Caribbean Marine Science

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Contents

Association News

From the Editors' desk

It has been a good year for the AMLC. The Association's 50th Anniversary signifies the resilience and dedication of the people who have nurtured its growth over the years, and we wish to express our congratulations and thanks to all the activists and participants who have supported the AMLC all this time. This year's 50th Anniversary meeting in St. Thomas was a success and a good representation of the AMLC's importance to the Region. Our bi-annual Scientific Conference has become a well recognized and respected scientific gathering in the Greater Caribbean, and we thank all those who have hosted and participated in planning of our meetings over the years. This year the AMLC offered simultaneous translation for the first time and we are hopeful we will be able to secure funding to make this a regular part of our meetings, so that we may encourage full bilingual participation. We also were blessed this year with a several motivated sponsors, who deserve our most sincere gratitude. Without them, we would not be able to achieve the levels of meeting quality evident the last several years. Sponsors of the St. Thomas meeting included:

Sustaining Level Sponsors:

- NOAA's Center for Sponsored Coastal Ocean Research - (student support, interpreters, and proceedings).

- Caribbean Fisheries Management Council (**CFMC**) (interpreters).

- University of Puerto Rico Sea Grant (**UPRSG**) (student travel awards).

- Virgin Islands-Experimental Program to Stimulate Competitive Research (**VI-EPSCoR**) (meeting logistics, poster sessions, lunches, student support).

- United States Geological Survey (**USGS**) (interpreters and student support, as well as in-kind web site and logo design).

- Caribbean Coral Reef Institute (**CCRI**) at the University of Puerto Rico (administrative support)

- University of the Virgin Islands (**UVI**) (hosting and administrative support)

Other Contributing Sponsors:

- Staff of UVI's Center for Marine and Environmental Studies

- USVI Department of Tourism

- Bellows International

-Ocean Wholesale Distributors- Marriott's Frenchman's Reef

- Living Hope Cathedral

- Coca Cola, Inc.

- H. Riise

Many students participated in the meeting, greatly adding to the lively information exchanges and programs at the meeting. We thank them all for their participation and we hope to see them return in future years to become active in AMLC affairs! Student travel awardees included:

Student Travel Awards

$400 awards (NOAA-AMLC)

Eva Fuente (U. of Costa Rica, Costa Rica)
Ainhoa León (Simon Bolívar U., Venezuela)
Jennifer Lentz (Louisiana State U., USA)
Michael Nelson (Auburn University, USA)
Belkis Garcia (Universidad Central de Venezuela)
Nelson G. Rangel (University EAFIT, Colombia)
Paloma V. Susan (CINVESTAV, U. of Mérida, México)
Ivanna Kenny (U. of the West Indies, Jamaica)

$200 awards (U. of Puerto Rico Sea Grant Program)

Stacey Williams , Danisse Ruiz, Sara Rivero, Brenda Soler, Maria Vega, Dihalia Fuentes, Alex Mercado, Keyla Sepúlveda, Kathleen Flynn, and Michelle Scharer

$100 awards (NOAA-AMLC)

Carly Randall (U. of North Carolina, Wilmington, USA)
Alex E. Mercado (U. of Puerto Rico)
Dihalia Fuentes (U. of Puerto Rico)
Rosa L. Gonzáles (U. of Puerto Rico)
Brenda M. Soler (U. of Puerto Rico)
Brandi Todd (U. of Puerto Rico)
Joselyd García (U. of Puerto Rico)
Roxane Boonstra (U. of Florida, USA)
Adriana López (U. Central de Venezuela)
Hannah Grey (U. Virgin Islands, St. Croix, USVI)

Elected

The AMLC Executive Board elected Dr. Paul Sammarco to the post of Executive Director-Elect, who will take office as AMLC's Executive Director following the 2009 Scientific Conference in Dominica. This office was established to provide Paul with a period of familiarization by working with Dr. Steve LeGore, the outgoing ED, providing a measure of administrative and organizational continuity into the future. We all expect Paul's experience, abilities, and enthusiasm to steer the AMLC to expanded directions and continued growth and look forward enthusiastically to his committed leadership.

Dr. Paul Sammarco

Brief News

"The Boston Globe reported that a bowhead whale recently caught by native fishermen off Alaska had in its blubber a harpoon that was used 115 years ago. The unique exploding lance was only used between 1885 and 1895 by New Bedford whalers. Scientists believe the bowhead whale may have been about 150 years old when it was killed by Eskimos a few months ago. They attribute the recent resurgence in the bowhead whale population to the collapse of the market for whalebone corsets".

The Mona Institute of Applied Sciences (MIAS) at the University of the West Indies, Mona Campus, Jamaica has released a CD-ROM featuring "An Introduction to Caribbean Sea Squirts (Ascidiacea)" compiled by Emeritus Professor Ivan Goodbody and illustrated by photographs of most common species taken while alive in their natural environment. Each photograph is accompanied by both a vocal and a textual description to guide the viewer. The work is designed for use by students and researchers working in the Caribbean who may need assistance in identifying animals which they see in the marine environment. Further information on the CD and how to obtain copies can be found on the website: www.caribbeanascidians.com or by contacting the Marketing Manager, Mona Institute of Applied Sciences, 4 Belmopan Close, University of the West Indies, Kingston 7, Jamaica, West Indies, (876) 970-2021 or email: mias@uwimona.edu.jm

Future Meetings of the AMLC

2008 - The Executive Board Meeting will be concurrent with the 11th International Coral Reef Symposium, hosted by NOVA University in Ft. Lauderdale, Florida. The meeting is scheduled for Saturday July 12th, 2008 at the Ft. Lauderdale International Convention Center, which is the same venue as the ICRS. Make your arrangements soon! We remind you all that all members are welcome to attend and participate in these meetings. Only Board members vote on issues, but open participation and discussion is encouraged!

2009 - Scientific Conference – This meeting is scheduled for Monday-Friday, May 25-29, 2009 in Dominica. Sascha Steiner at ITME will host the meeting and serve as that year's AMLC President.

AMLC List Server

The purpose of the AMLC list server is to facilitate communication and foster collaboration between and among our members. We hope all AMLC members will take advantage of this service – if you have any news, requests, or questions to distribute to the membership, just send a message to the email address below. On-line discussions among members concerning Caribbean marine issues are encouraged. Don't be shy! The NEW list server address is: members@lists.amlc-carib.org

Only AMLC members in good standing can post to the list. Messages not from a subscribed member will not be posted. Current AMLC members are automatically subscribed with the list controlled by Dr. David Wilson, AMLC's Membership Director, and new members are added as they join AMLC. The newsletter will be circulated electronically through our list server, which insures delivery and control over who receives the mailing.

As always, we request contributions for the Newsletter from our members and readers. We have a very diverse membership involved in many different areas of research. Your Newsletter is an efficient way of sharing information about your projects, or even better, finding help or cooperation from other members of the Association.

Ernesto Weil and Isabel Urreiztieta, Editors. Steve LeGore Associate Editor.

General Interest

Caribbean Corals in Danger of Extinction

Climate change, warmer waters cited as leading causes.

Caribbean coral species are dying off, indicating dramatic shifts in the ecological balance under the sea, a new scientific study of Caribbean marine life shows. The study found that 10 percent of the Caribbean's 62 reef-building corals were under threat, including staghorn and elkhorn corals. These used to be the most prominent species but are now candidates to be listed as *Critically Endangered* on the IUCN Red List of Threatened Species.

