Presentation Notes

A Regional Perspective on MPAs in the Western Indian Ocean

Escale Vacances Hotel, Rodrigues Island, Mauritius

9-14 May 2007

Prepared by the staff of *Shoals Rodrigues*, Point Monier, Rodrigues. 2007.

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Part I. Progress of MPAs in the Western Indian Ocean: Success & Disappointments

Gina Bonne, Chargé de Mission, Indian Ocean Commission – The Indian Ocean Commission and its Major Marine Programmes

The presentation introduced the Indian Ocean Commission (IOC); its purpose and some of the different programmes within the IOC. The talk specifically highlighted 7 of the projects concerned with the marine environment and for each of these projects discussed their aims and objectives and expected results: (1) Regional monitoring of fishing in the South-West Indian Ocean; (2) Regional project surveying large migratory species; (3) Regional project tagging tuna in the Indian Ocean; (4) Development of a regional network of MPAs in countries of the IOC; (5) Regional programme of sustainable management of the coastal zone in countries of the South-West Indian Ocean; (6) Development of a maritime highway and prevention of oil spills; (7) Development of a regional strategy for fisheries and aquaculture.

Remi Ratsimbazafy, Project Manager, WWF – The Western Indian Ocean MPA Network

The talk introduced the project "The development of an MPA network in the countries of the Indian Ocean Commission", which is being executed by WWF Madagascar through the Indian Ocean Commission. The talk explained the origin of, and the different aspects of the project, which is funded by WWF, Fonds Français pour l'Environnement Mondial, Conservation International and the Ministère des Affaires Étrangères.

There are more than 20 MPAs in the region, but these have been put in place individually without a comprehensive scientific analysis at a regional level; habitats and specific sites for flagship species are not well represented; MPA managers are not sufficiently trained and there is little opportunity for training. The history of the project was then explained: the value of MPAs was first agreed in November 2003 and this was followed by regional events such as SIDS in January 2005. The financial agreement was then signed in February 2006. The overall aim of the project is to: "Contribute to the maintenance of the biodiversity and the coastal and marine resources of the Western Indian Ocean Marine Ecoregion through a coherent regional network of effectively managed marine protected areas". The project components are: Development of a regional strategy; Creation of new MPAs and support for existing ones; Development of a regional forum of MPA managers; and Development of an awareness and communication programme. Regional strategies include aspects such as ecological, biological and socio-economic assessments; root cause analysis; data compilation (GIS); prioritisation and strategy formulation. For the MPAs, this involves supporting the Moheli Marine Park as well as other prioritised areas; Supporting initiatives relating to MPAs (e.g. coral reef monitoring); Supporting marine resources management; and supporting MPAs in gaining international designation. The MPA Manager's Forum will involve annual meetings, exchange visits and the development of a website. Finally, the communication and awareness aspect will include elaboration of the communication plan and development of a project website.

Alasdair Edwards, Senior Lecturer, University of Newcastle upon Tyne: Darwin Initiative – Workshop Organisation

The talk introduced the Darwin Initiative and the project in Rodrigues, supporting Shoals Rodrigues and the RRA in the establishment of 4 marine reserves in the northern lagoon. The history of the workshop was then explained: it began as a small workshop through the Darwin Initiative, where one output was "a marine reserve workshop for regional and international delegates", during which knowledge could be shared between international delegates and Rodriguans involved in the development of the marine reserves. In order to include the wealth of knowledge from the Eastern African countries, WIOMSA then became involved and it also became apparent that WWF and the IOC were also involved in the development of MPA projects in the region. It was then decided to

combine the workshop and the WIOMER MPA Manager's Forum into one event. Finally, ReCoMaP became involved, resulting in the final workshop and all the delegates present today. Alasdair also took this opportunity to thank Tara Hooper from the Marine Education Trust for all of her work organising flights and accommodation for the international delegates and to Shoals Rodrigues for their work here in Rodrigues.

Fiona Gell, Wildlife and Conservation Officer, Isle of Man Government – Community Involvement in Marine Protected Areas

The talk discussed some of the different aspects of marine conservation and fisheries in relation to MPAs in small islands.

The history of community involvement was first discussed: many MPAs are established opportunistically, with few guideline to follow and little support. However, the inclusion of the local community is very important and can determine the success or failure of a project. The talk highlighted what can be done in terms of community involvement before, during and after the establishment of MPAs e.g. good awareness, combining local knowledge and science and ongoing communication with stakeholders. The talk stressed that education at every level is vital and that although many communities already have a good understanding, there is also a need to understand the problems and risks involved, to keep people up to date on the activities affecting the sea as well as initiatives taking place elsewhere.

One important aspect is to correctly identify the key stakeholders: representatives aren't always obvious especially with fisher groups and so there needs to be an understanding of the community and, less vocal groups and individuals also need to be included. This takes time and resources, and a further problem is who decides who the key stakeholders are? Stakeholders also need to be involved at an appropriate stage and this depends on the time and resources available as well as the type of decisions that need to be made; a high level of participation is ideal, bit isn't always possible.

The traditional approach is for experts to take decisions first and then try to secure an agreement from the community, however people then tend to feel that the decisions are being imposed on them and so resist. A more collaborative approach is therefore to start with the stakeholders at the beginning and decide and secure the decisions together.

Local knowledge for example from fishers and divers is extremely important, and gives the long term context, whereas science can often only give a snap-shot view. The best option is therefore an on-going process, involving an exchange of information between the local community and scientists. Ongoing communication with stakeholders is also very important and stakeholders need to be regularly updated through newsletters, information boards and events; this deals quickly with concerns and questions. There is a need for appropriate media and making the information available in formats that are suitable for everyone; the information also needs to be repeated and given to new users of the area.

The talk then discusses 4 case studies:

(1) St Lucia: The government attempted to design a system of MPAs, however this failed. A new participatory approach was however very successful. The MPA has now been in place for 12 years and is managed by a committee representing the different stakeholder groups. There was good initial awareness, which has been built on and a good combination of science and local knowledge, however, some groups still felt that they weren't included in the consultation and management.

(2) Calf of Man: the area is a very well studied area due to the presence of a marine laboratory and so was suggested as an MPA. The community however felt that it was being imposed on them by outsiders and so rejected it. Although it was based on good science the local community was not involved enough in the early stages.

(3) Port Erin Closed Area: Main fishery is scallops, caught by dredging. An experimental project looked at the effect of dredging by closing an area of 2km^2. Initially, the area wasn't accepted,

but over time the effects became apparent and support was gradually built-up. The fishers were updated on the project through newsletters and became involved in monitoring the effects and now it is widely supported with fishers pushing for more closed areas.

(4) Rodrigues: education and awareness-raising is the key and this is carried out through school and youth training as well as fisher training and the local knowledge gained is combined with on-going research. As a result, there is now a high level of awareness around the island.

Conclusions: there are lots of ideal approaches but they need to be realistic and every situation is different. How the community is involved depends on the resources available, the community and the type of MPA. However, participation, communication and collaboration are key.

Questions:

Remi Ratsimbazafy asked can you give a good example of somewhere where local knowledge and science are combined. Fiona answered, here in Rodrigues, where Shoals staff talk to local fishers and then have the capacity to go and investigate the issues they are talking about and act on them through research.

Suzannah Walmsley asked what the different conflicts were in St Lucia and how they were resolved. Fiona answered that there were conflicts between fishers and tourism however these were overcome through a zoning plan, which included fishing priority areas, mooring zones for boats as well as completely protected sanctuary areas.

Innocent Wanyonyi stated that it is very interesting how far we use local knowledge to take decisions and that this is an interesting issue to follow up in later discussions.

Eric Blais and Liliana Ally, Director and Education Officer, Shoals Rodrigues – The Development of Marine Reserves in Rodrigues

The lagoon fishery is very important in Rodrigues and there are 2,000 registered fishers with a further 2,000 fishers fishing on a casual basis, which makes up almost 10% of the population. The fisheries are however being overexploited, too many fishers catch small immature fish and bad fishing practices damage the lagoon and reef habitats. Marine reserves were therefore suggested as a solution to promote the sustainability of the fishery and to protect habitats. The reserves were initially decided through stakeholder meetings held at 18 fishing villages around the island and this gave the fishers a sense of empowerment as they were involved at a very early stage. A GIS of the Rodrigues lagoon was also used to ensure that the reserves contained a range of different species and habitats. The results of these studies were then passed on to the Rodrigues Regional Assembly through meetings of the Coordinating Committee for Fisheries and Marine Resources. As a result, 4 marine reserves were proclaimed in April 2007; these were Rivière Banane (degraded habitats that need protection to recover, but good snorkelling), Anse aux Anglais (degraded habitats but a potential spawning ground for fish), Grand Bassin (big fish and a potential spawning ground) and Passe Demi (good dive site). Shoals Rodrigues is now working to support the development of these 4 reserves through a combination of research, training and education.

Research: Coral reef monitoring is carried out at 13 sites (6 inside the reserves; 7 outside) twice a year using the GCRMN techniques for assessing benthos, fish and invertebrates; Lagoon habitat surveys are carried out at 8 sites each year, assessing 3 habitats; Fisheries assessments are also undertaken working with 4 seine net fishing team and socio-economic monitoring started in 2006 at Rivière Banane. Feedback to the stakeholders is important and results of the scientific studies are explained to the fishers; annual stakeholder meetings are also held to discuss the progress of the marine reserves and for fishers to voice their concerns.

Training consists of capacity building, usually through visits by international scientists who train local NGO and government staff in aspects such as scientific survey techniques and data analysis.

Education: Education sessions for fishers involve theoretical and practical sessions and are held in 3-4 villages each year; 3 posters have also been designed highlighting the importance of marine reserves

and the effects of bad fishing practices. Primary school visits take place in each of the 13 schools and school groups also visit the Shoals Centre for activity sessions; various resources have been designed for this age group, including the Treasure Chests and Discovering the Ocean World primary school pack; Environmental Corners in each of the schools also act as a teaching tool. Workshops are held in order to demonstrate to teachers how to use these resources and how to incorporate the marine environment into the national curriculum and have been attended by over 70 teachers. Club Mer is a Saturday club for teenagers which involves lectures as well as practical sessions, swimming and snorkelling lessons.

The future work of Shoals Rodrigues involves the demarcation of the reserve at Rivière Banane with funding from the IOC; the development of alternative livelihood schemes, a continued education and awareness-raising programme and continued biological and socio-economic monitoring to assess the success of the reserves.

Questions:

Paul Siegel said that a key issue is alternative livelihoods, so what is the answer? Eric answered that he always asks fishers what they want to do and passes their suggestion on to the decision-makers through the Coordinating Committee.

Dev Ramgolam asked if the reserves extend off-lagoon and if so, how far? Eric stated that the reserves are half inside the lagoon and half outside.

Dixon Wariunge asked, where is the overfishing problem – there are only 4,000 fishers in a very large lagoon. Eric answered that the lagoon is very shallow and so there is a lot of trampling damage to the habitats which reduces fish populations; the island is also very isolated with a limited larval supply. Other problems where highlighted by Iain Watt (land-based erosion leading to sedimentation) and Sabrina Desiré (illegal fishing).

Jean-Baptiste Zavatra asked what management there is of the reserves. Eric answered that there are regulations in place and these are enforced by the Fisheries Protection Service and National Coastguard, however the laws are not well respected. Sabrina Desiré added that there are specific laws, for example a closed season for the seine net fishery.

Anfani Msoili and Mohamed Mondhiri, President of the Managing Committee and Activities Coordinator, Mohéli Marine Park, Comoros – La Démarche Participative pour la Mise en Place du Parc Marin de Mohéli.

The need for a marine park – studies carried out in 1985 highlighted a large decrease in fish catches. A demand for technical and financial support for the creation of a marine park was then made to the government in 1990 and this was agreed in 1998.

Objectives of the park are to: ensure the conservation of marine and coastal biodiversity; ensure sustainable use of the resources thus improving the living conditions of fishers; and supporting the development of ecotourism activities.

The methodology adopted was based on participatory management, whereby the local communities and the politicians shared the management decisions and responsibilities.

The stages in the development of the marine park were:

(1) A workshop on protected areas; (2) An inventory of the different methods of exploitation as well as identification of the decision-making structure in each village; (3) Definition of the objectives of conservation and on the delimitation and zoning carried out with the local communities; (4) Discussions of appropriate regulations and signing an agreement of co-management between the government and each village; (5) the park was officially created on the 9th April 2001; (6) A management committee consisting of 16 members composed of representatives from the community, the state and civil society was put in place.

The marine park is 404km^2 and includes 10 villages with a total population of 10,000 of which 250 are fishers (2/3 of total number of fishers). It is a global biodiversity sanctuary, which is home to dugongs, whales, dolphins, turtles, 100s of reef fish species and seabirds. It includes 91 hectares of mangroves, fringing coral reefs, seagrass beds, sandy beaches where turtles nest and 8 offshore islands.

Results to date: destructive fishing practices (e.g. dynamite fishing) have been greatly reduced (by up to 100%); the mining of corals for construction has been stopped; poaching of turtles has declined; and the removal of mangroves and sand has decreased; the number of beaches on which turtles nest has increased; as has the percentage cover of live corals and dugongs have now retuned to the area; fish catches and associated revenue for fishers has increased; and the number of tourists visiting the areas has increased. There have also been positive impacts on other communities outside the marine park and other communities now want to develop protected areas.

The challenges are: changing the way of thinking of the community; an effective transfer of management from the government to the local community; obtaining knowledge of the biodiversity in the region and on the management of natural resources by the community; the park has now become a zone of scientific interest for researchers.

What shouldn't be done: execute a programme of activities without taking into account the capacity of the community and their confidence in you; ask the community to deliberate issues which they don't control.

Factors which determined the success are: use of traditional knowledge; transparency of the decision-making process; the advice and technical support of the UNDP in establishing a strategic partnership.

