

# DUGONGS WITHOUT BORDERS: Building capacity for Indian Ocean sirenian conservation

A REPORT SUBMITTED TO THE CONSERVATION  
LEADERSHIP PROGRAMME



Community Centred Conservation  
C3 Madagascar and Indian Ocean Islands Programme  
2010

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*Cover photo: Dugong at Marsa Alam, Egypt © Luke Atkinson*

# **DUGONGS WITHOUT BORDERS: Building capacity for Indian Ocean sirenian conservation # 140108**

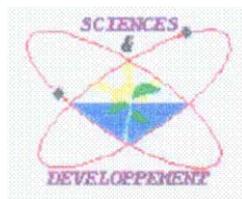
To build national and regional capacity in Madagascar and Comoros for collaborative dugong research and conservation initiatives

Northern Madagascar and Union of the Comoros May 2009 – August 2010

**Edited by Chris Poonian**

**Community Centred Conservation (C3)**

**Antsiranana 2010**



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# CONTENTS

<b>Section 1:</b>	<b>1</b>
<b>Summary</b>	<b>1</b>
<b>Introduction</b>	<b>2</b>
<b>Project members</b>	<b>5</b>
<b>Section 2:</b>	<b>8</b>
<b>Aim and objectives</b>	<b>8</b>
<b>Methodology</b>	<b>9</b>
<b>Outputs and Results</b>	<b>13</b>
<b>Achievements and Impacts</b>	<b>15</b>
<b>Section 3:</b>	<b>19</b>
<b>Conclusion</b>	<b>19</b>
<b>Problems encountered and lessons learnt</b>	<b>20</b>
<b>In the future</b>	<b>20</b>
<b>Section 4:</b>	<b>22</b>
<b>Appendices</b>	<b>22</b>
<b>Bibliography</b>	<b>23</b>

## **SECTION 1**

### **SUMMARY**

The project has proceeded extremely well and all objectives were fully achieved, despite political changeover and general instability in both countries. Seven months into the project, Patricia Davis was invited, based on the team's success, to participate in a United Nations Environment Programme (UNEP) - Convention on Migratory Species (CMS) meeting of ten experts in Singapore to develop an international protocol for rapid assessment of dugong populations (February 2010). The resulting standardised questionnaire was based largely on methods designed by the project. Ten months into the project, the team was asked to organize the first regional UNEP - CMS technical meeting for the conservation of the dugong, held in Antananarivo, Madagascar (August 2010), at which the Comoros and Madagascar presented preliminary Dugong Conservation Management Plans (CMPs) which had been developed through this and the previous CLP project. In the field, dugong knowledge surveys were conducted with 573 fishers across nine sites and seagrass surveys conducted at 16 sites - representing the most complete survey of dugongs and their habitat ever conducted in Madagascar. The capacity building and awareness-raising aspects of the project were also well-received, with the full participation of various sectors of society including local NGOs, national institutions, youth groups, schools and local communities. Both countries have made significant and measurable steps to implementing effective conservation action plans for the dugong as a direct result of this project.



UNEP-CMS regional dugong meeting in Antananarivo, Madagascar

## INTRODUCTION

The dugong (*Dugong dugon*) is in critical need of conservation intervention (UNEP 2002), particularly in the Western Indian Ocean (WIO) (WWF-EAME 2004). This coastal marine mammal has a low maximum rate of increase of 5 % per year (Boyd et al 1999) and feeds exclusively on seagrass. Populations worldwide have suffered overexploitation primarily due to direct and accidental capture (UNEP 2002). The World Conservation Union lists the dugong's status as vulnerable to extinction on a global scale (Marsh 2008) with an estimated population decline of 20% in the last century (UNEP 2002).

Through the United Nations Environmental Programme (UNEP)'s Convention on Migratory Species of Wild Animals (CMS), an international 'Memorandum for the Conservation of the Dugong and its Habitat' was created in 2007. Although it is a non-binding agreement with voluntary participation, this instrument encourages all signatory range states to develop national Conservation Management Plans for the species' future protection. Few countries within the species' range currently have active management initiatives in place due to a combination of factors including lack of data, technical expertise and political will. This is

particularly true for the WIO region, where a severe shortage of information on the species and a lack of financial and human resources have hampered conservation efforts, without which local extinction of the dugong is considered inevitable (UNEP 2002; WWF-EAME 2004).

