moon and three days before and after a full moon. Spawning period for the red coral grouper in northern Palawan has been identified as occurring in May to July, and in November and December. Grouper density has been found to go as high as 20 individuals/1,000 $m^2$. For groupers in the Calamianes area, and specially for the red coral grouper, in 1999, densities were determined to be 2.97 individuals/1,000 $m^2$ (Jose Ingles and Samuel Mamauag, pers. comm.). This number is expected to have declined in recent years.

The impact of excessive extraction of live fish on local subsistence and commercial fisheries for the same target species could result in fishing down the food chain with unknown long-term ecosystem effects through changes in interactions between organisms. A new equilibrium could arise in the absence of some of the top predators (groupers), possibly precluding the re-establishment of groupers and other affected species, and threatening vulnerable species such as humphead wrasse (Sadovy et al. 2003). Fishing for the live food fish trade often physically damages corals. The loss of physical structure induced by live reef fisheries and the selective removal of certain species can cause ecological change, but the results are not consistent (Sadovy and Vincent 2002).

A rapid marine biodiversity assessment (marine RAP) of the Calamianes Islands (Werner and Allen 2000) showed that in 1998, most of the 30 sites surveyed have suffered varying degrees of habitat destruction, primarily from blast fishing, *muro-ami*, cyanide use and anchor damage that leave marks in the form of bleached coral skeletons and rubble patches. The southwestern coasts of Coron Island were the worst affected by blast fishing and essentially are reduced to rubble to a depth of at least 20 m. The marine RAP further indicated that the reefs are severely depleted of market-sized fish, including the lack of large piscivorous species like groupers, barracudas, jacks and sharks. Lobsters appear to have been fished to the brink of extinction. Productivity loss from reef destruction through cyanide use is estimated to be about 304 kg/$km^2$/year. It further indicates that groupers are fished beyond what is biologically sustainable. Despite destruction, the area is still very rich in marine biodiversity and is showing evidence of coral reef recovery.

A 1999 coral reef assessment conducted by the PCSD staff showed that 3.93% of the reefs surveyed were in excellent condition, 34.43% in good condition, 44.26% in fair condition and 17.38% in poor condition. Lasmarias (2003) estimated that the annual reef damage from cyanide was 173.48 $m^2/km^2$/year or at a rate of 0.0173%. In 10 years, 0.17% of the coral cover in the Coron-Busuanga area will be lost if the current rate of cyanide use goes unabated. A coral reef assessment of Busuanga indicated heavily damaged coral reefs and low fish count (PCSDS 1998).

Padilla et al. (2003), in a sustainability assessment of LRFFT in the Calamianes Islands, reported that the industry is "mining" and degrading the resource base, greatly compromising its current and future regenerative capacity. The coral grouper, *P. leopardus*, the most dominant species in the trade in the Calamianes, is overfished. Fishing effort is high in the area. The export of live fish from the area decreased from 1994 to 1999. Although no trend was established due to the absence of previous data, the present estimate of catch per unit effort (CPUE) was found to be higher relative to estimates found elsewhere in the tropics. Fishers reported that they were traveling farther to fish and were spending longer periods to reach fishing grounds than in the past. The mean body size of *P. leopardus* decreased from 1998 to 1999, and there was a reduction of the ratio of total weight to total number of individuals in the catch (abundance) of live fish from 2000 to 2001. This suggests growth in overfishing. The LRFFT targets fish in the size range of 28–32 cm total length, which are young and sexually immature to maturing individuals. High catch rates of small-sized individuals in the stocks may lead to recruitment overfishing. Estimates of habitat degradation were small. However, dead coral cover was greater than live coral cover on cyanide-impacted areas and vice-versa on nonimpacted areas.

The use of cyanide is often associated with the use of compressor. In November 2003, some 202 groupers caught using cyanide were seized by authorities; likewise, 2 kg of cyanide were confiscated by barangay officials in El Nido (Tesorio 2003). There are speculations that those confiscated by the authorities are just a small proportion of the live fish caught using cyanide.

### 3.2. Economics and Trade

Although LRFFT has been operating for several decades, economic and trade information is scant. Price and volume data are collected and reported by municipality in Palawan Province by PCSD and the Palawan Provincial Fishery Office, BFAR-Region No. IV-B. The PCSD reports on key status indicators by municipality for the live reef fish for food industry, such as reef status, total production, shipment, number of accredited actors in the industry and cyanide detection test (CDT) incidence.

Export data on a national level are collected and reported by the National Statistics Office (NSO) and the Bureau of Agricultural Statistics (BAS). The quantity and value of exports of live grouper are reported in Table 1. It should be noted that the figures in this table do not tally / correspond with those collected by PCSD staff for 2003-2004 as contained in Annex 11-A, fact sheet 8-A.

Table 1. Quantity and value of exports of live grouper from 1991 to 2004.

| Year | Quantity (kg) | Freight on Board (FOB) Value (US$) |
|---|---|---|
| 1991 | 1,001,846 | 970,367 |
| 1992 | 2,285,691 | 2,008,005 |
| 1993 | 5,657,325 | 4,472,150 |
| 1994 | 5,328,763 | 4,521,186 |
| 1995 | 5,819,857 | 4,857,583 |
| 1996 | 3,062,569 | 2,674,603 |
| 1997 | 3,638,577 | 4,166,669 |
| 1998 | 3,298,647 | 4,335,509 |
| 1999 | 3,720,907 | 4,622,687 |
| 2000 | 7,070,842 | 14,344,337 |
| 2001 | 5,153,767 | 12,045,944 |
| 2002 | 6,789,883 | 10,916,245 |
| 2003 | 6,819,413 | 9,186,614 |
| 2004 | 5,497,699 | 7,557,375 |

Sources: NSO and BAS (various years).

The imports of live grouper into Hong Kong from the Philippines was 1,200,963 kg (10.25% of all live grouper imports) in 2001; 1,425,664 (12.52%) in 2002; and 1,578,384 (13.27%) in 2003. The leopard coral trout and the green grouper were the two top imported live grouper species into Hong Kong.

Prices paid to the fisher or fishing company that caught the fish are generally in the range of 2-4 times the prices paid for the same fish when dead. Higher-value fish are usually graded as undersized (<500 g); good or "plate" sized (500 g - 1 kg); oversized (>1 kg); or per piece (>1.5 kg). In the Philippines, where size limits are not enforced or not in place, all fish are purchased and fish that are undersized or not ready for market are moved to growout cages where they are held until they reach plate size.

Two characteristics of the trade are its volatility and its geographic expansion. Prices and consumption vary substantially by season, especially with the arrival of important holidays in consuming countries. Prices in Coron, for example, peak in December - February, with lower prices occurring during April - August. Less predictable factors that have strongly impacted demand in recent years have been the state of the economy; the occurrence of health issues, such as ciguatera; and the occurrence of red tides in the vicinity of fish holding and culture facilities. Fisheries have started and stopped several times in source countries for various reasons, including decisions by governments and communities, and civil unrest. Traders are constantly seeking new sources of fish and the frontier of the fishery has continually expanded in the last 25 years (Graham 2001).

Muldoon et al. (2004) reported that in general the market for LRFF has contracted over the past five years, becoming more focused on fewer species (primarily high and medium-value groupers). Following are thought to be the main causes of these shifts:

1. Overall improvements in transport technology and access to air transport that have helped to increase imports of high-value species. This has been reinforced by relative increases in operating costs for transporting fish by sea.
2. A decline of 40% in the LRFF market since 1998. This falling demand has led to weaker retail prices, making purchase and transport of lower-value fish unviable.
3. Increased aquaculture production of lower-value groupers in Southeast Asia from wild-caught fish. The increase in growout from hatchery production is seen as a positive industry development, but there is growing concern over the parallel increase in growout of wild-caught juveniles for market.
4. Downturn in general business because of international health scares, such as SARS and ciguatera poisoning.

The decrease in the Hong Kong consumer price index from the end of 1997 to the end of 2002 was accompanied by falls in wholesale and retail prices for LRFF. There is a growing market expansion for LRFF in mainland China with increasing incomes. Source countries have experienced decreasing prices for LRFF in recent years, but the impact of these price declines has been mitigated by favorable exchange rates fluctuations. Padilla et al. (2003) reported that the Philippines has a comparative advantage in the constantly growing fish trade. The government provided a supportive trade policy environment, particularly in the export of various fish products, to harness such potential. This resulted in such economic benefits as foreign exchange earnings, jobs and higher income for those directly involved in the export industry.

However, there were also detrimental effects. First, the premium price on preferred size of fish results in the targeting of young and sexually immature fish, which in turn leads to recruitment overfishing. Second, the significantly higher price of live fish drives the collection of fish well beyond limit and without regard to the capacity of the stock to regenerate. Third, cheap capital from traders and exporters further fuels the fishing trade. International demand accounts largely for the unsustainable path of the industry. Traders and exporters move fishing operations in response to shifting supply in the country.

Padilla et al. (2003) reported that income from fishing has been dissipated by declining catches due to overfishing and to the growing number of fishers. Returns from capital and labor have been greatly diminished over time, despite the increase in price of fish in nominal peso terms. The reason why fishers remain in the fishery is primarily the lack of nonfishing employment alternatives in the remote islands.

There are also other international trade considerations, such as the stricter requirements of the importing countries. In December 2003, the European Union blocked shipments of all fishery products from the Philippines because earlier imports contained high residues of "chloramphenicol," a banned antibiotic (Felix 2003).

The PCSD staff has estimated that the gross revenues from LRFT in the Philippines have been increasing. Revenues in 2003 of PhP588,857,400 increased by 2004 to PhP987,309,000.

### 3.3. Social and Community Issues

The LRFFT has provided some communities with the opportunity to earn – at least temporarily – additional income from their fish resources in the area where very few income-generating opportunities exist. For the most part, these benefits have been gained in the short run with considerable long-run costs, ecologically, economically and socially. While many fishers have gained an income in the short term, in many cases they end up indebted to brokers, or required to fish in a way that is incompatible with local practices and habits. Destructive fishing methods have been introduced. Fishers for live food fish have been affected by significant health impacts from poor safety controls in diving. The industry has resulted in increasing social disputes and disruption between fishers and communities over ownership and use of rights to areas and resources and over benefits obtained. There have also been increased levels of corruption and coercion. In addition to loss of fish resources and reef health, there is loss of potential alternative income-generating opportunities, such as scuba diving and other ecotourism-related activities.

A study by Conservation International-Philippines (2002) reported that the Calamianes has experienced very high population growth due to high in-migration from the Visayas region. A high number of households in the area are transient or seasonal fishers working under a contract with a boat operator or a financier. Despite this in-migration, there are few alternative income generating opportunities except fishing and subsistence agriculture. The poverty incidence in the area is high. The study found that the average gross revenues from cyanide and dynamite fishing exceeded those from hook-and-line. Regardless of fishing method, live fish provide a higher gross return per fishing trip and per fisher. The fishers reported that financial incentives encouraged the use of cyanide and dynamite.

Padilla et al. (2003) conducted a community and social impact assessment to determine the relationship between the live reef fishing industry and social issues and problems. They found that the current state of the LRFT in the Calamianes Islands is socially unsustainable. There is greater competition among fishers, both locally and from outside the area, causing increased damage to the reef ecosystem. The fishers' perceptions for local government and national line agencies involved in resource management were low, seeing them as ineffective. There has been a perception among them that the governments are tending to favor the interests of livefish traders. The barangay local government is regarded as having more significance and potential relevance than municipal or provincial governments. Fishers have little regard for their role in overall decisionmaking and for their relation with LGUs regarding LRFT. Most fishers believe that only local and financial elites have the capacity to make decisions. There is a high level of dependency of fishers on brokers and financiers for money which has resulted in an inequitable distribution of benefits. Live reef fishing has become the major economic activity for most of the communities in the Calamianes Islands. The dependency arrangements, inequitable distribution of benefits, growing threat to food security, limited access to basic services and weak sociocultural cohesion in the communities may be leading to a significant level of social instability.

Padilla et al. (2003) reported that communities are aware of the need to work with government to establish a sustainable resource management strategy. This presents an opportunity to seek ways of giving the communities greater management responsibility over local resources. If fishers continue fishing using destructive fishing methods, it is not so much due to profitability as the absence of other livelihood alternatives. Any alternative livelihood schemes will only work if the benefit to the fishers will be at least equal to the benefit they accrue using sodium cyanide (CI 2002). Mayo-Anda, Dalabajan and Lasmarias (2004) conclude that the poverty, high in-migration and high population growth rates, combined with lack of alternative livelihood to augment fishing income, put more pressure on the marine resources. With few alternatives from fishing because of very limited arable land and fresh water for irrigation and lack of skills and poverty, the relatively large income from illegal fishing provides a rational choice for fishing households. There were some proposed capital infusions, though. Last year, alternative livelihood projects should have been provided by the International Swaps and Derivatives Association (ISDA, an industry association of exporters) to fishers especially those engaged in the live fish industry through the Palawan NGO Network, Inc. (PNNI) (Anon. 2004). However, this did not materialize. If the perverse income incentive cannot be reversed, the other deterrent to engaging in illegal activities would only be through very effective law enforcement. However, the weak enforcement regime in the areas does not provide such a deterrent, as the succeeding sections will discuss more fully.

### 3.4. Management, Legal and Institutional Issues

Republic Act (RA) 8550, otherwise known as the New Philippine Fisheries Code of 1998, is the fundamental enabling legislation on fisheries in the country. It assigns to LGUs the duty of protecting and conserving fisheries resources within municipal waters and prescribes the identification of areas where workable resources management models (i.e., closed season, marine sanctuaries and reserves) can be implemented. The law defines specifically the legislative, enforcement, prosecutorial and quasi-judicial functions of LGUs within the municipal waters. The Local Government Code of 1991 also gives considerable power over local fisheries to municipalities. The provisions of other relevant laws and regulations pertaining to live food fish and coral reef management in Palawan are given in Annex 1.

Cyanide fishing is banned in the Philippines under the Philippine Fisheries Code of 1998. Sodium cyanide is likewise a regulated substance under RA 6969. As such, it is allowed only for the following industries which are not present in Palawan: electroplating industries, mining and metallurgical industries, steel manufacturing, synthetic fibers and chemicals, and plastic production. Despite the strong legal basis for stopping cyanide fishing, enforcement has been sporadic. In fact a Memorandum of Agreement was forged among government agencies, NGOs, civic organizations and ISDA-exporters to ensure the commitment of each partner for an efficient and effective handling of reports received through Cyanide Watch's Sumbungan hotlines (Anon. 2003). A harmonization of policies in Palawan related to the control of cyanide in LRFFT has been proposed leading to the drafting of a unified legal issuance through a model municipal ordinance (PSU 2004).

While cyanide fishing is illegal, national fisheries and trade policies promote the expansion of fisheries exports. The Fisheries Code of 1998 encourages the exportation of fish, while

its Section 61 at the same time prohibits the export of live fish except those "… hatched or propagated in accredited hatcheries and ponds." According to Dalabajan (2004), "This legal proviso has not impeded live fish catchers, traders and shippers because according to them the Bureau of Fisheries and Aquatic Resources has not passed an Administrative Order (AO) that provides enabling legislation to implement the said prohibition."

A number of national policies have encouraged export-oriented production, ranging from tariff reform programs to liberalization of the foreign exchange market to bilateral trade agreements to infrastructure investment. As Padilla et al. (2003) stated, "Implementation of these policies resulted in short term benefits for the fishing industry, but they had detrimental effects for the country's environment in the long run. Policies that encouraged export-oriented production without effective fisheries management regimes led to depletion of the country's fish stocks."

Coron Island (Coron Municipality) and Calauit Island (Busuanga Municipality) are part of the protected area system governed by RA 7586, otherwise known as the National Integrated Protected Areas System Act (1992). Theoretically, the NIPAS Law vests the site-specific Protected Area Management Board (PAMB) to, among others, "decide matters relating to planning, resource protection and general administration … of the protected area." Legally, Coron Island and Calauit Island should have formed interim PAMBs in the area by virtue of being included in the NIPAS System (as a result of Proclamation 1801 and Presidential Decree 1578). However, the Tagbanuas of Coron Island and Busuanga refuse to recognize the NIPAS laws in their respective territories. Instead, they are asserting their rights to manage their ancestral domains in accordance with RA 8371.

