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IN THIS ISSUE

- 6th INTL SIRENIAN SYMPOSIUM – DEADLINES OCTOBER 31 (pg. 5)
- STATUS OF AFRICAN MANATEE IN CAMEROON (pg. 14)

UPDATES FROM SIRENIA SPECIALIST GROUP REGIONS

Pacific Ocean Regional Subgroup (Australia and Pacific Islands)

In response to invitations to join the Pacific Ocean Regional Group of the IUCN SSC Sirenia Specialist Group sent out in early 2013, there are now 16 members. The draft objectives of the Pacific Ocean Regional group to be considered by the members are:

- To update the status of dugongs in the Pacific Ocean Region (Australia, New Caledonia, Palau, Papua New Guinea, Solomon Islands and Vanuatu)
- To communicate, collaborate and coordinate amongst dugong researchers and stakeholders in the region
- To provide advice on dugong research and conservation
- To provide annual reports to SSG co-chairs and articles to Sirenews.

The draft objectives of the Pacific Ocean mirror those of the Indian Ocean Regional Group in order to provide synergies between the two regions. An opportunity for further discussions to explore synergies could be at the International Sirenian Symposium to be held on 7 December 2013 in Dunedin, New Zealand. The option to develop work plans for each SSG region, which include the following items, could be explored:

- Research on dugongs and their habitats;
- Identification of information gaps;

UNION INTERNATIONALE POUR LA CONSERVATION DE LA NATURE ET DE SES RESSOURCES

INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES



Commission de la sauvegarde des especes - Species Survival Commission

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- Identification and reduction of threats to dugongs and their habitats;
- Legal protection of dugongs and their habitats;
- National, regional and international co-operation;
- Capacity building at all levels.

Pacific Region Membership List

Name	Country
Amanda Hodgson	Australia
Donna Kwan	UAE
Ivan Lawler	Australia
Helene Marsh	Australia
Bob Prince	Australia
Alana Grech	Australia
Elizabeth Burgess	Australia
Susan Soltzick	Australia
Rie Hagihara	Australia
Len McKenzie	Australia
Christophe Cleguer	Australia
Rob Coles	Australia
Clair Garrigue	New Caledonia
Francis Hickey	Vanuatu
Wendy Blanshard	Australia
Jillian Grayson	UAE

-Amanda Hodgson (A.Hodgson@murdoch.edu.au) and **Donna Kwan** (dkwan@cms.int), Regional Co-chairs, Pacific Ocean Region

Indian Ocean Regional Subgroup (East Africa, Arabian Region and Asia)

Under the guidance of IUCN-SSC Sirenia Specialist Group co-chairs, Drs. Helene Marsh and Benjamin Morales, the regional co-chairs initiated the membership drive by inviting 34 sirenian researchers from the East Africa, Arabian Region and Asia. This included the list of researchers from the region who responded to the April 2012 Sirenews article on this subject. As of today, the regional group consists of 21 members from 15 range states. The main objective of this membership drive is to get representation from all range states of sirenian/dugong occurrence. Regional chairs will continue to work towards recruiting more members especially from countries that are underrepresented.

As per the mandate, the objectives of the Indian Ocean Regional Group are being developed. The draft objectives being discussed within the group are:

- To update status of dugongs in the Indian Ocean Region (East Africa, Asia and Arabian Region)
- To communicate, collaborate and cooperate amongst the dugong researchers and stakeholders of the region
- To advise on issues of dugong research and conservation
- To provide annual reports to SSG co-chairs and articles to Sirenews

-Himansu Sekhar Das (hsdas@aed.ed) and **Tint Tun** (tinttun@gmail.com), SSG Regional Co-Chairs, Indian Ocean Region

African Manatee Regional Subgroup

Dr. Edem Eniang and Lucy Keith Diagne have been appointed as Vice-Chairs of the SSG African Regional Group. Our objectives are:

1. To further determine the status of the African Manatee;
2. To be an expert resource panel for the IUCN and other stakeholders;
3. To lead and advise others in the growing field of manatee research and management in Africa;
4. To promote and facilitate communication and collaboration among African manatee researchers.

For communication we are currently using the Yahoo discussion group “Trichechussenegalensis”, which was created in 2009 for African manatee researchers to share news and information.

Africa Region Membership List 2013

Name	Qual.	Role	Country	Affiliation	Position	Email
Lucy Keith Diagne	PhD candidate	Regional Co-chair	USA and Senegal	Sea to Shore Alliance	Research Scientist	lkeithdiagne@sea2shore.org
Edem Eniang	PhD	Regional Co-chair	Nigeria	University of Uyo	Professor	eniangedem@yahoo.co.uk
Patrick Ofori-Dansen	PhD	Member	Ghana	University of Ghana	Professor	ofdan@ug.edu.gh
Aristide Kamla	Masters	Member	Cameroon	African Marine Mammal Conservation Association	Researcher	kamlaaristide@yahoo.fr
Dawda Saine	BSc	Member	The Gambia	National Association of Artisanal Fisheries Operators	Director	dawda_saine@yahoo.com
Miguel Xavier	Masters student	Member	Angola	Ministry of the Environment	Technician	miguel_xavier2003@yahoo.com.br
James Powell	PhD	Member	USA	Sea to Shore Alliance	Director	jpowell@sea2shore.org
Tim Dodman	Masters	Member	United Kingdom	Wetlands International	Associate Expert	tim@timdodman.co.uk

NEWS FROM THE SECRETARIAT TO THE UNEP/CMS DUGONG MOU

The Dugong, Seagrass and Coastal Communities Initiative (DSCC Initiative)

The Dugong MoU Secretariat has developed the DSCC Initiative to advance projects for global conservation and management of dugong populations and their seagrass habitats, including the following:

The Global Environment Facility (GEF) Dugong and Seagrass Conservation Project

The GEF Project entitled “Enhancing the conservation effectiveness of seagrass ecosystems supporting globally significant populations of Dugong across the Indian and Pacific Oceans Basins” (Short Title: “The Dugong and Seagrass Conservation Project”) is nearing the end of development and now includes 32 Project Partners implementing 40 projects across



eight Project Countries: Indonesia, Madagascar, Malaysia, Mozambique, Solomon Islands, Sri Lanka, Timor-Leste, and Vanuatu.

Approximately US \$6 million of project funding is being provided by these Project Countries from their GEF-5 Biodiversity STAR funds. Additionally, over US \$98 million in co-finance is being contributed to global dugong and seagrass conservation by Supporting Partners, including Australia, Kenya, Myanmar, Papua New Guinea, Philippines, Seychelles, Tanzania and the United Arab Emirates.

This Project is expected to have global conservation benefits through its unprecedented investment in dugong and seagrass conservation, knowledge sharing via a Clearing House Mechanism, and its pioneering use of various novel approaches to dugong and seagrass conservation. Successful approaches will be extended to other dugong range states through several pilot projects planned under the Dugong, Seagrass and Coastal Communities Initiative. The GEF Project is expected to start in 2014.

Phylogeography and Genetic Diversity of Dugongs across Range States (Short title: “Dugong Genetics Project”)

The Dugong Genetics Project is in the final stages of completing the sequencing of dugong DNA samples and carrying out final data analysis. The project utilized a regional network of individuals/agencies that collected dugong samples for subsequent genetic studies and increased understanding of the value of genetic data for dugong conservation management among relevant range-state agencies.

Fundraising for the DSCC Initiative Projects: Pilot Projects

Following site visits and discussions with potential project partners, the Dugong MoU Secretariat is developing plans for pilot projects in India and Thailand under the DSCC Initiative.

The largest remaining dugong populations in India are found in the waters of Tamil Nadu. The Dugong MoU Secretariat is assisting in developing a pilot project in the Gulf of Mannar and Palk Bay regions of Tamil Nadu, which will include incentives to reduce pressures from fisheries and support sustainable fisheries management.

