Certification as a Conservation Tool in the Marine Aquarium Trade:

Challenges to Effectiveness

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Table of Contents

ACRONYMS

CCIF	Conservation and Community Investment Forum
EBM	Ecosystem Based Management
FAO	United Nations Food and Agriculture Organization
FSC	Forest Stewardship Council
GEF	Global Environment Facility
IMCC	International Marine Conservation Congress
ISEAL	International Social and Environmental Accreditation and Labeling Alliance
ISO	International Organization for Standardization
MAC	Marine Aquarium Council
MAMTI	Marine Aquarium Market Transformation Initiative
MPA	Marine Protected Area
MSC	Marine Stewardship Council
RPA	Reef Product Alliance

EXECUTIVE SUMMARY

Certification of products as environmentally-preferable is a conservation tool developed to create market incentives for products to be produced in an environmentally responsible manner. It has been part of the conservation toolbox for commercial fisheries, forestry, and other sectors, including the marine aquarium trade, for more than a decade. In the marine aquarium trade, live fish, coral, and invertebrates are collected from coral reefs throughout the world, and sold to marine aquaria hobbyists in developed countries. Much of this is collected illegally, with the use of cyanide to stun fish, making them easier to collect. Cyanide increases the stress and mortality on fish, can kill non-targeted species on the reef, and encourages destruction of the reef as collectors pry stunned fish out of crevices. Lax management in major source countries allows for overfishing to occur as well. Most of the world's marine ornamentals are collected in the Philippines and Indonesia, and sold in the United States and Europe, two regions in which ecolabels for certified products have had significant traction.

But the marine aquarium trade presents substantial challenges to effective certification. This report explores these challenges and considers the extent to which they can be overcome. It does not evaluate the existing certification program (the Marine Aquarium Council) specifically. Rather, this report looks at the marine aquarium trade as a whole, examines whether the essential conditions are in place for meaningful certification to succeed, and outlines efforts that might need to be taken to achieve success. It examines three key components of effective certification in the context of the marine aquarium industry in Indonesia and the Philippines:

(1) Satisfying the environmental claim
(2) Verifying the chain of custody
(3) Responding to economic incentives

Major Findings

Satisfying the environmental claim: The scientific, administrative, management, and legal frameworks necessary for meaningful certification do not exist in Indonesia and the Philippines. Basic environmental management, and hence certification, requires some understanding of the resource as well as mechanisms to limit take of the resource to acceptable levels. Meeting these basic needs for marine ornamentals in Indonesia and the Philippines is challenged by:

- Numbers: The sheer numbers of species involved -- more than 1000 species of fish, hundreds of invertebrates and dozens of coral species -- make determining appropriate catch levels a monumental task requiring huge amounts of data.

- Complexity: The complexity of coral reef ecosystems means that reductions in one targeted species can have ripple effects throughout the system. Yet data on life history characteristics and species interactions are sparse, and resources for monitoring impacts extremely limited or non-existent.

- Baselines: The paucity of un-impacted sites makes it difficult to determine the impact of fishing activities on coral reef ecosystems. Resources for monitoring impacted sites over time are extremely limited or non-existent.

- Collectors: The thousands of collectors at hundreds of sites are typically poor and uneducated, making it difficult for them to understand and manage the documentation required, and continue practices after certifiers and NGOs have left.

- Roving collectors: Free access laws in both Indonesia and the Philippines mean that local communities have little or no legal authority to prevent outsiders from collecting on their reefs. These laws allow collectors to travel among reefs throughout these countries, with little or no management controls.

- Other fisheries: Other coastal uses, including other fisheries, co-occur with the collection of marine ornamentals, making catch levels that consider only marine ornamentals meaningless.

- Enforcement: Huge coastlines, limited resources, and corruption mean that even the few laws that exist – such as prohibitions on cyanide use – are rarely enforced.

- Mortality: The transport of live fish that are sensitive to conditions results in high levels of mortality that spur additional levels of take from reefs. Remote collection sites and the small scale of most traders' collection facilities make maintaining healthier conditions difficult.

While NGOs and businesses can play a role in helping to overcome these challenges, effective management and certification cannot occur without greater government involvement. Government involvement is critical for at least four areas related to management: providing an underlying legal framework that allows for restrictions on resource extraction, providing some level of enforcement, managing for multiple uses via an ecosystem based management.approach, and ensuring long-term monitoring of impacts to better understand ecosystems and appropriate take levels. Recent legal changes in Indonesia and the Philippines indicate that there is some movement in these countries that might allow for better local government control of coral reef resources. Although limited, and still being tested, these reforms suggest opportunities for improvements in the future.

Verifying the chain of custody: Certification requires certainty that a product labeled as certified is actually certified. This requires establishing clear and consistent documentation of a chain of custody showing compliance against certification standards, and segregation of certified and uncertified fish at each step the product takes through the supply chain. But the supply chain in the marine aquarium trade is extremely fragmented and diffuse, its players disorganized and informally linked between thousands of collectors, traders, exporters, importers and retail dealers. Ever-changing demand in terms of which species are desirable and purchased makes it difficult to target and certify a single fish, or a batch of fishes from one location. In order to fill orders from their customers and achieve the necessary mix of products, dealers are almost always required to mix certified product with uncertified product, breaking the chain of custody.

One way to address the problem of tracking fish is to encourage the integration of operation between exporters and importers and ensure that they coordinate closely with, and support, collectors in areas where

more sustainable operations are possible. This could occur through formal purchase agreements, commitments to invest in capacity and other needs for collectors and traders to meet certification standards, or through full vertical integration in which a single entity owns the import and export facilities as well as operations in collecting areas. Full integration from importer to the collection site would provide the best opportunity to control supply and meet certification requirements. It could also generate additional revenue to be invested in upgrading equipment, practices and facilities to better meet certification standards.

Responding to economic incentives: To be viable, certification must provide real tangible value to consumers and major players in the industry. However, certification of marine ornamentals has not led to price premiums, improvements in quality, or clear reductions in mortality as anticipated. Without economic incentives, producers and suppliers have no reason to incur the substantial costs of certification and improve their practices.

The ultimate economic incentive is demand for certified product over uncertified product. However, this demand will not materialize on its own. In other resource sectors such as forestry and seafood, conservation NGOs have successfully created demand for more sustainable products through social marketing, public education, media work, industry partnerships as well as negative targeting of some industry players. Combined, these tactics have created the expectation among consumers and major industry players that companies have a responsibility to promote and support products that are produced in a more sustainable way. As industry leaders make a commitment, other industry players often follow to ensure market parity.

What will it take?

Currently, the conditions necessary for effective certification do not exist in Indonesia and the Philippines. Without substantial change in at least three areas, certification will have little to no environmental benefit:

(1) Satisfying environmental claims requires government involvement
(2) Verifying chain of custody requires an integrated industry.
(3) Responding to economic incentives requires demand for environmentally preferable products**.**

Certification is not a panacea for conservation. Even in sectors such as forestry and seafood, in which credible certification schemes have significant traction, problems remain and certified products are a small percentage of the global market. The conservation tools used to address these problems go far beyond certification. However, under the right conditions, certification can provide a set of guidelines for environmental performance and market incentives that are an important part of the larger toolbox.

Making certification a useful tool for marine ornamentals will require substantial changes and investment from concerned conservation interests and industry. In considering the utility of pursuing certification, we would argue that most, if not all, of the conditions necessary for effective certification must be addressed in pursuing *any* effective conservation approach. Therefore, a key question regarding future investment in certification is whether it can help achieve the conditions necessary for conservation in general. That question should be considered with input from the full range of experts engaged in this issue – including exporting country experts – and consideration of other conservation goals and approaches.

1. INTRODUCTION

Sections	Summary
• Overview • Study Approach • Certification	• This report examines three key components of effective certification – satisfying the environmental claim, verifying chain of custody, and responding to economic incentives – and determines whether the essential conditions necessary for effective certification exist in the marine aquarium industry. • Certification is a voluntary conservation tool developed to create market incentives for environmentally responsible production. Credibility is key for effectiveness. • Certification of marine ornamentals began in 2001 but very little product has reached consumers.

Overview

In January 2007 the leading industry magazine *Seafood Business* declared that the Marine Stewardship Council (MSC) had reached the "tipping point," reporting that sustainability had become a "full-blown movement" within the seafood industry and that MSC is the "obvious choice" for buyers wanting a green product (Hedlund, 2007). MSC had been the most widely respected and well known third-party certification scheme in the world for wild fisheries since 1999.

What did it take for MSC to get there? And what does this mean for certification in the marine aquarium trade?

Certification of products as sustainable or environmentally friendly has been around as a conservation tool since at least 1977 (Ward and Phillips 2008). The idea behind certification is that a certified eco-labeled product provides consumers with the opportunity to make informed choices about products they purchase while giving the seller of eco-labeled product a market advantage over non-eco-labeled products (Roheim 2008). This market advantage creates pressure down the supply chain to producers to demonstrate their environmentally friendly production by becoming certified (Ward and Phillips 2008). Certification can either reward already good players, or provide incentives for poorer performers to improve their environmental performance to gain certification. With improved production practices, it is hoped that resources are harvested in a more sustainable way and ecosystems are conserved. The ultimate drivers of this system are the presence of strong economic incentives for producers and suppliers to become certified.

The marine aquarium trade seems to be a promising target for such an approach. Indeed, the Marine Aquarium Council (MAC) has been working since 1998 to certify live marine ornamentals as sustainably harvested and handled. In the marine aquarium trade, live fish, coral, and invertebrates are collected from coral reefs throughout the world, and sold to marine aquaria hobbyists in developed countries. Much of this is collected illegally with the use of cyanide to stun fish, making them easier to collect. Cyanide

increases the stress on and mortality of fish, can kill non-targeted species on the reef, and encourages destruction of the reef as collectors pry stunned fish out of crevices. Lax management in the biggest source countries, Indonesia and the Philippines, allows for overfishing to occur as well. Most of the world's marine ornamentals are purchased in the United States and Europe (Sadovy and Vincent, 2002; Wabnitz et al. 2003), two regions in which ecolabels for other products have had significant traction.

But the marine aquarium trade presents substantial challenges to effective certification, including limited scientific and administrative frameworks in major source countries and complex, porous supply chains to get product to market. This report explores these challenges and considers the extent to which they can be overcome. It does not evaluate the MAC program specifically, or its effectiveness. Rather, this report looks at the marine aquarium trade as a whole, examines whether the essential conditions are in place for meaningful certification to succeed, and outlines efforts that might need to be taken to achieve success. In this report we strive to help participants at the International Marine Conservation Congress (IMCC) workshop on Trade in Coral Reef Species consider the utility of certification as a tool and the level of effort required for effective certification, as they explore the full range of conservation options for addressing trade in marine ornamentals.

Study Approach

This report examines three key components of effective certification in the context of the marine aquarium industry:

1. Satisfying the environmental claim.
2. Verifying the chain of custody
3. Responding to economic incentives.

These aren't the only critical components of effective certification, but they are necessary pieces to the credibility and viability of certification schemes that present particular challenges in the marine aquarium trade.

For each component, we present (a) an overview on its importance to certification in general (b) a situational analysis of the current situation in the marine aquarium trade in particular (c) a summary of challenges to overcome in the marine aquarium trade to be effective in the long term and (d) indications of what might be required to overcome challenges in the marine aquarium trade. Our report focuses heavily on Indonesia and the Philippines since up to 85% of the live marine ornamental organisms sold globally come from these countries (MAMTI 2006) and the challenges to effective certification are greatest there. We start with a brief overview of certification and conclude by synthesizing what it will take for certification of marine ornamentals to succeed in the long run.

The information presented is based on review of existing documents of the marine aquarium trade, certification schemes, and lessons learned from 10 years of certification in this and other sectors; as well as interviews with key players and the experience of the consultants in this, and related fields. Material was collected in March and April 2009. A list of those interviewed is provided at the end of the report, as well as brief biographies of the report's primary authors.

Certification

The value in certification comes from certainty. Buyers must have confidence that the product they are purchasing indeed meets the environmental claims made. Without that certainty, there's no incentive to purchase a certified product (which may cost more) over an uncertified product, and therefore no market advantage. With no market advantage, suppliers have no incentive to incur the costs of improving their practices and becoming certified, and the scheme will not be viable.