"One of the Atlantic Ocean's most beautiful marine habitats no longer exists in many places because of dramatic increases in coral diseases, mostly caused by climate change and warmer waters," said Dr. Michael L. Smith, director of the Caribbean Biodiversity Initiative at Conservation International.

A gathering of 23 scientists in Dominica in March 2007 analyzed data on Western Tropical Atlantic corals, seagrasses, mangroves and algae, which are

fundamental components of marine ecosystems providing food and shelter for numerous other organisms and local communities. The study was funded in part by the Royal Caribbean Cruises' Ocean Fund.

This was the first in a series of Global Marine Species Assessments (GMSA) of key marine primary-producers on a global scale. The GMSA is headquartered at Old Dominion University in Norfolk, Virginia, and is a partnership between Conservation International (CI) and the World Conservation Union (IUCN). It aims to dramatically increase the number of marine species assessed under the rigorous criteria of the IUCN Red List of Threatened Species to provide up-to-date information for marine policy and conservation efforts. After a final review, the species assessed during the Dominica workshop will be added to the 2008 IUCN Red List.

"Coral reefs support some of the richest areas of biodiversity in the world. When the coral reefs disappear, so will many other species which rely on reefs for shelter, reproduction and foraging," said Dr. Suzanne Livingstone, GMSA program officer. The threats to corals and other marine species include coastal pollution and human development; increased sedimentation in run-off water; thermal stress and heightened severity of hurricanes from climate change; and shifts in species dynamics due to over-fishing, according to the study. Scientists explained that the Caribbean has undergone the longest and most sustained impacts from human development since the colonization of the Americas.

Next to corals, mangroves appear to be the hardest hit. Mangrove cover in the region has declined by 42% over the past 25 years, with two of the eight mangrove species now considered *Vulnerable* to extinction and two more in *Near Threatened* status. "Mangroves protect shorelines, shelter fish, and filter pollution," said Aaron Ellison of Harvard University. "The Caribbean was blessed with an abundance of these useful plants, but the consensus of this workshop is that mangroves are in trouble everywhere and need to be protected and restored," he added. Mangrove forests are being cut down to make way for coastal housing, tourism, and aquaculture development. Beds of sea-grasses in shallow coastal waters, like mangroves, provide a vital nursery habitat for fish, including many commercially important species and are subject to similar threats. They are in equal need of protection to safeguard the wealth of marine life they support.

Unlike corals, seagrasses and mangroves, Caribbean algae appear to be surviving well and perhaps are taking advantage of the corals' demise. Algae thrive on dead or dying coral reefs and can overgrow and smother newly settled corals. In addition, the fishes that feed on algae are being overexploited and their reduced populations enable algae to form dense growths that prevent corals from re-colonizing.

The scientists noted that some healthy Caribbean coral reefs still exist in well-managed marine protected areas such as Bonaire Marine Park in the Netherlands Antilles. Direct human impacts are reduced in these areas allowing most corals to thrive; however, thermal stress from global warming affects all corals in the Caribbean and must be reversed if these refuges of Caribbean beauty are to survive, they added. "The Caribbean tourism industry relies heavily on the beauty and health of its sea life," said Dr. Kent Carpenter, GMSA Director. "Concentrated marine conservation and a global effort to halt man-induced climate change are necessary to preserve this vital economic engine in the region."

Photos of the surveyed marine life are available at:
http://images.conservation.org/admin/packaging/viewtransmit_ext.aspx?messageId=101089&userName=gpoggi&session=06f28c25d674d8866ea5c6aace8582ab

For more information please contact:
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Abigail Powell, Communications, IUCN Species Programme, abigail.powell@iucn.org; Tel: +41 22 999 0154

Conservation International (CI) applies innovations in science, economics, policy and community participation to protect the Earth's richest regions of plant and animal diversity and demonstrate that human societies can live harmoniously with nature. Founded in 1987, CI works in more than 40 countries on four continents to help people find economic alternatives without harming their natural environments. For more information about CI, visit www.conservation.org.

The World Conservation Union (IUCN)
The World Conservation Union is the world's largest conservation network. The Union brings together 84 States, 108 government agencies, more than 800 non-governmental organizations (NGOs), and some 10,000 scientists and experts from 181 countries in a unique worldwide partnership. The Union's mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. The World Conservation Union is a multicultural, multilingual organisation with 1000 staff located in 62 countries. Its headquarters are in Gland, Switzerland. http://www.iucn.org/

The Global Marine Species Assessment (GMSA).
The Global Marine Species Assessment began in late 2005 and is based in the Department of Biological Sciences at Old Dominion University. This project will be the first global review of the conservation status of every marine vertebrate species, and of selected invertebrates and plants. The project involves a range of partners in compiling and analyzing all existing data on approximately 20,000 marine species, and will determine the risk of extinction according to the IUCN Red List Categories and Criteria. http://www.sci.odu.edu/gmsa/

Contrast of Coral Reef Conservation in Western Pacific Island Nations

A recent publication in the journal *Bioscience* argues that, because coral reefs and other coastal marine ecosystems effectively extend into adjacent watersheds, they should be managed as an integrated unit. Marine protected areas alone, the paper states, "will miss their target of resource protection unless coupled terrestrial protected areas (TPAs) are established and enforced. Simply put, TPAs combined with MPAs create effective resource protection areas."

The paper's authors note that coral reefs worldwide are being degraded by human induced disturbances, and that runoff and sedimentation are among the greatest threats to reefs surrounding high islands and adjacent to continental land masses. Existing scientific data, they continue, "identify the key stressors, synergisms, and outcomes at the coral reef ecosystem, community, and population levels. These data demonstrate that marine protected areas alone may be insufficient for coral reef protection; integrated watershed management practices are also needed." However, despite the existence of such data, gaps in the effectiveness of environmental policy, legislation, and regulatory enforcement frequently prevent adequate protection of reefs in countries such as United States and Australia. In contrast, they assert, several Pacific Island Nations, "with intact resource stewardship and traditional leadership systems," have been able to apply research findings to coral reef management policies "relatively quickly."

The authors underscore that traditional systems of resource management are not always successful. However, they argue, citing case studies from Guam, Palau, and Ponhpei, that certain aspects of the traditional policies of Pacific island cultures "reflect an understanding that it is not the coral reefs and associated resources that can be managed, but rather the human activities affecting these ecosystems."

"In some of these islands, there is still direct reef tenure or ownership, and hence individuals take responsibility for the state of their coral reefs and the fisheries they support. This is different from the "tragedy of the commons" observed in the United States, wherein all have share ownership, but few take responsibility, and there is often a lack of concern among those living upstream regarding the impacts of their activities on individuals and ecosystems further downstream. In numerous Pacific Islands, the same villages or clans own both the upland areas and the coastal reefs affected by land-use practices within these watersheds. In addition, many Pacific island cultures treat the land-sea interface as a continuum rather than a boundary, and this "ridge-to-reef" stewardship recognizes that upslope activities affect people and resources farther down a watershed and in the ocean. Pacific island communities with intact reef tenure systems often act to protect their assets through internal governance.

"Finally, traditional leadership, which still exists in many of these islands, is hereditary, with time horizons longer than the two-to-four year electoral cycles prevalent in Western democracies."

Among their conclusions, the authors call for "a comprehensive review of U.S. federal legislation, regulatory agency jurisdiction, and human and financial resource allocation;" and urge that "government scientists be free of interference from their politically appointed supervisors and be allowed to express their true scientific opinions." They also endorse formal training designed to improve communications among policymakers, social scientists, and natural scientists citing as examples

programs run by the Aldo Leopold Leadership Program, COMPASS, and SeaWeb.

