

Issue 20 – December 2011

LIVE REEF FISH

information bulletin

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Produced with financial assistance from
Australia, France and New Zealand

Editor's note

From its inception, this bulletin has included articles looking at fisheries for live food fish and ornamental fish from just about every conceivable angle. Not being tied to any particular discipline, the bulletin has covered everything from the biology of reef fish resources to the role of consumers in ensuring that those resources remain productive. Or at least I keep thinking the bulletin has covered every angle, until another set of contributions arrives. The articles in this bulletin are good examples of new territory.

This bulletin begins with a review by Ditch Townsend of the world's marine ornamental fish industry and its management. Although reviews look backward, their purpose is to help point us in the right direction as we move forward. Mr Townsend clearly has that purpose in mind. He categorizes the challenges facing the industry in three main areas: the sustainability of marine ecosystems, the fair treatment of ornamental fish collectors, and the welfare of the fish being traded. After reviewing recent initiatives to address these challenges, including certification schemes and legislation, he concludes that we need to look at a broader array of policy options, and that there are new analytical tools to help us do so.

Next is an analysis of the live reef food fish industry in Palawan, Philippines. Michael Fabinyi and Dante Dalabajan look deep into the social landscape in an attempt to explain why, despite active management interventions by at least three layers of government and an impressive set of laws and regulations on the books, effective on-the-ground management of live reef fish fisheries and trade in Palawan remains elusive. To me, who likes to think that devising clever management strategies is the be-all, end-all of fisheries management, this is earthshaking stuff. This isn't about whether we understand the biology of the resource and the limits of its productivity, or whether we're able to use that knowledge to formulate appropriate management measures. It's about whether the basic institutions of governance are well matched to the structure of society. Back to square one!

In the next article, in a perfect segue, Gregg Yan exposes poor compliance with fisheries laws in the Philippines, including how the nominally protected humphead wrasse continues to be fished, sold and exported. The humphead wrasse is also the subject of the final article in this bulletin. Yvonne Sadovy, Syamsul Bahri Lubis and Santi Suharti report on Indonesia's efforts to manage the trade of humphead wrasse, particularly with respect to the protected status of the species on Appendix II of CITES.

Tom Graham



Sustainability, equity and welfare: A review of the tropical marine ornamental fish trade

Ditch Townsend¹

Abstract

About 27 million tropical marine ornamental fishes are traded each year. Of these, 80% come from Indonesia, the Philippines, the United States, and Sri Lanka. Over 80% go to North America, the European Economic Area, Switzerland and Japan. The trade depends on wild capture, but is becoming increasingly supplemented by aquaculture-produced ornamental species. The trade has impacts on three core areas: 1) habitat integrity and biodiversity of tropical marine ecosystems (**sustainability**), including the genetic diversity within individual species; 2) development of coastal communities related to practice safety, economic sustainability, food security, and trade fairness (**equity**); and 3) mortality, morbidity and husbandry of the fishes being cultivated and traded (**welfare**). There are numerous solutions to identified problems, but efforts to date have focused predominantly on voluntary certification or legislation. However, problems have not been adequately defined, and solutions have not been sufficiently explored to be confident about all policy recommendations or decisions. New analytical tools yet to be used include topic mapping and the DPSIR (driving forces, pressures, states, impacts and responses) framework. This review is an attempt to provide a comprehensive update on the trade and to suggest new ways forward, with an emphasis on the Pacific Ocean region for production, and the United Kingdom for consumption.

Introduction

Context

The ornamental tropical marine fish trade is set in the context of mainstream conservation (Balmford and Whitten 2003), natural resource management (Glaser et al. 2010), and the trades in ornamental freshwater fishes (Gerstner et al. 2006), ornamental invertebrates (Rhyne et al. 2009), marine curios (Grey et al. 2005), and live reef food fishes (Scales et al. 2007). Analogous labelling initiatives include the generic fair trade movement (FLO 2010), and for seafood, the Marine Stewardship Council (Gulbrandsen 2009) and the Aquaculture Stewardship Council (Dickson 2010).

Scale of the trade

Using government statistics, published scientific articles, grey literature and personal contacts, Wood (2001) estimated the global number of fishes exported to be 11–20 million and the number of fishes imported to be 25–40 million per year (different datasets and a lack of tracking information led to differing estimates). While Wood is frequently cited, she notes that her estimates are “very rough”

and “should be treated with caution.” She was subsequently misquoted in an extensively cited chapter by Green (2003) who mistook her catch estimates of 14–30 million fishes (including those dying before export) as her trade estimates.

A Global Marine Aquarium Database (GMAD) launched in 2002 was designed to capture accurate trade data (Green 2003), but data entry stopped after one year. The United Nations Environment Programme, using data for 1998–1999 from importers and data for 2000–2001 from exporters, estimated that 20–24 million fishes were traded annually (Wabnitz et al. 2003). The United Nations’ estimation method was unclear but required an extrapolation of data representing less than 0.5% of their lowest estimate. However, the Ornamental Aquatic Trade Association (OATA¹) states that GMAD data are “still probably the best available” (Keith Davenport, Chief Executive, Ornamental Aquatic Trade Association, pers. comm. 2009). The European Union (EU) commissioned a consultation on improving trade statistics related to EU imports of tropical marine fishes (UNEP-WCMC 2008). There has been no outcome since the report’s submission. Plans are underway in the United States (USA) to improve their trade data (Cooper and Best 2009).

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² <http://www.ornamentalfish.org/>

Combining prior estimates with up-to-date key informant knowledge, but without using the available data accessed by Smith et al. (2008), Zajicek et al. (2009) estimated that 20 million fishes are traded annually. Compounding the criticisms of earlier estimates (which Zajicek et al. rely on), is the fact that key informant data were not published, so their assumptions are unknown, and being anecdotal, the estimates cannot be statistically validated.

USA import data for 2000–2005 show that the average annual import of ornamental fishes (marine and freshwater) for this period was 187 million, although the authors note “poor record keeping at ports” (Smith et al. 2008). Detailed 2005 data indicate that 8% (nearly 15 million when back-calculated) were

marine fishes. Combined with GMAD data (Green 2003), and noting that 61.4% of tropical marine ornamental fishes were traded in North America, a rough recalculated global estimate increases to 24.4 million (excluding the 4.3% shipped within but not “imported” from USA waters). Incidentally, the GMAD itself apparently excludes data from Japan. With suggestions that the Japanese market accounts for at least 10% of global imports (Wood 2001), a final roughly recalculated global estimate is 27 million tropical marine ornamental reef fishes traded annually.

The relative scale of exports among countries (Wood 2001) is shown in a density equalisation map³ (Gastner and Newman 2004); in Figure 1, the darker

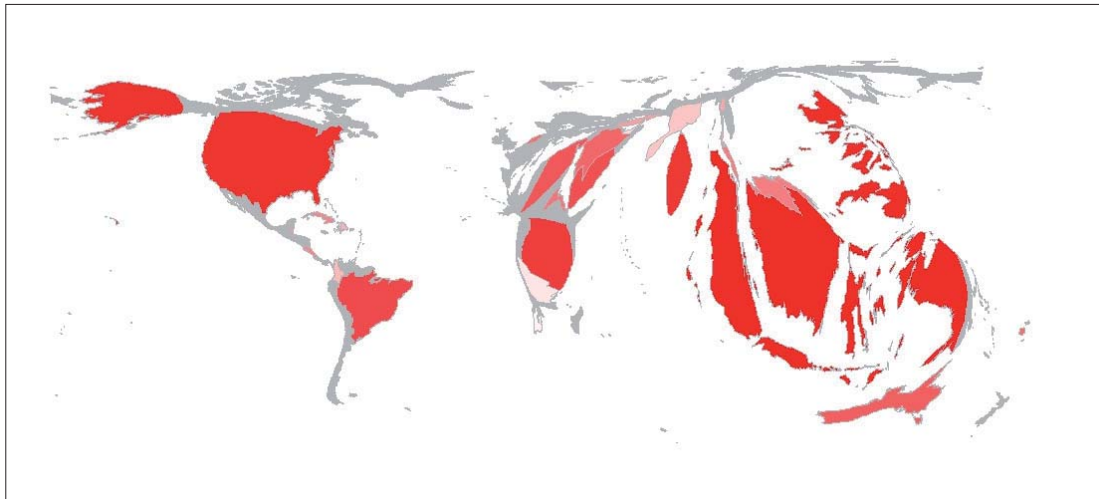


Figure 1. Density equalisation map for exports of tropical marine ornamental fishes, by country (produced by the author using open source Mapwindow™ GIS and ScapeToad software).

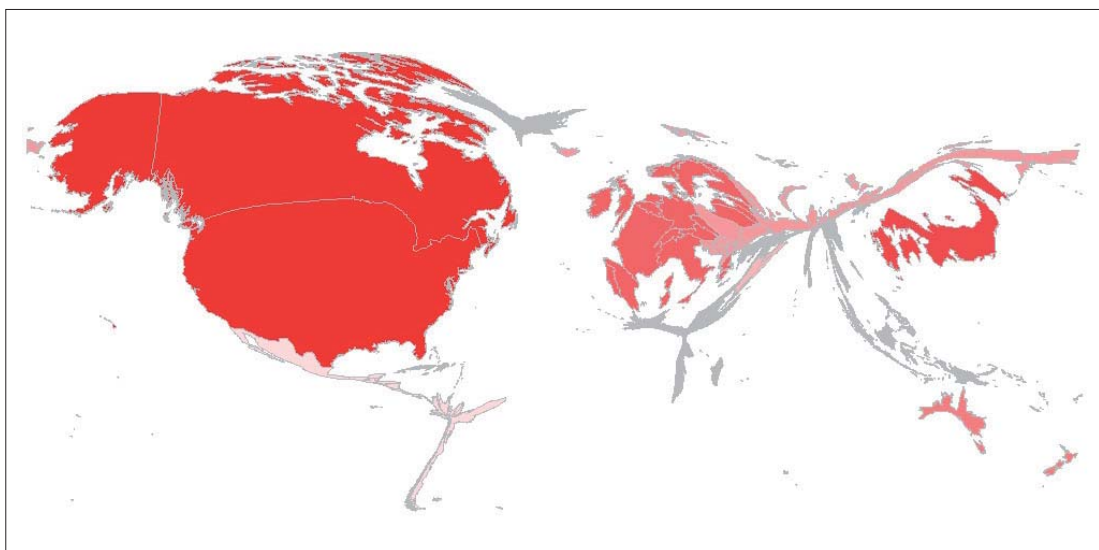


Figure 2. Density equalisation map for imports of tropical marine ornamental fishes, by region (produced by the author using open source Mapwindow™ GIS and ScapeToad software).