A certification scheme's credibility depends largely on its independence, the application of scientifically meaningful standards that satisfy a worthwhile environmental claim, and a verified chain of custody. A scheme's viability depends in large part on the economic incentives driving suppliers towards certification. We discuss the issue of independence below, and explore other components of credibility and viability in the following sections.

Third party certification schemes are considered the most credible type of ecolabeling. The "third party" refers to an independent accredited certifying body comparing production practices or performance against an environmental standard. This is in contrast to "first party" certification, in which a producer certifies that its own product meets satisfactory standards, or "second party' certification in which another vested interest, such as a trade association, certifies that a product meets satisfactory standards (Ward and Phillips 2008). In third party certification, standards typically are developed by organizations outside of the industry sector, adding to its perception of independence (Ward and Phillips 2008). The standard setting body (such as MSC or MAC) sets, reviews, revises, assesses, verifies and approves standards (FAO, 2005). It "holds" the standard and accredits competent independent auditors who then conduct the actual evaluations against the standard.

Certain requirements must be met to remain credible under guidelines established by internationally respected bodies such as the International Organization for Standardization (ISO), the International Social and Environmental Accreditation and Labeling Alliance (ISEAL), and the United Nations Food and Agriculture Organization (FAO). ISO outlines basic structures and processes for a wide range of labeling schemes that can apply to multiple sectors. ISEAL provides general procedures for developing credible standards regardless of sector. FAO's guidelines are more focused. They refer specifically to ecolabeling of fisheries, with procedural requirements based on ISO and ISEAL, plus minimum substantive requirements to ensure environmental performance at least in line with major international agreements and codes of practice.

(See Appendix 1 for a more detailed overview of certification in general).

Certification in the Marine Aquarium Trade

In 1998, the Marine Aquarium Council (MAC) was created as a standard setting body, to conserve marine ecosystems by creating standards and certification for the collection and care of marine ornamentals. Its third-party certification program was launched in late 2001 to cover both practices (industry operators, facilities and collection areas) and products (aquarium organisms). The standards outline the requirements for third-party certification of quality and sustainability in 4 areas to cover all aspects of collection and transport including: Ecosystem and Fishery Management; Collection, Fishing and Handling; Handling, Husbandry and Transport; and Mariculture and Aquaculture Management.

To assist in transforming the marine aquarium trade in the Philippines and Indonesia, the Marine Aquarium Market Transformation Initiative (MAMTI) funded by the Global Environment Facility (GEF), brought MAC together with two other NGOs: the Conservation and Community Investment Forum (CCIF), and Reef Check. It was hoped that by working together, these NGOs could: 1) build the capacity of collecting communities to develop certified ecosystem management, 2) ensure there is scientific assessment and monitoring of coral reefs and marine ornamentals stocks for management, 3) establish no-take zones and reef and stock restoration, 4) build the capacity of marine ornamentals collectors to become certified, 5) increase the financial resources and business skills for collectors to participate in a sustainable trade, 6) increase the participation of exporters, importers, and retailers in certification, 7) raise the awareness of, and demand for, certified marine ornamentals among consumers, and 8) provide project management and monitoring. While much was learned and accomplished, the MAMTI project was prematurely ended after 3.5 years due to the ineffectiveness of the overall approach and management of the initiative.

The level of MAC certified product reaching consumers remains very low. Globally there are now 17 certified collection areas, 16 certified collector groups, 19 certified exporters, 16 certified importers, and 8 certified retailers, as well as 3 MAC certified culturists (MAC website, April 2009*)*. There are few complete certified supply chains from reef to retail. MAC currently is reviewing its program and standards to improve its ability to assist with market transformation and sustainability. As part of this, MAC is moving away from on the ground capacity building for certifying collection areas and collectors, to focus on managing core business processes, certification systems and standards, and outreach and awareness (MAC Newsletter Update, Fall 2008; David Mainenti, personal communication).

Long term viability of the MAC system is challenged by a lack of sustainable financing. It was hoped that MAC certification ultimately would be supported and financed through cost recovery mechanisms derived from industry participation. Plans for this cost-recovery, fee-based system were outlined in MAC Business Plans as early as 2003. This has yet to happen, however.

2. SATISFYING THE ENVIRONMENTAL CLAIM

Sections
- What's important?
- Situational Analysis
- Challenges
- Overcoming Challenges

Summary
- Fulfilling an environmental claim that a product is produced in an ecologically sustainable manner is difficult, often due to limited data and the small number of producers that can meet that standard. Failing to support a stated claim undermines a certification scheme's credibility and effectiveness.
- The ecosystem and fishery collection standard under the current marine aquarium certification scheme strives to achieve ecological sustainability.
- The scientific data and administrative, management, and legal frameworks necessary for effective certification do not exist in Indonesia and the Philippines
- Some approaches, including risk analysis, adaptive management and the precautionary approach can help address some gaps in scientific knowledge, and NGOs and businesses can help meet some needs. However, ultimately, governments in these countries must do more to provide the basic frameworks necessary for management and effective certification.

What's important?

Certification schemes can develop standards to meet a range of goals. Some, such as MSC, claim to certify fisheries that are sustainable. Their claim is ecological sustainability, considering not just the long-term viability of harvesting the stock that is targeted, but maintaining the ecosystem that supports it. This is similar to the goal stated by MAC. Others, such as the Forest Stewardship Council (FSC), don't claim that certified sites are necessarily sustainable, but instead claim they are well managed and environmentally responsible. Similarly, others, such as the Aquaculture Certification Council, indicate that the product was produced with best practices, reflecting the best that exists right now in the industry, not necessarily what will ensure long term sustainability.

Fulfilling a claim of sustainability is difficult to achieve even in the best of circumstances for several reasons:

1. *Vague definition:* Although it generally includes concepts of long-term use of a resource while maintaining the structure and function of surrounding ecosystems, the definition of sustainable is often vague, value-laden, and interpreted differently by different interests (Ward 2008).

2. *Data and ecological understanding:* Typically, the science required to have the certainty that a product is taken in an ecologically sustainable fashion is simply not well developed. For example, data required to assess ecosystem impacts criteria under the MSC standard frequently do not exist for many fisheries, even in highly developed countries and those with progressive fisheries management (Highleyman et al. 2004). Where data do exist, the ecological studies to

interpret the actual effects of the catch throughout the ecosystem most likely don't exist, even in relatively well-studied systems.

3. *Lack of players able to meet the standard:* Every certification scheme has to balance setting the bar for environmental protection against the need for a certain number of players in the industry to be able to meet the standard (Ward and Phillips 2008; Ward 2008). If few or no producers can meet the standard, there will be insignificant amounts of certified product in the market and certification will gain no traction with consumers, producers, or others throughout the supply chain. But if the bar is set too low in an effort to encompass a critical mass of the industry, environmental protection may be compromised.

Making a claim of environmental or ecological sustainability without adequately supporting it undermines the certification scheme's credibility, and hence its value (Ward 2008). For example, MSC's credibility has been seriously questioned by some in the NGO community in part because of the certification of several controversial fisheries that many consider to be unsustainable, often due to ecosystem impacts. This has affected the overall level of support it receives from the environmental community (Highleyman et al. 2004). Similarly, a survey of marine hobbyists revealed high levels of skepticism among many knowledgeable hobbyists about MAC's effectiveness in protecting reefs, sustaining wild stocks, and adequately monitoring practices and chain of custody (Alancastro 2004).

Environmental benefits may still be realized even if ecological sustainability can't currently be achieved or demonstrated. Environmentally-preferred products that eliminate particularly destructive practices and meet other important requirements might still be worthwhile to pursue in the short and medium term and credible certification schemes can recognize these preferred practices. The claims made by the certification scheme must accurately reflect the standard, inform purchasers of just what level of environmental protection they're supporting, and not overstate claims. Over time, however, certification schemes should move towards sustainability. Until true sustainability is achieved, environmental degradation will continue to occur, albeit at a slower pace. Ongoing monitoring of certified areas over time can help fill holes in the scientific understanding of impacts and sustainable take levels. But this information needs to be incorporated into management. Credible certification schemes adopt at least three practices to move towards ultimate sustainability over time while recognizing the realities of an imperfect world today.

1. *Revising standards:* ISEAL and FAO require that standards are periodically updated to reflect the latest scientific and technological understanding, and that the revision process is transparent and open to all interested parties with opportunities to update relevant information.

2. *Continuous improvement*: The MSC strives for continuous improvement in the fisheries it certifies. Those fisheries that receive below a certain score on any criteria are certified with corrective actions outlining what actions the fishery needs to take to more adequately meet those criteria.

3. *Reassessment:* Assessments only last for a certain period of time (e.g. five years for MSC), at which point the entity must undergo an entirely new reassessment applying the latest scientific thinking and standards.

Situational Analysis

To date, the stated goal of marine aquarium standards under MAC for ecosystem and fishery conservation has been to verify that principles of ecosystem management have been applied to ensure ecosystem integrity of the collection area and sustainable use of the fishery. Ecosystem management is defined in the standards as management taking due account of all living organisms and their environment in the management area. In practice, this means management ensuring sustainability of target, dependent, and associated species. Ecosystem integrity is defined as the ability to support and maintain a balanced, integrated, adaptive biological community having species composition, biological diversity, and functional organization comparable to that of natural habitat in the region. Sustainable use is defined as the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining the potential of the components to meet the needs and aspirations of present and future generations.[1] In short, the MAC fishery and ecosystem conservation standard strives for ecological sustainability of certified products.

Meeting and verifying this high standard of sustainability requires substantial scientific data and management structure. However, in Indonesia and the Philippines today, the scientific, administrative, and management resources needed to do so do not exist. Even meeting lesser environmental standards such as eliminating the most destructive practices (such as cyanide use) or monitoring stock levels and restricting catch is not possible at current resource levels.

Scientific: Scientific research on the impacts of marine aquarium fishing is very limited, but studies on the impact of fisheries in general (primarily food fisheries) on coral reefs have documented reductions in fish size, overall biomass and density, predatory fish, overall catch, and catch per unit effort, as well as changes in the taxonomic composition of fish communities and sex ratios in some populations (Jennings and Palunin 1996; Pet-Soede et al. 2001; see review in Russ 1991). Overfishing on coral reefs can cause basic shifts in ecological functioning, increased algal growth, decreased coral cover and lower biodiversity (see summary in Bowden-Kerby, 2003). In a study of the effect of aquarium collection on coral reefs in Hawaii, Tissot and Hallacher (2003) documented a significant reduction in the abundance of aquarium fish at collection sites. Localized depletion of a number of targeted aquarium species have been reported at numerous other sites (Sadvoy and Vincent, 2002; Wabnitz et al. 2003; Wood 2001). Removing stony corals may be particularly disruptive since they are major reef framework constructors, providing critical habitat, refuge and feeding grounds for a wide variety of marine life (Bruckner 2003). Emerging externalities such as climate change and the link with coral bleaching must also be considered. These global issues can compound the recovery of habitats and the fish communities (Knowlton and Jackson, 2008).

[1] From the Marine Aquarium Council's Core Ecosystem and Fishery Management International Performance Standard for the Marine Aquarium trade and Core Collection, Fishing and Holding International Performance Standard for the Marine Aquarium Trade. Issue 1- July 2001. Definitions in the standards are based on definitions used by the U.N. Food and Agriculture Organization and Convention on Biological Diversity.

Coral reef fisheries in Indonesia and the Philippines are experiencing substantial adverse impacts from exploitation (Green et al, 2003, Pet et al, 2001), in addition to a variety of other stresses. But to understand the severity of this pressure, manage fisheries effectively, and set meaningful take levels, managers need to know:

- the condition of stocks at a given time;
- how the fish community operates and interacts;
- how this is influenced by fishing;
- the level of fishing effort and actual catch levels; and,
- biological characteristics of each species, including growth, mortality and recruitment (Sadovy and Vincent, 2002; Russ, 1991).

For the vast majority of marine aquarium fisheries in Indonesia and the Philippines, this information does not exist (Sadovy and Vincent, 2002). Moreover, ongoing monitoring of collection sites by scientists and managers is necessary to determine whether take levels are sustainable over time (Bruckner 2003; Russ and Alcala 1989). But the capability to carry out and sustain such monitoring also does not exist.