Trang province is home to the largest dugong population in Thailand and the animals hold a high iconic status in the region, but bycatch in gill nets and destruction of seagrass habitats are leading to concerns of an unsustainable mortality rate. A pilot project is being developed to trial incentive tools to counter the use of destructive fishing practices, provide support and advice on how to enhance monitoring, raise awareness of threats to dugongs and promote local eco-tourism.

The Dugong MoU Secretariat is also working to help develop pilot projects in several additional dugong range states, including Myanmar, Papua New Guinea and the Philippines.

Gulf Dugong Action Programme

The Gulf Dugong Action Programme is comprised of two components:

- 1) “Gulf Collaboration for Dugongs and Seagrasses” which aims to obtain information to update the conservation status of dugongs and their habitat in the Gulf and includes an Aerial Surveys Project, Dugong Stranding Project and Seagrass Assessment Project.
- 2) “Addressing Bycatch of Marine Mammals, Sharks and Turtles in the Gulf”, which aims to measure the number of deaths of endangered marine mammals, sharks and turtles due to capture by non-targeted fishing (i.e. bycatch), review existing initiatives and propose solutions to reduce this phenomenon. The Dugong MoU Secretariat is currently seeking funding for these projects.

For additional news on activities of the Dugong MOU Secretariat, follow our noticeboard at http://www.cms.int/species/dugong/dugong_noticeboard.htm.

SIXTH INTERNATIONAL SIRENIAN SYMPOSIUM 2013

The Sixth International Sirenian Symposium will be held on Saturday, December 7, 2013 in conjunction with the 20th Biennial Conference on the Biology of Marine Mammals in Dunedin, New Zealand. This symposium will be kindly sponsored by the Secretariat of the Dugong MOU, Convention on Migratory Species Office - Abu Dhabi.

The aim of this full-day symposium, in collaboration with the IUCN Sirenia Specialist Group, is to foster communication between researchers, managers, and policy makers. Scientists and managers representing countries from all over the globe will present new information on Sirenian conservation and management, stranding response and medical assessment, monitoring applications, and general biology and research. A special session will be devoted to Dugong conservation efforts in the Indo-Pacific. The symposium will include presentations, a poster session, and a Q & A session. Sirenian items will be available for purchase to raise funds for future student travel scholarships.

The cost of this workshop is \$10 USD. Space is limited, so please register by **October 31, 2013** at: http://www.marinemammalscience.org/index.php?option=com_content&view=article&id=591&Itemid=336&workshop=39.

If you would like to submit a presentation or poster please send an electronic copy of your abstract (300 word limit) to Nicole Adimey (nicoleadimey@gmail.com) by **October 31, 2013**.

UNIVERSITY OF FLORIDA OFFERS DISTANCE LEARNING COURSES ON MANATEES AND OTHER AQUATIC ANIMAL TOPICS

The University of Florida, College of Veterinary Medicine's Aquatic Animal Health Program offers exciting online courses in aquatics including one titled *Manatee Health and Conservation*. The course provides a detailed overview of manatee natural history, health assessment techniques, and research findings as well as exploring conservation issues. Emphasis is on the Florida manatee (*Trichechus manatus latirostris*) but other Sirenia species are also included. Lecturers include leading researchers in manatee biology as well as those on the forefront of conservation work. These experts include, but are not limited to, Drs. Bob Bonde and Roger Reep (authors of *The Florida Manatee: Biology and Conservation*), Dr. John Reynolds (former Chairman of the U.S. Marine Mammal Commission), Mr. Pat Rose (Executive Director of Save the Manatee Club), and Dr. Martine de Wit (veterinarian who oversees the Florida Fish and Wildlife Conservation Commission's Marine Mammal Pathobiology Laboratory).

The courses are available in slightly different formats to accommodate undergraduate, graduate, and veterinary students as well as continuing education (CE) for veterinarians, aquarists, biologists, or post-baccalaureates interested in graduate school. Participating undergraduate and graduate students have a variety of majors including Animal Science, Fisheries & Aquatic Sciences, Marine Biology, Wildlife Ecology & Conservation, and Zoology. Many of the undergraduate students are on a pre-veterinary medicine track. Other courses offered include:

- Aquatic Wildlife Health Issues (Summer semester, annually): a 3 credit course which introduces students and professionals to the natural history, anatomy, physiology, behavior and common health issues of aquatic species: whales and dolphins, seals and sea lions, manatees, sea turtles and crocodilians.

- Aquatic Animal Conservation Issues (Fall semester, annually): a 3 credit course that will expose students and professionals to some of the controversial issues surrounding aquatic animal species ranging from invertebrates to marine mammals, with emphasis on marine mammals, but also including sea turtles, fisheries, and marine ecosystems.

All of these courses are asynchronous in nature and can work with most schedules as there are no set lecture times. Students that have taken this course in the past have logged on to learn from all over the world. There have been students successfully taking our courses on five different continents from Asia (Dubai), Europe (Ireland and Luxembourg), North America (U.S., Canada, Puerto Rico) South America (Brazil) and Australia. Review of the lectures as well as completing the assigned readings, quizzes, homework, and other assignments can all be done asynchronously; however, there are also opportunities for live web discussions with the experts from the course.

To learn more about the courses please visit: <http://aquatic.vetmed.ufl.edu> or contact the Aquatic Animal Health Program Assistant at hendelj@ufl.edu. –**Jeffrey Hendel**



OCEAN GENOME LEGACY SEEKS SAMPLES FOR MARINE MAMMAL GENOME ARCHIVE

A variety of marine mammal tissue collections exist worldwide, however, significant obstacles limit widespread scientific use of the materials including strict national and international regulations on the collection, use, transfer, and holding of marine mammal parts and DNA; inconsistencies in the quality, condition, and storage of specimens; and limitations of each program's mission-specific funding. The non-profit institution Ocean Genome Legacy (OGL) is asking for your help in solving these problems.

To improve research access to materials from marine mammals suitable for molecular biology and genomic research, OGL created the Marine Mammal Genome Archive (MMGA). MMGA samples are obtained from existing collections, strandings, ongoing research projects, and byproducts of routine veterinary care. OGL utilizes the latest methods of gene and genome amplification to legally facilitate broad access to MMGA materials by providing researchers with accurate synthetic replicas of individual genes or complete genomes that contain no detectable material from the original specimen. They are suitable for most types of molecular research, but are not subject to existing national and international regulations and so may be distributed and used for research without need for special permits. With respect to research use, these replicas are the legal equivalent of photos, sound recordings or digitized data. They are also more stable and resistant to decay, less expensive to store and maintain, and extend the usable quantity of materials by orders of magnitude.

How can you become a part of this important effort? OGL relies on external scientists, aquarium staff, academic and government researchers, stranding responders, and aquatic veterinarians to provide the majority of its holdings. We are asking you to join us as collaborators in building this important community resource by contributing samples from your own work with marine organisms. Sirenia species are not yet represented in this public scientific resource - please help remedy this! Contributing samples is easy and OGL provides all collection materials. For mammals, simply place small (quarter-sized) pieces of muscle, skin, brain, heart, or kidney tissue or a small volume of blood in the provided pre-labeled tubes or Whirl-Pak bags and add the provided nonflammable, nontoxic fixative. Preserved samples may be stored and shipped at room temperature.

How will my samples be used? All genomic materials and data in the MMGA are available for use by the broader scientific community under appropriate permits and in compliance with all existing laws, rules and regulations under material transfer agreements that authorize only non-commercial research. Current holdings are accessible online (www.oglf.org/catalog). OGL has loaned ~2,000 DNA samples to date. As a member of the International Society of Biological and Environmental Repositories and the Global Genomic Biodiversity Network, OGL works to ensure that current best practices are maintained in collection, archival storage, and dissemination of biomaterials and associated data.

