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IN THIS ISSUE

- WEST AFRICAN MANATEE TRAINING WORKSHOPS (pg. 3, 6, 13)
- ORPHANED MANATEE CALF IN GABON (pg. 10)

CONSERVATION ACTION FOR DUGONGS: PACIFIC YEAR OF THE DUGONG AND UNEP/CMS PILOT PROJECTS

The Pacific Year of the Dugong (PYOD) is a campaign led by the South Pacific Regional Environment Programme (SPREP) and supported by UNEP/CMS, aimed at boosting the conservation of dugongs and its seagrass habitats. The campaign invites individuals, conservation bodies, communities and governments to support this unique drive for dugong conservation. The PYOD regional launch took place on 14 March 2011 in Koror, Palau, in the country which hosts the smallest, most remote and critically endangered dugong population in the region. In addition, national launches are organized in New Caledonia, Palau, Papua New Guinea, Solomon Islands and Vanuatu. SPREP has also established a campaign website (<http://www.sprep.org/biodiversity/PYOD/index.asp>) which has further information on the 2011 campaign, its objectives and events, as well as photographs and electronic material. In 2012, the Secretariat to the Dugong MOU will support a concluding event in Palau to mark the end of the campaign. The Dugong MOU Secretariat and SPREP are also planning a meeting in association with that event, to revise the 2008-2012 SPREP Action Plan for Dugongs.

In Daru, Papua New Guinea (PNG), the Pacific Year of the Dugong was launched with great celebration on 24 March 2011. Daru was selected as the national campaign launch location because of the high cultural significance of dugongs to the coastal villages in the Western Province of PNG. Moreover, the waters of PNG and Australia in Torres Strait share the largest remaining dugong population in the world. Traditional inhabitants from both the Daru region and the Torres Strait Islands have strong traditions based on the use of dugongs, a right protected under the Torres Strait Treaty

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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between PNG and Australia. The PYOD campaign launch marked a long-awaited revitalization of dugong protection efforts which has lapsed since the 1980s.

The major highlight of the campaign was the start of a new pilot project using financial incentives to address direct hunting of dugongs by changing people's practices and improving the livelihoods of local communities in Daru. At a meeting for the pilot project held prior to the launch event, the various stakeholders gave unanimous and overwhelming support for the initiative. Given the demonstrated high level of commitment from all levels of government, community based organizations and local leaders, the pilot project promises to make a highly successful contribution to progressing dugong conservation and management as well as livelihood improvement to communities in the Daru region.

The Secretariat to the UNEP/CMS Dugong MOU has selected two pilot projects to be developed and implemented in PNG and Mozambique. Five other projects (in India, Philippines, Solomon Islands, Tanzania and Thailand) were assessed as having the potential to meet the criteria and become viable financial incentives pilot projects – subject to available capacity, resources and funding. These potential projects have been invited to work closely with the Secretariat to further develop their proposals. In April 2011 the Dugong MOU Secretariat will meet with Mozambique's Ministry for the Coordination of Environmental Affairs and other pilot project partners, and make a site visit to Bazaruto Archipelago in order to further develop and progress the pilot project.

At the First Official Signatory State Meeting (SS1) in Abu Dhabi in October 2010, the Signatory States of the Dugong MOU agreed to fund a small number of pilot projects to trial financial incentive tools as a means to generate dugong conservation actions. While financial incentive tools have been used in marine turtle and a number of terrestrial conservation programmes, they have not been widely considered for dugong conservation efforts. Based on the selection criteria endorsed by Signatory States at the SS1, the Secretariat to the Dugong MOU is prepared to support a small number of innovative and novel pilot projects to be conducted at nominated dugong "hotspots". The overall objective of the pilot projects is to trial economic or social incentives to improve dugong survivability and habitat protection while improving economic and social well-being of communities by testing financial incentive tools to reduce direct dugong mortality (particularly from by-catch at relevant sites) and documenting lessons learned so they may be applied at other locations, where appropriate.

See activities of the Secretariat to the UNEP/CMS Dugong MoU on
http://www.cms.int/species/dugong/dugong_noticeboard.htm

See the Pacific Year of the Dugong campaign website on
<http://www.sprep.org/biodiversity/PYOD/index.asp>



Year of the Dugong launch in Palau with the president and local officials.



Schoolchildren in Daru, Papua New Guinea celebrating the launch.

WEST AFRICAN MANATEE CONSERVATION PROGRAMME: ON THE ROAD TO BUILDING A MANATEE SURVEYORS NETWORK!