³ A density equalisation map adjusts the sizes of map areas (in this case the world’s countries or regions) to match some form of relative data — in this case their exports (and in Figure 2, their imports) — without changing their positions relative to each other.

the colouration, the greater the rate of export. The relative scale of imports across regions, from Green (2003) supplemented by Rhyne et al. (2009), has been similarly mapped in Figure 2, and assumes that an additional 10% goes to Japan. Recent unpublished data, not reflected on this map, suggest that China has now joined the USA, the European Economic Area and Japan in the top ranks of marine ornamental fish importers (Zajicek et al. 2009).

Scope of the trade

Capture

The main source of fishes is the capture of adults on coral reefs (Reksodihardjo-Lilley and Lilley 2007; McCollum 2007). Cyanide use — previously common across the Philippines and now increasing in Indonesia — can have a devastating impact on collected fishes (up to 75% may die in transit as a result), uncollected fishes, corals and other invertebrates (McCollum 2007). More sustainable techniques involve fine-mesh hand nets and mist nets. However, their use can significantly damage coral — mist nets when snagged, and either one when used in company with sticks or rocks to break coral refuges. So-called “non-destructive” techniques have also been criticised because excessive fishing pressure can significantly alter local population structures, at least in species with no pelagic dispersal mechanism (Kolm and Berglund 2003).

Culture

Most reef fishes produce pelagic larvae, only a minority of which can find a suitable reef before dying. The vast majority of larvae that reach a reef are eaten by predators prior to settling, and this high pre-settlement mortality makes pre-settlement harvest significantly less environmentally damaging than the harvest of equivalent numbers of settled adults (Dufour 1997). Export resilience is highest in young adults; without local post-capture culture, juvenile harvest is almost worthless. Additionally, post-larval rearing enhances future acclimatisation because fishes will then be accustomed to artificial food (Lecchini et al. 2006). However, Bell et al. (2009) note that while post-larval capture and culture can benefit smaller scale or artisanal enterprises near export hubs, its commercial viability is reduced by the huge and often unpredictable fluctuations in available species and quantities within a given locale, leading to mismatches of supply and demand. There is also a risk to isolated island fish communities dependant on local replenishment rather than pelagic dispersal.

Hayes (2009) states that to date, less than 150 tropical marine ornamental fish species have been bred, while more than 1,300 species are currently traded

but awaiting viable culture protocols. This is close to the estimate offered by Zajicek et al. (2009) of 1,500 fish species in the marine ornamental trade. Koldeway and Zimmerman (2007) note, however, that nearly 300 of approximately 700 marine species bred have been bred over multiple generations. The Marine Ornamental Fish and Invertebrate Breeders Association has Internet forums dedicated to 21 different bony fish families, as well as notes on 11 other families, alongside a dedicated forum discussing shark and ray breeding (MOFIB 2010). But apart from a core of highly popularly bred marine fishes (e.g. the anemonefish *Amphiprion percula*), the vast majority of individual fishes bought by hobbyists are wild-caught.

Pomeroy et al. (2006) examined the option of small-scale aquaculture in countries that normally only harvest adults. High investment costs limit this option's likely viability. Large-scale breeding in wealthier countries (Wu 2009), with small-scale enterprises providing broodstock in the fishes' native countries, is more viable economically.

Trade structure

Zajicek et al. (2009) have examined the marine ornamental trade pathway as it applies to Florida, but it remains a useful template for understanding the structure of the whole trade. Essentially, collectors and culturists supply exporters, often with at least one intermediate buyer or broker (Reksodihardjo-Lilley and Lilley 2007). Importers then sell wholesale to retailers, who sell to consumers. Crucially, survival after final purchase depends on a fish's health when bought. This is itself related to retail quarantine practices. The hobbyist's skill plays a later, but important, role too (McCollum 2007).

Analyses of power and resource distribution in live reef fish food chains in the Pacific offer analogies that probably also apply to marine ornamental fishes. These include an inequitable balance of information, risk and investment, the conservatism of primary producers, and market fluctuations (Muldoon and Johnston 2006).

While wholesalers undoubtedly hold detailed data regarding sales to retail clients, such data are kept commercially confidential. When writing directly to 435 British aquarium retailers regarding marine ornamental polychaete worm sales, Murray (2010) obtained zero initial responses, and after 45 retailers were given a telephone follow-up, only two eventually provided any written data.

Very little research has directly involved hobbyists. Most recently, Murray (2010) received 314 responses from marine hobbyists to a self-selecting, United Kingdom (UK)-oriented, online survey. Of the six

pre-defined purchase factors (including “Compatibility”, “Looks good”, “Easy”, “Price” and “Function”), “Local shop recommended” was most often the lowest priority. Information from retailers about an animal’s source was desired by 91%, and 55% had heard of the Marine Aquarium Council (MAC). Furthermore, 97% would be prepared to buy a cultured animal at a price premium. Notwithstanding a willingness to pay more for sustainably caught wild fishes, another study suggested that hobbyists who were aware of MAC “revealed a strong lack of credibility for the MAC program and a higher confidence in alternatives,” preferring either tank-bred fishes or survival guarantees (Alencastro et al. 2005). But McCollum (2007) found that hobbyists in the USA were often ignorant of MAC.

In the USA, Zajicek et al. (2009) quote data from the American Pet Products Manufacturers Association annual consumer survey of 2007–2008, estimating that 800,000 households keep a tropical marine aquarium, each with an average of 12 fishes (around 10 million held at a time). However, Zajicek et al. note that around 9% of these fishes may have come from friends and relatives (some through home breeding). Assuming that: 1) 60% of the global trade reaches the USA, 2) all imported fishes are sold, 3) 20 million fishes are globally imported, and 4) commercial sales represent the remaining 91% of hobbyist fishes, the average turnover, and hence life expectancy, in hobbyist captivity would be around 8 months.

Additionally the Natural Resource Management Ministerial Council (NRMMC) (2006) of Australia quotes unsourced data for the UK, suggesting that 40% of fishes are kept by 7% of hobbyists. A power-law distribution in keeping with the Pareto principle and based on this figure would suggest that one-third of hobbyists keep two-thirds of fishes. It is not known whether turnover rates are similar among hobbyists.

The other significant consumer of imported marine tropical ornamental fishes is the public aquarium sector, although Koldeway and Zimmerman (2007) at the London Zoo suggest that “compared to the hobbyist market, public aquariums are minute consumers”. Being regulated under zoo legislation, and viewing healthy fishes being the reason the public attend, public aquarium fish welfare is closely monitored in the UK. It is not certain, however, how many public aquariums have gone as far as the London Zoo, which has a comprehensive Sustainable Acquisitions Policy. This incorporates MAC standards as minimum expectations for wild-caught display organisms, but allows for species rescue-breeding and re-homing of Customs seizures. Additionally, cultured fish can be considered, with a preference

for farms in fishes’ native countries. The authors note that, “There is a balance between the issues of welfare of fish handling and transport, and the capture impact sustainability.”

Lastly, USA authorities believe that organised crime is a significant threat arising from the marine aquarium trade (Cooper and Best 2009), with the potential to distort the structure and transparency of the trade. No data on the subject have been published, however, so it is difficult to make an independent judgement.

Impacts

Sustainability

Well documented examples of ornamental collecting pressures threatening full species extinction are rare. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) presently lists no such species, not even Indonesia’s Banggai cardinalfish, although at least one attempt has been made to list it (Vagelli 2008). However, local or regional vulnerability is possible (Teitelbaum et al. 2010) and can be ascertained using a tool validated by Roelofs and Silcock (2008).

Cyanide is frequently used to assist with the capture of tropical marine aquarium fishes but it can kill or damage coral *ex-situ* in the doses regularly used (Jones 1997), with the attendant risk of irreversible habitat change at damaged reefs that comes from algal over-colonisation of dead coral. Initially used primarily in the Philippines, its use is widespread in Indonesia, with multiple negative impacts on ecosystems, fishes exported, and collector communities (McAllister et al. 1999). The situation is worsened when collectors use surface compressor piped air (“hookah”), which allows longer and deeper dives than free or scuba diving (Pet and Djohani 1998).

In importing countries with tropical or subtropical zones, such as Florida and Hawaii in the USA, significant social and political arguments exist to severely limit aspects of the trade relating to non-indigenous, or exotic, fish species, although there are questions about its real economic and ecological impacts (Zajicek et al. 2009). The Indo-Pacific lionfish invasion of the Caribbean is the most quoted ecologically damaging example (Albins and Hixon 2008). In Australia, Whittington and Chong (2007) have gone so far as to call for “the number of species traded and the number of sources permitted ... to be dramatically reduced to facilitate hazard identification, risk assessment and import quarantine controls,” not least for fear of disease spreading to indigenous species.