Because we are a publicly funded nonprofit organization, OGL does not authorize, license, or obtain revenue from commercial use of materials in its collections. There is no charge for use of archived materials, although in most cases fees are required to recover part of the costs of processing, storing, and distributing samples. OGL's mission is to facilitate research that can help improve scientific understanding and that can contribute to the successful protection and management of marine species and environments. By providing open-access to materials and data, ensuring proper handling and long-term storage of materials for genetic and genomic analyses, and creating off-site redundancy to improve the physical security of invaluable collections, OGL hopes to help preserve irreplaceable biodiversity that is rapidly disappearing from the wild oceans.

We hope you will support the development of this scientific resource by depositing samples into this special collection! Request a sampling kit by email (info@oglf.org) or online form (<http://www.oglf.org/Deposit.htm>). For questions or more information on this project, please contact OGL's Biorepository Manager at deboer@oglf.org. –**Timery Deboer**



Ocean Genome Legacy facilities

A PROPOSAL ON A WORLD MANATEE DAY/MONTH: MANATEE EDUCATIONAL CAMPAIGNS AROUND THE WORLD

Although educational campaigns for manatee conservation are widely performed in most of the countries where manatees occur, devoting a particular day of the year to manatees on a global scale could bring massive and important attention to the species. The purpose of a World Manatee Day is to raise awareness about, and increase knowledge of manatees. Global campaigns serve to encourage people to actively participate in many different ways in manatee conservation. Those activities involve local people, fishermen communities and children living close to manatee habitats, but can also be extended to people in a completely different context of life.

In Mexico, manatee day has been officially celebrated on September 7th by the consultative and technical subcommittee for the recuperation, conservation and management of the manatee *Trichechus manatus manatus* in Mexico, since 2001. The idea has its origins in the Catazaja municipality (Chiapas State), where manatees have been traditionally celebrated on that date since 1999. On July 1st 2013, an invitation was extended to manatee specialists, educators and institutions around the world via social networks and emails, to determine their interest in joining the manatee celebrations on that day. We were excited to see that various people answered with enthusiasm. Puerto Rico was already on the way to having an official manatee day, also on September 7th. However, due to the difficulty of having a unique manatee day that would fit every country that desires to celebrate, we suggested September as manatee month for the future. As a result of this invitation, the National Manatee Working Group of Belize decided to reschedule educational activities and declared September as manatee month. Fundación Macuáticos Colombia joined the party in the social networks and Natutama (Colombian Amazon) devoted some days to celebrating Amazonian manatees.

This year the manatee day or week was celebrated with many events in at least four countries: Mexico, Puerto Rico, Belize and Colombia. In Mexico, events took place in various states with talks about manatee biology and conservation but also with educational activities for kids. More information can be obtained from Blanca Cortina and Paloma Ladron. In Puerto Rico, several agencies participated and they were expecting 37 schools to have activities on manatee conservation, which would represent about 10,000 children. Also in Puerto Rico, the Senate and the House of Representatives approved the September 7th law and the manatee as national mammal, although the signature from the governor is still missing. More information can be obtained from Antonio Mignucci. In Belize, they celebrated on numerous days with an essay and poster competition for schools and also with six days during the month of a travelling display. In Colombia, the Fundación Macuáticos promoted manatee day in social networks and Natutama organized events in the Amazon and broadcasted a radio program “Ondas del Amazonas” talking about manatees, their threats and what to do if people find a calf.

This year the invitation was sent with very short notice for most of the countries to organize events. Based on the success this year and the interest shown by several countries to participate in the future, we would like to renew the invitation, well in advance, to everybody working on manatees to join us next year in the celebration of manatee month, and in particular manatee day. Hopefully next year more countries would have time to organize their participation and maybe to interact with each other on some of the activities (by internet) or some competition/contest (picture, drawing, essay, poster...) among countries.

We wish to thank our colleagues in other parts of the world for their prompt response, and the information provided by the organizers of activities this year. We encourage individuals and organizations to let us know your suggestions about manatee celebrations in 2014. We also would like to invite the dugong community to join us in the celebrations. -**Coralie Nourisson^{1,2} and Nataly**

Castelblanco-Martínez³ (¹Geomare AC, Av. Miguel Alemán 616-4B, Col. Lázaro Cárdenas, C. P. 82040. Mazatlán, Sinaloa, México; ² CIBIO - Research Center in Biodiversity and Genetic Resources, University of Porto. Rua Padre Armando Quintas, 4485-661 Vairão, Portugal; ³ Oceanic Society, Blackbird Field Station, Turneffe, Belize; coralie.nourisson@gmail.com, castelblanco.nataly@gmail.com)

ANNOUNCING THE FIRST-EVER CITIZEN SCIENCE TOOL FOR SEAHORSE CONSERVATION



In October, Project Seahorse launched iSeahorse (www.iseahorse.org), the first-ever citizen science website and smartphone app for seahorses. Created in collaboration with the Zoological Society of London and John G. Shedd Aquarium, iSeahorse.org allows anyone, anywhere in the world to contribute to seahorse science and conservation with just a few clicks of a mouse or taps on a smartphone.

Seahorses are difficult to study in the wild because of their ability to blend, chameleon-like, into their surroundings, and their near-global geographical range. The IUCN Red List of Threatened Species lists 11 seahorse species as Vulnerable, but 26 other seahorse species are considered Data Deficient. This means that we do not yet know enough about them to assess their conservation status.

iSeahorse tackles this problem head-on. Powered by iNaturalist, one of the world's leading citizen science engines, iSeahorse expands the number of people observing seahorses in the wild from a handful of scientists to hundreds and potentially thousands of citizen scientists. Anyone can join iSeahorse. Whether you're a diver, a fisher, a scientist, a seahorse enthusiast, or just on a beach holiday, you can upload your photos and observations to iSeahorse, help identify seahorse species, and advocate for their protection in your ocean neighbourhood.

Project Seahorse scientists and global in-country experts will use this vital information to better understand seahorse behavior, species ranges, and the threats seahorses face. They will use this knowledge to improve seahorse conservation measures across the globe. What's more, the iSeahorse website and smartphone platform is designed to be readily adapted for other taxa, making it easier for other specialist groups to launch similar citizen science ventures.

For more information, contact Project Seahorse at iseahorse@fisheries.ubc.ca.

Project Seahorse thanks Guylian Belgian Chocolate, Whitley Fund for Nature, and Harmsworth Trust for their generous support of iSeahorse.

LOCAL NEWS

AUSTRALIA

Satellite tracking of Moreton Bay dugong confirms travel to and from Hervey Bay in Queensland Australia. Two large bays support significant populations of dugongs in southeast Queensland. These bays are separated by more than 100 kilometers of open surf coast, known as the Sunshine Coast; a very different habitat from the seagrass areas in the bays. Dugongs are occasionally caught in the shark protection nets on the Sunshine Coast leading to speculation that this region acts as a movement corridor between Moreton and Hervey Bays.

Despite 25 years of satellite tracking, dugong movement corridors have proved very difficult to detect. When a dugong undertakes a large-scale movement, it typically moves relatively fast submerging the tethered transmitter and making signals unavailable to the receiving satellite.

This year, a large female was tracked moving from Moreton Bay to Hervey Bay and back to Moreton Bay using ARGOS/GPS technology. The animal hugged the coast close to the Sunshine Coast shark nets and traversed the strait between the coast and Fraser Island (see map). The dugong took 4 days to make the 214km northern journey, stayed in Hervey Bay for 22 days and took 3 days to return to Moreton Bay via the same route. The ARGOS/GPS transmitter then came off but we have continued to receive acoustic evidence that that dugong was in Moreton Bay as the acoustic transmitter in the tailstock belt was not lost and its signals have been picked up by an acoustic array in the vicinity of the original capture site in eastern Moreton Bay.