Since August 2008, Wetlands International Africa (WIA) has been implementing the second phase of the West African Manatee Conservation program under the Regional Coastal and Marine Conservation Program for West Africa (PRCM). This is the continuation of initiatives implemented for nearly five years for a better understanding of the species' values, status and interests.

One of the main topics has been the methodology for monitoring manatees at defined sites. After selection of these sites, based in part on the level of threats, two people from each country (except one from Mauritania) were invited to attend training from 21-25 May 2010 in Senegal (*Editor's note: recommendations from the training workshop are presented in the next article*). Trainees selected are all focal points for the manatee monitoring network in their respective countries. After selecting the sites

and the team, a modular course was built with Professor Patrick Ofori Danson from Legon university of Accra, Ghana. Prof. Ofori Danson is implementing, in collaboration with Earthwatch Institute, a program for manatee monitoring in Volta Lake. The modular course contains different subjects such as:

- Unit 1: Introduction to the Sirenia Order, with emphasis on the evolution and status of the West African Manatee
- Unit 2: Biology and Ecology of the manatee
- Unit 3: Introduction to Morphometric and Cranial Measurements of the Manatee
- Unit 4: Identification of manatee food sources, feeding sites and habitats
- Unit 5: Methods to estimate numbers of manatee: sightings, scanning and telemetry
- Unit 6: Manatee habitat measurements and water quality analysis
- Unit 7: Transect surveys and scanning for manatees in the field
- Unit 8: An overview of manatee field research equipment and design of data sheets, data collection and monitoring
- Unit 9: The manatee Action Plan and establishment of database of manatee records
- Unit 10: Evaluation of the training in the Delta of Saloum, Senegal, near the Niimi National Park in the Gambia; Completion of Expected Learning Forms

Units 3 and 10 gave an introduction to morphometric measurements and the evaluation system. The meeting focused mainly on units 4-8 and one part of unit 9.

The objective for this training was to create a working group on manatee data collection within the PRCM sub-region in order to learn more on the migrations of this species. Before the end of the training, a common data sheet was adopted with the required small equipment. The project is focused on six countries: Mauritania, Senegal, Gambia, Guinea Bissau, Guinea and Sierra Leone.

The training also encouraged cooperation between different regions of the world, through the participation of experts from Mexico and Colombia. Dr. Benjamin Morales from the IUCN Sirenia Specialist Group and Ms. Nataly Castelblanco, a PhD candidate, made useful comments that allowed trainees to ameliorate the approaches.

Two days were used for presentations and the other two days were dedicated to the field exercise. The trainers found the difficulties of surveying manatees in the field, including the basic aptitudes to detect manatee occurrence. Familiarizing with the data sheets was the other objective of the field work. At the end of the exercise, many problems to resolve were identified, such as:

- making less noise (with the engine)
- working with a quiet team
- reporting events correctly and rapidly
- respect the timing during the scanning
- record all the events so that after every mission, you can assess external events that can influence manatee behavior

Wetlands international is running this project through trainees who are working on the ground in order to build a regional database for manatees and their habitats. The people trained in manatee survey methodology will then, with a manatee monitoring guide, train other people in their respective countries to build strong networks. Currently this network is working well in Guinea with three sites (*Kakounsou*, *Kaback Island* and *Benty*), Sierra Leone (*Fogbo*), Senegal (*Senegal River*, *Saloum River*) and Gambia (*Niimi*, *Tanbi* and *Gambia River*). For Guinea Bissau, the work will start in September.

To make this database sustainable and reliable, Wetlands International involved researchers from the regional veterinary school (EISMV) and Research Center for Oceanography of Dakar Thiaroye

(CRODT). Below is a list of participants in this important meeting. Currently, the database is provisionally coordinated by the project team in Wetlands International. The ideal situation is to have a research center take on the database management, collaborating efficiently with a network of research centers all along the African coast.

As a reminder, Wetlands International Africa conducted a previous workshop during 2005 and 2006 for manatee distribution in Africa. The main achievement of that workshop was the production of a regional strategy for manatee conservation, which can be accessed via the link below:

<http://www.wetlands.org/WatchRead/Allourpublications/tabid/1911/mod/1570/articleType/ArticleView/articleId/2261/Default.aspx>

Participants in the 2010 Wetlands International manatee training workshop:

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Field activities and participants at the 21-24 March 2010 training workshop.