Natural Resource Administrative and Management Frameworks: National and local governments in source countries, especially in Indonesia and the Philippines, struggle to effectively manage overfishing and development across coastal regions and take little responsibility for coral reef management. In Indonesia free access laws allow anyone to extract resources from any reef. There are currently no effective controls on fishing practices: dynamite fishing, overfishing, cyanide fishing all continue to take their toll in Indonesia. The Philippines provides a somewhat better legal framework for local communities to take control of their reefs. Locally-managed marine protected areas (MPA) have proven a viable approach in some communities where local governance is properly designed and enforcement is prioritized (personal communication, Stuart Green) but only a small portion of the reefs are actually under the jurisdiction of local authorities. As near-shore reefs have been depleted of fish and invertebrates, roving collectors in both countries have found it more lucrative to move from reef to reef in the offshore areas. These roving collectors continue to supply an estimated 70-80% of marine ornamentals from these countries, with little management oversight of their activities and efforts (MAMTI, 2006). Although destructive fishing practices such as cyanide use are technically banned in these countries, their use continues relatively unabated (Green et al, 2003 and Barber CV and VR Pratt 1997). Without adequate laws governing reef fishery management and practices, let alone the capacity and the resources to enforce such laws, few communities have been able to successfully develop and maintain effective coral reef fishery management frameworks on their own.

Challenges

Meeting the scientific, management, and administrative needs to manage and certify marine aquarium fisheries in Indonesia and the Philippines is particularly challenging given the ecosystems involved, the legal framework, and the structure of the industry. These challenges include:

Numbers

Basic fisheries management requires setting catch limits for targeted species to avoid depleting their populations. Knowing the condition of stocks and other information to set sustainable take levels for each of these species, at each site of interest requires a tremendous amount of data. With more than 1,000 fish species collected, setting levels for each is a monumental task. Historically, little data was collected on catch levels, and it is unknown what levels will allow populations to sustain themselves over time (Wood 2001). Proxies (such as relying on family level data rather than species specific data) have to be used, with careful monitoring over time of actual catch levels as well as documentation of subsequent impacts on targeted (and non targeted) populations to revise catch levels as needed.

Complexity

Coral reefs are incredibly complex systems (Sale 1991) and coral reefs around the world are suffering declines in diversity in response to human activities (Bellwood et al. 2004). Globally, more than 1,400 species of fishes, 500 species of invertebrates, and 140 species of hard coral are collected from the world's coral reefs for the live marine aquarium industry (Wabnitz et al 2003). The biology and life history strategies for most of these species are unknown (Bruckner 2003; Sadovy and Vincent 2002; Wabnitz et al. 2003), making it difficult to understand how species interact with one another or respond to different pressures. Catch of any single species can affect others by removing their social and spatial structures (Sadovy and Vincent 2002), further complicating setting catch levels. Moreover, marine species typically have different needs at multiple life stages from eggs to larvae to adulthood, complicating ecological interactions and impacts further. Fisheries management models developed to set catch levels for commercial fisheries typically address much simpler systems, and even then usually look at species in isolation. As the level of complexity in the fishery grows, the assumptions and errors inherent in setting management limits grow as well. The unique characteristics of coral reef fisheries can make traditional fisheries management models meaningless (Sadovy and Vincent 2002). The complexity of these systems increases the costs of understanding and managing them.

Baselines

Baseline data on stocks of targeted (and non-targeted) species doesn't exist. Understanding how reef fisheries are influenced by fishing requires some baseline from which to compare – either from before fishing occurred, or with comparable non-fished areas (such as marine reserves). It also requires regular ongoing monitoring of populations of all species on the reef. In most locations, pre-fishing data don't exist and comparable non-fished sites are exceedingly difficult to find due to increased fishing activity (Bruckner, 2003; Donaldson 2003; Wood 2001). This lack of a baseline for pristine marine ecosystems is particularly acute for coral reefs, which are the most diverse marine ecosystems and among the most threatened (Jackson et al., 2001). Most of the world's tropical coastal oceans are so heavily degraded locally that "pristine" reefs are essentially gone (Bellwood et al, 2004). Ongoing monitoring to measure impacts in these complex systems requires substantial resources.

Collectors

Collection of marine ornamentals is undertaken by thousands of individual collectors at hundreds of sites throughout the Philippines and Indonesia (MAMTI 2006). Each collector at certified sites needs to be trained (and certified) in non-destructive safe collection techniques, how to consistently record data on

take levels, and how to keep animals alive to reduce mortality and hence pressure on the reef. Most of these collectors are poor and uneducated, making it difficult for some to understand and manage the ongoing documentation for meaningful certification. Maintaining certification standards and practices after the initial certifiers are gone requires significant behavioral change, the necessary equipment and access to capital, and links to consistent purchases from buyers interested in certified supply in order to sustain commitment and efforts necessary to ensure responsible management of local reefs and trade. This requires that strong incentives as well as monitoring and, ultimately, enforcement, be in place to do so.[2]

Roving collectors

Roving collectors further complicate collecting accurate catch data and restricting catch. It is estimated that up to 80% of marine ornamental collectors in the Philippines and Indonesia are roving, meaning they travel among reefs to catch marine ornamentals (MAMTI 2006). Because of free access laws, local communities in Indonesia have no legal authority to prevent any outsiders from fishing on their reef. In the Philippines, roving fishers may be required to get a permit, but often don't due to lax enforcement or corruption (MAMTI 2006). Much roving occurs in far remote areas, making it difficult and costly to manage. Roving collectors have no incentive to establish and monitor catch limits or implement other best practices. When roving collectors catch in certified areas, if their catch isn't counted against the catch limits, then restrictions placed on local collectors become meaningless – they could easily be removing fish beyond the carrying capacity of the reef, long before monitoring captures these effects. Because of the large percentage of supply that comes from roving collectors, this aspect of the fishery must be addressed in some way for conservation efforts to be a success.

Other fisheries

The marine aquarium trade typically occurs side-by-side with other reef fisheries and coastal uses, many of them targeting the same species (Wood 2001). Not accounting for take from other fisheries makes catch levels set for marine ornamentals meaningless. A true ecosystem-based approach (EBM) focuses on the multiple activities occurring within an ecosystem, and looks at all the links among living and nonliving resources, rather than considering single issues in isolation (U.S. Commission on Ocean Policy, 2004). Managing one extractive activity – the marine ornamental take – in isolation will not achieve ecosystem-based management.

Enforcement

Vast areas of coastline and limited resources in the Philippines and Indonesia limit enforcement of the few laws that do exist – such as prohibitions against cyanide use. Enforcement of cyanide laws face other obstacles as well, including the very limited number of qualified laboratories that test for cyanide use. In addition, questions remain about the sensitivity of various tests, the ease of application by law enforcement, and the difficulty of detecting cyanide after a certain period of time because of its rapid conversion to metabolites (Bruckner and Roberts 2008). Corruption can reduce enforcement actions further (CCIF 2001a; Wabnitz et al. 2003). Certification itself is not an enforcement tool – follow-up

[2] The MAMTI project had started to work with collectors to compile log book data to determine catch level as a part of its M&E program; however this practice ended when the MAMTI project prematurely ended. There is no other known consistent collection of such data from collection sites.

audits are necessarily limited in number and scope. Regardless, minimal legal requirements for resource use in these countries mean that the vast majority of requirements for meaningful certification could not currently be enforced through law enforcement anyway.

Mortality

The marine aquarium trade deals in live fish which are quite sensitive to conditions off the reef. These live fish must pass through a complex, lengthy supply chain before reaching their new homes, which includes collectors, traders, exporters, importers, wholesalers and retailers. The process of capture, holding, transport, and packaging result in a relatively high mortality rate for the fish (CCIF 2001b) across the supply chain. MAC standards include a set of best practices along the entire supply chain to ensure that a healthy product is delivered to the consumer and to reduce overall mortality throughout the supply chain so that less fish are captured on the reef. But the remote locations in which fish are collected make applying best practices difficult at best given the lack of infrastructure available to them. The variety of species with differing needs in terms of handling and care, and the large number of variables determining the mortality rates across the supply chain (such as temperature, water quality, and more), make it difficult to successfully manage against mortality at the many links in the supply chain from reef to retail.

Overcoming Challenges

Scientific

Scientific gaps in information about coral reef ecosystems and fisheries will be a reality for a long time to come. The complexity of these systems and the lack of fisheries data are more substantial in the marine ornamental fisheries of Indonesia and the Philippines than in most other fisheries, but all fisheries face these challenges to a certain extent. For all fisheries, sustainable management in the face of uncertainty requires:

- Ongoing monitoring and adaptive management;
- Risk assessment and management; and
- A precautionary approach.

Adaptive management requires incorporating new information to continually improve the scientific basis for future management (U.S. Commission on Ocean Policy, 2004). Research and monitoring provides new information that, over time, can be used to determine whether take levels are adversely impacting marine life. If so, take levels and other management activities should be adjusted (Bruckner 2003). Establishing marine reserves with no exploitation can help clarify the impacts of fishing activity in collection areas (Wood 2001). As understanding of each site increases, management can move closer to ensuring sustainability. Risk assessment and management tools help determine the likelihood and implications of serious harm from activities in the absence of complete data. Management decisions are then based on the precautionary approach. Although there are many different definitions of the precautionary approach, its basic premise is that the absence of scientific information should not be used as an excuse for not taking conservation measures if there are reasonable grounds for concern about

impacts from an activity.[3] In fisheries, precautionary management typically translates into: less science = lower catch levels (Kaufman et al. 2004).

These tools need to be an integral part of any credible certification (or meaningful management in general) of marine ornamentals. FAO's guidelines for eco-labeling incorporate these concepts, particularly in relation to small-scale fisheries in which data is often limited. FAO acknowledges that the best scientific evidence available can take into account traditional knowledge of the resources, provided that its validity can be objectively verified. But to the extent that limited data or alternative techniques add to uncertainty, more precautionary approaches to management will need to be taken that might require lower take levels (FAO 2005). It also indicates that in the event of scientific uncertainty, suitable methods of risk assessment and risk management must be applied to address the uncertainty. The impacts that are likely to have serious consequences should be addressed through immediate management response or further analysis (FAO 2005).

These tools can help somewhat in overcoming challenges to effectively manage and certify marine ornamental fisheries. Over time, they can help deal with the challenges of the sheer numbers of species, complexity of ecosystems, and limited baseline data. Ultimately, as data and scientific understanding increase, management can theoretically move towards sustainability. These tools could also potentially address roving collectors in part through precautionary reduced catch levels that account for estimated take. However, roving collectors take such a large portion of catch that roving take levels themselves could easily be unsustainable and there very well could be nothing left over for local collectors. Therefore, other approaches will be needed to better address the roving collector problem. Moreover, applying these tools adds to the costs of certification and requires effective administration and management with a meaningful monitoring, compliance, and enforcement structure to be implemented over time.

Natural Resource Administrative and Management Frameworks

FAO guidelines require that eco-labeled fisheries be conducted under effective legal and administrative frameworks at the local, national, or regional level, with management systems that operate in compliance with all relevant laws and regulations and with effective mechanisms for monitoring, surveillance, control and enforcement (FAO 2005). None of these exist in Indonesia and the Philippines. But FAO also explicitly recognizes that developing countries might need financial and technical assistance to develop and maintain appropriate management arrangements. It encourages interested parties such as states, relevant NGOs, and financial institutions to provide such assistance (FAO 2005). The absence of basic management tools and institutions in the Philippines and Indonesia means that certification of marine ornamentals requires a very high level of on-site support to first create, and then maintain, the basic components of credible management.

[3] See for example The Convention on Biological Diversity, the FAO Code of Conduct for Responsible Fisheries, and the Commission of the European Communities Communication from the Commission on the use of the Precautionary Principle.

This support would need to come from one, or a combination of:

- The standard setting body
- Other NGOs
- Governments
- Businesses

The standard setting body: In the past, MAC and its MAMTI partners have stepped in to create these management tools and oversee the activities of a limited number of other NGOs. On-site MAC project managers coordinated the activities needed for certification, oversaw training of collectors, and worked closely with Reef Check, a non-profit organization that provided scientific expertise, surveyed reefs, and developed management plans, catch levels, and protocols for sites undergoing certification.