Equity

The livelihood value to artisanal communities of collecting for the marine ornamental fish trade, and community capacities to manage the natural resources that they control, have been catalogued in Indonesia (Reksodihardjo-Lilley and Lilley 2007; EC-PREP 2004), Fiji (Teitelbaum et al. 2010) and the Philippines (Vincent 2008). Where community-based natural resource management mechanisms are controlled by external, dominant stakeholders, reef fish overexploitation can simply become locally sanctioned (Thorburn 2003), and collectors can become exploited and indebted to the buyers they depend on. The additional problems of death and injury related to poor diving technique and equipment are carefully explained by McCollum (2007).

Welfare

Post-capture holding and transport are critical steps in the trade. Schmidt and Kunzmann (2005) estimated mortality rates at between 10% and 40% prior to export from a facility in Bali, Indonesia. This is far greater than MAC's target of less than 1% at each step in the trade. Much could be done to reduce export-related mortality from estimates that reach as high as 30% (Rubec and Cruz 2005): Temperature maintenance and available oxygen could be improved; fish densities and light ambience could be lowered; and chemicals could be added to buffer pH, neutralise ammonia, inhibit bacteria, and sedate fishes. Even accessing timely transport can be a significant problem (Teitelbaum et al. 2010).

Little appears to have been published regarding distributor or retailer husbandry outcomes, although OATA has published guidelines for members (OATA 2000) and offers training to retailers and local authority pet shop inspectors in the UK. Even less appears to have been published about hobbyist husbandry outcomes, although specific supportive resources have been published (Wood and Dakin 2003; Fenner 2008).

Responses

Certification

MAC was established to certify services for all parts of the tropical marine aquarium retail trade. Intended to have a comprehensive impact, Core Standards were developed for: 1) Ecosystem and Fisheries Management; 2) Collection, Fishing and Holding; and 3) Handling, Husbandry and Transport (Alencastro et al. 2005; Shuman et al. 2004).

Reksodihardjo-Lilley and Lilley (2007) describe some of the benefits of MAC-certified links for fishermen collecting in Indonesia. However, significant criticisms of ornamental fish certification initiatives from as early as 2006 regarding poor cost-benefit ratios, industry resistance, and lack of consumer demand have been the subject of very public assertions (Tlusty et al. 2006).

Criticisms of MAC programme strategy, and public revelations of major partnership challenges, have both emanated from a major donor evaluation: "Overall, the strategy of transforming the industry through the MAC certification of the entire chain of custody is not working... The partnership between the three organizations (MAC, RCF⁴ and CCIF⁵) is dysfunctional" (Bellamy and Winsby 2008). Anticipating this review, MAC's leadership changed in 2007 (Mainenti 2007), and four major developments resulted. The first has been an increasingly proactive stance by the USA government. Second is the initiation of a new European organisation: the Sustainable Aquarium Industry Association (SAIA), formally registered in late 2009, which hopes to provide monitored certification for retailers (Hayes 2008). The third development is that MAC has instituted changes, leading to a new, more accessible initiative for retailers — the Licensed Retailer Program (Mainenti 2009). It is worth noting that the UK has had only one MAC-accredited retailer, and it no longer operates. UK hobbyists now have great difficulty identifying the provenance of fishes in the average shop (Hayes 2008). The fourth development is the proposal, emerging from a workshop in Noumea, New Caledonia in December 2008, to develop a specific "Pacific Eco-Certification" programme (Teitelbaum et al. 2010).

Despite early promise, freshwater tropical fish certification initiatives have never made much progress (Chao and Prang 1997; Bicknell 2004). At present, the freshwater tropical fish sector looks to breeding for much of its sustainability, and to MAC for lessons in self-certification, although it has been suggested that the Forest Stewardship Council (FSC) might be more appropriate (Tlusty et al. 2006). As such, the marine tropical ornamental trade can learn little from certification efforts in the tropical freshwater domain.

It is worth noting the range of criticisms aimed at MAC's analogue — MSC — which has been accused of: 1) certifying fisheries that are not really sustainable (Dickson 2010); 2) not providing a sufficient financial incentive to fishermen; 3) remaining

⁴ Reef Check Foundation

⁵ Conservation and Community Investment Forum

out of touch with consumers (Goyert et al. 2010); 4) being insufficient to halt declines in fish stocks (Gulbrandsen 2009); and 5) marginalising small-scale producers (Ponte 2008). This is despite the initially assessed environmental benefits of MSC (Agnew et al. 2006). The whole certification initiative has, from the beginning, also been relegated in the eyes of some in the mainstream conservation world to a welcome, but insignificant, role (Balmford and Whitten 2003).

Also worth noting is the position of the 24 existing Fairtrade Labelling Organisations (FLOs) on certification. In their own words, "FLO is the only certification scheme that sets out to tackle poverty and empower producers in developing countries. Other schemes have as their focus 'protecting the environment' or 'enabling companies to trace their coffee'. They don't claim, or set out, to help producers improve the quality of their lives and take more control over their futures" (FLO 2010). While FLO operates with generic trade and producer standards, they have yet to develop any product standards specific to live animals. There have also been a number of criticisms levelled at Fairtrade in recent years, almost all of which are economic. Four key criticisms, rebutted by the Fairtrade Foundation (2008), are that: 1) member producers benefit at the expense of non-members; 2) less needy farmers have preference over more needy ones; 3) Fairtrade perpetuates a cash-crop farming poverty trap by reducing diversification; and 4) there are preferable ethical approaches to trade.

Legislation

The USA government is less sure now about the hopes for effective voluntary controls than it was at the start of this millennium when its Coral Reef Task Force suggested that, "after working with stakeholders over a specified time period, the U.S. should prohibit the import or export of any coral reef species unless accompanied by certification that the products were not taken through the use of destructive fishing practices" (quoted by Lieberman and Field 2001). While recognising the need to educate consumers more effectively, they now note: "Previous attempts to redefine the trade without legislative intervention have stumbled partially due to a lack of a clear understanding of the nature and scope of the industry as well as the behavior of players in the market". Indeed, they are prepared to state that, "a large percentage of the trade is currently in violation of existing laws...in the U.S. governing illegally harvested imports" (Cooper and Best 2009). While also alleging "the continued failure of CITES," a

recent USAID⁶-organised workshop proposed that USA laws need reforming (incorporating import, wholesale and retail licensing elements), and USA enforcement needs improving (Tissot et al. 2010). The USA dominates the marine ornamental export market, so significant changes to its import regime would have similar effects on other markets.

In the UK and Europe, a number of proposals have been made or implemented regarding regulating the marine ornamental trade, including one call for all imports to be certified (Taber 2008). The Swiss now appear to have the strongest welfare laws to cover fishes kept by hobbyists (Swiss Confederation 2008), with interpretations indicating that certain fishes are now required to be kept in social groups, and aquariums must have at least one opaque side (Pancevski 2008). UK animal welfare law makes no direct reference to hobbyist fish keeping but, as vertebrates, fishes are clearly protected from unnecessary suffering and an owner has a duty to "take such steps as are reasonable in all the circumstances to ensure that the needs of an animal for which he is responsible are met to the extent required by good practice", and mention is specifically made of "any need it has to be housed with, or apart from, other animals" (United Kingdom Parliament 2006). Research by Saxby et al. (2010) implies that even in the UK, there might already be a duty for hobbyists to keep social fishes in shoals.

Public aquariums are covered by specific zoo legislation (United Kingdom Parliament 1981), as are pet shops (United Kingdom Parliament 1983), and international fish transport is covered by the International Air Transport Association's Live Animal Regulations (IATA 2010), while EU Wildlife Trade Regulations stipulate other reporting and licensing requirements, including those for CITES (TRAFFIC Europe 2009).

Management

Rhyne et al. (2009) have called historical fisheries management "inexact and reactionary... often taking action only after a critical stock suffers overfishing or collapse." They note the need to switch from reactive to adaptive control. Notably, adaptive approaches for marine aquarium collecting have been the legislated norm in Hawaii for 20 years (Tissot 1999), and commercial practise in Fiji for longer (Teitelbaum et al. 2010). Kingsford et al. (2009) go further, recommending that ornamental fish exports should all require licences and only involve bred or sustainably managed natural stocks.

⁶ US Agency for International Development

While ecosystem-based management has been promoted for the supply side of the trade (Tissot et al. 2010), the interaction of official marine management systems such as marine protected areas and locally derived natural resource management can have counter-intuitive outcomes and care should be taken to fully understand proposed management areas and outcomes (Glaser et al. 2010).

Opportunities

Ontology

The internationally standardised topic mapping method (ISO 2003) allows all issues within a domain to be mapped, using the dimensions of topic and association (Pepper 2002). Initially, an ontology must be developed for the domain in question (Garshol 2007). A topic map can then be built and used for indexing instances of opinions, themselves sought through interviews, journal articles, and Internet-based opinion mining (Pang and Lee 2008). A topic map allows various features of issues to be consistently explored, including the polarity, extent, strength and necessity of opinions, alongside asserted or actual trends. However, there does not appear to be an ontology of the ornamental tropical marine fish trade domain, which could enable a clear and simple topic map of the issues to be built. Research is needed to lay the foundation for comprehensive opinion analyses, by defining the layout of a comprehensive, domain-specific topic map, allowing priorities, opportunities, and resistances to be more transparently and comprehensively factored into, or excluded from, policy-making.

Model

A “web of causality” has been used to explore entities, actions and consequences within the domain (McCullum 2007). This is apparently the only attempt to model the trade. While helpful, it is limited to a simple diagnosis of the underlying causes (hobbyist demand), and problem resolution focused solely on non-government organisation influences on knowledge and practises.