By: Robert H. Richmond, Pacific Biosciences Research Center, University of Hawaii.

Source: SeaWeb Ocean Update, October 2007

Australia Closes Barrier Reef to Fishing

In an effort to protect reef fishes the Australian government has implemented a ban on all recreational and commercial fishing along the Great Barrier Reef for three periods in the months of October, November and December. The closures are during a nine-day period around the new moon each month, when reef fishes spawn. Protecting these large aggregates of spawning fish is seen as essential to their conservation.

The first closure was from Oct. 5 to 13 and was deemed highly successful by Tim Mulherin, Primary Industries and Fisheries Minister. Mulherin lauded both commercial and recreational fishers for respecting the closures. During the nine-day closure, there were only two incidents of fishers breaking the mandate.

Richard Conroy, a Mackay Queensland Boating and Fisheries Patrol Officer, said, "Fishers were happily targeting the annual mackerel run and fishing inshore for estuarine fish species." The remaining closures for 2007 are from Nov. 2 to 11 and Dec. 2 to 11.

SOURCE: BYM Marine Environment News. READ MORE: **http://www.bymnews.com/news/newsDetails.php?id=16997**

Coastal Shark Fisheries in the Pacific

This study by Matthieu Juncker Maya Robert and Eric Clua of the CRISP Programme presents the general knowledge on shark exploitation and vulnerability, the current status of coastal shark fisheries, and the prospects for management and regulation in the Pacific Islands.

While comprehensive global data on the decline in stocks of shark species are still in short supply, recent research in specific regions and on specific shark populations has revealed dramatic reductions. In recent years, scientists, NGOs and some political leaders have begun to realise the potentially devastating effects of the worldwide decline in shark stocks. For some countries in the developing world, the decline of fish stocks generally has led to an increased effort to catch sharks for human consumption, but now sharks too are becoming more difficult to find. This has already led to food shortages, particularly among coastal communities, and could have serious long-term consequences (Watts and Wu, 2005). The main reason for shark stock depletion is definitely the demand for their fins which are being used for shark fin soup, an Asian delicacy (Knights, 2002). The extermination of Asian shark stocks has led Asian fishing operators to target sharks further and further away from their home countries, including the Pacific region. It has also contributed to the development of specific fisheries whereas elasmobranchs were so far essentially by-catches. If sharks traditionally benefited from a privileged status in the Pacific region where they are culturally very important, they don't seem to escape anymore to an increasing pressure responding to the Asian demand on shark fins.

Shark Vulnerability

The vulnerability of sharks is linked to their K-selected life-history strategy (Stevens *et al.*, 2000) and to the growing market for shark 'products' (especially fins). Most sharks and rays that have been studied have slow growth, late maturity and very low fecundity compared to bony fishes (Camhi *et al.*, 1998). These attributes result in very low intrinsic rates of increase (Smith *et al.*, 1998) and very low resilience to fishing mortality (Hoenig and Gruber, 1990). Such populations decline more rapidly and are not able to rebound as quickly as other fishes after population reductions (Sminkey and Musick, 1995; 1996). Thus, only moderate levels of fishing can be carried on these low biological productivity species without depletion and stock collapse (Camhi *et al.*, 1998; Musick, 1999; Cortes, 2000).

Extrinsic factor: growing market for sharks Shark meat has been used as food in coastal regions for over 5 000 years (Vannuccini, 1999). Most historical use of shark meat was local because the meat does not travel well without refrigeration.

Fisheries for spiny dogfish (*Squalus acanthias*) and the soupfin shark (*Galeorhinus galeus*) boomed in the 1930s off the West Coast of the US to meet the demand for Vitamin A from shark livers. In the Pacific island region, growing acceptance of shark meat by consumers in the late 1970s and the upsurge in the value of shark fins in the 1980s drove exponential growth in shark fisheries in the region. According to FAO statistics, world production of shark fins has increased from 1 800 tonnes in 1976 to 6 030 tonnes in 1997, peaking at 6 400 tonnes in 1989 (Figure 1).

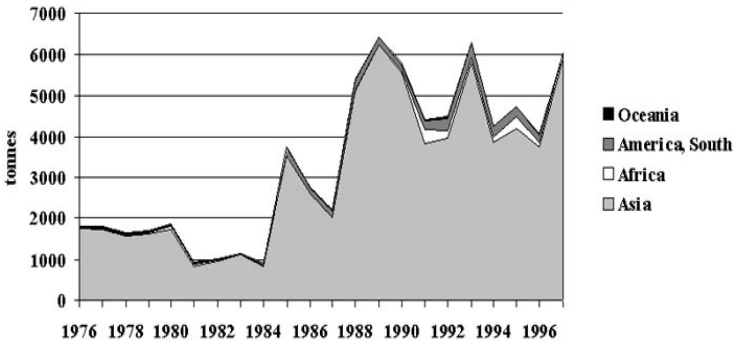

Figure 1. World production of shark fins by continent in tonnes, 1976-1997. Source: FAO-FIDI.

Sharks and their relatives may provide a multitude of usable products including but not restricted to: meat, fins, liver, skin, cartilage, and jaws and teeth (Musick, 2004). The demand for shark fins has grown rapidly in recent years, such that they are now among the world's most expensive fishery products. Similarly, the demand is rising for shark cartilage and other products for medicinal purposes (Walker, 2004).

The biggest and fastest growing market of all for shark fins is China, though there are huge markets in Japan, Hong Kong, Singapore and Korea (Figure 1). Although the shark fin itself has no taste, only texture, shark fin soup has become a prestige product in many Asian cultures (Knights, 2002). Therefore, tens of millions of sharks taken in fisheries each year have their fins removed and their carcasses discarded overboard (Fowler and Musick, 2002). This practice, called finning, represents a considerable waste, as the fins, on average, account for only about 5% of the total weight of a shark (Vannuccini, 1999).

Global shark fisheries

Fishing gear Sharks are captured with a wide variety of types of fishing gear and vessel. Sharks are mostly taken by gillnet, hook or trawl in industrial and artisanal fisheries (Walker, 2004). Small amounts are taken in traditional and recreational fisheries (including game fishers and divers) and bather protection programs by beach gillnet and drumline fishing.

Shark fisheries can be classified as "coastal hook and gillnet fisheries", "demersal trawl bycatch fisheries", "deepwater bycatch fisheries", "pelagic bycatch fisheries" (primarily bycatch in tuna longline and purse seine fisheries), and "freshwater fisheries" (*in* Walker, 2004).

Coastal hook and gillnet fisheries operate in continental shelf regions. The configuration of the fishing gear depends on the topography of the fishing grounds and on the available species mix of shark, chimaerid and teleost species. Much of the artisanal catch is taken by bottom-set longlines and by bottom-set gillnets, mostly made of monofilament webbing with some consisting of multifilament webbing (Walker, 2004).
At least half of the sharks killed are "bycatch", snagged while fishermen are targeting other species on longlines or in enormous trawl nets, gillnets or purse seines.

Fisheries Data World catches of cartilaginous fishes (sharks, rays and chimaerids) reported by FAO have grown considerably, from 271 800 tonnes in 1950 to 822 000 t in 1999 (Vannuccini, 1999). This growth was fairly regular, with some sluggish periods (early 1950s and most of the 1970s) and some sustained increases (1955-73 and 1984-98). These landings equate to hundreds of millions of individual specimens being harvested every year (Hueter, 1998). In Northwest Atlantic the shark coastal species recorded between 1992 and 2000 declined by an estimated 61% (Baum *et al.*, 2003). Declines for species of the genus *Carcharhinus*, range between 49 to 83% (Baum *et al.*, 2003).