A second dugong tagged the same week in Moreton Bay, a smaller male, also journeyed to Hervey Bay where it has remained in the same localized area for 12 weeks. Although the GPS/ARGOS data did not provide clear evidence of the migratory pathway, the results suggest that the animal travelled much further offshore, further evidence of the individualistic nature of dugong movements. -

Daniel R. Zeh and **Helene Marsh** (James Cook University), and **Col Limpus** (EHP Queensland)



Satellite Track of female manatee along Sunshine Coast, Queensland, Australia

Differences and similarities in the spatial ecology of dugongs and green sea turtles along Queensland, Australia: Implications for co-management. Dugongs (*Dugong dugon*) and green sea turtles (*Chelonia mydas*) are often found together in regions where they co-occur and have similar diet preferences within associated seagrass communities. These factors are assumed to cause an overlap in habitat use and provide a basis for co-management. This assumed spatial overlap has led to the use of spatial closures to be routinely suggested as a method to protect critical areas for dugongs and green turtles to promote species recovery.

However, to date the co-management of these sympatric species has been based predominantly on subjective assumptions of inter-species relationships with the notion that existing protection areas for one species will, by default, encompass the other. Yet, very little study has been done to objectively identify the true relationships between dugong and green turtle spatial ecology within regions where they coexist. Furthermore, the majority of existing protection areas in Australia were developed using aerial surveys and sighting record data; a major limitation of these methodologies is that they do not take into account movements of individual animals, which leads to errors of commission and omission in delineating protection zone boundaries.

The aim of our study was to provide an evidence-based method to inform the biological basis for co-management of these two sympatric species. This methodology can then be used to enhance systematic conservation planning by objectively delineating areas for protection of these species and other sympatric or inter-related species. We also determined the inter- and intra-species spatial relationships of dugongs and green turtles within and between distinct geographic locations and evaluated the efficacy of existing protection areas around northeast Australia.

Fast acquisition GPS transmitters were used to track eleven dugongs and ten green turtles at two geographically distinct foraging locations in Queensland, Australia (Shoalwater Bay and Torres Strait) in 2009, 2010, and 2012. Both of these regions contain habitat previously identified as of high conservation value for both species: Torres Strait supports the world's largest dugong population and foraging grounds for the world's largest green turtle population; Shoalwater Bay is home to the largest population of dugongs along the Great Barrier Reef (GBR) and also provides significant foraging habitat for the southern GBR stock of green turtles. Spatial closures also exist in both of these regions for the protection of dugongs and/or green turtles: the Great Barrier Reef Marine Park and Dugong Protection Areas along the GBR and a Dugong Sanctuary in Torres Strait.

To determine species spatial relationships, home-range analysis and bathymetric modeling were used to define home-range size and depth zone preference, which were compared to existing protection areas. Results indicated that overall (95% range) dugong and green turtle foraging ranges significantly overlapped in both locations. However, both species used different core areas (50% range) in relation to one another. Green turtles favored intertidal (Shoalwater Bay) and reef (Torres Strait) areas while dugongs preferred sub-tidal areas away from reefs (both locations). Significant differences also existed between regions in home-range size and depth zone use for dugongs, with individual dugongs using significantly larger ranges and deeper depths in Torres Strait (Torres Strait - overall: 263 – 1269 km² core: 54 – 223 km², 5-15 m depth zones; Shoalwater Bay: 16 – 73 km² core: 3 – 21 km², 0-5 m depth zones). Almost all green turtles used similarly sized overall and core foraging ranges in both locations (overall: 1.4 – 19 km²; core: 0.1 – 3.6 km²) but differed in their depth zone preference with turtles found almost exclusively at depths <5 m in Shoalwater Bay while turtles in Torres Strait were found over depths between 5 and 10 m around 40% of the time. Interestingly, two turtles, one in each geographic location, displayed movement patterns similar to dugongs in each location.

Individual analysis indicated dugongs were very individualistic and unpredictable in both regions, with animals moving in all directions and some animals using much larger ranges. In contrast, turtles showed strong site fidelity in both regions with each individual having its own distinct core areas with very little overlap between individuals. Additionally, both species used existing protection areas in Shoalwater Bay, but only a single tracked dugong used existing protection areas in Torres Strait.

In conclusion, coexisting dugongs and green sea turtles use similar habitats, making co-management possible, but differences exist between geographic locations and core areas which needs to be taken into account when developing protection zones. Additionally, current protection measures appear to be adequate in some areas of Australia while not in others. We have also shown that evidence-

based methods using fast-acquisition satellite telemetry can be used to delineate relationships between these and other inter-related species, increasing the efficacy of systematic conservation planning. Moreover, quantifying the spatial overlap, range size and depth zone distribution of dugongs and green turtles in Australia may be applicable to other regions where these species co-occur. It is suggested that similar studies be conducted throughout these species' range to better inform management and improve the conservation potential of management decisions.

The complete manuscript of this work is currently being prepared for publication. -**Christian Gredzens** (Christian.Gredzens@my.jcu.edu.au, School of Earth and Environmental Sciences, James Cook University, Australia)

BELIZE

Preliminary information from first tagged manatees in Turneffe Atoll (Belize) reveal regular travel patterns to the mainland. Turneffe Atoll (TA) is located in Belize, approximately 35 km from the mainland, and is the only atoll in the world where Antillean manatees (*Trichechus manatus manatus*) have been reported. TA provides several excellent characteristics for manatee habitat, encompassing shallow and sheltered lagoons, abundant seagrass beds and mangrove islands, and relatively few sources of anthropic disturbance. However, although the salinity shows some spatial and seasonal variability, no evident freshwater sources have been identified in TA. Manatees have been studied utilizing captures in Belize for years, but there had been no previous attempts to capture manatees in TA. In May 2013, an expedition with the aim to capture and tag manatees in TA was coordinated by Sea to Shore Alliance, Oceanic Society and U.S. Geological Survey (R. Bonde and C. Beck) and relied on the extraordinary support of many other Belizean organizations and individuals. Captures followed well-established standardized boat-based techniques. Two adult manatees were captured along the west coast of TA. The first manatee was an adult, and possibly pregnant, female captured at Douglas Lagoon. Due to the presence of scars on the tail and back, it was possible to confirm that this individual had been sighted consistently in the same area during boat-based surveys conducted a few months earlier. The second animal was an adult male captured at the mouth of Ambergris Creek. All captured manatees were checked during detailed health assessments, sampled and fitted with satellite PTT tracking devices before release. The male was tracked for 39 days until the tag stopped working, while the female has been tracked for 121 days until this analysis and is currently still tagged. Manatees remained in TA during 55% (female) and 70% (male) of the tracking days, indicating strong site fidelity. The female has always used the Douglas Lagoon area, while the male preferred Vincent (North) Lagoon. Exploratory analysis indicates a consistent pattern of travel between TA and the mainland, presumably to satisfy freshwater needs. Although the visits to the mainland are relatively short (less than one day), they seem to be regular, with a time window between trips ranging from 8 to 15 days (Average: 11.45 days). Both manatees have also regularly stopped in Drowned Cayes while traveling toward the mainland or returning to TA; the use of Drowned Cayes was 36% and 10% of the tracking time respectively (for the female and male). While manatees have used the western area of TA, which offers an excellent habitat for manatees, our preliminary results suggest that travels to the mainland could be necessary in order to satisfy their need for freshwater. The protection of manatee corridors along the coastal area of Belize City may be vital to maintaining an adequate manatee population in TA. – **Nataly Castelblanco-Martínez** (Oceanic Society, castelblanco@oceanic.org), **James Powell** (Sea to Shore Alliance), **Jamal Galves** (Sea to Shore Alliance & Coastal Zone Management Belize), and **Nicole Auil-Gómez** (Southern Environmental Association)



