Tropical Coasts

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Rare... Endangered... For sale.

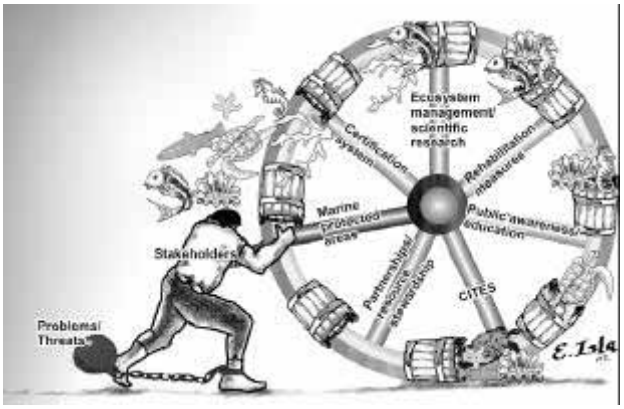
Is responsible marine wildlife trade a means to sustainability or a contributing cause to decline?

EDITORIAL

concerns and analyses

Sustainable Trade in Marine Endangered Species

Nancy A. Bermas
Issue Editor



Endangered species have gained considerable attention in the past decade as an issue of global proportion. At the recently concluded World Summit on Sustainable Development in Johannesburg, South Africa, concerns over endangered species were articulated and suggested actions to reduce the current rate at which species are being wiped out were included in the Plan of implementation.

Species become endangered or threatened when their population is reduced to unsustainable levels. Such is a result of, or a combination of various causes as human numbers grow and the demands on resources are mounting. The trade in endangered species is fuelled largely by market demand, which encourages commercial exploitation and poaching of high-priced and rare species. This issue of Tropical Coasts presents seven articles which look at the status of important species in trade, the nature and magnitude of the threats, some recommended and tested management measures being undertaken to ensure sustainable use of resources, as well as the successes and challenges in enforcing and implementing CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora).

Domestic and international trade in considered to have caused the overexploitation of coral reefs, removal of rare and key species and the use of destructive fishing practices in Southeast Asia, home to 34 percent of the world's coral reefs. Best's article describes the major issues and impacts of trade on coral reef ecosystems, presents innovative approaches to sustainable resource use, and specific recommendations for action. The article highlights the role of the United States in international trade and its responsibility in shaping conservation strategies and trade policies. To ensure more sustainable and responsible trade in coral reef animals and products, several approaches are recommended including recognizing the ecological limits of coral reefs and establishing ecological reserves as fishery management tools.

It is a common notion that reef conservation and the marine aquarium trade are incompatible as the latter is often cited as one of the causes of coral reef destruction due to destructive collection practices, overexploitation, high post-harvest mortality and the threat of extinction of target species. Holthus and Spalding present a different view in support of the industry, highlighting the socioeconomic benefits and motivation for reef stewardship created by the marine aquarium trade. The authors cite that collectors or marine ornamentals often become active reef stewards due to the socioeconomic benefits, such as creation of jobs and income that the trade brings to them. The Marine Aquarium Council (MAC) is spearheading a certification system in support of a sustainable marine aquarium trade, which aims to eliminate the negative aspects and accentuate the positive aspects of trade. To date, the certification system is gaining wide acceptance, which provides an impetus for MAC to aim at certifying a significant portion of the industry within the next five years.

Countries in East Asia, notable the Philippines and Indonesia are major exporters of aquarium fish, invertebrates and live corals. The Global Marine Aquarium Database (GMAD), which contains trade records from exporting and importing countries can generate a profile of species in trade and rank these species in term of the proportion of exports and imports. Green describes the usefulness and intricacies of GMAD and expounds on the contribution of East Asia to the global aquarium trade. Likewise, he expresses support to the marine aquarium trade. This despite controversy over its benefits and costs due to the difficulty in determining which species and how many of each species are traded. Better knowledge and understanding of the life history patterns and ecological dynamics of important species in trade, in combination with the existing information contained in the GMAD will hopefully provide answers to unfounded speculations and uncertainties concerning species used in trade, and the aquarium trade in general.

Shifting our focus to species-specific issues, giant clams constitute one of the most sought-after marine species in trade due to high demand for their meat and shells. Gomez and Licuanan state that throughout Southeast Asia, wild tridacnid populations have been depleted and some species like *Tridacna gigas* are depleted to the point of becoming virtually extinct. Illegal shell trade still continues despite inclusion of the giant clams in Appendix II of CITES. The authors propose that developing mariculture technology for tridacnids is primarily needed to provide clam seed for restocking as well as meeting the demands of commercial trade. Innovative ways of managing giant clams are also presented, which consider merging several approaches. In the Philippines, species restocking is being undertaken through stewardship agreements with local government units, people's organizations and private groups. On a regional scale, efforts to re-establish giant clam populations are being concentrated in marine protected areas.

For marine turtles, the scenario is similar. Chan and Shepherd's article provides a glimpse of the current level of exploitation of marine turtles in the region, which is mainly driven by the demand for their eggs, shells, meat, skin and bones. Egg collection for consumption has been considered as one of the major forms of exploitation of marine turtles in Southeast Asia. For most populations, the rates of decline have been estimated to range from 50-80 percent. The majority of countries in the region have acceded to CITES. Trade in turtle products, however, continues across international boundaries. While

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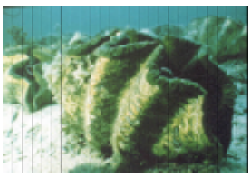
on the cover

Going... Going... Gone?

The trade in marine endangered species continues in the face of increasing global awareness to the environmental risks involved. As experts race to find ways in making the trade sustainable, international instruments and on-the-ground efforts provide vital clues on moving forward.

in this issue



departments

United with a common vision and purpose, Bali and Danang lay the foundations for a comprehensive strategy and action plans for their coastal and marine environment.

special feature

Coral Reefs in Crisis: Trade in Coral Reef Animals and Products

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Introduction

Coral reefs around the world are in crisis, threatened by a powerful combination of stresses. In Southeast Asia, trade is driving the overexploitation of reefs, the removal of rare and key species, and the use of fishing practices that physically destroy reefs. These unsustainable and destructive practices are endangering coral reefs, altering the ecosystem functions of reefs and greatly diminishing the long-term economic value and ecosystem benefits to local communities. Declining reef health threatens food security, jobs and livelihoods - from fisheries to tourism - for hundreds of millions in the region.

Both new and proven management approaches need to be widely adopted throughout the region to reverse reef degradation. Clear limits need to be set on the trade and ecological reserves established. Local communities, fishing co-operatives, commercial fishers and the national government must all assume responsibility for promoting sustainable collection practices and reef stewardship. Exporting and importing countries can play strong roles through creative export/import requirements.

*The views and opinions expressed in this article are solely of the author and are not necessarily those of the institution she is affiliated with.

US Fish and Wildlife Service

Corals and seashells for trade.

Overview of Trade

Coral reefs can be easily overexploited. Due to their high biodiversity and large number of species, reefs are characterized by many species with relatively low population numbers. Many rare species, complex food webs and tight-nutrient recycling – all make reefs especially vulnerable to overexploitation.

No other ecosystem supports the diversity and large number of species in trade as coral reefs. Trade involves:

- reef substrate, live corals, fish and invertebrates for the marine aquarium trade;
- live reef fish, giant clams, giant tritons, lobsters, shrimp, clams and snails for the live food fish trade;
- dead and dried sea cucumbers, fish, sharks, sea turtles, seahorses and other invertebrates for the dried food and medicinal trades; and

- dead and dried corals, precious corals, seashells, starfish and other invertebrates for the curio and jewelry trades.

In Southeast Asia, overexploitation and the use of destructive fishing practices (*i.e.,* those that physically destroy reef habitats, such as poisons, blasting, dredging and trawling), are driven largely by domestic and international trade in coral reef animals and products. International trade for live food and aquarium fish is driving the use of cyanide and other poisons to temporarily stun reef fish for easier collection. The poisons also kill coral and other reef animals, and can kill and injure the target fish.

Blast fishing, trawling and dredging are generally associated with trade for dead and dried food products. These practices often leave reefs totally destroyed or severely damaged, with little prospect for rapid recovery. The collection of live coral and reef substrate is destructive in that vital components of the reef habitat are permanently removed.

International trade in reef animals is largely unregulated and in many cases illegal and unreported. While many countries prohibit the use of poisons, fish collected with the use of cyanide are still entering the market illegally, along with prohibited species.

Major issues associated with trade include:

- overexploitation of reef resources and removal of rare and key species;

Lida Pet-Soude

Dynamite blast fishing.

- destructive fishing practices that destroy the habitat, such as blast fishing, poisons, dredging, trawling and muro-ami drive nets;
- targeting of grouper spawning aggregation sites that rapidly decimate adult populations;
- expansion of fishing and collection into deeper reef areas;
- lack of appropriate marine zoning, especially large-scale, permanent ecological reserves where extractive uses are prohibited;
- environmental impacts of seaweed mariculture in reef environments;
- vulnerability of reefs to extractive uses following bleaching events; and
- high incidence of paralysis and death in collectors associated with unsafe diving practices, inappropriate use of diving equipment (such as hookah rigs) and lack of diving regulations.

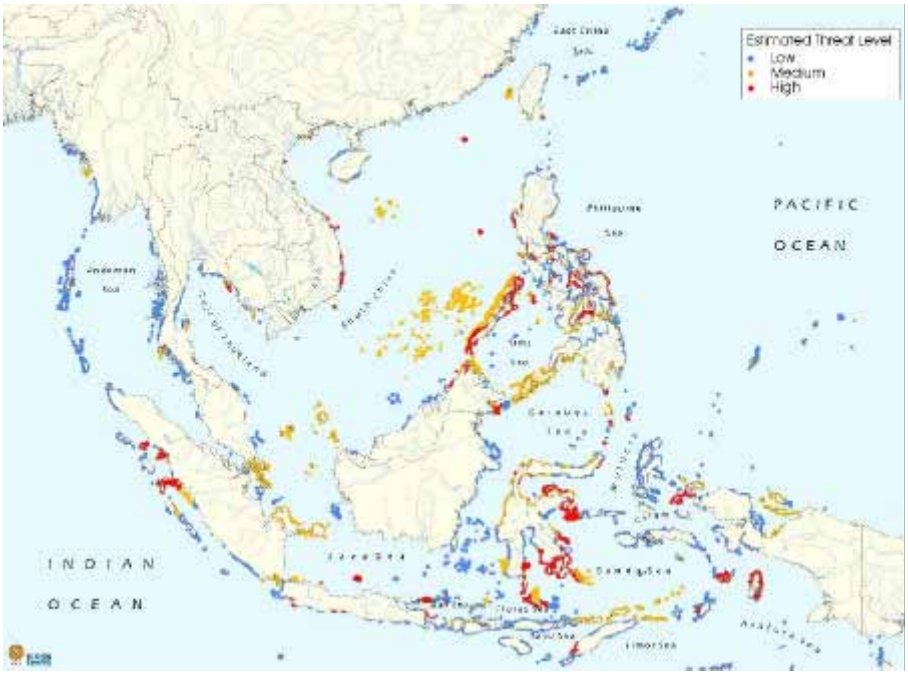
Rare and Endangered

Globally, coral reefs are *rare* ecosystems, covering only about 0.2 percent of the ocean's area. Coral reefs are also *endangered* ecosystems – over 25 percent of coral reefs have already been lost or severely degraded, and another 30 percent may be lost over the next 30 years. Major factors contributing to this coral reef crisis include overfishing and the use of destructive fishing practices, sedimentation and pollution from unsound coastal development and poor land use practices and bleaching from rising sea surface temperatures (Burke *et al.,* 2002).

More than 30 years ago, there was strong international concern that some coral reef species were endangered or may become threatened through trade. Some of those species are listed under the Convention on the International

Burke *et al.*, 2002

Figure 1. Map of Southeast Asia indicating reefs at low, medium and high risk from overfishing.



Burke *et al.*, 2002

Figure 2. Map of Southeast Asia indicating reefs at low, medium and high risk from destructive fishing.

Trade in Endangered Species of Wild Fauna and Flora (CITES), and include 2,000 species of hard (stony) corals, black coral, giant clams, Queen conch, and sea turtles.

Since the first reef animals were listed on CITES, the known status of corals and reefs indicate that they have become even more endangered from trade and other stresses. Given the coral reef crisis and the mounting threats to reefs, reef species and ecosystems can be considered as *endangered* and *threatened*.

Overfishing and Destructive Fishing

Nowhere is the threat to corals and reef animals from trade more evident than in Southeast Asia, home to 34 percent of the world's coral reefs and the center of marine biodiversity. Eighty-eight percent of reefs in the region are threatened by human activities, according to a recent assessment of the risks to reefs conducted by the World Resources Institute and regional collaborators. The greatest threats are posed by overfishing (Figure 1) and destructive fishing practices (Figure 2), threatening an estimated 64 percent and 56 percent of reefs in the region, respectively (Burke *et al.*, 2002). Many countries have 50 percent or more of their reefs classified as threatened by overfishing, while destructive fishing threatens over two-thirds of reefs in the Philippines, Malaysia and Taiwan and over 50 percent of the reefs in Indonesia (Table 1).

The severity of overfishing from trade is highlighted by five years of Reef Check surveys (Hodgson and Liebeler, 2002). Many species of high commercial value for the food, aquarium and curio trades were absent, or present in very low numbers, in almost all the reefs surveyed. The commercial trade is relatively mobile; even remote reefs are targeted for collection, particularly as nearby reefs are overfished.

Trade Impacts

Domestic and international trade is driving the use of destructive fishing practices, overfishing and the selective removal of key groups from coral reefs. Rare fish and coral species are often targeted by the aquarium trade for the wild pet industry, as these can fetch higher prices. The trade also targets large-polyped corals, which tend to be the slowest growing and the least common. Marine ornamental fish are presently collected in over 40 countries to supply hobbyists primarily in the United States, European Union, Japan and Canada. Overexploitation, the use of cyanide, and the local loss of rare or endemic species have been reported in many countries (Best *et al.*, 2002).

By targeting large groupers and wrasses, the live food fish trade removes key predator species from reef ecosystems, thus altering their dynamics. Trade also removes other fishes that feed on algae, and thus play an important role in ensuring that corals are not overgrown by more rapidly growing macro-algae. The overexploitation of key species, such as top predators and competitors, can lead to instability and cascading negative impacts on reef ecosystems (Carr *et al.*, 2002).

For some species, deeper reefs may be spatial refugia that have been maintaining fisheries despite the intense fishing pressures in shallower habitats. Exploitation in these deeper reefs is increasing as technology improves and as local fishers move into deeper waters. Very little is known about the ecology of these deeper reefs or the potential impacts from exploitation and it is extremely difficult to monitor or manage reefs at these depths.

The Role of the United States

While many food fish products primarily go to Asian markets, reef animals and products for the marine aquaria and curio trades primarily go to the USA, the European Union and Canada. The USA is the number one consumer of live corals and fish for marine aquaria, coral skeletons and other dried animals for curio and jewelry markets. Each year, the USA imports 60-80 percent of the live coral, over 50 percent of the curio coral, and 95 percent of the live rock and reef substrate in international trade (Bruckner, 2001). This trade is increasing by 10-30 percent each year (Figure 3). The USA

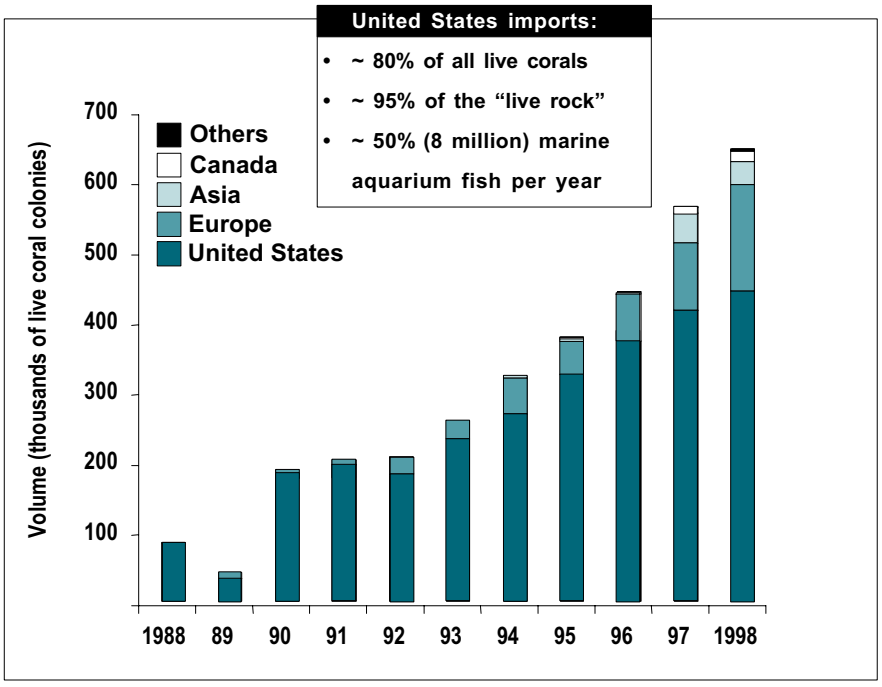


Figure 3. International trade in live coral from 1988 to 1998, showing the major importing countries. Trade has increased 10-30 percent each year.

Local communities, fishing cooperatives, commercial fishers and the national government must all assume responsibility for promoting sustainable collection practices and reef stewardship. Exporting and importing countries can play strong roles through creative export/import requirements.

also imports about 8 million of the 14-30 million aquarium fish in trade, two-thirds of which originate in the Indo-Pacific and are largely caught with cyanide (Anon., 2000; Wood, 2001).

Since 1988, the trade in coral for marine aquaria has increased over 400 percent and that in live reef rock has increased 1,700 percent. As a major importer and world leader in both trade and coral reef conservation, the USA could play a critical role in shaping conservation strategies and more responsible trade policies.

Table 1. Estimates of the percent of reefs at risk from overfishing, destructive fishing and integrated threats (aggregated for all human activities) for each area and the Southeast Asian region. (Burke *et al.*, 2002.)

Area	THREAT		
	Overfishing	Destructive Fishing	Integrated
Brunei Darussalam	0	0	21
Cambodia	100	Unknown	100
India (Andaman, Nicobar)	55	3	55
Indonesia	64	53	85
Japan	70	0	78
Malaysia	56	68	85
Myanmar (Burma)	48	10	56
People's Republic of China	75	23	92
Philippines	80	70	98
Singapore	48	22	100
Spratly and Paracel Islands	Unknown	100	100
Taiwan	70	75	100
Thailand	50	51	77
Vietnam	63	85	96
Southeast Asia	64	56	88

Approaches for More Sustainable Resource Use

How should the use of coral reefs be approached to ensure more sustainable and responsible trade, and future benefits to the local communities so dependent upon them? First, clearly recognize that there are ecological limits to the bounty provided by coral reefs. A precautionary approach, coupled with an ecosystem-based management approach, should be used to set limits on the volume and type of animals collected, and where and how fishing occurs. Second, a strong social approach is needed to equitably allocate those resources among potential fishers – subsistence and commercial – and to promote strong incentives for stewardship. Third, both exporting and importing countries can play a role in promoting more responsible trade and for shifting the burden of proof onto those who benefit commercially from reef resources. Specific recommendations for actions are listed in Box 1.

Recognize the Ecological Limits of Coral Reefs

Reefs are extremely vulnerable to overexploitation due to complex food webs and tight nutrient recycling. There must be a cautious approach how much and what types of animals are removed from reefs, where and when fishing is allowed,

Nowhere is the threat to corals and reef animals from trade more evident than in Southeast Asia, home to 34 percent of the world's coral reef and the center of marine biodiversity.

and how animals are removed – *i.e.,* follow a precautionary approach to setting boundaries for responsible removal and collection. Destructive fishing practices are inherently unsustainable and must be vigorously addressed through improved stewardship and stronger government enforcement and penalties. Species or sizes of animals that are inappropriate for trade – such as rare or key species and those that form the essential reef habitat – need to be identified and then excluded from trade.