RA 7611 or the Strategic Environmental Plan (SEP) for Palawan provides the overarching conservation policy framework for the province. SEP adopts the environmentally critical areas network (ECAN) approach to ensure the protection of vulnerable areas. ECAN is a graded system of protection and development control over the whole of Palawan and its environment such as small islands, mangroves, coral reefs, seagrass beds and surrounding seas.

In 1993, the Palawan provincial government passed Provincial Ordinance (PO) No. 1993-02 banning the gathering, buying, selling and shipment of live fish in Palawan. The following year, the provincial legislative council passed PO No. 1994-29, which exempted all species from the ban other than Napoleon wrasse (*Cheilinus undulates*), panther grouper (*Cromileptes altivelis*) and ornamental and aquarium fish in the Balistidae family. Thereafter, the provincial council amended PO No. 1994-29 through the passage of PO No. 1998-332 providing further exemptions from the ban on ornamental and aquarium fish of the families Pomacanthidae, Pomacentridae and Chaetodontidae. The law also allowed the gathering of *Cheilinus undulatus* provided that they: (1) are caught in the wild; (2) weigh 50-300 g or measure between 3 and 7 inches in length; and (3) are cultured in pen or cages over an 8-10 month period. In addition, the law installed a complicated certification system for shippers, traders and catchers of live fish. The PCSD issued Resolution No. 98-118 in 1998 which required all carriers of live fish by land, air and sea in Palawan to obtain a permit from PCSD and authorized the Philippine National Police (PNP) to implement monitoring activities. Puerto Princesa City Ordinance No. 110 regulates the live fish trade within Puerto Princesa City. The City Government of Puerto Princesa claims that the

implementation of City Ordinance 110 (Series of 1999) has resulted in reduced incidence of fish testing positive with cyanide (Macasaet 2003).

Resolution 98-118 has been amended several times to revise its coverage, monitoring and enforcement protocol. In 2000, the resolution took its present form when PCSD passed AO No. 2000-05 which provides an intricate accreditation system for culturing, catching, trading and transport of live fish species. PCSD AO No. 2000-05 prohibits culturing, catching, trading or transport of live fish species without accreditation from PCSD. The live fish catcher, fish cage operator, trader or carrier is required to submit a Letter of Commitment to PCSD on a monthly basis stipulating the methods used in collecting live fish; areas where collected; auxiliary invoice from the municipal government and proof that the live fish is cyanide-free. In addition to the fines, the conveyance and materials will also be confiscated and will not be released except by paying fine, without prejudice to the filing of evidence.

In May 2002, the Palawan Provincial Council issued a moratorium on the award of live fish permits (Arzaga and Pontillas 2003). Consequently, on 7 July 2003, PCSD approved the Conditional Phase Lifting of the Moratorium enjoining LGUs concerned to participate actively through the satisfaction of the following guidelines:

1. declaration from the municipal government of a policy to combat the use of cyanide in the live fish industry either by resolutions or local ordinances which shall include implementing guidelines addressing the problem of sodium cyanide use in the industry;
2. establishment of an operational regulation and monitoring system that addresses the use of sodium cyanide in the live fish industry;
3. allocation of human resources and budget to the above-mentioned initiatives in the annual plan and budgetary appropriation of the municipality; and
4. the municipality shall endeavor the active involvement of the Barangay / Municipal Fishery and Aquatic Resources Management Board or equivalent body, NGO and people's organization in the implementation of a regulatory and monitoring system that addresses the problem of sodium cyanide use in the live fish industry.

However, no municipality was able to complete all of the requirements, with most of the LGUs only able to satisfy condition number one.

In 2002, PCSD passed Resolution No. 197 (2002) on the prohibition on the use and mere possession of hookah compressor. Arzaga and Pontillas (2003) and PCSDS (2002) reported that PCSD AO No. 00-05 was not able to meet its objective of effectively addressing the issues of sodium cyanide used in the live reef-fish industry primarily because of the absence of consultation in the crafting of the AO. There was a perception that it has a complicated accreditation procedure and lack of necessary procedures in carrying out many of the provisions of the AO. Compliance in respect to accreditation was low, despite the information dissemination initiative of PCSD staff. The strength of the AO lies with its monitoring component which should build in periodic and random checks for cyanide use in live fish. However, the monitoring component of the policy tended to be weak because of: (1) nonconstitution of the multiparty monitoring team; (2) lack of protocol with respect to operationalizing the monitoring process which should have been addressed after the AO was issued; (3) CDTs that usually focused on the shipping out of

Palawan stage when traders / shippers are already transporting live fish that have been caught for some days; (4) ability of CDT centers to detect cyanide in the fish sample, given the behavior of the substance to be expelled out of the organism and the existing practice in the industry of stocking the fish for a number of days before shipment; and (5) reliance on incidental efforts of the PNP-Maritime Group to monitor and/or check the presence of cyanide during the pretransport stage of live fish.

Under PO No. 332 (1998), the maximum penalty for catching, shipment or transporting of banned live fish species is PhP5,000 and imprisonment of six months to one year and forfeiture of paraphernalia and equipment in favor of the government, or both, *by Court's discretion* (italics supplied). It is important to note that the provincial LGU qualified in the ordinance that the imprisonment / forfeiture of paraphernalia related to the gathering of banned live fish species is subject to the discretion of the court. Effectively, the provincial LGU has relinquished its prosecutorial and adjudicatory function that it could have otherwise chosen to exercise under the Local Government Code. A route that may be taken to avoid a protracted, nay, expensive litigation is through PCSD AO No. 2000-05, which provides the guidelines for the accreditation, regulation and monitoring of live fish catching, culture, transport and trading in the province.

The PCSD has also effectively banned cyanide use through Resolution No. 2002-197. For this resolution to be enforceable, LGUs need to adopt it by virtue of an ordinance. In Calamianes, only Busuanga Municipality has a ratified basic Fisheries Ordinance. Most of other regulations enforced in other municipalities have been supplanted by the Fisheries Code of 1998.

A number of different fishery law enforcement institutions exist at national, local and civil society levels. At the national level, these include the PNP, PNP-Maritime Group, Coast Guard, Department of Agriculture-BFAR, PCSD, Presidential Commission on Anti-illegal Fishing and Marine Conservation, and Inter-agency Task Force on Coastal Environment Protection. At the local government level, these include all barangay officials and Sangguniang Bayan or municipal councils. At the civil society level, these include citizen arrest; the use of tribal justice system, conflict resolution institutions, customary laws and practices; and Barangay and Municipal Fisheries and Aquatic Resources Management Council members (Dalabajan 2004).

In addition to government, NGOs in the Philippines have played a role in the management of LRFFT. Their efforts include training fishers on environment-friendly methods of catching live food and aquarium fish using nets, and developing a certification system to guarantee that the fish available in the market only come from sustainable catching methods. Beginning in the late 1980s, the International Marinelife Alliance (IMA)-Philippines, a Philippine NGO, began working with BFAR to develop a strategy to combat cyanide fishing and other forms of destructive fishing. The joint activities included the development of a computerized test to detect the presence of cyanide in fish tissue and organs in 1991 and the establishment of a network of six cyanide detection labs around the country to test samples from catch for export shipments in order to detect cyanide in aquarium and food fish and to provide evidence for prosecution. The testing resulted in a large number of court cases for cyanide fishing, and the support of law enforcement agencies. The PCSD and the WWF-Philippines have an active partnership to find solutions to LRFFT problems

and issues. Policy research and impact studies have been undertaken. Mayo-Anda et al. (2003) stated that,

> "Notwithstanding the complexity of regulations bearing on destructive fishing in Palawan, penalties for violation thereof is considered prohibitive by Philippine standards. Aside from the efforts of the government, other concerned groups have also assisted in arresting the worsening problem of cyanide and dynamite fishing. ...
>
> "One can see, based on above enumeration, that the government is neither lacking in laws, nor in enforcement institutions to implement the laws and regulations related to illegal fishing practices. Despite of this plethora of laws and regulations, and the number of institutions charged with implementing them, illegal fishing proceeds with an unrelenting pace. Some observers argue that the laws are only as important as the efficiency of enforcement institutions that are tasked to implement them. This means that there will certainly be a high level of non-compliance if the general public deems that enforcement is futile. Clearly therefore, there needs to be a huge amount of efforts to try to reform the way these laws are enforced and in the way that the penalties for the infractions are meted out. To do this, it is important to understand the dynamics of the law enforcement chain and to effect changes on the specific weak links."

A multistakeholder consultation relating to the Sustainability Assessment Project of the live reef fish for food industry initiated by WWF-Philippines held in Coron in December 2002 identified several areas of concern, which included (Padilla et al. 2003): (1) poor enforcement of laws; (2) entry and monitoring of nonresident fishers; (3) alternative livelihoods when restrictions are imposed on fishing activities; (4) permitting and licensing procedures; (5) lack of coordination among municipalities; and (6) complex accreditation process of PCSD.

The following actions were proposed at the 2002 summit: (1) strict enforcement of laws; (2) monitoring through regular patrols; (3) CDT; (4) enactment of ordinances which would reserve exclusive property and access rights to local and legitimate residents of Calamianes; and (5) provision of alternative livelihoods when fishing restrictions are imposed.

The First Palawan and Calamianes Islands Live Fish Summits were held in Puerto Princesa and Coron, Palawan, in March 2003. The participants of the summits identified options and recommendations to rationalize the LRFF industry. These included: (1) establishment of a CDT laboratory; (2) establishment of a national system of inspection, data gathering and monitoring; (3) establishment of a firm legal framework to detect and prosecute cyanide fishing and to require mandatory testing and certification of all live reef fish exports; (4) bans / restrictions in the export of vulnerable species; (5) regulation of the importation, distribution and use of cyanide; (6) addressing corruption within vulnerable government units through civil society involvement; and (7) public awareness campaigns. As a result of these summits, the PCSD organized a technical working group (TWG) to strengthen the partnerships of different stakeholders. The TWG has launched several initiatives to address illegal fishing activity. The industry itself has mobilized for an ecolabeling and standards

project for best practices in cyanide-free fishing. The TWG has been recently expanded to be a joint PCSD staff-Provincial Council technical working committee on the fisheries sector.

Padilla et al. (2003) concluded in their report on the live reef fish for food industry in Palawan that despite numerous national and local policies that govern the trade, there is no pro-active and sustainable resource management plan for the industry. The existing policies are not matched by strong and able institutional capabilities, particularly in enforcement and responsive governance. Coordination among government agencies is constrained by cross-cutting jurisdictional issues, ambiguous working relationships and lack of institutional accountability. There is a need for multistakeholder commitment to take specific roles in managing the industry, which can be achieved through consultations and dialogue. Collaboration of all stakeholders is crucial, with the cooperation of traders as the most crucial for success. Stakeholders need to be vested with responsibilities and incentives for self-regulation. The role of government is to formulate and enforce an effective policy environment against cyanide fishing and to control overfishing.

Mayo-Anda et al. (2003) identified a number of recurring themes to the poor level of law enforcement on illegal fishing in Palawan: (1) low infrastructure capacity – vigilance of "civil society"; adequate detection agency personnel and equipment; sufficient budget for detection agencies to perform their duties; availability and capacity of judges and prosecutors to handle cases filed by the enforcement agencies; (2) low technical capacity of the various actors in the enforcement chain; (3) procedural inefficiencies – overburdened and distant courts; (4) lack of interagency coordination – the multiplicity of enforcement agencies tasked with implementing fishery laws has produced the uncanny result of jurisdictional overlaps; and (5) lack of incentive for effective performance – underfunded law enforcement agencies are breeding grounds for corruption.

## 4. INTERVIEWS OF KEY INFORMANTS

Some 40 key informants were initially identified to provide supplementary information concerning LRFFT. Each informant was knowledgeable in at least one aspect of LRFFT. They were requested, either verbally or in writing, to complete an interview schedule (see Annex 2). The information that was solicited included their perceived status of the live food fish resources and the coral reef environment, as well as their feedback on various management options to sustain the industry and the associated measures.

Thirty-one key informants participated. The majority provided information through a guided interview, while a few completed the interview schedule on their own. The respondents occupied mid-level to high-level positions in their respective organizations. There were 13 respondents that came from the government sector, 8 from NGOs, 6 from the industry, and 2 each from the academe and fisher associations. The respondents from the government sector included 3 representatives (politicians) from the provincial government, 8 heads of offices, a barangay official and a lawyer. The NGOs represented included ELAC, WWF, CI, IMA and FISH Project.

### 4.1. Results of Interviews

The results of the key informant interviews are presented based on the major headings of the interview schedule. The percentages are based on the sample size of 31 individuals.

#### 4.1.1. Live reef food fish resources

The majority of the key informants felt that the condition of the live food fish resources has worsened over the past 10 years. Eighteen out of the 31 respondents (59%) gave the qualitative description of good (42%) and very good (17%) regarding the conditions of the live food fish resources 5 - 10 years ago. At present, only 26% perceived a good scenario. Such constituted those who answered a qualitative description of good (23%) and very good (3%) for the condition of the current live food fish resources.

The majority of the respondents (48%) described the status of leopard coral grouper (*Plectropomus leopardus*) as either slightly overfished (29%) or severely overfished (19%). Commonly called red *lapu* or *suno*, the leopard coral grouper accounts for around 90% of LRFT in Palawan. Most of the respondents (29%) also believed that the status of the orange-spotted grouper (*Epinephelus coioides*) could be described as slightly overfished. This species is locally called *lapu-lapu*, *loba* or *pugnon*. For the brown–marbled grouper (*E. fuscoguttatus*), 36% of the total number of respondents described its status as overfished; 22%, slightly overfished; while 10%, severely overfished. The locals call this species *garupa, lapu-lapu aswang* or *pugapo*. About half (45%) of the respondents felt that the Napoleon humphead wrasse (*Cheilinus undulatus*) is already overfished. Locally called *lubayan, mameng* or *tarungan*, the majority of the respondents (32%) perceived it as severely overfished.

The respondents were asked if they were aware if the spawning aggregations are being targeted for capturing live fish. Majority (42%) said they are aware; 20%, claimed that they have no opinion; while 16% said that they were not aware. For those who responded positively, they felt that the trend in targeting of grouper spawning aggregations is generally increasing.

The majority of the respondents expressed either no opinion or no answer regarding the level of post-harvest mortality. Some 16% believed that the level must have gone down. This is due to some technological innovations in transport using oxygenated water, as well as the use of faster aircrafts compared with conventional boats. The shipment is mostly done through chartered planes.

Most of the live fish shipped out of the Palawan area are for food. Notwithstanding, a small percentage of ornamental fish are likewise shipped out from the area.

#### 4.1.2. Coral reef environment

Similar results were obtained regarding the conditions of coral reef resources or environments. Thirty-nine percent of the respondents gave a qualitative description of good (32%) or very good (7%) to the conditions of coral reef resources 5-10 years ago. This may be compared with only 23% who mentioned that the coral reef conditions at present

could be described as good. Hence, the majority of the key informants perceived that the conditions of the coral reef resources have worsened over the last decade.

### 4.1.3. Use of cyanide

There were mixed perceptions regarding the trend in the use of cyanide for capture of live food fish. The majority of respondents (36%) perceived that the use was increasing; 16% felt there was no change; while 26% claimed that the trend was decreasing.

### 4.1.4. Fishers / stakeholders

The majority of the respondents (62%) felt that the number of fishers involved in the live fish food trade industry has increased over the last 10 years. The fishers have been attracted to venture into live food fish capture because there is a demand and live food fish commands higher prices compared to fresh fish. The fishers involved in the live fish capture and trade are both fishers from within and outside of Palawan. Migrant fishers from other municipalities in Palawan are also seen fishing in Calamianes waters. Migrant fishers also include those from the Visayas, excluding those who come from Batangas, Mindoro and Marinduque.

About half (42%) of the key informants believed that there are no alternative livelihoods available for fishers involved in the live fish industry or for their families. However, nearly two-thirds (62%) believed that fishers involved in the live fish industry may be willing to shift to other occupations and livelihoods if the fishers will also earn the same amount of income gained in selling their live food fish.

### 4.1.5. Management problems and measures

According to various studies, there are three main problems confronting the industry: (1) overfishing, (2) cyanide fishing and (3) influx of migrant fishers. The management options are divided into four categories: (1) regulatory, (2) information provision, (3) institutional and (4) nonregulatory. Under each category are specific measures that can be adopted to address the three key issues identified.