This hands-on approach places a tremendous burden on the standard setting body beyond that of many other certification schemes. For example, the MSC scheme evaluates entire fisheries, not individual collectors. It examines existing management regimes for key factors undertaken by existing management bodies such as setting catch levels, monitoring, and enforcement. It doesn't create these before they are evaluated, and it doesn't bear the cost of maintaining these structures. In some cases, other NGOs do play a role in developing or enhancing management regimes to help priority fisheries get certification, and external grants are available for small scale fisheries and those in developing countries to develop capabilities and pay for certification. But these are not central functions of the MSC itself and many, if not most, fisheries pursuing certification do so within an existing management regime.

Moreover, this role goes far beyond what a standard setting body should be doing in a credible third party certification scheme. It distracts from the central mission of a standard setting organization of setting, reviewing, revising, assessing, verifying and approving standards (FAO, 2005). It potentially undermines the independence of the standard setting body, and hence the credibility of the certification scheme, if it's viewed as having created the management structure to be evaluated. MAC is now moving away from this hands-on approach.

Other NGOs: Finding NGOs with the expertise to effectively work with local communities and fishers can be a challenge, but is probably necessary at least in the short term. In the long-term, however, reliance on NGOs (and funder support) for basic management raises questions about the ongoing viability of management regimes. NGO priorities and financial resources change over time. Once the NGO presence is gone, management practices can cease without strong incentive among fishers, managers, and businesses to continue, and adequate legal and administrative frameworks and resources to do so. This has been observed in the case of marine ornamentals.

Governments: Regardless of the level of support that the standard setting body and other NGOs are willing to provide for certification of marine ornamentals, governments in these countries must play a role. Some functions simply cannot, or are unlikely to, be met through other players, including:

- *Legal framework:* At the most fundamental level, a legal framework that provides for some control and management of resources must exist for any conservation effort to be successful. The current free access system in Indonesia and the Philippines hinders this. Roving collection allowed under the current system can render management plans moot. This legal framework can only come from the government.

- *Enforcement:* Certification schemes cannot replace ongoing enforcement. Certifying bodies complete an initial assessment of activities at a single point in time, and then typically conduct annual surveillance audits until the next reassessment. Although strong certification usually requires practices beyond minimum legal requirements, some basic enforcement capacity is necessary to at least control and document the most harmful practices, such as cyanide use.

- *EBM:* Coral reef ecosystems are under tremendous pressure from a variety of extractive activities, as well as pollution, coastal development, and climate change. Managing one fishery is not ecosystem based management and cannot ensure sustainability of that fishery. If an eco-label claims that the fishery is sustainably managed, at a minimum, take from other fisheries needs to be a part of it. Balancing multiple uses typically requires government involvement.

- *Long-term monitoring:* A long-term management body with sufficient resources must conduct ongoing monitoring to determine impacts of take levels and adapt management to account for these impacts. This role typically is filled by government.

Recent legal changes in Indonesia and earlier in the Philippines indicate that there is some movement in these countries that might allow for better local government control of coral reef resources. These changes are outlined in the table below. Although limited, and still being tested, these reforms provide some basis for local governments to gain greater control of resource use, and suggest more opportunities might be worth pursuing in the future. Past efforts at certification didn't directly engage governments in the certification process (Bellamy and Winsby 2008) and more concerted outreach in the future, building on these reforms, might help. However, regardless of legal reform, limited resources (e.g. funds) will remain a challenge in these countries.

Table 1. Recent Legal Changes in the Philippines and Indonesia

Legal Changes in the Philippines	Legal Changes in Indonesia
In the Philippines, authority for management of natural resources from the coastline out to 15 km offshore devolved to local governments in 1991. This shift in policy allows for a much more localized management systems and solutions. This has:	In Indonesia, the decentralization of government authority over the past decade away from Jakarta and toward the provincial and district governments,[4] has led to increased recognition of local community-based management systems. Changes to national law devolve the management of the coastal zone to provincial administration up to 12 nautical miles from the coastal shoreline. However, traditional fishing rights cannot be restricted and traditional fishermen can access all areas for subsistence; in other words, roving collectors still have the right to

[4] Particularly as stated in Local Governance Acts (Laws 22 and 25/1999, subsequently revised as Law 32 and 33/2004n)

• Resulted in development of management plans and bans and limitations on the collection of some species in the marine aquarium trade in some communities. • Encouraged establishment of no take zones and some increased law enforcement initiatives. • Allowed some towns and provinces to totally ban the collection of aquarium fish in order to discourage roving collectors. Unfortunately, a large proportion of the country's coral reefs are actually beyond the local government jurisdiction, making them vulnerable to roving collectors and offering no opportunities for a management framework.	roam. Despite this, a number of approaches are being developed that appear to be making headway: • Local governments have started to issue decrees declaring certain marine areas as protected or conservation areas[5]. Practical steps to actually ensure that conservation objectives are agreed on and implemented haven't produced much yet. But a lot of hope is focused on the creation of marine reserves and marine areas that would allow communities to manage resources under a locally developed plan. It is not clear yet how this will be handled with "open access" rights. • The new fishery law[6] allows districts to license small fishing boats. Ostensibly those boats that are not licensed (rovers for instance) could be kept out and fishing activities regulated. However, most local governments have few resources to enforce practices even if licensing is done well. • Through the new Coastal Management Law, the Ministry of Marine Affairs and Fisheries has an opportunity to operationalize specific 'management rights' for communities, but has not yet acted on this. • In some areas private actors have worked with communities to secure "rights' to effectively manage certain areas for tourism and pearl farming. This is challenging and the legal basis remains weak, but overall, some of these arrangements have proven quite effective.[7]

Businesses: A key question for the long-term success of certification in marine ornamentals is whether economic incentives can be structured to engage the aquarium industry in investing in needed tools and structure to meet environmental standards on an ongoing basis**.** The high level of on-site support for certification of marine ornamentals increases the true cost of certification substantially. Not only are there the typical costs of paying the certifier to evaluate practices and conduct compliance audits every year, but there are substantial costs associated with creating the tools and institutions needed for responsible management. Therefore, the economic incentives for becoming certified throughout the supply chain need to be strong, and will need to reach all the way down to individual collectors who must be in compliance all the time, not just when certifiers are present. We will explore these issues in the following sections.

[5] Under a Marine Affairs and Fisheries Ministry regulation number 17, 2008.
[6] UU31
[7] Specific case studies illustrating the challenges and opportunities of such private sector-community arrangements in eastern Indonesia and elsewhere can be viewed at http://www.leaseown.org/Case_Studies/Case_Studies.html.

3. CHAIN OF CUSTODY

Sections	Summary
• Why it's important • Situational Analysis • Challenges • Overcoming Challenges	• Chain of custody certification ensures that a product labeled as certified was actually certified. • The supply chain in the marine aquarium trade is fragmented and diffuse and includes collectors in remote reef locations, traders with poor facilities and equipment, as well as exporters and importers and retailers. • This complex supply chain makes it extremely difficult to track and retain certified product from reef to retailers. • Greater integration within the industry from the exporter/importer level down would allow for greater control over supply and greater ability to invest in needed improvements.

Why it's important

Certification requires certainty that a product labeled as certified is, indeed, actually certified. This requires establishing clear and consistent documentation of a chain of custody showing compliance against certification standards at each step the product takes through the supply chain from producer to consumer. A critical part of this is ensuring that uncertified product is kept separate from certified product along the way. Therefore, each player in the chain – from the source where it was collected to the retailer where it is finally sold to a consumer – must be individually certified in order to display the eco-label. Chain of custody certification provides a link between responsible collection and consumption, thereby enabling the consumer to make socially and environmentally responsible choices.

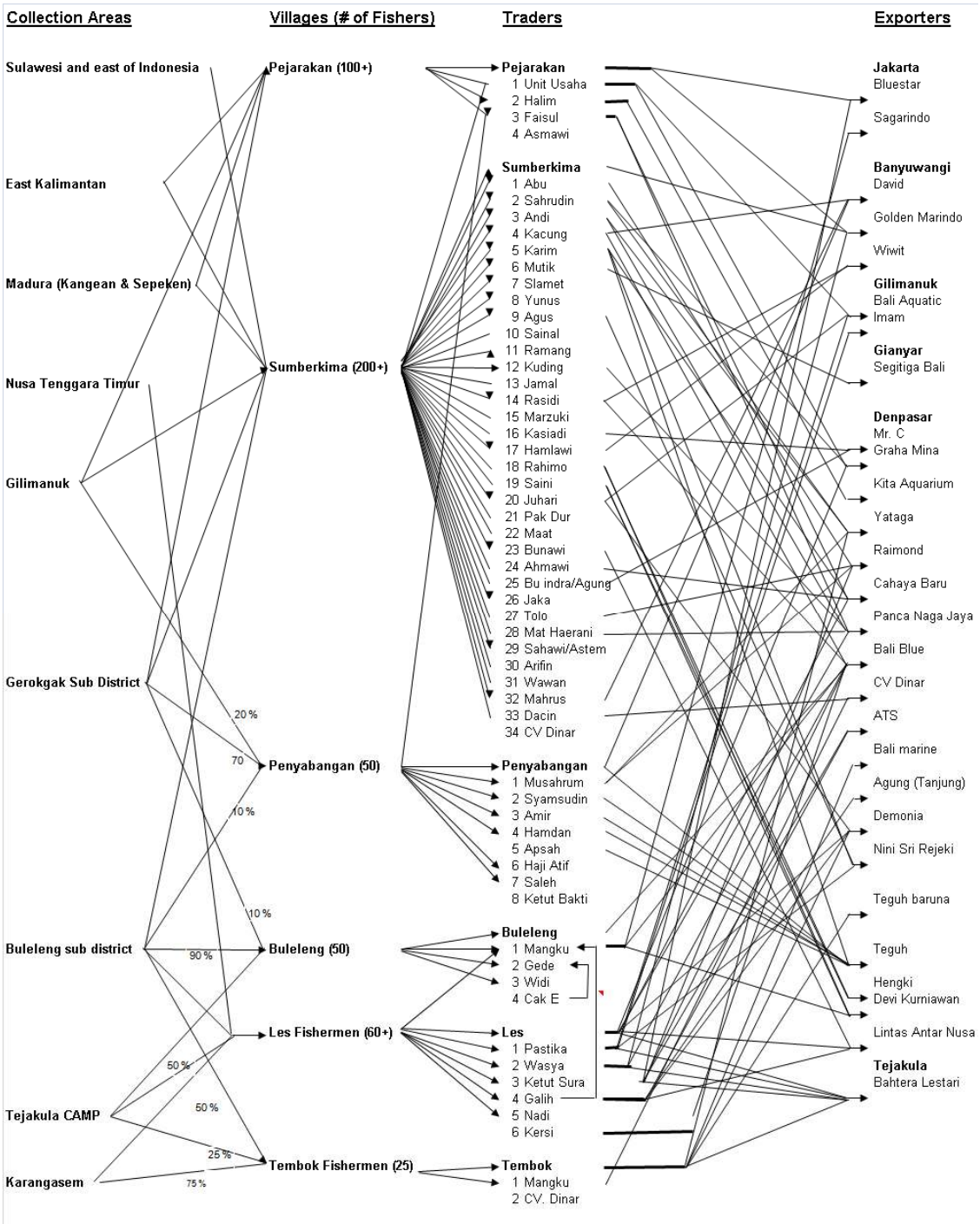
Situational Analysis

The supply chain in the marine aquarium trade is extremely fragmented and diffuse, its players disorganized and informally linked between thousands of collectors, traders, exporters, importers and retail dealers with few clear signs of differentiation between good and bad players across each segment. In addition, the changing nature of demand in terms of which species are desirable, ordered, and purchased makes it difficult to target and certify a single fish, or a batch of fishes from one harvest operation, specific reefs or collection areas. Even with MAC certification and standards, certified product is simply not finding its way through to consumers in a meaningful way.