The available data on world shark fisheries is considered to be rather limited and questionable. Even if FAO statistics are the most comprehensive

available, it is not possible to determine the exact volume of shark from within the total chondrichthyan catches. There are problems of species identification and lack of species-specific reporting. Many of the estimated 465 shark species are small, deep-water ones, seldom seen or caught. About 100 species are encountered in commercial fisheries throughout the world.

Also, there are several reasons for regarding the data as significantly underestimating actual chondrichthyan catches. This is due to the lack of reporting, in particular on bycatch or sharks discarded at sea, as well as on those taken by recreational, subsistence and artisanal fisheries. Many countries do not report the enormous numbers of sharks taken as bycatch. According to Bonfil (1994), the estimated annual elasmobranch bycatch at the end of the 1980s was between 260 000 and 300 000 tonnes or 11.6 to 12.7 million fish, of which the greater part was sharks, mainly blue sharks. Like other aspects of shark fisheries, incidental capture is very poorly documented.

However, evidence from the history of fisheries around the world, both targeting these fishes and taking them as bycatch, shows a major decline in chondrichthyan population size (Stevens *et al.*, 2000).

Ecological and economical consequences of shark over-exploitation

Ecological consequences As fishing effort increases, characteristic and predictable changes may occur in fish assemblages (Walker, 2004). Large animals decline or disappear from the assemblage and are replaced by smaller ones. This results in a gradual drift towards shorter-lived, faster-growing species. This is accompanied by an initial increase and later a decrease in the number of species in the exploitable population although the number of fish actually appearing in the catch can increase to a maximum level.

Nevertheless, the removal of sharks occupying the role of top predators in their ecosystems can have not only the expected effect of releasing control over their main prey, but sometimes unexpected second and third degree effects on non-prey species through trophic linkages (Stevens *et al*., 2000; Schindler *et al*., 2002).

Economic consequences Sharks provide tremendous economic benefits to those countries that have a diving industry but it is likely that, if the fishing industry is permitted to continue over-exploiting sharks in areas such as the Pacific Corridor (eastern tropical Pacific: the Galápagos Islands (Ecuador), Gorgona and Malpelo Islands (Colombia), Coiba Island (Panamá) and Cocos Island (Costa Rica)), there will be no possibility of shark tourism for many decades.

Currently, the Galapagos Islands generate about a third of Ecuador's US$430 million-a-year tourism business (Anonymous, 2003), although there is no information as to how much of that business is generated by shark diving. Whatever the case, the diving industry will collapse if sharks disappear from the reserve. A second example in the Bahamas: a single live reef shark is estimated to be worth US$250,000 a year through dive tourism, whereas a dead reef shark has a one-time value of $50-60 to a fisherman.

Pacific Fisheries

Oceania comprises 24 countries and territories and covers a total area of approximately 30 million sq. km., most of which is ocean. There are few industrial-scale fisheries that specifically target chondrichthyans. Those that do are based primarily in Australia and New Zealand. The largest fishery in terms of annual catch is the southern shark fishery off southern Australia. This fishery primarily takes catches of school shark (*Galeorhinus galeus*) and gummy shark (*Mustelus antaricus*) which is consumed locally. Other smaller target fisheries include the fishery for carcharhinid sharks off northern Australia, the West Australian shark fishery and the fisheries for rig (*Mustelus lenticulatus*) and school shark (*Galeorhinus galeus*) in New Zealand (Nichols, 1993).

Many subsistence and small-scale commercial fisheries for shark exist throughout the South Pacific region. Subsistence shark fishing is carried out by Polynesian, Micronesian and to a lesser, extent, Melanesian countries (Hayes, 1996). The

shark flesh is used for domestic consumption and teeth and jaws are commonly sold as curios to the tourist industry (Nichols, 1993). Sharks form an important part of the island culture in many countries, however, catches are poorly documented.

Within the South Pacific the most common sharks inhabiting reefs and lagoons are members of family Carcharhinidae (Hayes, 1996). Hence, these species are the most important subsistence and artisanal catches (Nichols, 1993). Species common to shallow water reefs include the black-tip shark (*Carcharhinus melanopterus*), lemon shark (*Negaprion acutidens*), and white-tip shark (*Triaenodon obesus*). Species of Rhizoprionodon sharks are common to the nearshore waters of the high islands of Melanesia, whereas the common black-tip shark, Australian black-tip shark and spot-tail shark (*Carcharhinus sorrah*) are common in more open lagoon waters adjacent to areas with wide continental shelves (Nichols, 1993). In deeper water, the grey reef shark, silver-tip shark (*Carcharhinus albimarginatus*) and large species such as the tiger shark (Galeocerdo cuvier), bull shark (*Carcharhinus leucas*), Java shark (*Carcharhinus amboinensis*) and several species of hammerhead shark (*Sphyma spp.*) are found. The blue shark (*Prionace glauca*) is also of commercial importance in the Pacific where it is widely caught by hook and line and in pelagic and bottom trawls (Nichols, 1993).

In the Western Central Pacific, chondrichthyans formed 0.9% of the total catch in 1990 (Stamatopoulos, 1993). This corresponds to a total catch of chondrichthyans of 97 224 t, with a rising trend.

American Samoa. There is no overall information on shark fisheries for this country. The American Samoa fishery statistics report that shark landings (all species combined) amounted to 880 kg in 2004 (Hamm *et al*., 2004).

Australia. Sharks have traditionally been an important part of diet of coastal Aborigines and Torres Straits Islanders (Last and Stevens, 1994). The commercial fishery for school sharks began in Victoria's bays and estuaries immediately after

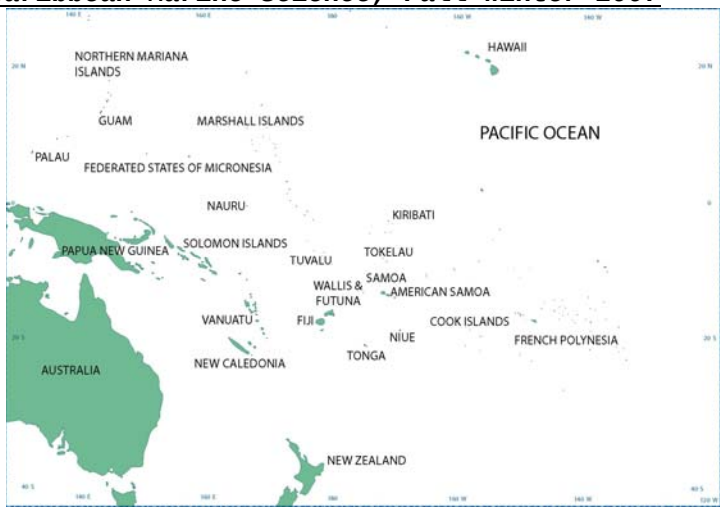

Figure 2. Oceania region and countries studied.

European settlement and became significant after the 1920s (Kailola *et al*., 1993). The Victorian fishery began to include catches of gummy shark and continued to dominate chondrichthyan catches for many years (Bentley, 1996). Its relative importance declined with the development of other domestic shark fisheries (Western Australia) as well as fisheries based on foreign fleets (Tawainese gillnetting vessels). Today, the capture of chondrichthyans for household consumption is insignificant in comparison to commercial operations. From 1987 to 1991, shark and ray fisheries represented 5% of all catches in Australia, equivalent to 1.5% of the world elasmobranch catch (the third highest percentage in the world (Bonfil, 1994). According to FAO, the total Australian catch of cartilaginous fishes (10 236 t) was less than 1% of world catches. Unlike the world catch, the reported Australian ray catch was less than 2% of the shark catch. Much of the shark catch is target species, which are usually reported accurately.