For the issue of overfishing, the top five management measures under the regulatory category chosen by the respondents are: closed season (64%), improved monitoring and enforcement (58%), closed areas of fisheries (55%), permits and licenses (48%) and control of fishing effort (45%). Most of the respondents (55%) also felt that there is a need for information provision to enhance public education and create greater awareness about the issue of overfishing. Some 45% of the respondents also believed in institutional measures, particularly in the form of industry self-regulation. The nonregulatory measure proposed by 39% of the respondents is to adopt an industry certification.

For the issue of cyanide fishing, the key regulatory measures suggested by the respondents were improved monitoring and enforcement, as well as regulation and/or control of cyanide. These options garnered 36% each. The majority (52%) felt that there should also be more information provision regarding the negative impacts of cyanide fishing. Institutional measures should also be adopted through industry self–regulation

(45%) and ICM/CBRM (39%) to improve on fisheries management. About one-third (32%) believed that nonregulatory measures in the form of certification should also be implemented to address the problem of cyanide fishing.

Different measures were forwarded to address the problem of influx of migrant fishers. These include: issuing permits and licenses (45%); improving monitoring and enforcement (39%); controlling migrants' participation in the industry (32%); and controlling of migrants (29%). Thirty-six percent of the respondents also felt that there is a need for information provision to create greater awareness about the problem of population increase. Only 19% of the respondents believed that institutional measures, in the form of industry self-regulation, may be adopted to improve on the management.

#### 4.1.6. Management options

More than half of the respondents (58%) were in favor of allowing the industry to continue. Consequently, nearly one-third (38%) felt that the industry should be banned. From those who felt the need to ban the industry, the majority (58%) opted that partial ban (in terms of either a geographic or a season ban) is the one applicable to the live fish industry.

Nearly all informants (87%) felt that the industry should be managed by all stakeholders involved – fishers, traders, government, NGOs, etc. Most of the respondents (42%) believe that the demand side of management measures for the industry, such as consumer education and import restrictions, can be effective policy instruments.

#### 4.1.7. Legal framework / regime

Most of the respondents (58%) felt that the existing laws and regulations are not sufficient in managing the industry of live fish capture and trade. In view of this, 74% of the respondents perceived that there should be a code of conduct or best practices for the live food fish industry.

#### 4.1.8. Role of aquaculture

A majority of the respondents (87%) felt that aquaculture has a role to play in the live fish industry. The respondents commented that aquaculture would lessen the pressure on the resources of the wild. It will help in increasing the volume of live food fish and assist in seeding areas with reduced fishery stocks. Instead of catching fish spawned in the wild, aquaculture can provide hatchery-spawned fish, and therefore can be used to sustain the trade, which in a way curbs the use of cyanide. Fish culture is an alternative source of live fish, and an alternative source of livelihood to others. Though aquaculture will tend to be more expensive than persisting with the wild-caught fish, if wild capture were banned, then aquaculture would become an economically viable option.

The stakeholder groups, though, are expected to perform specific roles. The private sector, aside from just laying the groundwork, needs to invest adequate funds for aquaculture to develop fish culture in order to produce the supply needed to meet a portion of the demand for live food fish. This sector should, according to key informants, also invest in

technology. On one hand, the government, accordingly, needs to provide incentives or support to private- funded hatcheries. Alongside with giving incentives, the government needs to enforce existing fishery laws, regulations and other safeguards, and monitor its implementation and also provide resources thereof. On the other hand, the academe's role is more on technical assistance, research and development of technology to help the industry. It is seen by respondents that the academe should be the forerunner in educating industry players in partnership with the private sector and government. The NGOs are seen as part of the monitoring system for enforcement and as partners in policy development. They are to work with government and academe for advocacy of reforms. Respondents also say that NGOs should also take part in granting financial incentives for research. Another stakeholder, the lending institutions, is seen to assist in providing soft loans and extending financial funding to investors in aquaculture. This is to allow small fisherfolks access to credit to be able to invest in aquaculture. The fisher associations are seen as advocates for vigilance in monitoring fishers' conduct by setting up systems of self-regulation and by training fisher-members in partnership with other stakeholders.

## 5. POLICY ANALYSES

The analyses of policy options are presented in four sections: (1) policy goal and objective; (2) policy evaluative criteria and indicators; (3) policy options; and (4) analyses of these options.

### 5.1. Policy Goal and Objective

The policy goal is for a sustainable fishing industry in Palawan Province that ensures viable fish stocks, ecosystems and livelihoods for present and future generations.

The short-term (1-4 years) policy objective is the development of a sustainable LRFF industry in the province through the reduction of threats associated with destructive fishing and overfishing.

The long-term (5-10 years) policy objective is the protection and conservation of fish resources and marine ecosystems in Palawan through development of sustainable capture fishing and mariculture; marine ecosystem conservation and rehabilitation; and viable livelihoods and community and economic development for coastal communities.

### 5.2. Policy Evaluative Criteria and Indicators

In order to evaluate the various policy options for achieving the short-term policy objective, three criteria are used: ecological, institutional and economic. The specific indicators and measures for each of these three evaluative criteria are described below.

**Ecological**. This criterion uses the biophysical attributes of the marine ecosystem to characterize the conditions of the ecological resource. Two specific indicators are used: (1) fishing activity – which is measured by CPUE and exploitation rates / yields per recruit of fish species targeted by LRFFT; and (2) marine ecosystem condition – which is measured by percent of live coral reef cover.

**Institutional.** This criterion uses political, social, industry and government administrative attributes to characterize the acceptability and feasibility of the policy option. Four specific indicators are used, each of which could be measured as low, medium or high: (1) political acceptability – which is measured by perceived and actual level of support of LGU for the policy; (2) social acceptability – which is measured by perceived and actual level of support of the local community members, specifically fishers and their households, for the policy; (3) industry acceptability – which is measured by the perceived and actual level of support by major industry players (traders / middlepersons, boat owners / operators, exporters) for the policy; and (4) administrative feasibility – pertains to the existence of laws and policies to support the policy option and of a workable monitoring and enforcement system, and the cost of policy option.

**Economic**. This criterion pertains to the impact of the policy option on private and social benefits and costs, including income, livelihoods, investment in the industry, food security, quality of life and value of the resource. Two specific indicators are used: (1) private benefits and costs – which are measured as the benefits and costs that accrue to individuals and firms as a result of the policy option, such as income, livelihoods, food security and quality of life; (2) society value – which is measured as the diverse social and economic values of coral reefs being provided to society as a whole, and to distant as well as adjacent communities. These include marketable values (associated with products, functions and services) and nonmarketable values (associated with opportunity, cultural significance, bequest and simple existence). The goods and ecological services of coral reef ecosystems include direct use values such as food fisheries, aquarium, pharmaceutical, tourism / recreation, livelihoods, research / education, aesthetic and cultural / religious. Indirect use values include coastal protection (erosion); biotic services within and between ecosystems (maintenance of habitats, biodiversity and genetic resources; regulation of ecosystem processes and functions; biological maintenance of resilience; and export organic production); biogeochemical services (nitrogen fixation, carbon storage, waste assimilation); and global life support.

### 5.3. Policy Options

Policy options for the short-term objective of the development of a sustainable LRFF industry in Palawan Province through the reduction of threats associated with destructive fishing and overfishing are given emphasis. Any policy option must be simple, cost-effective and enforceable.

Before any consideration can be given to policy options for developing a sustainable LRFF industry in Palawan Province, five overriding issues will need to be addressed. No matter what policy option is considered and eventually agreed upon, without addressing these five issues it will be ineffective. The five issues are: (1) need for effective monitoring and enforcement mechanisms; (2) active industry support; (3) viable alternative and supplemental livelihood opportunities for the fishers: (4) a LRFF management plan; and (5) political will.

**1. Enforcement.** Dalabajan (2004) stated, "Whether there is a ban or restriction, the government and key stakeholders are faced with the same question: how do they enforce

the law given the stark and obvious failure of the whole law enforcement structure?" He further stated these: (1) the Fisheries and Aquatic Resources Management Councils (FARMCs) fail to live up to the tasks assigned to them because of no resources; (2) the police and their community counterparts lack the legal and technical skills to gather evidence, file criminal complaints and litigate; (3) some civil society groups are not keen to perform enforcement functions because of persistent corruption and lack of government support; and (4) in the rare cases when the police successfully make an arrest, the court system makes it difficult to file cases. The penalties for noncompliance with laws and regulations should be strict and commensurate with the offense committed.

Mayo-Anda et al. (2003) conducted a study in which they examined and identified weaknesses in the enforcement system for illegal fishing, and developed cost-effective strategies for improving weaknesses and overcoming bottlenecks. They concluded that "… it is apparent that the net enforcement disincentive is negative (i.e. the illegal fisher gains a large net benefit from destructive fishing practices)." They further stated that "… a fisher in Calamianes would naturally use either cyanide or dynamite in his or her fishing activity for the simple reason that the net value of the deterrent to commit the crime is negative." Enforcement agencies, who are the critical players in the enforcement system, are beleaguered by institutional problems, such as lack of interagency coordination, deficient technical capacity, inadequate incentives, lack of political will by key officials and lack of resources.

Recommended steps to be taken to improve enforcement include:

1. Put in place a detection mechanism such that cyanide fishing will be detected outright and arrests could be made where and when they are committed.
2. Mobilize citizens' groups (Barangay / Municipal FARMCs and the barangay police component) in monitoring and enforcement, because formal law enforcement institutions alone cannot do the enormous task by themselves, and equip them properly.
3. Address corruption and collusion, which breed cynicism and reluctance among government and civil society members.
4. Increase the technical and logistical capacity of law enforcement institutions.
5. Law enforcement agencies should coordinate the jurisdictional responsibilities of their respective units among themselves.
6. The LGU should consider providing monetary and nonmonetary incentives to enforcement personnel who successfully conduct arrest.
7. Enhance capacity-building of prosecutors and judges, particularly in the area of fishery law enforcement and CRM.
8. Install an administrative adjudication mechanism in lieu of criminal courts, which will hear cases on cyanide fishing and other destructive fishing practices. The opportunities provided by the Local Government Code and the Fisheries Code of 1998 would enable LGUs to pursue this track.
9. Establish an on-site CDT laboratory in the Calamianes Islands in the municipality of Coron. (It should be noted that a resolution requesting for the establishment of a CDT laboratory in each municipality of Palawan province has been made by the Association of Barangay Captains of Palawan.)

An enormous investment from national government agencies and LGUs and political will are required to undertake these steps.

**2. Active industry support.** Any top-down, nonparticipatory approach to management of LRFFT in Palawan will not work. The major players in the trade must be involved in any decisionmaking. There are five exporters and buying stations in Coron. There are either local offices of exporters based in Manila or brokers for Manila-based exporters. These five companies are central and critical to the trade. Without their active support for any policy option, it will most likely be difficult to implement and succeed. The representatives of these companies need to be active partners in any strategy for management of LRFFT. If supportive and active, they can exert pressure and incentive for change on both supply (fishers, boat owners / operators) and demand (importers). The industry can also provide support through monetary contributions for both research and management activities. As demand for LRFF is likely to increase in the future, information and education on a sustainable industry for these companies is important. They should also be engaged in the development of industry standards for best practices for assessment and management of fish stocks, capture and culture methods, transportation and holding, and human health and safety issues. Ecolabeling, for example, could address the issue of cyanide fishing, as well as add value to the product by addressing consumer safety concerns.

**3. Livelihoods.** There are reportedly at least 1,000 fishers scattered over the Calamianes Islands engaged in LRFFT (estimate for 2002 from Padilla et al. 2003). There are few alternative or supplemental livelihood opportunities available for fishers or household members. There are large numbers of migrant or seasonal fishers in the area. Most fishers are dependent on financiers for credit. The fishers are marginalized from decisionmaking and most lack access to basic social services. Suggestions to ban the trade or to regulate the fishery, which will impact upon the income of the fishers, will not be effective without viable alternative livelihoods. These may include training in other nondestructive fishing methods, post-harvest handling of fish, mariculture, microcredit schemes, tourism, establishment of a fisher cooperative and improved educational opportunities for children. Continuous information and education on a sustainable industry for the fishers is crucial.

**4. Management plan.** The attempts to manage LRFFT in Palawan Province have been done on an ad hoc basis. While there have been a number of well-intentioned laws and policies, the attempts at management have been plagued by lack of coordination among government agencies and LGUs. There is a need for a strategic management plan for the trade for the province in which all stakeholders have agreed on a goal, objectives and courses of actions. It is understood that the said management plan will be part and parcel of overall fisheries and CRM plans to be developed at the municipal level. In the case of the Calamianes, a regional sustainable fisheries management plan that coalesces all four Calamianes LGUs into a common fisheries management framework has been proposed in earlier consultations.

**5. Political will.** If any change is going to occur in LRFFT in Palawan, there will need to be strong political will. This will be shown by national, provincial, municipal and barangay leaders supporting the selected policies with resources and action.

While all LRFF species in the trade are considered for management under the policy options, of primary importance are the: (1) leopard coral grouper, (2) orange-spotted grouper, (3) Napoleon / humphead wrasse and (4) brown-marbled grouper.

### 5.3.1. Policy options to address the short-term objective

Four policy options to address the short-term objective are presented: (1) status quo, (2) banning, (3) regulation -1 and (4) regulation - 2.

**Option 1. Maintain the status quo**

Under this option, the current arrangements will be maintained. The arrangements are characterized by separate policies by mandated agencies; no harmonization between PCSD policies and LGUs; weak law enforcement; weak political will; limited or no institutional coordination due to conflicting jurisdictional issues, ambiguous working relationships and lack of institutional accountability; difficulty with accreditation and compliance; and lack of strategic management plan.

**Option 2. Provincewide ban on LRFFT**

Under this option, the industry will be banned provincewide to take a precautionary stance to the degradation of the marine ecosystems, specifically coral reefs, and the overfishing of fish stocks, specifically coral trout (*Plectropomus leopardus*).

**Option 3. Regulated LRFFT - 1**

Under this option, there will be two levels of action. Under level 1, the following immediate actions will be taken:

1. All compressed air gear for fishing will be banned.
2. All nonresident fishers will be banned from municipal waters.
3. Spawning aggregations for target species of the trade will be closed.
4. Individual target fish species of the trade with a size between 28 cm and 33 cm total length (size range at sexual maturation or first reproduction) will be banned from being caught and traded.

Under level 2, the following intermediate actions, in addition to level 1 actions, will be taken:

1. The ban on the use of cyanide will be enforced through testing at a CDT laboratory.
2. A monitoring team and network will be established.
3. For every fish exported out of the municipality, a levy will be charged. This amount will be used by LGU to fund enforcement, monitoring and administrative costs associated with the industry.

Implementation of level 1 actions requires several activities. First, all compressors and associated equipment and SCUBA used for fishing will be banned from use in the waters of Palawan Province. Those current owners of compressors will be compensated by the

government based upon an agreed standard value for the equipment. Second, fishers will be retrained in the use of nondestructive fishing methods, such as hook-and-line, and in the proper handling of fish at capture and during post-harvest. Outreach efforts will be undertaken to induce fishers to switch to nondestructive fishing methods. Third, only licensed fishers who can show full-time residency in a municipality of Palawan Province will be allowed to fish in the municipal waters (within 15 km from shore). Each vessel must display a license number on the boat and each fisher on the boat must have proper license identification. Fourth, there will be an annual closure of a determined period on fish aggregations for selected target species of the trade during spawning. Marine protected areas (MPAs) will be established at these sites. MPAs can serve to protect and enhance fish stocks, improve ecosystem integrity and functions, and support ecosystem rehabilitation. In some cases, permanent closures of areas may be necessary to protect fish stocks and protect them from depletion. Fifth, enforcement will be improved and increased as recommended above.

Implementation of level 2 actions includes several activities. One, a CDT laboratory will be established in Coron. All exporters from the area will be required to submit to random sampling and testing, inspection, and government licensing. All shipments will require a certificate showing the origin, volume and species composition of the shipment, and certifying that the shipment has been subject to random CDT procedures and is cyanide-free. A tax will be levied on each shipment to pay for testing and monitoring. Two, all players in LRFF industry – fishers, traders / middlepersons, boat owners / operators and exporters – will be required to be accredited by PCSD (as required under PCSD AO Order No. 00-05). All accredited entities will be required to submit monthly records of fish catch by species, volume and location, and fish mortality, to a monitoring team. The monitoring team shall be composed of representatives from BFAR-DA, PNP, PCSD and each municipality. The accredited players will be subject to random checks on catch and records by enforcement staff of the monitoring team. Three, export and transport of fish and fisheries products in the Philippines require permits from BFAR. License conditions require that exporters maintain and submit records on the number and species of fish exported.