Establish Ecological Reserves as Fishery Management Tools

Coastal marine areas should be zoned into areas for different uses and fishing practices, including unfished reserves. Replenishment reserves or no-take reserves, where all extractive uses are prohibited, can be effective fisheries management tools (Ward *et al.,* 2001). Small-scale ecological reserves have been effective in enhancing municipal coastal fisheries in the Philippines, especially where local management and enforcement authority resides with the local fishers. However, to ensure sustainable large-scale commercial fisheries and functional reef ecosystems, large-scale ecological reserves are urgently needed (Pauly *et al.,* 2002).

How large should ecological reserves be? For the marine aquarium fish trade, evidence suggests that setting aside 33 percent of the collection area as no-take may not be sufficient and a larger area may be needed to ensure sustainability (Tissot *et al.,* 2002).

Box 1. Recommendations for actions.

- Adopt precautionary, ecosystem-based approaches to reef management.
- Prohibit commercial exploitation of species until a management plan has been developed that includes that particular species.
- Develop management plans with strong stakeholder involvement; balance commercial uses with local uses.
- Utilize environmental performance bonds, posted by commercial operators, as stakeholder investment.
- Establish substantial ecological, no-take areas as integral components of all management plans.
- Zone specific areas for specific uses and users, and establish appropriate monitoring plans for each area. Where appropriate, establish well-defined, small geographic areas that can be used as concessions to individuals, cooperatives or communities to increase stakeholder investment in sustainable use.
- Address destructive fishing practices through strong enforcement, appropriate fines and stewardship incentives.
- Importing countries - require individual importers to show documentation that animals and products were not taken by destructive means, and that they are from areas under sustainable management. Stiff fines should be levied on importers for falsification of documentation.
- Address the health impacts on divers from excessive diving and hold commercial operators responsible for diving safety. Include collector health as a component of permitting and eco-certification schemes.

Promote Strong Incentives for Resource Stewardship

Strong, decentralized, local governance can help promote responsible stewardship, management and equitable allocation of resources among the various users. Strong stewardship incentives can be promoted through co-management approaches, establishment of fishing co-operatives and the use of concessions – assigned and

While many food fish products primarily go to Asian markets, reef animals and products for the marine aquaria and curio trades primarily go to the United States, European Union and Canada.

B. Best

Women cleaning seashells in the Philippines for the curio trade.

delineated fishing areas to individual fishers or fishing cooperatives. Commercial users can be required to post environmental performance bonds as incentives for, and assurances of, good stewardship.

Shift the Burden of Proof and Expand the Role of Exporting and Importing Countries

Creative trade regulations and market incentives may be used to reward and encourage responsible use of coral reef resources. Central to the use of these regulations and market forces is the concept of shifting the burden of proof – commercial users must demonstrate that products are collected sustainably and without the use of destructive practices, rather than the burden falling on others to prove that harm has been done (Dayton, 1998).

Through export regulations and licenses, exporting countries could shift the burden of proof onto those exporters engaged in the live food fish and aquarium trades, where cyanide use is widespread. Exporters could be required to cover the cost of establishing and maintaining cyanide-testing facilities and for random, independent testing of live fish exports.

Importing countries must share responsibility along with exporting countries for creating incentives for sustainable products. Importing countries could require individual importers to show evidence (beyond the CITES documents) that products came

from areas under sustainable management and were collected by nondestructive methods. Importers would then have to work with the exporters and collectors in the source country to ensure sustainable practices are implemented and that effective management and monitoring are occurring. Such import requirements could also galvanize eco-certification schemes (Anon., 2000).

In some trades, it may be possible to channel consumer demand in importing countries for eco-certified products. A consumer who purchases an eco-certified product should be assured that the product is ecologically sustainable. Therefore, any eco-certification scheme must clearly document, before the products enter the market stream, that they were collected in an ecologically sustainable manner. Animals or products that cannot be assured of sustainability, are rare or inappropriate for trade, or come from areas that are not under sustainable management, should not be certified and allowed in trade. ■

B. Best

Variety of dead and dyed starfish for sale in the United States.

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Implementing an International Certification System for a Sustainable Marine Aquarium Trade

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Background

A responsible marine aquarium trade provides incentives for reef management and conservation. Unfortunately, there is an assumption among some that reef conservation and the marine aquarium trade are incompatible. Most of this current misunderstanding revolves around three main issues: destructive fishing, overfishing and high post-harvest mortality. However, only some marine aquarium industry operators employ these unsustainable practices. Furthermore, this assumption fails to take into account the socioeconomic benefits and motivation for reef stewardship created by the marine aquarium trade. The Marine Aquarium Council has established a certification system that aims to eliminate the negative aspects and accentuate the positive aspects of the trade.

Certification of the marine aquarium industry aims to eliminate the destructive use of cyanide and promote the environmentally sustainable use of hand nets.

Environmental Issues and the Marine Ornamental Trade

Destructive Practices

Destructive aquarium fishery collecting practices include the use of sodium cyanide and other chemicals to stun and catch fish, and the breaking of corals. Cyanide was first used to stun and capture aquarium fish in the 1960s in Taiwan and/or the Philippines (McAllister *et al.*, 1999). Since the late 1970s, cyanide has also been used to capture larger live reef fish for sale to specialty restaurants in Asian cities with large Chinese populations (Johannes and Riepen, 1995). Despite the fact that cyanide fishing is nominally illegal in most countries, the high premium paid for live reef fish, weak enforcement capacities and corruption have spread the use of the poison across the Asia–Pacific region (Barber and Pratt, 1997).

The use of cyanide involves dissolving tablets of the chemical in a bottle of seawater and then

squirting the solution at the target fish, which is usually hidden in a coral crevice. The stunned fish can then be caught or sometimes, after divers have pried the reef apart. They are later revived in uncontaminated seawater. Apparently, it is very difficult to know how many targeted fish are killed directly by cyanide use. The effects of the chemical also affect how well the fish survive the additional stress of handling and transport. Many cyanide caught fish die before or soon after they have been sold, with mortality figures ranging up to 80 percent (Hanawa *et al.*, 1998).

Cyanide also kills or damages corals and nontarget fish and invertebrates, although there is limited field research and data on this (Jones and Steven, 1997). In addition, cyanide use is a health risk for fishers, through accidental exposure to the poison and careless use of often shoddy compressed-air diving gear by untrained divers (Barber and Pratt, 1997).

Overfishing

The depletion of fish stocks due to collection of marine ornamentals has often been considered unlikely (Randall, 1987), although rare species may be an exception to this (Lubbock and Polunin, 1975). Overfishing seemed especially improbable for abundant species with pelagic eggs, as there is tremendous spatial and temporal variation in reef fish populations due to recruitment patterns. This also complicates the ability to determine the effects of fishing effort on reef fish populations (Doherty, 1991).

A growing amount of qualitative evidence of aquarium fish populations in fished areas is coming from underwater surveys and observations by reef scientists and fisheries experts. The information is varied. Some indicate there may be some reductions in fish populations, at least temporarily, among heavily fished species. Others report that there is no noticeable decline in fish diversity and abundance.

A growing amount of qualitative evidence of aquarium fish populations in fished areas is coming from underwater surveys and observations by reef scientists and fisheries experts. The information is varied. Some indicate there may be some reductions in fish populations, at least temporarily, among heavily fished species. Others report that there is no noticeable decline in fish diversity and abundance.

The only systematic study on aquarium fish harvesting effects was undertaken in Hawaii, which found declines in six of the seven most abundantly collected fishes (Tissot, 1999). The study also showed that there is no evidence of habitat destruction due to fishing practices and no increase in algae growth where herbivore populations were being collected.

Since live coral and live rock form part of the reef structure, their collection and export create additional concerns that high levels of harvesting from limited areas may affect the ability of the reef to maintain itself and its ecosystem functions. The trade in all hard (stony) corals, both live and dead, is regulated under Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which provides an important level of control and data gathering for the trade in coral species.

The most comprehensive review of the coral trade based on CITES data concluded that, globally, the trade in coral is not a high impact industry (Green and Shirley, 1999). In Indonesia, coral harvesting for the aquarium trade is managed by a fairly broad quota system and the harvest of coral is considered to be a relatively minor risk to the overall health of the coral reef ecosystem

(Bentley, 1998). Due to the importance of live coral to the reef ecosystem, specific area-based fishery management for coral harvesting is needed, as well as for the growing live rock collection in some countries (Grigg, 1984; Wells *et al.*, 1994).

Post-harvest Health and Mortality

Even when collected in an environmentally sound manner, aquarium organisms often suffer from poor husbandry and transport practices resulting in stress, reduced health and increased mortality. This unnecessary mortality creates added pressure on coral reefs as more organisms are collected to make up for those that die. There are wide variations in the estimated levels of post-capture fish mortality – from a few percent for net caught fish that are handled by high quality operations to 80 percent or more for cyanide caught fish that are poorly handled.

There are many variables that affect post-harvest health and mortality, such as collection method, characteristics of the species involved and level of experience of the collector and others handling the animal. The quality of the husbandry, handling, holding and transport facilities, and practices are particularly critical to the health of the fish, *e.g.*, water quality and packing densities. Fortunately, most of the quality controls that are needed to maintain the health of aquarium animals and minimize mortality are known. In addition, many aquarium industry operators have excellent facilities and high quality practices, and some retailers and importers in a few countries adhere to a "code of practice".

Certification will help tremendously in the area of post-harvest handling, minimizing mortalities and the demand for replacement fish from the reefs.

Positive Aspects of the Marine Ornamental Trade

Socioeconomic Benefits

Collecting and exporting marine aquarium organisms in developing countries creates jobs and income in rural low-income coastal areas that have limited resources and economic options (Holthus, 1999). Collecting marine aquarium organisms provides one of the few possibilities for a sustainable local industry. For example, there are estimated 7,000 aquarium fish collectors in the Philippines. Many of them support families. A report of the United Nations Educational, Scientific and Cultural Organization estimates the number of people in Sri Lanka directly involved in the export of reef animals as high as 50,000 (Kenchington, 1985).

Marine ornamentals are in fact one of the highest value added products possible to harvest sustainably from coral reefs, bringing a higher economic return than most other reef uses. For example, live coral in trade is estimated to be worth about US$7,000 per tonne, while the use of harvested coral for lime production yields only about US$60 per tonne (Green and Shirley, 1999). The figures for reef fish are even more striking. Reef fish harvested for food from one island country were valued at US$6,000 per tonne. Aquarium fish from the same country realized a return of over US$496,000 per tonne (FAO, 1999).

Reef Conservation Benefits

Due to the important socio-economic benefits that the aquarium trade brings to rural coastal communities in developing countries, fishers and their families have an incentive to ensure their reefs are healthy, managed for sustainable use and continue to produce aquarium fish. As a result, collectors of marine ornamentals and their communities often become active reef stewards. They guard these valuable resources against destructive uses and sometimes create informal management systems or de facto conservation areas.

This is often in areas that are far from reach of government capability to provide resource management or law enforcement. Many government agencies in developing countries admit that they will never have the staff or funds to adequately manage or police most coral reefs. Nor are there going to be outside "savior" investments, such as beach hotels, dive tours or ecotourism, for the vast majority of the world's "working" reefs. These coral reefs and the adjacent coastal communities depend on each other for their survival.

On the other hand, without sustainable use of coral reefs – such as the responsible collection of aquarium animals and the incentives that this creates for local resource stewardship – reefs would probably become open to more destructive uses. This could be in the form of destructive fishing by outsiders that have no stake in the future of local reefs. It could also be by the local fishers themselves. Without a sustainable income from aquarium fisheries or other sustainable use, they could be forced into poverty-driven use of destructive fishing practices in order to get food for their families. Without income generation options in the rural areas, they could also be forced to migrate to overpopulated urban areas, adding burden to social issues in the country.

Because of the important socioeconomic benefits the aquarium trade brings to rural, coastal communities in developing countries, fishers and their families have an incentive to ensure their reefs are healthy, managed for sustainable use and continue to produce aquarium fish.

Certification for a Sustainable Marine Ornamental Trade

The collection and export of marine aquarium organisms can be based on quality and sustainability to achieve a balance among reef health, aquarium animal collection and the benefits described above. This was proven by the many successful industry operations and aquarists that provide and maintain high quality, healthy aquarium organisms with minimal mortality.

Fortunately, the symbiotic relationship between reef conservation and the marine aquarium industry has now begun in earnest through the work of the Marine Aquarium Council (MAC) to bring together aquarists, the aquarium industry, conservation organizations, government agencies and public aquariums (Bunting *et al.*, in press). As the international, multi-stakeholder certification organization for the marine aquarium industry, MAC has undertaken the following:

- developed standards for quality products and sustainable practices;
- established a system to certify compliance with these standards and label the results; and
- begun creating consumer demand and confidence for certification and labeling.

Standards Development

The MAC℠ Standards outline the requirements for third-party certification of quality and sustainability in the marine aquarium industry -- from Reef to Retail℠. There are three MAC℠ Standards covering the entire supply chain:

- The Ecosystem and Fishery Management Standard addresses in-situ habitat, stock and species management and conservation by verifying that the collection area is managed to ensure ecosystem health and the sustainable use of the marine aquarium fishery.

- The Collection, Fishing and Holding Standard addresses harvesting of fish, coral, live rock and other coral reef organisms; handling prior to export; holding; and, packaging and transport, to ensure destructive practices are not used, the sustainable use of the marine aquarium fishery and the optimal health of the harvested organisms.

- The Handling, Husbandry and Transport Standard addresses the handling and tracing of marine life during export, import and retail to ensure their optimal health, their segregation from uncertified organisms and proper documentation to show that they pass only from one MAC Certified industry operator to another.

The MAC[SM] Standards are available at www.aquariumcouncil.org. They are accompanied by Best Practice Guidance documents that provide advice to industry operators on how they might be able to comply with the standards.

Certification and Labeling

The MAC[SM] Certification system was launched in November 2001 along with the unveiling of the MAC[SM] Certified label. Following the launch, 70 marine aquarium companies in more than a dozen countries worldwide publicly stated their commitment to become certified. MAC has accredited five independent certifiers to audit compliance of marine aquarium operators to the MAC[SM] Standards.

The first implementation of MAC[SM] Certification took place in the Philippines in June 2002. Three export companies, three collector associations and three collection areas were audited by a MAC[SM] Accredited certifier. The exporters were located in Metro Manila. The collector associations and collection areas were located in Palauig (province of Zambales in Luzon) and in Tubigon and Clarin (province of Bohol in the Visayas). Informal communications from the certifier sound promising. The results will be made public after the certifier's formal audit reports are finalized.

Elsewhere in the Pacific, Fiji is positioning itself to be among the first South Pacific countries with MAC Certified collection and export. Closer to MAC headquarters in Honolulu, work on marine ornamentals certification in Hawaii has received dedicated support and will be ramped up in the coming months. In Indonesia, the Asosiasi Koral Kerang dan Ikan Hias Indonesia (AKKII)–*i.e.*, the Indonesia Coral, Shell and Ornamental Fish Association – is working closely with a consortium of Indonesian conservation groups to develop a pilot project for the implementation of MAC[SM] Standards in that country.

On the demand side, MAC is actively working with several importers and retailers in the United States and possibly in Europe, aiming for certification before the end of 2002.

Creating Consumer Demand

MAC is undertaking a multifaceted campaign to inform consumers about issues in the marine aquarium trade and to encourage them to use their purchasing power to demand MAC[SM] Certified organisms. These are collected in a MAC[SM] Certified collection area by certified collectors and pass through only MAC[SM] Certified facilities.

Consumers can visit the MAC website at www.aquariumcouncil.org to find a list of the MAC[SM] Certified retailers. These retailers can carry both certified and noncertified organisms. Hence, when visiting certified shops, consumers will look for the tanks with the MAC[SM] Certification label and ask to review the shop's list of MAC[SM] Certified organisms. The first MAC[SM] Certified organisms are expected to be in the market by 2002. Major media campaigns are planned for 2003.

Conclusion

To date, MAC℠ Certification for the marine aquarium trade has proven to be highly successful. This is largely due to the multi-stakeholder approach to work with the entire chain of custody, particularly the village-based fishers and their communities, as well as national and local government agencies and nongovernment organizations. Within the first six months of the certification system launch, many of the industry operators seeking MAC Certification paid for their own audits. MAC is on track to having a significant portion of the industry certified within five years, which will allow MAC itself to become financially self-sustaining.

Consumers are being informed on how they can help promote reef conservation by shopping at MAC℠ Certified stores and purchasing certified organisms, located in tanks with the MAC℠ Certified label.

MAC Certification is also a success for environmental certification, in general. Already MAC is being called upon to assist in developing industry standards for other kinds of trade in natural resources, such as the trade in live reef food fish. ■

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Understanding the Trade in East Asian Aquarium Species

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Introduction

The aquarium industry has attracted much controversy in recent years. Opponents to the trade draw attention to the damaging techniques sometimes used to collect fish and invertebrates, and to the high levels of mortality associated with insensitive shipping and poor husbandry along the supply chain. Aquarium species are typically gathered by local fishers using live capture techniques (such as slurp guns or barrier and hand nets) or chemical stupefactants (such as sodium cyanide). Consequently, the marine aquarium trade is frequently referred to as a major contributing cause to the global decline of coral reefs.

Meanwhile, supporters of the aquarium industry maintain that it is potentially highly sustainable, that proper collection techniques have minimal impact on the coral reef, and that the industry is relatively low volume but with very high value. There is little disagreement about the latter – a kilo of aquarium fish from the Maldives was valued at almost US$500 in 2000, whereas reef fish harvested for food were worth only US$6. Aquarium species are a high value source of income in many coastal communities with limited resources, with the actual value to the fishers determined largely by market access.

The pan-tropical shrimp *Stenopus hispidus* is the most traded invertebrate.

The controversy over the benefits and costs of trade, in terms of environmental impact, persists largely because of the difficulty in answering two questions:

1. Which species are involved?

End consumers make most of their purchasing decisions on particular species, dictated either by the constraints of their aquarium system and the other organisms in it, their experience and skill level, or by fashion and impulse. Species which are naturally rare or have highly restricted ranges can be reasonably expected to be vulnerable to overcollection. For example, some species in trade, such as the Moorish idol, *Zanclus cornutus*, are widely distributed. It is therefore unlikely that trade is a threat to this species. Other species of fish in trade, such as the Indonesian cardinalfish, *Pterapogon kauderni*, have extremely limited biogeographical ranges, hence there may be justifiable cause for concern if this species is traded in large quantities.

2. How many of each species are traded**?**

The history of commercial food fisheries provides too many depressing examples of previously numerous populations of fish being decimated through overexploitation. Even abundant species of aquarium organisms cannot therefore be assumed to be safe if the quantities by which they are collected are unknown. In 2001, a pair of angelfish, collected from 100+ m using specialist deep diving techniques, sold for US$5,000 each – an event which attracted a good deal of attention. These fish are believed to be rare. There was also justifiable concern that such high prices would fuel collection targeted at a vulnerable species. However, there is no indication that this was anything other than an unusual sale to a highly specialized customer. If only a handful of these fish are collected and sold each year, then even with little idea of the biology or population dynamics of the species, it is unlikely to be

threatened by trade. Clearly, an understanding of the quantities by which the species in trade are collected and sold is essential.

If certain aquarium species have been identified as being threatened by trade or through a combination of their life history characteristics and the quantities by which they are collected, then appropriate action should be undertaken, in the interest of both trade and conservation. Options for action would be restricted to blanket global bans if the basis for targeted national level measures – where the organisms are coming from and where they are being shipped to – remain unknown.

Existing sources of data on the aquarium trade are inadequate to answer these questions. Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) lists all species of hard corals and giant clams. Parties to

Live coral colony packed and ready to be shipped.

Options for action would be restricted to blanket global bans if the basis for targeted national level measures – where the organisms are coming from and where they are being shipped to – remain unknown.

the convention are obliged to produce annual reports specifying the quantity of trade that has taken place in each listed species. Using these reports, the magnitude and taxonomic composition of the international trade can then be calculated (Green and Shirley, 1999). However, for all other organisms, there is no standardized system of reporting used by governments and nor is there ever likely to be one. Yet, the marine aquarium trade continues to receive the attention of politicians and conservation organizations, attracted by accounts of destructive collection practices, the introduction of alien species, overexploitation and the threat of extinction of target species. Some regulations have already been established, more are being called for and might follow. At stake is the employment of thousands of people, particularly in source nations, and the high incentives for coral reef stewardship, which the marine aquarium trade is capable of providing. An ill-informed decision could therefore either encourage the continuation of an environmentally destructive practice or deprive economically disadvantaged communities of a much-needed source of income, compelling them to turn to perhaps even more destructive, short-term activities in order to feed their families.

