Proceedings of the Western Indian Ocean Marine Turtle Conservation Workshop

Mombasa, Kenya
16th to 17th September 2004

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Editors

August 2005
The views expressed in this publication do not necessarily reflect those of KMFRI, KWS, Kenya Fisheries Department, WIOOMSA, WCS, IUCN EARO or WWF.

This publication has been made possible by funding from NEPAD.


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<td>BRDs</td>
<td>Bycatch Reducer Devices</td>
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<td>CBD</td>
<td>Convention on Biological Diversity</td>
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<td>CITES</td>
<td>Convention on International Trade in Endangered Species</td>
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<td>Convention on Migratory Species</td>
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<td>COP</td>
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<td>Coral Reef Conservation Project</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>Integrated Coastal Area Management</td>
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<td>MASMA</td>
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<td>Wider Caribbean Sea Turtle Conservation Network</td>
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<td>WIO</td>
<td>Western Indian Ocean</td>
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Executive Summary

The Western Indian Ocean marine turtle workshop was jointly supported by WIOMSA, IUCN, WWF, CMS, and WCS and jointly hosted and organized by KWS and KESCOM in Mombasa, Kenya. The theme of the workshop was to strengthen regional collaboration in research, conservation and management of sea turtles in the Western Indian Ocean (WIO) Region. The main objectives of the workshop were to:
- Discuss and adopt a coordination/networking strategy for marine turtle conservation and management in the WIO region
- Review national status reports and adopt modalities for the production of a Regional Marine Turtle Status report
- Discuss and adopt a draft proposal focusing on marine turtle research, conservation and management needs for the WIO region
- Discuss components of a draft proposal for submission to WIOMSA for consideration for a Marine Science for Management (MASMA) grant

Fifty-seven participants from 7 countries (Kenya, Seychelles, Tanzania, Madagascar, Mauritius, South Africa and Reunion and U.S.A) attended the workshop. The participants represented national and non-governmental organizations concerned with sea turtle conservation in the WIO region. During the first session, Dr. Jack Frazier gave a comprehensive overview on the historical perspectives of sea turtle research, conservation and management in the Western Indian Ocean region. This provided a background for national presentations which covered a range of topics that included background information on species, progress in research and monitoring, lessons and experiences in conservation and management and the status of legislation and policy.

The process to address the conservation and management of sea turtles in the WIO region began in 1995 in Sodwana bay, South Africa. The need to strengthen regional collaboration was considered as a crucial first step towards a successful research and management initiative. A number of initiatives have since been developed to advance sea turtle research, management and conservation in the WIO region resulting in increased commitment at local, national and regional levels.

KESCOM proposed to host a regional workshop to develop and discuss possible areas of research collaboration in the WIO. The workshop was an outcome of a decision that was made during the last meeting of the conference of parties of the Nairobi Convention (COP4) in July 2004, where a resolution was tabled to ‘Request the Secretariat of the Nairobi Convention to expedite implementation of the decision, CP. 3/4 to conserve sea turtles in the region in partnership with relevant organizations such as WCS, WWF, IUCN, CMS and WIOMSA’. A draft WIO regional concept proposal (part of which was to be developed for a MASMA grant application) was subsequently developed and presented for review and discussion at the workshop. Participants identified mechanisms through which regional collaboration could be effectively implemented and explored ways of strengthening existing national and regional frameworks (i.e. the WIO marine turtle strategy and IOSEA-MoU).

Participants formed 5 working groups to discuss objectives of the draft concept proposal which included (1) Research and monitoring needs for sea turtle conservation and management, (2) Capacity building needs for sea turtle conservation, research and management, (3) Strengthening of community participation in sea turtle research, management and conservation, (4) Integration of sea turtle research and management with sustainable fisheries management and (5) Reinforcement of networking and collaboration amongst regional sea turtle practitioners and decision-makers.

Expected outputs of the workshop included (1) Increased understanding of the region’s sea turtle conservation needs and research priorities (2) Development of an effective regional mechanism and commitment to implement past efforts for regional collaboration in sea turtle conservation (i.e. IOSEA-MOU, WIO Strategy). (3) A report documenting proceedings of the WIO Regional Marine turtle workshop and (4) A status report documenting the current state of knowledge of sea turtle conservation and management in the WIO region. The report herein documents a summary of the proceedings of the workshop.
Acknowledgements

The organizing committee comprising of Dr. Nyawira Muthiga (WCS, KESCOM Chairperson), Gladys Okemwa (KMFRI, KESCOM Vice-chairperson), Simon Nzuki (KESCOM programmes coordinator), Elizabeth Mueni (Fisheries Dept, KESCOM Treasurer), Flora Wambui (KWS, KESCOM), Andrew Wamukota (Assistant Secretary, KESCOM), Jane Nzuki (KESCOM) appreciate the significant financial contribution from the Western Indian Ocean Marine Science Association (WIOMSA) and the additional support from IUCN, WWF, CMS. We also wish to thank KWS for the logistic support provided.

Special thanks are due to Julie Church who assisted in developing the draft regional concept proposal and all the workshop participants, who enthusiastically contributed to the success of the workshop. The secretariat: Simmons Nzuki, Andrew Wamukota, Lucy Kivunzi, Jane K. Nzuki, Joseph Maitha and Benard Ogwaka are also appreciatively acknowledged for their tireless hard work both before and during the workshop. Finally, we are sincerely indebted to Ali Mohammed and NEPAD-COSMAR for financial support granted for the publication of these proceedings.

Opening Remarks

The KESCOM Chairperson, Dr. Nyawira Muthiga welcomed all participants to the workshop and gave a brief overview of the workshop objectives. She invited Dr. Richard Bagine, KWS Deputy Director (Research and Planning), to officially open the workshop.

Dr. Bagine raised the following points in his keynote address:

- The Kenya government attaches great value to conservation of endangered species like marine turtles and has ratified related international instruments for example; the Convention on Biological Diversity (CBD), the Convention on International Trade in Endangered Species (CITES) and the Convention on Migratory Species (CMS). Together with other countries in the region, Kenya has also signed the Indian Ocean and South East Asian MoU (IOSEA MoU), a regional agreement specific to the management and conservation of sea turtles.

- The states of the WIO region share one or more populations of five sea turtle species (green, hawksbill, loggerhead, leatherback, and olive ridley). However, although our governments recognize the transboundary nature of marine turtles, there has been limited appreciation of the value of using collective and synergistic responsibility to address threats to marine turtles.

- Marine turtle populations of the WIO region continue to decline as evidenced by decreasing numbers of nesting females and sightings compared to historical records, on the one hand and increased incidences of poaching, mortality from fisheries and habitat degradation on the other. The lack of systematic and standardized regional data has additionally made it difficult to quantify trends in sea turtle population dynamics or the impact of conservation efforts on turtle populations at a regional scale.

- We must recognize other past and current initiatives to address sea turtle conservation and management on a regional scale. The first attempt to establish a regional process to address the conservation and management of sea turtles was
started in 1995 at a regional sea turtle meeting in Sodwana bay, South Africa under the auspices of the IUCN Species Survival Commission (SSC) - Marine Turtle Specialist Group (MTSG). The meeting detailed actions to be implemented at local, national and regional levels to conserve sea turtles, and specifically called for “management through regional and international cooperation and coordination.” Similar recommendations were drafted during sea turtle meetings in Kenya (1997) and more recently in the United Arab Emirates (2000). However, despite these recommendations, the development of regional level collaborations in research and management for the conservation of sea turtles in the WIO has been limited.

- There is need to explore mechanisms for the development of an effective regional framework for coordinating, networking and sharing information. This can be expedited by empowering a regional steering body which will work with national and regional institutions as well as local communities. Regional action will contribute directly to the attainment of the action areas listed in the IOSEA-MoU Conservation and Management Plan as well as the Global Strategy. This is an opportunity for participants to write one more important chapter in the history of marine turtle conservation in the region.

Dr. Bagine thanked the sponsors of the workshop WIOMSA, IUCN-EARO through the Jakarta mandate project, WWF-EAME, WCS and all participants (national and regional institutions and turtle community groups/programmes) from the region for their continued support in implementing turtle conservation and management activities in the region. With these few remarks, and on behalf of KWS and KESCOM, the regional meeting was officially declared open.

The session facilitator (Gladys Okemwa) invited representatives of the various national (KWS, KMFRI, Fisheries Department) and regional organizations (UNEP, CMS) to say a few remarks in relation to their institution’s support towards research, conservation and management of marine resources and sea turtles.