-Dr. Mamadou NIANE (Project Manager, mamadou@nianefamily.com) and **Momar SOW** (Project Associate, momarsow2000@yahoo.fr); Wetlands International Africa (WIA), Rue 111, Villa No 39, Zone B Dakar, Senegal, P.O. Box : 25 581 Dakar-Fann, Tél +221 33 869 16 81, Fax +221 33 825 92 12, www.wetlands.org



OVERVIEW AND GENERAL RECOMMENDATIONS FROM THE WETLANDS INTERNATIONAL WEST AFRICAN MANATEE TRAINING: MAY 2010

As described above, from May 21-25 2010 Wetlands International Regional Office in Senegal (WIRO) realized a training session on the methodologies for monitoring the West African Manatee in the Saloum Delta, Senegal. The aim of the workshop was to improve the tools and methodologies for monitoring West African manatees and manatee habitat, through an integrated approach with local experts and wildlife managers from Gambia, Guinea, Guinea-Bissau, Mauritania, Senegal and Sierra Leone.

We were invited by Ibrahima Thiem (Regional Director of Wetlands International in Africa) and Dr. Mamadou Niane as international expert observers. The extraordinary organization of Dr. Mamadou Niane and Momar Sow ensured a successful workshop. This meeting was a great opportunity to share our experiences in manatee conservation in Latin America with our African colleagues. For us it was also meaningful to learn about West African experiences in manatee conservation. Both West African and Latin American countries share similar manatee conservation issues: limited economic resources for research, significant use of aquatic wildlife resources by local indigenous communities, manatee hunting activities in isolated areas, habitat loss and fragmentation, conflicts with coastal fisheries, and particular environmental conditions which make the study of manatees more difficult.

As a way to contribute to this great effort coordinated by WIRO, the following recommendations were given to Dr. Mamadou Niane and Mr. Momar Sow with the aim of strengthening the initiatives in West African countries. We hope that these recommendations help to facilitate effective management and research actions to conserve the West African manatee and human cultures in those countries.

GENERAL RECOMMENDATIONS

- ❖ Reduction of human-induced mortality to manatees should be the highest priority for the Wetlands International manatee conservation group. Decreasing mortality will likely involve: a) reduction of habitat loss, with the damming of rivers and coastal development; b) finding alternative livelihoods for people in order to reduce their dependence on manatee meat; c) local people seem to respect and admire manatee hunters; it would be better if they are admired and respected for taking good care of manatees; d) education involving local teachers and local communities.
- ❖ Be careful about popular beliefs about West African manatees (for example, assumptions about seasonality in reproduction or carnivorous feeding habits). Because of the scarcity of information about the species, we recommend caution before drawing generalizations and to consult basic research that has been done in other parts of the world.
- ❖ To develop a new research topic about interactions between manatees and humans, and to evaluate the real effect of manatee presence on human activities (e.g. rice farming, fisheries, etc). If necessary, search for solutions to mitigate these conflicts.
- ❖ To continue obtaining biological and cultural information from hunting cases, and if possible, to take morphometric measurements and to collect biological samples.
- ❖ In order to maintain this network we recommend that meeting sessions (once a year) and virtual sessions (every two months) should be planned by WIRO. The annual sessions should be preceded by work documents (reports) developed by each country.
- ❖ WIRO should build and manage a very well-structured database and GIS to give support to this manatee network. For this, it will be necessary to buy adequate hardware and software and to contract an expert in databases and GIS.
- ❖ Our colleagues and Sirenia experts, Lucy Keith (member of IUCN Sirenia Specialist Group) and Tomas Diagne, are working to establish an IUCN Sirenian subgroup for West African manatees. This action seeks to improve several regional and local initiatives. We recommend working closely with them and other local experts. West African manatees are also a priority species for IUCN and we strongly encourage regional actions.
- ❖ ECOSUR (Mexico) and Sherbrook University (Canada) started a Masters program in 2010 where graduate students are involved in environmental management problems. They must spend four to six months working on real problems outside of Mexico and Canada. In July-August of 2011 ECOSUR has plans to visit WIRO to facilitate opportunities for graduate students to get involved in helping to develop solutions to West African manatee conservation problems, starting in 2012.

- ❖ Gambia, Guinea, Guinea-Bissau, Mauritius, Senegal and Sierra Leone integrated an approach for the conservation of the West African manatee coordinated by WIRO and under the Regional Conservation program for the Coastal and Marine Area of West Africa (PRCM) initiative. Long-term adequate funding should be carefully planned to implement these regional West African manatee conservation and management actions.

For more information about the West African manatee Wetlands International program please contact: Dr. Mamadou Niane (mniane@wetlands.sn) and Momar Sow (msow@wetlands.sn).