Madagascar (Figure 1) is a case in point, with a huge coastline of over 4000km and globally significant marine biodiversity, yet severely limited technical and financial resources for research and conservation initiatives. Madagascar has been identified as a priority country within the WIO for further research into dugong status, abundance and distribution (UNEP 2002; WWF-EAME 2004). The northern and western coasts have been identified as regionally important, but information regarding the species' status and distribution and threats is limited (Cockcroft 1993; Cockcroft and Young 1998; WWF-EAME 2004). By becoming the first signatory state of the CMS Dugong MoU, Madagascar has shown its political commitment to conservation action for this threatened species. Dugongs have also been protected in Madagascar since 1993 under article 9 of Government Order No. 93-022 covering legislation for fishing and aquaculture which states:

*Unless special permission has been granted for scientific or technical experimentation by the Ministry of Fisheries and Aquaculture, it is expressly forbidden to kill, injure or capture marine mammals or other species recognized as endangered.*

The next step is to gather sufficient data on the species' status and distribution utilizing low-cost methods, appropriate for a country with limited technical and financial resources (Aragones et al 1997; UNEP 2002) on which to base conservation and management plans. In 2009, Community Centred Conservation (C3) was invited to collaborate with Malagasy partners to initiate much-needed research into dugongs in northern Madagascar with a view to implementing conservation and management actions for the remaining population as soon as feasibly possible.

The Comoros (Figure 1) still harbour a small population of which are highly threatened by incidental capture in gillnets. C3 has already assessed the

dugong population and related habitat and current threats, with co-funding from the CLP and the next priority in this country is to establish a Comorian CMP in collaboration with local stakeholders.