Manatee capture crew in Turneffe Atoll, Belize

BRAZIL

Two Caribbean manatee calves rescued in coastal Amazonia. Between July and September 2013, two orphaned manatees were rescued in brackish waters in regions considered to be potential hybridization areas between Amazonian and Caribbean manatees. The first animal, a 1.32m, 36 kg male named Omar, was rescued by local inhabitants of Passagem Grande village, Salvaterra, in the Marajó Island. Omar is being cared for by the same family of teachers who rescued a female manatee calf in the same area five years ago, with the support of Group of Studies of Amazon Aquatic Mammals (GEMAM, associated with the Goeldi Museum in Belém). Victor Maracá (1 m, 19 kg) was rescued by local firefighters at Maracá-Jipioca Ecological Station, 300 m off the Amapá municipality coast in the Brazilian state of Amapá. These rescues elicited an immediate response by governmental and non-governmental organizations, including members of the northern branch of the Brazilian Aquatic Mammal Stranding Network, law enforcement (IBAMA), management (ICMBio) and research (Amapá Research Institute, Mamirauá Institute, Aquatic Mammals Foundation and Goeldi Museum/GEMAM). Victor is presently in quarantine in the capital Macapá and is scheduled to be transported by air to Marajó Island to be rehabilitated with Omar. He will be released in Amapá after two years of rehabilitation. Similarly, Omar will be returned at his original rescue site in Marajó Island. -**Miriam Marmontel** (Mamiraua

Institute for Sustainable Development, Brazil; marmontel@mamiraua.org.br), **Danielle S. Lima, Renata Emin, Iranildo Coutinho, Sandra Romeiro and Leandro Aranha**

The Brazilian north coast. Compared to other areas where manatees are found, the Brazilian north coast is unique. It contains the only known co-occurrence of two species of manatees: the Amazonian manatee (*Trichechus inunguis*) and the Antillean manatee (*T. manatus*). Domning (1981) was the first to propose the area of the mouth of the Amazon River, in Brazil, as a possible zone of occurrence of the two species of manatees. At that time, at the beginning of the 1980s, he also speculated, due to the lack of concrete evidence of their presence, that the Antillean manatee had been extinct in the Marajó region. More recently, Vianna *et al.* (2006) reported the existence of hybrids near the mouth of the Amazon River, in the state of Amapá. In addition, a skull of *T. manatus* was recovered in Soure, in November 2005, on the east coast of the Marajó, refuting the hypothesis of a possible gap in the distribution of the *T. manatus* in this poorly surveyed stretch of coast (Siciliano *et al.* 2007). Since this remarkable record, ten manatee strandings were recorded in the vicinities of the Marajó bay: six were on the east bank and four strandings on the west bank the bay. Most stranded individuals were calves (70%), with the same proportion of males and females (N = 05). The years 2010 and 2012 had a higher frequency of strandings (N = 03, each). Of all stranded animals, seven were rescued alive and currently only two, both from the municipality of Salvaterra, are in rehabilitation: a female at the Center for Aquatic Mammals (ICMBio / CMA-PA) in Belém, Pará, and a male in a semi-captive environment in the community of Passagem Grande, municipality of Salvaterra, Marajó Island, Pará. This later specimen has nails but also has a white patch in the belly. Long-term surveys, initiated in 2005, are underway along the Pará state coast. These records represent a concrete result of the intense awareness campaign and field survey efforts conducted by the GEMAM's Museu Paraense Emílio Goeldi research team.

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CAMEROON

Status of African Manatee (Trichechus senegalensis Link, 1795) along the Cameroon coastline: an uncertain future. Background: As in many developing African states, very few conservation efforts are focused on marine mammals in Cameroon. Recent surveys have demonstrated that manatees are present in Cameroonian coastal areas; however this vulnerable species is being threatened by hunting, by-catch and habitat degradation (Grigione 1996, CWCS 2001, Ayissi 2007 and Fournier 2010). Notwithstanding, there is no system for monitoring and quantifying these threats and how they affect populations of manatees in Cameroon. Having very limited information about their current distribution and abundance, it becomes difficult to understand population dynamics, local status and trends.

General threats

Although there are existing laws and conservation policy on threatened marine species in Cameroon, they still face many threats. Conservation problems for Cameroon sea turtles, cetaceans and water birds were identified and documented. By-catch in gillnets and other fishing gear are the most severe causes of significant mortality. Other threats of varying magnitude include: habitat encroachment through coastal development (e.g. port and road construction), over-fishing, chemical and acoustic

pollution, ship collisions and ghost nets. The almost complete lack of scientific data on the biology, distribution, stock structure and abundance of sea turtles and cetaceans in Cameroon waters has as detrimental result that the impact of these threats cannot be properly evaluated, let alone addressed. An acceleration of research is inevitable with the involvement of national universities. More faunal surveys are needed to unveil the potential of the reserve and the need to establish and identify important relationships between species abundance, site temporal conditions (sandbank disappearance) and socio-economic activities with the view of identifying sustainable wetland ecosystem utilization options.

Destruction of habitats: Habitat destruction is the main threat to manatees through deforestation by cutting firewood, work around the fisheries along the coast, and the extension of agro-industries. Others include pollution related to the use pesticides and other fertilizers around Lake Ossa in Dizangue Littoral Region. Urbanization by expanding coastal cities and the mining and quarrying of sand are also important factors.

Poaching: Poaching through illegal hunting is still a threat to this species despite legislation and numerous conservation measures in place. Illegal hunting takes place in many locations, for example around Douala-Edea Wildlife Reserve and Cameroon Estuary.

Unwanted catches: Unwanted catches are also a threat to this species as the net frame is the vehicle widely used in various fisheries (Ayissi 2008 et Jeff *et al.* 2010).

Desertification and Climate Change: The drying of various aquatic environments, especially in the inland areas of lakes and along some rivers including the advancement of desert is attributed to climate change. Climate change greatly reduces vulnerable habitats around Lake Tchad and surrounding rivers.

Site-specific threats:

a) Ntem Estuary on the border to Equatorial Guinea

Water pollution: The release of hydrocarbon pollutants from forest companies in this area, Ntem River and its tributaries, are a potential threat, however no information exists on the impact of this threat. In the near future the construction of the deepwater port and dam on the Mvele-Ntem River will produce a negative impact on the habitat of this species.

Unwanted catches: They were noted through fishing nets because fishing is the main socio-economic activity in the area.

b) Cameroon Estuary

Water pollution: Through the discharge of pollutants from the oil companies and factories of the area such as ALUCAM Breweries, the Port of Douala, Douala Airport, cement plants and many solid and liquid wastes from households, resulting in much destruction of habitat. One of the most affected aquatic ecosystems is Lake Ossa with pollution from SAFACAM (agro-industrial farm) causing eutrophication of the ecosystem. This area is subject to a decade of boom in oil exploration with many potential releases without prior indication of threats to this species.

Poaching: Manatee meat is common in many restaurants mainly in the cities of Edea, Douala, and Mouanko. These animals are taken with a harpoon, nets, traps etc. According to Ayissi (2007), 18 individuals were captured in Canton Yassoukou in the Sanaga Maritime within a three week period. Also one of the major centers of capture for this species is in the upper reaches of the River Nkam at Yabassi and in Lake Bodiman.

Unwanted catches: One of the greatest threats to this species in the area is accidental capture in fishing nets in the lagoons and lakes (e.g. Lakes Ossa, Tisongo, and Nsah; Sanaga, Nyong and Dipombe Rivers; and Mouaha and Kombe streams). According to Ayissi (2013) in and around Mouanko 4-6 individuals were taken monthly during the major rainy season (June – October).