What is still to do: consolidate the knowledge of the communities through capacity building; set up a Geographical Information System to manage the data.

Questions:

Jaomanana asked what happened to the increased revenue generated as a result of the increased catches? Anfani answered that this went directly to the fishers themselves. Jaomanana also asked whether the increase in turtles was causing beach erosion? Anfani answered that although there are a lot more turtles than there were before he doesn't think that they are causing degradation to the beach zones.

Denis Etienne said that the figures given for the declines in illegal fishing were very encouraging, but how were the figures obtained? Anfani answered that the local community was involved from the beginning, particularly in the enforcement for example the prevention of turtle poaching. Hajanirina Razafindralambo asked how the responsibility was shared between the different communities. Anfani replied that each of the 10 villages within the Marine Park, has its own geographical area to take responsibility for out to a depth of 100m, and that includes management of fishing activities and illegal fishing.

Alasdair Harris and Francisco Ramananjatovo, Blue Ventures Conservation and Wildlife Conservation Society – "To Live With the Sea" – The Velondriake Network of Marine and Coastal Protected Areas, Southwest Madagascar.

The presentation highlighted the results of an experimental No-Take Zone for octopus and how this has led to a much more ambitious multi-zone MPA.

The study started in Andavadoaka, an isolated village with 1,200 inhabitants, which is very dependent on the sea (fishing is the primary activity for 71% of villagers). Octopus tend to be caught by women and children walking out into the reef at low tide, but now men also skin dive for octopus. The arrival of export companies in 2003 has meant that there is now access to a lucrative market, however this commercialism has increased the fishing pressure on octopus and has resulted in a decline in the fishery. Octopus catches represent 75% of fishery landings in Madagascar and so are very important. Their short life span and rapid growth means that they are very vulnerable to overfishing, but it also means that management measures may have a very rapid effect on recovery.

Discussions were held with stakeholders and it was agreed to implement an experimental No-Take Zone in November 2004 in order to maintain sustainable yields, increase the size of octopus caught, increase the price paid to fishermen from octopus and integrate resources monitoring. The No-Take Zone was 200 hectares, protected using the local law 'Dina' with guardians hired by fishers to prevent poaching. There were 2 closure periods: 1 for 7 months from November to June and 1 for 4 months from December to April, as well as the national fishery closure. The success of the No-Take Zone was monitored by collecting fisheries data before, during and after closure and comparing this with data from control sites. The results showed that after the 1st closure, the number of octopus caught increased by 13-fold and the weight of octopus caught increased by 25-fold. After the 2nd closure, there was a 4-fold increase in numbers and a 7-fold increase in weight. The increase after the 1st closure was more dramatic, but the increase after the 2nd closure was more sustained. The mean weight of individuals more than doubled and there was a highly significant increase in the size frequency of octopus after each closure. Catch per Unit Effort, however decreased after the 1st closure due to fishers travelling long distances to fish in the area once the No-Take Zone had been re-opened. After the 2nd closure, fishers in neighbouring villages were told that this was not acceptable and there wasn't such a decline in CPUE.

Conclusions: a short-term closure led to an increase in weight and number of octopus caught as well as an increase in the mean weight and the size distribution and this increased the revenue for fishers. The results were seen as very impressive and there were requests for further No-Take Zones and then more expansive protected areas protecting other species and habitats.

Studies were then undertaken to put in place a development plan affecting 23 villages. The plan aimed to be appropriate, adaptive, agreed by and easy to manage by the community. The objectives of the project are to: maintain ecosystem functioning; promote ecotourism; sustainable fisheries management; maintain or increase catches; insure against management failure; and simplify management. There are now 8 permanently closed areas; 16 zones of temporary closure, 3 natural reserves (terrestrial) and 2 Fish Aggregating Devices. The different habitats, fishing sites and closed areas have all been inputted into a Geographical Information System.

The management committee has a representative from each of the 23 villages, chosen by the villagers. There are 3 subcommittees and a management committee elected by members of the 3 subcommittees. The committees consist of men, women, fishers, collectors, village leaders, village authorities, teachers and members of a small NGO. The decisions are made from the bottom up, but the final decision is made by the General Assembly. Stages that have already been undertaken: Adaptation of regulations for the management of the zone based on the local laws 'Dina'; formalisation of the association; provision of an office based at Andavadoaka; identification of methods for adaptive environmental education. Future perspectives include: development of tourism befitting the local population; reinforcement of the capacity of the committee and the population in order to ensure that scientific and socioeconomic monitoring is put in place; improvement of the system of management of the MPA; improvement of the ability to obtain future funding.

Questions:

Lynda Rodwell asked if 7 months closure is long enough to tell if there's going to be a long-term benefit. Alasdair replied that the closure duration and dates were decided by the community and that they coincide with the cyclone season and the reproductive period of the octopus. However, the average weight of octopus does remain double pre-closure values for 3-4 months after the No-Take Zone is opened.

Pierre Pistorius asked if increased activity around the closed areas could cause octopus to move into these areas from outside, producing the higher yields observed. Alasdair replied that octopus are very territorial and that adults move offshore into deeper water where they aren't fished, therefore in the No-Take Zone there will be growth of juveniles rather than adults moving in. Additionally, octopus only have a life-span of 2-3 years.

Innocent Wanyonyi commented that this talk introduced the importance of branding, giving the project a name: "To Live With the Sea".

Aurélie Thomassin said that after the 1st opening of the No-Tale Zone fishers travelled a long way to fish in it. When the MPAs are increased, would there be a similar problem for villages on the periphery of the MPA? Alasdair answered that everyone came to see it because it was a demonstration project and the villages at the edge of the MPA would probably have a similar problem. They tried to overcome the problem through sensitisation sessions with neighbouring villages and discussed various options, but in the end they told people they could only fish there if it was their traditional fishing grounds and that seemed to work.

Lynda Rodwell commented on this question and asked if there was any consideration of making the areas permanently closed? Alasdair replied that there is now interest in more expansive permanent reserves and there are now 8 permanent reserves in deep water, but there is no plan to close the reef flat areas permanently.

Vineeta Hoon said that in the Lakshapweep islands there is natural closure due to the monsoons and asked if it was the same in Madagascar? Alasdair answered that there is a cyclone season from November to March, which limits offshore fishing, but people still fish.

Haji Mahingika stated that in Mafia Marine Park they have a temporary closure of 18-20 days and that the participation of the community depends on them understanding the problem. This highlights the importance of collaboration between social and natural scientists.

Vineeta Hoon, Centre for Action Research on Environment Science and Society, India – Supporting Environmental Stewardship: Conservation, Livelihoods and Environmental Education in Lakshadweep

The Lakshadweep islands are 36 islands off the southwest coast of India with a very large lagoon but also a very high population density.

The 1st programme initiated was community-based monitoring of reef related activities, which involved trying to understand what pressures there were on the marine environment and to collect quantitative data to show to the government that their laws weren't being implemented properly. As part of the programme various activities were surveyed such as SCUBA diving and snorkelling, coral collection, cowrie collection, octopus and net fisheries.

Challenges: initiating the participatory process; facilitating the establishment of an environmental education programme through socio-economic monitoring; evolving into a mechanism that gathers good reliable data; exploring alternative livelihood options; integrating livelihoods with conservation; and keeping going with interrupted funding.

The programme was set up in 2001 and the first activities undertaken were to establish the socio-economic assessments; document activities and traditional knowledge; understand livelihood options and establish monitoring of reef resources use. The most important aspect was to establish partnerships, trust and ownership. The monitoring activities started in 2002 and the environmental education was started in 2004, including teachers' orientation workshops and fieldtrips for the children. The biophysical monitoring programme started in 2005 based on snorkelling in the lagoon and in 2006 the livelihood programme was introduced, encouraging women to export dried tuna fish to Sri Lanka. The main problem is interrupted funding and during periods of no funding, skeleton projects were carried out, they worked with other NGOs in the Lakshadweeps and carried out public meetings.

Building environmental stewardship – school children were taken on fieldtrips to learn about the marine environment and they then gave public presentations on what they'd learnt.

Monitoring – this included resource-use monitoring as well as fish census, benthic monitoring and invertebrate monitoring. The data were used to develop resource maps in collaboration with the local fishers. Although scientists were not very impressed by the reliability of the data it provided very good training. Results of some of the surveys were then highlighted in the presentation e.g. coral cover; amount of boulder, shingle and sand collection, reef gleaning figures, and fish catches in the lagoon.

Lessons learnt – the process requires constant engagement and discussion; it needs frequent interaction to improve skills and motivation and it requires facilitation for feedback loops. Scientists feel that rigour is very important but it is also very important to engage the local community.

Livelihood enhancement – a number of issues need to be addressed when selecting the livelihood strategy: conservation needs to yield a high income, empower women, and address traditional values. The livelihood option they came up with was drying tuna fish. The fish are caught by the men and then processed by the women for export to Sri Lanka. Milestones to date are: the village has offered space for establishing the unit, 26 women came forward to work, a market study was carried out and a distributor located in Colombo.

In conclusion, the most important aspects are perseverance, commitment and transparency in all partnerships especially with the local community

Questions

Alasdair Harris asked how they reconciled the problem of conflict between scientific rigour and community participation. Vineeta answered that scientists just undertake their own research, but it is very important for the community to be involved in the science so that they start to understand how important the data is. Now the scientists carry out their own studies but the local community validates the data.

Innocent Wanyonyi (Regional coordinator SocMon WIO, CORDIO, Kenya) – Integrating Socio-Economic Monitoring at Coastal Management Sites in the Western Indian Ocean

The presentation introduced SocMon and outlined its aims and objectives: Its aim is to increase coastal manager's capacity to understand and incorporate the socio-economic concept into management. Its objective is to establish locally based teams to conduct regular monitoring of socio-economic indicators to provide data for local management decisions, which are linked into one regional network. Mr Wanyonyi emphasised that managing MPAs is a matter of managing the resource user's attitudes and behaviour rather than the resource itself and management teams need to adapt and respond to changes in the resource user's socio-economic context. The ability to incorporate socio-economic considerations into management determines the success or failure of the MPA as this information can be used as an early warning system to guide strategies to improve resource status.

SocMon WIO was established as a result of a workshop held in 2003 to examine the status of socio-economics in WIO. The workshop indicated paucity of socio-economic data and a lack of capacity in the regions to carry out socio-economic monitoring. SocMon success depends on building partnerships at the site (identification of socio-economic indicators, implementing plan through a local authority), regional (co-ordination, monitoring and support) and global (transfer of technical skills across the region) levels and is based on stakeholder participation. They use these partnerships to try to address goals of management by identifying threats, problems, solutions and opportunities as well as to determine the importance and cultural significance of the local resources and their use. It is also possible to asses the positive and negative impacts of management, assess management effectiveness and establish a community profile using socio-economic information.

The main achievements of SocMon so far include the drafting of standardised regional guidelines in 2005 and the publication of the SocMon WIO manual published in April 2006. This manual is currently being translated, in collaboration with ReCoMap, into Portuguese, French and Kiswahili to make it more accessible to the region. Another major success is the establishment of the network to include 12 sites, which it is hoped will be expanded to 15 sites by December 2007. The network allows feedback to reach the community and target a variety of audiences. Although great successes, there have also been challenges and lessons learnt. Local differences between the sites have necessitated a degree of flexibility and different assessment approaches to account for these differences. There is also a high cost of publication of the manual and the translation process is tedious. The joint partnership at some sites often leads to additional co-ordination costs and the need for sustained funding. It is also important to take a participatory approach with the community at an early stage and provide complete training to team-members as this has a great bearing on the success

of implementing SocMon, especially in terms of passing the information back out to the wider audience.

Questions:

Hajanirina Razafindrainibe asked to what extent the community should be involved in the process of managing MPA's. Innocent explained that community involvement varies from country to country and can assist in the process provided they are informed of the steps involved. It is unwise to include them to such an extent where the project may be comprised and in such cases it is better to keep the community involved through regular feedback.

Paul Siegel asked how SocMon identifies socio-economic indicators, as these are not always easy to identify. He also enquired as to where manager's may be able to get hold of the manual and whether it would be possible to attend workshops for training. Innocent replied that socio-economic indicators are listed within the manual and are identified by the objectives those managing an MPA want to achieve. The manual is available by post or as a download at www.reefbase.org. As for training opportunities, anyone is welcome to attend SocMon sessions.

Veneeta Hoon asked how many of the MPA's listed existed before SocMon and how many resulted after SocMon began. She also asked whether it wouldn't be possible for each country to translate the manual themselves rather than SocMon having to do it. Innocent explained that some of the MPA's existed before while others came after the transition period. As for the manual, they did consider this but when they asked if there was anyone willing to do the translations, no one came forward.

Eric Blais stated how important SocMon is in implementing MPA's and allowing effective management of those already in place through training and information.

Suzannah Walmsley (Fisheries Consultant Marine Resources Assessment Group) – Encouraging Community Involvement in MPAs: Issues and Approaches

Susannah began by emphasising how MPAs can have a profound impact on the community but are often not established with their best interests in mind. Often, the community suffers the short-term cost but through the use of local knowledge, skills and resources, effective management is possible. The 3 main problems facing MPAs are issues with sustainable management, non-compliance undermining management and ecological design problems, resulting in poor outcomes. All of these are interlinked and have knock on effects.

The presentation then outlined 3 examples of how management affects the success of MPAs:

1) Apo Island, Philippines – research and education and awareness campaigns were carried out before the implementation of the MPA. When the sanctuary was established, the small and discrete community managed it directly, resulting in no enforcement problems and good ecological success.

2) Sumilon Island, Philippines – the area was protected then fished and then protected again, so the effects on the coral and fish were less pronounced. As there is no resident community, raising awareness was difficult and compounded by political issues. This example illustrates how stakeholders like the government can considerably affect MPA success and without community involvement, the MPA has little chance of success.