Group photo of participants during the WIO Turtle Workshop held at Mombasa, Kenya from 16th to 17th September 2004
Dr. Frazier gave an in-depth overview of the importance of sea turtles in the Western Indian Ocean (Figure 1) focusing on the economic uses of sea turtles and their evolution. Within the WIO region, evidence of trade in sea turtle products can be traced back from 30,000 to 60,000 years ago in South Africa. Trade in turtle products by Arab and Chinese merchants was also documented along the Indian Ocean in East Africa between 10th and 18th century. Tortoise shell was considered to be of very high value and was traded alongside ivory and ambergris.

Around 2,000 years ago, trade in sea turtle products was observed in the Red Sea, East Africa, Arabia, India, Malaysia, and possibly China. Although trade in ambergris, ivory, frankincense occurred, tortoise shell was the most commonly mentioned commodity. During the British colonial administration (in the late 19th early 20th century), there were high levels of sea turtle exploitation for export especially from Seychelles to the UK. Later, there arose a concern for the future of the industry/resource pioneered by James Hornell and Arthur Loveridge in the late 19th century and by the British, French & Italian colonial administrations in the early 20th century.

More recently, ethnographic studies on sea turtle utilization have been carried out among the Bajun of Somalia and Kenya, and on the use of sucker fish for catching turtles in Madagascar. Research on the natural history and conservation of sea turtles was also initiated in Tongaland, South Africa, Reunion, Aldabra, Seychelles, Granitic Seychelles (Cousin Is.), Comoros, Kenya and Tanzania (Maziwi Is.). Research topics covered in the studies included: occurrence and abundance, morphometrics (sexual dimorphism), nesting ecology, reproductive biology, diet/feeding habits, effects of parasites and predators, movements (using mark and recapture) and colouration. Recent advances in research in the region have focused on natural history and conservation, satellite tracking, genetic studies of stock composition, community participation and development of regional agreements through workshops.

Dr. Frazier further expressed that future research topics and approaches in the WIO region should be directed towards:
- Long-term monitoring of trends and development of standardized methods;
- Assessment of migration and dispersal routes and stock assessment of populations through mark and recapture methodologies, satellite tracking and genetic profiling; and
- Assessment of the secondary effects of marine resource utilization including:
  - Fisheries interactions with sea turtles
  - Nesting beach conflicts among stakeholders
  - Multiple uses of turtle feeding grounds
  - Impacts of global warming

He emphasized that conservation efforts should focus on how to motivate communities to respect and conserve marine turtles. Promotion of community participation, development of private enterprise to empower communities that utilize sea turtles and strengthening of regional cooperation should be prioritised for successful conservation and management of sea turtle populations in the WIO region.
All five species of Indian Ocean sea turtles are found in Kenya. Green turtles (*Chelonia mydas*) are the most common species and are reported to nest throughout the coastline. Hawksbills (*Eretmochelys imbricata*) have mainly been reported to nests at Kiunga, Malindi, Watamu, and Funzi. Olive ridleys (*Lepidochelys olivacea*) are occasional nesters and they have been documented to nest in Kiunga, Malindi, Watamu and Mombasa. Loggerheads (*Caretta caretta*) have been sighted at Malindi and Watamu and Leatherbacks (*Dermochelys coriacea*) have been sighted in Malindi, Msambweni areas. Anthropogenic threats to marine turtles in Kenya include poaching and trade in turtle products, gill nets/artisanal fishing gears, beach traffic, trawling, pollution, coastal developments mainly lighting and armoring.

The Kenya Sea Turtle Conservation Committee (KESCOM) was established to complement government commitment to addressing global concerns for marine turtle population decline in response to increased incidences of marine turtle mortalities and poaching. Currently KESCOM has established community based turtle conservation groups spread out along the Kenya coast that monitor over 50% of potential nesting grounds. Since its establishment in 1993, the Kenya Sea Turtle Conservation Committee (KESCOM) has grown to over 200 members representing government institutions, NGOs, corporate entities, students and individuals committed to the conservation of sea turtles.
Research and Monitoring

Research and monitoring activities include early studies by Dr. Jack Frazier which documented species occurrence and biology of marine turtles in countries of the Western Indian Ocean region including Kenya. An aerial survey of marine mammals and turtles along the Kenya coast conducted in 1997 by KWS documented the distribution of sea turtles along the coast. Research on the impacts of trawling and the use of TEDs has been carried out by Fisheries Department in 2000 and by KMFRI in 2002. Both studies reported a 70% bycatch rate that includes turtles. A recent assessment of seasonality patterns in nesting activity for the years 1997 – 2000 indicated high nesting activity occurring between March and July. The assessment also documented clutch size variation, incubation, hatching success and trends in mortality. Through this analysis, some key nesting sites were identified.

Flipper tagging is carried out using titanium tags although plastic tags have also been used on juveniles by some conservation projects. Both nesters and net captured turtles are tagged. To date over 985 turtles have been tagged and several returns noted, Watamu, Kipini and Funzi turtle conservation groups have also been involved in collecting tissue samples for genetic analysis in collaboration with Cardiff University.

Between 2000 and 2002, fishermen helped release a total of 1,212 turtles. To date, 2014 nests have been reported, 758 sightings, and 578 mortalities. There have been 7 international tag returns received from Tanzania, Somalia, Seychelles, Mayotte and South Africa. The characterization of key nesting and foraging grounds has been initiated and is ongoing.

Information gaps include:
- Inadequate data and information on population status and structure;
- Underestimation of the nest numbers due to incomplete coverage of nesting beaches;
- Inadequate data on migrations and remigration intervals; and
- Inadequate socio-economic information.
- Inadequate information on utilization of sea turtle foraging habitats

Conservation and Management

KESCOM has received support over the years from various regional and international conservation organizations. Through this, conservation, education and awareness campaigns have been carried out on target groups (fishermen, schools, local community groups) based on identified needs and developed objectives. Information on sea turtle conservation activities and research is disseminated through a newsletter (Kasa News), publications and informal seminars.

KESCOM uses various approaches to promote stakeholder participation in conservation of turtles by involving local people, government, private sector and NGOs. Community action has been enhanced through capacity building activities such as training in biology and ecology of sea turtles, field methodologies in tagging and nesting habitat survey and awareness, mangrove replanting and environmental education. Some turtle conservation groups have incentive schemes to encourage in situ protection of nests by local people, nest adoption programs (eco-tourism) and translocation to secure sites.

Collaboration and Networking

There is good collaboration for turtle conservation among governmental institutions i.e. Kenya Wildlife Services, Fisheries Department, Kenya Marine and Fisheries Research Institute, Coast Development Authority and National Museums of Kenya,
non-governmental organizations (WCS, WIOMSA, IUCN-EARO and WWF-EAME) and the private sector. In addition, KESCOM has established linkages with other sea turtle conservation projects in the region and a database of experts for the region.

Policy and Legislation
Kenya is a signatory to the main international/regional instruments relating to marine turtles for example CITES, CMS, the Nairobi Convention and the IOSEA-MOU. National legislation concerning sea turtles includes: CAP 378 of the Fisheries Act and CAP 376 of the Wildlife Conservation and Management Act. Under these acts the poaching of turtles and their products (*i.e.* eggs, meat and carapace) is illegal. However there is inadequate enforcement compounded by jurisdictional overlaps and unclear penalties for specific infringements.

MADAGASCAR
*Rakotonirina BERTHIN, Lecturer, University of Toliara*
*Simon HARDING, Marine Coordinator, WCS*

All five species of Indian Ocean sea turtles have been recorded in Malagasy waters *(the olive ridley, green, hawksbill, loggerhead, and leatherback turtles). All species except leatherbacks have rookeries on Madagascar’s coastline. Nesting frequency in Madagascar is considerably lower than in other WIO nations. There is evidence that the number of nesting sites have been declining over the years.

Research and Monitoring
Research and monitoring activities are conducted by various institutions such as South-west Madagascar Institut Halieutique et des Sciences Marines (IHSM), Toliara. Study areas covered include nutrition and reproduction of green turtles, traditional fishing techniques and fisheries impacts, commercial trade of turtle and turtle products, conservation strategies and biometric analysis. A decline in the number of nesting sites has occurred between 1999 and 2002 in south west Madagascar region from Toliara to Ambola. Results from surveys of fishers in coastal villages in the Toliara region and Antsiranana by various researchers from 1986 to 2003 indicate that the number of turtles intentionally caught by fishers fluctuates seasonally and annually ranging from 10 to 42 turtles per month. Studies have also documented 129 turtle captures in 4 months in the Antsiranana region while a recent survey documents 80 turtles per month.