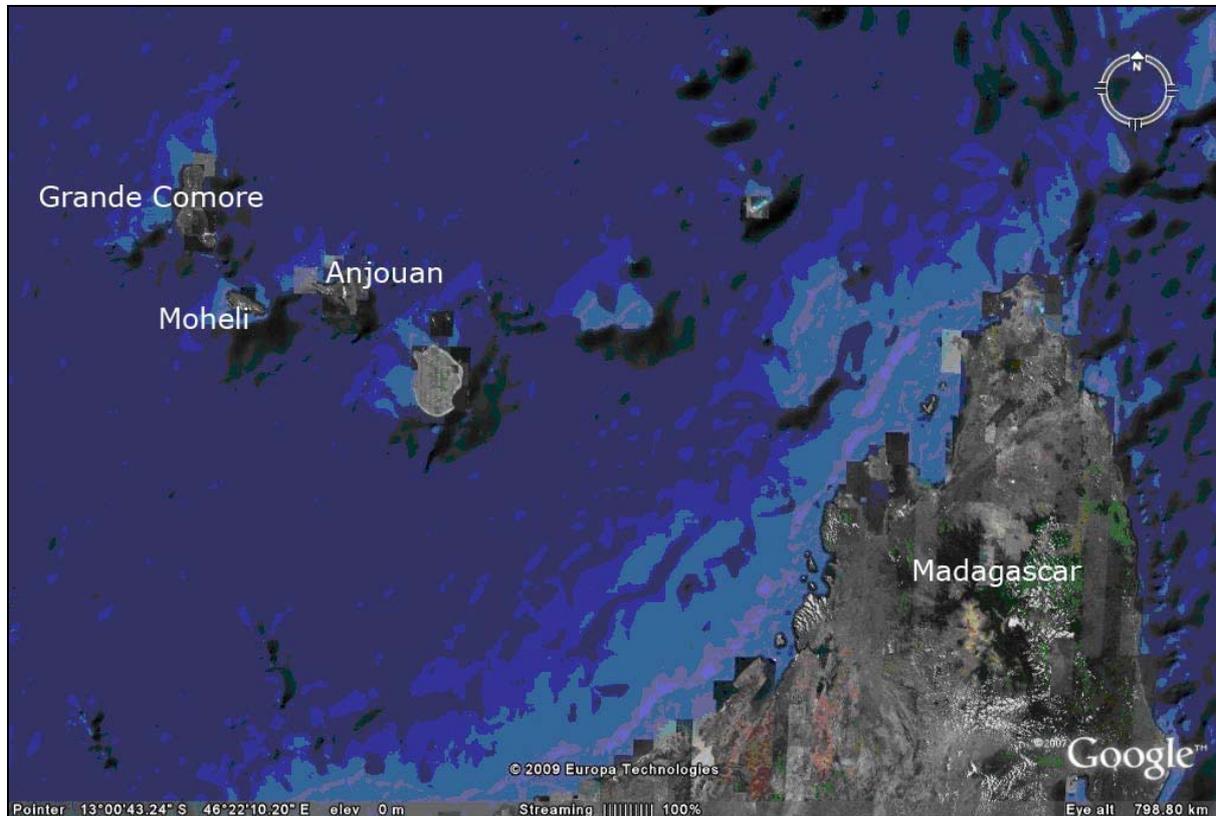


Figure 1. Northern Madagascar and the Union of the Comoros (from Google Earth)

## **Project members**

### *Patricia ZR Davis – Project Leader*

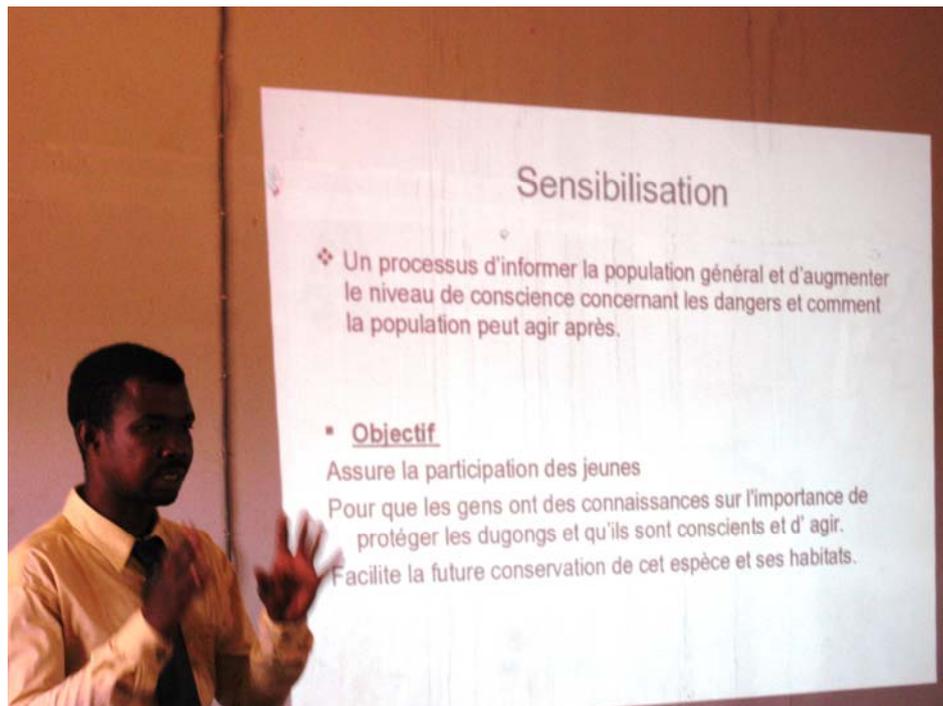
Patricia is a founding member of Community Centred Conservation (C3) and her interest lies in combining indigenous environmental knowledge with contemporary scientific techniques to conserve marine endangered species and ecosystems. She holds an MA in Biological Sciences from Oxford University and an MSc in Protected Area Management from James Cook University. Since 2001 she has worked on the conservation of dugongs and marine turtles in the Pacific and Indian Ocean islands using a combination of aerial surveys, fisher interviews and habitat mapping. She is currently working to develop innovative low-cost means to conserve declining populations of this species throughout the western Indian Ocean region.

### *Kamal Maoulida (MC) - Project Co-Leader / Comoros Field Coordinator*

Maoulida Kamal, from Grande Comore, has been part of the C3 team since 2006 and was promoted to Programme Officer in July 2007. MC has recently completed a DUT in Commerce, and the year before he completed a Bachelor in Applied Foreign Languages, specialising in English, at the University of the Comoros. MC was the project's representative at the CLP training in China 2009.