**Option 4. Regulated LRFFT – 2**

Under this option, the same conditions as described in option 3 shall exist. However, in addition, LRFFT shall be banned in those municipalities with aggregate live coral cover of equal to or greater than 50% poor condition. Hence, the industry shall be banned in the municipalities of Coron, Cuyo, El Nido and Taytay.

Furthermore, to ensure the implementation of a workable monitoring system, municipalities where the industry will be allowed shall submit to PCSD the following requirements specifically ensuring that cyanide will not be used in the industry:

1. declaration from the municipal government of a policy to combat the use of cyanide in the live fish industry either by resolutions or local ordinances which shall include implementing guidelines addressing the problem of sodium cyanide use in the industry;
2. establishment of an operational regulation and monitoring system that addresses the use of sodium cyanide in the live fish industry;

3. allocation of resources, involving human resources and budget, to the above-mentioned initiatives in the annual plan and budgetary appropriation of the municipality; and
4. active involvement of the Barangay / Municipal Fishery and Aquatic Resources Management Board or equivalent body, NGO and people's organization – as endeavored by the municipality – in the implementation of a regulatory and monitoring system that addresses the problem of sodium cyanide use in the live fish industry.

In addition, the size of fish caught shall also be used to regulate the industry. Stocks with sizes between 28 cm and 32 cm total length should not be caught and traded in the industry.

### 5.3.2. Policy options to address the long-term objective

**1. Stimulation of sustainable live reef fish mariculture**

Grouper growout is currently both technologically and economically feasible for immediate transfer to small producers in the Philippines. Although some technical and marketing problems (such as ensuring availability of seed) remain, the development of grouper culture looks promising. The capital requirements for the broodstock and hatchery / nursery stage of grouper culture may be beyond the financial means of many small producers. These stages of grouper culture may need to be developed as a larger project by private investors or government or be subsidized by government. Grouper culture is an option that can be used to manage and protect grouper populations in the wild, and at the same time provide an alternative source of livelihoods for fishers now engaged in wild capture of grouper. The development of small-scale grouper culture could significantly reduce the market's dependence upon wild stocks. However, for the industry to grow, economic incentives will need to be put into place. Coastal pollution from aquaculture operations, as well as the use of wild-caught trash fish for feed, raise concerns about sustainability.

**2. Ecolabeling**

Ecolabeling of live fish and certification of LRFFT will address consumer concerns and allow for premium prices to be obtained for fish. A certification program to be set up by the Marine Aquarium Council will be undertaken for the aquarium industry (Schrope 2000) and the same can be instituted for LRFFT.

**3. Community and economic development**

The issue of livelihoods for residents in the area will require an innovative and long-term strategy. A feasible solution may be one based on a coordinated and integrated approach involving a strategy of resource management and economic and community development. This approach finds solutions to the problem of overfishing, destructive fishing and excess capacity in both fishery and nonfishery economic sectors. Resource management must be innovative and must utilize new measures, such as property rights to control access, and ecosystem-based measures, such as MPAs. This approach recognizes that solutions involve targeting not just the individual fisher but the whole household and its broader economic livelihood strategies. To be effective, solutions must address the underlying issues of household food security, employment, income and livelihood. Solutions involve

stronger linkages between coastal fishing communities and regional and national economies, and recognize that solutions are found both inside and outside the fishing community. This strategy needs to address multiple challenges of coastal communities including employment, income generation, food security, better quality of life, social development, and delivery of community services and infrastructure. We must go beyond the commonly used solution of giving fishers "pigs and chickens" as a supplemental livelihood to more innovative approaches involving micro-enterprise development, skills development and training, and the use of information technology. The active participation of people in this approach, through a strategy of co-management, is mandatory in planning, formulating, and implementing development and management activities. Resource management must also be innovative and utilize new tools such as access control and property rights.

### 5.4. Analyses of Policy Options

Each of the four policy options will be analyzed based on the three evaluative criteria – ecological, institutional and economic – discussed in section 5.2 above, and the specific indicators and measures for each of these three evaluative criteria (Tables 2 - 5). The guiding principle behind the policy option analyses is the achievement of the short-term (1-4 years) policy objective – the development of a sustainable LRFF industry in Palawan Province through the reduction of threats associated with destructive fishing and overfishing. Supporting information for this policy option analyses is available in Annexes 4-12.

Table 2. Policy matrix no. 1 - Option 1: Maintain status quo.

| | Ecological | | Institutional | | | | Economic | |
|---|---|---|---|---|---|---|---|---|
| **Indicator** | Fishing activity | Marine ecosystem condition | Political acceptability | Social acceptability | Industry acceptability | Administrative feasibility | Private benefits and costs | Social value |
| **Measure(s)** | CPUE; exploitation rates | % live coral cover | Low, medium, high (L, M, H) | L, M, H | L, M, H | Law / policy existence; enforcement / monitoring; cost-effectiveness | Individual and firm – income, livelihood, food security, quality of life | Society – direct and indirect values of coral reef resources |
| **Fact Sheet** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Policy option 1: Maintain status quo | - declining catch<br>- declining CPUE<br>- several target species overfished<br>- growth overfishing<br>- recruitment overfishing | - increasing coral reef degradation<br>- declining quality of coral reef condition | M | M | H | - existing law / policy at national and local levels<br>- weak enforcement and monitoring<br>- no strategic plan<br>- unharmonized policies, rules, regulations<br>- weak coordination among government agencies and LGUs<br>- low cost<br>- weak political will<br>- difficult accreditation<br>- low compliance<br>- lack of accountability | - inequitable distribution of income<br>- declining incomes for many<br>- increasing incomes for few<br>- threat to food security<br>- increase in conflicts<br>- decline in quality of life<br>- decrease in livelihood opportunities<br>- invest-ments maintained | - loss of biotic services<br>- loss of food security<br>- reduction or loss of economic development and livelihood opportunities (i.e., tourism / recreation)<br>- loss of coastal protection<br>- loss of biogeo-chemical services<br>- loss of global life support<br>- net social welfare losses in long run |

Table 3. Policy matrix no. 2 - Option 2: Provincewide ban on LRFFT.

| | Ecological | | Institutional | | | | Economic | |
|---|---|---|---|---|---|---|---|---|
| **Indicator** | Fishing activity | Marine ecosystem condition | Political acceptability | Social acceptability | Industry acceptability | Administrative feasibility | Private benefits and costs | Social value |
| **Measure(s)** | CPUE; exploitation rates | % live coral cover | Low, medium, high (L, M, H) | L, M, H | L, M, H | Law / policy existence; enforcement / monitoring; cost-effectiveness | Individual and firm – income, livelihood, food security, quality of life | Society – direct and indirect values of marine resources |
| **Fact Sheet** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Policy option 2. Province-wide ban on LRFFT | - ban live food fish catch<br>- target a wider range of species<br>- increase fishing effort on all species<br>- increase in overfishing<br>- possible increase in destructive fishing<br>- encourages illegal trade in LRFF | - indeter-minate impact on coral reef condition<br>- indeter-minate impact on cyanide use | L | L | L | - new law / policy required<br>- increased level of monitoring and enforcement at LGU<br>- increased costs for enforcement and monitoring<br>- lower administration costs<br>- no CDT<br>- loss of government revenue<br>- strong accountability | - inequitable distribution of income<br>- reduction in income in short run<br>- loss of investment<br>- loss of livelihood in short run<br>- threat to food security<br>- increase in conflicts<br>- decline in quality of life<br>- encourages investment in other fisheries and mariculture<br>- reduction in export earnings | - indeterminate change in biotic services, coastal protection, biogeochemical services and global life support<br>- loss of food security<br>- indeterminate impact on economic development and livelihood opportunities (i.e., tourism)<br>- net social welfare losses in long run |

Table 4. Policy matrix no. 3 – Option 3: Regulated LRFFT – 1.

| | Ecological | | Institutional | | | | Economic | |
|---|---|---|---|---|---|---|---|---|
| **Indicator** | Fishing activity | Marine ecosystem condition | Political acceptability | Social acceptability | Industry acceptability | Administrative feasibility | Private benefits and costs | Social value |
| **Measure(s)** | CPUE; exploitation rates | % live coral cover | Low, medium, high (L, M, H) | L, M, H | L, M, H | Law / policy existence; enforcement / monitoring; cost-effectiveness | Individual and firm – income, livelihood, food security, quality of life | Society – direct and indirect values of marine resources |
| **Fact Sheet** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Policy option 3: Regulated LRFFT - 1 | - medium to long-term increased catch of specific target species<br>- medium to long-term overall fish stock recovery<br>- reduction in recruitment and growth overfishing<br>- possible encourage-ment of illegal trade in live fish | - long-term improve-ment in coral reef condition | M | M | M | - new law / policy required by province and municipality<br>- increased costs for enforcement and monitoring<br>- increase in administrative costs<br>- requirement of more budget and resources<br>- high dependence on active involvement and capability of LGU<br>- high dependence on active involvement of industry, nongovernment and people's organizations<br>- development of partnerships among stakeholders<br>- development of a provincewide strategic management plan<br>- improved coordination and harmonization of policies and functions<br>- strong accountability | - improve-ment in distribution of income<br>- medium to long-term improve-ment in income and quality of life<br>- expansion of livelihood opportunity<br>- improve-ment in export earnings<br>- improved food security<br>- short-run loss of investment<br>- increased conflict in short run | - improve-ment in biotic services<br>- improved food security<br>- medium to long-run improvement in economic development and livelihood opportunities (i.e., tourism)<br>- improved coastal protection<br>- improved biogeo-chemical services<br>- improved global life support<br>- long-term net social welfare gains |

Table 5. Policy matrix no. 4 – Option 4: Regulated LRFFT – 2.

| | Ecological | | Institutional | | | | Economic | |
|---|---|---|---|---|---|---|---|---|
| **Indicator** | Fishing activity | Marine ecosystem condition | Political acceptability | Social acceptability | Industry acceptability | Administrative feasibility | Private benefits and costs | Social value |
| **Measure** | CPUE; exploitation rates | % live coral cover | Low, medium, high (L, M, H) | L, M, H | L, M, H | Law / policy existence; enforcement / monitoring; cost-effectiveness | Individual and firm – income, livelihood, food security, quality of life | Society – direct and indirect values of marine resources |
| **Fact Sheet** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Policy option 4: Regulated LRFFT - 2 | If live food fish catch is not allowed in municipalities with 50% or more poor live coral cover:<br>- increase fishing effort<br>- target a wider range of species<br>- increase in growth overfishing<br>- possible reduction in recruitment overfishing due to size restriction<br><br>If cyanide use is controlled:<br>- medium to long-term increased catch of specific target | - indeterminate impact on coral reef condition<br>- indeterminate impact on cyanide use<br><br>If cyanide use is controlled:<br>- long-term improvement in coral reef condition | M | M | L | - new law / policy required by municipality<br>- increased cost for coral reef monitoring<br>- increased costs for enforcement and monitoring<br>- increased administrative costs<br>- high dependence on active involvement and capability of LGU<br>- high dependence on active involvement of nongovernment and people's organizations<br>- differential requirements and impacts on LGUs with and without live fish trade<br>- development of annual plans by LGUs<br>- submission and approval of plans to PCSD and Provincial Board<br>- strong accountability | If LRFFT not allowed:<br>- reduction in income<br>- loss of investment<br>- loss of livelihood in short run<br>- threat of food security<br>- increase in conflicts<br>- decline in quality of life<br>- investment in other fisheries and mariculture<br><br>If cyanide use is controlled:<br>- more equitable distribution of income<br>- medium to long-term improvement in income and quality of life<br>- expansion of livelihood | If LRFFT not allowed:<br>- indeterminate change in biotic services, coastal protection, biogeochemical services and global life support<br>- loss of food security<br>- indeterminate impact in economic development and livelihood opportunities (i.e., tourism)<br>- net social welfare losses in long run<br><br>If cyanide use is controlled:<br>- improvement in biotic |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | species<br>- medium to long-term stock recovery<br>- reduction in over-fishing<br>- possible encourage-ment of illegal trade in live fish | | | | | | opportunity | services<br>- improved food security<br>- medium to long-run improvement in economic development and livelihood opportunities (i.e., tourism)<br>- improve-ment in coastal protection, biogeo-chemical services and global life support<br>- long-term net social welfare gains |

## 6. RESULTS

The four policy options and associated analyses were presented to stakeholders concerned about LRFFT in the Calamianes Islands and Palawan at two separate policy fora in March 2005. The first was a Policy Conference on 8 March and the second was a meeting with Palawan Provincial Officials on 9 March. The results of these two fora are presented below.

### 6.1. Results of the Policy Conference

The analyses of possible policy options were undertaken through a multistakeholder Policy Conference (Annex 3) held on 8 March at the Palawan Sustainable Development Training Institute, Irawan, Puerto Princesa City. There were more than 60 delegates from the academe, fishers' organizations, industry, LGUs, NGAs and NGOs.

The morning sessions at the conference focused on providing an overview of LRFFT internationally, nationally and in Palawan. The four policy options were also presented. In the afternoon, the participants were broken into three groups to discuss the policy options. Three workshop groups were formed, based on the three evaluative criteria: (1) ecological, (2) institutional and (3) economic. Each of the four policy options was analyzed based on these evaluative criteria and the specific indicators and measures for each. The ecological group looked at the biophysical attributes of the marine ecosystem to characterize the conditions of the ecological resource. The institutional group examined the political, social, industry and government administrative attributes. The economic group studied the impact of the policy options on private and social costs and benefits, including income, livelihoods, investment in the industry, food security, quality of life and value of the resource.

Each workshop group was composed of the following: (1) facilitator, (2) cofacilitator, (3) documentor, (4) reporter and (5) participating members. The facilitator led the group discussion and encouraged the participants to share their ideas; the co-facilitator assisted the facilitator by steering the discussion back to the issues at hand when the discussion digressed; and the documentor wrote the output of the group and prepared the PowerPoint presentation of workshop output. The key workshop materials were the: (1) policy matrix (refer to Tables 2 - 5) and (2) fact sheet (see Annexes 4 - 12).

The workshop mechanics proceeded as follows. Each group evaluated the policy options based on the criteria (indicators and measures) given in the policy matrix. The fact sheet was used as a reference point. As appropriate, other information available from group members was also utilized. Following discussions, the members revised and/or modified the matrix, as they deemed appropriate. Then, they arrived at a group consensus. The reporter presented the group's output during the plenary session. There was an open forum after the presentation of the outputs. There were clarifications and deliberations during the open forum. The consensus of all participants was arrived at during the summary session.

The analyses of the four policy options are summarized in Tables 1 - 3 in Annex 13. The following paragraphs describe the evaluation of different policy options using the various criteria. These tabular outputs were synthesized by the authors based on the results of the workshops and the plenary presentations.

The ecological criterion is aimed at reducing the threats to viable fish stocks and coral reef ecosystem associated with destructive fishing methods and overfishing. The first indicator, fishing activity, is measured by CPUE and/or exploitation rates (see Table 1 of Annex 13). The fishery of live fish is seen to decline over the long term under option 1 (status quo), which is predicted to eventually result in recruitment and growth overfishing. Option 2 (ban of the industry provincewide) will result in increase in exploitation rate and CPUE of fresh fish species traded in the market. This is because the fishers will try to compensate for the loss in profit with possible concurrent increase in destructive fishing activities. Furthermore, this may encourage the rise of illegal live fish market. Both options 3 (regulated-provincewide) and 4 (regulated-with exception) are expected to stabilize the live reef fish catch for those areas where the industry is to be regulated. In addition, recruitment and growth overfishing is expected to decline. However, areas under option 4 where the industry is to be banned will have the same predicted outcome as that of option 2. The combination of ban and regulated industry may encourage illegal fish trade especially among those municipalities with a banned industry.