Earlier and recent studies include:
- South-east Madagascar, Project Fanomena, Tolagnaro, 2001 (Azafady/WWF);
- Loggerhead turtle nesting site location and frequency along 80 km of coastline;
- North-west Madagascar, Nosy Iranja and Nosy Mitsiho (IHSM/Peace Corps);
- Nesting sites and fishing activity, all species (Sodontra, 2003);
- North Madagascar, Antsiranana (IHSM/WWF);
- Nesting sites and fishing activity, all species (Sodontra, 2003);
- North-east Madagascar, Masoala (IHSM/WCS);
- Nesting sites and fishing activity, all species (Rakotonirina, 1998);
- Tagging programs.

Future research activities include:
- A survey of current nesting sites for four species of turtle, particularly on the west coast of Madagascar;
- An assessment of turtle mortality through fishing in all regions;
- An assessment of current egg collection activities in all regions;
- An assessment of current awareness of turtle protection legislation in Madagascar, and
- Genetic studies.

**Conservation and Management**
Participatory approaches have led to the introduction of community laws ('Dina') in fishing villages in the Toliara region (IHSM/ONE) although conversion of ‘Dina’ into a Communal decree (Arrêté) – is not yet in place due to interruption of the program by the political crisis in 2001-2002. A traditional closed season is observed between November and April. Further, during the fishing season it is prohibited to catch juveniles and nesting females while egg collection is strictly prohibited all year round.

Awareness raising and environmental education activities are conducted by Frontier (Toliara region) and Azafady (Tolagnaro). Project Fanomena (Azafady) has produced an educational booklet – ‘Boky-pano’ which has diagrams showing the long-term effects of 100% egg harvest, illustrations showing the lifecycle of the marine turtle, a copy of the national law making all turtle exploitation illegal (1988), with a Malagasy translation of the key phrase: ‘these animals are completely protected in all of Madagascar’s territory’, and pictures of all five marine turtle species known to be found.

Turtle Excluder Device (TED) Workshops have been held for commercial fishing companies in 2001, 2003 and in 2004 with expertise from Australia, Tolira and Mahajanga. More training is needed to introduce TEDs to all commercial shrimp fishers in Madagascar. There are very few nest protection programmes in operation in Madagascar and often only short term. A study in Tolagnaro region paid collectors (double the market price) per egg to leave nests intact. Intermittent protection is done on Nosy Iranja and Nosy Mitsiho in the North-west.

**Policy and Legislation:**
National regulations protecting sea turtles in Madagascar include:
- Decree 23 May 1923 which prohibits the capture of nesting females and individuals with carapace diameters of less than 50 cm;
- Decree 24 October 1923 which declared the nesting sites on the islands of Nosy Anambo (Diego Suarez), Nosy Iranja (Nosy Be), Chesterfield (Morondava), Nosy Ve (Toliara) and Europa (France) protected;
- Decree 760-80 which prohibits the sale of (dead) ornamental turtles and crocodiles as well as any products obtained from these animals for exportation, and
- Presidential Decree 88-243 which integrally protects sea turtles and other animal species cited in article 1 from exploitation.

However these regulations are not enforced despite regular infringement due to a lack of capacity for implementation, lack of qualified staff to enforce and administer existing legislation, immensity of the Malagasy coast making surveillance difficult and the high level of poverty and illiteracy in coastal populations. There is great need for integrated and effective conservation of marine turtles in Madagascar for national and regional importance. While the regulations should be adapted to accommodate local cultural practice, increased awareness and enforcement of existing regulations is a priority. Research and monitoring programs need to be planned and implemented, particularly tagging and genetics studies on a national scale.

**MAURITIUS**

*Mardayven NALLEE, Scientific Officer, Ministry of Fisheries, Albion Fisheries Research Centre*

The state of Mauritius comprises of the islands of Mauritius, Rodrigues, St Brandon, Agalega, Tromelin and Chagos Archipelago and lies south-west of the Indian Ocean.
at 20°S & 57°E. It covers an area of 1.9 million km² and the islands are of volcanic origin surrounded by fringing reefs. The outer islands are important sea bird and turtle nesting sites; however, few turtles have been observed to occur around Mauritius due to overexploitation by man and increase in coastal development. Occasional turtle nesting is reported around Mauritius and Rodrigues but no scientific data has been collected. Hawksbill turtles are hunted for eggs and the shell and green turtles are hunted for meat, fat, cartilage, skin and eggs. Threats to sea turtles include natural disturbances including hurricanes that destroy nesting beaches, illegal egg collection and fishing, purse seiners, gill net fishing as well as pollution from industrial effluents and sand mining.

Research and Monitoring
Monitoring programmes have shown that nesting activity peaks in summer season during the night while foraging turtles are observed in seagrass / algal beds and in reef areas. Population dynamics are unknown, but both hawksbill and green turtle populations are believed to be declining. Nesting beaches are presently found around St. Brandon, Agalega, Tromelin and Chagos Archipelago. Key research needs include studies of nesting populations at St. Brandon and Agalega, setting up of a monitoring program, tagging and tracking the migratory patterns of nesting and foraging turtles.

Conservation and Management
There is need to designate conservation areas, control beach erosion, mitigate the effects of beach lighting during nesting season and protect turtle foraging grounds. This should be complemented with integration of a turtle conservation strategy for coastal development and planning, strengthening of research capacity, development of a regular tagging programme and determination of causes of mortality.

Policy and Legislation
Enforcement agencies include Fisheries Protection Service of the Ministry of Fisheries, and the National Coast Guard of the Mauritius Police Force. The Fisheries and Marine Resources Act of 1998 makes provision for the protection of marine turtles as follows:
- Para 19 (1) (c) of Section IV stipulates that "no person shall fish a turtle, turtle egg or any marine mammal within the fishing limits of Mauritius without the written approval of the Permanent Secretary";
- Para 20 (1) (c) of Section IV stipulates that "no person shall land, have in his possession for purposes of sale or supply, sell or offer for sale any turtle whether dead or alive or part of a turtle, eggs, or stuffed turtle".

REUNION
Stephane CICCIONE, Sea turtles survey and discovery centre of Réunion Island (CEDTM)

The green, hawksbill, leatherback, olive ridely and loggerhead turtles have been sighted in Reunion. All species are protected under various international instruments (CITES, CMS) and national legislation. Threats to sea turtles are experienced in nesting, pelagic, developmental and feeding habitats. These threats depend on development level, cultural specificity and accessibility. However the most common threats include habitat destruction, pollution, poaching and fishing.

Research and Monitoring
The monitoring program of Iles Eparses has been ongoing since 1983 involving track counting every day on reference beaches and tagging programs every five years. Results have shown high seasonality and different evolution of nesting populations. In 2003, 63 of the 172 beaches of Mayotte showed nesting turtle tracks. 50% of
tracks (1000 to 2000) were counted on Saziley and Moya, two areas protected by Littoral Territories Conservatory. Since 1950, nesting is rare in Réunion (few tracks every 3 years). A rehabilitation program was put in place in 1999. In 2004, 18 tracks were counted on the rehabilitated beach.

An aerial survey program began in Réunion in 1996 and in Mayotte in 2002. In Reunion, green and hawksbill adults and juveniles feed on 10 to 30 meter deep coral and red algae areas. Turtle numbers have been increasing since 1996 with densities fluctuating from 10 to 100 turtles per km\(^2\). Observations of the foraging behavior of green turtles on sea-grass beds show a high spatial attachment. Mangroves of Europa and lagoons of Europa, Juan de Nova and Glorieuses are important development habitats for green and hawksbill juveniles. Following is a summary of their status:

- Iles Eparses Island has been protected since 1985;
- Europa and Tromelin Islands have never been inhabited. They comprise very important nesting sites for green turtles with constant populations of 8000 to 14000 females on Europa and 2000 to 4000 females on Tromelin;
- Glorieuses beach has experienced thirty years of guano & copra exploitation. The nesting population was thought to be extinct but nesting female numbers are rising again. There is evidence of about 800 green females and less than 10 hawksbill females;
- Juan de Nova also has a thirty year long exploitation of guano and copra, the turtle nesting population is quite low. Evidence shows less than 30 females nest on the island, 50% of them being hawksbills.