Cook Islands. Shark flesh is not commonly consumed in Rarotonga and consumer acceptance of shark flesh is generally low. However, sharks are taken as part of the deep water drop-line fishery in the Cook Islands and incidental captures of sharks have increased with the increasing incidence of fishing around FADs. Experimental line fishing conducted in Cook Islands waters by the SPC found sharks to constitute 2% of the catch by number and 15% by weight. In l978 and l979 4 and 26 tonnes of sharks and rays were taken respectively in the

southern Cook Islands, or 0.5 and 3% respectively of the total fish catch for these years (Anon, 1980).

Federated States of Micronesia. Marine resources are the country's largest natural resource, but little information is available on shark catches. Sharks are used as a subsistence resource in Kosrae and on Fais Island in Yap State. Sharks are also caught as a bycatch of the tuna longline and purse-seine fisheries but no information on catch is available. Catches consist largely of Carcharhinid sharks and commercial fishing is for fins only. Sharks are caught as part of the fishery for deep-slope species which targets snappers. Sharks accounted for 9% of the catch by number and 22% by weight (Dalzell and Preston, 1992).

Fiji. Little is known about the shark resources of the Fijian region, as little research has been done on the shark fauna (Nichols, 1993) but exploitation is believed to be light (Richards *et al.*, 1994). Until recently, reef fish was readily available, thus shark was not considered an important food fish (shark is not consumed in many areas of Fiji due to traditional taboos on its use, however, it is readily accepted in the Rotuma and Rabi communities). With the increase in population and greater ease of exporting there have been moves to develop shark fisheries both to supply the local demand for fish and to earn foreign exchange. There is an international trade in dried and frozen shark fin mostly taken as bycatch in the pelagic longline fishery and Fiji is a significant exporter of shark fin. Hong Kong is the largest importer of shark fin and Fiji exports significant quantities of the product to this market (Hayes, 1996). From the data supplied by observers on board local longline vessels, blue sharks together with oceanic white-tip and silky sharks are the most commonly caught in Fiji's EEZ (Swamy, 1999). Grey reef shark, and mako shark are also quite abundant and, combined with the three species mentioned above, form the major part of the bycatch. Hammerhead and white tip shark are quite common in the inshore areas and a few species also venture into the fresh water, especially the larger rivers. Only a few species are retained while most of the shark species are discarded (Swamy, 1999). This information corroborates the dropline fishing surveys carried out by the Secretariat of the Pacific Community (SPC): two species were recorded as bycatch (silver-tip and grey reef sharks). Other species recorded are the black-tip shark the white-tip reef shark, lemon shark, tiger shark and the bull shark. A substantial amount of blue shark is taken by longline vessels in Fijian waters: in 1994, a total of 16 tonnes or 0.4% of the longline catch was made up of this species (Anon, 1994).

Hawaii. More than 2 800 tonnes of sharks were landed in Hawaii in 1998 (Camhi, 1999). Since 1991, the proportion of sharks killed has increased by 2 500%. Sharks that are encountered by the fishermen in the nearshore coastal waters include sandbar, gray reef, black-tip, white-tip, hammerhead, Galapagos and tiger sharks. However, most sharks taken in Hawaii State waters are caught as bycatch in fisheries targeting other species, such as mahimahi, wahoo and tunas. Those sharks are mainly oceanic sharks: 50% are shortfin mako and 28% are thresher sharks. There have been no population assessments on these species, so there are no data to indicate whether the current level of exploitation is sustainable. According to Camhi (1999) the growth of an inshore fishery that targets coastal sharks is a major concern that needs immediate attention.

Kiribati. The people of Kiribati have in some parts traditionally credited the sharks with intelligence equalling that of a man (Nichols, 1993). In the Line Islands of Kiribati, sharks play a leading role in mythology where it is believed to be the most important of all the fish spirits. Elasmobranchs currently make up only 3.4% of total artisanal fisheries landings in Kiribati with catches only recorded from Onotoa to Aranuka (Anon, 1995).

Marshall Islands. Sharks are widely distributed throughout the islands from the reef to offshore areas. Although a variety of species are caught, harvesting consists largely of Carcharhinid sharks (Smith, 1992). Sharks are used as a minor subsistence resource and are taken as bycatch in the tuna longline fishery. Japanese, Taiwanese and US longline vessels operate in the Marshall Island EEZ for tuna and have a bycatch of sharks. Annual shark catches are variable; catches by Japanese fishing vessels were recorded from 1987 to 1991 and peaked at 28 000 t in 1990. Sharks are also caught

by the deep-slope fisheries predominantly targeting snappers (Lutjanidae) and groupers (Seranidae). Results from a dropline fishing survey conducted by the SPC in 1991 lists sharks as constituting 8% of the total catch by number and 49% by weight (Dalzell and Preston, 1992).

New Zealand. Shark has been utilized since pre-European times when Maoris made extensive use of school shark for food, oil and skin (Annala, 1995). Maori fishers traditionally caught large numbers of spiny dogfish during the two last centuries. Rig was probably an important species and is still caught in small quantities by Maori in part of the North Island. However, these catches are insignificant compared to the commercial catches (McKoy, 1988). Commercial shark fishing in New Zealand dates back to the early 1900s but was probably negligible prior to the 1940s, with small landings only from bycatch of other fisheries (NIWA Fisheries, unpublished data). Initial catches were based on longlining for school sharks, particularly the pregnant females which migrate into shallow water in spring (Palmer 1994). Around 1940, an increased wave of effort in shark fishing occurred as sharks were harvested for the vitamin-A-rich oil from their livers. School shark and dogfish livers were employed for this purpose, with the carcasses generally being dumped. The fishery developed rapidly to a peak of over 2 500 tonnes per year, then collapsed in the mid 1950s with the development of synthetic Vitamin A. The demand for shark fillets in Australia saw another increase in shark fisheries and in l97l some 3 000 t (Annala, 1995) of school shark, rig and ghost shark were landed, with 600 t of this total exported to Australia. Last decade, Chondrichthyan fisheries were moderately important for New Zealand with catches making up 2 % of the total fishery production (Bonfil, 1994). Nevertheless, New Zealand is the leader in Oceanian shark fisheries with 19 810 t of shark landings in 1999.

Palau. has an abundant and diverse population of sharks, but no commercial catch data are available (Nichols, 1991). A shark fishing survey carried out by the South Korean fisheries research and development agency in 1975 found hammerheads, milk sharks, white-tip sharks and sand sharks to be the most abundant. No commercial fishery targeting sharks has developed. Anon (1992), lists no sharks in either fish production statistics or export statistics.

Papua New Guinea. Small quantities of shark were caught by artisanal fisheries prior to 1980 (Stevens, 1993). Taiwanese gillnetters began fishing in the Gulf of Papua according to a gillnet survey conducted during 1977. Catch figures are only available for 1981 and 1982 when 810 000 and 405 000 t of shark were caught respectively. Mako sharks are important to sport fishing in PNG (Nichols, 1993). The main shark species taken are oceanic in habitat (Kumoru, 2003a,b). They are the silky shark and oceanic white-tip but some more coastal species, such as grey reef shark and silver-tip, are also taken in significant numbers, along with a range of other species such as black-tip, hammerhead, blue, thresher, mako, tiger, and crocodile sharks, as well as some pelagic rays. The fins and meat of most species are marketable, but some species are of low value, e.g. blue shark and may not be retained. Nine vessels have been licensed to fish for sharks since 2003 and this number was to be reviewed after two years as part of a fishery review. Shark exports ranged from around 1 900 t in 2000 to 1 300 t in 2003. Until recently, most of the meat and fins were exported to Taiwan, with frozen fins commanding a much higher price, which itself varied considerably by species. An increasing amount of the shark meat is now processed locally, for domestic consumption (Kumoru, 2003a) but unfortunately no data is available.