Global Marine Aquarium Database

The best source of quantitative data on the aquarium trade are the wholesale import and export companies which link the supply and retail ends of the business. As a matter of routine business practice, companies keep records of their sales, either as paper copies of their invoices or on company computer databases. The exact nature of these records varies, but each documents the quantity of any individual species bought or sold, the date of every transaction and source or destination of the shipment. Company sales records are therefore an excellent source of data on marine aquarium species in trade, and the only source of information on unrecorded species under any other process (*e.g.*, CITES). Over the past two years, the United Nations Environment Programme – World Conservation Monitoring Centre (UNEP-WCMC) has established good working relationships with such

companies from all over the world, with the help of the Marine Aquarium Council and regional trade organizations such as the Indonesia Coral, Shell and Ornamental Fish Association (AKKII) and the Philippine Tropical Fish Exporters Association (PTFEA). The companies have provided access to their sales records. Data from 50 representative wholesale exporters and importers of marine aquarium species (Table 1) have been harmonized by this process into a single publicly available Global Marine Aquarium Database (GMAD), which now contains more than 60,000 trade records. Each trade record is a total number traded for a unique combination of: species name (fish, corals, invertebrates other than corals); country of export; and country of import and date (year).

For instance, to know the number of powder brown tang (*Acanthurus japonicus*) exported from the Philippines to the Netherlands, calculate two numbers: the first, based on export data and the second, on import data. In September 2002, GMAD contained export data from six Philippine exporters, and import data from two Dutch importers. The above query would yield an answer of 2,151 fish exported and 425 imported. Given the respective sources of the data, it is probable that the figure based on exports is mostly representative of the trade in *A. japonicus* between the two countries. There are, of course, companies in the Philippines and Netherlands trading *A. japonicus* other than those which have contributed their data to GMAD. Therefore, this figure of 2,151 fish is just a quantitative total on which to base estimates of the whole trade in this species.

As a consequence, GMAD cannot be used to calculate the absolute volume of trade on any of the identified species, or between any pair of countries. However, such calculations are based on quantitative data and the degree to which these data are indicative of the trade depends partly on the proportion of operational wholesale export and import companies contributing data to GMAD.

If there are good reasons to believe that companies supplying the same markets do not differ substantially in terms of the species or the quantities by which they trade, then GMAD data may be used to calculate the relative contribution of any species, in any trading country or region, with more certainty. To continue the previous example, seven species of *Acanthurus* are exported from the Philippines. *A. japonicus* constitutes 65 percent of the trade in this genus, and one percent of the trade in all the fishes from the Philippines. If it is possible to assume that the Philippine export companies, which have not contributed data to GMAD, do not trade in substantially different quantities of this species, then these percentages may be taken as representative.

How Does East Asia Contribute to the Global Trade in Aquarium Species?

East Asia is the most important source of marine aquarium species--86 percent of all organisms in trade originate here. Most are destined for North America, with trade between both regions accounting for just over

Table 1. Some 46 wholesale importers and exporters of aquarium organisms have so far provided data to the GMAD.

Country	Number of companies
Australia*	1
Bahrain	1
Cook Islands	1
Fiji	2
France	2
Germany	3
Indonesia	17
Maldives*	1
Marshall Islands*	1
Mexico	1
Netherlands	2
Palau	1
Philippines	6
Saudi Arabia*	1
Solomon Islands	1
Sri Lanka	3
UK	3
USA	3

Data collected from exporters under licensing agreements have also been obtained from four management authorities*, in each case, this represents the business activities of several more companies.

half of the global total (Table 2). In East Asia, Japan, Taiwan and Singapore are also significant importers. About 14 percent of global trade consists of imports to East Asia, approximately equal to the volume of imports to the European Union. A proportion occurs within East Asia – Taiwan, Japan and China (Hong Kong) are major importers (Table 3). The low volume of traded organisms quantified as passing through Singapore may be an artefact of the data because Singapore is a significant supplier of aquarium species to Europe.

Table 2. Regional trade links, expressed as percentage of the total number of all species in the global aquarium trade.

	North America	East Asia	European Union	Unknown	Wider Europe	Middle East	Australasia	South America	Africa	Total
East Asia	52.7	14.0	13.0	4.9	0.6	0.2	0.1	0.1	<0.1	85.7
Caribbean	5.8	-	<0.1	-	-	-	-	-	-	5.8
North America	4.3	-	0.2	-	-	-	-	-	-	4.6
European Union	1.4	-	0.1	-	-	-	-	-	-	1.5
Red Sea	0.7	-	<0.1	-	-	-	-	-	-	0.7
Australasia	0.4	-	<0.1	0.5	-	-	-	-	-	1.0
Africa	0.2	-	-	-	-	-	-	-	-	0.2
East Pacific	0.1	-	-	-	-	-	-	-	-	0.1
South America	<0.1	-	0.2	-	-	-	-	-	-	0.2
Indian Ocean	<0.1	-	<0.1	-	-	-	-	-	-	<0.1
Middle East	-	-	<0.1	0.3	-	-	-	-	-	0.3
Total	65.7		13.5	5.7	0.6	0.2	0.1	0.1	<0.1	100

When the trade in different groups of organisms is examined, the pattern is similar. East Asia, mainly the Philippines and Indonesia, exports 85 percent of all the aquarium fish in global trade and 75 percent of the invertebrates other than corals. The contribution to the coral trade is even more dramatic – 99 percent of all live coral in trade originates from the region, mostly from Indonesia.

Table 3. Trade within East Asia expressed as a percentage of the trade in 1.5 million organisms from 1999 to 2001.

IMPORTERS / EXPORTERS	China	Hong Kong	Japan	DPR Korea	RO Korea	Malaysia	Singapore	Taiwan	Thailand
Indonesia	0.01	3.33	27.48	0.64	0.37	0.23	0.69	1.34	0.02
Philippines	–	13.00	8.69	0.29	–	–	0.69	43.23	–

GMAD contains trade records from 30 exporting and 44 importing nations. For any of these countries, it is possible to generate a profile of species in trade and to rank these species in terms of the proportion of exports or imports. To illustrate the type of information that can be generated, Table 4 lists the chief imports of a relatively well-known group of organisms– coral reef fish – into Japan, a market about which next to nothing is known. Fish from 200 genera and 425 known species, are imported to Japan from five countries. These are the Cook Islands, Indonesia, the Maldives, the Philippines and Sri Lanka. However, this list certainly reflects more of the spread of data within GMAD, rather than a complete list of nations supplying the Japanese market. Seven of the top imports to Japan are damselfishes (Family Pomacentridae), a dartfish (*Nemateleotris magnifica*), a surgeonfish (*Paracanthurus hepatus*) and a wrasse (*Thalassoma amblycephalum*).

A total of 858 known species of fish are exported from East Asia. To put this regional trade in context, a total of 1,196 fish species are traded globally.

Table 4. The top ten fish imports to Japan.

Species	%
Chromis viridis	8.6
Chrysiptera parasema	5.4
Amphiprion ocellaris	5.4
Chromis caerulea	3.3
Nemateleotris magnifica	3.1
Thalassoma amblycephalum	1.8
Chrysiptera springeri	1.8
Paracanthurus hepatus	2.2
Amphiprion clarkii	2.2
Dascyllus albisella	1.8

... the ten most traded species account for more than 50 percent of the organisms exported from East Asia. Conversely, the trade in more than 850 species of 'other' fish occurs in relatively low numbers, hence in combination, it accounts for just 40 percent of the total East Asian trade.

A giant clam on a coral reef in the Philippines. Most clams in trade are now cultured.

The East Asian species come from 291 genera and there is trade in small numbers of unidentified species of fish from another 20 genera. Almost two-thirds of species are associated with coral reefs during the majority of their life history and presumably, are collected from reef areas. Still, the relative number of traded species, which are associated with habitats other than reefs (*e.g.,* mudflats, seagrass beds and mangroves), is surprisingly high, although those traded in most numbers are coral reef species.

There are 156 known species of coral exported from East Asia, a substantial additional quantity of which are unidentified to the species level. A total of 419 known species of other East Asian invertebrates and unidentified species from a further 39 higher taxa also originate from the region and enter the global trade.

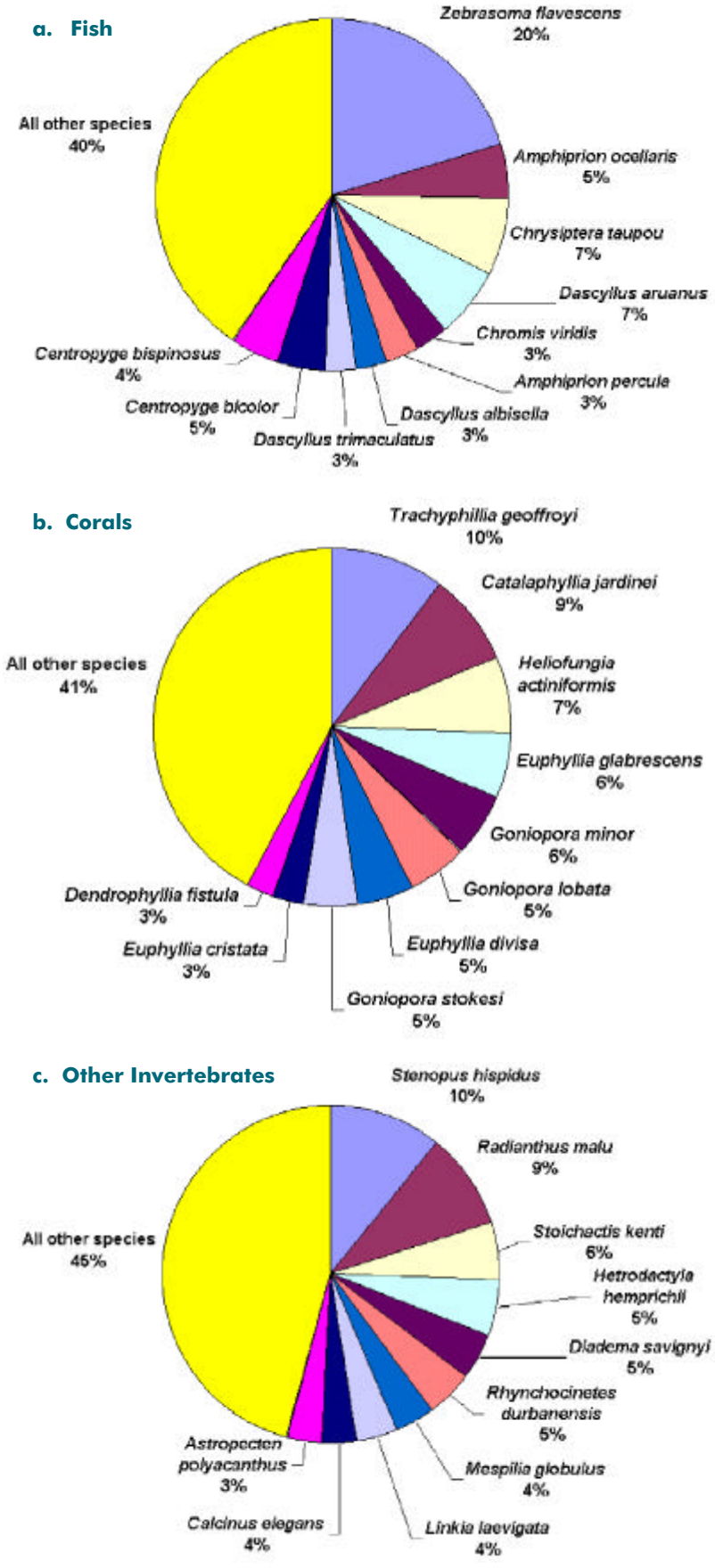
Despite there being so many species traded in these three diverse groups – fish, corals and other invertebrates – the majority of business is in relatively few species (Figure 1 a-c). In each case, the ten most traded species account for more than 50 percent of the organisms exported from East Asia. Conversely, the trade in more than 850 species of 'other' fish occurs in relatively low numbers, hence in combination, it accounts for just 40 percent of the total East Asian trade.

Does the Aquarium Trade Threaten Marine Species in East Asia?

Some people think so. For instance, the Banggai cardinalfish's (*Pterapogon kauderni*) status in the wild is precarious, with heavy collection for aquariums continuing. The species is endemic to the Banggai Islands of Indonesia and lives among the spines of the sea urchin, *Diadema setosum*, giving it a very restricted range and specialized habitat. Although tens of thousands of Banggai cardinalfish are exported, this accounts for less than 0.1 percent of all trade and no one knows whether that level of collection is more than what the population can sustain. However, in the case of this species, there is an alternative – it can be easily reared in captivity. Aquaculture, however, is no panacea to concerns over wild harvest. Less than 100 species can be successfully cultivated with only a small fraction being commercially viable. Generally speaking, for the majority of fish in trade, which tend to be small, short-lived and fast growing herbivores, collection in itself is unlikely to threaten extinction, unless the species has a highly restricted distribution. However, it is equally probable that collection, and some of the destructive practices used in the process, may be threatening the survival of rare fish by removing them from these already-stressed ecosystems. This has been claimed for the blue-spotted angelfish (*Chaetodontoplus caeruleopunctatus*) in the Philippines.

The next stage of work will be to combine life history and ecological data to highlight any species on which there may be concern. In 1999, the European Union suspended imports from Indonesia of seven coral species on the basis that the trade was not

Figure 1a-c. Major species in the aquarium trade.



demonstrably sustainable. In 2000, two species were further added to this list as were all species of *Euphyllia* and *Plerogyra*. This suspension forbade trade in four of the 10 most traded species (*Catalaphyllia jardinei, Euphyllia divisa, E. glabrescens, E. cristata* and *Trachyphyllia geoffroyi*) and closed a major market to one-third of the coral exports from the region. The suspension has since been lifted, but without a better comprehension of the ecology and dynamics of these species, it is not possible to state that collection has not adversely affected source populations.

Our lack of understanding of the ecology of aquarium species is particularly acute for invertebrates. The 'top 10' in Figure 1(c) consist of small crustaceans (shrimp and hermit crabs), cnidarians (anemones) and echinoderms (starfish and urchins). None of these, superficially, are cause for concern because they are likely to occur in populations far exceeding the numbers being taken for the aquarium trade and are more widely distributed. This is, however, purely conjecture. Clearly, a better understanding of the numbers of species in trade will only ever be partially useful for management purposes as long as large gaps remain in our knowledge of target species' ecology. ■

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Giant Clam Conservation in Southeast Asia

Introduction

Of the nine extant species of giant clams (Table 1) found only in the Indo-Pacific region (Figure 1), seven are found in Southeast Asia (Figure 2).

Tridacnids or giant clams are algal symbionts. They obtain nutrients from their photosynthetic endosymbiotic dinoflagellates (Griffiths and Streamer, 1988) and filter feeding (Klumpp *et al.*, 1992). Giant clams thrive in relatively shallow sunlit waters. They are broadcast spawners engaging in mass spawning, usually as the new or full moon approaches. Their yolk-laden planktonic larvae take about a week to metamorphose into shelled pediveligers, acquiring a foot that allows them to select suitable substrata for attachment. Juvenile tridacnids are vulnerable to predation and tend to be cryptic. As they grow, they deposit more shells, which serve as sole protection for their soft body parts.

Tridacnids are important ecologically and commercially. Clam populations add topographic detail to the seabed and serve as nurseries to various organisms, especially fish. Their calcified shells are excellent substrata for sedentary organisms, such as stony corals, soft corals, algae, sponges, bryozoans, shell-boring worms, as well as other bivalves, thereby increasing the reef's biodiversity. They contribute to reef production. By their photosynthetic zooxanthellae, tridacnids are primary producers. Nitrogenous wastes and photosynthetic by-products are largely recycled between the giant clam host and its zooxanthellae. For a bivalve, the giant clam's biomass production is impressive, and is a food source for various predators, such as some flatworms, octopus, various carnivorous gastropods and fish, crabs and hermit crabs, fish, some marine turtles and humans.

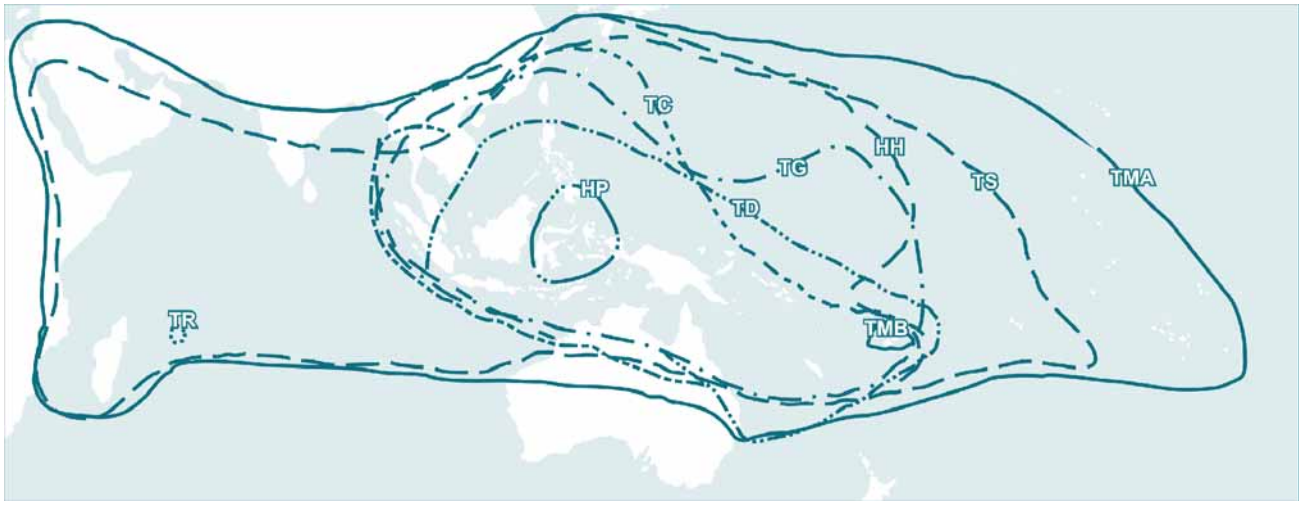
Fishers collect wild clams as they encounter them while fishing. These may be consumed on the boat, searanched near the fisher's house by the sea to be eaten on special occasions (Salamanca and Pajaro, 1996), or sold in the local market. In Mactan Island of Cebu, Philippines, a popular restaurant serves giant clam dishes to locals and foreigners alike, regardless of the nationwide ban on clam harvesting. In Coron Island, north of Palawan, tribal *Tagbanuas* traditionally gather *Tridacna crocea* from shallow reefs where they are most abundant. The clams are shucked and the meat is dried and sold in the local market on skewers.

Aside from utilizing the clam meat, shells have been traditionally used by man in various ways. They are common household items, such as soap dish, salad bowl, garden

Table 1. Taxonomic classification of tridacnids or giant clams.

Kingdom	: Animalia	
Phylum	: Mollusca	
Class	: Bivalvia	
Subclass	: Heterodonta	
Order	: Veneroida	
Family	: Tridacnidae	Genus *Tridacna* Bruguiere **Species:** *Tridacna gigas* (Linne, 1758); *T. derasa* (Roding, 1798); *T. squamosa* (Lamarck, 1819); *T. maxima* (Roding, 1798); *T. crocea* (Lamarck, 1819); *T. mbalavuana* (Ladd, 1934) = *T. tevoroa* (Lucas, Ledua and Braley, 1991); and *T. rosewateri* (Sirenko and Scarlato, 1991). Genus *Hippopus* Lamarck **Species:** *Hippopus hippopus* (Linnaeus), *H. porcellanus* Rosewater

Rosewater, 1965 and 1982; Lucas et al., 1991; Newman and Gomez, 2000; Sirenko and Scarlato, 1991.



Modified from Rosewater, 1965 and 1982; Lucas, 1988; Sims and Howard, 1988; Zann and Ayling, 1988.