Satellite tracking of nesting females has shown that turtles foraging in the Mozambique Channel nest along the coasts of Madagascar and East Africa whereas the turtles that nest of Tromelin forage along the East coast of Madagascar. In 1997, a genetic program identified two different rookeries of green turtles in the South West of Indian Ocean:- an Indo-pacific rookery in Tromelin and Atlantic rookery in Europa. In 2004, a new program was set up to establish the distinction between these two different rookeries in the Mozambique Channel, and delineate the distribution area of each rookery.

**Conservation and Management**

Conservation programs range from awareness, nesting beach surveys and habitat conservation & rehabilitation. The awareness programs were implemented in 1977 with a sea turtle ranching program which developed into sea turtle surveys and a Discovery Centre that will be opened in October 2005. Already, the centre receives 60 000 visitors and 8 000 pupils annually. The centre is involved in sponsoring sea turtles exhibitions and organizing of sea turtles awareness days (www.tortuemarine-reunion.org). In Mayotte, conservation programs are organized by the turtle teams and the Agriculture and Forest Directory of Mayotte Service. Other programs include the Oulanga na Nyamba (Marine turtle and environment) and the Sea Turtle Days (www.tortuedemayotte@wanadoo.fr).

**SEYCHELLES**

*Pierre Andre ADAM, Asst. Conservation Officer, Ministry of Environment and Natural Resources; Jeanne MORTIMER, Consultant, Marine Conservation Society*

Four species of sea turtles are found in the Seychelles, the green turtle, hawksbill, leatherback and the loggerhead turtles. The leatherback and loggerhead do not nest in Seychelles whereas the green and hawksbill nest along the island’s beaches. The green is the most common. Various natural and anthropogenic threats face sea turtles in Seychelles including historical over harvesting, poaching, accidental
capture, entanglement and ingestion of debris, boat strikes, predation by dogs (hatchlings and eggs), habitat destruction through beach development and natural phenomena such as coral bleaching. Unregulated development of sensitive coastlines has also had an impact on turtles.

**Research and Monitoring**
Research and monitoring activities carried out in Seychelles have focused on:
- Rapid and opportunistic surveys on nesting populations and habitats and on foraging aggregations and habitats;
- Long-term and short-term monitoring programs on nesting and foraging activities; and
- A stranding network to assess general mortality factors;
- Satellite tracking, and
- Genetic sampling and analysis.

Monitoring programs have mainly been carried out in Aldabra and the Seychelles Bank. In Aldabra turtles have been protected since 1968 and there has been a steady increase in nesting particularly of green turtles. Other programs were started in other islands e.g. Cousin (1970) and Aride (1976). The monitored areas can be categorized into four: Aride, Curieuse Marine Park, Cousin and Ste. Ann Marine Park. Conservation and management areas that need to be further addressed include:
- Personnel training in monitoring and enforcement;
- Equipment for enforcement e.g. patrol boats;
- Public awareness campaigns;
- Expansion of the monitoring programs; and
- Better understanding of foraging habitats and turtle migrations.

**Conservation and Management**
Conservation and management initiatives involve artisan compensation and reinstallation program, turtle monitoring programs, creation of an association of stakeholders and nest protection programs.

**Legislation and Policy**
National policy and legislation is used to protect turtles through the fishing authority and the coast guard.

**SOUTH AFRICA**
*Ronel NEL, Regional Marine Ecologist, Kwazulu Natal Wildlife*

Marine turtle species found in South Africa include the loggerhead, leatherback, Hawksbil, and Green turtle. The threats to sea turtles in South Africa range from shark net catches, direct threats including sporadic and incidental catches, muthii (traditional medicine markets), high incidences of turtle eggs being harvested to feed to chickens, and habitat destruction.

**Research and Monitoring**
Past research was carried out by Paolo Luschi of the University of Piza. Genetic information has also been contributed to a recent global study. However, no dedicated population genetic studies have been conducted on any turtle species. Beach patrolling and tagging is done to maintain records in order to estimate population size and gather data on behaviour. The tagging programme was initiated in 1962/63.
Conservation and Management
A workshop was held on 11th and 12th November 2003 to review current conservation efforts (provincially, nationally and regionally), promote and finalize a national management plan, investigate mechanisms to ensure long term sustainability of turtle monitoring programmes, and assess the feasibility of the expanding benefits derived by local communities through turtle conservation/tourism and sub-regional integration of conservation management efforts between South Africa and Mozambique. The meeting recommended that management programmes should be geared towards:

- Expanding awareness programmes dedicated to turtles and directed to different sectors interacting with turtles and the turtle programmes;
- Focusing awareness campaigns on turtle friendly coastal fishing;
- Encouraging academic, research and education programmes at all levels;
- Promoting conservation and monitoring efforts that actively include non-breeding species (or phases) frequenting South African waters such as hawksbills and green turtles;
- Encouraging active participation in regional conservation management efforts;
- Encouraging South Africa to become a signatory to the IOSEA MoU and the Atlantic under CMS.

Legislation and Policy
There is legislation on habitat destruction although it is limited. In addition, there are five new Marine Protected Areas and a strong environmental legislation especially in relation to beach driving and implementation of comprehensive EIA processes.

TANZANIA
Jairos MAHENGE, Principal Park Ranger, Mnazi Bay-Ruvuma Estuary Marine Park

All five species of sea turtles found in the Western Indian Ocean (WIO) have been sighted in Tanzanian waters. These include the green turtles, hawksbill, leatherback, olive ridley and loggerhead turtles. Green turtles and hawksbills are known to nest on the Tanzanian beaches. Apart from natural predators, the threats to turtles include incidental capture in gill nets (jarife), slaughter of nesting females, egg harvesting and disturbance if nesting beaches through construction. Coastal communities in Tanzania have traditionally used turtles for food and medicinal purposes. The non-human predators include monitor lizards, snakes, mongoose, dogs and pigs.

RESEARCH AND MONITORING
The research carried out has revealed that all five species of sea turtles known to occur in the WIO have been recorded in Mtwara. Local residents interviewed in 1993 claimed that turtle numbers were declining as a result of accidental and deliberate capture in gill nets, egg harvesting, poaching of nesting females and beach disturbance. Interview surveys conducted in Mtwara in 2003 revealed that there is a need to take urgent measures towards the conservation of sea turtles. Eighty percent of all respondents saw the need for conserving the sea turtle while 9% and 11% did not think of conservation and did not know, respectively. The proposed conservation measures included awareness raising and education, law enforcement, and protection of key foraging and nesting sites. Tagging was also suggested, as people are scared to kill and eat tagged turtles.

On Mafia Island, 231 nests have been recorded, the majority of which were green turtles, with only 9 hawksbill nests. It is estimated that between 1000 and 2000
turtles are caught annually in the island. A total of 6,919 young turtles successfully hatched in Mafia in 2001. Loggerhead turtles have also been sighted, though they do not nest in Mafia. Between 2001 and 2002, the overall hatching success of nests was 59%. Since January 2001 when nest monitoring began, a total number 421 nests have been verified (Green- 411; Hawksbill-10) with successful hatching of 21,044 hatchlings. In 2003 two turtle nests were recorded in Mbudya Island within the Dar es Salaam Marine Reserves following ongoing conservation activities.

Recent studies in Mnazi Bay Ruvuma Estuary Marine Park indicate that the main nesting season for green turtles is between March and June. A similar pattern has been observed in both Mafia and Zanzibar with hawksbills being recorded only between December and April. A total of 25 nests have been verified with a successful hatching of 1,378 hatchlings. No hawksbill nest has since been recorded after the findings from the 2003 survey that they also nest within the park area.

Tagging is carried out in Mnazi Bay, Ruvuma Estuary Marine Park. Turtles have been tagged and skin samples collected for DNA analysis. In Mafia Island, tags have been recovered from green and loggerhead turtles that were tagged in the Seychelles, Comoros and Natal, South Africa. In Kilwa, a tag was recently recovered from a green turtle tagged while nesting in Watamu, Kenya. In November 2003, Mnazi Bay Ruvuma Estuary Marine Park recorded a tag from a green turtle tagged in South Africa.