Acknowledgements

We sincerely appreciate the invitation of WIRO that gave us the opportunity to participate in this workshop. The strong commitments of all participants guarantee the future of the West African manatee and we encourage the IUCN Sirenia Specialist Group to help with this initiative. -**Dr. Benjamín Morales Vela** (El Colegio de la Frontera Sur (ECOSUR), Av. Centenario Km 5.5, Chetumal. México; Co-Chair of the Sirenia SG/IUCN; bmorales@ecosur.mx; bmoralesv@hotmail.com) and **Dr. Nataly Castelblanco Martínez** (El Colegio de la Frontera Sur (ECOSUR), Av. Centenario Km 5.5, Chetumal. México; Member of Sirenia SG/IUCN; castelblanco.nataly@gmail.com)

LOCAL NEWS

CARIBBEAN

Viability of the Caribbean manatee population. The Caribbean manatee *Trichechus manatus manatus* is an endangered species affected by natural and anthropogenic mortalities, such as poaching/hunting, fishing interaction and boat impact. We built a Population Viability Analysis (PVA) for this metapopulation with the goal to define the extinction tendency under various scenarios of catastrophic impacts, hunting and carrying capacity. Specifics goals were: (1) to review and update data on distribution, historic and current status and risks for the species, (2) to simulate its extinction on various hypothetic scenarios and (3) to determine which factors have more impact on the extinction process. The Regional Management Plan for the West Indian Manatee (*Trichechus manatus*) of the UNEP (Quintana-Rizzo and Reynolds 2007) was used as the main source of information, since it is the most actualized document on the population situation. Subpopulations were defined using genetic structure, geographic barriers and ethologic characteristics of the species. A series of multiple individual Monte Carlo simulations of deterministic and stochastic factors were run on VORTEX9.99 Software. The metapopulation is found in the tropical region with a discontinued distribution, where the Panama subpopulation could represent a fragile link between subpopulations. Predictions of future population sizes and quasi-extinction events using PVA can only be accurate if managers are confident that their data were adequately captured. However, in our case the information was dispersed and scarce. One of the main weaknesses of the model was the lack of accurate, standardized and updated data on population size, so the interpretation of the results has to be taken with caution. However, this PVA helped us to better understand which of a suite of management strategies is likely to maximize the probability of a population to persist. For instance, the PVA showed that the metapopulation would be unable to recover from the mortality caused by hunting and capture in fishing nets. On the other hand, in order to conserve the Caribbean manatee it is meaningful to identify and to conserve/restore manatee corridors, promoting

long-distance manatee movements by mitigating obstacles, and thus facilitating the genetic exchange between contiguous subpopulations. Although our model has strong limitations, as real subpopulation sizes could be underestimated, it made it evident that for most of the countries the situation is critical, the manatee research is still scarce, and action plans at the regional level are needed urgently. These plans need to include eradication of anthropogenic mortality, to diminish habitat fragmentation and to increase the carrying capacity. In order to evaluate the dynamic of this metapopulation, it is important to develop standardized counting methods in areas of Latin America where it is difficult or impossible to conduct aerial or boat surveys of manatees, such as Central and South American rivers. The complete manuscript of this work is being prepared for publication. -**Nataly Castelblanco-Martínez and Coralie Nourisson** (El Colegio de la Frontera Sur. Av. Centenario Km. 5.5.CP 79000. Chetumal, Quintana Roo, México; castelblanco.nataly@gmail.com)

Reference:

Quintana-Rizzo, E. and J.E. Reynolds, I., 2007. Regional Management Plan for the West Indian Manatee (*Trichechus manatus*), United Nations Environment Programme. United Nations Environment Programme. CEP Technical Report, Kingston, Jamaica.

CUBA

Training for Cuban specialists on the monitoring of wild manatees (*Trichechus manatus*) in natural protected areas. One of the limitations to the study of manatees in Cuba is the lack of training of the people responsible for monitoring the species. Two events of high significance have taken place in Cuba in order to strengthen local capacity in collecting information on manatees in Cuban waters.