3) Lake Chilwa, Malawi – Suzannah used this example to illustrate how fishermen are mobile and travel great distances to reach fishing grounds. On Lake Chilwa, there are specialist fishers that follow the fish around the lake and are therefore dependent on the fish for their livelihood. The settled lakeshore farmer-fishers only exploit the fish seasonally when it's available and diversify into farming to make up the shortfall. Consequently, a co-management strategy based on the sedentary fishers would automatically exclude the fishers that are most dependent on the resource. This is an important factor to managing MPAs in these circumstances.

The main points to consider from these studies is that the local community will help provided that the benefits of the MPA are fed back into the community to compensate for those whose livelihood is

adversely affected. The MPA guidelines for the Caribbean illustrate tools for community involvement and outline how important it is to emphasise the benefits to the community, for example, tourism, alternative livelihoods (e.g. commercial ventures and aquaculture but these must be considered in the early stages) and empowerment through knowledge gained. It is also necessary to explain the short-term loss as a long-term gain in terms of continued access to the resource in the future.

Suzannah then introduced ParFish (participatory fisheries stock assessment), an approach developed in Zanzibar that highlights the tools available to support resource assessment, which can be applied to MPA issues. It operates on a participatory framework with the local fishers, using their knowledge of the area to contribute to the assessment from an early stage, in a 6-step process. The initial tools include stakeholder analysis, a communications plan and meetings with the stakeholders to set the objectives for the assessment and introduce new concepts and participatory mapping. When stakeholder assessment interview data (to incorporate local knowledge), fishing experiment data, catch-effort and fisher preferences (the outcomes they would like or dislike) are entered into the ParFish software, the result is an estimate of the state of the fishery resource and recommended levels of control. These outcomes can then be communicated back to the fishers in terms of stock size, fish catch and growth and discussed to result in successful co-management. The relevant information on ParFish and the toolkit can be found at www.fao.org, www.mrag.co.uk and www.fmsp.org.uk.

Questions:

Aurelie Thomassin asked how ParFish can be put in the context of Reunion. Suzannah replied that it is important for methodologies to be adapted to local communities/context. ParFish provides an approach for stock assessment and involves the local fishers in that process.

Stephen Mangi asked who they use as a target for the software? Suzannah explained that the Institute of Marine Science developed the software and training is needed to carry out the assessment. You need to coordinate the assessment and carry out the analysis on the software. The implementing institution could take the results and interpret it for the fishers. Their input can then be asked.

Said Ahamada queried how much information you can trust from the fishermen. Suzannah explained that in Parfish, the assessment is based on biological data of the fish stock but socio-economic aspects are included, as any management options will affect the fishermen. It doesn't include more general aspects.

Vineeta Hoon posed the question of refrigeration – if there are no facilities, the fishers will need to fish every day rather than 2 large catches a week. Suzannah indicated that this is not included in the marketing aspects but management can be tailored to fit the situation in that sense.

Lynda Rodwell (Lecturer in Environmental and Resource Economics) – Environmental Conflict Management in Mombasa Marine National Park and Reserve, Kenya: A Multicriteria Spatial Approach.

Lynda began by introducing herself. Her first interest in MPAs came through her PhD, with particular interest in the potential enhancement of fisheries. She recently completed a study using Mombasa Marine Park with Arthur Tuda, the outcomes of which are presented below.

The park itself is a small no take zone (6km^2) and the reserve extends past the lagoon area (200 km^2). The lagoon is considered multiuse and is a source of livelihood for many people. The main problems associated with the multiuse approach can be broken down into 3 areas: nearshore (jetskiing, boating, swimming and beach seining), beach (commercial and recreational activities, beach protecting and turtle nesting areas) and reef (leisure walking, gleaning, diving and coral reef habitats). In order to protect these areas, it is necessary to identify management options and develop a series of methodologies to minimise conflict between the various activities.

The methodologies include the Multicriteria Decision Analysis (AHP) process, Geographical Information Systems (to map habitats and activities and how they might be affected) and Mathematical or Integer Goal Programming (to find the optimal solution regarding which activities should continue and which should be stopped). Phase 1, the AHP process, involves identifying the

goal, assigning objectives to the goal and identifying the attributes for each objective. The objectives are placed in a matrix, assigned weights and compared. A score of importance for each objective is then calculated based on how two objectives compare. The weights for each objective are then normalised to find the average weight, also known as the conflict score. Phase 2, the use of the GIS, combines the scores for each activity to create map layers and a conflict score for each location, which can be compared. The result is a scale of low to high conflict scores for each area, which can be translated into rankings of conflict to compare. The final phase, using the IGP model, selects the activities that will minimise conflict under the present management scenario.

The three phases of the process include identifying the objectives, producing a series of conflict scores for each location (which can be compared) and optimisation, where you try to minimise conflict. The end result of these methods is a system to decide which activities should continue and or should be excluded from particular regions. The main shortcoming of the study is that it is a subjective process and the importance or weighting of each objective may alter depending on who is involved in the process. Despite this, combining these tools can improve the spatial planning process and can be altered depending on the objectives.

Questions:

Denis Etienne commented that the tool is trying to put the project into specific parameters. He then asked how you incorporate unregistered fishermen or different influences such as politics, which can change the result? Do you notice a difference between the study and reality? Lynda answered that there are a large number of stakeholders, which have to be included to a certain extent in the process. The sensitivity can be altered to include as many people as you like but this would produce different results due to the weighting. You would need to completely explain how it works to the fishermen and they won't necessarily agree that fishing causes conflict. The weights would have to be adjusted to consider sensitivity where it occurs. There is a great potential to include stakeholder views.

Faliarimino Rakotomanana asked what are the necessary conditions for being able to feasibly use the tool in Madagascar. How long will it be before it is a widely applicable tool? Lynda emphasised that this was a theoretical piece of work that can now be put into the field to see how it can be applied. It is difficult to tell how long before we can see if it will work in practise but the long term goal is to use the model to identify areas of conflict. These results in the field will have to be validated.

Jocelyn Bezara queried whether anyone had considered yet the changes that could occur in the fishermen. For example, they could change their sector of activity for a period of time. Lynda replied that it is too early to predict the effect on fishermen but beach seining, for example, conflicts heavily with the other objectives. This may lead to more emphasis on eliminating or reducing certain activities. Zoning and spatial planning may be key to this process.

Dixon Waruinge (Programme Manager, Nairobi & Abidjan Conventions, UNEP, Kenya) & Julie Church (formerly IUCN, Kenya) – Managing MPAs: A Toolkit for the Western Indian Ocean

Dixon began the presentation with an overview of the Nairobi convention (set up for the protection, management and development of marine and coastal environments in the East Africa Region). Convention came about in 1981 due to growing concern that development was having a considerable impact. It was ratified by all countries in the WIO in order to help develop partnerships with NGO's and key stakeholders and execute regional projects. Each country appoints a focal person who helps identify the collaborating departments, provides technical support and interacts with United Nations agencies. By 1996, the convention was well established and the question of how to manage the 50 or so MPAs already established and implement a structure to include the community now arose. A series of surveys and assessments between 1999-2001 indicated there were few trained managers and that there was little recognition for the competence and skills of the current MPA managers. Consequently, there was a need for training that would allow MPA management to be recognised as a profession.

It was decided that a proactive toolkit was needed to provide a hands on guide on all aspects of MPA management (including communications and planning) that would be generally applicable to

community, NGO led or government managed MPAs. It contains information from global sources but with specific reference to the 9 countries in the Western Indian Ocean. The finished manual was published in 2004 and introduced to scientists at the 10th Coral Reef Symposium in Okinawa, Japan. The toolkit is structured in 2 parts: Management and conservation, each supported by theme sheets. The Management section includes legislation (e.g. MPA definitions), participatory processes (e.g. conflict resolution), planning and reporting (e.g. MPA design/zoning, ecological integrity), human resources/finances/equipment/infrastructure and monitoring and evaluation. Part 2 includes sustainable use of habitats and species, fisheries and tourism, education and recreation as well as coastal development.

Julie then discussed the introductory training and future considerations. The process was to provide introductory training sessions to 150 MPA managers in the WIO. These sessions introduced and distributed the toolkit, workbook and also wiofish database and provided an opportunity to develop a method for evaluating the effectiveness of the toolkit. Another aim for the sessions was to encourage a dynamic reviewing process whereby a second edition can be produced to build on the current material. It is anticipated that copies will be produced in French and Portuguese as well as English to reach a wider audience. So far three sessions have been conducted in Kenya ad Somalia, Tanzania and the Seychelles with two more yet to come. Feedback indicates the toolkit to be a well-structured comprehensive guide that is topic based and provides case studies and recommendations. However, requests have been put forward for more in depth information, cross-referencing and an index for ease of accessibility. It has also been suggested that each new edition includes feedback and lessons learnt from previous editions and from other regions rather than just the WIO. At this point, Julie asked those in the audience that have been present at sessions whether they have been used successfully, many of which replied they had. She concluded that the toolkit is a useful product with great significance for the WIO.

The toolkit is available in hard copy, on CD or at www.wiomsa.org/toolkit.

Questions:

There were no questions after this discussion but Denis Etienne commented that it is a very good product and should be translated in French and distributed to French speaking countries to make it more accessible. It is expected that training sessions will be held to develop the toolkit for further resources. The tool must be used on a global level and a network of the IUCN should allow us to do this. It will soon be urgent to review and reassess information gained.

Paul Siegel (Marine Conservation Advisor, WWF International) – Integrated Coastal Management in West Africa: The Evolution of Integration in Cayar, Senegal

Paul introduced his talk as a practical example of how MPAs fit into the global picture and how it can become a tool for general coastal management. He began by stressing that integrated coastal management (ICM) is about taking a variety of priorities and collating them into a general context, operating at a national (maximising benefits), regional (minimising conflict and negative impacts on resources, people and the environment) or local level. Conservation should be about modifying the community's behaviour as well as the biological science but since many of the people managing MPAs are not trained in social science, the right questions to bring about a change in behaviour are not being asked.

Paul then went on to illustrate the importance of social science using the case study of Cayar (600km from Dakar) in Senegal. Last year, the fishers brought in over 400000 of fish, a large indication of how ecologically important this resource is for employment, food security, emigration, commerce, immigration and traditions. Through fisheries and consensus in the community, it became apparent that sustainable conservation is a factor that has to be considered rather than sustainable development. In Cayar, the evolution of ICM began by speaking to the local fishers and their families, the idea being to have a discussion to articulate the problems with the fishing first and then to come to a solution. This discussion naturally came round to MPAs and by including the fishermen in these initial talks,

they automatically became empowered to protect and control their fishing grounds. However, in order to compile a complete set of issues and conflicts, it was necessary to include a wider set of stakeholders so that the MPA could serve a wider area of people. Once the MPAs were established to protect the marine sector, the more social conflicts such as rubbish were brought up by the fishermen as areas that need to be dealt with. So, the MPA became a tool to help control this problem as well as a pollution resolution. The result of this particular study was the development of a micro finance and more recently a community radio station which covers both terrestrial and marine information that is useful for the whole community. The case study illustrates how involving the smaller community at the start, can evolve to serve a wider community and provide even greater benefits.

He then concluded that ICM doesn't have to evolve from a set point. If you allow the community to find a consensus and initiate activities based on the priorities identified by the community, they will naturally do things within the context of environmental management. In this process, it is important to establish decision making, priority setting, good communication and consultation mechanisms because people cannot solve problems until they realise they exist. Another major consideration is that by working with the community to reach small goals, you build their confidence and have modest impacts that are sustainable and will have long term benefits.

Questions:

Hajanirina Razafindrainibe stated that it is true to that when developing an integrated management plan it's allowed to evolve, but then when the plan's actually out into action it isn't adapted to that specific site.

Paul answered that if we want to create a sustainable situation, you must go beyond the absorption capacity of the stakeholders. In essence, if you only have a set amount of funding over a period, you must only take on projects that can be maintained over a long period through this funding. It is important to raise the most adaptable questions and find solutions but consider that each country has their own peculiarities.

Aurelie Thomassin, PhD Student, Institut de Recherche pour le Developpment, la Réunion - Territorial Disagreements and Agreements: a Geographical Method to Display Social Acceptability of Marine Protected Areas in the South-West Indian Ocean.

The study involves a social approach to MPA management. There are almost 20 MPAs in the region with many more in development. In addition, there is the IOC project to create a network of MPAs, which aims to give some coherence to this increase in protected areas. The study is therefore taking place in a very dynamic time for the development of regional MPA management. It addresses the need to put in place methods and tools that are standardised and comparable between the different MPAs.

A number of different methods are presently available for assessing biodiversity and marine resources: for monitoring the health of coral reefs, there are techniques such as Reef Check, GCRMN and global databases such as Coremo. The development of MPAs also however needs to consider socio-economic aspects, and although the development of standardised tools and methodologies is less developed than those for ecological factors, there is now SocMon, which has been developed by CORDIO. There exists, therefore a number of tools in the region, which could be used to put in place regional management of MPAs. These 2 aspects are however approached in a very independent way, often involving conflict and at present there is no tool to link the environmental and social aspects together in the context of MPA projects. This project aims therefore to propose this type of management tool, using a geographical approach, to link these 2 aspects together in a spatial and territorial dimension.

A territory is a portion of the land's surface, which is occupied by a social group in order to ensure their reproduction and to meet their vital needs. It is very important to integrate this territorial dimension when studying the relationships between a population and the environment that they exploit. There are 3 different types of territories: economic (based on use of the area); cultural (based on the history and local traditions) and legal (based on laws/regulations). When an MPA is developed, this creates a new legal territory, which is superimposed on a network of existing territories created by the local community. This study aims therefore to explore this territorial dimension and show how the

new territory, the MPA, can most easily be combined with the existing territories. Superimposing a new territory onto other territories constructed by the local community can result in both agreements and disagreements. Agreements occur when the purpose of the 2 territories overlaps for example if the MPA is placed in an area that is culturally forbidden or dangerous then this will be socially acceptable. If however, the MPA is placed in an area that is culturally important for fishing then this will result in potential conflicts.