Conservation and Management
Turtle conservation programmes are carried out in various areas along the coast of Tanzania including the islands. These include the Tanga Coastal Zone conservation and development programme), Coastal Region (Mafia Island sea turtle and dugong conservation programme: Sadaani National Park), Mtswara (Mnazi Bay - Ruvuma Estuary Marine Park), Dar-es-Salaam (Dar es Salaam Marine Reserves), Zanzibar Island and Mnazi Bay, and Ruvuma Estuary Marine Park. Currently four nesting beaches are under management in Mnazi bay in collaboration with the local community after initiation of a long term turtle conservation strategy in October 2003. A nest protection incentive scheme was introduced in Mafia Island in early 2002. This scheme has led to an increase in the number of nests reported by local villagers from 68 in the first year to 164 in the second year and an estimated decline in poaching from 49% to 5%.

Legislation and Policy
Turtles are officially protected under Fisheries Act No. 6 of 1970 Section 7. The Marine parks and Reserves Act No. 29 of 1994 provides for the establishment of Marine Protected Areas and the protection and conservation of coastal and marine life including turtles. Despite this, turtle populations have been declining rapidly due to poaching and nesting females and eggs, shell trade, captures in artisanal gillnets and commercial prawn trawlers and disturbance of nesting beaches from tourism development and fishers camps. Tanzania is committed to implementing the activities outlined in the Conservation and Management Plan (CMP), an annex to the IOSEA-MoU.
<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>SPECIES</th>
<th>RESEARCH AND MONITORING ACTIVITIES</th>
<th>CONSERVATION AND MANAGEMENT ACTIVITIES</th>
<th>LEGISLATION AND POLICY</th>
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</thead>
</table>
| Kenya   | Green Hawksbill Olive ridley Loggerhead Leatherback | • Surveillance of nesting beaches and reporting of turtle sightings, nesting, and mortality, tagging of net released turtles.  
• Tissue sampling for genetic analysis  
• Characterization of nesting and foraging habitats  
• Studies on illegal trade of turtle products | • Formation of community turtle conservation groups along coastline to assist in conservation  
• Education and awareness campaigns for local community groups, fishermen and schools.  
• Incentive programs for nest protection and net release  
• Translocation of nests  
• Promotion of multi-institutional partnerships with national organizations and non-governmental organizations | International agreements signed include Nairobi Convention, CITES, CBD, CMS and IOSEA MoU  
National legislation:  
• The Fisheries Act CAP 378  
• Wildlife Act CAP 376. |
| Madagascar | Green Hawksbill Olive ridley Loggerhead Leatherback | • Studies in nutrition and reproduction of green turtles.  
• Nesting and tagging programs.  
• Surveys of fishers and fishing activities. | • Community laws in fishing villages.  
• Environmental education and awareness.  
• Workshops on Turtle Excluder Devices  
• Incentives for nest protection. | International agreements signed include CITES, CBD, CMS and IOSEA MoU.  
National legislation:  
• Decree 23 May 1923.  
• Decree 24 October 1923.  
• Decree 760-80.  
• Presidential Decree 88-243. |
| Mauritius | Green Hawksbill | • Monitoring of nesting and foraging turtle populations and nesting beaches.  
• Tagging and tracking | Recommends:  
• Integration of a turtle conservation strategy.  
• Strengthening of research capacity | International agreements signed include CITES, CBD, and IOSEA MoU.  
National legislation.  
• The Fisheries and Marine Resources Act 1998, Para 19 (1) (c) of Section IV and Para 20 (1) (c) of Section IV |
| Reunion | Green Hawksbill Leatherback Olive ridley Loggerhead | • Daily monitoring of reference beaches.  
• Five-yearly tagging programs.  
• Aerial surveys.  
• Satellite tracking of females  
• Genetic analysis | • Awareness, surveys and habitat conservation and rehabilitation. | All species of turtles are protected under CITES, CMS and national legislation |
| Seychelles | Green Hawksbill Leatherback Loggerhead | • Monitoring of nesting and foraging populations  
• Characterization of habitats.  
• A stranding network to assess mortalities.  
• Satellite tracking  
• Genetic analysis | • Artisan compensation and reinstallation program.  
• Turtle monitoring programs, creation of an association of stakeholders and nest protection programs. | International agreements signed include Nairobi Convention, CITES, CBD and IOSEA MoU.  
National legislation is through Fisheries Act and Wild Animals Regulation. |
| South Africa | Loggerhead Leatherback Hawksbill Green | • Long term monitoring of nesting beaches with good trends on loggerheads and leatherbacks available from 1965  
• Tagging program started in 1962  
• Genetic sampling | Recommends:  
• Development of research, and targeted education and awareness programs e.g. turtle friendly long-lining and trawling.  
• Identification of mechanisms to ensure long term sustainability of programs  
• Include non-breeding phases of turtles in conservation and monitoring efforts  
• Development and finalizing of the national management plan | International agreements include CITES, CBD, CMS and IOSEA MoU  
National legislation |
Plenary Discussion Outcome
The lack of adequate enforcement is a common concern in the region. Noting that communities in the region have traditionally consumed turtles for a long time, alternative livelihood sources need to be explored to divert this dependence.

Non-Governmental/Inter-Governmental Organizations: Implications for Sea Turtle Conservation and Management In the WIO

This session demonstrated how various international and regional organizations are currently either directly involved in turtle conservation work or undertake studies or activities that provide support to the management and conservation of sea turtles and their habitats in the WIO. An effective regional framework will serve to channel technical expertise and resources thereby contributing to the effective management of sea turtles in the region.

Indian Ocean South East Asia Memorandum of Understanding (IOSEA MoU)

Through the collective implementation of an associated Conservation and Management Plan, the Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA MoU) puts in place a framework through which states of the Indian Ocean and South-East Asian region, as well as other concerned states, can work together to conserve and replenish depleted marine turtle populations for which they share responsibility. The MoU applies to the waters and coastal States of the Indian Ocean and South-East Asia and adjacent seas, extending eastwards to the Torres Strait. For implementation purposes, the area is divided into four sub-regions: South-East Asia and Australia, Northern Indian Ocean, Northwestern Indian Ocean, and Western Indian Ocean. The species of marine turtles covered by the MoU are the Loggerhead, Olive Ridley, Green turtle, Hawksbill, Leatherback, and Flatback *Natator depresses.* The IOSEA MoU has been signed by most of the countries of the WIO.

The IOSEA Marine Turtle MoU runs a projects database which is meant to provide information on marine turtle conservation projects throughout the Indian Ocean and South-East Asia. The ultimate goal is to populate the database with details of virtually every marine turtle conservation project in the Indian Ocean - South-East Asia region (and beyond). The completeness and accuracy of the database will depend on those who are running the projects.

The World Conservation Union Marine Programme in Eastern Africa (IUCN)

The Eastern African Regional Marine Programme, established 1992, is the oldest marine programme in IUCN involving 8 countries. The aim of the programme is to maintain the
biodiversity and ecological processes of marine and coastal ecosystems in Eastern Africa, to restore their functioning where this has been impaired, and to facilitate the sustainable and equitable use of marine resources. Current strategies include: building a sound scientific knowledge base, building capacity, and improving policy and legislation.

Under the IUCN Global Sea Turtle Conservation Strategy, support for the region through the IUCN-EARO includes:
- The IUCN Species Survival Commission – Marine Turtle Specialist Group;
- A Sea Turtle Recovery Action Plan in 1997;
- A training Workshop on sea turtle excluder devices in 1997;
- Personnel support to KESCOM in 2001 and 2002; and
- Regional sea turtle conservation work in the WIO.

Wildlife Conservation Society (WCS)

Nyawira MUTHIGA, Conservation Scientist, WCS Mombasa

Wildlife Conservation Society - WIO focuses on adaptive management techniques to support site-based conservation initiatives and research to inform policy. In addition, WCS promotes training and capacity building, the engagement of communities and the development of sustainable livelihood options. Strategies include:

- Long-term monitoring of coral reefs and marine protected areas in Kenya;
- Research on the impacts of human activities including fishing, tourism and more recently climate change on coral reefs in the WIO (Kenya, Tanzania, Mauritius, Madagascar);
- Support to local communities and the private sector to plan and manage ecotourism activities in Madagascar and South Africa; and
- Capacity building of local communities and non-governmental organizations in turtle conservation and monitoring has also been carried out in collaboration with KESCOM.