The first event was "The Workshop on Techniques to Study Manatees in the Wild", held from 21-24 June 2010 at the Marine Research Center, University of Havana (CIM-UH). It was organized by the National Center for Protected Areas (CNAP) and the National Enterprise for the Protection of Flora and Fauna (ENPFF). The objectives were: 1) to standardize methodologies for collecting information about abundance, distribution and habitat of manatees in Cuba; 2) to discuss the status of the species in Cuba; and 3) to train participants in techniques of sampling wild populations of manatees. Local specialists from ten provinces and more than 20 Cuban institutions participated. Invited experts from Colombia (Dr. Nataly Castelblanco), Guatemala (Dr. Esther Quintana) and USA (Dr. James Powell, Dr. Robert Bonde, Dr. Andrew Garrett, Dr. Alex Costidis) shared with the participants their experiences and information about manatee conservation status. The first part of the workshop was the explanation by the specialists of the methodologies used in other regions for monitoring wild populations of manatees. They addressed techniques such as aerial surveys, observations from boat and land, telemetry, side-scan sonar, and use of various genetic techniques, among others. The second part of the workshop was the explanation of the anatomy and physiology of marine mammals. This section included a detailed necropsy of a donated manatee calf carcass. The necropsy was conducted by biologist Alexander Costidis (University of Florida). In the third section of the workshop, the local researchers described the situation of the species in the six areas proposed for monitoring manatee populations in Cuba. These areas are North Guanahacabibes and La Coloma in Pinar del Rio, Ensenada de Siguanea on the Isla de la Juventud, Ciénaga de Zapata, Delta del Cauto and South Granma. Finally, the participants discussed the monitoring protocol to be implemented in protected areas, thus promoting the exchange of points of view and experiences. Twenty-one Cuban specialists, technicians and workers were trained on issues related to health and anatomy of manatees (and other marine mammals), sampling techniques and rescue

and sampling of carcasses. One of the main results of the workshop was the creation of an inter-institutional work agenda in order to continue the monitoring of the species in the country.

The second event was "The Practical Training on Collecting Data on Manatees in Field, Ensenada Siguanea, Isla de la Juventud", conducted from 7-13 February 2011 as a continuation of the first workshop. It consisted of an expedition for practical training on manatee monitoring implementation. This practical workshop was coordinated by CIM-UH, CNAP and ENPFF. Local specialists of the protected areas of Pinar del Rio, La Habana, Granma, Santiago de Cuba and Isla de la Juventud participated in the experience. They became familiar with conducting monitoring surveys and recording manatees, use of field instruments and filling out data sheets. These training activities are also important because they encourage studies aimed at the conservation of the species in different areas of the country.

These two workshops provided a framework of experience exchanges in the surveys of manatee populations. Also, the integration and coordination of actions among institutions and centers from different sectors in the country denote an increased interest in the species. The implementation of a standardized monitoring program in the country will offer essential information to support manatee management plans and will strengthen the conservation process throughout the island.



Participants in the Cuba training workshop.

Acknowledgements

The workshops were possible thanks to the help and support of the Cuban government and non-governmental institutions concerned about manatees. These activities were funded by GEF-UNDP, Sea to Shore Alliance, Wildlife Trust/EcoHealth Alliance, and MacArthur Foundation. We also appreciate the attendance of the international experts who accepted our invitation to the workshops. We are grateful to the Marine Mammal Pathobiology Lab (MMPL) of the Florida Fish and Wildlife Conservation Commission (FWCC) for the donation of the manatee carcass.

-**Anmari Alvarez** (anmari@cim.uh.cu.Center for Marine Research, University of Havana, Cuba. Calle 16 #114 entre 1ra y 3ra, Miramar, Playa, Cuba), **Yanet Forneiro, James Powell, and Nataly Castelblanco.**

GABON

Orphaned manatee calf in Gabon. On September 24, 2010 a live West African manatee calf, approximately one month old, washed up on the beach in Mayumba, a very remote section of southern Gabon in central West Africa. It is unknown where the manatee originated from, but evidence suggests

it was traveling with its mother in the ocean and became separated. Staff from the Wildlife Conservation Society (WCS) at Mayumba National Park rescued the male calf, who was 117cm long and weighed 27kg at rescue. This is the first documented record of a West African manatee in the Atlantic Ocean in Gabon.

After stabilizing him in a bathtub overnight, the calf was transferred to a corral, which the staff quickly built at the edge of a nearby lagoon. WCS contacted Lucy Keith since she has been studying manatees in Gabon since 2005, and she connected WCS to Dr. Tony Mignucci (Puerto Rico Manatee Conservation Center) and Dr. Gregory Bossart (Georgia Aquarium), who both have experience in caring for orphaned manatee calves in developing countries. They are providing excellent advice via the internet and have, along with several other organizations, sent funds and supplies to help the staff there keep the animal alive. None of the people on site had worked with manatees previously, and all are to be commended for huge efforts over the past six months, including feeding the manatee every three hours around the clock, finding and housing volunteers, and locating and transporting supplies to the remote location. Ken Cameron, a WCS veterinarian who has previous Florida manatee expertise, traveled up from the Congo and spent the first month in Mayumba helping to stabilize the calf and to address health issues. Recently Dr. Mignucci sent Inter American University of Puerto Rico graduate student Jonathan Perez-Rivera to Gabon for 4 months to care for the manatee calf and to train local care-givers, and he is doing an excellent job.