Solomon Islands. Sharks are caught by subsistence and small-scale artisanal fishers in some areas of the Solomons, generally as a bycatch of fishing for deep-water bottom fish or of tuna purse-seining (Skewes, 1990). Subsistence fishers eat the flesh of the shark and the shark fin is sold for export. Shark worship has traditionally been common in the Solomon Islands and still continues on some islands (Nichols, 1993). Local Gilbertese communities hunt shark for domestic consumption especially in the Wagina area in the Western Province (Skewes, 1990). Shark landings comprise mainly Carcharinid sharks. The inspection of the catch from a shark longliner in 1984 found that 62% of the catch was made up of spot-tail shark (Skewes, 1990).

Tokelau. Shark fishing is generally carried out by older men in Tokelau who use nylon lines with wooden floats and hooks. They anchor on the reef and drift over deeper water. Caches of up to 50 sharks a night have been taken by some fishermen (Nichols, 1993).

Tonga. Fishing has always been an important subsistence activity in Tonga. Traditionally, shark contributed substantially to the fish portion of the diet, especially on the outer islands (Bell *et al*., 1994). Sharks were captured by noosing, where a shark is enticed alongside a boat with a coconut rattle, bait is then thrown in and, as the shark follows the bait, a noose is slipped around the shark and it is dragged on board. Modern methods are now used and consist of a hook and length of chain attached to a nylon rope and floats (Hayes, 1996). A two-year fisheries project during 1980 and 1981 identified the following species in Tongan waters: grey reef, white-tip, black-tip, hammerhead, mako and tiger shark. The blue shark, great white shark and pelagic thresher have also been identified (Bell *et al*., 1994). Landings of shark at Vuna and Faua in Nuku'alofa in the 1993 artisanal fishery were estimated at 364 kg of shark for the 12-month period, or less than 0.1% of the total finfish landings (Bell *et al*. 1994).

Vanuatu. Shark is currently a bycatch of the deep reef slope fishery, the main artisanal fishing activity in Vanuatu (Dalzell, 1992). Although some fishers specifically target shark for commercial sale, shark makes up a very minor portion of the catch (Dalzell and Preston, 1992). Mako sharks are important to sport fishing in Vanuatu (Nichols, 1993). Shark meat is marketed commercially in the local fish market in Port Vila and a substantial amount of shark fin is exported. Shark fin exports are only known to have occurred up to 1989. Catches from fishing trials conducted by Fisheries Department vessels in 1983 and 1984 showed sharks to comprise 10% and 16% of catch by weight respectively. The only source of data on shark sales is the Natai fish market from 1988 to 1992; shark purchases for this period range from 725 kg in 1989 to 1 289 kg in 1991.

Country information from a questionnaire

In early June 2006, a questionnaire was sent out to assess the impact of reef shark fisheries in 15 member countries of the Secretariat of the Pacific Community: American Samoa, Cook Islands, Fiji, French Polynesia, Guam, New Caledonia, Northern Mariana Islands, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu, Wallis and Futuna. Only one-third (5) countries responded:

Cook Islands stated that reef sharks were not fished or targeted commercially and that there were neither accidental nor incidental catches.

French Polynesia answered that there were shark fisheries in the country until April 2006. In fact, the government decided on April 28th 2006 to stop this activity for at least a 10-year period to protect all shark species in the EEZ except Mako shark. Any kind of market using shark parts is prohibited, accidental catches should be released back into the sea and shark feeding is severely regulated. However, before April 2006, sharks were fished to be consumed locally (meat, fins), sold at the market place (teeth, full jaws) or sold on to middlemen for export (fins). Most of the catches were oceanic sharks while the minority was reef sharks: black-tip shark, grey reef shark, lemon shark, silver-tip shark and white-tip shark. These specimens were caught using net, small-scale longline and fish pen traps.

In **Guam**, there is no industrial shark fishery: the shark take is predominantly non-commercial and incidental. The catch comes from nets, spearing, shoreline hook-and-line, trolling and boat-based bottom fishing.

Northern Mariana Islands do not have an active fishery for reef sharks. They are not looked upon favourably by fishers because dealing with such bycatch during fishing operations is time-consuming and dangerous according to the Fishery Department. One individual is attempting to take sharks commercially using longlining. However, his venture has been less than successful. The Fishery Department is unsure whether he is still taking sharks.

New Caledonia answered that some sharks were fished for subsistence (meat) and to be sold on the local market (teeth, full jaws). The available data on shark fisheries is questionable because they come from a professional fishery which is not the main fishery in the country when compared to recreational and subsistence activities and also because there is absolutely no recording of landings.

In conclusion, the majority of Heads of Fisheries did not answer our questionnaire. The five answers to the questionnaire all say that no significant effort is expended to catch reef sharks. This information is interesting because, from the point of view of Fisheries Departments, fishing pressure on reef sharks is not high, although no data is available for 80 % of these countries.

Synopsis of Pacific Island shark fisheries and recommendations

Questionable data Most available data from shark catches concern the professional and even industrial pelagic fisheries. FAO assumes that the data presented in their reports are mostly collected from commercial or industrial fisheries while recreational, subsistence and artisanal fisheries are "likely to be substantially under-reported" (Valuccini, 1999). These data do not match up with the subsistence economy of most of the Pacific Island nations (Hayes, 1996).

Besides shark catch data may be rather variable depending on the source of information. For example, annual landing data obtained from the Division of Aquatic Resources of Hawaii range from 31 to 117 t between 1997 and 2001, while for Camhi (1999), 2 800 t of sharks (including sharks taken solely for their fins) were landed during 1998 in Hawaii.

Assessment of the information collected through literature and questionnaires shows that Pacific shark catches seem to be poorly documented. The data indicates that for most Pacific countries (at least 64 % of the studied nations): Federated States of Micronesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, Northern Mariana, Nuie, Palau, Solomon Islands, Tokelau, Tonga, Vanuatu and Wallis and Futuna, fisheries authorities do not have accurate valid data and certainly none that could help in shark management efforts.

Recommendations and conclusions

Without such basic biological information as abundance, age and growth, and population structure, it is difficult for fishery managers to determine the effects of current fishing pressure on these populations or to develop informed management to ensure the long-term sustainability of specific elasmobranch populations (Camhi, 1999). The information is lacking mainly because, until recently, sharks were not economically valuable and were therefore neglected by fishery managers (Camhi, 1999).

However, because of their comparatively low biological productivity and, for many species, because of their high catch susceptibility, most chondrichthyan species require management action long before sufficient data are available to undertake full stock assessment. It is therefore necessary to apply rapid assessment techniques to assess the risk from the effects of fishing (Walker, 2004).