Future areas of focus include regional surveys to develop a more comprehensive knowledge base for MPA management, increased collaboration between scientific institutions and management institutions, monitoring of climate change effects on coral reefs at a regional level. All these areas have potential to generate information to support a regional strategy for sea turtle conservation and management.

Western Indian Ocean Marine Science Association (WIOMSA)

Patrick GWADA, WIOMSA Country Coordinator; KMFRI

The need for a regional marine science association was expressed in 1989 leading to the establishment of WIOMSA in 1993. WIOMSA aims to promote information exchange, encourage the support of marine science in the region, foster inter-institutional linkages, promote and advance marine sciences and provide a forum for discussion and dissemination of information in the WIO region.

WIOMSA’s Marine Science for Management (MASMA) grant program was subsequently established to increase the emphasis of research in the WIO region especially the intersection of natural and social sciences for coastal and marine management. MASMA aims to improve the contribution of coastal and marine resources to socially, economically and environmentally sustainable development of WIO countries, through conducting applied research that is geared towards addressing management issues/problems in the long-term. Challenges experienced that are relevant to sea turtle research studies include:
- Weak incorporation of social science components into research proposals. Most proposals are written by natural scientists. As a result, few proposals have been transdisciplinary. The small number of social scientists working on coastal and marine issues has been a limiting factor. Thus, there is an urgent need to establish a unifying mechanism to bring social scientists together in the region.
- Weak linkages between academic/research institutions and management oriented institutions which reflect the overall weak linkage between science and management which leads to limited involvement of key stakeholders in projects.
- Research outputs mainly target peer-reviewed scientific publications which are not available to managers. These outputs should be further translated and/or packaged for managers.

New Partnership for African Development- Coastal and Marine Secretariat (NEPAD-COSMAR)
Ali MOHAMMED, Coordinator NEPAD - COSMAR

NEPAD is a comprehensive, integrated development plan that addresses key social, economic and political principles for the continent. NEPAD entails a commitment by African leaders to African people and the international community to place Africa on a path of sustainable growth, accelerated by the integration of the continent into the global economy. Under the NEPAD COSMAR programme, NEPAD strives to be part of all the regional conservation initiatives. NEPAD has affirmed that international support for its implementation is essential and has been endorsed internationally by the African Union (July 2001); the General Assembly (Resolution 57/2, Sept 2002); WSSD (Aug/Sept 2002) and the G8 Summit (June 2002, 2003). NEPAD's political leverage and platform offers the best platform to move the regional collaboration concept on sea turtle conservation forward. NEPAD's environment action plan includes a coastal and marine sub-theme.

A secretariat hosted by Kenya has been established that aims to streamline coastal and marine issues within NEPAD, to mobilize political will for policy and institutional measures, facilitate resource mobilization through partnerships and foster knowledge sharing and networking. A regional strategy for the management of sea turtles would benefit from NEPADs political leverage and would fit well into the NEPAD COSMAR programme.

The Nairobi Convention

Recognizing the uniqueness of the coastal and marine environment of the region, the threats it faces, and the necessity for remedial/pre-emptive action, the countries of the WIO region have revitalized The Nairobi Convention (Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region) and its two protocols (i) concerning Protected Areas and Wild Flora and Fauna in the Eastern African Region and (ii) concerning Cooperation in Combating Marine Pollution in Cases of Emergency in the Eastern African Region. The Convention and its two protocols were signed in 1985 and have been in force since 30 May 1996. The Nairobi Convention has now achieved 100 percent ratification, a rare achievement for a regional/international convention.

The Nairobi Convention provides a legal framework for regional cooperation in the protection, management and sustainable development of the WIO region’s marine and coastal environment. Through this framework, the convention provides a mechanism for implementation of global treaties and other conventions in the region. Task Forces and Working Groups under the Nairobi Convention provide a means for collaboration and cooperation between partners in addressing urgent technical issues within the scope of the
Convention. These include the Ad Hoc Legal and Technical Working Group; the Coral Reef Task Force, the Group of Experts for Marine Protected Areas in Eastern Africa (GEMPA-EA); and the Physical Alteration and Destruction of Habitats (PADH) Task Force.

Discussion Outcomes:
- The importance of combining marine research with management was acknowledged so that efforts put into research are not in vain.
- The involvement of social scientists in sea turtle research and management was recognized. WIOMSA’s role in encouraging and training more social scientists in the WIO region was applauded.
- The importance of acquiring political support for turtle conservation initiatives was emphasized
- The need to strengthen coordination of work to avoid duplication and overlaps that lead to wastage of resources was reiterated.

Strengthening Regional Cooperation in the WIO
Jack FRAZIER, Research Associate, Conservation Research Center, Smithsonian Institute

Dr. Frazier emphasized the complexity of conserving marine turtles. Sea turtles live in the sea with fish therefore the problems that affect fisheries also affect turtles. Turtles have a complex life cycle. Sea turtles are slow to mature and are long living but the survival rate of their hatchlings is low. Being migratory in nature, turtles do not belong to a specific country and as a result they are a shared resource. Thus, the responsibility to preserve them is shared and it cannot be the responsibility of only one nation. Due to the declining nature of turtle populations there are a variety of pressures that affect a single turtle, ranging from egg collectors fighting for the eggs of one turtle on a single nesting beach to fishermen that go out in search of that one turtle for food. Sand mining, tourist activities and poor waste disposal affect sea turtle habitats. Sea turtle stakeholders include the foresters that cause erosion by cutting down trees, conservationists that protect the turtle, the researchers that wish to study them as well as the governments whose laws govern the use of the sea turtles and their habitats. All these users have property rights over turtles and the effects of the different users vary in different countries.

The various systems that regulate access to turtles include:
- Privatisation, where there is investment to catch and process turtles for economic gain;
- State regulation through regulated tourism and permits to fishing co-operatives to catch and process turtles (in cases where the state declares absolute protection of the turtle this requires trust and co-operation of all stakeholders);
- Commons or “folk management” where harvested turtles and/or their eggs are packaged and sold and the benefits go back to the community (in many places, the community has adopted turtles as part of their cultural values. However, all efforts to protect turtles are lost once the turtle leaves sites where they are valued and protected), and
- International agreements where the EEZ areas are owned by different countries (this requires inter-governmental accords to enable countries to co-operate for the common good of the turtle).

For regional co-operation to succeed several issues should be taken into consideration:
- Collaboration among stakeholders;
- Sharing of basic information about turtle migration within the region;
- Simplification of communication with communities to drive, motivate and inspire people to conserve the turtle;
- Development of adequate cultural incentives to communities;
- Access to traditional and non-traditional information on turtle uses and values, and
Marine turtles are a flagship species and important questions that will be encountered are whose property they are and who has rights over them. Regional co-operation is important in maintaining survival of turtles in our waters.

**Plenary Discussion Outcomes**
- Considering the extractive use of turtles by one community and the protective use by another, group action is needed to protect this shared resource. There should be an economic value attached to the turtle that would enhance its conservation. Thus, research in the region should elucidate the values of the two activities and give value to the conservation of the turtle. In the IOSEA MoU most actions are based on trying to reduce turtle mortality. However, there should also be ways to demonstrate that if a community is going to extract a shared resource, it will not be depleted. This can only be established through research. In the case of sea turtles, it would be impossible to control usage without regional co-operation.

- All country presentations show that there are legal mechanisms to conserve sea turtles; however, implementation is a major problem. It is important that we empower communities to conserve natural resources rather than solely depending on legislation.

- To enhance regional co-operation there is an Intergovernmental Oceanographic Commission initiative to promote management of coastal and ocean data and these data products can be relevant to the region.

- It is important to harmonize user rights within the region as different countries have different user rights concerning sea turtles and their habitats. Harmonization of these rights would be important in the handling of trans-boundary issues due to the migratory nature of sea turtles.

**Standardization of Flipper Tag Codes in the WIO**

Jeanne MORTIMER, Consultant, Ministry of Environment, MCS Seychelles

As highlighted in the previous presentation, sharing of basic information about turtle migration within the region is crucial for management purposes. Tagging efforts should be increased and the tag codes used should be standardized. Dr. Mortimer presented a short summary of the importance of tagging. Topics covered in the presentation included: what tagging tells us about individual nesting and foraging turtles i.e. where, when, how often (e.g. sex, number of clutches laid, seasonality), growth rates, migrations routes between nesting and foraging sites, survival rates and mortality factors. Flipper tags are commonly used to track turtle migrations in the region. However, as discussed in this presentation, they do have their limitations.