The objectives of the study are to: develop a geographical approach to resolve the problems related to MPA management; propose a management tool, using GIS which is able to link ecological and socio-economic data; identify zones of territorial disagreement in order to allow managers to highlight priority actions; test the generic suitability of this tool in order to contribute to a regional MPA management initiative.

The study will be undertaken in La Réunion, Rodrigues and Comoros. All countries have employed a participatory approach in the development of their MPAs however there are different socio-economic contexts and the MPAs are at different stages of development.

The study will initially involve a library search, combined with interviews with the different managers in the region in order to develop a protocol which will allow the network of territories to be characterised. Data on the MPAs will then be collected through interviews and remote sensing; these data will be inputted into a GIS and analysed spatially. This will allow comparisons between the sites and identification of conflicts and regional indicators.

Questions

One of the Malagasy delegates asked how other cultural and anthropological aspects will be integrated into the study. Aurelie answered that this is just the beginning of the project but a participatory approach (e.g. participatory mapping) will definitely be used.

Pamela Bapoo-Dundoo, National Coordinator UNDP GEF Small Grants Programme – Challenges of Funding Community-Based Fisheries-Related Projects

The UNDP has 3 themes: social, economic and environmental and has a number of key environmental programmes. The Global Environment Fund (GEF) Small Grants Programme was established in 1992 at Rio and is administered by the UNDP on behalf of the GEF. It is offered in 123 countries around the world and works with local communities on the issues of: biodiversity, reducing the risks of climate change, cleaning up international waters, combating land degradation and phasing out persistent organic pollutants. It provides up to $50,000 grants to NGOs and CBOs with a specific emphasis on: poverty alleviation, local empowerment, participation of women and vulnerable groups. The SGP meets the challenge by: operating in a decentralised and flexible manner; responding to national and community priorities and needs by being demand-driven; involving a wide variety of stakeholders at the local and national levels. In each country there is a National Coordinator and a National Steering Committee consisting of Ministers of the Environment, Fisheries and Finance as well as representatives from the private sector and NGOs. The National Steering Committee ensures transparent project selection and monitors and evaluates the projects. SGP project development, implementation, monitoring and evaluation is based on participation by community members and local stakeholders and members of the Steering Committee go into the field and talk to the local stakeholders in order to help project development.

Mauritius joined the GEF SGP in 1995 and 75 projects have now been funded.

Capacity building – reinforces capacity in organisations both directly and through project implementation and supports national and international experts.

Policy Changes - have covered all important ecosystems of Mauritius and Rodrigues through inclusion of broad awareness-raising projects.

New technologies and discoveries – in the 11 years a number of new technologies have been developed through the projects and new species have been discovered for example in Rodrigues.

Projects aren't just related to fisheries and other projects include education programmes for girls affected by prostitution and drugs, development of posters to stop the spread of alien species and promotion of sustainable consumption of electricity.

Fisheries related programmes – Mauritius has made impressive economic gains in recent years, but there is a high risk that many people will be marginalised and slip back into poverty unless there is action to help them establish new means of livelihoods. Two of the most vulnerable groups are the small-scale sugar planters and fishers and if these issues aren't addressed then there could be an increase in poverty, which would be very difficult to deal with. In Mauritius and Rodrigues coastal communities are very dependent on the lagoon fishery which results in a number of problems, such as low levels of income and profits from the overexploited fisheries, high dependence on Government support through the Bad Weather Allowance and limited alternative income producing opportunities. The SGP tackles these challenges by funding demonstration projects through NGOs, reinforcing the capacity of individuals and funding projects that have high policy dialogue components. Some beneficiaries of the projects have been: Ex-sand miners who had no employment after sand mining was banned - they were encouraged to develop alternative ecotourism activities such as kayaking, bike riding and mangrove discovery tourism; The Sustainable Reef Fishery project in Rodrigues led to a policy change and the development of 4 marine reserves in Rodrigues; The Environmental Corners project is working to integrate environmental education into primary schools; Fishers who are unable to continue fishing in the lagoon have been supported by the SGP to venture into off-shore fishing through the purchase of a boat; Reef Conservation Mauritius has set-up a project to install permanent mooring buoys around Mauritius to protect coral reefs at popular dive and snorkel sites; use of octopus traps as an alternative method of catching octopus; development of a Marine Environmental Education and Resource Centre on the beach at Perybere in Mauritius; and a sustainable dolphin watching project at Tamarin.

Lessons learnt: Community participation is essential (e.g. fishers wanted marine reserves but not in front of their own village); government commitment is very important in terms of policies (e.g. bad weather allowance; off-lagoon fishing policy without proper loans to buy boats); working relationship between NGOs and the government is important as often the government will block projects because they don't want to work with NGOs; and credibility of NGOs – it is the role of the SGP to act to act as a mediator and support NGOs so that the projects work.

Questions

Denis Etienne made the point that policies are usually written by Ministers who know nothing about the environment or conservation, so projects working in collaboration with NGOs, which can lead to policy change are very important.

Bruce Cauvin, Education and Outreach, Association Parc Marin de la Réunion – An MPA in La Réunion: Here it is, at last!

In Réunion there are 12km^2 of reefs located in the south and west of the island and these consist of embryonic and fringing reefs. The first studies of the coral reefs were carried out by Gerard Faure and Lucien Montaggioni in the early 1970s and no degradation was observed. In the following years however roads were built, cars become more frequent, nautical activities become popular and spearfishing increased. The first signs of degradation were observed in 1977 when sponges were seen to be replacing corals and the numbers of sea urchins increased. In the 1980s the decline of corals was observed by scientists and this was explained by domestic and agricultural pollution. As a result the first wastewater treatment station was constructed in 1985. In 1991 a conference was held to discuss the health of the coral reefs; one of the main results of this conference was the concept of a Marine Park as a possible management tool. The Réunion Marine Park Association was created in 1997 and it's activities included scientific surveys, education and awareness-raising. In the year 2000 consultation meetings were held with stakeholders and a steering committee was created. The National

Marine Reserve was finally officially created in February 2007. The Marine Reserve covers 40km of coastline and includes 20km of coral reefs; it has an area of 35km^2. There are 3 zones: Level 1 - global perimeter where most uses such as fishing are allowed but regulated; Level 2 – increased protection, fishing is forbidden except for traditional and professional fishers; Level 3 – sanctuaries, where all activities are forbidden.

The next steps to manage the reserve are: creation of a screening committee (stakeholders) and a scientific committee; adaptation of the regulations through consultation with the stakeholders; development of a communication plan; choose a manager to implement the management plan; use of eco-guards to enforce the regulations; delimitation of different zones by buoys in two phases: in 2OO7 sanctuaries on the ref flat and in 2008 the outside boundaries of the MPA on the reef slopes.

The main causes of degradation in the last 10 years have been natural impacts such as cyclones (resulting in high sedimentation due to land run-off) and coral bleaching. There are now 14 monitoring sites, 7 on the reef slopes and 7 on the reef flats which are monitored using the GCRMN methods and 5 bleaching events have been observed to date. The reefs are also affected by anthropogenic impacts such as trampling on the reefs in the search for octopus, crabs and molluscs, overfishing, urban pollution and collapsing seawalls leading to beach erosion.

Conclusions: The managers of the Marine Park aim to decrease both the direct and indirect anthropogenic impacts. However, it is also very important to educate the whole community about the need to protect the marine environment and it is therefore essential to continue this work in order to change people's mentality over the years.

Questions

Denis Etienne stated that it has taken a very long time due to a very hard administrative process, therefore well done! He then asked what is the upper limit of the reserves on land? Bruce answered that the reserves go up to the high tide level. Sabrina Desiré asked what the reaction of the fishers was to the reserves. Bruce answered that it had been a very difficult period and that the traditional fishers were strongly against the reserve, however education and awareness-raising is very important and they are now starting to see a change in the mentality of the population.

Alasdair Harris asked what led to this change in mentality, was it coral bleaching? Bruce replied that there had been a lot of media publicity showing the degradation of the reefs and they also focused on young people, reaching over 23,000 young people through education sessions. He stressed that the media is a very useful tool in awareness-raising.

Aurelie Thomassin added a clarification that the zones were all agreed in collaboration with all of the different stakeholders.

Faliarimino Rakotomanana asked why they didn't propose co-management with the fishers and tour operators. Bruce answered that is ongoing now.

Jean Paul Paddack, Regional Representative, WWF Madagascar and West Indian Ocean Programme – The Madagascar Protected Areas and Biodiversity Foundation: Lessons Learned (2000 – 2007) for Marine Conservation

The biodiversity of Madagascar is extremely rich, representing 80% of the world's biodiversity. The marine biodiversity is also very rich and it has one of the largest coral reef systems in the world as well as an extensive area of mangroves. The National Environmental Action Plan (NEAP) was created in 1990 and was divided into 3 phases, each of 5 years. Phase 1 was the set-up of a regulatory framework and institutions; Phase 2 launched the initiatives in MPAs and 3 MPAs were set-up. NEAP is now in it's 3rd phase, mainstreaming and sustainability. At this point 70% of funding now comes from local sources, compared to only 30% which comes from donors abroad.

How was this achieved In Madagascar? The 1st stage was to identify the different financing instruments such as trust finds and debt swaps, tourism related fees, taxes and private sector investments. Financing could come from Government revenue allocations (e.g. bonds, the lottery,

premium priced license plates, stamps); from grants and donations; real estate and development rights; fishing industry revenues (e.g. tradable fishing quotas, fishing fees and fines); or biodiversity prospecting. An exercise of feasibility analysis was then carried out to find out which would have the most impact in the quickest time. For each factor (e.g. coastal zones, pollution, environmental education), they looked at which specific financing method would be the easiest to implement. They also investigated potential new sources of funding for example from the mining sector, oil sector and fishing.

After analysis, finance through a trust fund appeared to be the option to give the quickest results. The initial ideas were formulated in 1999 and a committee was formalised in 2000. A Steering Committee was set up in 2001 by the Minister for the Environment in order to set-up a Trust Fund to contribute to the funding of biodiversity and protected areas conservation in Madagascar. The mission of the foundation is to: Provide financial support for biodiversity conservation in Madagascar through development and sustainable use of protected areas for the following activities: conservation of protected areas, research and monitoring; development of eco-tourism in National Parks; education, information and communication. The foundation has a board of directors with 9-11 members from the private sector and civil society. The first directors were appointed in September 2004 and the Foundation received its first grant in July 2005. Over the years they have received $31million and today there is $11 million in the bank.

Lessons leant: National leadership is critical; collaboration between Ministry of Finance and Environment is important; develop economic justifications to "sell" the environment to public finance ministries - need a good business plan; need to create a national dialogue; collaboration with other NGOs; need to invest in communications; the private sector offers a huge opportunity; invest wisely and in a green way e.g. "Living Planet Fund"; legal framework is the key; participate in international conferences to find out what is going on in other places around the world; be positive!; it is very important to develop detailed cost projections; the government needs to put in its own resource in capital; the steering group can play a positive role.

The Financing Marine Conservation report is available on the WWF website: http://panda.org/downloads/marine/FMCNEWfinal.pdf

The report The Economics of Worldwide Coral Reef Degradation can be found at:

http://panda.org/downloads/marine/cesardegradationreport100203.pdf

Questions

Denis Etienne asked if money will be invested in the mining sector. Jean Paul replied no, because there are regulations and restrictions as to what the money can be invested in.

Julie Church stated that this was a success story and showed the need for a committed government, which is very hard to find. What got the government so committed? Jean-Paul replied that lobbying and pressure from WWF and Conservation International as well as embassies and the World Bank. In addition, the government wasn't asked initially to put any money on the table: WWF and CI each put $1million. Also, the new president understands the environment and was very sensitive to the fact that the environment interested donors.

Remi Ratsimbazafy asked if a common fund of this sort would be a possibility for the region. Jean-Paul answered that it is a possibility and the IOC has a very important role to play.

Mary Francois, Socio-economist, Rodrigues – Promotion of non-fishing income generating activities

In Rodrigues, fishing is dominated by traditional techniques using small boats in the lagoon, but the lagoon is silted and is being over exploited resulting in a substantial decline in catches. Formal and informal studies undertaken by the Association de Pecheurs de l'Ile Rodrigues (APIR) and Shoals Rodrigues highlight this problem and call for sustainable remedial actions. The Chief Commissioner highlighted his support for the MPA at Mourouk and since 2006 the MPA is being set-up with funding

from the UNDP. The RRA Fisheries and Marine Resources regulations have been enforced since 9th April 2007 and 4 sites have also now been designated as marine reserves. Socio-economic studies carried out by APIR and Shoals show that fishers agree that the lagoon is overexploited and most agree to stop fishing in the reserves but with conditions: some ask to be paid compensation (3,000 – 5,000Rs per month); others would like to do other jobs such as cleaning beaches and planting trees; others want to set-up their own business with financial support. One way to stop overexploitation is to reduce the number of fishers: there is a need to work out what the carrying capacity is and additional fishers should be encouraged to look for alternative employment options. Many fishers are keen to stop fishing and set-up their own business, but many have trouble identifying good opportunities. A number of Rodriguan agricultural products such as lemons and onions have a high market value and are already being cultivated within the MPA boundary. With adequate support these could be transformed to generate income.

The Chain of Value includes: the basic product (e.g. lemons); the inputs and technology needed for its production; the activities for processing and transforming it; the inputs and the technology needed for the transforming process; the support services (commercialisation, training, transportation, information, quality control, etc); research and innovation; activities for complementing the access to market.