Deforestation: Deforestation of mangroves for use as firewood and for fish smoking, and expansion of agribusiness such as SOCAPALM and SAFACAM (Palm and rubber agro-industrial farms). According to CWCS (2001) and Din et al. (2008), 500,000m³/an fuel wood and service are taken to the city of Douala and according to Ajonina (2012) between 1985 and 2010 there was an almost complete disappearance of 20-25% of mangrove forests in the Cameroon Estuary. This was mainly through the rapid urbanization of the city of Douala and siltation and sedimentation (Borough of Dizangue). The impact of this is unknown because no evidence exists for damage assessment.

c) Rio Del Rey Estuary and Nigeria border

Water pollution: Through the discharge of pollutants from the oil companies and factories such as SONARA (oil company), CDC, PAMOL (Palm and rubber agro-industrial farms) and solid and liquid waste from households in this area. This area has been subject to a decade of boom in oil exploration with many potential releases without prior indication of threats to this species.

Poaching: Manatees are hunted in this region and according to Grigione (1996) cross-border traffic exists with neighboring Nigeria in this area, but data is lacking on catch data and traffic.

Unwanted catches: As in all areas that use nets as fishing gear, by-catch are common in the waters of Nina, Granny, and Cross Rivers and numerous creeks. However, information about this threat is non-existent.

Deforestation: Deforestation in this area for firewood, fish smoking, and the expansion of agribusinesses such as CDC and PAMOL, with much infrastructural development since post-war Bakassi; data is non-existent.

Conservation efforts

Research: Many efforts have been made by some organizations such as WCS, CWCS, WWF and CAML. Their efforts have focused on the distribution, status and threats to the species.

Policy, Legal and Institutional framework: The manatee as an endangered species has a strict protection of species in Class A according to the laws on the regime of Wildlife in Cameroon. In addition there is a series of texts and laws relating to the protection of this species such as: Law 94/01 (20 January 1994) laying down forest, fauna and fish diet; Ministerial order-0002/MINEPIA (01 August 2001) to set up protection of fish resources; Ministerial order -0021/MINEPIA (11 April 2002) to set up inspection of industrial fishing vessels, scientific observations and monitoring of the fishing activities.

Moreover, the country is a signatory to many international conventions such as: The Convention on the Conservation of Nature in Africa (or Algiers Convention, 1968; ratified in August 29, 1978); CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora, ratified 5 June 1982; The CPM (World Heritage Convention), ratified December 7, 1982; CMS (Convention on Migratory Species), ratified 01 November 1983; The Abidjan Convention, ratified August 5, 1984; CBD (Convention on Biological Diversity), ratified 19 October 1994; The Ramsar Convention on Wetlands, ratified 26 January 2006; the program for the Man and the Biosphere (MAB); and The Convention on the World Heritage of UNESCO. Many institutions, administrations, national and international NGOs, civil societies, and grassroots organizations are involved in the conservation of this species.

Habitat Restoration: Many efforts are underway to restore manatee ecosystems by planting mangroves as well as conducting experiments at the Wildlife Reserves of Douala-Edea and “Bois de Singes”, the coast around Kribi by institutions such as MINEPDEP, CWCS, University of Douala, the RCM, FAO and other organizations.

Barriers to efforts

Research: Despite research efforts various gaps still exist because the status of certain threats such as deforestation, pollution, and poaching in some sites are not well understood. Even populations and their sizes are poorly understood. Furthermore, there is not enough information on genetic aspects to differentiate subpopulations.

Policy, Legal and Institutional framework: Despite the national dynamics, populations of this species are facing numerous threats, as the country is not a signatory of the CMS MoU for the Conservation of the Manatee and Small Cetaceans. In addition, the country does not have a legally protected marine area.

Habitat Restoration: Apart from some mangrove reforestation actions, these actions are centered in part of the Cameroon Estuary around the city of Douala. In addition to many great works, the distribution area of the species has adequate management plans, however the effective management of solid and liquid waste is lacking.

Recommendations

Research: further research at critical sites to assess populations; study of migration flows; evaluate all impacts especially poaching, pollution, and the destruction of critical habitats; study the composition of populations.

Policy, Legal and Institutional framework: signing the MoU for small cetaceans and Sirenian Western Atlantic; create marine protected sanctuaries in high distribution areas; encourage a national policy for conservation of the species; training young Cameroonians on the biology of the species.

Habitat Restoration: restore all habitats and degraded mangroves along the coast; assess impact studies of different projects on the coast that involve the conservation of manatees in the management plans; manage household waste efficiently on the Cameroon coast; educate and sensitize the masses

Acknowledgements

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-*Isidore Ayissi* (Marine biologist/oceanographer), isidoreayissi@gmail.com

FLORIDA

Florida loses two manatee matriarchs in 2013. The year 2013 has been a record-setting year for manatee mortality in Florida (FWC 2013), but of the many deaths documented, two warrant special mention: Piety, estimated age of 43 years at death, and Narnia, 35 years old at death. Each had extensive sighting histories and were two of the longest-documented wild Florida manatees.

Piety was first documented by pioneer researcher Dr. Daniel (Woody) Hartman as part of the 1972-73 winter aggregation of manatees using Kings Bay, Crystal River, located on Florida's northwest coast. She was recognizable by a series of linear scars on her back, the result of a boat's propeller strike. During the subsequent 40 years since Piety's first documentation, she received additional scars from encounters with boats, and was well known to biologists and the public alike.

Although we do not know her year of birth, Piety was independent during that winter of 1972-73, but was considered young. In February 1978 she was observed with her first known calf, who researchers named Narnia. Like her mother, Narnia also was well known due to her scars, the first

received while she was still nursing from Piety. As time went by, a propeller strike in 1997 resulted in the loss of a large portion of her tail, which made her highly visible to observers.

Until their deaths in 2013, each of these manatees had extensive sighting histories at Crystal River, as well as at other sites along the northwest coast of Florida. The MIPS archives contain a total of 182 sightings of Piety, and 163 of Narnia.

Both Piety and Narnia were just two of the now estimated 600+ manatees that overwinter at Crystal River each year, yet each was a significant contributor to the Crystal River manatee population. During Piety's lifetime she was documented with 13 calves, her last known in 2009. Narnia was documented with 14 calves during her lifetime, her last known in 2010.

Both manatees were recovered dead by Florida Fish and Wildlife Conservation biologists in Kings Bay, Crystal River, Narnia on 26 Feb 2013 and Piety on 12 Mar 2013. The cause of death was undetermined for both. We are saddened by this news, but herald their contribution to helping scientists better understand manatee biology and the threats that challenge their existence.

Currently, over 3,000 Florida manatees are individually identifiable by unique features, predominantly scars and mutilations resulting from accidental encounters with boats. These individuals are photographically documented and their sighting histories are archived in the Manatee Individual Identification System known as MIPS. MIPS data are analyzed to estimate adult survival, reproduction, and movements (Beck et al. 2012). -**Cathy A. Beck** (U.S. Geological Survey, Southeast Ecological Science Center, 7920 NW 71st Street, Gainesville, Florida 32653, USA)

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INDIA

Where have all the dugongs gone? A study on long-term occupancy trends in the Andaman and Nicobar archipelago, India. Long-term (over 50 years) occupancy, persistence and extinction of a data-poor dugong (*Dugong dugon*) population were estimated across multiple seagrass meadows in the Andaman and Nicobar archipelago in India. This study was based on historical sighting, stranding and mortality records from 1959-2004 and extensive surveys carried out by us between the years 2010 and 2012 in all potential dugong habitats covering about 75 % of the coastline.