For successful tagging, flipper tags must be accurately recorded and unique, with a simple code that maximizes the number of possible combinations. The challenges of using flipper tags range from misreading records or omitting/transposing letters leading to the loss of a record. In addition there may be difficult field conditions (at night, in rain, at sea, etc) which will depend on the level of training of personnel.

Another key challenge is maintaining unique codes. There are many turtles being tagged nationally and globally and many programmes in one country. Thus, more than one programme can end up using the same prefix leading to confusion. Possible solutions to reducing confusion could include using either (1) one code for a wide area while
maximizing the number of combinations or (2) a unique code per country using the two letter ISO code is recommended e.g.: 

KE: Kenya  
MG: Madagascar  
MZ: Mozambique  
SC: Seychelles  
YT: Mayotte  
KM: Comoros  
MU: Mauritius  
RE: Reunion  
TZ: Tanzania  
ZA: South Africa

Use of the three letter ISO code is not recommended as this may cause confusion. The combinations of codes should also be maximized e.g.: 

KE 0001 to KE 9999

will give 10,000 combinations

whereas:

KE A 0001 to KE A 9999  
KE B 0001 to KE B 9999  
KE C 0001 to KE C 9999 (etc)  
KE Z 0001 to KE Z 9999

gives 260,000 combinations.

Careless mistakes that may occur when recording codes can lead to confusion and a loss of important data; for example, recording EI 512 vs. E1512. Personnel should be trained to record prefixes carefully and to check back on unusual tags. For the WIO region it is recommended that:

1. All tag series currently in use in the IOSEA region should be identified and the information should be posted on the IOSEA web site.
2. Where confusion is likely, the tag series should be discontinued and a new one employed.
3. Reference should always be made to the IOSEA website before new tags are ordered.
4. Government coordination of the tag series used in each country should be ensured.
5. The two-letter ISO prefix should be considered for future use and standardization of tag codes be carried out for a wider area (nationally and regionally).

At the 2nd Meeting of the Signatory States of the IOSEA MoU, held in Bangkok in March 2004, the issue of standardizing turtle tag codes was discussed. Participants at the meeting agreed that the IOSEA website could serve as the repository for this information. The need to avoid duplicating the tag numbers in the region; and the value of having a central repository listing what tag series have been used by each country in the region was noted. Researchers can then refer to that site when they encounter any unusual tag(s) on their turtles.

Development of a Draft Regional Concept Proposal

J. CHURCH, Assistant Coordinator, Jakarta Mandate, IUCN-EARO

A draft WIO region concept proposal was presented for review and discussion by Ms. Julie Church. Ms. Church articulated that the purpose of developing a regional concept proposal is to enhance the establishment of collaborative programmes in the Western Indian Ocean (WIO) that safeguard sea turtle populations through specific research, conservation and management actions. The actions in the proposal have to be specific as not everything can be done. It is therefore hoped that the proposed actions will build up on past WIO management and conservation strategies, strengthen regional and international links and improve on fundraising mechanisms. There is a growing commitment to marine issues therefore it is possible for regional co-operation to work.
Broad questions to be considered when reviewing the proposal included: whether regional co-ordination in research and management can work, what resources are available, whether the objectives and activities capture the gaps and whether the suggested locations for implementation of specific research activities were optimum. The following issues were suggested for prioritization in the draft proposal:

1. **Strengthening regional co-operation:**
   - Developing a proposal to address research and monitoring needs;
   - Conducting a regional review of the status of the sea turtle in the WIO;
   - Availing information on the threats to the sea turtle and habitat changes in the WIO;
   - Standardizing long term monitoring programmes;
   - Developing protocols for data sharing;
   - Developing a regional sea turtle database;
   - Coordinating a regional tagging protocol;
   - Initiating and developing satellite tagging programmes;
   - Conducting genetic assessment of turtle populations on a regional scale; and
   - Developing a regional committee to fundraise and network.

2. **Building capacity for research and management:**
   - Identifying areas that need capacity;
   - Implementing training initiatives and regional exchange programmes;
   - Providing equipment for research and monitoring; and
   - Establishing national action plans for countries in the region.

3. **Strengthening community participation:**
   - Promoting the use of indigenous knowledge in conservation by conducting socio-economic assessments;
   - Phasing out monetary incentive schemes in monitoring programmes; and
   - Sourcing alternative livelihoods and eco-tourism benefits.

4. **Enhancing research focus and management:**
   - Focusing on sustainable fisheries management; and
   - Ensuring implementation of research recommendations by management bodies.

**WORKING GROUP RECOMMENDATIONS:**

Five working groups discussed the listed objectives and the associated suggested activities (√) in the draft concept proposal. The participants identified priority activities and made the following recommendations:

**Group 1: Research and Monitoring Needs for Sea Turtle Conservation and Management**

Summarise existing data and information about the status of threats to turtles and their habitats.

- All available quantitative and qualitative information should be put together in a standardised and comparable format. The information should include methods of data collection i.e. species, equipment used, sample size, frequency, manpower used, area covered, tagging, tracks and nest survival. The use of illustrations and photos is recommended.
The standardized database will aid in identifying benchmark sites for long-term monitoring. A benchmark site should have the following characteristics:

- It should be of regional/national significance
- It should include nesting, foraging and developmental habitats,
- It should have historical data in place,
- It should represent a wide range of human impacts,
- It should include both island and mainland rookeries, and
- There should be capacity for long-term monitoring at the site

A template of the database incorporating all the information needs should be produced. In addition, focal points should also be identified to coordinate activities at local, national and regional levels.

Expected outputs of this activity include:

- Identified gaps in research and monitoring;
- Identified benchmark nesting and foraging sites in the region; and
- Available reports in hard copy and IOSEA on-line format.

Standardize all monitoring programmes and initiate a long term regional monitoring programme

- Source experts from the region or internationally to train and build capacity for sea turtle research.

- Develop standardized regional research and monitoring protocols for adapted from methodologies currently in use in the region and other published guidelines (e.g. the MTSG Techniques Manual) for:
  - assessing nesting activity and status of turtle habitats,
  - assessing fisheries impacts,
  - developing sea turtle hatcheries,
  - conducting genetic assessments to identify management units
  - conducting in-water surveys,
  - establishing a regional tagging programme,
  - establishing a regional stranding network.

Identify Priority Research Activities for Implementation (see also Group 4)

Participants prioritized the following activities to monitor sea turtle habitats:

- Map sea turtle nesting and foraging habitats through aerial and in-water surveys using GIS. Computer hardware and software is needed to facilitate this activity.

- Identify management units of sea turtle populations through genetic assessments. Currently two genetic assessment projects are underway in Reunion and Kenya. The financial costs and limited expertise hamper this research in the region.

- Intensity national tagging programmes so that important turtle migratory routes in the region can be identified through the use of flipper tags and satellite telemetry.

Plenary Discussion Outcomes

- Research on nesting habitats is on-going in some countries, but there is need for more comprehensive studies. In addition, the research protocols need to be standardized so that regional level analysis can be done. Turtle conservation groups that have been
monitoring nesting activities could provide information on long-term or seasonal trends under this activity on the IOSEA website.

- A standardized and centralized tagging system should be set-up as a priority. Each country should submit details of their tagging system. This activity is being followed up by Dr. Jeanne Mortimer.

**Group 2:** Capacity Building Needs for Sea Turtle Conservation, Research and Management

Participants suggested the following capacity building activities:

**Training:**
- Train local community members (tailored to suit their respective environments) on entrepreneurship and income generating activities such as ecotourism;
- Incorporate conservation education in school curricula beginning at the lowest level of education.
- Develop linkages with other regional/ international organizations (e.g. IOC, WIDECAST) to provide technical support in the form of exchange programs/internships or expertise.

**Data Collection and Monitoring:**
- Broaden data collection by increasing the number of monitored sites and improving
- Establish a regional data base that will be managed by a secretariat to ensure integrity in ownership of data and content;
- Strengthen collaboration with local national universities to build research capacity
- Establish facilities and guidelines to rehabilitate sick or injured turtles;

**Plenary Discussions and Outcomes**

Discussions were made on how to empower the youth. The meeting agreed that the youth in local communities should be trained so that on their return they can build capacity within their communities. However, it may not be practical depending on the level of training needed (i.e. to university level). In this case, (from experience in Kiunga, Kenya), the trainees eventually leave their communities to get employed elsewhere defeating the purpose. Capacity building should however be focused on the wider marine environment as well.