An example was given using lemons: once each ring of the chain has been identified, the next step is to assess what already exists and what does not. If rings of the chain are lacking, new opportunities exist for creating business and jobs. Examples were given for lemons, onions and chickens. For each, the value added products, direct and indirect employment and potential markets were listed.

It is very important that adequate support is provided throughout the process in terms of technical and management training and fishers should be encouraged to group into cooperatives. The Rodrigues Regional Assembly could ask for funding through the Empowerment Fund based in Mauritius in order to provided business and technical advice to fishers, as it is difficult for fishers to apply for funding themselves (e.g. though the GEF-SGP).

Questions

Denis Etienne stated that fishers in Rodrigues are rarely just fishers and many are also farmers so this could be a good option here.

Pamela Bapoo-Dundoo stated that it isn't true that fishers are not able to apply for GEF-SGP grants. The application does need to come from a registered association in order that they can open a bank account, but fishers can be helped to create an association or they could work through an umbrella organisation such as a local NGO so that they can still benefit from the funding.

Sabrina Desiré stated that through her discussions with fishers in Rodrigues they have said that they find it very difficult to work in a group for various reasons. Mary replied that it may be difficult at first, but then it will become easier; one fisher on their own cannot produce enough chicken, but a group of fishers together will have a lot more power and can produce a lot more chicken. There are already a number of associations and cooperatives in Rodrigues so it is possible,

Pamela Sooprayen Kwet-On added that IFAD currently have a project to encourage fishers to work together in a group to buy off-lagoon fishing boats. No organisation will give funding to individuals so how can the government be encouraged to give more support? Mary answered that the politicians need to go into the villages to meet the fishers. It will take time but we need to persevere to try to change people's mentality. It is easier to encourage people to work together in groups than it is to try to get the government to change their policies and give money to individuals.

Chikambi Rumisha said that he wanted to caution the approach as fishers are very proud people and it is very difficult to stop them fishing. There needs to be a very good strategy for example, minimising entry to the fishery. If fishers are forced to stop fishing they will sabotage the reserves. Fishers are individualists and want to do their own thing. Mary replied that in Rodrigues many people became fishers in order to qualify for the Bad Weather Allowance as it gives them a guaranteed income at the end of the month. If they are offered other jobs and these jobs provide more money than they get from fishing, they will happily stop fishing; this is supported by surveys from APIR and Shoals Rodrigues.

Julie Church, UniquEco Designs Ltd, Kenya – Turning MPA Waste into an MPA Solution

One problem in MPAs is waste. Many man-made products are discarded, leaving a dirty scar on the landscape and these are also sometimes mistaken for food by marine animals. Successful MPA conservation requires workable and realistic socio-economic solutions but these are not easy to find. Many alterative livelihood schemes have been established, but many do not survive without free financial and technical support. The Flip-Flop initiative may provide an example of an income generating activity for local communities adjacent or within MPAs; help contribute to environmental clean-up; provide a tool for monitoring ocean currents, oil pollution spills etc for MPA networks, and provide a medium for developing local skills, awareness and education.

The project started on the north coats of Kenya in 1997 and is a story of evolution, starting with flip flops being cut up to make floor mats and toys. WWF were fundamental at the beginning, ordering 20,000 keyrings. The women and young men however, really made it happen and they were willing to learn and try new things out. What initially was seen as rubbish and of no value, became a lucrative industry. In the last 18 months the business has been turned into a limited company, which was registered in August 2005. UniquEco's mission is to: "to work with craftsmen and women from disadvantaged areas to produce and market products made from recycled rubbers, plastics and metals thus improving their well-being, while ensuring that the biological, social and cultural richness of the local people and environment is maintained or bettered". The objectives are: Social - to increase the revenue earnings from locally crafted eco-friendly and recycled products; Environmental - to contribute to better conservation though the production of eco-friendly products from recycled materials. Economic - to generate profit to finance development and growth of UniquEco.

UniqEco's beliefs are that they are driven to tell the world about the effects of pollution and to encourage everyone to take individual responsibility. This is achieved through the development of unique and creative products of which the rewards will be fairly used to motivate those with limited opportunities to improve their livelihoods and their environment. UniquEco's principles are that: people are the sources of creativity as well as the solution – people are very artistic and so it is important to harness this and turn it into a livelihood. Their targets/dreams are to: have over 1 million people in the world owning a piece of the story; facilitate better management of natural resources through greater awareness; encourage better production and management of the local craftsmen and women; and promote fair business for remote local people in Eastern Africa.

Progress in the last 18 months: UniquEco is in business, it has survived and has traded around US$35,000; there is a market both locally and internationally and they have achieved a good quality product that people want to wear without knowing its story; they are contributing to the environmental cause – consumers are now more aware of marine and coastal issues and over 100,000 flip flops have been used; they have contributed to poverty reduction – over 130 people are involved in production, there is now a workshop in Nairobi and another community group has been trained in south Kenya to work with them.

Problems – Business: it is a tough business, especially with no start-up funds and the risks are high; sales are increasing but costs are also increasing; tools are very limited. Environmental: the community doesn't always understand the environmental aspects of the project; there is limited information on the impact the flip flop collection is having on the environment. Social: there is limited socio-economic information to track the impact the project is having on the livelihoods of the local communities; price - what price is fair to the artisan & customer; guarantee - protection for a new idea?

Lessons leant: It is a tough business; need a flexible approach; it is a risk; efficiency is very important – can't waste time and resources; a business plan is a help. Above all need commitment, determination and open dialogue.

Plans – Business: need to secure investment; need to develop a better collection system; improve production and marketing; monitor the impacts on the lives of those involved; contribute to global

initiatives. People and Environment – they plan to set-up a charitable arm so that they can work with communities without affecting the business.

MPA Management lessons: local creativity can be developed to improve local livelihoods; through this local people become more aware of the environmental issues and indirectly contribute to a cleaner world. Alternative livelihoods – is this an option? Turning young fishers into artisans reduces pressure on the environment and generates income for a wide range of community members. Flip flops could also be monitored and mapped to provide an indicator of currents.

UniquEco is an experience and lessons can be shared to help address the alternative livelihood issue. However, it isn't a panacea and will need to be adapted to different situations.

Questions

Suzannah Walmsley asked who collected the flip flops, was it individuals or a group and how are they paid? Julie replied that they don't directly work with the collectors; they have however worked with school groups doing beach clean-ups and they are also trying to collaborate with sea-turtle conservation groups to get them to collect flip flops. At the community level they have a field liaison person who pays everyone individually for the items that they make, although ideally this will change in the future.

Aurelie Thomassin asked if the community received training for this. Julie answered that they were inspired by her ideas but then took these on and developed the ideas themselves using their own creativity.

Pamela Sooprayen Kwet-On asked if it would be possible to set-up a twinning experience between the women in Kenya and Rodrigues and Julie answered that is definitely a possibility.

Denis Etienne, Indian Ocean Commission – The development of alternative economic activities in the Soufriere Marine Park

The Soufriere Marine Park in St Lucia was created in 1996 after a long period of negotiations and awareness-raising. The development of the Marine Park reduced the size of the fishing zones, therefore displacing fishers. Some 'destructive' methods of fishing are still practiced on the reefs and there is also poaching. Fishers were therefore, unable to see any positive impacts from the creation of the Marine Park. Although a group of semi-professional fishers understood the economic difficulties they didn't have the capacity for investment. Funding was therefore secured from the Fonds Francais pour l'Environnement Mondial to help fishers to diversify their activities. This was achieved through a voluntary change in activities combined with a lot of work informing and raising-awareness. A multi-partner approach was used involving the fishing department, civil society, the Marine Park and the St Lucia Development Bank (SLDB). An investment fund was created with an investment of €20,000 in agreement with the SLDB. A buy-back scheme was put in place for fishers who wished to give up their fishing gears and convert to another livelihood. The fisher contributed a minimum of 10% of the sum, the investment fund provided 20% and the bank lent 70% at a preferential rate. Eight fishers have now profited from this plan: 2 now fish in the open sea on FADs; 2 have invested in glass bottom boats; 1 has bought a water taxi; 2 invested in agriculture or raising livestock and 1 is now in commerce. This could also be a solution in Rodrigues, but it requires a lot of work.

Allen Cedras (Manager, Seychelles Centre for Marine Research and Technology - Marine Parks Authority) – Marine National Parks of the Seychelles

The presentation began with a short introduction on the Seychelles. There are 115 islands totalling an area of 445km^2, with an exclusive economic zone of 1.3 million km^2. Within the Seychelles, there are 14 MPAs designated under 3 different acts: there are six Marine National Parks (comprising 61.77 km^2 and are strictly no take zones, all established between 1973 and 1997), 3 Special Nature Reserves, four shell reserves and one protected area. These areas are all managed by SCMRT-MPA, which up until 2003, were two separate institutions with overlapping activities.

Allen then went into more detail regarding the establishment of the MPAs. It was decided there was a considerable need to protect the cultural aspects of the Seychelles in the face of tourism development. In order to effectively manage the MPAs, it was decided that a wide a group as possible be involved including tour operators, national coastguard, Seychelles Fishing Authority, NGO's, educational institutions and some private sector companies. Strong partnerships with the local residents living near or within park boundaries were also encouraged. Up until the 1998 Coral Bleaching Event, the focus of resource management was towards an ecosystem approach which shifted towards promoting the recovery and preventing further degradation of the corals following the event. Regular monitoring of the coral reef and daily patrols to deter poaching have been implemented in order to prevent further loss of habitat. However, there are also problems with human conflicts as a result of settlement. Many of the parks are located near to human settlements or industrial areas, resulting in a number of threats from outside the park boundaries. This aspect does still provide some advantages since many of the people living in the park are dependent on the area for their living so consequently take better care of the habitat. The parks are also generally small making them easier to manage.

The parks are financed through entry fees for non-residents, overnight stays, research fees for scientists and one third is supplied through government subsidy. Further sources of revenue come from tortoise adoption, underwater trails and ecotourism. The teams in the parks also carry out a number of activities, including patrols, monitoring and assisting visitors.

Questions:

Bruce Cauvin asked whether it was true that *Acropora sp* of coral have disappeared completely following the coral bleaching. Allen replied that he was not able to confirm this but would check with his colleagues.

Dev Ramgoolam asked whether it was possible to expand in more detail the underwater trails. Allen explained that these trails require a lot of money to fund them so often require private sponsors. This is because they need to use specialist equipment that do not damage the habitat and are resistant to degradation. At several points along the trail, there are information boards for the tourists and although there is a guide, the tourists are effectively on their own. There are two diving sites and four snorkelling sites.

Denis Etienne asked whether Allen could confirm funding comes from the private sector. Allen confirmed that this was the case although all installations and work is carried by the staff directly.

Aurelie Thomassin commented that Saint Anne was the first park in the region and was created early. Have you been in touch with the local community and if so, how have they reacted to it? Allen explained that there was not much of the community exploiting the area but the establishment of the airport in 1973 led to the development of the marine park.

Jaomanana, Jean Baptiste Zavatra and Jocelyn Bezara, ANGAP, Madagscar – A Network of National Parks in Madagascar

ANGAP manages 18 National Parks; 5 integrated natural reserves and 17 special reserves, of which some have double status also including Marine Protected Areas. There are currently 3 MPAs, although the National Park at Kirindy Mitea will include the marine and coastal zone at Belo sur Mer.

Nosy Hara National Park – the management objectives are: protection of habitats of high ecological importance; protection of threatened species; promotion of biodiversity and development of ecotourism; promotion of responsible fishing. There are 3 zones, which protect a wide range of habitats and high biological diversity (e.g. dugong, turtles, seabirds, corals, reef fish, mangroves, seagrass and offshore islets). Impacts to the natural resources include: overfishing; destruction of habitats (e.g. reefs exposed at low tide); illegal fishing (beach seine); cutting down mangroves for construction and charcoal; poaching of turtles; collection of turtle eggs; uncontrolled tourism. Setting up the reserve involved preliminary studies and public consultations highlighting the advantages of MPAs; committees were then set-up representing the local community at all stages of the development including in the enforcement of the MPA; public consultation on the delimitation of the reserve

boundaries took place and a temporary protection order was signed by the regional authorities; the project documents were then sent to the Ministry and a regional planning workshop led to a shared vision being defined. The reserve has collaborative management: the principal management body is ANGAP working in collaboration with WWF Madagascar, a surveillance committee, consultative and executive bodies as well as a steering committee consisting of regional authorities, the university and economic partners.

Strengths and weaknesses of 3 Marine Parks in the Masoala National Park – these Marine Parks are situated in the north-east of Madagascar and were created in 1997. Management strengths include: collaboration with the local community resulting in the creation of a surveillance and enforcement committee (CSC) for the Marine Park; the establishment of regulations based on the local law 'Dina' for each park; collection of results from ecological surveys; discussion of improvements to the management strategy; and creation of alternative development projects. In particular, in terms of management, there has been an improvement in the management strategy for the octopus fishery - studies into resource-use by the octopus fishers and closure of the fishery during the period when juveniles require protection; they also have qualified personnel and good collaboration with other partners such as WWF, WCS, IHSM and the fisheries service. Weaknesses of management include: trampling damage to corals by octopus fishers; illegal collection of sea cucumbers; use of illegal fishing gears; capture of turtles and fishing within the protected (sanctuary) zone. The biggest problem is application of the law – regulations have to go through a very lengthy procedure which often has little success, there is often opposition from collectors for example the collectors of sea cucumbers and a lack of effectiveness of personnel and limited finances. Other problems include logistical problems (problems with communication between the teams and costs) and natural impacts such as coral bleaching and cyclones.

The Marine Park of Nosy Antafana is situated within the Biosphere Reserve of Mananara-Nord and has very high biodiversity. The Park was created in 1989 and has progressed though various phases of development. Management successes include: existence of a management plan; public participation in surveillance of the park; integration of women in the development process; development of alternative livelihoods through a partnership with the association "Slow Food International"; partnership with CORDIO for ecological surveys of the reefs; and existence of the local law 'Dina' to control use within the Park. Weaknesses include: difficulty in finding financial support combined with rising costs; Park managers' lack of verbal power; lack of qualified personnel for management of the MPA and insufficient equipment for research.