The second indicator is marine ecosystem condition, which is measured by live coral cover (see Table 1 of Annex 13). The impact on the reef ecosystem is expected to be different for each policy option. Policy option 1 is foreseen to continue degradation of coral reef. Both options 2 and 4 are predicted to have an indeterminate impact in reducing the use of cyanide on reef because it is dependent on the capacity of institutions to enforce the law, and the effectiveness of the monitoring and surveillance mechanisms. Option 3, however, is expected to result in the improvement of coral reef condition over the long term. Overall, both options 1 and 2 are not expected to reduce threats to viable fish stocks. Options 3 and 4 will reduce threats to viable fish stocks and coral reef ecosystem on areas where regulation is to be instituted.

The institutional criterion has four indicators (refer to Table 2 of Annex 13). It requires the active support of various stakeholders and the presence of mechanisms to ensure the success of implementation. The support from the key groups to be impacted by any of the policy options is predicted to vary. Option 1 has a medium support from LGU and community. Meanwhile, it has high support from the industry. Option 1 recognizes the socioeconomic benefits that are derived by the industry players. This option is seen as not optimal in sustaining the benefits in the long run as fishery resources start to decline. Option 2 has low support from municipal LGUs, community and industry. This has a contrasting impact on socioeconomic gains and poses indeterminate results. Option 3 has high LGU and industry support. This support is manifested in the expressed will of local leaders to implement changes and the ready acceptance of the industry and fishers' organizations in banning the use of compressors for fishing. In the long run, this option is viewed to assure that there will be continuous supply and harvest of live fish on a sustainable manner. Option 4 has low acceptability and support from all stakeholders because of its impact on income and revenue on the municipalities where live fish trading is concentrated. There will also be difficulty in implementation of the policy in affected towns.

The legal bases to ensure the success of the policy tended to be present but disparate in option 1. This is reflected in the weak administrative mechanisms to enforce the existing

policies. Stronger administrative mechanisms for the success of option 2 need to be put in place, requiring bigger budget, human resources and logistics. The low support from the municipal government units for this option will make it hard to implement this policy. Option 3 will require improvement in the existing administrative mechanisms, which expectedly will entail a lot of political will and resources. However, such initiative and resources can be distributed among key stakeholders, thereby reducing reliance from the government. Option 4 will have a mixed requirement and outcome: the same as option 3 for those areas to be under a regulated management regime, and the same as option 2 for those municipalities where the live fish industry will be banned. In summary, option 3 has a better chance for success in implementing the necessary administrative mechanisms given the strong support from all key stakeholders.

The economic criterion pertains to the impact on private costs and benefits. Its objective is to gain maximum profits coupled with equity considerations. The live fish industry has an estimated value of PhP987,309,000 in 2004, up by 67.7% in 2003. Profits gained by all key players in 2004 were estimated at PhP696,121,408.13. In terms of equity, the fishers gained the most with a total share of PhP587,862,976.28 (84.4%). The traders gained a total of PhP106,431,910 (15.29%). Minimal revenue was collected by the municipal government units, valued at PhP1,826,521.65.

On a per kilo basis of profit, the individual fishers collect PhP1,072; the traders, PhP194; and the municipal government units, a measly PhP3.33. Overall, the individual traders gain much of the profit due to the volume of catch sold to them.

The reported production of 548,505 kg in 2004 was still way below the computed potential production of LRRFT for Palawan (except the Kalayaan Island Group) of 4,900,000 t. This means that the industry still has the potential to expand. However, the expansion and even the operation of the industry should be done with caution and should consider the situation of the specific locality. In some municipalities, the exploitation may have already exceeded the potential production. Hence, the industry may need to be banned – either temporarily or permanently – in certain areas to allow the stocks to replenish. A case in point is the Coron / Busuanga area. The area has an estimated production of 58.5-117 t. However, based on the actual reported shipment of LRFF for the area of 279.94 t, the production is way beyond the estimated biological limit. This gives an indication of overfishing in the area, and the exploitation of other areas outside of these municipalities. These municipalities only serve as transshipment points.

The industry value and profits will define the gains and losses associated with each policy option. Options 1 and 3 have the same value of PhP696,121,408.13 in 2004. However, with option 1, the value is expected to decline in the medium to long term because of unsustainable practices that characterize the industry under this option. Option 2 is expected to result in the decrease in value and profits to be realized coming from fresh fish industry by at least one-third of its present live fish value. Under option 3, the industry is expected to expand and therefore the value and profits to be derived from the industry is also expected to increase.

In the case of option 4, those municipalities where the industry will be regulated will have the same estimated value and profit as in option 3. Meanwhile, those municipalities where

the industry will be banned have the same features as in option 2. The analysis for the economic criteria in terms of gross value and profit derived from the industry points to option 3 as the best option to realize the maximum value and profit for the industry.

The consensus of the participants was to maintain LRFF industry in Palawan. However, they wanted a sustainable industry. There was both an expressed political will and an industry will for change. In view of the above analysis, it was agreed that the status quo (option 1) will not sustain the industry. Banning was also not considered to be an optimum solution. Hence, provincewide ban (option 2) and selective ban (option 4) were ruled out. Consequently, the regulated industry (option 3) was preferred by the majority of the participants. Refer to Annex 13.

Several specific measures were associated with the regulated industry. First is the total ban on the use of compressed air (all types) for the live fish industry. Second, there must be greater enforcement of anti-cyanide laws. Third, there should be licensing of municipal fishers to restrict entry. Fourth, size limits of target species must be instituted. Fifth, there is a need to establish more MPAs, particularly to protect spawning aggregation. Sixth, there needs to be more systematic monitoring and evaluation of LRFFT. Last, there is a need to strengthen enforcement.

The need for collaborative management of LRFFT was also emphasized. Both the government and industry must take active roles in management. The industry must establish standards for best practices for fishing and marketing. Over the long-term, two solutions are proposed towards developing a provincial and national innovation system for LRFF industry to compete and survive in the global market while assisting local coastal communities. First, aquaculture or mariculture needs to be developed to reduce the harvesting of wild stocks. Second, there must be alternative livelihood development for fishers and their families. Such livelihood schemes, however, must go beyond the "dole-out of pigs and chickens". There should be broad programs to include microenterprises, credit and economic development of coastal communities.

Three areas for action or applied research were forwarded. First, research should be undertaken to identify size limits of targeted fish species so as to reduce the harvest of sexually immature or subadult fish. An optimum target size range must be established. Second is the need for more scientific investigations concerning the status of coral reefs in Palawan. At present, the geographical limits of the province's coral reefs are not fully defined yet. Third is the need for a more comprehensive stock assessment of targeted species, particularly red coral grouper. The sustainable yields of the target species must be duly established.

There was also a concluding agreement to consolidate the draft report, key informant surveys and workshop results into final recommendations. These will then be discussed during the final workshop on 12 May 2005.

The results of the Policy Conference were consistent with the results of key informant interviews. In the conference, the participants reached a consensus that a regulated industry is the most reasonable option to sustain the live fish industry in Palawan.

Similarly, the majority of the key informants interviewed felt that it is better to have a regulated industry rather than banning it, either partially or provincewide.

### 6.2. Results of the Meeting with Provincial Officials

The results of both the Policy Conference and the key informant interviews were presented in a special session to the Vice-Governor and several Provincial Board Members on 9 March 2005. Key staff of PCSD, who were involved in activities pertaining to LRFFT, also participated in the discussion. There were deliberations on the results of the policy analyses and Policy Conference, but no consensus was reached. Two additional policy options were developed as a result of this meeting, in addition to the original four. These are briefly described below.

**Option 5: Regulated live reef food fish trade – 3**

Under this option, the industry players in LRFFT in Palawan Province shall be given 90 days from an established date to be accredited by PCSD and to organize themselves so as to be represented in management decisionmaking processes. Following this 90-day period, if the industry players will have met these requirements, a regulated industry, similar to option 3, will be implemented. If after the 90-day period, the industry players will not have met the requirements, a moratorium banning the trade will be put into place.

**Option 6: Regulated live reef food fish trade – 4**

Under this option, LRFFT in Palawan Province shall be banned, through a moratorium, for 1 year from an established date. During this period, the industry players (fishers/catchers, traders, cagers, carriers) shall be required to be accredited by PCSD. The industry players shall also organize themselves so as to be represented in management decisionmaking processes. Following this 1-year moratorium, if the industry players will have met these requirements, the moratorium will be lifted and a regulated industry, similar to option 3, will be implemented. If the industry players will not have met the requirements, the moratorium will be continued.

### 6.3. Results of the Meeting with PCSD

The final presentation of this policy brief on 27 May 2005 to PCSD resulted in several observations that helped refine the recommendations. These are the need to: (1) determine the source of sodium cyanide and finally contain it; (2) engage more fully LRFF industry players in the adoption of best practices that they themselves promote and enforce to foster stronger responsibility and accountability and improve their own image and record; and (3) implement fishers' registration and ultimately licensing so that nonresident fishers cannot operate freely in Palawan coastal waters. It is thus intended that these three needs will be addressed in the pending Provincial Ordinance on LRFFT, as well as in the immediate thrusts of PCSD in linking with coastal projects operating in Palawan.

## 7. DISCUSSIONS AND RECOMMENDATIONS

A number of options have been presented to address the short-term (1-4 year) policy objective of the development of a sustainable LRFF industry through the reduction of threats associated with destructive fishing and overfishing. Four policy options were developed in this analysis and two more were developed as a result of meetings held in Palawan in early March 2005. The results of the Policy Conference were consistent with the results of key informant interviews. In the Policy Conference, the participants reached a consensus that a regulated industry is the most reasonable option to sustain the live fish industry in Palawan. Similarly, the majority of the key informants interviewed felt that it is better to have a regulated industry rather than banning it, either partially or provincewide. In contrast, provincial officials, while reaching no consensus, focused on the options of requiring the industry to be accredited and organized, and on the use of moratorium to ban the trade.

Any policy option will need to balance ecological, institutional and economic considerations. Moreover, any policy option, to be effective, must be simple, cost-effective and enforceable. The consensus of those that participated in the policy fora is that a regulated industry supporting a sustainable LRFFT is a more viable option than banning the trade. On one hand, Banning the trade will lead to social and economic disruption for the fishers involved in the trade, increased illegal fishing activity and indeterminate impacts on coral reef condition and fish resources. Banning the trade will require high levels of enforcement, which do not currently exist, and more costs for government. A regulated trade, on the other hand, in which industry players are actively involved, will be more cost-effective and lead to long-term improvement in coral reef and fishery resources.

### 7.1. Management Actions

Among the key activities to be considered is to develop a management plan specific to LRFFT in close collaboration with the industry stakeholders. While there have been a number of well-intentioned laws and policies, the attempts at management have been plagued by lack of coordination among government agencies and LGUs. The strategic management plan for the trade should include relevant stakeholders who have reached consensus on goals, objectives and courses of actions. In addition, there is a need for active participation of local communities and stakeholders for effective monitoring and enforcement of any policy option. If any change is going to occur in LRFFT in Palawan, there will need to be strong motivation and commitment of municipal governments and barangay leaders. This will be shown by supporting the selected policies with resources and action. The rationale of providing monetary incentives for law enforcers must be also thoroughly considered. The current perception in the Calamianes is that law enforcement personnel are ineffective because they are prone to accept bribes from violators.

Key management measures to be instituted include banning the use of compressed air for fishing and closed fishing seasons during spawning times and at aggregation sites. MPAs may be established at grouper spawning aggregation areas. Dr. Jose Ingles of WWF and Mr. Sam Mamauag of UP-MSI have recommended that there will be one MPA to be

established in Puerto Princesa City, three in Taytay and three in Calamianes (per pers. comm., April 2005). There should be active local participation in the establishment and operation of MPAs following tested methods (White et al. 2005). Results of initial consultations with the four LGUs in the Calamianes by the FISH Project in 2004 resulted in the identification of a total of 29 proposed MPAs that can comprise the Calamianes network of MPAs. There is also a need for ecosystem rehabilitation in areas with degraded coral reefs.

### 7.2. Research / Studies

It is recommended that strategic studies be undertaken to provide further information concerning LRFF industry in Palawan. These could include:

Socioeconomic aspects:

- relationship between market size demand and biological characteristics of the individual target species (e.g., demand for sizes of species which are sexually immature or subadults); and
- economic analysis of the cost and benefits of illegal or destructive fishing activities.

Biophysical aspects:

- aggregation areas and spawning times of the individual target species in the trade;
- sizes of individual target species for harvest restrictions;
- overall stock assessment of target species, including population density and distribution;
- use of other analytical tools for assessment of reef areas (e.g., deterioration index); and
- practical studies on broodstock development as part of an overall mariculture industry development program for the Calamianes, the fundamental consideration of which is the supplemental growout of broodstock for releasing into well-managed MPAs in due time.

This policy brief is currently used as a reference in drafting the Palawan Live Reef Fish Ordinance of 2005 concerning the sustainable fishing regulation of live reef fish species. The said ordinance is now being deliberated / reviewed by the Provincial Board's Committee on Agriculture and Fisheries. The policy options contained herein may also be useful in crafting a national policy for LRFFT, given that there are other coastal provinces that have active LRFF fisheries and have not formulated policies for management. The results of the Palawan case study shall also be useful in revising the 1998 Fisheries Code, particularly Section 61, on live fish issues.

The immediate next step is to put the selected policy in place and to make each local government unit responsible for its implementation. The policy should be reflected in the coastal resource management, integrated coastal management and/or fisheries management plan of each local government unit.

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## 9. ANNEXES

Annex 1. Laws and regulations governing live food fish and coral reef management in Palawan.

| Law/Regulation | Provision |
|---|---|
| RA 8550 (New Fisheries Code) | • ***Section 2.*** Declares it a policy to achieve food security, limit access to the resource, ensure sustainable development, protect the rights of fisherfolks, provide technical and financial support, establish integrated coastal area management in specific areas, among others.<br>• ***Sections 5-15.*** Provide some management instruments, such as exclusive use to Filipinos; imposition of fess and other charges; limited access, catch ceiling limits, closed seasons, protection of rare, threatened and endangered species; requirement of environmental impact statement and environmental compliance certificate; monitoring, control and surveillance; and transport regulation.<br>• ***Sections 16-25.*** Mandate LGUs to enforce all fishery laws, rules and regulations; enact appropriate municipal fishery ordinances which will prohibit destructive fishing gear and its variations (such as possession and use of cyanide); establish license fees of fishery activities; and coordinate with national agencies in the conservation and protection of fisheries and aquatic resources, such as the establishment of CDT laboratories.<br>• ***Section 61.*** Allows the export of live fish only if they are hatched or propagated in accredited hatcheries and ponds under a framework of close regulation during times when such exportation affects domestic food security and production.<br>• ***Sections 86- 106.*** Define and provide for the penalties of acts detrimental to the fishery resource. |
| Ministry of Natural Resources AO No. 12 (1979) | Regulates the utilization of marine turtles, eggs and by-products. |
| Batas Pambansa 265 (1982) | Prohibits the extraction of gravel and sand from beaches. |
| RA 7160 (New Local Government Code) | • ***Section 17***. Directs LGUs to discharge functions necessary for the provision of basic services and facilities for fishery activities, among others.<br>• ***Section 18.*** Gives LGUs the power to generate and create their own sources of revenue and to have equitable share in the proceeds from the utilization of national wealth and resources.<br>• ***Section 26.*** Provides for the duty of national government agencies to maintain ecological balance in any project or program.<br>• ***Section 149.*** Gives municipalities the exclusive authority to grant fishery privileges and impose rentals, fees or charges.<br>• ***Section 294.*** Directs LGUs to finance livelihood projects.<br>• ***Sections 389, 444, 447, 455, 458, 465 and 468.*** Give |

| Law/Regulation | Provision |
|---|---|
| | environmental powers to barangay and municipal chief executives, Sangguniang Bayan, city mayor, Sangguniang Panlungsod, provincial governor and Sangguniang Panlalawigan, respectively.<br>• ***Section 465(b[3{v}]).*** General executive power to adopt measures to safeguard and conserve land, mineral, marine, forest and other resources of the province to be exercised in coordination with the mayors of component cities and municipalities.<br>• ***Section 468(a[1{vi}])***. General power of the Sangguniang Panlalawigan to approve ordinances to protect the environment and to impose appropriate penalties for acts which endanger the environment, such as dynamite fishing and other forms of destructive fishing; illegal logging; smuggling of logs, natural resources products and endangered species of flora and fauna; slash and burn farming; and such other activities which result in pollution, acceleration of eutrophication of rivers and lakes or of ecological imbalance. |
| RA 7611 (The Strategic Environmental Plan for Palawan) | • Mandates the creation of PCSD and vests it with the power to adopt, amend and rescind such rules and regulations and impose penalties for the effective implementation of the Strategic Environmental Plan (SEP) for Palawan and other provisions of the SEP Law. Pursuant to its mandate, PCSD has passed AO No. 00-05 providing the guidelines for accreditation, regulation and monitoring of live fish catching, culture, transport, storage/warehousing and trading in Palawan.<br>• ***Section 2.*** Declares the state policies of protection, development and conservation of resources by assisting and supporting programs and projects; supporting and promoting sustainable development; adopting measures; and promoting and encouraging involvement of all sectors.<br>• ***Section 4.*** Adopts a comprehensive framework called SEP, characterized by ecological viability, social acceptability and integrated approach in section 5. The framework must be built into the formulation and implementation of programs by legal fiat (section 6).<br>• ***Section 10.*** Zones coastal/marine areas into core and multiple use zones to simplify management over such areas.<br>• ***Section 16.*** Provides the machinery for the strategy and plan. |