Regulation of shark fisheries does not mean a complete ban on fishing for these species but restrictions that may allow populations to recover. Successful sustainable shark fisheries are possible. This is particularly true for:

- smaller species that mature early and have a relatively large number of young. The fishery for gummy sharks in Australia stands as a good example. Success in this fishery has come through knowledge of the biology of the species and active management measures (mostly through regulation of mesh size in the gillnet fishery) (Walker, 1998; Stevens, 1999)
- species with higher production rates continue while species with lower rebound potential are driven to stock collapse (Musick, 1999; Stevens *et al*., 2000). For example the sand tiger (*Carcharias taurus)* and dusky shark (*Carcharhinus obscurus*) populations, which have very low intrinsic rates of increase, collapsed in the western North Atlantic shark fin fisheries in the late 1980s and show only

modest signs of recovery (after ten years of fishery regulation), while the more productive sandbar shark (*Carcharhinus plumbeus*), although depleted, continues to drive the fisheries (Musick *et al*., 1993; Musick, 1999).

Technical measures such as the following should be considered:

- Regulation of fishing gear
- MPAs, which are highly suitable for the management of chondrichthyan species known to aggregate, where they are vulnerable to capture or disturbance by human activities (Bonfil, 1999)
- Fishing area closure (of an area to all or selected fishing gears for continuous or selected time periods)
- Size limits: Legal minimum sizes can be used to avoid growth overfishing. Legal maximum sizes can be used to avoid recruitment overfishing (Walker, 2004).

As a regional approach should be considered, a synthesis of the existing legal framework in the Pacific countries would be particularly interesting. In spite of recent initiatives, such as French Polynesia which banned in 2006 all shark fisheries (except mako shark), this analysis would probably show that few appropriate regulations are implemented for providing an efficient conservation of reef sharks in the Pacific countries.

By Matthieu Juncker with the collaboration of Maya Robert and Eric Clua. This article was kindly provided by M. Juncker and his colleagues, and we thank them all. The MS was lightly edited and shortened and all refrences were omitted. For the full MS visit the CRISP programme webpage at http://www.crisponline.net/

Meetings & Conferences

2008 Ocean Sciences Meeting

From the Watershed to the Global Ocean
Orlando, Florida, USA, March 2-7, 2008

The following was provided by meeting organizers: It moves from the top of the highest mountain to the depths of the deepest oceans. As limnologists, oceanographers, and educators, water is the lifeblood of our endeavors. Now, as never before, we recognize the interconnections between land and sea and at 2008 bi-annual Ocean Sciences Meeting we are going to recognize the important nature of these connections. Please join us March 2-7, 2008 in Orlando, Florida for this event. We invite you to participate through submissions to oral or poster sessions. Following the trend at our recent meetings, increasing emphasis is being placed on poster sessions with the goal of not limiting the number of concurrent oral sessions and giving greater exposure to presenters at all sessions. We especially encourage the submission of poster presentations as a very effective means of facilitating discussion of research. Poster sessions will be scheduled at times when there are no conflicts from oral sessions or scheduled special workshops, field trips, or town meetings. The poster sessions include receptions to provide opportunities to make professional connections in a social setting.

For more information please contact the conference management office by e-mail at orlando2008@sgmeet.com or by phone at 800-929-ASLO or 254-399-9635.

Watersheds and Coral Reefs: Science, Policy and Implementation - at the 2008 Ocean Sciences Meeting. Orlando, Florida. March 2-7, 2008

The University of Hawaii Kewalo Marine Laboratory and NOAA's Center for Sponsored Coastal Ocean Research are hosting the special topic session "Watersheds and Coral Reefs: science, policy and implementation" (#076)at next year's Ocean Sciences Meeting in Orlando, Florida. We encourage the submission of abstracts focusing on integrated approaches to coral reef ecosystem management that incorporate the biophysical with the social sciences to address coral reef management from a watershed perspective. Abstracts were due on October, 2007.

For more information on this session and questions please contact Dr. Bob Richmond richmond@hawaii.edu or Dr. Felix Martinez Felix.Martinez@noaa.gov.

IOC/WESTPAC 7th International Scientific Symposium. Natural Hazards and Changing

Marine Environment in the Western Pacific. May 21 – 25, 2008

This is a call for papers and registration for the 7th IOC/WESTPAC Symposium. Date: 21-25 May 2008. Venue: Kota Kinabalu, Sabah, Malaysia. Abstract Deadline: 28 Feb 2008. Sponsors: Intergovernmental Oceanographic Commision (UNESCO) (Sub-Commission for the Western Pacific), and the Malaysian Ministry of Science, Technology and Innovation (MOSTI).

Subthemes:

-The linkage between Western Pacific and Climate Change

-Marine Environmental Modeling and Data Management

-Coastal Processes and Managements in the Western Pacific

-Marine Ecosystem Health and Assessments

The Symposium will consist of plenary lectures by renowned scientists, invited papers, and voluntary oral and poster presentations. Proposals are invited for post-symposium programmes in the form of discussion on special topics, workshops and related activities.

For details of the symposium, please go to:

http://www.ums.edu.my/conferences/index.php?mod=Publication&action=homeacces and

http://www.ums.edu.my/conferences/index.php?mod=Publication&action=homeacce

Caribbean Environment Forum – 23-27 June 2008 at the Grenada Trade Center, Grand Anse, Grenada

The meeting is organized by the Caribbean Environmental Health Institute, the Grenada Solid Waste Management Authority, GEF, GEF-IWCAM, U.S. Centers for Disease Control, and Clean Islands International. The organizers expect key Caribbean stakeholders to gather for discussions of issues and experiences related to environment and development, with a focus on sustainable development. For further information please contact:

CEF 4 Secretariat, Caribbean Environmental Health Institute (CEHI), P.O. Box 1111, Castries, Saint Lucia, Tel = (758) 452-2501/1412; Fax = (758) 453-2721; email = cef4@cehi.org.lc URL = www.cehi.org.lc

10th Annual Caribbean Conference on Sustainable Tourism Development – April 28 – May 1, 2008 in Providencialis, Turks & Caicos

The Caribbean Tourism Organization, in collaboration with the Government of the Turks & Caicos Islands and the Turks & Caicos Tourist Board, will host this meeting headquartered at the Beaches Turks & Caicos Resort & Spa (by Sandals) which is a Green Globe Certified hotel.

The Conference will bring together regional and international tourism specialists, Ministers of Government, Directors of Tourism, as well as developmental experts from the cultural, environmental and academic spheres and the local communities to share their experiences and offer solutions to the problems in the development of sustainable tourism.

The Caribbean Conference on Sustainable Tourism Development is part of the information dissemination and regional awareness component of CTO's Strategy for Sustainable Tourism. It looks at how member states can design and implement sustainable tourism policies and programmes, offering a regional forum for information exchange on the successes and pitfalls of national, regional and international initiatives.

The organizers welcome all who share their concern for and interest in preserving the region's most valuable resources. For more information contact:
CTO Barbados
One Financial Place
Collymore Rock
St. Michael
Barbados
Tel: 246-427-5242
Fax: 246-429-3065
Email: ctobar@caribsurf.com

or

CTO USA
80 Broad Street
32nd Floor
New York, NY 10004
Tel: 212-635-9530
Fax: 212-635-9511
Email: ctony@caribtourism.com

34th Scientific Meeting of the AMLC

2009 – The 34th Scientific Meeting of the AMLC will be hosted by Sascha Steiner of the Institute for Tropical Marine Ecology, Inc. on the island of Dominica. The dates have been established as Monday-Friday May 25-29, 2009. The 2009 Executive Board Meeting is scheduled for Sunday, May 24th at 9:00 AM.