The following diagram illustrates the complexity of the structure of the industry supply chain using, as an example, collectors from 6 villages in Northern Bali, Indonesia, and the top 9 collection areas as well as the traders and exporters that buy their fish. Of the 28 exporters only 6 are MAC certified. Of these only 4 sell their product to certified importers who also sell to a number of certified retailers. Further, these 4 exporters must source significant amounts of non-certified fish to fill their orders and run the risk of inadvertently mixing certified product with non-certified product as none of them have fully segregated, parallel handling systems in their facilities for keeping certified fish separate. It quickly becomes clear

that tracking the source of certified fish versus non-certified fish, and maintaining the integrity of the system to ensure that standards (and documentation) are properly in place is difficult.

Figure 1. Marine Aquarium Supply Chain from North Bali[8]



[8] Source: CCIF, January 2007.

Challenges

These realities lead to two substantial challenges to effective chain of custody certification:

Documentation

Obtaining clear and consistent documentation from each player as certified product moves through each step of the supply chain has proven to be challenging – and almost impossible without consistent oversight and support by an outside entity (e.g. NGO technical assistance) at the level of the collectors. More than for other certified products, the marine aquarium trade relies almost exclusively on individuals, or loose cooperatives of fishermen collectors, who collect from a wide expanse of reefs and fisheries, making even day-to-day tracking to a specific reef difficult to manage. Physical documentation in many of these areas is challenging and its value not fully understood. The MAMTI project achieved a level of success in proper documentation with the training and monitoring of collectors in sites across Indonesia and the Philippines, but these behavioral changes proved to be less than durable, with documentation compliance rates dropping after the MAMTI project exited these sites (personal communications with MAMTI staff and collectors; CCIF, 2007). The costs associated with documentation are also a concern. The high level of noncompliance suggests that the costs of doing so are high.

Leakage

There remains a significant amount of 'leakage' of certified products out of the limited fully certified supply chains which exist. Certified fish are ultimately sold to non-certified industry players, reducing the already limited amount of certified product reaching consumers. It is not just the disorganized nature of the industry supply chain that encourages leakage. Profit in the marine aquarium industry is achieved by maintaining high volume and possessing the proper species mix to meet ever changing demand. Demand outstrips the number and variety of certified products available. In order to fill orders from their customers and achieve the necessary mix of products, dealers are almost always required to supplement certified product with uncertified product, most of which is not properly segregated and results in certified fish being mixed in with uncertified fish, breaking the chain of custody. To complicate things, pre-existing relationships across the supply chain often preclude traders from seeking certified buyers for the limited certified product they have; resulting in certified product being sold to dealers who are not certified but require those particular fish species to meet their orders.

With limited certified product making it through the supply chain, a certification scheme can't reach the "tipping point" – the point at which the demand for certified product is strong while the challenges of securing enough ecolabeled products have been sufficiently overcome.

Overcoming Challenges

One way to address the problem of tracking fish through an undifferentiated and fragmented chain of custody is to encourage the integration of operation between exporters and importers who wish to be certified and to ensure that they coordinate closely with, and support, collectors in areas where more sustainable operations are possible. It is important to understand how the industry currently conducts itself and where the value can be found to understand how to consider options for supply chain and operational integration.

In 2001 The Conservation and Community Investment Forum (CCIF) conducted a full analysis of the existing marine aquarium trade and sought to understand how it could be transformed into a more sustaining provider of certified product, local livelihood for fishermen in source countries, and efficient and profitable enterprise for the myriad traders, exports and importers across the supply chain (CCIF 2001b). A major finding from this assessment was that no single organization owns or controls an entire chain of custody for aquarium fish (from collector to the retail level). A clear recommendation stemming from the CCIF analysis at the time was the need to develop an integrated and coordinated approach along the supply chain from each collection area to consumers in a way that reforms the economics of the industry, providing more capital to manage (and enforce) better environmental practices around collection and handling, and the necessary technological assistance to collectors, communities, and even local governments.

The marine aquarium trade can generate significant returns. In 2001, depending on the intensity of fishing, exporters realized between $1,300 and $8,000 in net profits per km^2 of reef per year (CCIF 2001a). Reports from the MAMTI project between 2004 and 2007 suggest that such profitability continues. However, economic value in the trade also continues to largely be concentrated away from the collectors and traders on the ground and instead in exporters and importers. The following highlights the economic situation for each segment of the trade between collectors and importers.

Collectors

Wages hover around or just above the daily income for an average unskilled laborer in each source country. Conditions are dangerous (collectors rarely work past age of 35 given the strains from diving and travel required) and income levels are increasingly at risk as the health of reefs and fish stocks continue to plummet as a result of overfishing and oversupply of standard 'low-end' species (CCIF 2001a).

Traders (middlemen)

Traders typically maintain small operations with very low gross margins. Depending on the location, scale, and other factors these can range from breakeven (CCIF 2001a) to up 20% or more (IFC-PENSA, 2005; CCIF 2006). Most are not able to reinvest in the necessary equipment and facilities to professionalize their operations and consistently meet standards of certification. Many traders understand the need for more sustainable practices for both ecological and economic reasons. However, without the capital to improve holding facilities, order management infrastructure, and transportation logistics they are unable to respond. As a result, fish mortality and low compliance with standards (where compliance is attempted) persist.

Exporters

Exporters have the ability to make considerable profits (CCIF 2001a; IFC-PENSA). This is primarily driven by their ability to sell their fish in US and European markets at considerable mark-ups (CCIF 2001a). In many cases exporters are investing in the basic, necessary equipment and facilities, yet most certified exporters do not consistently or adequately segregate certified fish from non-certified, claiming that the costs are too high (or the incentives too low). It is important to note that exporters' profit margins depend highly on the diversity and quality of supply; especially the high-end fish (demand is very consistent for these species). As such, exporters tend to buy all of the fish offered by the collectors/traders in order to secure these high value fish, even if they do not need the low end fish or intend to sell them (or plan to force importers to buy them as part of the price to also secure the high end fish). Some exporters have already integrated their operations through to the collection areas, owning boats and holding facilities and employing collectors, in order to improve and control the consistency, quality and variety of collection. In these cases it appears that both the exporter and the collectors can improve their income. Under such cases, managing resources under more sustainable practices stands a better chance of succeeding since profits are higher and can be invested in supporting better practices.

Exporter Economics

To illustrate the economics involved in the switch towards integrated operations, consider the case of an average Manila based exporter and contrast it with that of an "integrated" exporter. A traditional Manila exporter does not control collection of fish. Instead, fish are bought from independent contractors – with all the attendant complications in terms of mortality and non-optimal species mix. While in some cases, the traditional exporter finances the boats of the contractors in order to gain some measure of control over supply, they do not own their own collection stations. A hypothetical "integrated" exporter, by contrast, owns all boats as well as the collection stations; and collectors earn salaries. This integrated exporter can count on a reduction of mortality from current levels to less than 10% resulting from superior fish handling and nondestructive harvest methods, and can adjust species mix to fit market conditions. The economic advantages of the improved species mix and lessened mortality are considerable. They have the potential to not only fully offset the costs of converting operations to a fully sustainable, non-destructive set of practices, but also to dramatically improve exporter profitability. (CCIF 2001b)

Importers

Importers include standard import operations as well as various trans-shippers and wholesalers, these latter types typically focusing on large volume and low handling and holding capacity (leading to lower quality fish). Importer margins (net) are lower than for exporters -- between 2 and 10% (CCIF 2001b). For all importers, the quality and quantity of supply is the most critical profit driver, but most have little control over either of these factors. Most partner closely with exporters in source countries, but rarely is this more than a verbal contract or commitment to sell fish to importers. Lasting partnerships are difficult to maintain and integrated operations between exporters and importers almost non-existent. Improved integration between importers and exporters and on down to the collection operation would result in better control of the quality as well as the quantity and variety of aquarium organisms. It would also allow improved profit margins across the chain to ensure the necessary investments in facilities and policies, to meet high standards, are in place.

The major barrier to integration is capital. According to the 2001 CCIF study, a fully scaled in-country collection operation will cost about $1,000,000, with another $500,000 required for working capital (CCIF 2001b). But integration is necessary for the industry to mobilize the resources, and leverage influence on the demand side, to shift to sustainable practices and truly begin to reform the trade.

In the last few years, there has been some movement towards integration in some cases. For example, an importer in Japan recently purchased a Sulawesi-based export facility to channel increasing volume of fish to the Japanese market. Also, a Taiwanese investor invested in an East Java trading operation, presumably to access a consistent supply from the region. In Medan, Sumatra several investors from Singapore invested and developed partnership with local traders. The extent to which the industry is adopting a more integrated approach is unclear. Indeed, there is evidence of the opposite also happening each year as importers find new export partners, exporters and traders get out of the business and new ones get on.

Integrated Exporter

Bali Blue is a tropical fish exporter in Bali. In 2001 they had a yearly export volume of 1.7 million fish, and revenue of over $4 million. The company had a share of about 30% of the eastern Indonesian market and owned a fleet of 26 boats that ranged all over Indonesia in pursuit of aquarium fish. With full control over its supply, the company was more profitable than most exporters, with net margins in excess of 30%. (CCIF RPA, 2001).

While currently relationships between collectors, exporters, and importers typically are quite informal, there are a number of ways for the industry (exporters and importers in particular), and other stakeholders to address the need for integration as a driver for reform, from strengthening purchasing agreements to establishing dominant, fully integrated companies through direct investment into existing companies (importers, exporters, collector facilities and operations, etc).

Some ideas are presented here:

1. *Contracts*: Formal purchase agreements between certified exporters and collector groups, and certified exporters and importers could increase certified supply by providing a set of consistent channels for certified product demand and establish conditions for environmental practices and quality. Most contracts now are verbal and can be easily ignored. An example of such agreement is Amblard, a certified importer in France, which has relationships with three certified marine aquarium fish and coral exporters in Indonesia (and a fourth non-certified exporter). The business relationship between Amblard and the exporters is currently rather informal. During early stages of the relationships there were written agreements consisting of key terms and conditions (such as quotas, prices, etc.), however, the written agreements were not renewed and agreements remain informal. That said, the exporters have committed to not supply other French importers and Amblard in turn provides technical assistance to the exporters. (Personal communication, Rory Hutagalung, Amblard, April 2009).

2. *Investment and Capacity*: Exporters can formally commit to providing essential investment and capacity for the necessary holding facilities and other resources necessary for collectors to meet standards, or can invest in wholly owned facilities and commit to buying directly from collectors

in the area. In addition, exporters can capitalize facilities and fleets, equipping salaried collectors with sustainable equipment and training.

3. *Fully integrated supply chain company:* Full integration refers to a single entity owning the import and export facilities as well as operations in collecting areas. While full integration exists in a few places (Fiji, Australia, Hawaii) it is virtually unheard of in Indonesia and the Philippines. Full integration from importer to the collection site would provide the best opportunity to control supply quality, meet certification requirements, and ensure optimal resource allocation to invest in the necessary conditions.

A number of opportunities appear to exist to work with importers and exporters to build fully integrated supply networks. In 2001 the RPA Business Plan (CCIF 2001b) identified specific companies interested in formally integrating to create integrated supply chains from the United States into both Indonesia and the Philippines. Also, general discussions with exporters in Indonesia (personal communications, CCIF 2006) indicate a desire to increase control of collection facilities as a way to improve quality and consistency in supply. To pursue full integration, leading importers and exporters need to be approached and funding secured - or leading companies need to take the initiative to invest their own funds - in order to change the underlying set of economic incentives by financing the conversion of their operations. While the costs to do so are high, the opportunities for those companies that choose to integrate can be high as well. It is likely that the economic benefits stemming from the operational efficiencies and economies of scale from integration are considerable and would likely offset the capital costs associated with converting to better practices.

4. ECONOMIC INCENTIVES

Sections	Summary
• What does it take? • Situational Analysis • Challenges • Overcoming Challenges	• To be viable, certification schemes must create real and tangible value for the end consumer and dominant players in the industry. • To date, certification of marine ornamentals has not generated the value promised. • The ultimate economic incentive is consumer demand. This demand won't materialize on its own: the conservation community will need to create it.

What does it take?