| Law/Regulation | Provision |
|---|---|
| RA No. 6969 (Toxic Substances Control Act of 1990) | • Regulates, restricts and prohibits the importation, manufacture, processing, sale, distribution, use and disposal of chemical substances and mixtures that present unreasonable risk and/or injury to health or the environment; and prohibits the entry, even in transit, of hazardous and nuclear wastes and their disposal into the Philippine territorial limits for whatever purpose.<br>• ***Section 5.*** Defines hazardous substances as those which present long-term environmental hazards, including chronic toxicity upon repeated exposure, carcinogenicity (which may in some cases result from acute exposure but with a long latent period), resistance to detoxification process such as biodegradation, and have the potential to pollute underground or surface waters, among others.<br>• ***Section 6.*** Mandates the DENR, as the implementing agency and as part of its functions, powers, and responsibilities:<br>- to require chemical substances and mixtures which are presently being manufactured or processed to be tested if there is a reason to believe that they pose unreasonable risk or injury to health or the environment;<br>- to confiscate or impound chemicals found not falling within said acts cannot be enjoined except after the chemicals have been impounded;<br>- to monitor and prevent the entry, even in transit, of hazardous and nuclear wastes and their disposal into the country; and<br>- to call on any department, bureau, office, agency, state university or college, and other instrumentalities of the Government for assistance in the form of personnel, facilities and other resources as the need arises in the discharge of its functions; among others.<br>• As penal sanctions, ***Section 13*** prohibits the acts of:<br>- knowingly using chemical substance or mixture which is imported, manufactured, processed or distributed in violation of this Act or implementing rules and regulations or orders;<br>- failure or refusal to submit reports, notices or other information, access to records, as required by this Act, or permit inspection of establishment where chemicals are manufactured, processed, stored or otherwise held;<br>- failure or refusal to comply with the pre-manufacture and pre-importation requirements; and<br>- causing, aiding or facilitating, directly or indirectly, in the storage, importation or bringing into Philippine territory, including its maritime economic zones, even in transit, either by means of land, air or sea transportation or otherwise keeping in storage any amount of hazardous and nuclear wastes in any part of the Philippines. |
| Presidential Decree 979 | • ***Section 4.*** Prohibits the discharge or dumping of noxious gaseous and liquid or other substances from any vessel, floating craft or other |

| Law/Regulation | Provision |
|---|---|
| (1979) | manmade structure at sea by any means, into the territorial waters; throwing, discharging or depositing from any vessel, craft or structure, or from shore, wharf, manufacturing establishment, mill of any kind, any refuse matter any kind or description other than that flowing from streets and sewers and passing there from in a liquid state; depositing or causing to be deposited material of any kind in any place on the bank of a navigable water or river where they can be washed into the waters by natural or other means, or whereby navigation may be impeded or obstructed. |
| RA 9147 Wildlife Resources Conservation and Protection | • ***Section 2.*** Declares the state policy to conserve wildlife resources and habitats by conserving and protecting, regulating collection and trade, and to initiate and support conservation studies.<br>• ***Section 3.*** Allows the enforcement of the Act over all areas including protected areas and exotic species.<br>• ***Sections 6-14.*** Regulate collection, possession, transport, exportation and importation, introduction and bioprospecting.<br>• ***Sections 22- 25.*** Provide for some protection measures, such as determination of threatened species, allowance of collection, breeding and propagation, and establishment of critical habitats.<br>• ***Section 27.*** Defines and penalizes acts considered to be illegal. |
| RA 7586 (NIPAS Act) | ***Section 2.*** Protection of areas with natural, biological or physical diversities of the environment, notably those with unique biological features to sustain human life and development, as well as animal and plant life. |
| EO 240 of 1995 | Creating Fisheries and Aquatic Resources Management Councils (FARMCs) in barangays, cities and municipalities, their composition and functions. |
| RA 7061 (People's Small-scale Mining Act) | ***Sections 5-7.*** The provincial or city Mining Regulatory Boards cannot award small-scale mining contracts inside tourist reservations, marine reserves, parks and wildlife reservations, and ancestral lands of cultural communities without their consent. |
| RA 7942 (Philippine Mining Act of 1995) | ***Chapter VIII.*** Provides for the administration of quarry resources, which could include coastal resources such as sand and mineral deposits near the water. |
| Proclamation No. 2152 (1981) | Declares the entire province of Palawan as a Mangrove Swamp Forest Reserve prohibiting the entry, sale, settlement or other forms of disposition of all mangrove areas subject to existing rights. |
| Proclamation No. 219 (1967) | Declares the whole province as a Game Refuge and Wildlife Sanctuary and the small islands as National Reserves under the administration of PAWB; prohibiting the hunting, taking or killing of any wild animal or bird specified in RA 2590. |
| PCSD Staff Resolution No. 93-27 | Adopts guidelines for tourism-oriented establishments in Palawan. |
| PCSD | Opposes the *pa-aling* method of fishing. |

| Law/Regulation | Provision |
|---|---|
| Resolution No. 94-48 | |
| PCSD AO No. 05 | • Provides for accreditation, regulation and monitoring of live fish catching, culture and transport.<br>• Requires certificate of accreditation before any of such acts.<br>• Implements the order through a multipartite monitoring team.<br>• Defines and penalizes the acts violating the order such as absence of accreditation, allowing other persons to use one's accreditation and chartering or lease of unaccredited aircraft. |
| PCSD Resolution No. 92-10 | Declares total war against all forms of illegal fishing in the province. |
| PCSD Resolution No. 98-116 and 98-118-A | Calls for the passage of uniform policy governing the disposition of marine resources in all municipalities, specifically a uniform fisheries ordinance. |
| PO No. 332 | • Prohibits the catching, trading, shipping, storage and caging of certain species in the live reef fish industry.<br>• Requires documentation such as certificate of origin, certificate of compliance and cyanide clearance.<br>• Provides for the Bantay Palawan to lead in the implementation, assist the formation of FARMCs and coordinate with government agencies.<br>• Provides for the payment of fees and the definition and penalty of prohibited acts. |
| PO No. 334 (1999) | Creates the Fisheries and Aquaculture Resources Division of the Office of the Provincial Agriculturist Office. |
| PP City Ordinance No. 110 | • Bans or prohibits the shipping out of live fish out of the city.<br>• Requires documentation such as certificate of origin and cyanide clearance.<br>• Implements the ordinance through a special committee headed by the mayor.<br>• Provides for the payment of fees and the definition and penalty of prohibited acts. |
| Municipal Ordinances passed in Culion and Coron | Adopt PCSD AO No. 05 and request the deferment and lifting of the moratorium of the live fish ban, respectively. |
| Busuanga Sangguniang Bayan Resolution No. 68 (2000) | Provides for the establishment of the Integrated Municipal Coastal Resources Management Project. |
| Busuanga Municipal Basic Ordinance No. 24 (2001) | Provides for the creation of the Municipal FARMC. |

Annex 2. Key informant interview schedule.

TECHNICAL ASSISTANCE:
**"Policy Brief on Live Food Fish Capture and Trade:**
**Focus on Calamianes Islands and Palawan Province with Implications for National Policy"**

ACTIVITY:
**Key Informants Interview**

**INTERVIEW SCHEDULE**

Name of interviewer: _____ Date of interview:_____ Location of interview:_____

**Name of person interviewed**: _____

**Position/occupation**: *(please check option)*
1 = LGU Province ___ 2 = LGU Municipality ___ 3 = LGU City ___ 4 = Barangay ___
5 = DOJ ___ 6 = Others *(please specify)*: _____

**Relationship to the live food fish industry**: *(please check one option)*
1 = Government ___ 2 = NGO ___ 3 = Industry ___ 4 = Fisher ___ 5 = Fisher organization ____
6 = Others *(please specify)*: _____

Contact details: _____

**A. Resources**

1. How would you describe the condition of the live food fish resources 5-10 years ago?
***(Action: check one option.)***
9 = no opinion ___ 1 = very bad___ 2 = bad___ 3 = neither good or bad___ 4 = good___ 5 = very good ___

2. How would you describe the condition of the live food fish resources today?
***(Action: check one option.)***
9 = no opinion ___ 1 = very bad___ 2 = bad___ 3 = neither good or bad___ 4 = good___ 5 = very good ___

3. If there was a change (*please refer to Q1 vs. Q2*), why:
_____

4. How would you describe the condition of the coral reef resources 5-10 years ago?
***(Action: check one option.)***

9 = no opinion ___ 1 = very bad___ 2 = bad___ 3 = neither good or bad___ 4 = good___ 5 = very good ___

5. How would you describe the condition of the coral reef resources today?
***(Action: check one option.)***

9 = no opinion ___ 1 = very bad___ 2 = bad___ 3 = neither good or bad___ 4 = good___ 5 = very good ___

6. If there was a change (*please refer to Q4 vs. Q5 responses*), why:

_____

7. How would you describe the status of the following species?
***(Action: use WWF/HKSAR) guide for species identification and tick one option in each.)***

options: 9 = no opinion
1 = minimally exploited
2 = still underexploited/approaching sustainable yield
3 = within sustainable yield
4 = slightly overfished
5 = severely overfished

a. **Leopard coral grouper**: _____
(*Plectropomus leopardus;* locally called *red lapu, suno*)
b. **Orange-spotted grouper**: ____
(*Epinephelus coioides;* locally called *lapu-lapu, loba, pugnon*)
c. **Napoleon / humphead wrasse**: _____
(*Cheilinus undulatus;* locally called *lubayan, mameng, tarungan*)
d. **Brown-marbled grouper**: _____
(*Epinephelus fuscoguttatus;* locally called *garupa, lapu-lapu aswang, pugapo*)
e. **Other(s)** *(specify species)*: _____ **status** (*use options*): _____
f. **Other(s)** *(specify species)*: _____ **status** (*use options*): _____
g. **Other(s)** *(specify species)*: _____ **status** (*use options*): _____
h. **Other(s)** *(specify species)*: _____ **status** (*use options*): _____

8. What are the primary source areas for these species today? *
***(Action: list and plot in map approximate location of reef areas by species.)***

a. **Leopard coral grouper**: _____
(*Plectropomus leopardus;* locally called *red lapu, suno*)
b. **Orange-spotted grouper**: ____
(*Epinephelus coioides;* locally called *lapu-lapu, loba, pugnon*)
c. **Napoleon / humphead wrasse**: _____
(*Cheilinus undulatus;* locally called *lubayan, mameng, tarungan*)
d. **Brown-marbled grouper**: _____
(*Epinephelus fuscoguttatus;* locally called *garupa, lapu-lapu aswang, pugapo*)
e. **Other(s)** *(specify species)*: _____
f. **Other(s)** *(specify species)*: _____
g. **Other(s)** *(specify species)*: _____
h. **Other(s)** *(specify species)*: _____

Note:_____

_____

9. What are the primary source areas for these species 5-10 years ago?*
***(Action: list and plot in map approximate location of reef areas by species.)***

a. **Leopard coral grouper**: _____
(*Plectropomus leopardus;* locally called *red lapu, suno*)
b. **Orange-spotted grouper**: ____
(*Epinephelus coioides;* locally called *lapu-lapu, loba, pugnon*)
c. **Napoleon / humphead wrasse**: _____
(*Cheilinus undulatus;* locally called *lubayan, mameng, tarungan*)
d. **Brown-marbled grouper**: _____
(*Epinephelus fuscoguttatus;* locally called *garupa, lapu-lapu aswang, pugapo*)
e. **Other(s)** *(specify species*): _____
f. **Other(s)** *(specify species*): _____
g. **Other(s)** *(specify species*): _____
h. **Other(s)** *(specify species*): _____

Note:_____

_____

10. Has there been a change in the composition of live food fish species being harvested?
***(Action: check one option, if response is No opinion or No, skip Q11 and proceed to Q12.)***
1 = Yes ___; 0 = No ___ 9 = No opinion ___;

11. If yes, what species are you harvesting now that you did not exploit before?
***(Action: list species.)***

List/note:_____

_____

12. What is the trend in the use of cyanide for capturing live food fish in the reef areas?
***(Action: check one option.)***
9 = no opinion ___ 1 = rapidly increasing ____ 2 = slightly increasing ___
3 = no change ___ 4 = slightly decreasing ___ 5 = decreasing ____

13. Why *(refer to Q12 response)*?
_____

14. Are you aware if the spawning aggregations are being targeted for capturing live fish in the

reef areas?
*(**Action: check one option, if response is No opinion or No, skip Q15 - Q17 and proceed to Q18.**)*

1 = Yes ___ 0 = No ____ 9 = No opinion ___

15. If yes, can you identify these reef areas? *
*(**Action: list and plot in map approximate location of reef areas by species.**)*

List/note:_____
_
_____

16. If yes, what is the trend in the targeting of grouper spawning aggregations?
*(**Action: check one option.**)*

0 = no opinion ___ 1 = rapidly increasing ____ 2 = slightly increasing ___
3 = no change ___ 4 = slightly decreasing ____ 5 = decreasing ____

17. Why (*refer to Q16 response)*?

_____

18. What is the level of post-harvest mortality (*refer to present versus 5-10 years ago*)?
*(**Action: check one option.**)*

0 = no opinion ___ 1 = rapidly increasing ____ 2 = slightly increasing ___
3 = no change ___ 4 = slightly decreasing ___ 5 = decreasing ___

19. Describe the chosen level of post-harvest mortality *
*(**Action: describe/quantify if possible the rate of increase or decrease/100 pieces.**)*

_____

_____

20. How do you transport your catch and at what percentage per mode of transport?
___ by airplane, ___ %
___ by boat ___ %

21. Has this changed over time *(refer to the present versus 5-10 years ago)*?
1 = Yes ___ 0 = No___

22. What percentage of live food fish is shipped out of the area as:
a. **Leopard coral grouper**:
1 = full-grown fish ____ %
2 = fingerlings ____%
b. **Orange-spotted grouper**:
1 = full-grown fish ____ %
2 = fingerlings ____%
c. **Napoleon / humphead wrasse**:
1 = full-grown fish ____ %

2 = fingerlings ____%

d. **Brown-marbled grouper**:

1 = full-grown fish ____ %

2 = fingerlings ____%

23. Has the shipment of full-grown live food fish changed over time (*refer to the present versus 5-10 years ago*)?

1 = Yes ___ 0 = No___

24. What percentage of live fish shipped out of the area are:

1 = food fish _____ %

2 = ornamental fish ____%

25. Has the percentage of live food fish shipped out of the area changed over time *(refer to the present versus 5-10 years ago)*?

1 = Yes ___ 0 = No___

26. Where are the transshipment points? ***

***(Action: list and plot in map the transshipment points.)***

**B. Fishers**

27. Have the number of fishers involved with the live food fish industry been:

1 = increasing ____

2 = decreasing ____

3 = almost constant/no change ____

28. Why (*refer to Q27 response*)? _____

29. If increasing, where do these fishers come from?

***(Action: check one option.)***

1 = within Palawan municipalities ____

2 = outside Palawan (*specify location*) _____

30. There is concern about the health of fishers and their alleged use of drugs to prolong their diving time. Can you comment on this?