Dugong populations are currently restricted to a few areas where they seem to have persisted over several years. We found that dugong occupancy had declined by 60% over the last 20 years and the present-day occurrences were mainly in sheltered bays and channels with persistent seagrass meadows dominated by *Halophila* and *Halodule* sp. Within these locations, dugongs consistently avoided patchy meadows with low seagrass cover. Availability of suitable seagrass habitat is not a limiting factor for dugong presence, but entanglement in gillnets and direct hunting appears to have likely resulted in local extinction of dugongs from several locations.

Presently, though they are not a targeted species, many dugongs get accidentally entangled in nets or hit by propellers of fast moving boats causing serious injuries to the animal. We conclude that the effective management of these remnant endangered dugong populations will require a multi-pronged approach involving the following: 1) Complete protection of areas where dugongs continue to persist, 2) Monitoring of seagrass habitats that dugongs could potentially re-colonize in the near future, 3) Reducing gillnet use in seagrass meadows used by dugongs, and 4) Working with indigenous communities to reduce impacts of traditional hunting.

This study is part of a recovery program undertaken by the Ministry of Environment and Forests in collaboration with the Nature Conservation Foundation. The results were based on our research during Phase I of the project during which we aimed to gather some of the basic information on population and habitat distribution, dugong habitat use and threat assessment that would feed into a larger recovery plan. In the second phase, we plan to develop and implement a comprehensive community based monitoring program and build up this information combining further population, behavioral, and seagrass ecosystem system studies with management, policy and education programs. -Elrika D'souza (Research Fellow, Nature Conservation Foundation, Mysore; Elrika@ncf-india.org) and Vardhan Patankar (Research Fellow, Nature Conservation Foundation & Research Affiliate, Andaman and Nicobar Islands Environmental Team (ANET))

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OKINAWA

The Uncovered “Inconvenient Truth”. Inappropriate facility for the dugong: The Okinawan dugongs are in peril. According to a multi-year survey undertaken by Okinawa Defense Bureau, there are three remaining dugongs inhabiting Okinawan waters; two (mother and calf) are often seen along northwestern shores and another is regularly seen around Kayo, roughly five km to the east of Henoko near the site of the planned Futemma U.S. Base. In the past dugongs were occasionally observed off the coast of Henoko, however no sightings have been reported since 2009.

Irresponsible EIA: The Okinawa Defense Bureau submitted the Environmental Impact Assessment (EIA) report to the Okinawa Prefecture in December 2011. The conclusion of the assessment was that “implementation of the project would have little impact on each dugong’s inhabitation range, behavioral ecology and feeding environment, as well as on status of the Okinawan dugong population”. However, 517 inadequacies and mistrusts of the assessment were pointed out by the Okinawa governor in March 2012. The governor submitted his opinion to the Okinawa Defense Bureau saying that “it is impossible to protect the environment if the base was to be constructed”. The Okinawa Defense Bureau submitted the revised EIA report in December 2012, and then applied for permission to reclaim the planned base area despite many problems still left in the revised statement. The Okinawa governor must decide whether to permit it or not in the near future.

Inconvenient truth for EIA and the base: On 22 September 2013, newspapers reported that during the period from April to June 2012, for the first time in three years, a total of 12 feeding trails of dugongs were found in coastal water off Henoko, where the reclamation is planned. The Tokyo Shimbun, in its 22 September issue, also reported that a dugong was sighted in May 2012 swimming in

Oura Bay, adjacent to Henoko waters in an area also planned for partial reclamation. These facts in the survey report first came to light due to a right-to-know request by the Kyodo News Service. The Okinawa Defense Bureau stated that the survey report was not intended for publication.

Despite the dugong feeding trails found in Henoko in 2012, the revised EIS submitted in December 2012 did not include such descriptions and the impact assessment was conducted without taking into consideration the current use of the base-planned site by the dugongs. The Okinawa Defense Bureau says the “EIA takes into account the past feeding trails found around Henoko, so the conclusion of the assessment does not need to be changed. There are no plans to rethink the base relocation.”

The revised EIA must be amended: The dugong which left his/her feeding trails in Henoko is considered to be the juvenile who became independent of his/her mother a few years ago and has been migrating extensively in search of feeding grounds. Henoko has the largest seagrass bed in Okinawa, and the dugongs are likely to use the area in the future. Therefore, the revised EIA should be reviewed and amended according to the fact that the dugongs use the seagrass beds in Henoko. This information would make it impossible to conclude that the project would “have little impact”. However, the Okinawa Defense Bureau maintains a stubborn attitude and the Japanese government is eager to move forward with the project. If the Okinawa Defense Bureau initiates the project, we are afraid that the Okinawan dugong population may be driven into extinction. –**Taiko Kudo** (rigel@mbf.nifty.com)

SRI LANKA

Dugongs and Humans: The Sri Lankan situation. Our research carried out in the North coastal regions of the country (mainly focusing on the Gulf of Mannar and Palk Bay areas) assessed the interactions between fishermen and dugongs as well as the occurrence of hunting and accidental deaths of dugongs. More than 85% of the interviewed fishermen confirmed that they have seen dugongs during their fishing careers. Many of these fishermen knew of specialized dugong hunters in their communities who in the past and to date purposely target dugongs. Almost all fishermen agreed upon the fact that the number of dugong bycatch has lessened over the years. However, the disconcerting fact was that they believe that it is due to a drastic reduction in the dugong populations courtesy of dynamite fishing and overhunting of the animal in the past and even now.

When asked what they would do with an animal that is accidentally caught in their fishing gear, many fisherman claimed that they would consume part of the meat and sell the rest. The number of fishermen insisting on releasing the animal was significantly less. This clearly shows that to these people, a stranded or accidentally caught dugong automatically becomes an important source of income as well as meat. The fact that a dugong contains a large amount of meat directly translates into a large sum of money with a minimal amount of effort. From the point of view of a dugong conservationist these are vital points that need direct and scrupulous attention. However, hope lies in the fact that 100% of the fishermen acknowledge the importance of dugongs as a component of nature. We believe that this can and has to be capitalized upon when devising a conservation plan for the dugongs.

As we see it, another reason for the decline of dugong numbers could very well be the destruction of seagrass beds along the north and northeastern coasts of Sri Lanka. Sea grass is the main source of food for the dugong as research has clearly shown. Therefore the proper assessment and management of seagrass beds are of paramount importance for the conservation of dugongs.

Dugong conservation in Sri Lanka should be a multi-pronged endeavour with a high emphasis placed on the fishing communities in and around the northern coast. –**Ranil P. Nanayakkara** (ranil_n@hotmail.com or ranil@bearsrilanka.org)

Review of the Policy and Legislative Framework for the Conservation of West Indian Manatees (Trichechus manatus manatus) in the Republic of Trinidad and Tobago. The following is a current review of the main policy and legislative framework for the conservation of the West Indian manatee (*Trichechus manatus manatus*) species and habitat in the Republic of Trinidad and Tobago. The specific policy and legislative framework for the West Indian manatee conservation and management in Trinidad and Tobago is specific to highly complex and includes numerous policies, laws, and plans at the national level, as well as regional and international agreements and formal commitments. The existing policy and legislative framework is species specific and non-specific that can be applied to define the species as an animal, fish, living natural resource and an endangered species.

The primary lead national environmental policy which addresses the species is the National Environmental Policy 2006, which establishes a policy context for the protection and conservation of the species by the state. This policy is not an isolated statement, but builds on the existing policy framework, and supplements and enhances other public policies and plans, including National Wetland Policy 2001, Draft National Wildlife Policy 2013, Draft National Protected Areas Policy 2011, National Forest Policy 2011, National Biodiversity Strategy and Action Plan 2001, UNEP: Regional Management Plan for the West Indian Manatee (*Trichechus manatus*) 2010 and the Draft Trinidad and Tobago Manatee Recovery Plan 2000. It is envisaged that this Policy will be enabled and implemented through existing and proposed legislation, strategic plans of key government agencies and other private and public institutions, and management plans for the species and its habitats.