Figure 1. **Map showing the distribution of tridacnids in the Indo-Pacific region. TG=*Tridacna gigas*, TD= *T. derasa*, TS=*T. squamosa*, TMA=*T. maxima*, TC=*T. crocea*, TMB=*T. mbalavuana* (=*T. tevoroa*), TR=*T. rosewateri*, HH=*Hippopus hippopus*, HP=*H. porcellanus*.**

ornament and food trough for domesticated animals.

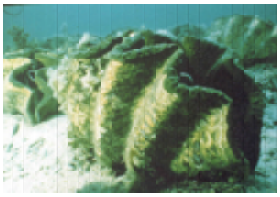
In the Philippines, shellcraft-making is practically a cottage industry for families living along the coast. Whenever giant clam shells are available, workers use them for shellcrafts. Regardless of the ban on giant clam products, shell curios, jewelry or craft are still being sold by peddlers and small-time entrepreneurs.

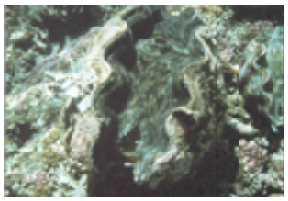
Commercial Trade: Past and Present

Giant clam meat is consumed in most Southeast Asian nations like Taiwan, Japan and Hong Kong (Shang *et al.*, 1991; Conservation Science Department WWF Indonesia-Sahul Bioregion, 2000). In the 1960s and 1970s, annual landings were estimated at 100-400 tonnes in Taiwan. Because giant clam meat is often obtained by poaching, it is mixed with other mollusc meat, and is called *compoy* or *ganbei* (Lucas, 1994). Although clam mantle and dried clam meat are consumed, frozen and fresh adductor muscles are preferred (Dawson, 1986; Tisdell and Chen, 1992).

With the demand for giant clam meat, harvesting natural clam stocks may not be sustainable. In 1985, giant clams were included in the Convention on International Trade in

Figure 2. **Tridacnid species in Southeast Asia.**


Tridacna gigas


T. derasa


T. squamosa


T. maxima


T. crocea


Hippopus hippopus


H. porcellanus

The remaining giant clam populations are threatened by commercial exploitation, bleaching, disease, pollution, poaching and illegal fishing practices that degrade habitats.

Endangered Species of Wild Fauna and Flora (CITES) Appendix II list, (*i.e.*, the giant clam trade is now regulated in order to ensure that utilization of the species does not compromise species survival). Signatory countries to CITES must abide by and support its rules and regulations. However, 1986 reports indicate that giant clams are still being traded, with consumers largely in Malaysia, Singapore and Japan (Stanton, 1994). High-grade adductor muscle products were being sold at retail prices of US$100 per kilogram (Firdausy and Tisdell, 1992; Lee, 1988). In 1989, wholesale prices for *T. gigas* adductor muscle (>400 gram) were sold at US$29-31 per kilogram, while *T. derasa* and *H. hippopus* adductor muscles (about 200 gram) were sold at for US$15-19 per kilogram (Shang *et al.,* 1991).

Until 1996, the Philippines was exporting wild *T. crocea*, after the Bureau of Fisheries and Aquatic Resources declared a selective lifting of the collection ban beginning 1991 (BFAR, 1991and 1996). Wild *T. crocea* was largely exported to Japan. The estimated annual demand for whole clams in 1991 reached 500 tonnes (Shang *et al.,* 1991). Japan was also sourcing clam meat from giant clam hatcheries in Palau, the Solomon Islands, and the Marshall Islands.

On the other hand, clam shells from the Philippines were also being imported by Japan, Australia, Europe and the USA. However, with the government ban covering most giant clam species, much of the legal shell trade is now locally confined, and continues to thrive despite the trade ban. The illegal shell trade, however, continues. In 1996, Rotterdam Customs officials confiscated a shipment containing 11,000 tridacnid shells (Lochen, 1997).

Indonesians have found use for fossilized shells of *T. gigas* and *T. derasa* buried in reef flats by cutting them into terrazo tiles. Unfortunately, shells from live clams are also being used. In 1982, records show that this tile industry produced 600 t onnes of tiles per month (Usher, 1984). From 1978 to 1983, between 20 and 200 tonnes of such shell materials were moved from the Karimun Jawa Islands to the nearby tile production center in Semarang, at US$5-20 per tonne (Brown and Muskanofola, 1985). It appears that shells were also being exported, as Netherlands Customs officials were able to seize a shipment container with clam shells while in transit through Rotterdam Harbour (Lochen, 1997).

More recently, giant clams are being sold as aquarium pets. In the Philippines, a popular commercial establishment in Manila continues to sell clams for the aquarium. There is a huge aquarium market in Europe, Japan and the USA (Dawson, 1986). Between 60,000 and 80,000 clams are traded annually; tridacnids entering the USA comprise over 70 percent (NOAA-National Marine Fisheries Service, 2001). Most species, except *T. mbalavuana (=T. tevoroa)* and *T. rosewateri*, are available from hatcheries in Palau, the Solomon Islands and the Marshall Islands.

Different tridacnid species for aquarium are priced depending on mantle coloration. Current prices for *T. maxima* at 4-13 centimeters are US$25-149 per piece. *T. crocea* at 2.5-10 centimeters shell length are US$15-105 a piece. *T. gigas* juveniles are priced at US$25 - 45 per clam. *T. derasa* at 5 - 7.5 centimeters are being sold at US$16 - 42 per clam. *T. squamosa* at 4 - 7.5 centimeters are being sold at US$15-35 per clam. Despite the availability of cultured clams, aquarium shops also sell wild clams. The reasons for this may either be because wild clams still enter the market and shop owners will take whatever is available, or because wild clams are being offered at lower retail prices than cultured ones.

Other Threats

In addition to commercial exploitation, the remaining giant clam populations are threatened by bleaching, disease, pollution, poaching and illegal fishing practices that degrade habitats.

Clams that are stressed (*e.g.*, from lack of nutrients, extreme temperatures, suboptimal light conditions, etc.) manifest different levels of mantle bleaching, from paling to whitening. Endosymbiotic zooxanthellae are lost and eventually the mantle coloration. When the mantle has completely bleached, clam mortality is usually expected. In addition, stressed clams may succumb to disease or acquire secondary infections as a result of stress (Alder and Braley, 1988; Norton *et al.,* 1993).

Reef pollution by industrial and domestic wastes, siltation, or cyanide (used to collect aquarium fish) result in environmental degradation and destruction of potential giant clam habitats. Blast fishing likewise results in habitat degradation, and would have direct effects on clam survival if dynamite were thrown over clam populated areas. Furthermore, Rodriguez *et al.* (1993) indicated that larval requirements for metamorphosis and settlement (hence recruitment) largely depend on larval recognition of spatial interactive patterns of physical, biological and chemical features of the microenvironment. Degraded habitats are less likely to present the required cues for larval settlement.

Humans remain the most formidable threat to giant clams, as they can harvest a population within hours. Decline in clam populations has been associated with their proximity to human settlements. Commercial fishers have expanded their fishing grounds, even crossing boundaries, in order to harvest giant clams. There have been several incidents in the Philippines of clam poaching by foreign Asian fishing vessels. Although some of these vessels have been impounded, others have gone scot free because marine patrols are ill-equipped.
In Indonesia, several incidents of clam poaching in the south of Sulawesi and in Irian Jaya have also been reported, mostly committed by locals from surrounding islands (Aw, n.d.; Conservation Science WWF Indonesia-Sahul Bioregion, 2000). According to reports from the Ministry of Agriculture of Malaysia, tourists often perpetrate clam poaching. They collect clam meat from marine protected areas and hide it in their dive jackets or in a safe place for later retrieval, or they pay islanders directly to collect for them.

Mariculture

There is an obvious need to develop a mariculture technology for tridacnids to provide clam seed for restocking, as well as an alternative source of clams for the demands of commercial trade. As cultured clams become readily available to local and international markets, harvest pressure on wild stocks may decrease. It is important that the remaining wild populations be allowed to recover, either naturally or by infusion of cultured stock.

Table 2. Giant clam hatcheries in Southeast Asia that produce giant clams for research and reseeding.

Country	Location and cultured species
Indonesia	Hassanudin University Marine Station, Barrang Lompo Island, South Sulawesi (TG, TD, HH)
Malaysia	Muka Head Marine Station, Centre for Marine Coastal Studies, Universiti Sains Malaysia, Penang (no data)
Philippines	Bolinao Marine Laboratory, The Marine Science Institute, University of the Philippines-Diliman (TG, TD, TM, TC, HH) Silliman University-Marine Laboratory, Dumaguete City, Negros Oriental (TS, TM, TC, HH) Guiuan Development Foundation, Inc. , Eastern Samar (TG, TD, TS,TC, HH)
Singapore	Tropical Marine Science Initiative, National University of Singapore (TS)
Thailand	Aquatic Animals Spawning Development Center, Prajuab Kirikan Province (no data.)

In the 1980s, scientists from Australia, the Philippines and several Pacific Island nations (including Fiji, Kiribati, the Solomon Islands and Palau) collaborated through an international research program to develop the giant clam mariculture technology. Studies have shown that tridacnids make good mariculture species because of their short planktonic life and autotrophic (=self-feeding, no need for additional feeds) nature (Lucas, 1988). Several culture manuals have already been produced (Heslinga *et al.,* 1990; Braley, 1992; Calumpong, 1992; Mingoa-Licuanan *et al.,* 2000). Table 2 lists the clam hatcheries in Southeast Asia.

Conservation

The larger species have been subjected to greater fishing pressure than the smaller species, mainly because of the former's greater biomass and large shells. Table 3 presents a checklist of tridacnid species in Southeast Asia.

Stock assessments of wild tridacnid populations in the Philippines date back to the 1984-1986 surveys done by the University of the Philippines Marine Science Institute (UPMSI) and the Silliman University Marine Laboratory (SUML). *T. gigas, T. derasa* and *Hippopus porcellanus* have been reported as overfished (Juinio *et al.,* 1989). What remains of the *T. gigas* populations may still be found in the south, such as in the province of Palawan. On the other hand, remnant *T. derasa* populations may still exist in the east, in the peninsular province of Eastern Samar, and in the west, in the Island of Maricaban (province of Batangas). *H. porcellanus* may be virtually extinct, and if ever a few populations remain, these might be located in the further south of the Philippines. On the other hand, *T. squamosa*, the burrowing species *T. crocea, T. maxima* and *H. hippopus* are still relatively abundant, although local extinctions may have already occurred.

In Thailand, *T. gigas* and *T. derasa* have already been reported as extinct. Surveys in Ko Kradad (Trad Province) and the Mu Ko Surin Marine National Park indicate that there may be three remaining extant species: *T. squamosa, T. maxima* and *T. crocea* (http://www.TalayThai.com, 2001).

The clam populations (*T. squamosa, T. crocea, T. maxima* and *H. hipppopus*) in Malaysia are mostly found in the waters of Johor, but only *T. crocea* occurs in relative abundance. *T. gigas* is virtually extinct (Tan and Yasin, 1998).

There are limited reports on tridacnids in other areas of Southeast Asia. *T. maxima* has been reported in Hong Kong and Taiwan. *T. gigas* is extinct in Taiwan. *T. squamosa, T. maxima, T. crocea* and *H. hippopus* have been specifically reported from North Borneo. *T. crocea* and *H. hippopus* have been reported from Singapore. *T. gigas* is known to be native to Myanmar (Rosewater, 1965; CITES, 1999). *T. squamosa, T. maxima* and *T. crocea* are found in Vietnam (Groombridge, 1994).

Table 3. Checklist of tridacnid species in Southeast Asia.

Area	Species						
	T. gigas	*T. derasa*	*T. squamosa*	*T. maxima*	*T. crocea*	*H. hippopus*	*H. porcellanus*
Hong Kong, China				extant			
Indonesia	extant	extant	extant	extant	extant	extant	extant
Malaysia	extinct		extant	extant	extant	extant	
Myanmar	extinct						
Philippines	extant	extant	extant	extant	extant	extant	virtually extinct
Singapore					extant	extant	
Taiwan	extinct		extant	extant	extant		
Thailand			extant	extant	extant		
Vietnam			extant	extant	extant		

Management

The Philippines, Myanmar, Thailand, Taiwan, Indonesia, Hong Kong, Singapore and Brunei, are signatories to CITES. Hence, tridacnids are to different degrees protected by law, *e.g.*, one that bans the collection of wildstock and imposes corresponding penalties for mere possession, etc., over and above CITES requirements. Export of all giant clam species is controlled by the designated management authority of the State. However, implementation of such laws leaves much to be desired.

In countries where ethnic groups traditionally eat giant clams for food, the law may lean towards tolerance, such as in the Philippines regarding the *Tagbanua* tribe in the south. The Chulalongkorn University Social Research Institute in Thailand is attempting to involve the Mokens in clam mariculture in the Surin Islands through a clam culture project. The Mokens, a semi-nomadic group, belong to the Chao Lay or sea nomads inhabiting the eastern shores of the Andaman Sea. The Mokens, however, have established themselves on the Surin Islands and have moved their village sites from time to time. For the past two decades, the Surin Islands have been in existence as a national park, with implications to the way of life of the Moken inhabitants.

Management of giant clam resources, therefore, needs to merge several approaches. Banning clam collection may be the beginning, but it is not the end. Similarly, regulation of the export trade may look good on paper, but it does not address the illegal trade because concerned government agencies cannot or do not enforce the law effectively. Another approach would be for researchers to cultivate the species, and to take it a step further, conduct a strategic reseeding program, which involves research scientists, empowered local government units (LGUs) and community stakeholders. Educational campaigns should be conducted regarding the reseeding program. They should disseminate information on the merits of using cultured clams and the demerits of collecting clams from the wild. Where applicable, alternative or supplementary sources of livelihood need to be undertaken.

Management of giant clam resources needs to merge several approaches. One approach would be for researchers to cultivate the species, and conduct a strategic reseeding program, which involves research scientists, empowered local government units and community stakeholders.

Species Restocking

Conservation measures to re-establish giant clam populations in reefs are being undertaken in the Philippines. The UPMSI has spawned all Philippine species. It is culturing tridacnids for research and restocking. To develop its broodstock collections for hatchery spawning, the UPMSI obtained larvae and clam seed from foreign and local sources (Coastal Aquaculture Centre-Solomon Islands, Micronesian Mariculture Demonstration Center-Palau, James Cook University of Northern Queensland-Australia and the SUML-Philippines). Local broodstock were also collected from selected reefs.

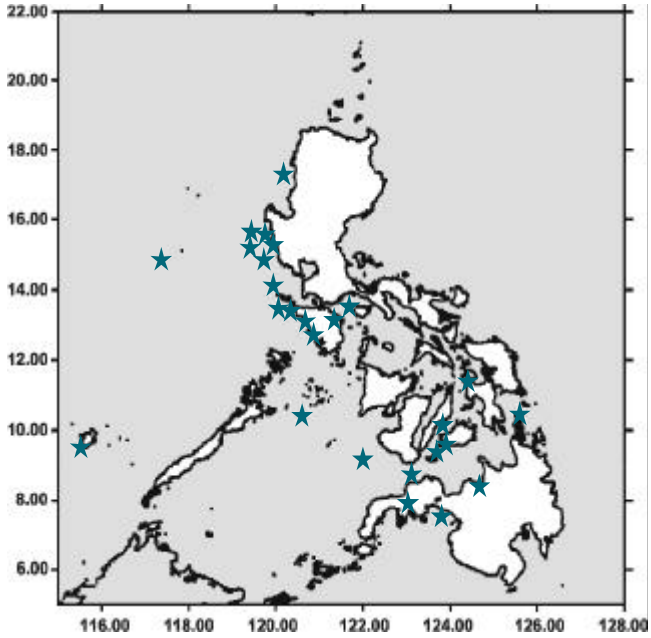
With little financial support, the UPMSI began transplanting cultured clam seed of different species in a few sites in 1986. Since then, as interest in clam seeding grew and sponsorships were solicited, the number of restocking sites have increased. In 1995, the UPMSI was able to spawn *T. gigas*, the first time in the Philippines that this species was spawned in captivity. The institute has reseeded cultured *T. gigas* belonging to at least seven cohorts, into 24 out of 27 restocking sites, from Ilocos Norte (Luzon) in the north, to Tawi-Tawi (Mindanao) in the

Ten coral reef sites in the Philippines are being established as demonstration areas for coral reef enhancement through the transplantation of coral and the restocking of giant clams.

south, from Pagasa Island (Kalayaan Islands Group) in the west, to Eastern Samar (Visayas) in the east (Figure 3). The UPMSI is also soliciting stewardship agreements with LGUs, people's organizations, nongovernment organizations and private groups in the implementation of its clam restocking program. Recently, the species restocking effort received a substantial boost from the Pew Marine Conservation Fellowship for one of the authors (EDG). In this program, some 10 coral reef sites throughout the country are being established as demonstration areas for coral reef enhancement through the transplantation of coral and the restocking of giant clams, principally the true giant clam, *T. gigas*.

Two other Philippine institutions, the SUML (Dumaguete) and the Guiuan Development Foundation, Inc. (GDFI) are producing cultured tridacnids for reef restocking. The SUML is culturing most Philippine species except *T. gigas* and *H. porcellanus*, and is restocking clams in the context of their community-based coastal resources management program (Calumpong *et al.*, 2000). The GDFI has recently spawned their *T. gigas* broodstock, which originated from the UPMSI. The foundation has been involving neighboring coastal communities in its clam reseeding program.

Figure 3. Map of the Philippines showing UPMSI's sites (blue star) for giant clam restocking.



To re-establish giant clam populations, clam restocking programs in Southeast Asia are concentrating on marine protected areas (MPAs), such as sanctuaries and national parks. Although MPAs are initially protected by law, oftentimes, the participation of organized local communities seems to be more relevant in effectively maintaining protection over a particular MPA. Outside of the MPA, giant clam resources in communal fishing grounds are still traditionally treated as communal property.

Enhancement of MPAs by transplanting giant clams is one means of developing ecotourism. The Great Barrier Reef is an example of how ecotourism may be used as a management tool to conserve natural resources and generate revenues at the same time (Reichelt and Williams, 2001). The UPMSI is restocking the Hundred Islands National Park (managed by the Philippine Tourism Authority)

with 10,000 cultured clams. Similarly, there are plans in Malaysia to re-introduce cultured giant clams in the Tunku Abdul Rahman Marine Parks (Gayana Resort Bay Sdn Bhd, 1999). The Cendrawasih Bay Marine National Park of Indonesia named one of its reefs "Tridacna" because of its conspicuous giant clam populations. Remote areas need to capitalize on their existing marine resources to develop the tourism industry. For example, Indonesia is promoting the remote Togean Islands of Central Sulawesi (south of the equator) for their breeding grounds for giant clam, marine turtle and coconut crab (Conservation International Indonesia, 2000).

Conclusion

By and large, conservation efforts to re-establish tridacnid populations in Southeast Asia may be beginning to shift gears, as governments, both local and national, are beginning to support projects on clam restocking nationwide. Clams cultured for restocking programs require a certain lead time to obtain suitable reseeding sizes. Tridacnids are long-living species, and if left undisturbed on the reefs, will continue to be productive components of reef systems. ■

In Southeast Asia, clam restocking programs are concentrated on marine protected areas. The UPMSI is restocking the Hundred Islands National Park with 10,000 cultured clams. In Malaysia, there are plans to re-introduce cultured giant clams in the Tunku Abdul Rahman Marine Parks.