_____

_____

31. Do the fishers and their families have other livelihoods than fishing?

***(Action: check one option, if response is No opinion or No, skip Q32 and proceed to Q33.)***

1 = Yes ___ 0 = No___ 9 = No opinion ___

32. If yes, enumerate/explain livelihood options.

_____

_____

33. Do you feel that fishers would be willing to move to another occupation if they could make the same or more money? *(**Action: check one option.**)*

    1 = Yes ___ 0 = No___ 9 = No opinion ___

34. Explain why *(refer to response of Q33)*

_____

_____

**Management Options**

35. According to various studies, there are three main problems confronting the industry: **(1)** overfishing, **(2)** cyanide fishing and **(3**) influx of migrant fishers. What management options do you propose to address each issue? ***(Action: tick relevant measure and make comments/notes on the space provided.)***

| **Management Measures** | (1) **Over-fishing** | **Comments / notes** | (2) **Cyanide fishing** | **Comments / notes** | (3) **Influx of migrant fishers** | **Comments / notes** |
|---|---|---|---|---|---|---|
| **I. Regulatory** | | | | | | |
| 1. Closed areas or fisheries | | | | | | |
| 2. Closed season | | | | | | |
| 3. Control of export of species | | | | | | |
| 4. Control of fishing effort (number of fishers) | | | | | | |
| 5. Control of fishing methods (hookah) | | | | | | |
| 6. Control of migrants | | | | | | |
| 7. Control of participation in the industry (resident vs. nonresident fishers) | | | | | | |
| 8. Improved monitoring and enforcement | | | | | | |
| 9. Permits and licenses | | | | | | |
| 10. Protection of spawning aggregations | | | | | | |
| 11. Regulation / control of cyanide | | | | | | |
| 12. Size limits | | | | | | |
| 13. Quota system | | | | | | |
| Others, specify | | | | | | |
| **II. Information Provision** | | | | | | |
| 1. Education/awareness raising | | | | | | |
| Others, specify | | | | | | |
| **III. Institutional** | | | | | | |
| 1. Industry self-regulation | | | | | | |
| 2. Adoption of ICM / CBRM | | | | | | |
| Others, specify | | | | | | |
| **IV. Nonregulatory** | | | | | | |
| 1. Certification | | | | | | |
| 2. Others, specify | | | | | | |

36. Should we allow or ban the live food fish industry?
*(**Action: check one option, if response is Allow, skip Q38 and proceed to Q39; if the response is Ban, skip Q37 and proceed to Q39.**)*
1 = allow __
2 = ban __

37. If allow,
Why?_____
_____

38. If ban, should it be:
1 = partial ban ___
2 = total ban___
Explain why
_____

_____

39. Do you feel that existing laws and regulations are sufficient to manage the industry?
*(**Action: check one option.**)*
1 = Yes ___ 0 = No___ 9 = No opinion ___

39. Explain and propose recommendations *(refer to the response in Q39).*

_____

_____

41. Do you feel that there should be a Code of Conduct or best practices for the live food fish industry?
*(**Action: check one option, if response is No opinion or No, skip Q42 and proceed to Q43.**)*
1 = Yes ___ 0 = No___ 9 = No opinion ___

42. If yes, what should it include?_____

_____

43. Who can best manage the industry?
*(**Action: check one option.**)*
1 = Fishers____ 2 = Traders____ 3 = Government____ 4 = All together ___
5 = others (*specify*) _____

44. Explain why *(refer to response of Q43).*

_____

_____

45. Do you feel that the demand side management measures (consumer education, import restrictions) can be effective? *(**Action: check one option.**)*

1 = Yes ___ 0 = No___ 9 = No opinion ___

46. Explain why *(refer to response of Q45).*

_____

_____

47. Do you feel that aquaculture has a role to play in the industry?
*(**Action: check one option.**)*

1 = Yes ___ 0 = No___ 9 = No opinion ___;

48. Explain why _____

49. What needs to be done to develop aquaculture?
*(**Action: explain all ticked items.**)*

1 = private __ specify _____
2 = local government __ specify _____
3 = national government __ specify _____
4 = academe/research __ specify _____
5 = NGOs __ specify _____
6 = lending institutions__ specify _____
7 = fishers' associations __ specify _____
8 = others__ specify _____

50. What species should be cultured?
(***Action: list species.***)

_____

_____

51. Do you have any other comments?

_____

Annex 3. Conference program.

| Time | Activity | Responsibility |
|---|---|---|
| 0800 - 0900 | Registration/arrival of participants | Palawan Council for Sustainable Development (PCSD) Staff |
| 0900 - 0935 | **Opening ceremony** | |
| | National anthem | PCSD Staff |
| | Opening remarks | **Hon. Joel T. Reyes**<br>Governor, Palawan |
| | Messages | **Hon. Abraham Kahlil B. Mitra**<br>Representative, 2nd District - Palawan<br>**Hon. Antonio C. Alvarez**<br>Representative, 1st District - Palawan<br>**Hon. David Ponce de Leon**<br>Vice Governor, Palawan |
| | Introduction of participants | **Mr. Alejandro Marcaida**, PCSDS |
| | Overview of the Policy Conference | **Dir. Nelson P. Devanadera**<br>Executive Director, PCSDS<br>**Hon. Modesto Rodriguez**<br>Chair, Committee on Agriculture of Palawan Provincial Board |
| | **Session 1: Plenary presentations** | Moderator: **Mr Alejandro Marcaida**, PCSDS |
| 0935 - 0950 | FISH Project, Calamianes learning site and technical assistance for live food fish trade | **Mr. Benjamin Francisco**<br>FISH Project |
| 0950 - 1015 | Overview of the live food fish trade internationally and in the Philippines | **Dr. Robert S. Pomeroy**<br>Principal Investigator, University of Connecticut |
| 1015 - 1045 | Synopsis of the status, issues and studies concerning live food fish industry in Palawan | **Dr. Michael D. Pido**,<br>Palawan State University (PSU) |
| 1045 - 1100 | Break and photo session | |
| 1100 – 1200 | Elaboration of policy analysis options on live food fish industry in Palawan | **Dr. Robert S. Pomeroy** |
| 1200 - 1300 | Lunch break | |
| | **Session 2: Workshop** | Moderator: **Dr. Michael D. Pido** |
| 1300 - 1310 | Workshop mechanics | **Dr. Michael D. Pido** /<br>**Ms. Mariluz Tejares**, PCSDS |
| 1310 – 1445 | Workshop by breakout groups | Workshop chairs, reporters and documentors to be assigned |

| | | |
|---|---|---|
| | **Session 3: Plenary presentations** | Moderator: **Dr. Robert S. Pomeroy** |
| 1445 - 1600 | Reporting of outputs/open forum | Policy session chair or representatives |
| 1600 - 1615 | Noon break | |
| 1615 - 1630 | Synthesis of workshop outputs | **Dr. Robert S. Pomeroy** |
| 1630 - 1640 | Next steps / post-conference activities | **Dr. Michael D. Pido** |
| | **Closing ceremony** | |
| 1640 - 1650 | Closing remarks | **Hon. Lucena D. Demaala**<br>President, League of Municipalities<br>Palawan Chapter |
| 1650 - 1700 | Closing address | **Hon. Edward S. Hagedorn**<br>Mayor, Puerto Princesa City |

Master of Ceremony: Alejandro S. Marcaida, PCSD Staff

## Annex 4. Fact sheet 1: Ecological / fishing activity.

Ecological / fishing activity. This indicator is measured by CPUE and exploitation rates / yields per recruit of fish species targeted by LRFFT. Relevant information are given in the table below.

Table 1. Results of sustainability indicators in the Calamianes Islands, using primary and secondary data (Source: Padilla et al. 2003).

| **Sustainability Indicators** | **Results in the Calamianes Islands Using Primary and Secondary Data** |
|---|---|
| Catch | Live fish catch (in kg weight) predominantly of *P. leopardus*, decreased from 1998 to 2001. |
| CPUE | Absence of benchmark does not allow trend analysis.<br>Present estimate of CPUE in the harvest of live fish was higher relative to estimates found elsewhere in the tropics. |
| Fishing distance and duration | Respondents travel farther than in the past in search of new and productive fishing grounds, resulting in longer fishing trips / duration. |
| Species composition | *P. leopardus* remains the most dominant species. |
| Fish body size | • Mean body size of *P. leopardus* decreased from 1998 to 1999.<br>• There was also a reduction of the ratio of total weight (in kg) to total number of individuals in the catch (abundance) of live fish from 2000 to 2001.<br>• Both results suggest growth overfishing. |
| Size / age at sexual maturity | • Live fish trade targets size range (28-32 cm total length) which are young and sexually immature to maturing individuals.<br>• High catch rates of these small-sized individuals may lead to recruitment overfishing. |
| Fishing mortality rates | High, preliminary estimates of mortality rates for *P. leopardus* are relatively higher than those in the Great Barrier Reef, Australia. |
| Exploitation rates / yield per recruit | MSY is exceeded; stocks of *P. leopardus* in the Calamianes are overfished. |

Table 2. Catch and Effort Data for Cyanide Fishing per Year.

| **Fishing Season** | **# of Months** | **# of Trips** | **# of Days** | **# of Hrs.** | **# of Kgs.** | **CPUE** |
|---|---|---|---|---|---|---|
| **NE Monsoon** | 7 | 224 | 627 | 6,944 | 2,038 | **0.2935** |
| **SW Monsoon** | 5 | 200 | 200 | 2,040 | 400 | **0.1961** |
| **TOTAL** | | **424** | **827** | **8,984** | **2,438** | **0.2714** |

Note: About 1 kg/4 hours.
Source: CI (2002).

Production is continuously increasing by more than 40% of the yield of the previous years in Coron / Busuanga, except for the year 2003,which yielded a negative figure of 37.56%.

An increase of 68.24% is seen for the province from 2003 to 2004. -

Table 3. Production data, LRFF industry, 2001-2004. (Sources: DA/BFAR 2001; PCSD 2001-2004; de Sagun 2002; and CI 2002.)

| | Coron/ Busuanga | | | Palawan | | |
|---|---|---|---|---|---|---|
| **Year** | **No. of Catchers*** | **Volume (in kg)** | **% Change Over Previous Year** | **No. of Catchers**** | **Volume (in kg)** | **% Change Over Previous Year** |
| 2001 | 2,100 | 127,007 | | | | |
| 2002 | 2,100 | 203,945 | 60.57% | | | |
| 2003 | 2,100 (?) | 146,918 | -27.96% | 4,117 (?) | 327,143 | |
| 2004 | 2,100 (?) | 279,945 | 90.54% | 4,117 (?) | 548,505^ | 67.75% |

Notes to figures:
1. *The number of catchers per year was based on PCSD reports.
2. ** The number of catchers per year was based on the assumption that 51% of the total production of live food fish are from Calamianes and computed as the total number of catchers reporting based on PCSD reports over 51%.
3. (?) The figures used are from the reports in PCSD and do not account for increases in the number of catchers for years 2003 and 2004 for which data are not available.
4. ^ Years 2003 and 2004 volume was computed based on the reported number of boxes shipped, with ration of 1:6.5 (1 box contains 6.5 kg of live food fish).

Annex 5. Fact sheet 2: Ecological / marine ecosystem condition

Marine ecosystem condition. This indicator is measured by percent of live coral reef cover. Relevant information are given below.

Table 1. Status of coral reefs by municipality in Palawan, Philippines.

| Municipality | Reef Status (Percent Cover) | | | | | No. of sites |
|---|---|---|---|---|---|---|
| | Year | Excellent 75-100 | Good 50-74 | Fair 25-49 | Poor 0-24 | |
| **Municipalities with live fish industry** | | | | | | |
| Aborlan | 2003 | 0.00 | 60.00 | 40.00 | 0.00 | 20 |
| Agutaya | 2002 | 4.76 | 19.05 | 38.10 | 38.10 | 21 |
| Araceli | 2000 | 0.00 | 33.30 | 66.70 | 0.00 | 3 |
| Bataraza | 2003 | 4.17 | 66.67 | 29.17 | 0.00 | 24 |
| B. Point | 2001 | 0.00 | 42.86 | 42.86 | 14.29 | 7 |
| Busuanga | 1999 | 0.00 | 0.00 | 77.78 | 22.22 | 9 |
| ***Coron*** | ***1999*** | ***16.67*** | ***16.70*** | ***0.00*** | ***66.67*** | ***6*** |
| Culion | 1999 | 0.00 | 0.00 | 77.78 | 22.22 | 9 |
| ***Cuyo*** | ***2003*** | ***9.52*** | ***28.58*** | ***9.52*** | ***52.38*** | ***21*** |
| Dumaran | 2001 | 5.88 | 35.29 | 58.82 | 0.00 | 17 |
| Magsaysay | 2001 | 0.00 | 27.78 | 66.67 | 5.56 | 18 |
| Narra | 2003 | 0.00 | 55.56 | 44.44 | 0.00 | 18 |
| Quezon | 2001 | 11.76 | 41.18 | 47.06 | 0.00 | 17 |
| Rizal | 2003 | 0.00 | 47.62 | 47.62 | 4.76 | 21 |
| Roxas | 2004 | 9.09 | 50.00 | 40.91 | 0.00 | 22 |
| Espanola | 2001 | 3.85 | 34.62 | 61.54 | 0.00 | 26 |
| San Vicente | 2000 | 4.55 | 13.64 | 54.55 | 27.27 | 22 |
| ***Taytay*** | ***2001*** | ***0.00*** | ***7.69*** | ***7.69*** | ***84.62*** | ***13*** |
| Balabac | No data | | | | | |
| Linapacan | No data | | | | | |
| Cagayancillo | No data | | | | | |
| Puerto Princesa City | No data | | | | | |
| **Municipalities without live fish Industry** | | | | | | |
| ***El Nido*** | ***2002*** | ***0.00*** | ***0.00*** | ***45.5*** | ***54.55*** | ***11*** |
| Kalayaan | No data | | | | | |
| Data source | PCSD | PCSD | PCSD | PCSD | PCSD | |

Annex 6. Fact sheet 3.

Table 1. Potential reef damage from cyanide fishing per fishing boat, 2000.

| | | | |
|---|---|---|---|
| **Estimation of fishing effort** | | | |
| No. of cyanide operations per day per boat | | | 1 |
| Area of reef (Coron and Busuanga) | | $km^2$ | 1,253 |
| Fishing effort | | Operations/$km^{2\text{-day}}$ | 0.0008 |
| Days of operation: NE monsoon | | days/year | 157 |
| SW monsoon | | days/year | 50 |
| | | | |
| **Average live fish catch per operation** | | | |
| NE monsoon | | pieces/operation | 10 |
| SW monsoon | | pieces/operation | 2.4 |
| Spermonde Archipelago, Indonesia (Pet and Pet-Soede 1999): | | | |
| | | liter of cyanide/fish | 1 |
| Cyanide use | | $km^2$/li cyanide | 1 |
| Reef area destroyed | | $km^2$/fish | 1 |
| | | | |
| **Potential reef damage per fishing boat using cyanide** | | | |
| NE monsoon | | $m^2/km^2$ | 1.2514 |
| SW monsoon | | $m^2/km^2$ | 0.0958 |
| Entire Year | | $m^2/km^2$ | 0.6736 |
| | | | |
| No. of fishers | % cyanide user | # of cyanide user | # of boats |
| Coron 3,478 | 25 | 870 | 217 |
| Busuanga 643 | 25 | 161 | 40 |
| Total 4,121 | | 1,030 | 258 |
| | | | |
| Total potential reef damage per year | | $m^2/km^2$ | 173.4898 |
| Annual rate of reef damage | | %/year | 0.0173 |

Notes:
1 Estimation procedure follows that suggested by Mous et al. 2000
2 Sources of data: LRFT survey data, CI 2000.
Palawan – 2000 CBMS, PPDO.
PCSD data of coral reef area
3 Data on reef and no. of fishers are not available from the above sources.

Annex 7. Fact sheet 4: Institutional / political acceptability.

This indicator is measured by the perceived and actual levels of support of LGU for the policy. Reference is current political leadership. Scale is qualitative:
High (H) – high support
Medium (M) – medium support
Low (L) – low support

Annex 8. Fact sheet 5: Institutional / social acceptability.

This indicator is measured by the perceived and actual levels of support of the local community members, specifically fishers and their households, for the policy. Scale is qualitative:
High (H) – high support
Medium (M) – medium support
Low (L) – low support

Annex 9. Fact sheet 6: Institutional / industry acceptability.

This indicator is measured by the perceived and actual levels of support by major industry players (traders / middlepersons, boat owners / operators, exporters) for the policy. Scale is qualitative:
High (H) – high support
Medium (M) – medium support
Low (L) – low support

Annex 10. Fact sheet 7: Institutional / administrative feasibility.