Questions

Jaffar Mouhidine asked how they solve the problem of illegal fishing. Jocelyn replied that the first step is to set-up local conventions in each region; the second is to present a formal legal document to the fishers and then sign a contract with the Ministry of Fisheries to work together to arrest poachers; the final step is to provide education to prevent illegal fishing occurring.

Dev Ramgoolam asked for further information about the 3 different zones. There are 3 zones: Core Zone, which is No-Take; Buffer Zone in which some types of fishing are allowed and Protected Zone in which fishing is allowed using sustainable techniques.

Haji Mahingika (Research & Monitoring Officer, Mafia Island Marine Park, Tanzania) – Involving the Community of Mafia Island Marine Park

Haji began his talk with an introduction to Mafia Island Marine Park. The park was established in 1995, covers 822km^2, has 14 villages with a population of over 20,000 and is dominated by fish/marine related resources of 70-80%. It is critical site for biodiversity due to the mosaic of tropical marine habitats, which have achieved world heritage status. The park has taken a multi-user approach through zoning and is broken down into 3 zones: the core zone, specified use zone and general use zone. They also incorporate community involvement in the running of the park, for example, the use of monitors to collect data daily (from fish landing sites in marine park villages). This community

involvement is necessary to achieve the objectives of the park, namely to collect data and drive decision-making (using WWF guidelines to look for physical bioindicators).

There are a number of both voluntary and paid monitors who collect data from neighbouring villages. This has had a knock on effect on enforcement in the community. Prior to 2001, there was no enforcement of regulations but since the involvement of resource monitors, the number of people arrested for poaching has decreased and the number of patrols has increased.

Haji then outlined the lessons learnt. Primarily, data collectors are useful in monitoring the resource use in the park and it is important to pay them something. The increase in patrols has lead to a more sustainable fishery although permits are too frequently handed out to non-residents. There are considerable problems facing the park such as the disregard for the zoning scheme, resulting in fish diversity loss. Non-residents are often not reported, education and funding to pay the community monitors, establish alternative livelihoods and pay out seine net exchange is desperately needed. A lack of funding and dependency on grants makes it difficult to establish alternative livelihoods and pay out of the seine net exchange programme. Consequently, the latest management review has targeted education, community training and identifying opportunities as current initiatives of the park as well as promoting alternative livelihoods and including more women.

Questions:

Suzannah Walmsley asked whether there are any problems with the village enforcement units showing leniency towards family and friends. If so, how are they dealt with? Haji replied that there are generally no problems with that aspect as they understand they are conserving their future.

Dev Ramgolam asked whether funding is used to pay for the volunteers. Haji replied that yes, they periodically do use funding for this purpose.

Innocent Wanyonyi queried how the park plans to sustain the current programme in terms of all livelihoods when they depend on funds at the moment. Haji explained that they are trying to help the fishermen to find alternative livelihoods to relieve the pressure on the marine resource.

Said Ahamada wanted to know whether there was a plan in the future to involve the community in data analysis as well as collection. Haji replied that since the data is used to arrive at decision making points, they would like to filter the skills down to the primary schools.

Chikambi Rumisha commented that the essence of involving the community in data collection is to illustrate that they can work with the park for a common goal. By feeding information back to them and showing how their work is benefiting their future, they are more likely to enforce regulations and identify foreigners who shouldn't be there.

Pierre Pistorius (Research Officer, Seychelles Island Foundation) – The Effect of a Major Coral Bleaching Event on the Abundance and Composition of Carnivorous Reef Fish in Aldabra's Marine Protected Area

The Aldabra Atoll is located 420km North West of Madagascar and is the largest raised atoll made up of four islands. The research station is situated on Picar, the North West Side and the MPA incorporates the tidal lagoon and 1km perimeter of the atoll. In 1971, the lease was purchased by the Royal Society. In 1979, the Seychelles Island Foundation was established to manage the atoll and in 1981, it was declared a special nature reserve. In 1982, it was declared a World Heritage Site. Monitoring is carried on a number of species including tortoises, turtles and robber crabs.

Pierre presented a case study running from 1998 - 2006 to estimate the annual CPUE (catch per unit effort) of fish in the subsistent fishery to determine the impact of the bleaching event in 1998 that affected 90% of corals. Coral bleaching is a major concern for the MPA and it was thought there would be a direct link between the bleaching event and the subsistent fishery, which supports the 15 people on Aldabra. Fish were caught using hand lines with baited hooks, individual weights were measured and a total annual estimate for each species calculated. The study has so far shown that there is a significant decline in CPUE and the decline was much sharper in 2002. Past studies have shown

that there are no changes in fish abundance provided the integrity of the reef is maintained, but when the coral reef starts to degrade changes become evident. Between 2004 – 2006, CPUE was 25% lower than seen immediately after the event. Although CPUE declined over study period, it is difficult to draw a direct cause-effect relationship, as the decline could be a result of natural changes in the trophic system. Illegal fishing is also not a problem and the study showed the benefit of long term studies.

Apart from the study, the Aldabra Marine Programme established in 1999 has been assessing the recovery of the corals. There has been no significant recovery of hard corals and only a small amount in soft corals and the number of fish is correlated with the percentage of live coral. Of the fish species, the decline of Emperors has been most noticed and it is theorised that since they predate on invertebrates, the decline may be due to a habitat loss and consequent decrease in the number of invertebrates. Pierre concluded that the MPAs are an important tool for assessing the effects of habitat loss on reef associated organisms.

Questions:

Alasdair Edwards commented that the data is not necessarily representative because piscivores may been fished out already and you actually have herbivores growing really fast.

Paul Siegel asked whether monitoring of fish populations in areas where fishing isn't occurring are being carried out to act as controls in order to determine whether the same decline is occurring everywhere. Pierre answered that with each fishing trip, the atoll is divided into 15 sites, all of which are near to the base. At the moment, other sites have not been considered but it is a future consideration.

Alasdair Harris commented that although there is no causative effect with the coral data, it does indicate (from other papers published in the Seychelles) large scale problems of declining abundance across the Seychelles.

Alasdair Edwards (Senior Lecturer, Newcastle University, UK) – Using Length-Frequency Data to Identify Management Options: A Case-Study Based on Large Seine Net Fishery of Rodrigues Island, Indian Ocean

Alasdair began his presentation by posing the question: how can simple length frequency and statistical data be used to give an idea of the status of fish stocks. He illustrated this question using Rodrigues island seine net fishery as an example. Data from the Fisheries Research and Training Unit (FRTU) as well as that collected by Shoals Rodrigues illustrated seine net fishers account for 4% of fishers on the island and bring in 25% of all fish caught in the lagoon. The seine fishers are also the most professional group and are necessary for the island economy. The data indicated that CPUE between 1994-1997 was low but became 2.5 times more profitable following the 1997/1998 seine net licence buy back and management implementation. However, the fishery is operating very close to the maximum sustainable yield. In order to accurately assess the state of the fishery to account for illegal fishing, biological data collected by Shoals from five seine net teams ranging over much of the lagoon was used to confirm the preliminary conclusion taken from the FRTU data. This data shows that the reserves do not suffer high concentrations of fishing and illustrate a multispecies fishery with over 80% of catch being examined. Length-frequency sampling was carried out to compare size of catch, which reflects size at which fish are caught in mesh or move into the fishing ground and rate of mortality.

Alasdair then used a few species to illustrate how it is possible to determine whether the species is subject to overfishing.

1) Cordonnier (*Siganus sutor*): 34% of fish survive to maturity but 84% are caught before length of ultimate yield. Using data from fishbase, fishing mortality is calculated and is shown to be three times higher than natural mortality and consequently indicates gross over fishing.
2) Capitaine (*Lethrinus nebulosus*): data shows only 5% survive to maturity and fishing mortality is three times the natural mortality. Therefore, also subject to gross over fishing.

3) Rouget (*Mulloidichthys flavolineatus*): the data showed a different case here where 90% survive to maturity and fishing mortality is 1½ times the natural mortality. This indicates slight over fishing but it is still sustainable.

4) Mullet (*Valamugil seheli*): this species sustainable fishing where 91% survive to maturity. This may be due to juveniles living close to the shore and then migrating out to the fishing grounds, acting as a natural protection against over fishing.

5) Breton (*Gerres longirostris*): data shows 84% survive to maturity and fishing mortality is roughly equal to natural mortality. This indicates that juveniles are recruiting into fishing grounds at the right level, preventing over fishing.

The result is a mixture of species which are overexploited and sustainably exploited. The overexploited species are caught at a relatively small size but this may be less to do with mesh size and more to do with body shape making them easier to catch. An average of predicted mesh size shows mesh size to be about 8.7cm, consistent with the minimum legal mesh size of 9cm.

The study has provided evidence that the fishery is just sustainable (possibly due to the closed season) but that several key species are being overexploited. The fishery is also confined to the lagoon and there are some areas such as close to shore and the offshore shelf that form a natural protected area, supplying the lagoon with juveniles. In terms of future management considerations, altering mesh size is not feasible (as would result in fish dying of old age) but the implementation of the four marine reserves can help to make the fishery sustainable for the long term. However, alternative livelihoods for the fishermen are a necessary part of the process.

Questions:

Paul Siegel asked what happened to the fishers that stopped operating after the seine net buy back. Specifically, what have they done since? Sabrina answered that some were paid a co-operative amount depending on where they fished while others joined other teams and continued fishing. This is mostly because they have such a strong connection to the sea that they just want to be in the sea. Others also do line or basket trap fishing.

Paul Siegel queried whether the data would be adequate to predict the change in fish size and species once the MPAs are placed. Alasdair answered that by just protecting the area without providing alternative livelihoods is just shifting the problem elsewhere. It is unclear whether models would provide any answers.

Julie Church commented that fisheries information (in general) needs to be made more apparent to all management teams, particularly the decision-makers. Alasdair replied that it was hoped those people would be present for the duration of the workshop but it is only the people who pass on the information who are present.

Sanjeev Leckraz whether it is possible to determine spawning periods of the key species using length-frequency data and whether the closed season for the seine net fishing is appropriate. Alasdair emphasised that you need many different lines of data and species in order to get a clear picture of the fishery and as yet, there is not enough information to predict spawning periods. The closed season however probably saved the fishery.

Stephen Mangi (Research Fellow, Plymouth Marine Laboratory, UK) – Successes and Disappointments of MPAs in the Western Indian Ocean: The Case of the Mombasa Marine Park and Reserve

Stephen introduced his talk using Mombasa Marine Park as a case study to examine evidence of recovery, spillover, changes in catch over time and effects of gear restrictions after implementation of the park. The park was started in 1986/1987, covering an 8.2km^2 area, which includes most of the south. The reserve is made up of zones of different activity, for example beach seining.

In terms of reef recovery, the use of effective protection has resulted in an increase in live coral cover, in spite of the coral bleaching event in 1998. Fish biomass has increased over time, resulting in a

decrease in sea urchin biomass. To determine whether there is any spillover occurring from the protected region, traps were placed at distances away from the boundary in the North and South as well as near to the boundary. Traps placed nearer to the boundary indicated higher weight and size of fish than those further away. This indicates that the fishery in the MPA has increased enough to start moving into other areas. Fishers have adjusted to these changes by placing their traps near to the boundary. Dispersal of fish was further confirmed by examining the lacerations on the coral from herbivorous fish and invertebrates. The frequency of smooth bites indicative of herbivorous fish decreased with distance from the park while the number of serrated bites typical of sea urchins increased in frequency with distance from the park.

The zoning of the park has resulted in gear restrictions, the effects of which were examined by collecting gonads of the fish brought to fish landing stations. Gonads from 12 species of fish were collected to estimate maturity and calculate length of maturity. Catch monitoring and interactions with corals (for example, trampling by boats or gear) and coral density measurements were also recorded. The results showed that the proportion of juvenile fish caught was significantly higher when beach seine nets were used, with large basket traps and hand lines the next highest. It was also recorded that 6.5% of the catch was thrown back daily as the fish were too small. Coral damage was shown to be highest is areas of spear fishing and beach seining, while coral density and size of coral was shown to be highest in areas only used by basket traps or where beach seining was absent. The lowest density and coral size was found in areas where all types of fishing used.

Stephen concluded that the MPA helped restore the coral reef habitat and adjacent fisheries although regulation enforcement is difficult. Fishermen were also not included in the initial process, which has contributed to the difficulties in regulation enforcement. Education and awareness is therefore needed to rectify this problem and promote compliance.

Questions:

Mohamed Omar Said Mohamed asked whether the observation of the fish traps at the boundary is really indicative of spillover or could it be a result of migration. Stephen replied that it is a case of the fish within the protected area having grown to the extent that they are now moving into the surrounding area in search of more space.

Haji Mahingika asked whether there was concern about the fishermen placing their traps right on the boundary edge. Stephen replied that although they are on the edge, they are not within the boundary and it does not appear to be a problem. There are definitely more traps at the edge of the park than away due to better catches.

Julie Church enquired what the size of the mesh is that they use and whether it is within the legal limit. Stephen explained that the mesh size sampled was 1-3cm at the end of the nets although a larger net is used initially. The small net is used to haul in the catch.

Mohamed Omar Said Mohamed commented that the management of the Mombasa MPA in Kenya is different to other because the Fisheries Act put the fisheries department in charge of enforcing fishing practises. This causes a major conflict, as the MPA is not involved in the legislation or regulation process.

Vineeta Hoon enquired as to how the beach seining causes damage to the coral. Stephen explained that the net is 150m long and is thrown into the deep water. The fishers then stand on the beach and pull it towards them, which pulls up everything in its path.