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continued on page 56

The Bali and Danang Co
A Stakeholder Response for

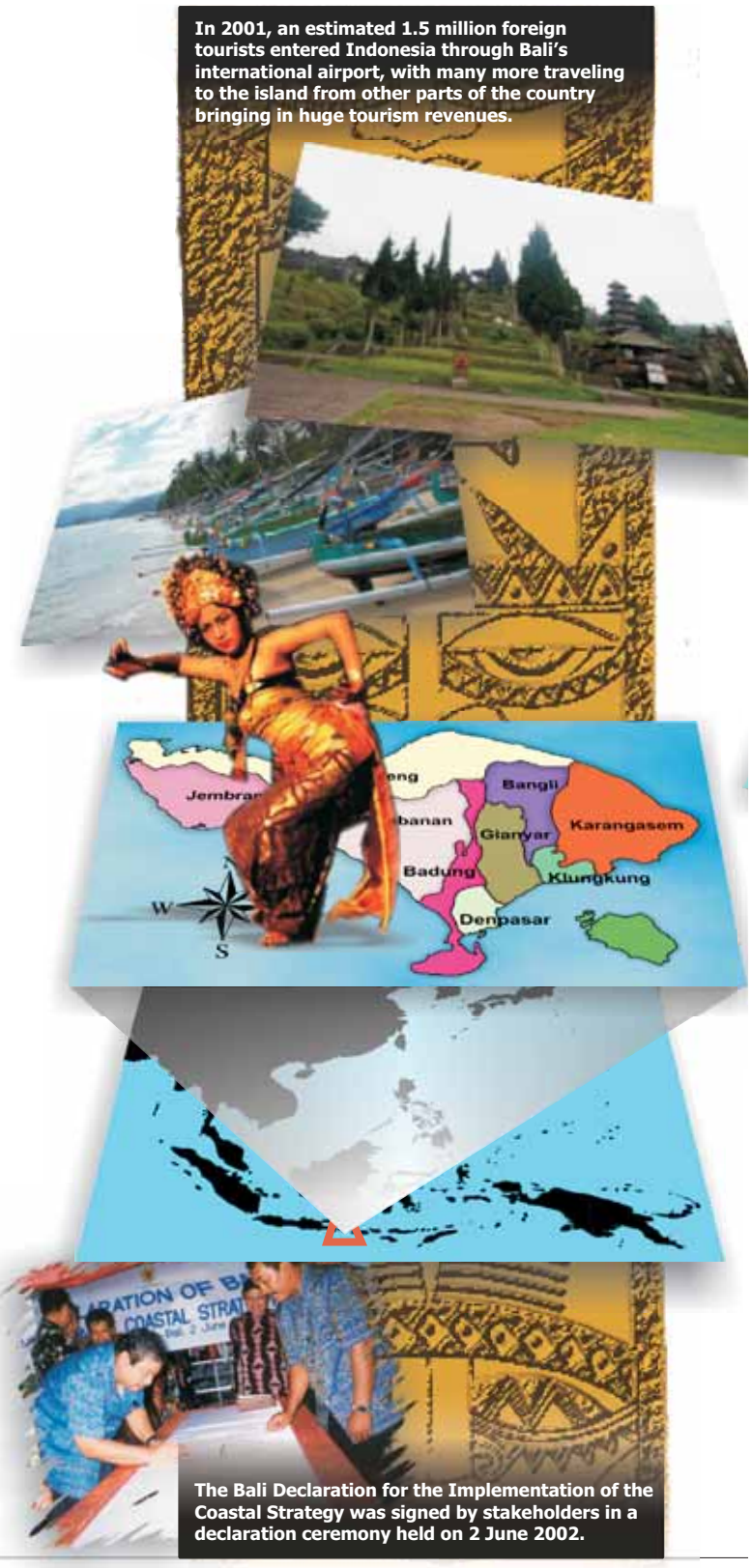
BALI, INDONESIA

Bali has the popular image of a tropical paradise. The island's beautiful natural attractions include miles of sandy beaches, picturesque rice terraces, towering volcanoes and tropical forests rich in exotic wildlife. Infused within this backdrop is a palpable and enduring Hindu culture with numerous ceremonies that have become attractive events. The local culture, combined with Bali's natural environment are a major attraction for visitors from all over the world, making tourism a significant contributor to Bali's economy.

However, in recent years, many major developments along the coastal areas of Bali have led to the destruction and degradation of its coastal and marine environment and resources. Although the Balinese stakeholders understand the benefits of such development projects can lead to social and economic improvements, they are also aware that their revered traditions are threatened by these development activities. They recognize the need to protect their coastal and marine environment and resources from such changes. The Tri Hita Karana, a doctrine which is part of traditional Balinese culture, effectively addresses these concerns. The doctrine has been used as a guiding principle in developing the Bali coastal strategy, as a tool for achieving sustainable economic development, and in conserving and protecting the coastal and marine environment and resources in Bali.

On 2 June 2002, the Coastal Strategy of Bali Province was formally presented and approved by the Balinese stakeholders in a Declaration Ceremony, which was witnessed by the Delegates for the Fourth Preparatory Committee Meeting for the World Summit on Sustainable Development (WSSD). The Balinese declared their commitment to the environmental protection and sustainable development in the province of Bali and resolved to fulfill their roles and responsibilities to implement the Bali Coastal Strategy. "The Bali Declaration for the Implementation of Coastal Strategy" was signed by 21 representatives, including the Governor of Bali Province, Regents, the Mayor, and Chairmen of the Legislative Assemblies of different regencies of Bali. The Minister of Environment for Indonesia also witnessed the Declaration, which was overwhelmingly supported by stakeholders.

Balinese always envision Bali to be a prosperous and peaceful place for all. They firmly believe that their traditional 'Tri Hita Karana', which balances spiritual development with the economic growth, cultural preservation and environmental protection, is effective in protecting their coastal and marine environment and resources. The Bali Coastal Strategy embodies this doctrine, and provides the Bali people with a framework and series of action programs for achieving the desired equilibrium.



In 2001, an estimated 1.5 million foreign tourists entered Indonesia through Bali's international airport, with many more traveling to the island from other parts of the country bringing in huge tourism revenues.

The Bali Declaration for the Implementation of the Coastal Strategy was signed by stakeholders in a declaration ceremony held on 2 June 2002.

astal Strategy Declarations: a Common Vision and Future

The literacy rate of Danang is 98.3 percent, generating a large pool of dynamic and capable human resources. Its modern infrastructure facilities and policies for investment make it one of the most promising destinations for domestic and foreign investors.

The People's Committee organized a workshop on 6 June 2002 to introduce the Strategy, share experiences on its development and declaring the commitment of the city for its implementation.

DANANG, VIETNAM

Danang is located on the central coast of Vietnam and is considered to be one of the most important economic growth centers of the country, due to its strategic geographical location and rich ecological, historical, cultural and economic values. The City offers favorable climate for the development of trade and the service sectors, such as tourism, transportation, shipping, aquaculture, manufacturing and construction.

In parallel to economic development, Danang is also challenged with environmental management issues, such as pollution from land- and sea-based sources, overexploitation of marine and coastal resources, degradation of habitats, inadequate planning for sea- and land-use, weak local capacity, and limited public awareness on the importance of managing and protecting the marine and coastal environment.

In response to the challenges Danang initiated measures to balance economic and industrial development with environmental protection. In November 2001, Danang completed its Coastal Strategy a document that provides a broad management framework – the sustainable development of the City. Its development served as a vehicle for stakeholder consultation, particularly in identifying the values and threats to the coastal and marine resources and environment. To address the identified concerns, strategies and long- and short-term action programs were developed, covering multiple use conflicts, improving environmental quality, preserving biodiversity, promoting environment-friendly economic development, creating environmental investment opportunities and, more importantly, outlining a common vision of how the Danang people see their coastal and marine environment in the future.

The Coastal Strategy was developed following a long process of consultation with stakeholders. It is therefore considered a "people's strategy", since it reflects the common aspirations of the concerned community at large. The development of the Coastal Strategy elicited positive results, notably the expressed commitment of the local leadership in overseeing its implementation. Public awareness was also enhanced, which subsequently elicited changes in the people's perception concerning the values and the vital role of the environment and natural resources.

On 26 December 2001, the People's Committee of Danang City approved the Coastal Strategy through Decision Number 8294/QD-UB. The People's Committee then organized the Danang Coastal Strategy Declaration workshop on 6 June 2002. The workshop was aimed at increasing public awareness on the Danang Coastal Strategy, sharing experiences on its development, declaring the commitment of the city, and mobilizing various stakeholders at the national and local levels for its effective implementation. More than 70 people, including local stakeholders and representatives from central government agencies, 11 coastal cities and provinces, PEMSEA, media and an international donor agency, attended the event. The Vice Chairman of the People's Committee of Danang City and the Chairmen of the People's Committee of the 6 districts comprising Danang signed the Declaration.

Danang's efforts in developing and implementing the Strategy were highly recognized. The need to replicate the process in other coastal provinces and cities in Vietnam was also highlighted.

Bali Declaration for Coastal Strategy Implementation

Commitment on partnerships among stake-holders for implementation of integrated coastal management in the coast of Bali

RECOGNIZING that the coast of Bali is a place of God, where the philosophy *'Tri Hita Karana'* guides the life of people and their relations to God and the natural environment;

APPRECIATING that the coastal and marine resources provide Balinese people with economic and social development opportunities as well as a cultural uniqueness;

APPRECIATING that the natural habitats of the coast of Bali such as mangroves, coral reefs, and seagrass beds play key roles in protecting biodiversity, maintaining water quality, and safeguarding shoreline against erosion or natural disasters;

UNDERSTANDING that the resource system of the coast of Bali is threatened by high development pressure;

RECOGNIZING that socioeconomic concerns, such as poverty alleviation, human health protection, environmental management, economic growth and equitable distribution of resources, are integral components of sustainable development;

COMMITTING ourselves, the Ministry of Environment for Indonesia, the Provincial Government of Bali, and other stakeholders in public and private sectors, to work in partnership, with the help of Asung Kertha Wara Nugraha Ida Sang Widhi Wasa (God Almighty), for the sustainable development of marine and coastal resources of Bali;

NOW THEREFORE, we hereby pledge to implement 'the Coastal Strategy of Bali' with particular emphasis on the following:

- Implementation of information, education and awareness campaigns among various stakeholder groups in communities throughout the area;
- Formation of communication forums at the village and subdistrict levels, to enhance the public participation in decision-making processes;
- Establishment of an integrated environmental information system to provide the public with ready access to relevant information on state of the environment;
- Strengthening multi-sectoral coordinating mechanism to enhance local capacities and collaboration in planning, managing and monitoring the marine and coastal environment;
- Strengthening existing laws and regulations and/or enactment of new legal instruments to safeguard sustainable development of marine and coastal resources, and to prevent pollution from land-based and sea-based human activities;
- Mobilization of stakeholders in economic sectors such as tourism and fisheries to exercise corporate responsibility in the planning, development and implementation of sectoral activities;
- Setting up a favorable policy and investment environment to support and serve as incentives for private sector investments in environmental facilities and services;
- Enhancement of capacity building initiatives to train local agencies and communities in the implementation, monitoring and enforcement of environmental regulations, as well as in land- and sea-use spatial planning and management practices;
- Adoption and implementation of appropriate policies and management programs to minimize and prevent beach erosion, and to protect public facilities and sacred places in coastal areas;
- Application of appropriate regulatory and economic instruments to control both land- and sea-based sources of contamination to rivers, coastal areas and the sea, and to promote the development of affordable, socially acceptable environmental facilities and services among communities, industry and business sectors in Bali;
- Incorporation of conservation, rehabilitation and sustainable use of coastal habitats into relevant sectoral plans and programs to enhance biological diversity and the sustainability of important economic activities such as fisheries, aquaculture and tourism;
- Strengthening controls over the exploitation and consumption of groundwater and the implementation of water conservation programs across sectors of society; and
- Mobilization of traditional villages, civil society groups, religious leaders, media and scientific communities to manage and conserve heritage areas, structures and traditional activities of socio-cultural and religious significance.

We hereby declare our commitment to keep Bali ***B**ersih* (clean), ***A**man* (safe), ***L**estari* (sustainable) and ***I**ndah* (beautiful).

SIGNED in Bali, Indonesia on the 2nd June 2002.

Chairman of Legislative Assembly at Badung Regency,

I.B.K. Suryatmaja M.

Regent of Badung,

A.A. Ngurah Ratmadi, SH

Chairman of Legislative Assembly at Buleleng Regency,

Drs. Nyoman Sudharmaja Duniaji, MBA

Regent of Buleleng,

Pit. I Ketut Wijana, SH

Chairman of Legislative Assembly at Denpasar Municipality,

I Ketut Sukita, SE

Mayor of Denpasar,

Ida Bagus Alit Wiryawan, SH

Chairman of Legislative Assembly at Jembrana Regency,

I Wayan Mawa

Regent of Jembrana

Dr. Drg. Gede Winasa

Chairman of Legislative Assembly at Gianyar Regency,

I Wayan Arditha, SH

Regent of Gianyar,

Tjokorda Gde Budi Suryawan, SH

Chairman of Legislative Assembly at Tabanan Regency,

I Made Arjanbawa, SH

Regent of Tabanan,

Nyoman Adi Wiriatama

Chairman of Legislative Assembly at Klungkung Regency,

Wayan Sutena

Regent of Klungkung,

Ir. Tjokorda Gde Ngurah

Chairman of Legislative Assembly at Bangli Regency,

I Wayan Kaler Sudira, Bsc

Regent of Bangli,

I Nengah Arnawa

Chairman of Legislative Assembly at Karangasem Regency,

I Nyoman Matal

Regent of Karangasem,

Drs. I Gede Sumantara, AP

Chairman of Legislative Assembly at Bali Province,

Ida Bagus Putu Wesnawa

Governor of Bali,

Dewa Beratha

Witnessed by :

Minister of Environment,

Nabiel Makarim, MPA.,MSM

Danang Declaration for Coastal Strategy

Agreement on partnerships among stakeholders for the implementation of integrated coastal management in Danang City

Danang City is recognized as:

- The emerging international gateway of Vietnam and one of the most important economic growth centers of the country owing to its strategic geographical location and rich historical, cultural, economic and ecological values;

- The transport hub of the north-south rail, highway and air routes; the key point of the East-West corridor to the highlands and neighboring countries in the Mekong River sub-region, with several commercial seaports and an international airport promoting trade not only within its neighboring provinces but also with the other countries in the region;

- The commercial and industrial focus of Central Vietnam, supporting a wide variety of industrial activities and providing an environment conducive for investments; and

- An important tourism site owing to its favorable weather, rich history and culture, proximity to several UNESCO World Cultural Heritage Sites and presence of famous landscapes and seascapes.

Ecologically, the coastal areas of Danang support a variety of aquatic habitats and resources that provide immense socioeconomic value to the people of the area;

Rapid economic development, however, brings about environmental problems, such as pollution from domestic, industrial and agricultural sources, booming tourism, habitat and biodiversity loss and overexploitation of resources that threaten the integrity of the coastal resource systems;

We acknowledge that development of the coastal areas of Danang and protection of the coastal ecosystems and their resources must be mutually supportive to promote sustainable development;

We envision that sustainable development can be achieved through Danang people's determination and commitment to integrate sustainable management practices with economic development;

We commit ourselves to work in partnership for the effective implementation of the Coastal Strategy of Danang City.

NOW THEREFORE, we, the representatives of Danang City, hereby pledge to ensure the sustainable development of marine and coastal resources of Danang by:

Strengthening communication, education and information exchange in order to raise awareness and mobilize the participation of different sectors, organizations and communities in managing and protecting the coastal and marine environment and their resources through:

- Effective public awareness and education programs including the establishment of an integrated information management system, information centers and communication networks;

- Improved education programs on the environment and research and development programs to upgrade the livelihoods of local communities; and

- Pilot sites on community-based beach clean-up and waste segregation, ISO 14000 implementation and other resource conservation programs.

SUSTAINING the use of resources and environment in the coastal area through:

- Innovative policies on water resource development and management and water quality standards to protect coastal ecosystems and public health; and

- An ecosystem management approach to fisheries planning and development, integrating fisheries management into coastal management programs of the City.

PRESERVING biodiversity and areas of natural, social, historical and cultural significance through:

- Establishment of coastal and marine protected areas and development of land- and sea-use zoning scheme; and

- Stakeholder mobilization and building effective partnerships among conservation groups, scientists, concerned sectors and communities to manage, preserve and restore areas of ecological, social and cultural significance.

PROTECTING the ecosystems, environment, human health and society from risks caused by natural disasters and human activities through:

- Partnerships with the private sector in investment opportunities for the rehabilitation of polluted rivers and lakes and the protection of ground water and surface water quality;

- Community-based clean up programs to build awareness and enhance cooperation among the different stakeholders regarding environmental protection and management;

- Forest watershed management programs to prevent soil and beach erosion to prohibit illegal forest exploitation and increase green cover in urban areas; and

- Recovery of clean-up costs and compensation for environmental damages from oil and chemical spills.

DEVELOPING areas and opportunities that contribute to economic prosperity while protecting the environment and preserving the ecological values through:

- Policies, regulation and administrative arrangements to promote investments on environmental facilities and services and environment-friendly industries; and

- Cooperative arrangements with Thua Thien, Hue and Quang Nam provinces, to effectively address transboundary environmental problems such as oil spills, flooding and inundation, introduction of alien species, protection of migratory species, and management of fishery resources.

We hereby agree to work in partnership with one another, and with the People's Committee, the central government, relevant government agencies, the private sector, local communities, and scientific institutions/academe to implement these strategies and action programs to achieve the shared vision of the Danang people.

Signed in Danang City, Vietnam on 6 June 2002
on behalf of the

People's Committee of Danang City

Mr. Hoang Tuan Anh
Vice-Chairman

People's Committee of Ngu Hanh Son District

Mr. Nguyen Dang Hung
Chairman

People's Committee of Hoa Vang District

Mr. Ngo Ngoc Tam
Chairman

People's Committee of Hai Chai District

Mr. Ngo Van Dung
Chairman

People's Committee of Son Tra District

Mr. Thai Nguyen
Chairman

People's Committee of Thanh Khe District

Mr. Bui Thi Dieu Thanh
Chairman

People's Committee of Lien Chieu District

Mr. Huynh Son Trung
Chairman

Marine Turtles: The Scenario in Southeast Asia

Eng-Heng Chan
Professor
Sea Turtle Research Unit
Faculty of Science and Technology
University College of Science
and Technology Malaysia
Kuala Terengganu, Malaysia

and

Chris R. Shepherd
Programme Officer
TRAFFIC Southeast Asia
Selangor, Malaysia

Introduction

Marine turtles have been utilized by people in Southeast Asia in many different ways. The eggs, which are of high nutritive value and said to possess special qualities have been harvested commercially for decades, while the animals are hunted for their shell, meat, oil, skin and bones. Products are used for both domestic purposes and international export, often violating national and international legislations.

Egg collection for consumption is one of the major forms of exploitation of marine turtles in the Southeast Asian region, with the Philippines, Indonesia and Malaysia known to be source and consumer countries. In the Philippines, although national laws now prohibit turtle egg collection, it is common knowledge that at the local level in the Tawi-Tawi Islands, up to 70 percent of the eggs are harvested and smuggled through an effective network which supplies neighboring countries. The turtle egg industry of the Berau District of East Kalimantan, Indonesia, which supports the largest aggregations of green turtles in the country has been estimated to generate an income of over US$200,000 a year. In Malaysia, commercial egg collection takes place only in Terengganu where the local government issues licenses to the local villagers by tender. The value of this activity is estimated at no more than US$50,000 per year.

Prof. Chan (standing, first from left) examining turtle eggs being freely sold in the markets of Brunei Darussalam. The vendor openly informed the author that these eggs did not originate from the country, but were obtained through a well-established network of suppliers operating in the region.

The world's largest trade in live green turtles has been centered in Bali, Indonesia, for many decades. This trade has supplied turtle meat and shell to countries as far as Japan, Hong Kong and Europe, in addition to meeting the local demand where turtle meat is served as food in Balinese-Hindu culture. Although government decree sets the quota at 5,000 turtles to be captured, it is believed that many times over this number are harvested. Government Regulation No. 7 of 1999 has now outlawed the exploitation of all marine turtles.

Hawksbill turtles have been and still are relentlessly hunted in the past for their carapace, which is fashioned into ornamental products, commonly known as tortoise shell. The supply of hawksbill shells to Japan has supported a guild of several hundred craftspeople in Japan in what is known as the "*bekko* industry". Tortoise shell is

also imported by dealers in China, including Hong Kong, Taiwan, South Korea and other countries.