When analysing environmental indicators and constructing policy options, the DPSIR is used. This proposes that “drivers” lead to “pressures”, which affect the “state” of a system. Changes in “states” then have “impacts” and, consequently, a number of “responses” can be derived in order to tackle the problem at any of its links (Kristensen 2004). Human development needs can also be considered alongside environmental conservation opportunities (Svarstad et al. 2008). A comprehensive DPSIR framework covering the domain could be a useful contribution to policy-making and practice.

Analysis

Despite detailed analyses of some small subsections of the domain such as Indonesia (Reksodihardjo-Lilley and Lilley 2007) and post-capture culture (Bell et al. 2009), recent analyses of the whole domain have either focused on single strategies such as consumer advocacy (Livengood and Chapman 2010), or have been restricted to a minimalist expert consensus position (Tissot et al. 2010). This review is intended as a comprehensive, yet succinct, review of the domain, in the expectation that a comprehensive ontology and DPSIR framework will allow for better recommendations to emerge.

Conclusions

Little comprehensive or recent data are available on the scale of the tropical marine fish trade, with large-scale reviews relying on estimates. More has been described about the trade’s negative attributes than its positive ones. The trade’s structure and impacts are broadly known but not usefully collated. A number of solutions of varying utility have been attempted or proposed. The trade also has a number of helpful analogies from which lessons can be learned. But even without the questionable outcomes of MAC’s history, it is possible to imagine that it and the recently launched Aquaculture Stewardship Council share analogous vulnerabilities to MSC. These are related to their similar origins, structures and methodologies, if not to a common conceptual weakness associated with the wider eco-certification movement. The potential for these or other certification initiatives to benefit tropical reef sustainability, reef-using human communities, and reef fish welfare is by no means assured.

It is time to consolidate what is known in the field, and to analyse it with new methods, before making more policy decisions. With increasingly strongly contested assertions, potentially divergent objectives to the mainstream fair trade movement, and an uncertain future regarding the public perception of fish welfare (in the context of potentially under-utilised laws in the UK), the time is ripe, now that new tools are available.

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The policy–practice dichotomy: An analysis from Palawan, Philippines

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Introduction

Although the live reef fish for food trade (LRFFT) has provided a much-needed source of income for impoverished coastal communities across the Asia-Pacific region, ensuring that the trade operates sustainably has proven difficult. In Palawan Province, Philippines, the LRFFT faces substantial challenges. Years of intense fishing pressure, as well as the use of sodium cyanide to catch live fish, has resulted in significant levels of coral reef degradation and the decline of fish stocks in parts of the province (Padilla et al. 2003). Hence, fishers in some locations must now travel greater distances and for longer periods to find fish, and struggle to make ends meet as their ability to easily catch fish decreases (Fabinyi 2010). Attempts at regulation have been introduced, but implementation and enforcement of these regulations remains challenging (Dalabajan 2005, 2009; Fabinyi 2009a).

This paper analyses how attempts at governing the LRFFT in Palawan over time have been successively hindered. The paper focuses particularly on how certain features of the social² landscape in Palawan have overturned or significantly reduced the impact of various regulations. Although other factors are certainly at play — not least the sheer market demand for live fish in market countries — this paper emphasises the role of three inter-related local social themes: 1) the capacity of government institutions and legal frameworks to effectively implement regulations, 2) the distinctive culture of fisheries governance in the Philippines, and 3) the perspectives and practices of local fishers themselves. By focusing on such features, the paper aims to draw greater attention to how in a developing country context such as the Philippines, policies are not necessarily the central driver behind actual practices on the ground. The reality of this social context means that formal policy and management interventions are just one of a broader suite of factors that determine practices.

Managers involved in trying to regulate the trade are frequently well aware of many of these issues; similarly, analysts of the LRFFT in Palawan have alluded to the complicated nature of policy-making and to the “interplay of political and business dynamics” (Pomeroy et al. 2008). However, given the continuing gaps between policy and practice in many source LRFFT countries, a more explicit and detailed examination of the factors that lie behind these gaps is necessary (Mosse 2004). The history of the ways in which local factors have shaped and overturned specific management interventions in Palawan suggests that greater attention could still be paid to specific local factors that, in the end, tend to actually determine local resource use patterns. While this paper focuses on Palawan, the issues of implementation and enforcement are common to many developing countries (including most source LRFFT countries), and so the arguments presented have relevance for other locations as well.

The material for this paper is informed by long-term research on and experience with the LRFFT in Palawan by both authors. More broadly, the methodological approach used is framed by an anthropological perspective on policy, which, among other concerns, is characterised by taking the policy process itself as an object of analysis (Mosse 2004; Wedel et al. 2005). Fabinyi has conducted ongoing ethnographic fieldwork in Coron municipality in the Calamianes Islands of northern Palawan since 2005. He was based in a coastal community there for 12 months between 2005 and 2007; more recent research in 2009 included semi-structured interviews with 115 live reef fish collectors from five coastal communities around Coron. Interviews were also conducted with fish traders, and government and non-governmental organisations involved with the LRFFT in Coron town and in Puerto Princesa, the provincial capital. Dalabajan has worked closely on the LRFT in Palawan since 1998 as a policy specialist, and has co-authored several reports relating to fisheries law enforcement in the region.

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2 The use of the word “social” in this paper is a simplified term that encompasses economic, political and cultural factors as well.

Regulating the LRFFT in Palawan

As has been well documented, the LRFFT has, in many cases, been associated with significant environmental problems, such as the use of sodium cyanide and the more general problem of overfishing (Sadovy et al. 2003; Scales et al. 2006). In large part because of the environmental concerns associated with the LRFFT, there have long been and continue to be considerable efforts (by a range of organisations) directed towards increasing the sustainability of the trade. Many of the issues facing the LRFFT have been exemplified by experiences in the Philippines, and more specifically Palawan Province, where the LRFFT has increased in value and expanded since beginning in the 1980s. Currently, the LRFFT in Palawan is practiced in virtually every coastal part of the province. As elsewhere, a key concern has been the use of sodium cyanide. Cyanide testing laboratories set up by the International Marinelifelife Alliance (IMA) in Manila and Puerto Princesa show the range of annual averages of tested samples of live food and aquarium fishes testing positive for cyanide to be from 11% to 59% between 1993 and 2001 (Rubec et al. 2002; see also Padilla et al. 2003; Dalabajan 2005).

In the early 1990s, decision-makers in Palawan started to look more seriously at LRFFT regulation after the much publicised exposé of the IMA about the effects of an unregulated LRFFT. The provincial government in 1993 and the City of Puerto Princesa in 1992 instituted bans on the LRFFT, which evoked strong reactions from industry. The provincial ban prompted live reef fish traders and airline shippers to file a case in the Supreme Court seeking nullity of the ordinance, arguing that the prohibition would deprive them of due process and livelihood and would unduly restrict them from practicing the trade. Later in 1993, the provincial government lifted its ban except for certain species, such as the humphead or Napoleon wrasse (*Cheilinus undulatus*), humpback or panther grouper (*Cromileptes altivelis*) and some species of aquarium fishes. Ironically, in 1997, the Supreme Court ruled in favour of the original provincial ban, citing that the prohibition of the LRFFT was a lawful exercise of power to ensure, among many other goals, a balanced ecology (Supreme Court of the Philippines 1997). The City Government continues to retain its ban.



Figure 1. Palawan Province, Philippines.

In 2000, the Palawan Council for Sustainable Development (PCSD) passed Administration Order No. 2000-05, which put into effect a revised and more detailed accreditation system for culturing, catching, trading and transporting live fish species. In 2002, PCSD Resolution 97 (2002) was passed in order to prohibit the possession or use of an air compressor on a fishing boat, and a moratorium on the number of permits to trade live fish was also issued.

By the early 2000s, a range of reports by national and international organisations underscored the negative effects of the LRFFT in Palawan. Such reports emphasised the basic problem of overfishing, and analysed specific issues relating to the continuing use of cyanide, a decrease in the mean size of leopard coral grouper,³ an increase in the practice of fish cages for grouper grow-out, and some of the social impacts of the trade, such as loss of livelihood security (e.g. Conservation International 2002; Padilla et al. 2003). In 2005, the US Agency for International Development-funded Fisheries for Improved Sustainable Harvest (FISH) Project produced a policy brief on the LRFFT in Palawan, which consolidated the recent findings on the negative trends of the LRFFT in Palawan (Pomeroy et al. 2005).

³ *Plectropomus leopardus* is the most important species in the LRFFT in Palawan in terms of value and quantity.

In response to the policy prescriptions of the FISH Project report, the provincial legislative council passed Provincial Ordinance 941 in 2006, which was primarily characterised by the introduction of two new pre-conditions before LRFFT could be allowed in a municipality: the establishment of fish sanctuaries and the introduction of closed seasons. Over the course of 2006 very few municipalities complied with either of these pre-conditions, prompting the provincial Bureau of Fisheries and Aquatic Resources (BFAR) to declare a province-wide moratorium on the export of live food fish. Predictably, the traders in the municipalities were angry, and municipal leaders and fishers descended to the provincial capital, pleading the case for LRFFT collectors, who, they argued, would bear the biggest toll of the moratorium (Dalabajan 2009; Fabinyi 2009a). The moratorium was lifted shortly afterwards, with Provincial Ordinance 941 unimplemented.

The PCSD continued to be concerned about overfishing, which led to the issuance of Resolution No. 07-340 in December of 2007. The resolution sought to establish a quota system for the export of live reef food fish, with a maximum allowable volume of 140 metric tons per year on the provincial scale. Since the passage of the resolution, considerable negotiation with the industry has occurred, primarily over how to allocate the quota among the traders. By mid-2011, the quota system was being subjected to another review, and had not yet been implemented.