Jennifer Ah-King (Project Manager, Reef Conservation Mauritius) – An overview of Reef Conservation Mauritius

Jennifer began by introducing reef Conservation Mauritius as an NGO established in 2003 to provide a platform for research, monitoring, education, training and resource management. Their current projects include coral reef restoration, seabird monitoring, fixed mooring buoys, research, cetacean monitoring, education and management and conservation of the northern shelf islets. The northern islets are considered an important terrestrial and marine resource, with many endemic species. They

are currently threatened by impacts from human rubbish and anchoring, (resulting in sponsorship from the ministry of environment to install 8 mooring buoys) and potential development. Although they are a resource for tourism, Reef plans to develop a snorkel trail to further protect the coral from trampling by visitors in conjunction with the mooring buoys. Also associated with the Northern Islets area, Reef has begun seabird and cetacean population monitoring.

The installation of Fixed Mooring Buoys both in and outside the lagoon is an ongoing project. The pilot study began in 1999 and was finally implemented in 2003 as a result of damage caused to corals from anchors etc. Initial funding came from the government and the SGP to produce the buoys and support other aspects such as deployment. Other funding has also come from Barclays Bank as there are currently 30 buoys deployed but many more are required, which necessitates a large sum of money. Over the period, the design of the buoys has evolved into a long thin tube to reduce wave impact and a colour coding system to denote the kind of activity occurring in the area. Each buoy has a unique number, which is listed on reflective tape along with a contact number should any damage occur. The buoys are attached to the substrate either via natural or artificial mooring and have a pick up line for boats to tie up to. A part of the fixed mooring buoys project is reef monitoring of fish and benthos to show the positive impact the buoys are having on the areas where they are already in place. Sensitisation sessions with the fishermen are also incorporated to show them how to use the buoys and to explain why they are important to help conserve the lagoon habitat. Reef also works in collaboration with the tourism authority that issues skipper licenses. The main problems encountered with the project mainly come down to maintenance and funding for long term sustainability. One consideration at the moment is the option for operators to adopt a buoy and take responsibly for general maintenance although this is still difficult without funding.

All research and resource management projects undertaken by Reef have a strong education base to allow distribution of information to the local community. A number of tools are being developed to replace the books currently used in schools so that the marine environment can be brought into the school curriculum. These include posters, flash cards, games, CD-ROMs, films and a new beach resource centre where school children can come and learn. The programme includes teacher training sessions and partnership with Shoals Rodrigues and the Ministry of Education.

Questions:

Bruce Cauvin asked what protocols are used. Iain Watt replied that procedures developed by COI (1998) form the basis of their protocol but are amended to suit the circumstances. It is similar to the reef watch method.

Jean Paul Paddack enquired whether theft is a problem with the buoys, what is the unit cost per buoy and how do the currents affect the buoys. Iain and Jennifer answered that the buoys are not practical to steal but there are many problems with mishandling and damage, resulting in many having to be replaced. As a result, to make it logistically easier to deploy the buoys, Reef is considering using a drill rather than artificial moorings. Although there are no currents, there are swells, which can affect the buoys. Each buoy costs about $1000 (US) to produce and deploy. 20% of the cost per buoy per annum goes towards maintenance.

Haji Mahingika enquired why chains are not used instead of rope. Iain explained that the cost of using rope is significantly less. The stainless steel cable that is available comes apart in strands as it is not of good quality and can cause serious injury. Chains are also heavier and would require extra buoyancy in the buoy to keep them off the bottom and prevent damage to coral. If we altered the buoyancy, the design of the buoys would also alter and at the moment, they are designed as low resistant tubes so they won't break during cyclones.

Faliarimino Rakotomanana enquired whether Reef has undertaken action with the fishermen and schools. Jennifer answered that priority areas are being targeted with 10 schools at the moment receiving education. The fishermen are also being trained on how to use the buoys but this is an ongoing process.

Bruce Cauvin commented that in Réunion the cable is in a sheath to prevent the strands fraying, so could this method be used in Mauritius? Iain replied that you can't get good quality steel cables and it

would be expensive to import and maintain. The quality of the material is the limiting factor as even when we've tried using a sheath, the steel disintegrates.

Sanjeev Leckraz, Technical Officer, Ministry of Agro-Industry and Fisheries – The Management of the Blue Bay Marine Park

There are 2 types of MPA in Mauritius: Marine Parks and Fishing Reserves. There are 2 Marine Parks at Blue Bay and Balaclava and 6 Fishing Reserves. Blue Bay and Balaclava were designated as National Parks in 1997 and proclaimed as Marine Parks in October 2000. Fishing Reserves have existed for more than 50 years but were proclaimed as MPAs in July 2000. Objectives of MPAs in Mauritius are: conservation and protection of biodiversity; provision of environmentally sustainable recreational opportunities; information and education to promote understanding and appreciation of the natural environment; and research and monitoring.

Blue Bay Marine Park is situated in the south-east of Mauritius and covers 353 hectares. It includes the lagoon and extends 1km seaward from the reef crest. It contains a rich marine ecosystem with diverse communities of marine flora and fauna. The Park is managed through the application of the Fisheries and Marine Resources (MPA) Regulations, which provides the following tools: zoning and permit systems and law enforcement. Awareness campaigns and monitoring are also undertaken. Although Blue Bay was proclaimed in 1997, effective management didn't start until 2004 due to a lack of enforcement. The Park has been demarcated into different zones with the aim of providing protection to critical habitats, ecosystems and ecological processes; conserving biological diversity; catering for various activities and; separating conflicting human activities. The different zones are: Strict Conservation Zones A & B (No-Take Zones); Conservation Zone; Multiple Use Zone (fishing with traps and lines allowed); Swimming Zone; Traffic Lane; Ski Lane; Mooring Zones; 2 Fishing Zones for amateur fishers (only line fishing from the shore). There are various types of permit available with an annual charge for the different activities.

Law enforcement is carried out on a 24 hour basis by the Fisheries Protection Service and is done by daily boat and coast patrols at unfixed times. During the patrol permits are checked; illegal activities such as littering and fishing in No-Take Zones are checked; sensitisation is carried out and fines are given to those contravening regulations. They also collaborate with the National Coastguard for enforcement.

A combination of methods are used to raise awareness including slide and video presentations to school groups; lectures; brochures, pamphlets and posters; signboards and display boards and guided tours.

Monitoring of benthos, fish and invertebrates is carried out on an annual basis at 5 stations in the Blue Bay Marine Park. The GCRMN methods are used and data are analysed using the COREMO software. Water quality (DO, BOD, COD, nitrate, phosphate, total and faecal coliforms) is also monitored.

Problems encountered: many activities such as kite surfing weren't included in the original regulations as they weren't commonly practised in Mauritius at the time; temporary structures such as barges and pontoons also weren't included. Tourism is expanding fast leading to problems. There are problems with the permit system with people not renewing their permits each year and problems with mooring of boats – people want to moor their boast in front of their houses leading to conflicts. In addition, the maintenance of buoys causes problems as there is no one with the technical knowledge to maintain them.

Decisions taken so far: seine net fishing banned in the Marine Park in 2003 and 37 fishers were given compensation; sea walk banned; amendments proposed to the Fisheries and Marine Resources Regulations; officers trained in SCUBA diving to carry out maintenance of buoys; new procedures for permits introduced to encourage renewal; a Steering Committee set-up to include local stakeholders in management of the park; procedures are underway to declare it as a Wetland of International Importance under the Ramsar convention.; procedures underway to develop a buffer zone; a policy paper to limit the number of permits is in preparation; and additional information boards are being placed in the Park in French.

Suggestions for improving management: training of staff is very important in all aspects of MPA management; exchange programme between different countries to share expertise and experience.

Questions:

Denis Etienne asked if the money collected for permits goes back into the Park. Sanjeev answered that there is an MPA fund, but that the money generated now goes to the Ministry for Finance. He also asked whether the tourist activities such as glass bottom boats pay a tax. Sanjeev replied that they have a commercial activity permit for which they pay 5,000Rs per year, however they are now developing a policy paper to limit the number of permits granted.

Jacqueline Sauzier asked why didn't they ask NGOs to help with the monitoring to do a better job and how do they sensitise boat operators? Sanjeev answered that personnel for the monitoring isn't a problem, it is the funding that's limited and although the Mauritius Marine Conservation Society sits on the Steering Committee no-one offered to help. There are information boards everywhere so that everyone including the boat operators has access to them.

Jacqueline Sauzier, President, Mauritius Marine Conservation Society – Three Decades of NGO Activism in Marine Conservation

People generally manzge the marine environment with ignorance. Those people involved in management do not swim, or fish whereas the people who depend on the sea and work in the sea every day have no political power.

The Mauritius Underwater Group was created in 1964 and divers explored the lagoons and reefs. These divers soon noticed that large fish were declining in numbers and that dynamite fishing in the 1970s was causing serious damage to reefs. The Mauritius Marine Conservation Society was then created in 1979. The aims and objectives of the MMCS were to: promote an awareness and appreciation of marine life; arouse an interest in the creation of marine parks; encourage respect for laws relating to the marine environment; induce the Government to enforce existing laws. Three aspects retain their attention: the Government was not enforcing laws; the public were not aware of the laws; the importance accorded to the creation of Marine Parks. Thirty years later these aspects remain priorities for MMCS. Although the aims of the society were updated, very little changed, however instead of talking about "creating" marine parks, they now talk about "creating and managing protected areas". Their motto remains "Conservation through Education".

The role of NGOs in lobbying and militating is on 2 levels for the: creation of laws and the enforcement of existing laws.

Marine Parks – the first formal proposition to create an MPA in Mauritius was in 1974 when Blue Bay and Balaclava were proposed, however 20 years later there were still no Marine Parks. During this time there were many conferences, discussions and lobbying by the MMCS and the issue was raised in the press, however as there was no legislation in place nothing happened. As it was clear that there was no political will to declare MPAs, the MMCS changed their strategy and started to approach users and of the lagoon and companies who operated in the lagoons. This was achieved through press articles, public talks, meetings with politicians and participation in the National Environment Committee.

In 1995, a study of MPAs was carried out by the IUCN and the Great Barrier Reef Marine Park Authority. The MMCS presented data from the region and recommended that more sites should be protected with Marine Parks at Blue Bay and Balaclava proclaimed for educational purposes. Finally, after a very long fight the 2 Marine Parks were proclaimed in 1997, but then nothing else happened…..The Balaclava marine park was a disaster, with no management, no zoning, no sensitisation, no education, no mooring buoys…nothing. So again, they mobilised public opinion by approaching the local authorities and finally organised a round table on MPA management with politicians, academics, NGOs and members of the public.

What now? There are many questions to be answered e.g. where are the educational facilities?

Where are the guides? What monitoring occurs? How is the ecology of the MPA's changing? Why is civil society not involved in the management of the MPA?

There are also challenges to face such as the collection of sea cucumbers, which is a big problem. MPAs remain a very important tool for protecting biodiversity but why should tourism always be invoked as a reason for conserving our marine biological resources?

Questions:

Paul Siegel added that you are not alone! This problem between NGOs and government is the norm and occurs in many other countries around the world. Jacqueline added that although the MMCS sit on the steering committee for the Blue Bay Marine Park, there isn't enough discussion and it isn't very successful. Sanjeev Leckraz reacted and said that meetings are held once very 2 months and that the idea of the buffer zone came from the committee. Jacqueline added that there still needs to be more collaboration.

Denis Etienne stated that the government has a lot to gain from the effective management of the marine park. Tourism is very big business in Mauritius and economic development is an objective fixed by the Government. However, as a result of this development the coastline has become completely unnatural with so many hotels being built. There is therefore a very delicate balance in Mauritius.

Jean Paul Paddack suggested that the economic value of MPAs be shown to the government – when you talk about money the dialogue changes enormously.

Tayffa Hasanali, Regional Programme for the Sustainable Management of the Coastal Zones of the Countries of the Indian Ocean (ReCoMaP)

ReCoMaP is a 5 year programme funded by the EU (with a budget of €18 million) and managed by the Indian Ocean Commission. It is managed by a Regional Coordination Unit based in Mauritius and there is a National Focal Point in each country, a regional steering committee and a technical committee. There are 7 countries involved: Mauritius, Seychelles, Comoros, Madagascar, Kenya, Tanzania and Kenya with collaboration from South Africa, Réunion and Mozambique.

The global objective of the project is a reduction of poverty by improving sustainable management of marine and coastal resources in the countries of the south-west Indian Ocean. The specific objective is to improve the capacity of local communities, public institutions and private organisations in order to improve their knowledge of integrated coastal zone management.

Expected results are: (1) improvement of the databases, use of these data and systems of monitoring; (2) reinforcement of the capacity of institutions in the region and training for professionals in marine and coastal zone management; (3) improvement of access to information and sensitisation of the public; (4) development and adoption of national Integrated Coastal Zone Management plans in each of the countries; (5) improvement of the capacity of the different countries to take an active role in international negotiations related to environmental questions; (6) active participation of stakeholders in the setting up of ICZM plans; (7) development of a regional census as a common approach to sustainable management of coastal resources.

A Call for Proposals will be announced to NGOs, local communities etc for which 55% of the budget is available. Following this call for proposals, basic proposals will be evaluated and successful applicants will be invited to submit a full proposal. Training will be given in the production of full proposals, the proposals will be evaluated by a committee; projects selected will be put in place and finally monitoring and evaluation will be undertaken by ReCoMaP.