Satisfying the requirements for credible certification costs money. Costs include the costs of training, equipment, and proper holding facilities, segregation systems to keep certified organisms separate from uncertified ones, certifying bodies to conduct assessments and compliance audits, plus the costs of developing and providing the data needed to assess compliance against standards. In highly environmentally destructive fisheries, the cost of moving into compliance with an eco-labeling standard can be high (Ward and Phillips 2008). In the marine aquarium industry, collectors and traders at the local level, especially, rarely possess or have access to the resources required to move into compliance and to pay the costs of certification. Exporters and importers may have resources but no direct incentive for adopting best practices that don't immediately result in a competitive advantage or increase in business profits.

To overcome this inertia, certification must create real and tangible value for the end consumer and/or the dominant players in the industry chain (CCIF 2002). Without sufficient value, the essential "demand pull" for certification will not occur and the certification scheme will not be viable over time (CCIF 2002). This value can come in a number of forms. Some of the value that has been suggested for certification of marine ornamentals includes:

Price premiums

Price premiums for certified products are often flagged as a possible economic benefit of certification – the idea that consumers will pay more for a product that they know is better for the environment than an alternative product (CCIF 2002; Roheim 2008). Evidence of price premiums for certified products in general is spotty, anecdotal, and often hypothetical (CCIF 2002; Roheim 2008). A survey conducted by CCIF (2002) suggested that price premiums only "stick" if the benefit of the certified product is physically obvious and immediately beneficial. An example is the better taste and health benefits of organic produce, or the energy savings from purchasing Energy Star appliances. In the marine aquarium trade, price premiums were cited as a potential benefit of certification, because of the higher quality and reduced environmental impact of certified product (Bellamy and Winsby 2008).

Cost reduction

In limited cases, certified products may result in economies of scale or greater efficiencies from new processes or technologies. For example, lower energy use and higher soil productivity from organic farming have been shown to lower costs (CCIF 2002). In the marine aquarium trade, improved collection, handling, and transport practices of certified product are intended to reduce mortality, thus improving income opportunity and reducing costs (MAC 2002).

Long-term supply

By definition, sustainable use of natural resources should allow for long-term harvest, without depleting the resource and the ecosystem which supports it. If certification promotes or ensures sustainable use, it provides businesses and consumers with a long-term supply of the product. In the marine aquarium trade, sustainable take levels and practices in certified areas, combined with lower mortality throughout the supply chain, have been expected to provide long term benefits to local communities that depend on the reef, as well as long term supply to businesses throughout the supply chain.

Market access

Some markets require certification as a "ticket to play" (CCIF 2002). This can occur when consumers demand certified products, or dominant buyers require it. This is similar to the concept of price premium: the idea that consumers will demand a sustainable product and thus give preference to those that are certified.

Situational analysis

Price premiums

Price premiums generally have not been recorded for MAC certified marine ornamentals (Bellamy and Winsby 2008). The price continues to be driven by supply and demand and overall product quality. According to recent anecdotal evidence gathered through informal discussions with industry players, there does not appear to be a significant quality difference between certified fish and non-certified fish. The enhanced quality promised from certified fish didn't materialize, primarily because certification efforts focused on problematic areas where destructive fishing practices were common (MAMTI 2007). Moreover, exporters, importers and retailers who are responsible players already had developed short supply chains over the years that allow them to source high quality products from more environmentally responsible locations such as Australia, Sri Lanka, the Maldives and Hawaii (MAMTI 2007). In addition, exporters who understand and care about quality are able to apply best practices in their operation and also support such practices from their suppliers by providing collectors with support and technical assistance in order to improve/maintain quality without a certification regime (personal communication, Rory Hutagalung, Amblard, April 2009).

Cost reduction

Because certification has not yet translated into clearly higher quality and measurable reductions in mortality, cost reduction benefits didn't materialize. Moreover, exporters find that the costs of implementing and maintaining product quality best practices exceed the actual cost of the mortality to them. Exporter profits are relatively insensitive to the cost and mortality of the fish. It is estimated that

the cost of goods sold for the lower-value fish (about 80% of total sales) accounts for less than 5% of revenues (CCIF 2001a). In fact, segregating certified fish and non-certified fish adds to costs. Traders and exporters still generally mix all their fish, even those that are certified. It is not clear whether any exporters in Indonesia, for instance, maintain parallel and segregated system the way many importers do (personal communication, Rory Hutagalung, Amblard, April 2009).

Reductions in mortality would make the most difference for collectors and traders. Collectors and traders would see increased profit (as they currently are not paid for fish that die or become sick or injured) and pressures on the reef could be reduced if mortality is reduced. However, they typically don't have the resources to invest in the improvements needed to upgrade their situation and reduce mortality.

The total costs of adapting MAC certification standards and becoming certified have not been calculated by MAC or others. However, the following table provides an overview of the requirements for certification at each segment of the supply chain, and outlines the kinds of costs which would need to be paid to complete the certification process.

Table 2. MAC Certification Requirements

Certifications	Requirement	Activity related cost
Collection Area	Collection Area Management Plan (CAMP)	• CAMP development, documentation, implementation. • CAMP management and enforcement. • CAMP monitoring and periodic review
	CAMP Committee to implement CAMP	• Institutional setup and capacity building • Committee operations
	Scientific Survey	• Ecosystem survey and analysis
	TAC (Total allowable catch) Implementation	• Collection and Fishing records • Analysis, monitoring, and action to prevent over fishing
Collectors & Middlemen	Collection, Fishing and Holding Practices	• Collection, Fishing and Holding Training • Equipment which complies with the standard • Holding facility improvements (segregation and maintenance of fish health) • Screening and segregation • Documentation (mortality, sales and finance, and traceability records)
Exporter Facility	Handling, Husbandry and Transport Practices	• Facility improvement (segregation and maintain health condition of fishes) for complying with the standard • Quality control • Documentation (mortality, sales and finance, and traceability records)

Some studies (Alancastro 2004; Rubenstein 2003) suggest that approaches other than certification may be preferred by buyers for reducing mortality and perhaps be more effective tools in promoting improved fishing handling and transport, including: a guaranteed increase in the length of survival and purchasing tank-bred fish when possible for both quality and environmental reasons.

Long term supply

The classic "tragedy of the commons" is at play when focusing on long-term supply as an incentive for certification. Because natural resources are typically a "commons," those who take less in the short term in the name of sustainability are at a disadvantage to their competitors. Therefore, those who incur the costs of certification, may be doing a good deed for the resource base, but are at a disadvantage to "free loaders" who also benefit from a better resource base, but fail to pay for certification. This creates a disincentive for certification. Although individual good players may become certified, widespread adoption is hindered.

Long term supply is most likely to work as an industry-wide incentive if a dominant industry player forces certification throughout the supply chain, resource pressures are so great that businesses are motivated to form collectives to save the industry, or other substantial market pressures exist (CCIF 2002). None of these appears to be the case in the marine ornamentals trade right now.

Market access

Consumer demand for certified marine ornamentals is limited, and in some cases, negative. Consumers don't demand eco-labeled products purely on their own initiative; marketing plays a large role in creating that demand (Roheim 2008). Yet a 2004 survey of marine hobbyist respondents actively engaged in internet bulletin boards and discussion lists revealed that only half were aware of MAC with only 11% very familiar with the program (Alancastro 2004; Alancastro et al. 2005). Moreover, those most knowledgeable about MAC were least supportive, and less likely to believe that certification is effective in protecting reefs and ensuring the sustainability of wild stocks. Respondents expressed skepticism that practices were adequately monitored and that certified fish actually came from certified collection areas. A key issue undermining credibility was the lack of an effective cyanide testing program (Alancastro 2004). Personal communication with a number of people associated with MAC directly or indirectly suggests that in some cases, hobbyists hold very strong negative feelings about MAC.

Although a few leading exporters and importers are growing in recognition, currently there are no dominant exporters, importers, or retailers in the marine aquarium industry with an inordinate amount of market share in any one country. The industry is still represented by a large number of small operators (traders, exporters and importers). It is not likely that one dominant player will emerge organically, although increasing integration through formal agreements and relationships between players could increase the emergence of industry leaders.

Challenges

Securing direct economic incentives like price premiums or a notable reduction in mortality or increased market access as a result of certification is not likely to happen anytime soon. To add to the challenge of initiating economic incentives for a transition into a certified trade is the presence of strong dis-incentives which need to be understood and addressed (see Box).

Price Premiums and Cost Reduction

In order for price premiums to be realized demand will need to increase, measurable quality improvements and mortality reductions will need to be realized, and uncertified options will have to decrease. If there remains a large supply of cheaper, uncertified fish (as there is now) price premiums will be difficult to command – especially given current uncertainties about MAC certification.

Market access

The lack of credibility that certification currently holds among serious hobbyists means that creating demand for certified product among marine ornamental consumers isn't simply an issue of educating a likely-receptive but uninformed audience. Rather, it's an issue of increasing the credibility of the program and reversing negative impressions developed over the past decade.

The current structure of the industry, with large numbers of small operators means there are few dominant players with the market power to force this issue.

Dis-Incentives

Not only is realizing economic benefits from certification difficult, industry is pre-disposed to not seek certification as a result of certain economic dis-incentives, including:

- Additional time and effort for documentation
- Additional costs associated with becoming certified such as new investment to implement best practices, cost of survey and monitoring, cost of assessment/re-assessment, and compliance audits.)
- Additional time needed for segregation.
- Reduction in potential income due to limitation on total allowable catch.

Overcoming Challenges

Economic incentives to drive certification of marine aquarium ornamentals should not focus on promising price premiums or improved quality, which have proven hard to deliver. Rather, the ultimate economic incentive is buyer demand for sustainable products – at both the consumer and the corporate level.

Creating Demand

Without consumer demand for the product, there would be no market (Roheim 2008). But consumer demand only goes so far. It's unlikely that Wal-Mart's customers were clamoring for sustainable seafood in 2006 when Wal-Mart announced that it would purchase all of its seafood from certified fisheries within 5 years. Many companies engaged in buying and selling seafood are adopting more sustainable policies and practices despite limited consumer demand. Rather, adopting more sustainable practices such as certification allows businesses to demonstrate corporate social responsibility which can reward them by improving their public image and fostering greater consumer loyalty (Roheim 2008). These benefits are enhanced when environmental NGOs help to recognize good players and publicize bad players. As industry leaders make a commitment, other industry players often follow to ensure market parity or advantage. This domino effect helps sustainability and certification reach the tipping point (Ward and Phillips 2008).

This demand will not materialize on its own (Roheim 2008). It requires strategic education and communications campaigns by NGO's and concerned industry players that target the most effective "gatekeepers" within the industry and the consumer community, and communicate the most effective

messages for reaching them. While the standard setting body (e.g. MAC) can do appropriate outreach to educate potentially interested players, it alone can't create this demand. Past experience in both forest products and seafood demonstrate the critical role that other NGOs play in conditioning the climate and creating the expectation among consumers and the industry that major players will be environmentally responsible (see Box).

FSC and Home Depot

It took two years of active campaigning on the part of broad coalition of environmental NGOs. But in August of 1999 Home Depot, the largest home improvement retailer in the world, committed to stop selling wood products from endangered forests, and give preference to products certified by the Forest Stewardship Council (FSC) whenever they're available. The shift towards FSC products didn't come easily. Led by Rainforest Action Network, groups such as American Lands Alliance, Forest Action Network, the Coastal Rainforest Alliance, Student Environmental Action Coalition, Earth First!, Greenpeace, the Natural Resources Defense Council, and others protested, petitioned, and raised consumer and corporate awareness in a variety of colorful ways. The tactics included generating media and consumer attention with banners, bus tours, in-store theatrics, and celebrity endorsements among others. Within months of Home Depot's announcement, competitors Wickes Inc. and Lowes Inc, followed suit, and in little more than a year at least five additional major retailers and three major home builders were on board (Carlton 2000; Krill 2001).

The sustainable seafood movement illustrates the level of effort required to create this market demand. In the late 1990's the new NGO SeaWeb introduced the tools of strategic communications and social marketing to ocean conservation, and began raising the profile of ocean issues in the media. It conducted market research to determine what messages resonated with people and began educating consumers about the connection between ocean conservation and the food on their plates (Boots 2008). It engaged seafood gatekeepers such as famous chefs to get the word out and worked with the Natural Resources Defense Council in a successful campaign to create market pressure for improved management of Atlantic swordfish. Soon thereafter, conservation groups such as the Audubon Society and Monterey Bay Aquarium created seafood guides to inform consumers about the impact of their seafood choices on the environment, and other groups began similar outreach. These early media and consumer efforts by NGOs conditioned the climate for sustainable seafood (Boots 2008).