Discussion

Government capacity and legal weaknesses

As the work of Dalabajan (2005, 2009) has indicated, the capacity to enforce legislation is an ongoing challenge in Palawan. Weaknesses in the judicial system, and the current regime of testing for sodium cyanide mean that fishery violations for using sodium cyanide, for example, are usually not prosecuted. Dalabajan (2005) presented a striking statistic: despite an estimated 250,000 individual cyanide fishing trips between 1999 and 2002 in the Calamianes Islands, there was not a single successful conviction for cyanide fishing between 2001 and 2005.



Figure 2. Live reef food fish being loaded on an airplane at Coron airport, Calamianes Islands.

Problems of monitoring and accreditation are also clear. The trade in the eastern island municipality of Cagayancillo and in the remote, extreme southern municipalities of Palawan is virtually completely unmonitored and unregulated. It is unlikely that any attempt to monitor or regulate this trade will be successful until broader issues of governance and cross-border trade are addressed. A more recent concern involves the remarkable increase in the operation of fish cages for groupers and the ability of governments to successfully regulate this trend. Fishers supply fish cage owners with wild-caught juveniles, which are then placed in cages until they reach a marketable size. In the absence of full-cycle aquaculture, however, fish cages will hasten the decline of grouper stocks. A vast proportion of fish cage operations used for grouper grow-out are unaccredited, and the absence of PCSD accreditation means that the catch does not go through the standard recording system.

More generally, the legal framework for the LRFFT in Palawan is characterised by confusion and a lack of harmony between laws and different levels of jurisdiction. The industry has effectively argued, for example, that a prohibition against live reef fish exports in the Fisheries Code of 1998 does not apply, because of a lack of an administrative order from BFAR (Dalabajan 2005). Questions also remain about which levels of government have control over regulations relating to waters and marine resources. PCSD nominally has the power to make province-wide laws over everything to do with the environment and natural resources. However, in

practice, PCSD and the provincial council tend to work with individual municipalities, which argue that under the national Local Government Code of 1991, they have control of “municipal waters” — waters extending 15 km from shore. This means that any attempt to implement a uniform, province-wide system of regulation is likely to be a long and slow process of negotiation to get individual municipalities to institute the legislation. As Dalabajan has argued (2009), in 2006 municipalities were able to band together and force the provincial government to “blink first” and back down over its threat of a moratorium. With regard to the quota system, although the legislation was passed at the provincial level in December 2007, by mid-2009 no municipality had instituted a corresponding municipal ordinance. While decentralisation is usually regarded as a form of governance that lends itself to equitable and efficient patterns of resource management, in this instance the power of the municipalities has proven to be a notable obstacle in instituting any province-wide system of regulation.

The culture of fisheries governance in the Philippines

The problem is not only a failure to enforce regulations because of a lack of resources or weaknesses in legal frameworks, but also the issue of what is typically labelled “political will”, or a lack thereof. It is not the intent of this paper to suggest that local governments are unwilling or incapable of regulating the fishery. Indeed, the case of Puerto Princesa City, where the government has instituted a blanket ban on LRFFT activities since 1992, illustrates that regulation is seen as a need by some policy-makers and governments. However, there is an extremely high level of concern among many stakeholders — particularly among fishers — about the standards of fisheries governance in Palawan (Fabinyi 2009a). This is not always a simple issue, however. What is often simply labelled as a lack of “political will”, or even more simply as “corruption”, can be more helpfully broken down into three categories or patterns of governance.

First is the way that local politicians in the Philippines are pressured to address the concerns of fishers. Fisheries regulations are typically resisted and reshaped by fishers who appeal to concerns about livelihood and poverty (see Fabinyi 2009b for details). As many social scientists have noted, the idea of a “right to survive” (Szanton 1972), or that of a “basic rights discourse” (Kerkvliet 1990), is a very strongly-held value among local people in the Philippines, and

local politicians need to be seen as respecting these rights. Frequently, these rights are seen as more important than any more abstract or legalistic laws that may derive from the state (Fabinyi 2009b).

Second, there is a blatant conflict of interest among members of political classes with regard to live fish trading. In many municipalities, for example, prominent live fish traders are liberally represented within municipal councils. As one concerned observer commented on the potential for successfully regulating the trade in one municipality: “At the end of the day, nothing will happen because the people involved in the fishery are the people at the top.” This is certainly a cynical view, but one does not have to subscribe to such a pessimistic opinion to see that conflicts of interest are clearly present.

Third is the issue of more direct corruption. While no specific incidents of corruption are being alleged in this paper, many enforcement agencies are routinely accused by small-scale fishers in particular of specific incidents of extortion of legal fishers, and of accepting bribes from organised networks of illegal fishers (Fabinyi 2009a). Overall, the whole culture of fisheries governance means that any attempt at regulation will face strong institutional opposition.

Practices and perspectives of local fishers

Another set of factors working against regulation in Palawan is the dynamic nature of local fishing practices, and the perspectives of fishers about governance and regulation.⁴ Highly mobile, with flexible livelihood strategies, fishers often: 1) collect live fish in one municipality and then sell the fish in another municipality; 2) migrate seasonally to different municipalities; or, 3) as in the case of southern Palawan, sell the fish to traders who then transport them (undocumented) over the border to Malaysia (Daw et al. 2002). Linked to the mobility of LRFFT fishing practices is the fresh (i.e. dead) leopard coralgroupers fishery. Although there are only limited data on the extent of the fresh leopard coralgroupers fishery in Palawan, according to information provided by BFAR, the fresh leopard coralgroupers fishery may be at least as significant in terms of sales as the live leopard coralgroupers component of the LRFFT. Many of leopard coralgroupers that end up as exported fresh fish are the result of mortality from the LRFFT; however, there are also other fishers who target fresh leopard coralgroupers, specifically because of the relatively high price of fresh leopard coralgroupers compared with other fresh fish species — around PHP 600/kg (or

⁴ Clearly, in addition to the local factors emphasised in this paper, the forces driving the consumption of live fish in market countries and the increasing prices are of great significance for fishers. In Coron, shortly before the Chinese New Year in 2009, for example, prices to fishers reached PHP 3,100/kg, or USD 62/kg. Any long-term solution to addressing the sustainability of the LRFFT must address these issues.

USD12/kg) to fishers for export-quality product. This means that even if any system of regulation for the LRFFT is successfully implemented, it has the potential to push more fishers into the fresh leopard coral grouper trade, and hence may do little to prevent overexploitation of the most important species of the LRFFT in Palawan.

Related to fishers' practices are their perspectives about regulation that tend to discourage regulation of the LRFFT (see Fabinyi 2009a, 2009b, 2010). In particular, the view of many fishers is that authorities should focus much more attention on preventing illegal fishing with cyanide, as opposed to restricting the activities of small-scale fishers who use hook-and-line. The level of cynicism many fishers feel towards political processes means that broad regulations are often viewed as unfair and illegitimate.

An important factor behind these perspectives is the general lack of participation of fishers in the decision-making process. During the implementation of the quota system, for example, very few fishers even knew of its existence. Out of 115 fishers interviewed in 2009 (49 in March and 66 in June) in Coron municipality, only 6 individuals knew of the quota system (5.2%). So even if fishers' organisations may have been nominally represented in the decision-making process, in real terms the participation by fishers has been extremely limited. The lack of power among fishers in the decision-making process of the LRFFT is an issue that has been recognised for a long time in Palawan (see Padilla et al. 2003; Fabinyi 2009a). Importantly, the lack of participation by fishers in this process is not simply a matter of social justice. It is likely to increase the level of popular opposition to any regulations that are introduced. The mobilisation of fishers, and popular discontent with the perceived sudden way in which aspects of Provincial Ordinance 941 were introduced in 2006, was a primary factor why these regulations were never completely implemented (Fabinyi 2009a).

To simply condemn the industry and say that all industry players are ignoring the negative trends of the LRFFT would be overly simplistic. In many provincial summits such as those organised by PCSD and non-governmental organisations, one can see the passion among the fishers and some traders to work towards a sustainable industry. What is clear, however, is that some of the particular regulatory options being pursued have long faced, and will likely continue to face, powerful social factors that inhibit or derail regulation.

Conclusion

This paper has presented an analysis of the ways in which various policies designed to reform the LRFFT have historically played out against the

backdrop of the particular social characteristics of Palawan Province. In doing so, the goal has been to highlight some of the considerable disjunctures between policies and actual practices, and to show how any set of policies must take stock of, and be shaped to some extent by, these particular features of the local context. The paper has not focused on the failures of policy in order to be overly negative and critical; rather, the point has been to demonstrate the value of understanding the local social context when designing strategies to improve the sustainability of the LRFFT. This paper has focused on Palawan, but the problems of implementation and enforcement of policies are widespread across many developing countries. An appreciation of such local contexts is of importance for a range of countries in which the LRFFT takes place.

Efforts at regulating the LRFFT throughout the Asia-Pacific region have taken many forms, and many of these measures have been introduced in Palawan Province. While notable gains have been achieved in various parts of Palawan, there remain significant problems related to enforcement and implementation of these laws and policies. These problems are in large part due to particular features of the social landscape in Palawan itself, which have been emphasised in this paper, including a lack of government and legal capacity; the culture of fisheries governance in the Philippines; and the practices, perspectives and priorities of local fishers.