The manual includes information about the project, eligibility criteria, instructions for submission and deadlines. The sum available is €2.5 million and there are 5 themes for the region: reinforcement of the legal framework relative to ICZM; soil erosion; coastal erosion; management of lagoon resources and; lagoon pollution. For each theme, the actions, activities and geographic priority zones are specific to each country. The first call for proposals will be launched in September 2007 and the project should

start in May 2008. Eligible applicants are non-state actors e.g. associations, NGOs, local community cooperatives. The project should have a duration of 24 months, with a budget of between €10,000 – 100,000, with a 5% contribution from the organisation, which can be financial or in-kind. Some notes – the themes and geographical zones are priorities but aren't exclusive; collaboration between NGOs and public institutions is encouraged; stakeholders can form into a cooperative to submit a project; the same project can cover 2 or more countries; it is possible to obtain more information from the National Focal Point; proposals that complement existing national projects are encouraged; the sustainability of actions is an essential element.

Questions:

Sabrina Desiré said that in Rodrigues it took 5 years to gazette the marine reserves: a project is set-up but it takes a very long time for the law to change. How can ReCoMaP help to make regulations move along more quickly? Tayffa replied that unfortunately the project cannot intervene in legislative issues.

Anfani Msoili asked how they could ensure that there wouldn't be long delays in actually obtaining the money. Tayffa answered that the projects will start in May 2008 and must be completed within 24 months. The 2nd call for proposals will involve fewer problems and so there should be a more rapid transfer of funds.

Jaffar Mouhidine said that when you manage a project that lasts over 2-5 years things may arise that you don't expect - can you re-finance a project? Tayffa replied that it would be possible to submit another proposal during the 2nd call for proposals.

Iain Watt, Technical Advisor, Marine Park Project Rodrigues – Partnerships for MPAs in Mauritius and Rodrigues

This is a medium-sized project funded by the GEF/UNDP, implemented by the UNDP and executed by the Rodrigues Regional Assembly/Ministry of Fisheries; there are 3 years remaining.

Although the marine ecosystem of Rodrigues is still in a fairly good condition, it is threatened by unsustainable fisheries, destructive fishing practices and ecosystem degradation. The establishment of an MPA addresses these issues in view of a sustainable utilisation and conservation of coastal/marine resources. The objective of the project is to put an MPA in place as a demonstration site using innovative methods for management.

The MPA will be established at Mourouk in the south-east of Rodrigues and will cover an area of approximately 180km^2. It will encompass nine villages, one hotel with water sports facilities, three islets and an inland Botanical Gardens Project.

The main aim of the project is to develop a community-based strategy for the Marine Park working in close collaboration with the local stakeholders. To date, Community Resource Committees have been set-up with members from each village; selected members then sit on the Community Advisory Council. It is these people who will accompany patrols and start to develop a community-based enforcement system.

Questions:

Julie Church asked, what are the main challenges – why has it been delayed for 2 years? Iain answered that there have been several challenges, the first is a continuity of staff, both the project staff and the RRA; there has also been a change in government during the project, which changed a lot of things. The real problem now is that it's taken so long that the community will lose enthusiasm for the project.

Ian Valmont, Science Assistant, Nature Seychelles – How is your MPA doing? Management Effectiveness of MPAs in the WIO

In the case of the Cousin Island Special Reserve the answer would be: Ours is doing OK thank you!

Cousin Island is situated 4km south-west of Praslin and has an area of 27 hectares. The reserve includes the island and the sea 400m from the high water mark and contains coastal forest, wetlands, mangroves, dunes, seagrass, algal beds and reefs. There are a number of endemic land birds and it is the most important breeding site for hawksbill turtles in the western Indian Ocean. Cousin was designated as a nature reserve in 1968, but didn't incorporate the marine environment until 1975 when it was designated a Special Nature Reserve. It is now managed by Nature Seychelles.

In 2003 a workshop was held in Malindi at which a workbook for assessing the management effectiveness of MPAs in the Western Indian Ocean was developed. The workbook was tested in 8 pilot sites in 3 countries (Kenya, Tanzania and Seychelles), coordinated by the IUCN and UNEP. Assessment involved the completion of worksheets for 6 components: context, planning, inputs, process, outputs and outcomes.

The results of the study state that Cousin Island Special Reserve is a long established MPA with well trained staff and sustainable investment in management and science. Although the management was initially reluctant to participate, they produced a high quality report, which showed that the NGO is managing the site with considerable skills and experience. The MPA is well run and largely achieving it's biodiversity and socio-economic objectives. Status and trends are known for land and sea birds, turtles and coral species, however there is no monitoring programme for plants, other vertebrates, invertebrates and aspects of marine ecology. There is also a need for the development of different stakeholder relationships.

Biodiversity studies indicate that the seabird trends are stable. The Hawksbill turtle monitoring programme is the longest running in the world and shows that nesting turtles increased by 300% in 30 years, with over 200 turtles observed in 2006-2007. Cousin has the highest fish biomass in the granitic MPAs, however severe coral bleaching in 1998 has led to a shift in species.

Future perspectives: The turtle monitoring programme has been running for 35 years. The programme has been updated and a computerised database set-up; there are also more intensive surveys and research collaborations are being initiated as are collaborations with other stakeholders. For reef fish, research collaborations have been established with MSc students and 2 sites have been established as national coral reef monitoring sites. Mooring buoys are now in place to protect the reef and wardens now undertake monitoring.

The Reserve is managed through an annual work programme. The study found that management plans were largely adequate, however the routine plan has been revised to incorporate adaptive management. The study showed that the reserve design is adequate, however there is no buffer zone. There are 8 staff members plus 1 or 2 visiting scientists or students. The Reserves has an in situ budget of US$100,000. Foreign visitors pay user fees of $200,000 per year and so the financing needs are met entirely by tourism; there is no money from the government; a small trust fund has also been established.

Access to the Reserve is free to locals including school groups and Wildlife Club groups and free publications are given to schools and the public. Ecotourism involves purely the locals and the site is managed by local staff.

Threats and impacts: poaching is almost non-existent although they do have occasional fishers who put their traps just inside the reserve boundary; there are limited impacts from tourism and mooring buoys are in place; drinking water is brought in and solid waste is taken away to Praslin.

The follow-up assessment was used to draw up a new management plan for the next 5 years; the monitoring programme is being upgraded and a research plan drawn up in collaboration with universities; 2 monitoring sites have been established and demarcation buoys are in place to designate the reserve boundaries; there is now also a full-time Conservation Officer and an Experience Exchange Programme is in place for capacity development.

Questions:

Aurelie Thomassin asked who are the stakeholders and where does the money from the permits go? Ian replied that the money goes to pay staff salaries and for management of the island.

Remi Ratsimbazafy asked how much capital they have in the small trust fund and what is the interest? Ian answered that half of the revenue goes directly to the management of the reserves for fuel, salaries etc.

Aurelie Thomassin asked are there fishers who used to fish in the reserve area and what happened to them? Ian answered that there are very few fishers in the area; he's sure that there were people who did fish there, but he doesn't know what happened to them.

Dev Ramgoolam asked if there are any recreational activities within the reserve and what activities does the fee cover? Ian replied that there are no real recreational activities in the reserve. The fee is to come onto the island, where tourists are given a guided tour on the land, although they are also able to snorkel.

Mohamed Omar, Senior Scientist, Kenya Wildlife Service – Implications of Biodiversity Conservation in Urban Marine Protected Areas: The Case of Mombasa Marine Park

The Coast Conservation Area includes 6 gazetted MPAs as well as terrestrial ecosystems. Kenya Wildlife Service focuses on monitoring of both these marine and terrestrial environments. There are 20-30 marine rangers in each MPA.

The Mombasa Marine Park is the only MPA located in a city; Mombasa has a population of 660,000 and a density of 3,111 persons per km^2. Mombasa has no proper sewage treatment facilities and 4,369 tons BOD enters the adjacent creeks each year. Mombasa also has a major port and there were 5 oil spill incidences between 1983 and 1993 within the port, a major oil spill in 1998, which destroyed a huge area of mangroves and a further oil spill in 2005. These factors have major implications for managing an MPA in a town area.

Monitoring of the density of Crown-of-Thorns Starfish (COTS) shows that since 2004 there have been very high densities, especially in Mombasa Marine Park. Coral cover was already low (<40%) and therefore the managers became concerned. This increase in COTS may be linked to sewage pollution as the increase in nutrients may result in an increase in larval survival. Rangers were mobilised and they physically removed COTS from the Marine Park. After 2005, densities were low and continued to decline and coral mortality due to COTS fell from 28% in 2004 to 9% in December 2005. However if the problem is pollution, then the removal of COTS will not deal with the issue in the long-term.

Beach development is another issue, resulting in serious conflicts. Buildings are constructed on beaches which are nesting sites for turtles within the Marine Park. The whole coast is lined with hotels, resulting in beach erosion and loss of turtle nesting sites.

There are 1,600 hectares of mangroves in Tudor Creek to the south of the Marine Park, however raw untreated sewage flows into the mangroves. They studied 250 10mx10m plots to assess the condition of the trees by calculating the complexity index. The complexity index was lower for mangroves inside the creek than outside, suggesting overexploitation as people remove the mangroves for construction and firewood. Studies of the saplings also suggest overexploitation.

The MPA is therefore facing so many threats. Mangroves should be the support system for the coral reefs, but they are also stressed, highlighting the fact that when managing a small MPA factors taking place outside of the area also need to be considered. Anthropogenic pressures faced by the mangroves include intense cutting, sewage pollution, grazing animals and unsustainable farming leading to soil erosion. However, fishers need to live and depend on this environment for their livelihood, so it is a very important system that needs to be conserved. A re-planting programme has been implemented with the local community and KWS paid locals to re-plant mangroves. Unfortunately, in 2006 most saplings died due to heavy rain resulting in sedimentation; *Avicennia marina* however survived due to the increased nutrients from sewage.

Conclusions: There is a need for an effective monitoring system to detect problems before they happen; confining conservation to a small area is not sustainable in urban areas; management for conservation has to be pro-active and adaptive and should consider how to restore degraded systems;

management needs to think beyond small areas and think of for example seascapes - a good ICZM policy is therefore essential.

Other projects undertaken by KWS include turtle conservation monitoring and tagging; community projects such as the development of mangrove boardwalks; donations of boats to remote island communities; and education activities (e.g. Marine Environment Day).

Questions:

Jaffar Mouhidine asked Mohamed to explain the technique for re-planting mangroves. Mohamed replied that the technique depends on the species being planted and it is very important to consider zoning. For *Avicennia marina* viable seeds need to be collected, raised in a nursery, kept in the shade in a mixture of fresh and seawater for 3-4months and then transplanted to the field. For *Rhizophora mucronata* the propagules can be directly planted. It is therefore important to find out what species were there originally and choose the right area for each species.

Summary

Innocent Wanyonyi – Community Participation and Education

Several things emerged from this session: (1) it is extremely important to first determine who the main stakeholders are who should be involved in the project; (2) in each of the presentations there were specific management activities in which communities were involved e.g. resource assessments, monitoring surveillance or simply consultation. The most successful cases were when the community actually took decisions in collaboration with the decision-makers; (3) activities that created a sense of ownership were successful; (4) the development of alternative livelihoods is very important; (5) branding is a very useful way to drive participation as the community is able to identify with the "product".

Eric Blais – Monitoring and Managing MPAs – Community Issues

Several tools are available in the region to help to monitor and mange MPAs. It would be good to make these tools available to the maximum number of people and provide more training for people so that all managers are on the same wavelength. For example, the SocMon manual, ParFish and the MPA Toolkit. There is a need for training in using these tools in order for them to be effective. Paul Siegel also showed that very few MPA managers are trained in social sciences, but this is very important for MPA management.

Jean Paul Paddack – Monitoring and Managing MPAs – Case Studies and Research Findings

(1) A number of presentations discussed the lack of capacity and this is still a challenge – how can we jumpstart the process? (2) Sharing of information – it is very important that a webpage be created as part of the projects as it's important to keep up to date; (3) The involvement of communities is an integral part of success – how can we get them more involved in terms of monitoring and control? (4) There are still problems with involvement of the private sector; Julie's talk was inspiring, but there is still not a good collaboration between civil society, MPA management and the private sector. How can we make that more systematic and significant? (5) There is a need for good scientific data as shown by Pierre Pistorius and Alasdair Edwards, we also need to blend science and socio-economics; (6) We still need to find ways to be more effective lobbyists; (7) There is a funding problem, but it is less of a problem than we think – we need to provide a good sell for a product and be a bit more ambitious.

Denis Etienne – Funding and Income Generation

This was a very important session: money is very important for the creation of MPAs and their effective management. The different presentations highlighted different methods of funding MPAs e.g.

large organisations such as the EU or World Bank or private sponsorship. The development of a trust fund is a very interesting idea and something that is very feasible and could be put in place in other places and even on a regional basis; smaller grants from GEF-SGP are also very important for NGOs. The ReCoMaP project is a real opportunity for regional projects, which are lacking funding. Mary Francois however showed that depending on external funding isn't always enough and new methods of income generation need to be developed. Julie Church created an economic activity as well as developing an alternative livelihood and even with a very small amount of funding alternative livelihoods can be developed, for example in St Lucia. This is very relevant to Rodrigues as fishers will need to diversify in order to continue to earn a living.

Alasdair Edwards – Impediments and Solutions in MPA Management

The different presentations showed how contrasting different MPA set-ups are, with different pressures, funding structures etc. On one hand there are fairly self-funded MPAs with lots of freedom and on the other, MPAs with more government funding and less freedom. Where there is more self-funding it is much easier to manage the MPA. There also different externalities e.g. in Mombasa urban externalities are very difficult to manage, in contrast Cousin Island has no real externalities, therefore some people have a much harder task. There are 3 points to raise: (1) MPAs are a means to an end and not the end themselves. They are a tool within an ICZM context and a way towards sustainable conservation; often the MPA becomes the goal; (2) it is surprising that there are so few social scientists here as coastal management has shifted much more towards socio-economics these days. Natural science issues are fairly straight forward, but social issues are much more complex however conservation cannot be achieved without solving the social science issues; (3) It is encouraging to see some workable and realistic alternative livelihoods. Without these, reducing fishing pressure and the creation of MPAs won't work.