The manatee calf has been named “Victor”, and he is considered to have a reasonable chance of survival. This is an exceptional opportunity not only to help this individual, but for scientists to learn about this elusive species, to promote educational awareness for manatees in Gabon and throughout Africa, and for international collaboration between manatee researchers from around the world. Victor is only the second known orphan calf in Africa to be cared for in captivity, and there will be many challenges to overcome for his eventual successful release back to the wild. Unlike West Indian and Amazonian manatees, our medical knowledge of this endangered species is literally nonexistent, thus Victor is a true ambassador for his species. We hope to be able to tag and track him upon his release (targeted for 2013, but this will be dependent upon his health). In the meantime, funds are desperately needed to support the care of this animal over the next 1.5 years. Donations are gratefully accepted at:

Victor the Manatee, c/o the Marine Program
Wildlife Conservation Society
Attn: Grace Seo
2300 Southern Boulevard
Bronx, NY 10460 USA
Tel: 718-220-8156
Please make checks payable to the Wildlife Conservation Society.

-**Lucy Keith** (keith@ecohealthalliance.org), **Ken Cameron** (kcameron@wcs.org), **Ricardo Zanre** (rzanre@gmail.com), **Tony Mignucci** (mignucci@manatipr.org), **Gregory Bossart** (gbossart@georgiaaquarium.org), **Aimee Sanders** (missaimeebutterfly@yahoo.com) and **Richard Parnell** (parnellmayumba@yahoo.co.uk).



Victor in his lagoon enclosure, shortly after rescue (photo by A. Sanders).



A recent health assessment of “Victor” by Puerto Rican manatee student Jonathan Perez-Rivera (photo by A. Sanders).

MADAGASCAR

Can dugong taboos in Northern Madagascar contribute to their effective conservation? Northern Madagascar is believed to host a regionally important, yet relatively unstudied dugong population. Accidental capture in gillnets poses the greatest contemporary threat to the species’ survival in Madagascar now that deliberate hunting is no longer viable because the population has declined so

rapidly in recent decades. Taboos (locally known as *fady*) are a significant part of Malagasy life and are central to status and position in society; they may also affect, and sometimes even directly manage, many constituents of the local natural environment. We interviewed several local dugong experts (e.g. senior or experienced fishers or dugong hunters) in Northern Madagascar. Questions focused on dugong taboos and their impact on hunting, killing and meat preparation.

Dugongs were associated with numerous legends owing to their anthropomorphic nature. Stories were recounted of how, in the past, dugongs actually used to be human, descendents of a brother and sister who entered into an incestuous relationship. It was believed that the illicit couple was eventually forced by the local community to escape into the ocean where they became dugongs. It was noted that dugongs were similar to humans except that they lacked feet and they were also regarded to have comparable intellect. It was taboo to let women or children see dugongs because of the similarities between dugong and human genitalia. If fishers planned to hunt dugongs, the team was chosen from several different families to ensure that no illicit sexual encounters with dugongs occurred during the fishing trip.

Not everyone was permitted to kill a dugong; in most villages a specialist was required. These specialists were rare and often had to travel vast distances from their home village to perform the distinctive ceremony and butchering procedures. During meat preparation the dugong was hidden from people and prepared and butchered in a secret location using special equipment before the meat was brought to the village and shared among the community. The animal was slaughtered on its back; the navel and surrounding parts were removed because they were believed to be fatally toxic. It was taboo to put salt on the navel or head. Many parts were not permitted to be cut with a knife including: breast, genitals and ears. Genitals and breasts could not be sold; to even talk about genitals was taboo. Cutting the ear from a dugong was believed to cause immediate deafness. The person who caught the dugong guarded the head safely to ensure that no one ate the ears and wore a garland (locally known as *voamora*) to avoid bad luck. The entrails of the dugong were returned to the sea to prevent dogs scavenging on them. Nobody was allowed to joke or laugh about the animal either when alive or dead and it was covered with a veil to protect its modesty. Interestingly, there were also taboos that restricted dugong exploitation, as in some places it was considered bad luck to catch more than one animal.