In some societies, sea turtles bear a cultural value. In Bali, for instance, green turtles are offered sacrificially in temple ceremonies, while in Buddhist culture which practices "release of life", marine turtles recovered from incidental captures are kept collectively for eventual release during special occasions as in Taiwan. In Thailand, hatchlings are raised in captivity for several months and later used in similar ceremonies. This practice has recently been adapted by the Sea Turtle Research Unit (SEATRU) in Malaysia where Buddhist groups make nest adoptions which are purchased from licensed egg collectors for in-situ incubation by SEATRU. The "release of life" is achieved through the natural release of hatchlings as they emerge on the beach. This novel approach is gaining acceptance among local religious groups and offers an alternative to the purchase of caged animals for release (which ultimately supports detrimental wildlife trade), besides supporting the nest adoption program of SEATRU.

The long-term consumptive use of marine turtles, coupled with incidental captures in fishing gear, loss of feeding and breeding habitats, and marine pollution have resulted in dramatic declines in the major nesting populations of the region. The loss of the leatherbacks in Terengganu, Malaysia, is often cited as a classic example of population crash. Similar trends of decline have recently been reported for the leatherback populations of the Pacific Ocean. Declines in hawksbill and olive ridleys turtles have been no less dramatic. Currently, only the green turtle continues to nest in significant though much reduced numbers, in Indonesia, Malaysia and the Philippines (Figure 1). Notwithstanding, the rates of decline in the

Stuffed specimens of sub-adult and juvenile of green and hawksbill turtles, and products made from turtle scales are commonplace in any souvenir shop in Vietnam, such as this one in Vung Tau City. A national sea turtle action plan hopes to reduce exploitation in the next few years.

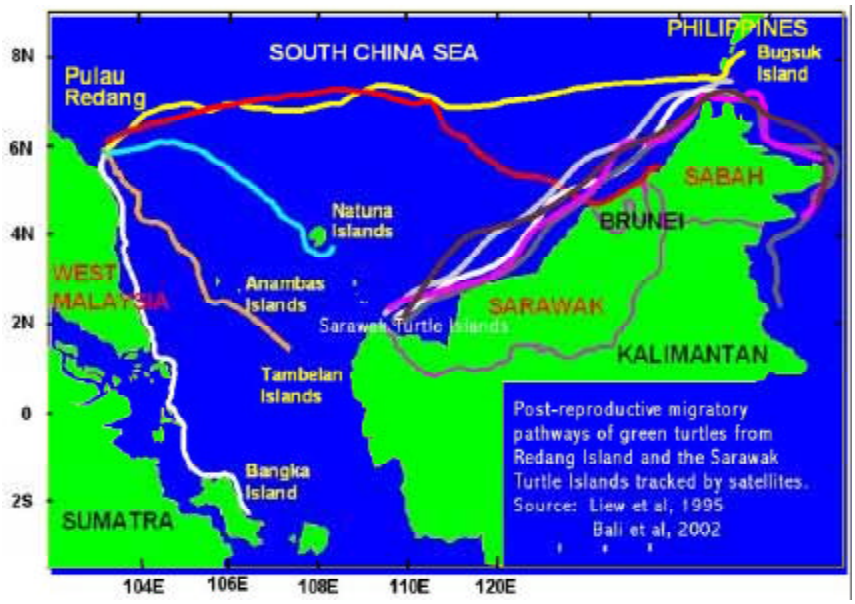


Figure 1. The migration of green turtles between nesting grounds in Malaysia and resident feeding grounds in nearshore waters of neighboring countries demonstrates that marine turtles are shared resources among the countries of Southeast Asia. Hence, conservation efforts must be undertaken collaboratively to ensure that all habitats critical to the survival of the populations in question are adequately protected.

The long-term consumptive use of marine turtles, coupled with incidental captures in fishing gear, loss of feeding and breeding habitats, and marine pollution have resulted in dramatic declines in the major nesting populations of the region.

region have been estimated to range from 50 to 80 percent for most populations. It is critical that conservation work be intensified to ensure that the remaining populations can be sustained in the long-term.

Conservation Efforts

Marine turtle conservation in Southeast Asia has taken an upswing in the last five years. Testimony to this is the conclusion of several regional instruments: the establishment of the transboundary Turtle Islands Heritage Protected Area in 1996; the Memorandum of Understanding on ASEAN Sea Turtle Conservation and Protection in 1997, and the Memorandum of Understanding (MOU) on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and Southeast Asia in 2001. The latter was facilitated by the Convention on Migratory Species. This MOU contains 24 programs and 105 specific activities, which aim to reverse the decline of marine turtle populations throughout the region. However, these conventions and agreements must be effectively implemented and enforced if they are to have an impact on marine turtle conservation.

At the global level, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) serves as the major instrument in curbing the international trade of marine turtles. All species of sea turtles are listed on Appendix I of CITES, which prohibits any trade for commercial reasons. All countries in Southeast Asia are party to CITES, with the exeption of Lao PDR and East Timor.

The status of hawksbill and leatherback turtles has been listed as "critically endangered" by The World Conservation Union, although some parties have made attempts at downlisting certain populations of hawksbill turtles. Green, loggerhead and olive ridley turtles are listed as "endangered". Though most of the countries in Southeast Asia have ratified CITES, international trade of sea turtle products in the region is still rife. Sea turtles, easily recognized by their pliable, parchment-type shell and ping-pong ball shape and size, can be purchased in many markets in the region. As recently as September of 2002, 120 kg of turtle eggs were seized from an Indonesian fishing vessel by Customs officers in Singapore. Seizures of lorry loads of the eggs smuggled from Indonesia have also been occasionally reported in Sarawak, Malaysia. Tortoise shell products as well as stuffed turtles are available for sale in handicraft and souvenir shops in many countries, often in large quantities. Many of these are sold to tourist and retailers, and taken to other countries, which is in direct violation of CITES regulations.

While regional and international agreements and conventions set the stage for intergovernmental efforts, it is often the local grass-roots level projects which help address the everyday issues in marine turtle conservation.

Brunei Darussalam

Currently, there is no law to prohibit egg collection and exploitation, although the Wildlife Protection Act prohibits the hunting, killing or capture of sea turtles. Hatcheries have been established and local egg collectors are encouraged to surrender eggs for incubation. A national committee, headed by the Director of Fisheries, has been formed to carry out turtle conservation, research and educational projects.

Cambodia

Very low nesting activity, probably less than 50 nests per year, has been recorded. Currently, sea turtles and eggs are exploited by the rural poor for consumption and trade. There is currently no existing national legislation for the protection and conservation of sea turtles, but plans are in place to develop relevant laws and regulations, and to initiate public awareness campaigns. A National Sea Turtle Training Workshop held on 2–4 September 2002 in Sihanoukville served as the springboard to marine turtle conservation in the country.

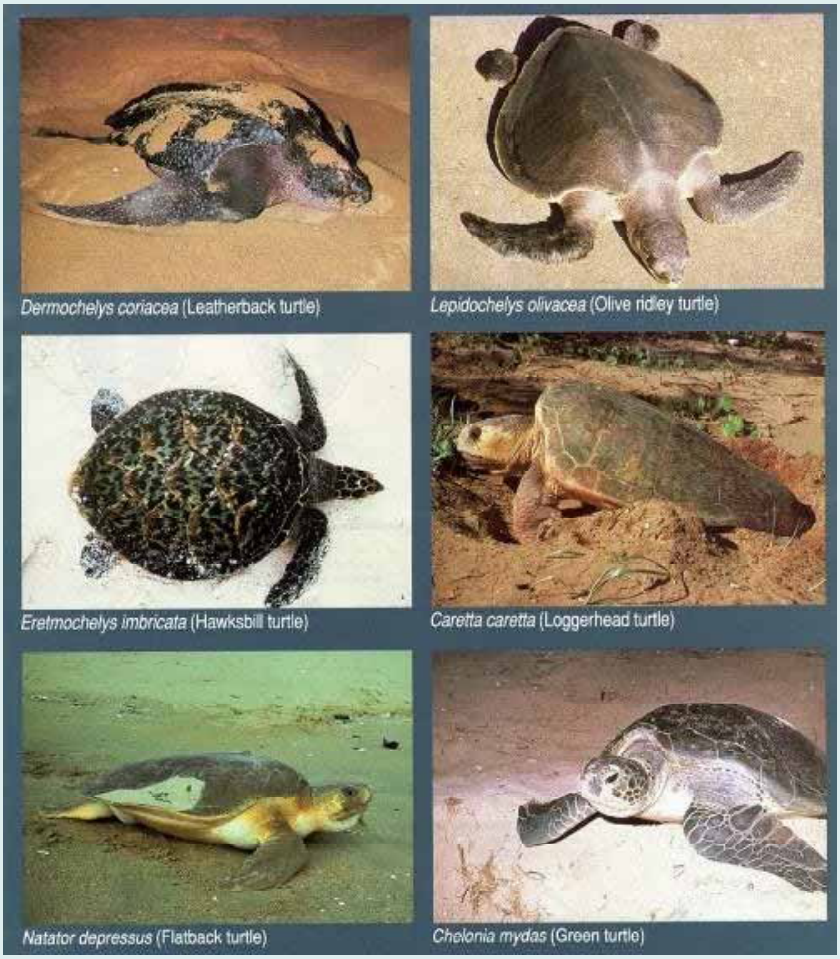
Indonesia

All six species of sea turtles are listed as endangered and are protected by law. Government Regulation (PP) No. 7/1999 together with Act No.5/1990 prohibit utilization of both live or dead sea turtles or their parts and derivatives. Commercial egg collection is controlled by law. In January 2002, the local government of the Berau District in East Kalimantan introduced new rules to reduce the level of egg exploitation and to protect up to 60 percent of the eggs produced. In a few locations (*e.g.*, Kepulauan Seribu) head-starting programs are practiced.

Malaysia

Malaysia has a long history of sea turtle conservation programs, dating back to the 1970s. Efforts are focused

Box 1. The species in question.



Queensland Department of Environment and Heritage

Of the seven species of sea turtles which roam the world's oceans, the six depicted above are found in Southeast Asia.

Only one significant nesting population of leatherbacks remains - in Bird's Head Peninsula, Irian Jaya, Indonesia, where up to 3,000 nests are currently documented. The once renowned population in Terengganu, Malaysia, is now essentially extinct. Myanmar has reported about 300 nests of olive ridleys per year, while elsewhere in Indonesia, Malaysia, Thailand and Brunei Darussalam, less than 50 nests are known to be found per year. The only important remaining populations of hawksbills occur in Malaysia and Indonesia. In Malaysia, between 400-600 nests are deposited in the Sabah Turtle Islands and 200-300 in Melaka; while overall density in Indonesia ranges from 1,000 to 2,000 nests per year.

Loggerheads are rarely found since these are a subtropical nester. However, Myanmar has documented up to 100 nests of loggerheads per year.

The Australian flatback does not nest here, although some have been reported to feed in the waters of Indonesia.

The green turtle is the only species which nests in appreciable numbers in the region. Current densities in Indonesia, Malaysia (mostly in the Turtle Islands of Sabah and Sarawak) and the Philippines (Tawi-Tawi Islands) stand at 10,000-20,000 nests per year, while Myanmar and Thailand have reported 500 and 300 nests, respectively, per year.

(NB: Since marine turtles lay about 5-6 nests per season, it is necessary to divide nesting density by this factor to arrive at an estimated number of mature female turtles in the population)

Egg collection for consumption is one of the major forms of exploitation of marine turtles in the region with the Philippines, Indonesia and Malaysia known to be source and consumer countries. The turtle egg industry of the Berau District of East Kalamantan, Indonesia, which supports the largest aggregations of green turtles in the country have been estimated to generate an income of over US$ 200,000 a year.

mainly in protection of turtle eggs. Sabah and Sarawak currently protect close to 100 percent of eggs deposited while in Peninsular Malaysia, less than 50 percent of the eggs deposited are protected. While major nesting sites are protected, some of them (in Peninsular Malaysia) are still leased to local inhabitants for commercial egg collection.

Marine turtle conservation comes under the purview of the state governments, which have enactments specifically for the management and protection of sea turtles. Uniform legislation for sea turtle protection is currently being developed at the federal level for adoption by the various states of the country.

Sea turtle conservation issues are well known among the Malaysian public since these are well covered by the media. Other activities, such as long-term turtle volunteer programs and turtle camps, help spread the message.

Myanmar

Conservation work on marine turtles here is carried out by the Department of Fisheries, which has been responsible for providing complete protection to turtle nesting beaches since 1997. This involves mainly egg incubation in natural nests and hatcheries. Public educational programs have also been initiated.

Myanmar Marine Fisheries legislation has provisions for the protection of sea turtles, their habitats and nesting beaches with major nesting beaches being declared sanctuaries. Waters within 3 miles of the coastline of sanctuaries are also protected.

Philippines

The Wildlife Resources Conservation and Protection Act or Republic Act No. 9147, which was approved by Congress in July of 2001, is intended to form the "backbone of marine turtle conservation and protection" in the Philippines (citing Atty. Wilfrido Pollisco, Director of the Department of Environment and Natural Resources, in July 2002). This law bans the exploitation of all endangered species, including marine turtles and their eggs. In spite of strong opposition from the local communities, implementing rules and regulations are expected to be approved soon and enforced.

Eight islands have been declared turtle sanctuaries by the Philippine Department of Environment and Natural Resources (DENR) but currently, only Baguan Island, one of six Philippine Turtle Islands, is actively protected. Commercial egg harvest has been allowed up to 2001 on the remaining five islands where as much as 70 percent of the eggs are marketed. In other remote islands, turtles are still exploited not just for their eggs, but for the meat as well. DENR is monitoring and confiscating sea turtles in trade, but such enforcement efforts are difficult to carry out in remote regions. An information and education campaign is being carried out jointly by a few agencies.

Thailand

In Thailand, many provisions have been made to protect sea turtles. The commercial harvest, sale and consumption of sea turtle meat, eggs and other products are now banned. Important feeding grounds, such as seagrass beds and coral reefs, are protected by law. Harmful fishing gear (such as pushnets and trawl) are prohibited. Nesting beaches are protected, with all eggs transferred to hatcheries for incubation. In some locations, hatchlings are raised for a short period before release. Although release of headstarted hatchlings, as mentioned earlier is in accordance with practices in Buddhism, its effectiveness as a conservation measure needs to be reviewed.

Vietnam

Sea turtles have only recently received national protection in Vietnam. Turtle eggs and meat have been widely consumed, while the hawksbill has been heavily exploited for its shell. Stuffed sub-adults and juveniles of both green and hawksbill turtles are prominently displayed in large quantities in souvenir and handicraft shops around the country, which are sold illegally, both within the country as well as abroad. A National Action Strategy is currently being developed to expedite the conservation of marine turtles and impotant nesting areas in the country.

While regional and international agreements and conventions set the stage for intergovernmental efforts, it is often the local grass-roots level projects which help address the everyday issues in marine turtle conservation.

Conclusion

Trade in marine turtle products remains an important conservation issue in the Southeast Asian region. Although most of the countries in question have acceded to CITES, sea turtle products continue to be traded across international boundaries. The traders who are involved will continue to operate as long as there is a demand for the products and money to be made. Within some countries, exploitation of turtles and their eggs is a deep-seated tradition, which cannot be easily abolished by new legislation. Educational programs aimed at various stakeholders in sea turtle exploitation, coupled with strict enforcement of legislation designed to protect the turtles should be carried out if sea turtles in Southeast Asia are to survive into the future. ■

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Conserving Migratory Species Through Ecoregion Conservation Approach: The Case of Sea Turtles in Sulu-Sulawesi Marine Ecoregion

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Introduction

The Sulu-Sulawesi Marine Ecoregion (SSME) is located in the Indo-West Pacific, the global center of marine biodiversity (Briggs, 1999). Within this center is an area of maximum coral and tropical reef fish diversity called the Coral Triangle. The SSME is situated at the apex of this triangle. Geographically found between 15° N latitude and 116° E longitude and 0° N latitude and 127° E longitude just above the equator, the SSME touches the coastlines of Indonesia, Malaysia, and the Philippines, and covers an area of nearly a million square kilometers (Figure 1). It comprises the Philippine Inland Seas (Sibuyan Sea, Visayan Sea, Camotes Sea, and Bohol/Mindanao Sea), the Sulu Sea, the Sulawesi Sea, and the small islands and large island provinces within.

Figure 1. **The SSME comprises the Philippine Inland Seas (Sibuyan Sea, Visayan Sea, Camotes Sea, and Bohol/ Mindanao Sea), the Sulu Sea, the Sulawesi Sea, and the small islands and large island provinces within.**

Thirty-five million inhabitants directly benefit from the biodiversity of this marine ecoregion in terms of fisheries, tourism, navigation for trade and commerce, transportation and communication. Coastal development has significantly progressed to support various economic activities and for human habitation. Unsustainable trends in the use of these resources and the complex patterns of human-mediated activities in the region however, resulted in local extinction of species, depletion of biological populations, and degradation and loss of habitats.

Recognizing that small-scale and site-specific approaches to conservation do not achieve full conservation results, the World Wide Fund for Nature (WWF) developed a more comprehensive, long-term, and large-scale approach to biodiversity conservation called ecoregion conservation. Ecoregion is defined as a relatively large unit of land or water that is biologically distinctive and harbors a characteristic set of species, ecosystems, dynamics and environmental conditions (WWF, 1998). Through WWF's comprehensive analysis of the earth's biological wealth, 238 ecoregions, which represent the earth's biodiversity were identified. Of the over 200 terrestrial, freshwater, and marine ecoregions, the SSME was identified as one of WWF's priority marine ecoregions. This evolutionary approach is designed to conserve, and where necessary, restore the fullest possible range of biodiversity over large spatial and temporal scales.

The first step in the process for developing an ecoregion conservation program is the reconnaissance – a rapid assessment of the ecoregion's biodiversity, threats and opportunities for conservation as well as the identification of existing interventions and key actors. The next step is the formulation of the biodiversity vision where the aspirations for conserving and restoring the biodiversity of the Sulu-Sulawesi Seas are articulated. This vision is set by a broad range of stakeholders and experts based on the biophysical and socioeconomic assessments. The vision, a 50-year goal for biodiversity conservation in the ecoregion, is anchored on the four fundamental goals of conservation:

- The representation of all distinct natural communities within a network of protected areas;

Ecoregion is defined as a relatively large unit of land or water that is biologically distinctive and harbors a characteristic set of species, ecosystems, dynamics and environmental conditions.

Box 1. Biodiversity of the SSME.

Jurgen Freund

The SSME harbors, among others, 22 species of whales and dolphins including sperm and killer whales; 5 of the world's 7 species of sea turtles; the endangered dugong or sea cow; whale shark, the largest fish in the world; the very rare megamouth shark; the highly prized Napoleon wrasse; and even the extremely rare deep-dwelling coelacanth, the only living representative of a group of fishes from the dinosaur era.

The biodiversity of the Sulu-Sulawesi Marine Ecoregion provides direct benefits in terms of fisheries, tourism and navigation for trade and commerce, transportation and communication to 35 million inhabitants.

The SSME Vision

Jurgen Freund

A marine ecoregion that remains to be globally unique and a center of diversity with vibrant ecological integrity, harboring representative species, assemblages, communities, habitats, and ecological processes. A highly productive ecoregion that sustainably and equitably provides for the socioeconomic and cultural needs of the human communities dependent on it. An ecoregion where biodiversity and productivity are sustained through generations by participatory and collaborative management across all political and cultural boundaries.

- The maintenance of ecological and evolutionary processes that create and sustain biodiversity;
- The maintenance of viable populations of species; and
- The conservation of blocks of natural habitats large enough to be responsive to large-scale periodic disturbances and long-term changes.

Based on the biodiversity vision, a broad stakeholders' Ecoregional Conservation Plan is developed through stakeholders' workshops and situation analysis. The conservation plan sets the 10-15 year conservation goals for the ecoregion and identifies conservation actions to achieve these goals.

The vision for the SSME was formulated through the Workshop to Formulate the Biodiversity Conservation Vision for the Sulu-Sulawesi Marine Ecoregion (SSME) held in March 2001. Seventy-eight biophysical and socio-economic experts from Indonesia, Malaysia and the Philippines participated in the workshop.