But major NGO players and funders recognized that consumer demand alone could not transform an unsustainable industry: only major seafood buyers could create sufficient market pressure down the supply chain to reform fisheries practices. Pursuing sustainability quickly became a two-way street, as industry leaders sought out conservation NGOs to help them meet new consumer expectations, and NGOs courted major players to change their practices and transform the industry. Groups such as the New England Aquarium, Environmental Defense Fund, and Monterey Bay Aquarium formed friendly partnerships to advise major companies such as Ahold, Wegman's and Bon Apetit Management Company on improving their environmental performance. Others, such as Greenpeace, publicized the "good" and "bad" players in the industry to increase the pressure.

With substantial support from the David and Lucile Packard Foundation, more than a dozen major NGO players in North America began efforts to coordinate their messages to the seafood industry in 2006. Their hard work paid off in 2008 with the release of *A Common Vision for Environmentally Sustainable Seafood*, outlining 6 steps that environmentally responsible businesses should take to move towards sustainability. The Common Vision demonstrated that major conservation groups were united in their call for sustainability, spelled out substantive steps for businesses to achieve the goals of sustainability, and extended a helping hand to the business community to help them find ways to get there (see Box). One of the substantive steps outlined is purchasing environmentally responsible seafood, including seafood certified by a credible program.

Today, sustainable seafood is a mainstream principle among major seafood buyers – although the industry has a long way to go, if you're not at least moving towards sustainability, you're not a major player. Certification is one part of this movement, but not the only part, for several reasons.

First, the supply of certified products on the market is limited. Despite MSC's relative success, it still only supplies about 7% of the global supply of wild caught seafood (Howes 2008). Businesses can't meet their needs with only certified product. Conservation groups advise businesses on how to improve their environmental performance in other ways as well, including evaluating the sustainability of noncertified products and engaging businesses in policy reform to improve fisheries management. These additional conservation efforts add substantially to industry reform.

Second, existing certification schemes haven't gained full support throughout the conservation community. Despite widespread agreement that MSC makes a valuable contribution to sustainable seafood, some conservation groups retain concerns about at least some of their certified fisheries. A few, such as Greenpeace, are vocal about it. Certification schemes for farmed seafood suffer from credibility problems across a broad spectrum of conservation groups, substantially reducing their impact. Much of this reflects the balancing act of setting standards that are environmentally meaningful, while allowing a critical mass of the industry to become certified and create momentum. Regardless, conservation groups can agree on many other actions needed to reform the seafood industry, even if disagreement on some certification schemes remains.

A Common Vision for Sustainable Seafood

Environmentally responsible businesses:

1. Make a Commitment
Commit to developing and implementing a comprehensive, corporate policy on sustainable seafood.

2. Collect Data
Assess and monitor the environmental sustainability of seafood products.

3. Buy Environmentally Responsible Seafood
Support environmentally responsible seafood choices through purchasing decisions.

4. Are Transparent
Make information regarding seafood products publicly available.

5. Educate
Educate customers, suppliers, employees and other key stakeholders about environmentally responsible seafood.

6. Support Reform
Engage in and support policy and management reform that leads to positive environmental outcomes in fisheries and aquaculture management.

Finally, because of this "balancing act," certification may only go so far. It may not be the most effective tool to push environmental performance as far as it needs to go, while still certifying a critical mass of the industry to maintain momentum. Other conservation tools may be necessary help to push the envelope towards sustainability.

Quotes in the seafood industry press illustrate the influence of sustainability.

"Sustainable seafood not only is in vogue in many countries, but well on its way to becoming the standard. Major seafood companies that once seemed uninterested in environmental concerns now are scrambling to associate themselves with the increasingly powerful – and profitable – green revolution." - from *Early bird gets the fish.* By Karl-Erik Stomsta. Intrafish. January 2007

"We wanted a stability of supply, a stability of prices. The media profile of sustainability was growing exponentially, and we wanted our customers to know we were tackling this issue responsibly." Quote from an executive of Sainsbury's supermarkets in the UK in *Sainsbury's greens up its seafood program.* By Karl-Erik Stomsta. Intrafish. January 2007

"As one seller said in a conversation, 'we were not one of the first ones to get in the forefront of selling sustainable fish, but now, four years later, we wish we had, as we see those companies that jumped out first have been very successful. We have seen this in our market.' – from *Behind the scenes at the Seafood Summit: competition, influence, and sales,* By John Sackton, SeafoodNews.com, Feb. 3, 2009

"Regardless of whether sustainability ever becomes profitable, or whether it merely becomes an insurance policy against environmental groups and media attack dogs, it seems increasingly unlikely the movement will prove to be a passing fad." – from *Sustainable seafood feels good, but is it profitable?* By Karl-Erik Stomsta. Intrafish. January 2007

"Merely a buzzword just a decade ago, sustainability has crossed into the mainstream." – from *Sustainable seafood movement advancing*. By Steven Hedlund. SeafoodSource.com. March 15. 2009

Creating Demand in the Marine Aquarium trade

The marine aquarium trade has both advantages and disadvantages in creating demand compared with the sustainable seafood movement. It has an advantage because it's a much smaller industry with a more targeted end consumer. This can allow for a more focused communications effort, with less investment. However, certification of marine ornamentals starts from a disadvantage because past efforts at certification appear to have little to no credibility within the hobbyist community. Both real and perceived credibility issues must be addressed as part of creating demand for certified product.

Moreover, currently there are no dominant industry players in the marine aquarium trade as there are in seafood and forest products. In absence of a dominant player(s) an alternative is increased integration of the industry, especially between importers and exporters, which, combined, can bring collective resources, buying power and increasingly sustainable and consistent operations to bear on the current challenges, bringing both economic and ecological order to the industry.

5. WHAT WILL IT TAKE AND WHAT CAN WE DO?

Sections	Summary

• Necessary conditions
• What will it take?
• What can we do?
• Conclusion
	• The essential conditions necessary for effective certification of marine ornamentals do not yet exist in Indonesia and the Philippines.
	  • Satisfying environmental claims requires government involvement.
	  • Verifying the chain of custody requires an integrated industry.
	  • Responding to economic incentives requires demand for more sustainable products.
	• Creating these conditions will require substantial investment by the conservation community.
	• Certification is not a panacea. But it can be a useful tool in the larger conservation toolbox by providing guidelines for environmental performance and contributing to market pressure for reform.

Currently, the conditions necessary for effective certification of marine ornamentals do not exist in Indonesia and the Philippines. At least three essential conditions must be developed for certification of marine ornamentals to be effective:

1. *Satisfying environmental claims requires government involvement.* At a minimum, conservation in general and certification in particular require a legal framework that allows for management, including the ability to control resource extraction. Free access laws in Indonesia and the Philippines currently hinder this at best. An EBM approach to conservation also requires government involvement, to consider the full spectrum of activities affecting the ecosystem. Basic enforcement and monitoring functions typically also require a strong government role. Before there can be effective certification of marine ornamentals from Indonesia and the Philippines, these countries need to provide the basic tools of management.

2. *Verifying chain of custody requires an integrated industry.* The marine aquarium industry must be more vertically integrated to track certified product from reef to retail and to generate the revenue needed to invest in training, equipment, facilities and other resources necessary for more sustainable practices. A more integrated industry can also allow for the emergence of dominant players who can both respond to, and create demand for, certified product

3. *Responding to economic incentives requires demand for environmentally preferable products.* Better environmental performance needs to become a mainstream expectation among consumers and dominant players in the industry, creating pressure and incentives down the supply chain, and in source countries, for reform. If there is no market demand for certified product, there is no market advantage and no incentive to incur the considerable costs of certification.

Under current conditions, without addressing the need for greater government involvement, industry integration, and demand for certified product, certification will provide little or no environmental benefit.

What will it take?

Certification is not a panacea for conservation. Even in sectors such as forestry and seafood, in which credible certification schemes have significant traction, problems remain and certified products are a small percentage of the global market. The actual environmental benefits resulting from certification remain unclear (Agnew et al. 2006; Ward 2008) and the conservation tools used to address these problems go far beyond certification.

Under the right conditions, certification can provide a set of guidelines for environmental performance and create market incentives that are an important part of the larger conservation toolbox. However, making certification a useful tool for marine ornamentals will require substantial changes in each of the three conditions outlined above, and hence substantial investment from concerned conservation interests and industry. Moreover, even established standard setting bodies such as MSC and FSC are not completely self-financing and still require large subsidies from charitable foundations and other donors to continue their role.[9] These costs should be explicitly recognized by the conservation community as it develops its strategy moving forward.

Appendix 2 outlines an integrated model for how creating the essential conditions necessary for effective certification might work. This model outlines certain tactics that can help enhance the drivers of change for each of these conditions. A key starting point for bringing about change is creating greater demand for marine ornamentals harvested in an environmentally responsible fashion.

What can we do?

As the single largest market for marine ornamentals (Wabnitz et al. 2003) the condition over which the US has most control is its demand. Following the lead of the forest and seafood movements, to create demand for more sustainable products the conservation community would need to implement an effective communications, outreach, social marketing and advocacy campaign to create the expectation among consumers and major industry players that their fish will be collected in a more environmentally responsible manner. The development of this campaign would need to involve social marketing experts and consumer research to identify whom to target (e.g. knowledgeable hobbyists, a broader consumer base, critical "gatekeepers" or others) and what messages work (e.g. environmental, quality, socioeconomic, or others). This campaign should also involve a wide range of conservationists from exporting countries as well as the US to identify policy and other government reforms that can affect the flow of unsustainable products, and how to influence those policies. US influence can create critical pressure for change, but ultimately change will need to come from within the exporting countries.

Conclusion

In considering the utility of pursuing certification, we would argue that most, if not all, of the conditions necessary for effective certification must be addressed in pursuing *any* effective conservation approach.

[9] FSC reports on its website (www.fsc.org) that 60% of its funds come from foundations, government and business contributors, with 40% from fees and services. MSC reports on its website (www.msc.org) that 77% of its funds come from charitable grants..

For example, without an adequate legal framework that allows for management and limits on extraction, that extraction can continue unabated. Without resources for enforcement and incentives for compliance, violations will continue. Without incentives and mechanisms for change, current practices will remain.

Therefore, a key question regarding future investment in certification is whether it can help achieve the conditions necessary for conservation in general. That question should be considered with input from the full range of experts engaged in this issue – including exporting country experts – and consideration of other conservation goals and approaches. Even under the right conditions, effective certification alone will not transform the industry. No single approach can resolve such a complicated issue with causes and effects that span the globe. But in combination with other approaches it may help create market incentives for change and provide guidance for environmental performance.

APPENDICES

Appendix 1. Certification 101

Certification is a conservation tool developed to create market incentives for products to be produced in an environmentally responsible way. Certified products typically carry an ecolabel that identifies it to consumers as better for the environment than non-certified products. Economic incentive is created through the selective purchasing power of consumers, who preferentially chose certified products marked with an ecolabel. In some cases, consumers may pay more for a certified product. The higher price, increased volume of sales, or other benefits, reward the producers of certified product over those producing noncertified products. This then creates incentives for other producers to improve their environmental performance (Ward and Phillips 2008). In this way, certification theoretically can spread improved production practices throughout an industry.

Undergoing certification is a voluntary process that producers undertake if they believe there is an advantage to doing so. It requires having their environmental performance or practices measured against a set environmental standard. The process can incur significant costs from both the improvements needed to meet the standard and the evaluation process itself. The perceived benefits of certification must therefore outweigh the costs.

Suppliers at each step in the supply chain (such as exporters, importers, wholesalers, and retailers) must also undergo their own certification if they want to sell certified product with the ecolabel displayed. This chain of custody certification ensures that product being sold as certified actually came from a certified producer that met the environmental standard. It typically involves demonstrating practices that keep certified product segregated from non-certified product and documentation tracking each item.