**Group 3:** Strengthen Community Participation in Research, Management and Conservation

The participants prioritized and recommended the following activities:
- Evaluate incentive schemes for sea turtle conservation, so that the targeted benefits are sustainable and wide-spread. For example, instead of giving rewards to individuals, a common fund can be set up to help the community with education bursaries, and health facilities etc.
- Promote a two-way feedback approach between the local communities and researchers through collaborative research projects and sharing of research outputs.
- Involve local communities in legal and policy frameworks so as to instil a sense of ownership and empowerment in the management of their resources; thereby, easing adaptation and enforcement of laws.
Initiate well focused alternative-supplementary income generating activities collaboratively with local communities. The alternatives should be feasible, community driven and large-scale so as to have positive socioeconomic impacts that can lead to a reduction in pressure on overexploited natural resources. However, the initial investments may need to be funded and managed for a period of time before the venture is handed over to the community. Suggested alternatives include:

- Increasing community driven ecotourism ventures that have direct benefits to the community; and
- Establishing pilot ‘conservation zones’ where local communities can play a leading management role. Once successful, this can be replicated in other areas.

Plenary Discussions
Participants emphasized the importance of communities and their role in management and conservation; the need to conduct participatory research with communities to build a conservation ethic; the need to strengthen social science research in the region in order to understand the socio-economic dynamics of communities vis-à-vis conservation of sea turtles and other marine resources and the need to evaluate land ownership issues concerning tourism development in relation to (a) the conservation of turtles (b) impacts on communities and their willingness to conserve sea turtles.

Group 4: Integrate Sea Turtle Research and Management with Sustainable Fisheries Management

Evaluate the direct effects of fishing gear on turtle mortality in at least 3 countries in the WIO.

The participants prioritized the following research activities fisheries related impacts:

- Assess the impacts of industrial fishing techniques, specifically long lining and purse seining. Independent fisheries observers should be on board to collect data. Suggested countries for this activity included South Africa, Seychelles, Madagascar and Mauritius.

- Assess the impacts of artisanal fishing activities, particularly the use of gill nets, on sea turtle mortality, including drift and large mesh [shark] nets. Research methods should be shared and standardized so that they can be adapted on a regional level. Research activities should focus on testing the effectiveness of various management measures such as:
  
  - Strict regulation on drift and gill nets in selected sites in the WIO with the aim of assessing effectiveness in reducing sea turtle mortality; and
  - Seasonal and/or permanent closure of specific areas to fishing gears known to cause sea turtle mortality.

Build on existing Turtle Exclusion Device (TED) and By-catch Reduction Device (BRD) initiatives in the WIO

The participants identified and prioritized the following research activities:

- Design and develop the most appropriate bycatch reduction devices (BRDs) and turtle excluder devices (TEDs) for the region and conduct tests in at least three selected countries. As a follow up, fishery observers should be engaged to assess the effectiveness of the new TEDs and BRDs on commercial vessels.
Expertise is needed to assist in developing the gears and should be sourced from internationally.

- Develop and test eco-friendly longline gear. Suggested countries included Seychelles and Mauritius. Funding mechanisms should be explored from the IOTC, SWIOFP and FAO.

In addition, the participants suggested the following research activities to be added:

- Assess the effects of coastal development and tourism on the breeding and foraging sea turtle populations of sea turtles with linkages to other national/regional research initiatives.

- Assess the impacts of coastal mineral extraction and/or sand mining on the nesting and feeding grounds of sea turtles with linkages to national/regional research initiatives (suggested countries: Madagascar and Tanzania).

- Determine the sustainability of traditional harvesting on sea turtle populations in selected countries where specific communities are allowed to harvest turtles (suggested countries: Madagascar and South Africa).

**Discussion Outcomes:**
- Population modeling techniques should be incorporated to understand the recovery status of sea turtle populations in the region.
- It is essential to involve as many marine and coastal programmes on both mainland and island states to have a regional outlook.
- Selection of pilot countries should be done transparently and this will be based on the status of the country and the expertise available to do the research.

**Group 5: Reinforcement of Networking and Collaboration amongst Regional Sea Turtle Practitioners and Decision Makers**

Participants agreed that regional coordination is a priority and acknowledged that the IOSEA Marine Turtle MoU provides a specific framework for marine turtle conservation, which is already operational and has been signed by most of the WIO States. Dr. Nyawira Muthiga gave a presentation on the Coral Reef Task Force of the Nairobi convention to facilitate the discussion on a possible model that could be adopted in the region.

Participants suggested that the Nairobi Convention (page 14) could provide additional political and potential financial support for implementation of the IOSEA MoU within the region; thus, bridging the two instruments through the establishment of a WIO-IOSEA Marine Turtle MoU Task Force which will further promote networking and regional collaboration. The taskforce will have the explicit purpose of facilitating implementation of the IOSEA MoU, as well as contributing to fulfilling the general work programme of the Nairobi Convention.

**Plenary Discussions**
- Participants agreed to establish a WIO-IOSEA Marine Turtle MoU Task Force and agreed that a proposal for interim recognition of this should be presented at the next meeting of Nairobi Convention Focal Points with a view to having it formally tabled and adopted at the next Conference of the Parties (in late 2006).

- Participants recommended that the taskforce should be comprised of IOSEA Focal Points (where they have already been appointed) or other officials in countries that
have yet to sign the IOSEA MoU as well as ex-officio members from selected international nongovernmental organizations (e.g. IUCN, WIOMSA, WCS, WWF). The taskforce may also include observers from other relevant organizations that contribute to marine turtle conservation (e.g. SWIOFC, IOTC). Kenya Wildlife Services which is the IOSEA MOU focal point was recommended to be Kenya’s focal point.

KEY RECOMMENDATIONS

- Participants recommended that the Task Force will be mandated to work with relevant national and regional organizations to prioritize future work in the region and provide advice on other matters pertaining to the management and conservation of sea turtles and their habitats.

- The Task Force will organize its own business and elect a chairperson and vice-chairperson on a three-year rotational basis.

- The Task Force will maintain regular contact by email and meet at least once a year in conjunction with the Meeting of IOSEA signatory states to review progress, source and confirm funding and decide on a regional work plan. Meetings will be held in different venues communication will be maintained as appropriate with the IOSEA Marine Turtle MoU, the Nairobi Convention, and other related instruments (i.e. CITES, EAME, NEPAD, SWIOFC and other regional and international fora).

- Vital to its success is the commitment to regional collaboration by all levels of sea turtle management bodies including the governments, international and local NGOs, national sea turtle committees and local sea turtle conservation groups. These groups should be involved at the outset to minimize overlap and jurisdictional conflicts.

- In keeping with objective 6.4 of the IOSEA Conservation and Management Plan “To improve coordination among government and nongovernmental sectors in the conservation of marine turtles and their habitats”, participants recommended that national committees be created and/or strengthened in all countries. Ideally, this should include the national focal points of the Nairobi Convention. Each national committee should, among other things, take the lead in promoting the implementation of national commitments vis-à-vis the IOSEA Marine Turtle MoU by:
  - Developing and overseeing the implementation and regular review of a national turtle conservation and management plan within the country;
  - Ensuring good relations are maintained with regional, national and local groups and individuals interested in marine turtle conservation;
  - Soliciting funding for national conservation activities;
  - Reporting, through its chair, to the WIO-IOSEA Marine Turtle MoU Task Force;
  - Providing inputs of national activities to the Regional Task Force.

Participants further recommended that a formal letter should be sent to the coordinator of the Nairobi and Abidjan Convention secretariat by the Coordinator of the IOSEA-MoU outlining the recommendations and resolutions of the workshop to facilitate the process of introducing the concept at the next Nairobi Convention focal points meeting.
Closing Remarks

On behalf of the Assistant Director of Fisheries, Mr. Godfrey Monor, Mrs. Martha Mukira congratulated the hosts Kenya Wildlife Service (KWS) and Kenya Sea Turtle Conservation Committee (KESCOM), for the successful completion of the workshop. She extended her gratitude to WIOMSA, WCS, IUCN and WWF-EARO for their financial support and all workshop participants for their active participation and enduring devotion to meeting the workshop objectives. Special thanks were given to KWS and KESCOM for hosting the workshop as well as providing organizational and logistical support before and during the workshop. She finally thanked the Whitesands Hotel management and staff for the excellent services and facilitation provided.
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