While the Ecoregion Conservation Plan is being formulated, an interim WWF action plan has been developed. This plan was based on the biodiversity vision and the recommendations of the visioning workshop. It outlines specific targets, actions to achieve the targets, and activities to be undertaken by WWF over a period of five years. This provides basis for WWF's conservation interventions on issues that require immediate action while the planning process is still being completed. The over-all goal of the interim WWF action plan is to ensure continuous adoption of the fundamental goals of biodiversity conservation and advocate

economic development compatible with biodiversity conservation. Under the plan, WWF will pursue ten objectives, one of which is: "threatened species and their habitats protected to maintain viable populations".

The ecoregion functions as important habitat for both human communities as well as diverse populations of marine wildlife including, among others, five of the seven species of sea turtles. Since these highly migratory marine reptiles are susceptible to extreme development-driven threats and unsustainable fishing practices, conservationists have recommended all species except the Australian flatback and Kemp's ridley to be included in The World Conservation Union (IUCN) Red List as endangered or vulnerable. All seven sea turtle species are also listed under Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and under Appendices I and II of the Convention on Migratory Species (CMS). Three important habitats of green and hawksbill turtles are found in the Sulu-Sulawesi Seas. These include the nine islands of the Turtle Islands cut across by national borders placing six within the Philippines and three within Malaysia; the Sipadan Island, located in one of the corridors that connect the Sulu and Sulawesi Seas; and the Derawan Group of Islands on the side of Sulawesi Sea, in East Kalimantan, Indonesia. These islands play an important part in the life cycle of sea turtles in the region (Figure 2).

To strengthen and increase effectiveness of conservation efforts at the national and regional scales, WWF along with other relevant stakeholders from Indonesia, Malaysia and the Philippines through its SSME Program recognized the need to establish a tri-national conservation program for sea turtles in the SSME. To address this need, the WWF-SSME Program is currently facilitating a tri-national initiative for a coordinated conservation of sea turtles within the context of the ecoregion program. In line with this, the program brought together 22 local managers, decisionmakers, NGO representatives, and government officials from Indonesia, Malaysia and the Philippines for the first Tri-National Training Program on Sea Turtle Biology and

Figure 2. Three important habitats of green and hawksbill turtles can be found in the Sulu-Sulawesi Seas. These include the nine islands of the Turtle Islands cut across by national borders.

The Tri-National Turtle Protected Area hopes to initiate on-the-ground formal tri-national collaboration and cooperation in the conservation of sea turtles in the Sulu-Sulawesi Seas. If the expansion of the Turtle Islands Heritage Protected Area to include Derawan Islands in Indonesia materialized, it will become the world's first tri-national sea turtle protected area.

The Tri-National Training Program on Sea Turtle Biology and Conservation held in Derawan Islands, Indonesia from 27-30 March 2002, provided a venue to share lessons learned and opportunities to broaden collaboration and partnerships, and initiated a process to effect the establishment of a tri-national sea turtle reserve.

Conservation. The training which was held in Derawan Islands, Indonesia from 27-30 March 2002, enhanced the participants' understanding of sea turtle biology, ecology, and increased their technical competence on conservation and sustainable management of marine turtles. It also provided a venue to share lessons learned and opportunities to broaden collaboration and partnerships and initiated a process to effect the establishment of a tri-national sea turtle reserve.

Immediately following the highly successful training, the Strategic Planning Workshop for a Tri-National Sea Turtle Conservation Program for Indonesia, Malaysia, and the Philippines was held in Berau, East Kalimantan from 01-04 April 2002. Sixty-two participants from the three countries participated in the workshop. The planning workshop reviewed the population status and existing management arrangement and issues relevant to the conservation of sea turtles in the three countries; validated the need for a tri-national management program for sea turtle conservation; formulated a tri-national conservation program for conservation involving the three states and generated an action plan to launch and implement the tri-national sea turtle program.

This workshop formulated a comprehensive tri-national sea turtle conservation program for the SSME through consensus building. The program outlines in-country and transboundary interventions, which will form part of a consolidated action plan to be developed and adapted to national situations while maintaining alignment with the existing national and regional conservation programs. This program consists of seven objectives, one of which determines the involvement of stakeholders in turtle management and conservation.

The workshop also agreed to pursue the establishment of the world's first tri-national sea turtle protected area through the expansion of Turtle Island Heritage Protected Area (TIHPA) to include the Derawan Islands in East Kalimantan, Indonesia. The tri-national turtle protected area hopes to initiate on-the-ground formal tri-national collaboration and cooperation to conserve sea turtles in the Sulu-Sulawesi Seas. This will also serve as a platform to expand the tri-national initiative to other conservation concerns, *e.g.,* coral reef, mangrove, and seagrass conservation.

The WWF-SSME Program is currently coordinating with the WWF offices in Indonesia, Malaysia and the Philippines to promote the endorsement of the Tri-National Sea Turtle Conservation Program by the governments of the three nations. The WWF-SSME Program is also working with the TIHPA-Joint Management Committee to establish the tri-national protected area. These initiatives are highly motivated by a recent finding that the three countries share these sea turtle resources. This was scientifically proven when the National Oceanic and Atmospheric Administration of the US Department of Commerce through Sabah Parks, WWF and the Philippine Department of Environment and Natural Resources - Parks and Wildlife Bureau, tracked a nesting hawksbill turtle with a satellite transmitter on 31 January 2001, from Selingaan Island in Sabah, Malaysia. The turtle was tracked for 45 days passing through possible feeding areas in Derawan Islands in East Kalimantan. More recently, a green turtle tagged from the Philippines Turtle Islands was recovered in Derawan. Derawan Islands provide habitats crucial to the various life stages of sea turtles, such as growth and development, reproduction and feeding.

Conclusion

The tri-national sea turtle conservation program is envisioned to effectively conserve the largest green and hawksbill turtle populations and their habitats in the Southeast Asian region. This will also provide a springboard for broader conservation efforts and opportunities for trade, security, and ecotourism in several priority conservation areas adjacent to the territorial boundaries of Indonesia, Malaysia, and the Philippines. If proven effective, this initiative may expand to other sea turtle habitats in other ASEAN countries. Most importantly, the tri-national conservation program for sea turtles in the Sulu-Sulawesi Seas can foster regional collaboration that can contribute to an improved quality of life for its constituency.

There are however, tremendous challenges to effectively implement this tri-national sea turtle conservation program. Current security problems and political conflicts among the three neighboring states particularly along their borders inhibit effective collective conservation interventions. Another challenge we face is to prove that this conservation initiative is economically beneficial to the states' constituents. ■

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Beyond the Promises: Enforcing and Implementing CITES

Introduction

In many ways, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) broke new ground when it was adopted, particularly in its approach to enforcement and the commitment of the parties. Since then, it has had remarkable initial success at controlling a major catalyst of species destruction: international trade in wildlife and its parts and products. The time has come, however, for CITES to begin to "mature," to build on the initial successes in a way that fosters a longer-term "steady-state" protection and in this way, become a true "sustainable development" convention. This maturation will necessarily require new developments in the manner in which the Convention is implemented and enforced. In preparation for it, it is important to consider both the Convention's successes to date, and the challenges that have arisen and need to be faced.

Convention on International Trade in Endangered Species of Wild Fauna and Flora

Controlling Both Sides of Trade

CITES creates a "two-edged sword" to combat illegal or destructive wildlife trade. Its mandatory controls on trade are imposed both when the specimen or product leaves the country of origin and when it arrives at an interim or final destination.

In practice, this approach is a major contributor to CITES' success. Very promptly after the Convention's entry into force, Europe, the United States and Canada (major importers of specimens and products at the time) imposed import controls, including absolute prohibitions on all trade in several Appendix 1 species. This immediate implementation of controls promptly produced an impact on the amount of trade and on the amount and nature of takings from the wild, even where the countries of export had not taken any effective steps to implement the Convention.

These prohibitions were adopted under the CITES provisions that allows members to adopt stricter controls than under CITES. Initially this approach was sometimes necessary where systems, technology and/or capacity were limited in their ability to impose the detailed regulatory controls necessary for implementing the Convention. In the intervening years, both the US and the EU have imposed more detailed systems, which enable them to impose the CITES limitations and distinctions.

In more recent years, this concept of "stricter controls at the national level" has come under scrutiny. Many parties claim that such controls conflict with the role of CITES in setting international quotas, and the potential of CITES to be a determinant of the sustainability of use of listed species. They also may be considered in some cases as a means by which some countries may overcome national sovereignty

regarding environmental conservation.

On the other side of this controversy, many small and developing countries note that it is always easier to implement stricter controls (which are usually prohibitions with few exceptions), than it is to enforce controls based on complex testing or external quota systems. An example of this is found in the various limitations that exist or are voluntarily accepted regarding ocean species. Often the only way to determine whether whale meat, for example, is that of a permitted species is by DNA analysis – something that may be nearly impossible for many countries to undertake as part of a systematic programme of CITES implementation, even where they favor and support the limitations on traffic in certain species.

International Attention

A second component of CITES effectiveness has been its Conference of the Parties (COP), which has not only continuously reviewed the lists of species and the procedures of the Convention, but has also stood as a guardian of the Convention's process, censuring parties that do not comply with their CITES obligations. CITES-related trade with such parties may be restricted and, perhaps worse, the Party's reputation among eco-tourists, donors, and others may be negatively impacted. International law includes relatively few strong enforcement mechanisms. Censure by the CITES COP continues to be a sharp and significant sanction, and a strong incentive to compliance with the Convention. The strongest use of this sanction has been against countries that have either failed to adopt the necessary legislative measures required under the convention; or failed to implement or enforce those measures effectively.

CITES must evolve in order to both address the evolution in the nature of wildlife trade and to better satisfy the needs of the new millennium – to live up to its potential as a "sustainable development" convention.

Evolution of CITES Implementation

CITES was adopted as a matter of urgency, in light of a perilous situation facing many rare, important, and valuable species. It has been extraordinarily successful in many instances in achieving this initial goal. Where, in 1972, many experts feared that elephants and whales would soon be extinct, today those species are populous enough that some parties are seeking to have them "downlisted" (*i.e.*, moved from Appendix I – trade prohibited; to Appendix II – trade allowed subject to quotas and other controls).

At this point, however, the Convention must evolve in order to both address the evolution in the nature of wildlife trade and to better satisfy the needs of the new millennium – to live up to its potential as a "sustainable development" convention. The forces mandating this evolution arise both organically (within the Convention itself) and externally.

An "Explosion" of Listing

The need for development can be discerned simply from the fact that Appendices I and II currently list more than 30,000 species of plants and animals. This volume clearly places an extraordinary demand on every party. Even trade in whole specimens may be difficult to control and it may be difficult to equip officials with the ability to recognize listed species. Where international traffic involves a "part, product or derivative" of a specimen, capacity to identify it becomes even more complex and demanding. To ensure that the Convention is properly implemented, enforcing officers need access to experts, databases, identification techniques and equipment, in addition to training in the various CITES processes and permit systems.

The fact that a species is endangered increases its value, as well as the demand. Where the supply is controlled or curtailed, the price will continue to spiral as long as demand exceeds the available supply.

Legal trade in wildlife, however, is an important component of "sustainable use" of these species by their countries of origin. This trade can be seriously disadvantaged by delays, such as the delays required in order to undertake the process of identification and of confirming that relevant documents of permission are genuine.

Controlled Legal Trade

Another challenge can be seen in the comparison between Appendix I with Appendix II. Appendix II, which includes in some cases whole genera rather than individual species, currently comprises more than 90 percent of the species contained on the two lists. Trade in Appendix II species is further enhanced by the fact that CITES management authorities have been duly authorized in the overwhelming majority of the contracting parties.

As a result, CITES is increasingly focused on controlled, sustainable trade rather than on prohibition, but must cover an astoundingly large number of species. This evolution is increasing the difficulties faced by CITES parties in enforcing the convention.

It is always more complicated and costly (in both human and financial terms) to "control" something than to prohibit it. For example, laws in many countries limit the opening hours of pubs and other establishments that serve alcohol. Often, this is an absolute prohibition. No pub may be open for this type of business during the "closed hours". Such a law is comparatively easy to police – if the establishment is open, it is violating the law. This does not mean that all violations can be found and cited; however, a pub's operation requires public custom, so that an open pub is usually easy to find.

By contrast, it is much more difficult to regulate the activities of an operation which is being conducted legally. Staying with the alcohol example, many countries permit the sale of alcoholic beverages only to persons above a certain age. This type of "regulation" or "control" of the market is quite onerous to police. The officials must actually observe a sale, know or determine that the purchased item contains alcohol and know or determine that the buyer was underage. These factors are much more difficult to determine and to document with appropriate evidence.

Of course, the fact that a prohibition is simpler to enforce does not mean that it will be more effective. One need only examine the United States' experience with the complete prohibition of all sales of alcohol in the 1930's. Although normal alcohol sales were curtailed, the public (or a large fraction of it) did not agree with the purpose of the law. As a result, an enormous illegal trade developed and flourished, creating a very successful criminal class. It is clear that this kind of impact is possible in wildlife trade as well, if the public does not support appropriate penalties or other controls and the demand for the product remains unabated. This is one force which may be leading to the creation of a new wildlife trade underground – a new avenue of criminality.

Implementing officials in receiving countries must evaluate the legitimacy of export permits presented, as well as the factors underlying that permit's issuance. The evidentiary requirements necessary in order to prove that a particular import is illegal are much more complicated, where the trade is "legal but controlled," than where it is simply prohibited. In addition, each Party must maintain constant

awareness of species numbers and status and of the various side-effects of species trade, in order to participate effectively in setting and implementing international quotas.

Perhaps the greatest challenge, however, is found outside the Convention.

CITES creates a "two-edged sword" to combat illegal or destructive wildlife trade. Its mandatory controls on trade are imposed both when the specimen or product leaves the country of origin and when it arrives at an interim or final destination.

Demand for "the Rare"

Although CITES has been effective in severing the lines of supply of protected wildlife products, it does not address demand for them. Often, although the reasons underlying the original demand have disappeared, the demand remains. Ivory and tortoise shell offer good examples of this phenomenon.

Ivory was originally prized for its "carveability," because it had neither the grain of wood nor the fracturability of stone. Few substances could be worked artistically and still possess the hardness, color, workability and durability of ivory. In the modern world, however, many substances possess these qualities. Similarly, tortoise shell was originally valued for its plasticity – it could be worked and moulded into many items of value (adornments, dressing table items, etc.) Here also, progress has eliminated this value. Modern plastics are, of course, plastic. They are, in fact, the chief (undercutting) competitor of tortoise shell. Today's demand for and perceptions of the value of ivory and tortoise shell appear to arise primarily out of their rarity.

In some cases, the fact that a species is endangered increases its value, as well as the demand. International advertisements for unique hunting experiences are predicated on the fact that a particular species will soon disappear from the wild. The discerning hunter, they claim, should not miss one of the last opportunities to kill the species in its natural setting and to obtain a trophy that will soon be unobtainable.

Standard economic principles recognize that, so long as a demand for a product exists, the supply of that product will control the price. In other words, the harder it is to find a product-in-demand, the higher the price of that product will be. Where the supply is controlled or curtailed, the price will continue to spiral as long as the demand exceeds the available supply.

And therein lie the seeds of the most important challenge for CITES.

Creation of a "New" Criminal Class

In recent years, an alarming shift has become apparent – smugglers and criminals who have, in the past focused on commodities, such as drugs and stolen artworks, are increasingly turning to trade in listed animals and plants. Sometimes, the black-market value of these commodities is astounding, but even where the value is moderate, the profits of this trade can be substantial. Beyond the value of this activity, however, the pernicious inducement to criminals to trade in species is inexorably connected to the fact that the penalties involved are very low – either by statute, or by application. In many countries, statutory authority to punish wildlife trade violations does not even exceed the value of the specimens the violator possessed at the time of apprehension. It is often true moreover that judges, prosecutors and those imposing administrative fines do not utilize the full range of penalties that are authorized.

A recent, non-systematic evaluation of CITES violations in the EU found that the incidence of capture of repeat offenders carrying commercial quantities of specimens is increasing. In some cases, smugglers were found in possession of hundreds of live or preserved amphibians or birds. When these cases went to court, penalties did not come close to the maximum authorized amount, nor, in most cases, to the value of the specimens that were confiscated at the time of the arrest.

It is clear, even from available informal studies that the perception that species-related crimes are not "important" and do not merit high penalties (coupled with the fear that the judges' or administrators' communities and constituencies will believe so) often stays the hand of punishment. As a result, few wildlife trade offenders are imprisoned and the financial penalties imposed are usually less than the value of the specimens found in the offender's possession when he was arrested. Such practices cannot be expected to serve as a disincentive to continue an ongoing enterprise of illegal wildlife trade. By comparison to the treatment accorded drug or art smugglers in many countries, this "slap on the wrist" is almost laughable.

Beyond these incentives are the practicalities. The heightened demand for wildlife products continues to raise the value of illegal wildlife and its products, so that smugglers, both individuals and enterprises, can afford a level of technology that is often unavailable to law enforcers. Although customs and other officials are sometimes provided with additional funding and equipment for this reason, those benefits are rarely meted out to the officials and institutions combating wildlife crime.

Looking for Answers

In some countries, the inefficiency of enforcement has been addressed by increasing the training and powers of apprehending officers, in some cases giving them the ability and authority to use deadly force, if necessary. Such measures may answer only a few of the primary concerns of CITES enforcement of the 21st Century.

In the long run, the solutions for CITES's new challenges will not be so simple. Merely tightening the controls on species movement will not be enough. So long as the demand is present, the market values will continue to increase, providing both the incentive and the financial means to continue evading legal controls.

Increasing penalties could ultimately have some positive impact, however, in many cases, such increase is not likely to occur. Like the resurgent demand for rare species products, this reluctance appears to be a function of public opinion. Even in countries whose judiciary is very independent, higher penalties will rarely be assessed where the majority of the local, otherwise law-abiding citizenry does not feel that the crime "deserves" it. And, where decisions impose higher penalties than public opinion would endorse, it is entirely likely that either the judges or the laws will change. Clearly, then, one important effort must focus on a long-standing and elusive problem. It must give priority to developing more effective means of impacting public opinion, both to affect demand, and to support the imposition of appropriate penalty levels, particularly in importing countries.

In this connection, however, it should be noted that the specific impact of enforcement is not based entirely on the size of penalties. Studies have shown that a greater certainty of apprehension is often a much stronger deterrent to violators than heavy penalties. Hence, active and rigorous controls, along with administrative fines (or even "warnings") can be an unexpectedly effective deterrent, particularly in the case of minor or incidental violators. Unfortunately, where the illegal trade is a part of an ongoing business, the

"businessmen" involved will typically factor the "costs" of occasional apprehension, fines and confiscations into their "costs of doing business". Hence, the net of apprehension must be extremely tight, if it is to have a significant deterrent effect.

Ultimately, however, more than these changes in the control of imports will be needed. Both edges of the CITES sword must be sharpened. On the export side, Convention processes are already giving increased attention to the sustainable use of Appendix II species as a national resource. Once legal markets develop at rational levels, the spiralling inflation caused by unfulfilled demand may reach a "steady state," which can begin to remove the incentive for criminal trading, at least to a level that it can be properly policed. On the import side, this alteration in demand levels may be at least as important as the strength of controls in ultimately controlling the harm caused by international trade, which is the true objective of CITES.

These efforts complement and are complemented by other Convention's processes that recognize the impact of one species' listing on the conservation status of other species and habitats. Together they will help create a rational world market for wildlife products – and give CITES its proper position as the pre-eminent "sustainable use convention". ■

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Sustainable...

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regional and international agreements and conventions set the stage for intergovernmental efforts, the authors recommend education to raise public awareness, coupled with local grass-root level projects and ultimately, strict enforcement of international agreements/conventions and legislation to help conserve the existing population of marine turtles in the region.

A recent initiative, which complements Chan and Shepherd's article on marine turtle conservation is presented by Trono and Cantos through the ecoregion conservation approach, showcasing the Sulu-Sulawesi Marine Ecoregion (SSME). The SSME not only harbors five of the world's seven species of marine turtles, but also encompasses important habitats of green and hawksbill turtles, which cut across national borders spanning the Philippines, Malaysia and Indonesia. A tri-national marine turtle conservation program is being formulated, which aims at strengthening and increasing the effectiveness of conservation efforts at the national and regional scales. The article describes the important steps in developing the program with the involvement of different stakeholders from the three countries. One of the highlights of the initiative will be the establishment of the world's first tri-national marine turtle protected area, through the expansion of the Turtle Islands Heritage Protected Area, to include Indonesia, the Philippines and Malaysia. This initiative is envisioned to bring about not only effective conservation of the largest green and hawksbill turtle rookery in the region, but also to foster stronger regional cooperation.