In this way, the paper has illustrated how policy interventions related to the LRFFT are just one of a number of factors that actually determine LRFFT practices "on the ground" in Palawan. The paper has aimed to unpack some of the "political and business dynamics" alluded to by Pomeroy et al. (2008:64), and to show why a greater recognition and understanding of such contexts is necessary to achieve the aims of sustainable regulation. Many of the organisations and individuals involved in the work of regulating fisheries such as the LRFFT in places such as the Philippines are, of course, aware of many of these issues in practical terms. The point is that these issues could be more explicitly analysed and more usefully applied to goals of sustainability. In Palawan at least, one important potential implication for policy is the need to strengthen particular institutions and organisations that can contribute to greater levels of policy enforcement. Given the historical weaknesses of regulatory actions, greater effort could be directed towards strengthening various governance institutions inside and outside of government. In Palawan, such actions could include greater levels of support for citizens' groups such as the *bantay dagat* (sea wardens), improving the technical capacities of formal law enforcement institutions, and addressing the weaknesses of judicial and legal institutions (Dalabajan 2005).

This analysis has argued that any path to more sustainable forms of governance of the LRFFT may need to more explicitly acknowledge the gaps between policies and practices that frequently exist. While managers and regulators are typically aware of many of these issues, there remains a need to understand in more detail the factors and reasons behind such gaps, the actual social practices and perspectives that drive patterns of resource use, and to evaluate any potential implications for policy. Importantly, the particular factors that shape the efficacy of new policies and laws will vary in different locations, pointing to the ongoing need for deeper understanding of and engagement with the local social contexts in which regulation is always embedded.

Acknowledgements

This article is a revised, summarised version of "Policy and practice in the live reef fish for food trade: A case study from Palawan, Philippines", published in 2010 in *Marine Policy* 35(3):371–378. Michael Fabinyi thanks the PADI Foundation for funding fieldwork in 2009, and the residents of Palawan for generously sharing their time. Both authors thank Sarinda Singh and Tom Graham for comments on an earlier draft of the paper. All errors and omissions remain the authors' own.

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Endangered *mameng* (humphead wrasse) openly traded

Gregg Yan¹

Inside a dank, dimly lit corner shop within the sprawling Cartimar pet complex in Pasay City, Philippines, a representative of the World Wide Fund for Nature (WWF) gazed at a large and brightly lit aquarium where the shop's most expensive fish are displayed for sale.

His eyes veered toward a single fish: A dull greyish-green fish delicately flecked with dark cyan, around the same size and build as a jumbo *tilapia*, but with much thicker lips.

The day's search was done. At last, a *mameng*.

"*Alam niyo po bang illegal iyan* (Do you know that's illegal)?" he asked a slight, moustachioed shop attendant cleaning a tank. Distracted, the attendant shot the WWF representative a quick glance, then shrugged.

Also called Maori, Napoleon or humphead wrasse, *mameng* (*Cheilinus undulatus*) is one of the world's most valuable live food fish, occasionally found in seafood restaurants, markets and even exotic pet retail centres such as Cartimar. Fetching up to USD 138 per kilogram² in posh seafood restaurants in Hong Kong, Singapore, Taiwan and Malaysia, the fish is certainly tasty — but is certainly endangered as well.

How traders are able to sell this, plus other endangered and legally protected marine organisms with impunity, is the story of laxity on the part of the Philippine National Police, Coast Guard, Bureau of Fisheries and

Aquatic Resources, and the Department of the Environment and Natural Resources in enforcing standing laws and curbing the illegal trade in marine life.

Among the world's most massive, colourful and long-lived reef fish, adult *mameng* grow up to 6 feet from snout to tail and can tip the scales at over 200 kilograms. With a lifespan of more than 30 years, *mameng* are classified by the International Union for Conservation of Nature (IUCN) as "endangered" — meaning that wild populations may become extinct without immediate management and protection. Thus, they are protected by Philippine law.

Republic Act 9147, or the Wildlife Resources Conservation and Protection Act, allows the collection of endangered or threatened wildlife (including *mameng*) solely for scientific, breeding or propagation purposes. The Act prohibits the killing of all endangered animals except for religious or indigenous tribal rituals, or if the animals host an incurable and communicable disease, or the animals are



Figure 1. Juvenile *mameng*, or humphead wrasse (*Cheilinus undulatus*), for sale in Penang, Northwestern Peninsular Malaysia (photo by Gregg Yan).

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² USD 1.00 = PHP 44 (as of December 2011. PHP is the Philippine peso)

killed in an act of self-defence. The commercial trade in *mameng*, whether for seafood or the aquarium trade, is punishable by law.

The Philippines became a signatory to the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES) on 16 November 1981. As a signatory, the Philippines is obligated to regulate the trade in all species, whether they fall under CITES Appendix I, II or III.³

Unless special permits are issued by a governing body such as the Philippines Bureau of Fisheries and Aquatic Resources or the Protected Areas and Wildlife Bureau of the Department of Environment and Natural Resources, all trade in endangered species, including consumption and sale, is prohibited.

In 2007, several high-profile Metro Manila restaurants, including Portico 1771 and North Park, were found to have been offering *mameng*. With lobbying from WWF and concerned citizens, the dishes were promptly dropped from the menus.

Sadly, not all establishments have abolished this delectable fish from their menus.

On a Saturday afternoon, hours before the typical influx of diners, the WWF representative visited the Seafood Restaurant Hotpot along Malate in old Manila and asked a trailing waiter, “*Meron po ba kayong mameng* (Do you have *mameng*)?”



Figure 2. In Malaysian Borneo’s Kota Kinabalu City, a single one-kilogram fish can retail for USD 115 (photo by Gregg Yan).

“*Meron po, pero mamaya pa makukuha, saka kukunin pa sa kabila* (We have it, but we’ll get it later from the other restaurant),” he replied, referring to the restaurant’s extension.

Two weeks later, a separate trip to the Full Moon Restaurant and KTV Bar in Fort Ilocandia, Laoag, found the dish was on the menu at these establishments as well. “We offer it mostly to the Chinese clientele,” said a waiter.

Illegal exports of live and frozen *mameng* specimens have also proven to be lucrative. WWF data reveal that a meter-long *mameng* sold for almost USD 1,380 in one Hong Kong restaurant. The thick lips of the fish alone can sell for almost USD 460.

On the remote isles of Tawi-Tawi in the southern Philippines, divers with compressors hunt for young *mameng* in shallow reefs and drop-offs for several hours weekly. Once the fish are spotted and are driven into cracks and crevices, the divers squirt a diluted mixture of sodium cyanide to stun and draw the fish out, eventually killing all corals, sponges and other immobile invertebrates around the site. Once captured, the juvenile *mameng* are reared in rudimentary shallow pens made of coral and limestone.

These destructive fishing activities typically violate several laws: the capture of *mameng*, entering and fishing in marine protected areas, and the use of cyanide.

Captured fish are then fed and fattened for traders who come from the nearby Sabah (Malaysian) border. Traders from mainland China also come to buy the fish, which are then kept alive in aerated, filtered holds. In December 2006, 359 juvenile *mameng* were confiscated from the M/V *Hoi Wan*, a Chinese fishing vessel apprehended in Palawan. The find remains one of the most significant wildlife apprehensions in Philippine history.

Though sufficient laws give authorities a legal basis to curb the trade, it continues — mainly because of a lack of on-the-ground enforcement. There is much more to the illegal seafood trade than just *mameng*, though.

³ CITES uses a system that classifies species according to the immediacy of their possible extinction.

Sharks, manta and eagle rays, giant clams, even dolphins and whales are occasionally butchered and sold in various towns and cities throughout the country.

Off Bohol's Pamilacan Isle in November 2006, the WWF representative witnessed the butchery of devil rays (*Manta mobula*) and manta rays (*Manta birostris*). The latter is a protected species, classified as "near threatened" by IUCN, and according to Republic Act 8550, the sale of its meat is illegal. Locally called *sanga*, these majestic giants are usually caught after dark, their leisurely pace and tendency to surface making them easy prey for fishers armed with strobe lamps and drift nets. Dropped off in areas such as Baclayon Pier in Bohol, they are soon carted off for slaughter and sale, their tails cut off to make souvenirs.

Sanga meat sells for USD 1.15–1.60 per kilogram, depending on the quality. Light meat is preferable and slightly more expensive. Dried *sanga* strips sell for USD 11.50–18.50 per kilogram. Although deemed illegal by Fisheries Administrative Order 193 under Republic Act 8550, otherwise known as the Fisheries Code of 1998, the trade in manta ray meat continues.

"It's really bad down in Masbate," WWF Sorsogon researcher Dave David said during a research trip. "Fishermen hunt manta rays nonstop. It's the wild west down there."

Even the sea's largest fish are not spared. On 15 February 2010, an 18-foot-long whale shark (*Rhincodon typus*) was found floating belly-up in Tingo, Batangas — its dorsal and pectoral fins neatly sliced off.

Long held in esteem as a Chinese delicacy, shark fins and meat are usually exported to China, Hong Kong and Taiwan. Whale shark flesh, called "tofu meat", sells for about USD 9.20 per kilogram, while dried shark fins are a hundred times more valuable at USD 920 per kilogram.

The Bureau of Fisheries and Aquatic Resources disclosed that at least 200 whale sharks were slaughtered in 1997 alone. Stacked like cordwood, dried fins from many different shark species are still seen today in Hong Kong shops.

Whale sharks are classified by IUCN as "vulnerable" and protected under Republic Act 8550 under Fisheries Administrative Order 193, the same law that protects manta rays. Possession or slaughter of a single whale shark merits a maximum jail term of four years, coupled with a maximum fine of USD 230 and the cancellation of the offending party's fishing licenses.

Joel Palma, the head of WWF's Conservation Programmes said, "This is a real eye-opener, for it proves that the slaughter of endangered species — even one as big as a *butanding* — can still take place if we let our guards down."