Malagasy people in this region appeared to respect dugongs based on the taboos that society had associated with them. Taboos may have historically played a role in both directly and indirectly managing dugong captures. In the past, marine protected area regulations have been adopted as taboos and have resulted in positive conservation developments. Fully involving community members, especially harnessing the knowledge of elders in education campaigns, could ensure that local traditions continue to play a key role in contemporary endangered species conservation at the local level.

This work was conducted in collaboration with the University of Antsirananana, *Centre Nationale de la Recherche Oceanographique* (CNRO) and Madagascar National Parks. We are grateful to the Conservation Leadership Programme, Convention on Migratory Species and Mohamed bin Zayed Conservation Fund for financial support. -**Eleanor Cunningham** (C3 Madagascar and Indian Ocean Islands Programme), **Patricia Davis** (C3 - Community Centred Conservation), and **Ismael Leandre** (C3 Madagascar and Indian Ocean Islands Programme), info@c-3.org.uk.

MALI

West African Manatee Training Workshop. A West African Manatee Research and Conservation Training Workshop led by Lucy Keith was held in Djenné, Mali from 23-30 November 2010. Eleven participants attended from five countries: Mali, Chad, Ivory Coast, and Niger (see below for participant

list). Manatee researcher Tomas Diagne of Senegal also attended and assisted in all aspects of the workshop. Training included classroom instruction on general manatee biology and evolution, field research techniques, manatee conservation strategies and management, fundraising techniques, use and care of field sampling equipment, demonstration of manatee necropsy procedures, biological sampling protocols, and opportunities for participants to ask questions. Field instruction activities took place on the inland Niger River delta and included practicing boat and village interview survey techniques, practice using field equipment and datasheets, and environmental data collection. Participants also gave presentations to the group on manatee research in their home countries and shared their experiences. Training materials were provided, including standardized datasheets, a French translation of the manatee necropsy guide, an aquatic plant identification guide CD, and instructional power point presentations developed in French and English. Field equipment was also provided for each country so that researchers are able to collect more accurate data once they return to their own study sites. Equipment included GPS units, binoculars, depth sounders, digital thermometers, secchi disks, refractometers, headlamps, drybags, and waterproof logbooks. At the end of the workshop participants completed evaluation forms and all rated the effectiveness of the training as very high. This workshop and future training sessions currently being planned are designed to continue regional training that was begun during previous workshops held in Ghana from 2007-2009, and to continue building a cohesive regional network of African manatee researchers. The Mali workshop and field equipment for participants were made possible by generous funding from the U.S. Marine Mammal Commission, the U.S. Fish and Wildlife Service, Disney Conservation Fund, Columbus Zoo Conservation Fund, and Sea World Busch Gardens Conservation Fund. - **Lucy Keith** (EcoHealth Alliance, 233 Third Street North, Suite 300, St. Petersburg, Florida 33701, keith@ecohealthalliance.org)

Mali Workshop Participants

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Lucy Keith	EcoHealth Alliance, USA
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Abdoulaye Biné Guindo	L' Agence du Bassin du Fleuve Niger (ABFN), Mopti, Mali
Tomas Diagne	Oceanium Dakar, Senegal
Dr. Kouame Djaha	Université Abobo Ajamé, Côte D'Ivoire
Broulaye Diakité	Eaux et Forêts, Chef de Cantonnement Djenné, Mali
Hamma Ba	TSEF/Service local de la Pêche, Djenné, Mali
Operi Berthe	L' Agence du Bassin du Fleuve Niger (ABFN), Kangaba, Mali
Soumaila Berthe	L' Agence du Bassin du Fleuve Niger (ABFN), San, Mali
Diallo Boubacar Boureima	Direction de la Faune, Chasse, et Aires Protégées, Niger
Oumar Diaboite	Eaux et Forêts, Sofara, Mali
Soumana Timbo	Direction Nationale Eaux et Forêts, Bamako, Mali
Abakar Saleh Wachoum	Chef de Secteur des Pêches et de l'Aquaculture du Lac Léré, Chad



West African Manatee Research and Conservation Training Workshop group photo, Djenné, Mali.

ABSTRACTS

Distribution of the Antillean Manatee, *Trichechus manatus*, on the east coast of Ceará state and west coast of Rio Grande do Norte state.