Any discussion on endangered species trade is not complete without touching on CITES, the Convention responsible for addressing unregulated international trade of wild fauna and flora. In spite of a number of difficulties in implementation and enforcement, CITES has made significant progress in controlling illegal or destructive wildlife trade since coming into force in 1975. Young deduces that the time has come for CITES to evolve in harmony with the changing nature of wildlife trade and conform to the requirements of sustainable development. For CITES to achieve this level, new developments in implementation and enforcement are required. Outside the Convention, addressing the "demand for the rare" was identified as one of its most important challenges. Hence, efforts focusing on developing effective means to impact public opinion were suggested. Within the Convention, solutions were presented to address emerging issues concerning the export and import sides of the trade.

The importance of species preservation in attaining sustainable development clearly indicates that endangered species should be given the full protection they deserve while, at the same time allowing rational trade to occur. The articles presented in this issue provide insights into where protection of species are most needed and identify measures and solutions in support of sustainable use of these resources. Collectively, the solutions proposed are complementary, if not similar and they all point to a way forward. On-the-ground initiatives that put into action some of the solutions presented are shaping up, albeit slowly, and generating good results. As the consequences of extinction are lasting, it is imperative to save what is remaining, to sustain the goods and services that the oceans and coasts have been providing the people through the generations. ■

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- Essential Elements of an Effective Contingency Plan
- The Contingency Planning Process
- Effective organizational structures for response to environmental emergencies
- Integrating claims procedures into contingency plans

Who Should Participate?

The course is designed for representatives from national response agencies, relevant legal agencies/organizations, shipping industry, petroleum industry, environmental NGO's, fisheries, marine salvage, port authorities, local communities and other relevant organizations.

Entry Requirements

- Must be directly involved in the formulation and coordination of damage claims from ship pollution and in the development/updating of contingency plans
- English language proficiency

PEMSEA

NEWS

PEMSEA's Program of Actions Meet WSSD's Recommendations

JOHANNESBURG, SOUTH AFRICA — At the world summit in Johannesburg, PEMSEA Regional Programme Director, Dr. Chua Thia-Eng participated in the ocean coordinating group meetings to share in a collective effort to promote the ocean agenda in the WSSD plan of implementation. He also discussed PEMSEA's views and experiences with other colleagues from other parts of the world on integrated coastal management and large marine ecosystems at workshops and seminars.

Most of PEMSEA's past and current activities are in line with WSSD's declaration and plan of implementation, such as forging multi stakeholder partnerships, applying integrated management approach, mobilizing private sector resources to augment public sector's efforts in environmental management and implementing strategies, policy and action programs to improve sanitation, strengthen natural resource base, promote good governance at local levels, and increase public awareness on environment and sustainable development.

PEMSEA submitted three Type II projects at the Summit. They include a project on public and private sector partnership-an attempt to mobilize private sector investment through developing an enabling environment to facilitate direct investment from national or international financing. Another project focused on strengthening local government partnerships in implementing coastal strategies and action programs related to integrated coastal management. The third project emphasized building regional partnerships for the implementation of a regional sustainable development strategy for the seas of East Asia as well as national coastal/ ocean policy and sustainable development strategies within the framework of the regional strategy.

UNDP Considers PEMSEA Strategy as Development Vehicle

BEIJING, PR CHINA — UNDP has a unique perspective on PEMSEA's Sustainable Development Strategy for the Seas of East Asia (SDS-SEA). This was made apparent during an International Waters meeting organized by UNDP on 18 October in Beijing.

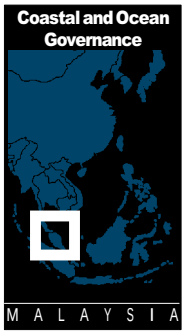
In a remark that confirmed the growing recognition of the SDS-SEA, Mr. Frank Pinto, Executive Coordinator for the UNDP/BDP/Environmentally Sustainable Development Group/GEF stated that UNDP was considering using the SDS-SEA as a framework for Capacity 2015. Capacity 2015 is a UNDP effort aimed at developing the capacities of countries to meet sustainable development goals under Agenda 21 and the Millennium Development Goals at the local level.

The SDS-SEA is seen as an instrument that cuts across all sectors, not just the environment sector. It has evolved to provide a platform for:

- harmonizing relationships between the economy and the environment as related to the Seas of East Asia;
- forging operational linkages across national and regional programs addressing issues such as poverty alleviation, sustainable livelihood, reduction of vulnerability to natural hazards, economic growth and maintaining the health of human beings, ecosystems and the natural resource base; and
- promoting intersectoral, interagency, intergovernmental and interproject partnerships for overcoming constraints to sustainable development of the region.

PEMSEA Regional Programme Director, Dr. Chua Thia-Eng attended the meeting, which was a side event of the Second GEF General Assembly, held from 16-18 October.

A copy of the SDS-SEA is available at the PEMSEA website. Comments and suggestions are welcome. http://www.pemsea.org/envirostrategy/



Experts Meeting Gains Momentum

KUALA LUMPUR, MALAYSIA — Twenty officials and experts have committed to meet on the 18-20 November, to review the status of national and regional policy in the East Asian Seas and discuss related regional scenarios for the future. The Experts' Meeting on Strategies for Better Coastal and Ocean Governance, co-organized by PEMSEA and the Maritime Institute of Malaysia (MIMA) will be held in Kuala Lumpur. The participant experts will be coming from government agencies and non-government institutions involved in coastal and ocean policy studies, formulation and implementation in countries of the East Asia Seas.

The Experts' Meeting will have three specific goals: a) the development of guidelines for national coastal and marine policy development, based on experiences of countries in the region and around the world; b) the development of a Consultation Document to pave the way to a Declaration of Principles on the Seas of East Asia; and c) the further revision of the draft Sustainable Development Strategy for the Seas of East Asia. The Declaration of Principles will determine the commitment and form of regional collaborative arrangements for the Seas of East Asia, while the Sustainable Development Strategy is envisioned to become the common framework of action for the East Asian Seas, which will implement the WSSD adopted documents and other international programmes of action.

The Experts' Meeting is the first of a series of consultations that will be made at national and regional levels leading to the Ministerial Forum for the Seas of East Asia and International Conference on Coastal and Ocean Governance: Towards a New Era of Regional Collaboration and Partnerships, slated for 8-12 December 2003.

Leadership Seminar Highlights Need for Coastal and Ocean Management

XIAMEN, PR CHINA — Leaders and scholars in ocean and coastal governance met on 21 September in Xiamen to brainstorm on how sustainable use of the coasts and oceans in the East Asian region can be best achieved. The Seminar on Leadership in Ocean and Coastal Governance was attended by over 80 participants that included current and former secretaries/ministers, as well as representatives from government agencies, the private sector, financial institutions, the academe, international organizations and NGOs. The seminar was organized by PEMSEA and the State Oceanic Administration of PR China and hosted by the Xiamen Municipal Government.

Keynote presentations during the seminar were delivered by: Indonesia Minister of Marine Affairs and Fisheries, Dr. Rokhmin Dahuri; PR China State Oceanic Administration Administrator, Mr. Wang Shuguang; Xiamen Mayor, Mr. Zhang Chagping; Ship and Ocean Foundation Executive Director, Dr. Hiroshi Terashima; World Bank Senior Coastal Management Specialist, Dr. Marea Hatziolos; GEF Senior Adviser on International Waters, Dr. Alfred Duda; and PEMSEA Regional Programme Director, Dr. Chua Thia-Eng. The presentations covered such topics as ocean and coastal governance, integrated coastal management (ICM), financing and policy reforms.

Highlights of the ensuing discussions focused on the need to institutionalize coastal management programs at all levels to avoid the negative effects of changes in leadership and administrations. Ecotourism was also highlighted during discussions, recognizing that ecotourism is among the fast-growing industries in the region. If coastal and marine degradation continues, the needed earnings from this industry would be negatively affected. The seminar participants stressed that integrated planning and management is critical for sustainable ecotourism.

Regarding policy reform at the local, national and international levels, the seminar suggested that actions are required to develop and adopt a regional mechanism to enhance the collective efforts of

Continued on page 62

NEWS

Diplomats Discuss Investment Opportunities

MANILA, PHILIPPINES — The role of public-private partnerships (PPP) as a mechanism for developing self-sustaining environmental facilities and services was the topic of discussion at a recent briefing of several embassy personnel organized by the UNDP Manila Office on 16 August. Representatives from the embassies of Australia, Brunei Darussalam, Indonesia, Japan, Finland, New Zealand and the United States were in attendance, as well as those from the Asian Development Bank, World Bank and Philippine Business for the Environment.

The main focus of the briefing was PEMSEA's initiatives in the East Asian Seas region, and the development of local government capacities in coastal and ocean governance. The benefits of creating a policy and investment climate for private sector participation in environmental projects through the ICM process were explained, as well as the procedures for identifying and selecting appropriate investment opportunities.

A number of questions were raised by country representatives concerning the ways and means of developing and promoting potential "investment opportunities". Coastal strategy development and environmental risk assessment were identified as key tools to assist local governments in delineating priority environmental concerns, while building environmental awareness and consensus for action among communities and other stakeholder groups.

Four key questions are asked of local stakeholders when selecting projects for PPP, namely:

1. Does the project address an urgent environmental concern?
2. Is there an opportunity for private sector investment in the project?
3. Have the project risks and proposed risk-sharing arrangements been delineated?
4. Will the project make a profit?

Currently, PEMSEA project sites in Bali (Indonesia), Bataan and Manila Bay (Philippines), Danang (Vietnam), Klang (Malaysia), and Xiamen and Bohai Sea (PR China) are in the process of completing studies to answer these questions.

Representatives confirmed their willingness to work with PEMSEA in promoting the partnership opportunities with investment groups and operating companies within their respective country and regional networks.

UNDP Resident Representative Mr. Terence Jones presided over the briefing, with Dr. Chua Thia-Eng, Regional Programme Director, and Mr. Adrian Ross, Senior Programme Officer, making presentations on behalf of PEMSEA. ■

Leadership Seminar from page 59

countries to restore, protect and sustain the shared coastal and marine ecosystems in the region. The establishment of a system of marine protected areas, the formulation and adoption of national coastal and marine policies and supporting legal frameworks, and other institutional arrangements for countries in the region were identified as important steps forward.

Most importantly, the need for leaders with political will, long-term vision and a focus on implementation was stressed. Such issues as ratification and enforcement of international conventions, demonstrated progress and success in implementing ICM, and increased efforts in meeting international and national targets for sustainable development were listed as some of the areas requiring commitment by the region's leaders.

Two aspects were identified as a prerequisite to the sustainability of environmental management and development programs, namely recognition of the real economic value of natural resources; and the enhancement of the investment climate to attract private sector investments and to mobilize public sector investments in the environment. ■

Ministerial Forum and International Conference on the Sustainable Development of the Seas of East Asia: Towards a New Era of Regional Collaboration and Partnerships

8-12 December 2003

The International Conference

The Conference is designed to catalyze regional and international efforts and collaboration in minimizing environmental deterioration, improving sustainability in the use of natural resources, providing a cleaner coastal and marine environment and protecting the remaining ocean heritage. The Conference will gather concerned stakeholders from the coastal nations of East Asia, including policymakers, resource and economic managers, scientists, members of the business community, media and other members of civil society, to discuss the environmental management challenges faced by the East Asian seas and to foster stronger partnerships and commitments.

The principal themes of the Conference will be:

1. Best practices, experiences and lessons learned in the testing and application of integrated environmental and natural resource management of coastal and ocean-related ecosystems;

2. Critical challenges in managing shared waters - overcoming governance, financing, scientific, communication and capacity barriers; and

3. Regional collaboration and partnership - developing effective and sustainable regional and subregional mechanisms for environmental and natural resource governance; building intergovernmental, interagency and intersectoral partnership at regional, national and subnational levels.

The conference will consist of plenary and thematic sessions over a 5-day period. Discussions and recommendations from each technical session will be summarized and reported to the plenary sessions for general deliberation; and conclusions arising from the plenary sessions will be reported to the Ministerial Forum for review and adoption.

The Ministerial Forum

A Ministerial Forum attended by concerned ministers and senior officials of PEMSEA participating nations will receive summaries of the thematic reports, conclusions and recommendations of the technical and plenary sessions of the conference, review the final draft of the Sustainable Development Strategy for the Seas of East Asia and consider a draft Declaration or Statement of Principles for adoption. The forum shall consider innovative and sustainable regional collaborative arrangements and financing mechanisms for strengthening and sustaining regional coastal and ocean governance as obligated under Agenda 21 of UNCED and in response to the recommendations of the WSSD and other related instruments.

Side Event: Environmental Investment Round Table

The Investors Round Table is a gathering of industry, business people, policymakers, consultants, financial institutions and donor agencies. Representatives from local governments will introduce high quality environmental investment opportunities and government commitments to risk reduction measures with the objective of establishing long-term partnership arrangements with the private sector.

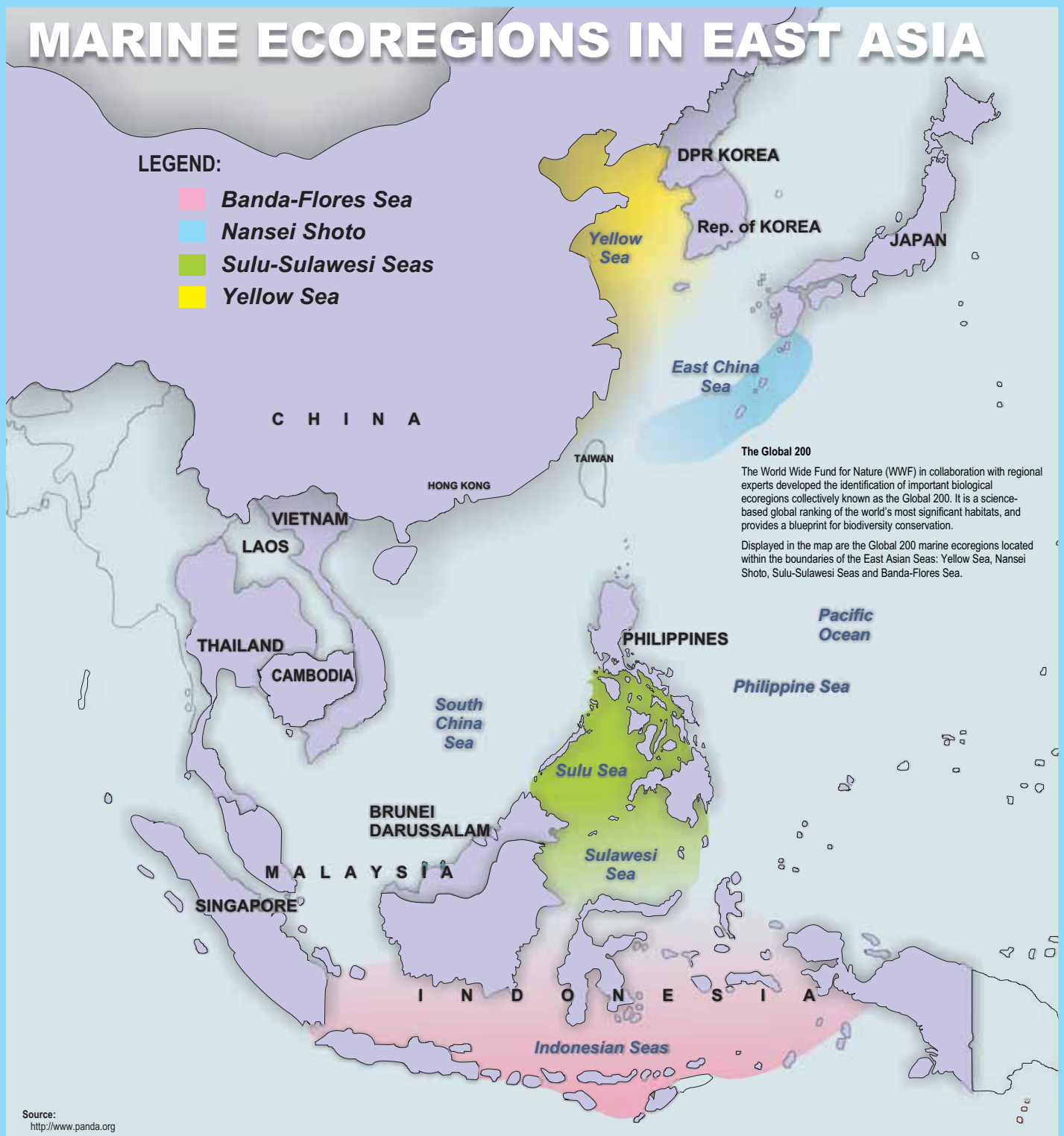
The Round Table involves an intensive program consisting of themed sessions and workshop forums focusing on the Public-Private Partnership process and the emerging market opportunities. Project proposals will center on environmental technology, facilities and services required in seven PEMSEA-supported project sites.

This event promises to be an interactive platform for building more effective environmental management systems and the sustainable delivery of public goods and services in the East Asian Seas Region.

All these events are being organized by
GEF/UNDP/IMO Regional Programme on Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)
and hosted by
the Government of Malaysia

For more information, e-mail PEMSEA at info@pemsea.org and visit www.pemsea.org

MARINE ECOREGIONS IN EAST ASIA



The Global 200

The World Wide Fund for Nature (WWF) in collaboration with regional experts developed the identification of important biological ecoregions collectively known as the Global 200. It is a science-based global ranking of the world's most significant habitats, and provides a blueprint for biodiversity conservation.

Displayed in the map are the Global 200 marine ecoregions located within the boundaries of the East Asian Seas: Yellow Sea, Nansei Shoto, Sulu-Sulawesi Seas and Banda-Flores Sea.

Source:
http://www.panda.org

Yellow Sea

Features:
A regional center of endemism for fish and invertebrates, the semi-enclosed Yellow Sea is one of the largest shallow areas of continental shelf in the world. It provides the major overwintering ground for numerous species of fish and invertebrates.

Selected Species:
- Dugong (*Dugong dugon*)
- Dall's Porpoise *(Phocoenoides dalli)*
- Gray Whale *(Eschrichtius robustus)*
- Pacific Herring *(Clupea pallasii)*

General Threats:
- Sedimentation
- Industrial Pollution
- Domestic Sewage

Nansei Shoto

Features:
A subtropical ecosystem with unusual endemism for its habitat type, the Nansei Shoto island chain contains diverse coral reefs that support many endemic fish species as well as populations of marine birds and mammals.

Selected Species:
- Loggerhead Turtle *(Caretta caretta)*
- Dugong *(Dugong dugon)*
- Japanese Parrotfish *(Calotamus japonicus)*

General Threats:
- Overexploitation of Resources
- Sedimentation

Sulu-Sulawesi Seas

Features:
This ecoregion holds one of the most diverse marine communities on earth with globally high fish and coral diversity. The Sulu-Sulawesi holds over 450 species of scleractinian corals with fish diversity reaching its highest worldwide level in this region.

Selected Species:
- Napoleon Wrasse *(Cheilinus undulatus)*
- Green Turtle *(Chelonia mydas)*
- Bottlenose Dolphin *(Tursiops truncatus)*
- Water Monitor *(Varanus salvator)*

General Threats:
- Destructive Fishing Practices
- Overexploitation of Resources
- Sedimentation

Banda-Flores Sea

Features:
The Banda-Flores ecoregion supports numerous endemic species of coral, fish and invertebrates, as well as populations of marine turtles, dugongs, giant clams and seabirds.

Selected Species:
- Carpet Shark *(Eucrossorhinus dasypogon)*
- Blainville's Beaked Whale *(Mesaplodon densirostris)*
- Hawksbill Turtle *(Eretmochelys imbricata)*
- Leatherback Turtle *(Dermochelys coriacea)*

General Threats:
- Destructive Fishing Practices
- Overexploitation of Resources
- Sedimentation
- Oil Spills
- Domestic Sewage