The whale shark remains the only legally protected shark in Philippine waters. But repeated visits to the Cartimar pet complex revealed that white-tip and black-tip reef sharks, nurse sharks, and bamboo and epaulette catsharks are all sold legally, for USD 34.50–57.50 per shark.

An unnamed, Chinese-run, live seafood shop within the vast Dampa complex along Macapagal Highway also offers live nurse and bamboo catsharks for consumption, albeit at slightly more expensive rates.

Any visit to Cartimar, as well as other shops offering marine fish and invertebrates, will also likely turn up giant clams.

Seven of the world's eight giant clam species can be found in the Philippines, all protected by Republic Act 8550, which states that the taking of rare, threatened or endangered species as listed by CITES and as determined by the Department of Environment and Natural Resources, is unlawful. Violation of this section is punishable by imprisonment, ranging from 12 to 20 years, coupled with a fine of up to USD 2760.

At a popular seaside *palutuan* (seafood dining hub) in Mactan City in 2009, the WWF representative came upon seven live giant clams being sold for *kini-law* (raw seafood served in vinegar), a popular dish.

Asked if she knew that selling the clams was illegal, the vendor replied with a smile, "*Oo. Pero wala namang nanghuhuli eh* (Yes, but no arrests are made)." Less than a hundred metres away is a police outpost, perhaps too occupied to bother checking its environs.

A Cartimar vendor peddling giant clams said the police rarely raided her shop. "*Saka hard corals lang ang kinukuha* (They just confiscate the hard or reef-building corals)."

Whales and dolphins are also slaughtered and sold. In 2007, lobbying again convinced two upscale Makati restaurants, Tsukiji and Sushi Tsumura, to drop whale meat — a long-standing Japanese delicacy — from their menus.

The list goes on, from endangered *dugong* to top shells, giant triton and other shellfish. From city centres to remote markets, the trade in illegal marine life flourishes.



Napoleon Wrasse Status and Protection Workshop

Yvonne Sadovy,¹ Syamsul Bahri Lubis² and Santi Suharti³

The humphead wrasse (*Cheilinus undulatus*), also known as the Napoleon wrasse, is a large reef fish belonging to the family Labridae. It is distributed across coral reefs of the Indo-Pacific region, and is capable of reaching 2 m in length and almost 200 kg in weight. The species is a protogynous hermaphrodite.⁴ The Napoleon wrasse takes 5–7 years to reach sexual maturity (which occurs when they are 40–60 cm in total length) in the wild and has slow population replacement rates. The Napoleon wrasse is popular in the live reef food fish trade, which is centred in Hong Kong and Mainland China. This fish is intensely sought, and typically caught live using cyanide. It is also very attractive to recreational divers who very much enjoy observing and photographing this species in the wild.

The biology of the species, combined with high commercial interest from the live reef fish trade, has resulted in significant declines in populations in Indonesia, the foremost exporter of Napoleon wrasse. According to Dr Toni Ruchimat, Director of Area and Fish Species Conservation in Indonesia, the biggest global exporter of the species, it is nowadays rare to see large adults in the country. This is in comparison to 15 years ago, when Dr Ruchimat became a researcher at the Centre for Marine Aquaculture Research in Gondol in north Bali, and conducted research on Napoleon wrasse rearing and hatchery. Dr Ruchimat believes that monitoring the population and breeding the species is needed for its management and protection. In 2004, due to concerns about population declines, the Napoleon wrasse was listed on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and listed as “endangered” on the International Union for Conservation of Nature (IUCN) Red List. As a result of the CITES listing, Indonesia introduced an export quota of 8,000 fish, which was later reduced to 4,000 fish per year. The

species is considered to be challenging to survey in the wild and cannot be raised in captivity at commercial levels, despite many years of research.

Despite the export quota and additional measures such as an air-only export requirement and measures taken by Hong Kong (the major importer of Napoleon wrasse) to control international trade, there remain concerns over illegal, unreported and unregulated (IUU) trade in the species, which seriously undermines the Appendix II listing. IUU trade compromises Indonesia’s ability to allow its depleted populations of the species to recover. In a workshop in Bali in 2010, the many challenges associated with IUU trade were identified and discussed.⁵ For example, Napoleon wrasses are sometimes labelled as groupers when sent out by air, and illegal exports by sea are rife as indicated by confiscations in Hong Kong. Much IUU trade occurs from Hong Kong into mainland China, where illegally imported fish can be seen openly on sale in southern markets. In shipments, Napoleon wrasses are sometimes stored below groupers to hide them. Transshipments through Singapore are often not documented, and Hong Kong — the foremost importer of the species — cannot adequately enforce restrictions on imports by sea. In general, inspections of shipments by sea are inadequate by both importing and exporting countries, and significant trade of the species is by sea. Many of these issues were addressed at national and international meetings in 2006 and 2010. Indonesia recently proposed that greater action be taken to combat IUU trade in the species — especially in the area of enforcement — at the CITES Conference of the Parties 15 in Doha, Qatar. The decision⁶ calls for CITES Parties to consider limiting international transport of Napoleon wrasse by air, and to work on finding acceptable options for dealing with confiscated fish. It also urges Parties to increase normal measures

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⁴ Many adults change from being female to male during their lifetime and, hence, reproduce as both sexes.

⁵ Workshop report on the trade of *Cheilinus undulatus* (humphead or Napoleon wrasse) an CITES implementation, 3 and 4 June 2010, Bali, Indonesia. [available at: <http://www.cites.org/eng/com/sc/61/E61-49-A.pdf>]

⁶ For background info see: <http://www.cites.org/eng/cop/15/sum/E15-Com-II-Rec14.pdf>

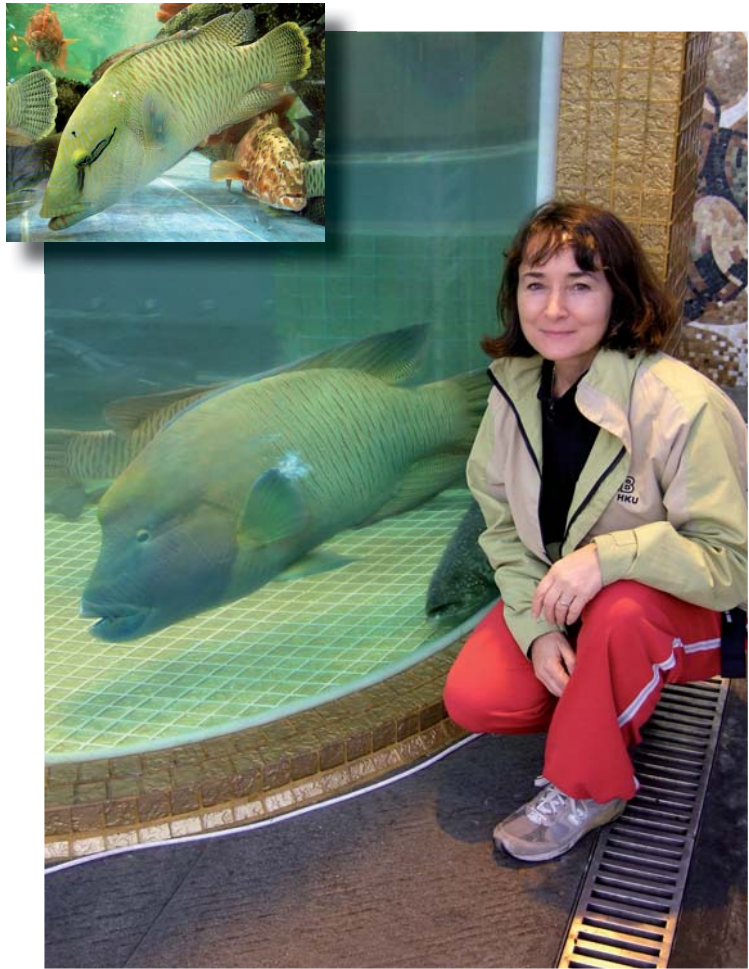
taken for trade control, and requests the CITES Secretariat's assistance in doing so through a newly established working group on the species.

If illegal trade continues, cyanide fishing — which is the major fishing method used to catch this species, despite the fact it is illegal — will persist and Napoleon wrasse populations will continue to decline in Indonesia and elsewhere due to excessive overfishing. This will negatively affect income options for fishers and dive tourism opportunities. Moreover, existing regulations to protect the species within Indonesia are outdated and need revision because, as described below, they do not provide the legal basis to enforce any existing law regulating movement, use or capture of the species internally. In this case, regulation 375/Kpts/IK.250/5/95 prohibits the capture of Napoleon wrasse except for research and traditional fisheries.

Given the challenge of implementing the CITES listing and the outdated nature of current decrees, a workshop on managing Napoleon wrasse was conducted on 8 July 2011, in Jakarta, Indonesia. The national-level workshop was organised by the Indonesian government in collaboration with the IUCN Groupers and Wrasses Specialist Group, and attended by about 40 representatives from the Ministry of Maritime Affairs and Fisheries, Ministry of Forestry, employers, universities, the live fish trade industry, locally active non-governmental organisations and researchers.

The discussions revolved around: 1) the need to review the current Indonesian decrees; 2) the need for regulations to address IUU trade concerns, both within Indonesia and with respect to international trade, to better allow populations to recover; 3) mariculture of the species; and 4) refinement of the monitoring protocol for assessing the species in the field and the need to repeat previously conducted surveys to determine any changes in population status.