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Studies on the distribution of Antillean manatee, *Trichechus manatus*, in Brazil began in the 1970's, indicating that the species occurred discontinuously from the mouth of the river "Doce" (Northern ES) to São Luis (MA). In the late 1990's, field assessments indicated that the species disappeared from ES, BA and SE states, and reported the species presence from Alagoas to Amapá, identifying three discontinuity areas: (1) Barra de Camaragibe (AL) to Recife (PE); (2) Iguape to Jericoacoara (CE); (3) Parnaíba river delta to Lençóis Maranhenses (PI-MA). In Ceará, recent studies showed that the area of discontinuity in the state is even greater, as the species was only found to occur in Barroquinha municipality (West coast–bordering Piauí state) and three municipalities on the East coast (Fortim, Aracati and Icapuí). This study, aimed at updating the distribution of the Antillean manatee between Beberibe municipality (CE) and Touros (RN), is based on Traditional Ecological Knowledge (TEK) of local fishers. Information was obtained from semi-structured interviews with 10% of the active fishers in the region. The key question used to determine manatee distribution was "When was the last time you saw a manatee in the region?". Data analysis was essentially qualitative, and it was performed through the interpretation of the interviewees' narrative. The responses were divided into four area categories: sightings within less than two years were considered **Current Occurrence**; sightings between two and

five years old were considered **Recent Occurrence**; sightings more than five years old were considered **Historical Occurrence** of the manatee; and **Non Occurrence**. Six hundred and seventy eight interviews were conducted in 77 communities (averaging 8.8 interviews/community). Gaps in manatee occurrence in the study area were detected, but since they were shorter than 25km, we have considered the species distribution as continuous, between Aracati (CE, at 4°31'26,6"S/37°42'04,3"O) and Touros (RN, at 5°15'03,7"S/35°23'35,7"O). The results confirmed previous estimates for the distribution of the manatee along the Rio Grande do Norte coast. In Fortim and Beberibe (CE), the species was not observed by the fishers in recent years. Thus the species occurrence in the East coast of Ceará seems to be decreasing, indicating that efforts to conserve the Antillean manatee in the region must be urgently improved, and more research is needed to better estimate the small remaining population, its trends and coastal habitat use.

Key-words: *Trichechus manatus*, distribution, traditional knowledge.

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Priority areas for Antillean manatee conservation on the east coast of Ceará and west coast of Rio Grande do Norte states, NE Brazil.

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The Antillean Manatee, *Trichechus manatus manatus*, is the most endangered marine mammal in Brazil. Current population estimates ranges from 200 to 500 animals, showing signals of decline (IUCN, 2010). Classified as “CR” in the Brazilian Red List and “EN” in the IUCN Red List, the species is a high priority conservation target in the country. The west coast of Rio Grande do Norte (RN) and the east coast of Ceará state (CE) comprise the main area of newborn manatee stranding, the major threat to the species (Parente et al., 2004). This work gathered basic information about the species in this critical region in order to determine priority areas for manatee conservation. Methods were adapted from The Nature Conservancy (“Priority Setting Step of Conservation by Design”; Chatwin, 2007), which identifies high priority places to ensure biodiversity conservation. The study area comprises the coastline between Beberibe (CE) and Touros (RN) municipalities, with c.500km of extension, divided in 83 coastal communities, with the presence of six estuaries. According to Chatwin (2007), the tools needed to establish priorities, known as “ecoregional assessment”, are focused on answering four key-questions: (1) What should be protected?; (2) From what should it be protected?; (3) How much should be protected?; and (4) Where should it be protected?. Following this methodology, the establishment of manatee conservation priority areas was performed answering each question. Information about the species occurrence and potential areas of use were obtained. They were considered and crossed so it was possible to elect/choose levels of ecological importance for the coastal zone of the study area (extremely high, very high, high and moderate). Each community was analyzed separately, according to the presence of manatee ecological attributes, i.e., manatee occurrence, presence of seagrass meadows, freshwater sources and birth areas. Also, these attributes were classified according to its current

condition, vulnerability and abundance. Data gathered produce a ranking of the communities, with an asymmetric *continuum* between suitable areas and those with absence of any of the ecological attributes. Results demonstrated that 48,2% of the communities have a high level of ecological importance for the species. A map with priority areas for manatee conservation was produced, with 17 blocks of different priority levels distributed in the study area, between extremely high, very high and high priority areas. The coast between eastern of Aracati (CE) and western of Icapuí (CE), Areia Branca coast (RN) and São Miguel do Gostoso and Touros coast (RN) are the highest priorities areas for manatee conservation in the region. They all have manatee ecological attributes, but differ on the intensity of threats, which should address different strategic actions in each local. The next step to build a Conservation Plan for the Antillean Manatee in the area is to identify priority actions, time scale and stakeholders, addressing them for each community studied, according to manatee threats and degree of priority.

Key-words: manatee, priority areas, conservation.

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