Course Offerings

The Smithsonian Tropical Research Institute (STRI) offers a short course in Tropical Field Phycology
July 2008

Dates: 9-23, 2008
Location: Bocas Research Station, Bocas del Toro, Panamá.
Registration Fee: $500 (fellowships are available).
Instructors: Dr. Brian Wysor, Roger Williams College; Dr. Wilson Freshwater, University of North Carolina, Wilmington; Dr. Suzanne Fredericq, University of Louisiana in Lafayette.
Organizer: Rachel Collin, STRI
Application: This course is directed toward graduate students and advance Licenciado candidates and will be conducted in English. Please email your CV, 1 letter of recommendation, and a 1-2 page statement explaining your background and reasons for taking the course, to Rebecca Rissanen at RissanenJ@si.edu before March 1, 2008. Limit 12 students. For more information see http://striweb.si.edu/taxonomy/

Tropical Marine Ecology and Conservation Semester Abroad
Bonaire - Spring 2008

Undergraduate study abroad opportunity in the Caribbean. The Tropical Marine Biology and Conservation study abroad program is accepting applications for spring 2008 semester. Student participants will register for 17 semester hours: Coral Reef Ecology, Scientific Diving, Environmental and Cultural History of Bonaire, Marine Conservation Biology, and Independent Study. The program description can be found using the following link:
http://ciee.org/program_search/program_detail.aspx?page=2&sec=1&program_id=1739&t

The scientific diving course provides dive training that prepares students for AAUS certification at their home universities. Students will receive the following training in the scientific dive course: Open Water, Advance Diver, Rescue Diver, Emergency First Responder, CPR + First Aid, Dan Oxygen Rescue, Underwater Photography and Videography, night diving and underwater navigation.
Students will be trained in the following Reef Monitoring Protocols: Reef Check and AGRRA.
Independent research provides students with the opportunity to conduct a research project of their choice in marine science and to publish the results in a student journal, PHYSIS: Journal of Marine Science. A copy of Volume 1 of the journal can be downloaded on the following page:
http://ciee.org/program_search/program_detail.aspx?page=2&sec=0&program_id=1739&type=part

Prerequisites: Overall GPA 2.75 or better, 2 semesters of biology, chemistry, geology, ecology or environmental science and a nationally recognized open water SCUBA certification (or a PADI referral – you can do your check out dive in Bonaire).
The deadline for application to the spring semester program is December 1, 2007. Interested students should contact the Rita Peachy Director of CIEE Research Station Bonaire at RPeachy@ciee.org or call 1-800-40-STUDY. The study abroad office at your institution will assist you with registration.

Fellowships for Interdisciplinary MPhil Research at UWI on Caribbean Marine Resource Governance

The University of the West Indies (UWI) Centre for Resource Management and Environmental Studies (CERMES) at the Cave Hill Campus in Barbados is offering two MPhil degree fellowships for full time interdisciplinary research on marine resource governance in the Eastern Caribbean available for 2007/08 and 2008/09 academic years. Each fellowship provides BBD$ 35,000 (US$ 17,500) per year for two years. The fellowships are associated with the CERMES research project on "Marine Resource Governance in the Eastern Caribbean" (MarGov project). Before contacting us, persons interested in this opportunity should first visit www.cavehill.uwi.edu/cermes/margov_profile.html for information on the project. The focus is on examining coastal and marine resource governance at national and local levels in OECS countries and Barbados primarily using concepts from complex adaptive systems and network analysis.

Persons should also determine if they satisfy the UWI requirements for admission to an MPhil degree. Refer to the UWI school or Graduate Studies and Research "Manual of procedures for graduate diplomas & degrees" available at www.uwi.edu/documents/pdfs/Manual_Of_Procedures_2005.pdf or consult the School directly. The minimum admission requirement for an MPhil programme is an Upper Second Class Honours first degree or its equivalent.

CERMES will consider persons with natural science, social science or interdisciplinary first degrees. Preference will be for degrees that included marine resource studies and for candidates familiar with Caribbean countries. Candidates in an MPhil programme are required to register for some graduate courses, but this degree is awarded primarily on the basis of a research thesis. Strong research and fieldwork skills are essentials. The UWI Graduate Studies process for application to do an MPhil will apply.

Persons who are both interested and eligible may contact the project with an expression of interest, a recent CV and a copy of their academic transcript. Email the project at margov.project@cavehill.uwi.edu

Opportunities for Shark Research

Bimini, Bahamas – 2008

Volunteer positions at the Bimini Biological Field Station (Sharklab) will be available through the year starting in November 2007 through December 2008. If you have a biological background or interest in shark biology and wish to join the research team either as a volunteer or project leader (PhD candidate or Post Doc) –for a minimum of one month- please contact Dr. Gruber at sgruber@rsmas.miami.edu with a copy to Kat Gledhill (Station Manager) at bbfssharklab@gmail.com. Please also visit our website at www.miami.edu/sharklab for details about the station, our research and courses.

Change of Address

MOVING? To ensure that you continue to receive *Caribbean Marine Science*, notification of upcoming AMLC meetings and other AMLC information, please fill out the following change of address form and mail it to the address below, or send the information by e-mail to David Wilson at the e-mail address below.

Dr. David Wilson
Australia Fisheries Management Authority
506/16 Moore Street
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Australia
davetroywilson@gmail.com

Name & Title _____

Institution/Association _____

Address _____

_____

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Telephone _____
FAX _____
E-mail_____
Scientific Interests _____

Dues

Individual membership dues for 2007-2008 are $25.00 due in June 2007. You can make your payment with Dr. David Wilson, AMLC's Membership Director, who can be contacted by e-mail at: davetroywilson@gmail.com. If you attended the St. Thomas meeting, your membership fee for the two years of 2007-09 was included in the registration fee. If you did not attend the meeting, please remit your dues as discussed here. You may also help AMLC with a donation membership contribution if you wish; the schedule for these is presented below. Student dues are still $5 per year.

The AMLC can accept credit cards payments (Visa, MasterCard or American Express) for AMLC dues. A 5% service charge will be added to credit card payments. Checks must be in U.S. dollars, from U.S. banks (or a U.S. dollars bank draft), made out to "AMLC", and sent to Laurie Richardson.

Name & Title

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AMLC Background & Goals

The Association of Marine Laboratories of the Caribbean (AMLC) was founded in 1956 by marine researchers with interests in the marine science of the tropical Atlantic and Caribbean. Founded primarily as a scientific organization, the strength of the AMLC lies in the diversity of its member laboratories and the extensive expertise of its membership. Institutional, individual scientist and student memberships are available.

Annual AMLC meetings are hosted by member laboratories actively conducting marine research in the Caribbean. The host laboratory arranges facilities for research presentations, and logistical arrangements. The AMLC has no designated official language so researchers are free to make their presentations in their native language.

Caribbean Marine Science, published in English and Spanish, is the biannual newsletter of the AMLC and informs members of AMLC activities, pertinent events, and relevant research.

The purpose of the AMLC is to advance common interest in the marine sciences by:

a. Assisting and initiating cooperative research and education programs
b. Providing for a for exchange of scientific and technical information
c. Fostering personal and official relations among members
d. Publishing the proceedings of scientific meetings and a newsletter

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All members of the AMLC (individual and laboratory) are encouraged to send relevant news items at any time, to the newsletter. Relevant news items include, but are not limited to: new facilities, faculty/staff changes, positions available, research programs and initiatives, publications of general interest, awards, visiting scientist opportunities, and education programs. Submitted items should be sent to the AMLC newsletter office by the end of February for inclusion in the Spring issue, and by the end of September for the Fall issue.

Please send your information and comments to:

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