Under current Indonesian law, the Napoleon wrasse is subject to annual export quotas that are allocated among the different provinces. Workshop participants discussed the frequent violation of these and other laws that relate to the Napoleon



Napoleon (humphead) wrasses are sold outside restaurants in Sai Kung, northeastern Hong Kong. Large fish, like the one shown here, beside Yvonne Sadovy, are often displayed to attract customers; smaller, juvenile, fish, like the one on the image at the top, are sold as “plate-size” food. Our work shows that some of these fish are illegally brought into China, as all trade into China is illegal (main image: George Mitcheson; insert: Stan Shea).

wrasse trade, as well laws regulating fishing methods (e.g. gear used and minimum sizes). Two key pieces of legislation are the “Agriculture Decree on the Prohibition of Fishing 375/Kpts/IK.250/95 Napoleon Wrasse (*Cheilinus undulatus*)” and the “Directorate General of Fisheries Decree No. HK.330/Dj. 8259/95 on the Size, Location and Procedures for Napoleon Wrasse Fishing”. According to S. Alina Tampubolon, Director of the Directorate of Marine Resources Surveillance PSDKP, this latter rule is invalid because its implementing legislation has been replaced.⁷ This raises concerns about enforcement and lack of provisions regarding fish size, which could threaten the sustainability of the Napoleon wrasse in Indonesia.

⁷ The decree is no longer valid because it was implemented under a fisheries law, the Shelter Act (UU no. 9/1985), which no longer exists, having been replaced by a new fisheries law (31/2004). Because sanctions for violations of the decree are based on the Shelter Act, the decree needs to be adjusted to be consistent with the Shelter Act's replacement.

In response to a question on the role of mariculture and restocking in population restoration, Dr Yvonne Sadovy of the IUCN Groupers and Wrasses Specialist Group and the University of Hong Kong, noted that restocking has not yet proven to be effective in restoring populations of exploited marine fishes in general, and that mariculture will not on its own protect the species because hatchery production is only at the research phase and not at commercial levels, while and fishing will not stop just because mariculture starts. Indeed, fishing for grow-out purposes continues on juvenile Napoleon wrasse, an activity defined by Food and Agriculture Organization of the United Nations (FAO) as “capture based aquaculture” (CBA) and one that requires fisheries management. Dr Sadovy later circulated to workshop participants the full FAO definition of CBA:

*Capture-based aquaculture is the practice of capturing or collecting live material from the wild and its subsequent direct use in aquaculture. Based on this, it should be noted that CBA, in addition to the taking of seed, includes the collection of broodstock from the wild for use in hatcheries, whereby the aquaculture system requires repeated replenishment from the wild stock for each production cycle generation produced. Furthermore, the key aspect of this definition, which has not elsewhere been considered in aquaculture practices, is that there can be significant wild capture or collection involved in relation to some types of grow-out operations that have previously been considered only as “aquaculture” and unrelated to “fisheries”.*⁸

Field survey results on wild Napoleon wrasse conducted by Dr Sadovy and Sasanti Suharti of the Research Centre for Oceanography in Indonesia were presented to workshop participants. The surveys took place in 2005 and 2006 at six sites: Bunaken, North Sulawesi; Bali and Kangean Islands; Banda Islands; Maratua; Raja Ampat; and Nusa Tenggara Timur (NTT). The results showed that fishing pressure is high and that there is extensive damage to reef habitats in many areas. Findings also showed that Napoleon wrasses are typically rare, but that at sites where the species is not targeted by fishers, divers can still find it. The density of Napoleon wrasses in Bali and Kangean Islands was only 0.04 fish per hectare (ha). Densities at the other five sites were: Bunaken, North Sulawesi, 0.38 fish per ha; Raja Ampat, 0.86 fish per ha; NTT, 0.18 fish per ha; Maratua, 0.15 fish per ha; and Banda Islands, 1.60 fish per ha. More details are available at: <http://www.fao.org/docrep/013/i1706e/i1706e00.htm>. A survey

was conducted at a seventh site in 2007, around the Karas Islands of West Papua, which also showed low average densities. Surveys were conducted in adult habitat, mainly using snorkel for logistical and safety reasons. In workshop discussions, it was acknowledged that the species is particularly difficult to survey because it is uncommon and wide-ranging, and so needs to have dedicated sampling techniques developed. The survey method should be replicable and simple to conduct. The virtual transect survey approach using GPS (global positioning system) that was used in earlier surveys was acknowledged to be a good approach⁹ for the species but that, in addition, more survey sites were needed, previously surveyed sites needed to be resurveyed to determine whether populations were recovering, and greater use of scuba was preferable.

The workshop discussion on ways to address IUU trade examined the pros and cons of a moratorium on exports from Indonesia, a decision that could be taken at the national level in Indonesia. Considerable concern was expressed that current export quotas may not be effective in ensuring population recovery because of challenges with enforcement, and that stronger measures are needed.

The workshop concluded with the following recommendations:

There is a need to standardize the survey methods in the assessing of Napoleon wrasse populations in the wild with leadership from the government and there should be a review and revision of relevant Indonesia regulations of the Napoleon wrasse through the establishment of protected status with specific protection options such as restrictions on catch size, fishing areas (such as marine protected areas or areas already considered to be overfished), suspension of fishing effort or absolute protection (moratorium). There is a need to support a scientific and policy analysis related to full protection (moratorium) of the Napoleon wrasse and to improve effectiveness of restrictions on the Napoleon wrasse. Specially, restrictions to be immediately revised apply to law No. 45/2009, PP. 60/2007, and KP No. Permen. 03/2010. (PBS / KKJI). Zero quotas could support a moratorium on fishing and trading Napoleon wrasse in the country. With a moratorium, surveillance on catching and trading of Napoleon wrasse is easier to implement. The moratorium is expected to give a chance to Napoleon wrasse to recover its population in natural habitats.

⁸ Lovatelli A., Holthus P.F. (eds). 2008. Capture-based aquaculture. Global overview. FAO Fisheries Technical Paper. No. 508. Rome, FAO. 298 p. See <http://www.fao.org/docrep/011/i0254e/i0254e00.htm>

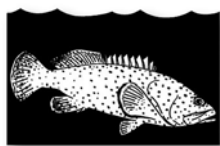
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News and events

Sabah hosts regional exchange workshop on live reef food fish

As part of the Coral Triangle Initiative, a regional exchange workshop on live reef food fish was held in Kota Kinabalu, Malaysia, in October 2010. The workshop generated a few news items, including these:

New Sabah Times reported on the Sabah government's commitment to making the local aquaculture industry, including the culture of live reef fish, a sustainable one (13 October 2010; <http://www.newsabahtimes.com.my/nstweb/fullstory/43250>).

Islands Business reported on Papua New Guinea's use of the ecosystem approach in its fishery management plans (15 October 2010; http://www.islandsbusiness.com/news/index_dynamic/containerNameToReplace=MiddleMiddle/focusModuleID=130/focusContentID=21115/tableName=mediaRelease/overrideSkinName=newsArticle-full.tpl).

Malaysia's *Daily Express* reported on 13 October 2010 the efforts of Indonesia, Malaysia and Philippines to collectively manage marine resources in the Sulu-Sulawesi Marine Eco-region through a tri-national regional conservation programme (story no longer available online).

Workshop: Market-based improvements in live reef fish food trade

A workshop was held 1–3 March 2011 in Bali, Indonesia, with the aim of improving management of the live reef food fish trade in the Coral Triangle. Information about the workshop, including copies of presentations, is available at: http://wwf.panda.org/what_we_do/where_we_work/coraltriangle/events/live_reef_food_fish_trade_workshop/. A 1 March 2011 AFP story associated with the workshop can be found at: <http://www.google.com/hostednews/afp/article/ALeqM5ipzGJZBGK88FzGZdwFZ7yUvqsu7w?docId=CNG.d70335b221e954b0bc244c109be991c4.391>

Taiwan's grouper farms mostly recovered after typhoon Morakot

Typhoon Morakot, which hit Taiwan in August 2009, reportedly damaged more than 90 per cent of the 1,500 hectares of grouper culture ponds in Taiwan. A year later, according to an 8 August 2010 story in *Taipei Times*, 80 per cent of grouper farms had, with government assistance, resumed operations (<http://www.taipetimes.com/News/taiwan/archives/2010/08/08/2003479860>).

From reef to restaurant

A 9 February 2011 article in *CNN World* took a broad look at the live reef food fish trade, from the reefs of Palawan, Philippines, to the restaurants of Hong Kong and China. The article includes some good pictures (<http://www.cnn.com/2011/WORLD/asiapcf/02/08/reef.fish.trade/index.html>).

A few videos

This WWF video (2008) focuses on the live reef food fish trade in the Coral Triangle: <http://www.youtube.com/watch?v=kzOdo1hDqvs>

This video, by WWF and Pulau Mas, looks at live reef food fish fisheries in Indonesia, and highlights Pulau Mas, a live fish exporting company committed to sourcing sustainable fisheries: http://wwf.panda.org/what_we_do/where_we_work/coraltriangle/solutions/live_reef_fish_trade/

Another video from Indonesia, produced by Pulau Mas and Komatkomit (2011), focuses on the perspectives of fishermen in the live reef fish fishery: <http://www.youtube.com/watch?v=JRPzTmWVPoE>

Taiwan launches its largest live fish carrier

According to a 22 September 2011 story in *Focus Taiwan*, a live fish carrier vessel capable of carrying 36 metric tons was launched from the port of Kaohsiung on its maiden voyage to mainland China. The vessel, built with government support, supplements Taiwan's 18-vessel fleet of live fish carriers, and is by far the largest in the fleet (http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aECO&ID=201109220040).

Reef fish aggregations

The Society for the Conservation of Reef Fish Aggregations released its Newsletter (no. 15) in October, with news on aggregation research and management from Australia and Fiji, among other locales (<http://www.scrfa.org/>).

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Original text: English

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