This indicator pertains to the existence of laws and policies to support the policy option, the existence of a workable monitoring and enforcement system, and the cost of policy option. Scale is qualitative:
High (H) – high support
Medium (M) – medium support
Low (L) – low support

Annex 11-A. Fact sheet 8-A: Economic / public and private benefits and costs.

This indicator is measured as the benefits and costs that accrue to individuals and firms as a result of the policy option, such as income, livelihoods, food security and quality of life in the Coron / Busuanga area.

Table 1. Gross revenue data, LRFF industry, 2001-2004.

| Year | Gross Revenue | Change Over Previous Year | |
|---|---|---|---|
| | | Gross Revenue Change | % Change Over Previous Year |
| 2001 | 177,809,800 | | |
| 2002 | 265,128,500 | 87,318,700 | 49.11 |
| 2003 | 249,760,600 | (14,632,100) | ( 5.52) |
| 2004 | 475,905,500 | 196,144,900 | 78.53 |

Notes:
1. Gross revenue was computed based on the production data (same as the volume of catch given in Table 3, Fact Sheet 1 of Annex 4) multiplied to the average selling price of traders per kilo.

2. Average selling price of traders per kilo: 2001- PhP1,400; 2002 - PhP1,300; 2003 - PhP1,700 ; 2004 - PhP1,700.

Table 2. Gross revenue distribution per identified industry player, Coron / Busuanga, 2003-2004.

| Industry Player | 2003 | | | 2004 | | |
|---|---|---|---|---|---|---|
| | Number | Amount Share | Average Share per Industry Player | Number | Amount Share | Average Share per Industry Player |
| Catchers | 2,100* | 68,954,550.00 | 80,454.65 | 2,100* | 321,936,750.00 | 153,306.50 |
| Traders | 15 | 32,485,692.80 | 2,707,141.06 | 15 | 61,900,428.92 | 4,126,695.26 |
| Carriers | 2 | 16,324,000.00 | 8,162,000.00 | 8 | 31,104,850.04 | 3,888,106.25 |
| LGU | 1 | 489,725.00 | | 1 | 933,150.00 | |
| Other indirect players | | 31,504,932.00 | | | 107,617,298.03 | |
| Total | | 249,758,899.80 (with a rounding off difference of PhP1,700.20) | | | 475,905,500.00 | |

Notes:
1. The number of catchers was assumed not to have increased. Share is computed based on selling price of PhP1,700
   and same volume.
2. The volume of production handled by the catchers is assumed to be the same with the traders.
3. The average selling price of catchers to traders for both years is PhP1,150 per kilo of live fish.

Table 3. Sustainability **i**ndicators and **r**esults in Calamianes Islands **(**Source: Padilla et al. 2003).

| **Sustainability Indicators** | **Results in the Calamianes Islands Using Primary and Secondary Data** |
|---|---|
| Price | Increased significantly over a 10-year period |
| Employment | Over 1,000 artisanal fishers, primarily migrants from other provinces |
| Investment | At least 300 boats engaged in industry |
| Labor productivity | Average annual gross profit amounted to over PhP25,000 in 2001. This is lower than legal minimum wage rates. Fishers remain in the industry because they do not have employment alternatives. |
| Capital productivity | • Average returns on investment are very low.<br>• Quite a number of fishers are already losing. |
| Income distribution | Inequitable distribution of benefits – those who have greater access to and control of finances reap the benefits while ordinary fishers continue to incur debt year-round. |

Annex 11-B. Fact sheet 8-B: Economic / public and private benefits and costs, Palawan, 2003-2004.

This indicator is measured as the benefits and costs that accrue to individuals and firms as a result of the policy option, such as income, livelihoods, food security and quality of life in Palawan.

Table 1. Total gross value of the industry.

| Year | Average Landed Price MNL | Volume kg | Total Value PhP |
|---|---|---|---|
| 2003 | 1,800 | 327,143 | 588,857,400 |
| 2004 | 1,800 | 548,505 | 987,309,000 |

Table 2. Net provincial profit sharing, 2003 and 2004.

| Players | Average Profit | Production | 2003 | % | Per Player | | Production | 2004 | % | Per Player | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | | | | | Total | | | |
| | Per kilo | kg | Value PhP | Share | No. | Share PhP | kg | Value PhP | Share | No. | Share PhP |
| Fishers | 1,072.00 | 327,143 | 350,617,146.00 | 84.44 | 4,118 | 85,142.58 | 548,505 | 587,862,976.00 | 84.45 | 4,118 | 142,754.49 |
| LGU | 3.33 | 327,143 | 1,089,386.19 | 0.27 | 8 | 136,170.77 | 548,505 | 1,826,521.65 | 0.26 | 8 | 228,315.21 |
| Traders | 194.04 | 327,143 | 63,478,827.72 | 15.29 | 82 | 774,132.05 | 548,505 | 106,431,910.00 | 15.29 | 117 | 909,674.45 |
| Total | | | 415,185,359.91 | 100 | | | | 696,121,407.65 | 100 | | |

Notes to computations:
1 Profit per kilogram for fishers was derived at by computing the average net profit per kilo of the minimum and maximum selling prices (PhP972.755 + 1,170.755).
2 Profit per kilogram for the traders was derived at by computing the average net profit per kilo of the minimum and maximum selling prices (PhP221.12 + 201.13 + 186.95 +166.95).

Table 3. Estimated gross revenue, costs and returns for live fish fishers, 2003/2004.

| | **Minimum Selling Price PhP1,150** | | | **Maximum Selling Price PhP1,350** | |
|---|---|---|---|---|---|
| | Unit | Value | % | Value | % |
| **Gross revenue** | **PhP** | **2,300** | **100%** | **2,700** | **100%** |
| Catch per trip (kg) | kg/trip | 2 | | 2 | |
| Selling price per kg | PhP | 1,150 | | 1,350 | |
| **Total cost** | **PhP** | **354.49** | **15.52** | **358.49** | **13.27** |
| *Fixed cost* | *PhP* | *42.47* | *1.84* | *42.47* | *1.57* |
| Pump boat | PhP | 13.7 | | 13.7 | |
| Engine | PhP | 21.92 | | 21.92 | |
| Fishing gear | PhP | 6.85 | | 6.85 | |
| *Variable cost* | *PhP* | *289.02* | *12.56* | *289.02* | *10.70* |
| Wages (PhP100/day) | PhP | 50 | | 50 | |
| Gasoline | PhP | 101.88 | | 101.88 | |
| Kerosene | | | | | |
| Bait | PhP | 59.9 | | 59.9 | |
| Fishing materials | PhP | 48.5 | | 48.5 | |
| Food | PhP | 17.62 | | 17.62 | |
| Maintenance | PhP | 11.12 | | 11.12 | |
| *Miscellaneous* | *PhP* | *23* | *1.00* | *27* | *1.00* |
| Profit and risk (estimated 1% of gross sales revenue per kilo) | | 23 | | 27 | |
| **Net profit, per trip** | **PhP** | **1,922.51** | **84.47** | **2314.51** | **86.73** |
| **Net profit, per kilo** | **PhP** | **972.75** | | **1157.25** | |

Notes to computations:

1. Pump boat cost is computed using straight line depreciation of the value of the engine at PhP25,000 over a 10-year period (PhP25,000 / 10 years / 365 days x 2 days / trip).
2. Engine cost is computed by straight line depreciation of the value of the engine at PhP20,000 over a 5-year period (PhP20,000 / 5 years / 365 days x 2 days / trip).
3. Fishing gear cost is computed by straight line depreciation of the value of the fishing gear at PhP2,500 over a 2-year period (PhP2,500 / 2 years / 365 days x 2 days /trip).
4. Wages is computed based on the 2-day trip of 2 fishers in a pump boat with an average catch of 2 kg live fish (12.5% of total catch) with minimum wage of PhP100/day (2 day trip x 2 fishers x PhP100/day x 12.5%).

Table 4. Estimated gross revenue, costs and returns for live fish traders, 2005.

| 42 Boxes | Minimum Selling Price PhP1,700 | | | Maximum Selling Price PhP1,900 | | 23 Boxes | Minimum Selling Price PhP1,700 | | Maximum Selling Price PhP1,900 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Unit | Value | % | Value | % | | Value | % | Value | % |
| **Gross revenue** | **PhP** | **535,500** | **100** | **598,500** | **100** | **Gross revenue** | **293,250** | **100** | **327,750** | **100** |
| No of boxes per shipment | No. | 42 | | 42 | | No. of boxes per shipment | 23 | | 23 | |
| No of kg per box | kg/box | 7.5 | | 7.5 | | No. of kg per box | 7.5 | | 7.5 | |
| Selling price per kg | PhP | 1,700 | | 1,900 | | Selling price per kg | 1,700 | | 1,900 | |
| **Total cost** | **PhP** | **465,848** | **86.99** | **535,143** | **89.41** | **Total cost** | **261,001.66** | **89.00** | **298,951.66** | **91.213** |
| *Fixed cost* | PhP | *333* | *0.062* | *333* | *0.056* | *Fixed costs* | *166.66* | *0.057* | *166.66* | 0.051 |
| Rental (PhP10,000/30 days) | PhP | 333 | | 333 | | Rental (PhP5,000/30 days) | 166.66 | | 166.66 | |
| *Variable cost* | PhP | *49,710* | 9.283 | *49,710* | 8.305 | *Variable cost* | *33135* | *11.299* | *33135* | 10.109 |
| Wages (13 pax @ PhP220) | PhP | 2,860 | | 2,860 | | Wages (6 pax @ PhP200) | 1,200 | | 1,200 | |
| Shipment costs | | | | | | Shipment costs | | | | |
| Air freight | PhP | 35,000 | | 35,000 | | Air freight | 25,000 | | 25,000 | |
| Trucking | PhP | 1,000 | | 1,000 | | Trucking | 1,000 | | 1,000 | |
| Packaging | PhP | 5,000 | | 5,000 | | Packaging | 2,760 | | 2,760 | |
| Utilities | | | | | | Utilities | | | | |
| Electricity | PhP | 500 | | 500 | | Electricity | 250 | | 250 | |
| Water | PhP | 100 | | 100 | | Water | 50 | | 50 | |
| Auxiliary permits | PhP | 1,050 | | 1,050 | | Auxillary permits | 575 | | 575 | |
| Miscellaneous | PhP | 4,200 | | 4,200 | | Miscellaneous | 2,300 | | 2,300 | |
| *Cost of fish (min. PhP1,150) Max. PhP1,350)* | PhP | *362,250* | 67.647 | *425,250* | *71.053* | *Cost of fish* | *198,375* | *67.647* | *232,875* | *71.053* |
| *Miscellaneous cost* | PhP | *53,555* | 10.00 | 59,850 | 10 | *Miscellaneous cost* | *29,325* | *10* | *32,775* | *10* |
| Profit and risk (10% of gross revenue) | | | | | | Profit and risk (10% of gross revenue) | | | | |
| **Net profit, per shipment** | **PhP** | **69,652** | **13.01** | **63,357** | **10.586** | **Net profit, per shipment** | **32,248.34** | **10.997** | **28,798.34** | **8.786** |
| **Net profit, per kg** | **PhP** | **221.12** | **0.041** | **201.133** | **0.034** | **Net profit, per kg** | **186.94** | **0.06** | **166.947** | **0.05** |

Notes to computations:

1. The fixed and variable costs, as well as the mortality rate of 10%, were sourced from an interview with a trader.

2 Gross revenue: Selling price per kg of live fish x the number of kg shipped per shipment which is 315 kg for 42 boxes or 172.5 kg for 23 boxes.

3. Cost of fish = selling price of the fishers per kg of live fish that the trader is willing to buy x the number of kg per box x the number of boxes per shipment.

4. Net profit = gross revenue - total costs.

5. Net profit per kg = net profit per shipment, divided by the number of kg shipped, which is 315 kg for 42 boxes or 172.5 kg for 23 boxes.

Annex 12. Fact sheet 9: Economic / social value.

This indicator is measured as the diverse social and economic values of coral reefs being provided to society as a whole and to distant as well as adjacent communities. These include marketable values (associated with products, functions and services) and nonmarketable values (associated with opportunity, cultural significance, bequest and simple existence). The goods and ecological services of coral reef ecosystems include direct use values such as food fisheries, aquarium, pharmaceutical, tourism/recreation, livelihoods, research/education, aesthetic, and cultural / religious. Indirect use values include coastal protection (erosion), biotic services within and between ecosystems (maintenance of habitats, maintenance of biodiversity and genetic resources, regulation of ecosystem processes and functions, biological maintenance of resilience, export organic production), biogeochemical services (nitrogen fixation, carbon storage, waste assimilation), and global live support.

Table 1. Value (in PhP) of reefs of Northwestern Palawan (1,549.3 $km^2$) in PhP.

| Sector | Value |
|---|---|
| Fisheries | 206,572,000 |
| Tourism | 47,401,000 |
| Research | 10,205,000 |
| Carbon sequestration | 153,379,710 |
| Coastal protection | 426,054,750 |
| Biodiversity | 127,816,425 |

Source: Samonte-Tan and Armedilla (2004).

Table 2. Total economic value (TEV) of reefs of Northwestern Palawan (1,549.3 $km^2$), in PhP million.

| Sector | Value |
|---|---|
| Net market | 254.0 |
| Nonmarket | 707.3 |
| TEV | 961.2 |

Source: Samonte-Tan and Armedilla (2004).

Annex 13. Summary of results on the policy option criteria from the multistakeholder consultations.

Table 1. Summary of results on the ecological criteria from the multistakeholder consultations.

| Indicators | Option 1 Status Quo | Option 2 Ban | Option 3 Regulated - Provincewide | Option 4 Regulated -with Exception |
|---|---|---|---|---|
| Fishing activity | **[↓]** Fish catch (long term)<br>**[↑]** Recruitment / growth overfishing | **[↓]** CPUE / catch of target live fish<br>**[↑]** Increase in CPUE of other species | Stable catch of target species<br>Overall fish stock recovery<br>**[↓]** Recruitment and growth overfishing | Same as option 3 with LRFFT<br>Same as option 2 without LRFFT |
| Marine ecosystem status | **[↑]** Coral reef degradation<br>**[↑]** Depletion of marketable live fish size<br>**[↓]** Abundance of target fish species | **[↑]** Coral reef cover<br>**[↑]** Abundance of target fish species | **[↑]** Coral reef condition<br>**[↑]** Increase in fish stock / fish size<br>Stable biodiversity for reef species | Same as option 3 with LRFFT<br>Same as option 2 without LRFFT |

Table 2. Summary of results on the institutional criteria from the multistakeholder consultations.

| Indicators | Option 1 Status Quo | Option 2 Ban | Option 3 Regulated - Provincewide | Option 4 Regulated -with Exception |
|---|---|---|---|---|
| LGU support / acceptability | Medium | Low | High | Low |
| Community support / acceptability | Medium | Low | High | Low |
| Industry support / acceptability | High | Low | High | Low |
| Administrative support / feasibility | Low | Medium | Medium | Low |

Table 3. Summary of results on the economic criteria from the multistakeholder consultations.

| Indicators | Option 1 Status Quo | Option 2 Ban | Option 3 Regulated - Provincewide | Option 4 Regulated - with Exception |
|---|---|---|---|---|
| Private profit (PhP) | Fisher:1,072/kg<br><br>LGU: 3.33/kg<br><br>Trader: 194/kg | Fisher: 357*/kg<br><br>LGU: 1.11/kg<br><br>Trader: 64.67*/kg<br>*1/3 of live fish profit | Fisher: 1,072/kg<br><br>LGU: 3.33/kg<br><br>Trader: 194/kg | 4 municipalities (Coron, Cuyo, Taytay, El Nido), same as option 2<br><br>The rest, same as option 3. |
| Society profit (PhP) | Fisher: 587.8 M<br>LGU: 1.826 M<br>Trader: 106.4 M<br><br>Total: 696.12 M | Fisher: 195.93 M*<br>LGU: 0.608 M*<br>Trader: 35.46 M*<br><br>Total: 232.04 M*<br><br>*1/3 of aggregate live fish profit | Fisher: 587.8 M<br>LGU: 1.826 M<br>Trader: 106.4 M<br><br>Total: 696.12 M | 4 municipalities (Coron, Cuyo, Taytay. El Nido), same as option 2<br><br>The rest, same as option 3. |