Third party certification schemes are considered the most credible type of ecolabeling. The "third party" refers to an independent accredited certifying body comparing production practices or performance against an environmental standard. In third party certification, standards typically are developed by organizations outside of the industry sector, adding to its perception of independence (Ward and Phillips 2008). The standard setting body sets, reviews, revises, assesses, verifies and approves standards (FAO, 2005). It "holds" the standard and accredits competent independent auditors (certifiers) who then conduct the actual evaluations against the standard.

Some of the more well-known and respected certification schemes include the Forest Stewardship Council (FSC) which certifies forestry practices worldwide, and the Marine Stewardship Council (MSC) which certifies wild commercial fisheries used for seafood. Since 1999, MSC has certified about 7% of the world's global supply of wild caught seafood (Howes 2008). But the actual environmental benefits resulting from certification schemes are hard to measure and remain uncertain (Agnew et al. 2006; Ward 2008).

Certain requirements must be met to remain credible under guidelines established by internationally respected bodies such as the International Organization for Standardization (ISO), the International Social

and Environmental Accreditation and Labeling Alliance (ISEAL), and the United Nations Food and Agriculture Organization (FAO). ISO outlines basic structures and processes for a wide range of labeling schemes that can apply to multiple sectors. ISEAL provides general procedures for developing credible standards regardless of sector. FAO's guidelines are more focused. They refer specifically to certification and ecolabeling of fisheries, with procedural requirements based on ISO and ISEAL, plus minimum substantive requirements to ensure environmental performance at least in line with major international agreements and codes of practice.

To be credible and effective, ISEAL and FAO make clear that all standards for certification must:

- Clearly state their objectives;
- Be based on the best scientific information available;
- Ensure objective measures against verifiable criteria, indicators and benchmarks;
- Be verifiable;
- Be reviewed periodically and updated;
- Be established through a transparent multi-stakeholder process with substantial opportunity for public comment.

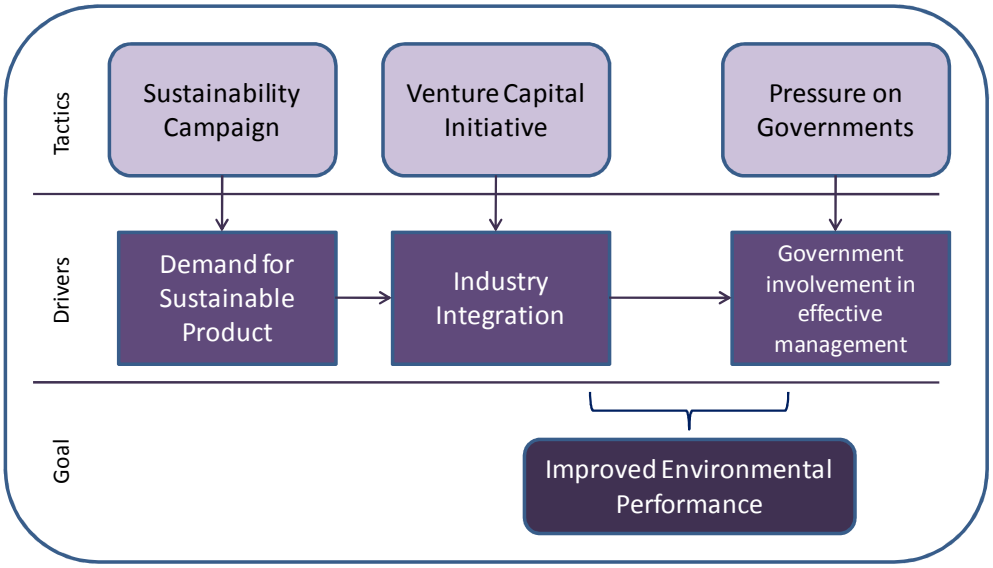
FAO guidelines also outline certain fundamental requirements for a credible certification scheme to build on. They require that eco-labeled fisheries be conducted under effective legal and administrative frameworks at the local, national, or regional level, with management systems that operate in compliance with all relevant laws and regulations and with effective mechanisms for monitoring, surveillance, control and enforcement (FAO 2005).

Elaborating on these fundamentals, Ward (2008) draws on years of experience in seafood certification to argue for standards that are as explicit as possible to verify compliance. Standards should be clear and unambiguous with minimal opportunity for different interpretation by different certifiers. Standards that aren't explicit are open to different interpretations leading to different results (Highleyman et al 2004; Ward 2008) and possibly to pressure or manipulation by specific interests (Ward 2008). ISEAL also calls for international standards to avoid ambiguities in their interpretation and to include objective and verifiable criteria, indicators and benchmarks. Minimizing ambiguity is challenging, since fisheries vary greatly, and all standards must have some level of interpretation.

Appendix 2: A Possible Model

Certification is not a panacea for conservation. Even in sectors such as forestry and seafood, in which credible certification schemes have significant traction, problems remain and certified products are a small percentage of the global market. However, certification can provide a set of guidelines for environmental performance and market incentives that are an important part of the larger toolbox. Making certification a useful tool for marine ornamentals will require substantial changes in three essential conditions – government involvement, industry integration, and demand for more sustainable product -- and hence substantial investment from concerned conservation interests and industry. We suggest an integrated model for bringing about these conditions, in which certain tactics are used to enhance the drivers of change, and each driver influences the next.

Figure 2. Proposed Integrated Model Approach



The primary driver: demand

Demand for certified ornamental fish is absolutely crucial for successful certification.

Tactics: The conservation community needs to develop and implement an effective communications, outreach, social marketing and advocacy campaign to create the expectation among consumers and major industry players that their fish will be collected in a more environmentally responsible manner. The development of this campaign should involve social marketing experts and consumer research to identify whom to target (e.g. knowledgeable hobbyists, a broader consumer base, critical "gatekeepers" or others) and what messages work (e.g. environmental, quality, socioeconomic, or others). It should also thoroughly explore the credibility problem, and in some cases animosity, MAC currently faces. It may be that this handicap is too great to overcome, or that a completely new organization or new name is necessary to make it work. This campaign would need to engage a wide range of conservationists from

exporting countries, as well as the US and Europe, to identify policy and other government reforms to influence both the supply of and demand for unsustainable products.

In this campaign, certification is part of a larger sustainability movement. Given the small amount of certified product available, and the need to avoid a "chicken and egg" situation regarding certified products, the "ask" of the campaign should not be restricted to certification. Rather, it should be designed to create incentives and pressure for change. Some components to consider include:

- Identifying preferred source countries with existing best practices or performance (regardless of certification) to provide market advantage for better environmental performance.
- Identifying "Do Not Buy Unless Product is Certified" countries, such as Indonesia and the Philippines, to create pressure in those countries for making the changes needed for meaningful certification. It may be that no products can be certified in the short-term. However, the goal of the "ask" is to create market pressure for reforms that can lead to certification down the road.
- Identifying "Do Not Buy" species that are simply unsuitable for aquaria, illegal, or endangered, threatened or rare.
- Advocating for policy reforms in both the US and exporting countries to support sustainability.

Different levels of certification might complement this approach. For example, the gold standard of certification could be sustainable use and ecosystem management (the stated goals of MAC's current standard). However, the vast majority of collection sites will be unable to meet this standard, and the gap between reality and aspiration will likely be too much to close in one step, regardless of incentives. Lower levels or "steps" could be recognized along the way to sustainability that are much more realistic to achieve. This could include a basic level which promises that no destructive practices such as cyanide are used, and a mid-level that promises the fishery is well managed, such as by setting and monitoring catch levels based on existing (albeit limited) knowledge. Each level should make clear where it falls in relation to the gold standard, and not overstate environmental benefits. The goal should be to promote continuous improvement to result in true sustainability over time.

Operationalizing: industry integration

To meet this demand, importers and exporters will need more control over their supply chain, and will need to integrate. Integration is a cross-cutting problem solver for many of the challenges discussed in this document. An integrated industry can help increase demand for certified product by increasing capacity to channel these products. Integration could also create significant cost reductions across consolidated operations through improved performance and cost savings such that more value from realized profits can be used to invest in best practices downstream at the collector level. Integrated industry players could also present governments and NGOs with leading partners to sustain and give weight to specific tactics of a focused demand campaign (i.e. by leading the way on "do not buy" compliance and insisting that suppliers and partners also participate).

Tactics: Establishing venture capital to finance the conversion of leading companies in the marine ornamentals trade to more sustainable fish collection, handling, holding, transporting, and marketing

practices is something proposed in a business plan for the Reef Product Alliance (RPA) venture (CCIF 2001b) and should be revisited. Doing so would make them more able, and more willing, to invest in certification and the tools, training, and equipment necessary to achieve certification. The RPA business plan called for the creation of a separate, for-profit limited liability investment corporation to assemble a portfolio of investments from private and public sources to finance this conversion. While there was real interest in RPA from certain investors (private and institutional, including foundations, the International Finance Corporation, and leading industry entities) the plan was ultimately shelved when the MAMTI project launched. Now seems a good time to revisit the RPA proposition.

A key question is whether market campaigns in the US and Europe will influence importers and exporters. Past market campaigns in forestry and seafood focused heavily on large retailers or distributors with brand names. There are few of these in the marine ornamental industry.

Reform: pressure on governments

Recent changes to national law in Indonesia and the Philippines have opened up new possibilities for local management and control of coral reefs.

Tactics: Newly integrated dominant industry players will increase pressure on governments for legal and management structures that support better management and certification, in order to meet new demand for more sustainable product. Increased interest in and pressure by exporters, traders, and collectors in the direction of greater control could help shape the implementation and development of new government policies. In-country NGO engagement and support can help spur needed policies as well. In turn, these basic improvements should help set the stage for conservation across a wide range of issues impacting coral reefs, not just trade in marine ornamentals.

A key question is whether other industries that benefit from the status quo (such as live food fish, coral mining etc.) will have greater political influence and incentive to override pressure from marine ornamental exporters for reforms.

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Appendix 4. Individuals Contacted

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Paul Holthus, Executive Director, World Ocean Council; formerly Executive Director Marine Aquarium Council

Rory Hutagalung, Amblard Overseas Trading S.A. (French Importer) representative in Jakarta, Indonesia

David Mainenti, Executive Director, Marine Aquarium Council

Katrina Nakamura, Sustainable Fisheries Partnerships, and Accredited Certification Body for the Marine Aquarium Council.

Domingo Ochavillo, Reef Check Philippine Country Director

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Ben Starkhouse, University of British Columbia, Global Marine Aquarium Fish Values calculations

Appendix 5. Biographies of Primary Authors

Amy Mathews Amos is founder and Principal of Turnstone Consulting with more than 20 years experience working on a wide range of environmental issues for non-profit conservation groups, scientific societies, and the US federal government. She brings expertise in marine conservation with experience as a professional evaluator to this project. Previous consulting work has included two evaluations of the Marine Stewardship Council, and development of common messaging to the seafood industry on sustainability from 15 major conservation NGOs. She has served as Vice-President and Program Director for Marine Conservation Biology Institute, Policy Analyst for Sierra Club Legal Defense Fund (now Earthjustice), and Senior Evaluator for the US GAO (now Government Accountability Office). She received her undergraduate degree from Cornell University's Department of Natural Resources and holds graduate degrees in both environmental science and public policy from Indiana University's School of Public and Environmental Affairs.

John D. Claussen is a Partner with Starling Resources; a private sustainability consulting practice in Indonesia, and is co-founder and the Managing Director of the Conservation and Community Investment Forum (CCIF), a US-based non-profit. John brings 15 years of consulting and project management experience working with business, government, and non-profit clients throughout North America and Asia. Throughout his career he has focused on delivering rational, common sense solutions to a broad array of environmental challenges, including: designing business models joining productivity and profit with pollution prevention and chemical use reduction; developing long term financial management analysis and tools to ensure that conservation investments result in the greatest returns possible; and, leading microfinance initiatives for fishermen and farmers to provide business skills and financial resources needed to participate in truly sustainable trades. Previously, John worked as a senior associate with California Environmental Associates and was a project manager with Radian International in the Silicon Valley. John earned a BS degree in Biology from Valparaiso University in Indiana in 1993. When not working or spending time with his family, he enjoys scuba diving, biking, reading, and the occasional game of baseball with the Jimbaran "J's" Baseball Club in Bali.