Section 3.1 and 3.2 of the National Environmental Policy 2006 commits the Government to establish and maintain Environmentally Sensitive Areas (ESA) where by Government will establish a system of protected areas through the designation of ESAs for parts of the environment that are significant examples of the country's heritage and of great importance to the sustenance of life, science, the country or the international community. Under section 3.2, Environmentally Sensitive Species (ESS), the Government will establish a system for the protection of animals and plants in Trinidad and Tobago which scientific evidence suggests are rare, endemic, endangered, vulnerable or keystone species, through their designation as Environmentally Sensitive Species. Also, the implementation of international commitments relating to the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD), Ramsar, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the Protocol Concerning Specially Protected Areas and Wildlife (SPAW).

The main legislative framework that addresses the conservation of West Indian manatees is the designation as an ESS under section 41 of the Environmental Management Act 2000; under rules 3, 4 and 5 of the ESS Rules 2001; and Environmentally Sensitive Species (Manatee) Legal Notice No 123 2005. The 2005 notice has four sections; Part I designates the animal as an ESS, Part II gives the reason to meet the objectives for the designation as a ESS, Part III gives the limitations on use of and activities with regard to the ESS with which compliance is required and Part IV outlines, subject to clause 5, the wise use of the ESS and the mitigating measures to be undertaken are specified. The other main direct supporting legal protection is the definition as an animal under the Conservation of Wildlife Act Chapter 67:01 (1958) of the Laws of Trinidad and Tobago, which in section 2 defines a "protected animal" as one that is not specifically mentioned in the 2nd or 3rd schedule to the Act. The West Indian manatee under this section can be listed as a non-game species.

Under the Fisheries Act Ch 67:51 (1980) the West Indian manatee can be interpreted as a "fish" where a "fish" includes "oysters, crabs, shrimps, turtle, turtle eggs, corals, and any species of other

marine fauna. The full protection status of the species is limited by this definition as it may be challenged that the species may be “fished”. The Bulletin of the Trinidad and Tobago Field Naturalist Club (Allahar 1993) identified the manatee as an aquatic animal and “nothing in our fisheries legislation repeals the common law rights of the people to hunt it in the sea and in the tidal waters”.

Only one of the species’ critical habitat areas are protected under Environmentally Sensitive Areas (Nariva Swamp Managed Resource Protected Area) Notice No. 334 2006 and the Bush Wildlife Sanctuary and Nariva Swamp Prohibited Area under the Conservation of Wildlife Act Chapter 67:01 (1980), Forests Act Chapter 66:01, and Legal Notice No.78 of 1993.

Other supporting legal habitat protection provisions are available under the Environmental Management Act (2000 and 2006), Conservation of Wildlife Act Chapter 67:01 Act 16 (1958), Forests Act Chapter 66:01 Act 42 (1915; Amended by 4, 1922; 29, 1925; 5, 1933; 37, 1933; 148, 1955; 23, 1999), Marine Areas (Preservation and Enhancement) Act Chapter 37:02 (1970), Fisheries Act Ch 67:51 (1980), Archipelagic Waters and Exclusive Economic Zone Act Chapter 51:06, Town and Country Planning Act Chapter 35:01 Act 29 (1960; Amended by 13, 1974; 49, 1977; 31, 1980; 21, 1985; 21, 1990), Municipal Corporations Act No. 21 (1990; Amended 2007), Municipal Corporations Act No. 21 (1990), Tobago House of Assembly Act of 1996 and the National Heritage Trust Act, (Chap. 40:53).

The lead management implementation of primary policies and laws for the West Indian manatee is effected mainly through the Conservation of Wildlife Act (CoWA), Chapter 67:01, and enforced in the island of Trinidad by the Forestry Division Wildlife Section and in the island of Tobago by the Department of Natural Resources and the Environment (DNRE) of the Tobago House of Assembly (THA). The management of wildlife is also regulated through the environmentally sensitive species and areas (ESS and ESA) rules of the Environmental Management Act Chap. 35:05, which is primarily implemented by the Environmental Management Authority (EMA) and the DNRE in Tobago.

There is a need for review of any conflicting species legal status, especially the Fisheries Act Ch 67:51 (1980), and a greater need for the political will to allocate resources due to poor record of policy and legal implementation for an integrated institutional policy and legislative coordination. There is critical in situ need for sustainable species and habitat conservation and protection, enforcement, monitoring and research. – **Jalaludin Ahmad Khan** (Independent Marine Mammal Researcher/Director INDIVERSITY GROUP; Email: jkhanth@gamil.com; Phone: (868)7431604; P.O. Box 1400, Port of Spain, Trinidad and Tobago, West Indies)

Stranding Reports of West Indian Manatees (*Trichechus manatus manatus*) in the Republic of Trinidad and Tobago. Over the last 23 years six manatees have been estimated stranded in Trinidad and Tobago based on documented and unconfirmed reports. The most recent reported incident occurred in July 2013 of one juvenile manatee which died. Most documented reports are from the Nariva River drainage and Ortoire River on the east coast of Trinidad. This summary is not a fully comprehensive list from all habitat areas.

Standings reports 1990-2013

2013 July (1) - One male baby manatee was reported rescued from the mouth of Ortoire River, Manzanilla, Trinidad on 11 July 2013. The manatee was 40 inches in length and weighed approximately 14 kg. The rescue was a joint effort by the Zoological Society of Trinidad and Tobago Inc, the Manatee Conservation Trust, and Forestry Division. The manatee died after 16 days of care at the Zoological Society of Trinidad and Tobago Inc Zoo in Port of Spain. Newspapers reported that necropsy findings conducted by Dr. Ray Ball, senior veterinarian and director of medical science, Lowry Park Zoo, Florida, USA, showed that he had no body fat reserves, was suffering from pneumonia, gastroenteritis,

ulcers and intestinal damage, and that the right flipper x-rays showed it had been dislocated which made it difficult for the manatee to swim. The dislocation appeared to be a natural deformity.

2011 October to December (2) - Two adult manatee carcasses were reported, one at the mouth of the Mitan River (Nariva) and the other on the shore of Cocos Bay. The Manatee Conservation Trust gathered reports from concerned villagers that one of the manatees, while in the sea north of the Ortoire River, was being harassed by fishermen who kept passing a boat over the area where the manatee was observed. Signs of abrasions on the back of one of the manatee carcasses, most likely from a collision with a boat, lend credence to this report and the Trust condemns this act of cruelty.

2000 September (1) – One manatee calf which was illegally taken from the mangroves near the Mitan River (Nariva River) by an individual who had intentions of selling it to the Zoological Society of Trinidad and Tobago Inc Zoo. The Zoological Society of Trinidad and Tobago Inc and the Manatee Conservation Trust reported that they investigated and found the calf swimming in a shallow ravine behind a house in Las Lomas (Central Trinidad). The animal was reported to have been rescued, rehabilitated, and returned to the wild at the Nariva Swamp by the Manatee Conservation Trust.

1994 (1) – A dead adult manatee was reported sighted in the Mitan River.

1993 (1) – The birth of a manatee calf was reported in Nariva swamp. The animal was not reported as stranded.

1990 (1) - One adult manatee sighted at the L'Embaranche River was accidentally caught in a fishing net and butchered. -**Jalaludin Ahmad Khan** (Independent Marine Mammal Researcher/Director INDIVERSITY GROUP; Email: jkhannt@gamil.com ; Phone: (868)7431604; P.O. Box 1400, Port of Spain, Trinidad and Tobago, West Indies)

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