### *Ismael Leandre Project Co-leader / Malagasy Field Officer*

Ismael holds a degree in Natural Sciences from the University of Antsirananana and currently works as a Programme Assistant for C3. His work focuses primarily on ecological fieldwork and community liaison at our study sites around the northern Madagascar coastline. Ismael enjoys presenting our findings to local communities and acting on their feedback to better protect marine resources.



**Ismael Leandre presents CLP project results at the University of Antsirananana**

*Ben Ahmed Al'yas'aa (Paradise) - Comoros Outreach Officer*

Paradise originates from the town of Iconi in Grande Comore and has a degree in tourism from the University Institute of Technology- a branch of the University of the Comoros and ultimately wants to study environmental management overseas. In 2008, he completed training in SocMon and is currently responsible for coordinating the Junior Ecoguard network. Paradise is focussed on a career in sustainable development and management of natural resources.

*Chris Poonian - Project management and administration*

Chris' research interests focus on the human dimensions of natural resource management and he believes deeply in the importance of building capacity of local individuals for long-term sustainability. He has worked extensively on novel capacity-building programmes and is spearheading the development of regional training programmes for coastal biodiversity management in the western Indian Ocean in collaboration with local universities. Chris is also in charge of developing the SocMon network in Comoros.

*Sthelastine Rosoanirinia – Madagascar Outreach Officer*

Sthela is a graduate from the University of Antsiranana and is responsible for developing publicity and social marketing campaigns for C3 and its work in Northern Madagascar. She also plays an important role in socioeconomic and fisheries survey work.

*Sahondra Parent – Project Administration (Madagascar)*

Sahondra's main interest is in incorporating traditional knowledge and historical data into endangered species conservation and she holds an MSc from the University of Reunion in Biodiversity Conservation.

## **SECTION 2**

### **AIM AND OBJECTIVES**

To build national and regional capacity in the Comoros for collaborative dugong research and conservation initiatives

- to train at least two national experts, and three research assistants from each country in dugong research, conservation and management and promote information sharing and collaboration (by end of project)
- to conduct baseline surveys of seagrass habitat and interview surveys of dugong occurrence and traditional knowledge in north-west Madagascar (by month 6)
- to create a National Dugong Conservation Action Plan (DCAP) for the Comoros and initiate a DCAP for Madagascar (by end of project)
- to implement national public awareness campaigns about dugongs in both countries (by end of project)

The project followed its original aims and objectives closely with no significant changes. Timelines were slightly distorted, particularly for policy-focussed objectives, because of political turnover in both countries.

## METHODOLOGY

### *Interview Surveys*

Dugong status and distribution in the northwest of Madagascar was investigated using semi-structured interviews of community members (based on Davis and Poonian 2007). A total of nine landing sites were sampled across the Diana (northernmost) province in order to achieve a geographically representative sample, particularly considering the high migration rate of fishers in the area (Philigence Rajesiarinanana, *Service pour la Pêche Maritime de la région de Diana* pers comm 2009; Figure 2).



**Figure 2. Study sites in Northern Madagascar**

Sites were selected based on previous studies in the area that had identified priority areas with high numbers of dugong observations (WWF-EAME 2004) and detailed consultation with local government bodies, Madagascar National Parks

(MNP) and *Service pour la Pêche Maritime de la région de Diana*, who identified key regional landing sites.

A total of 573 fishers were approached were conducted between July 2009 and June 2010 Graduates from the University of Antsiranana and staff from the *Centre Nationale de la Recherche Oceanographique* (CNRO) conducted interviews in the local Malagasy dialect, *Sakalava*, following training and piloting of the questionnaire. Interviews were conducted individually in all cases. Interviewees were first shown a picture of the dugong and asked whether they had seen the animal before. Once it was ascertained that they were indeed referring to a dugong, interviewees were questioned about the characteristics and incidence of dugong observations, capture, cultural practices, consumption and sale of meat and their level of understanding of the species' status and relevant local and national laws (see Appendices for Fisher Questionnaire in English and Malagasy).

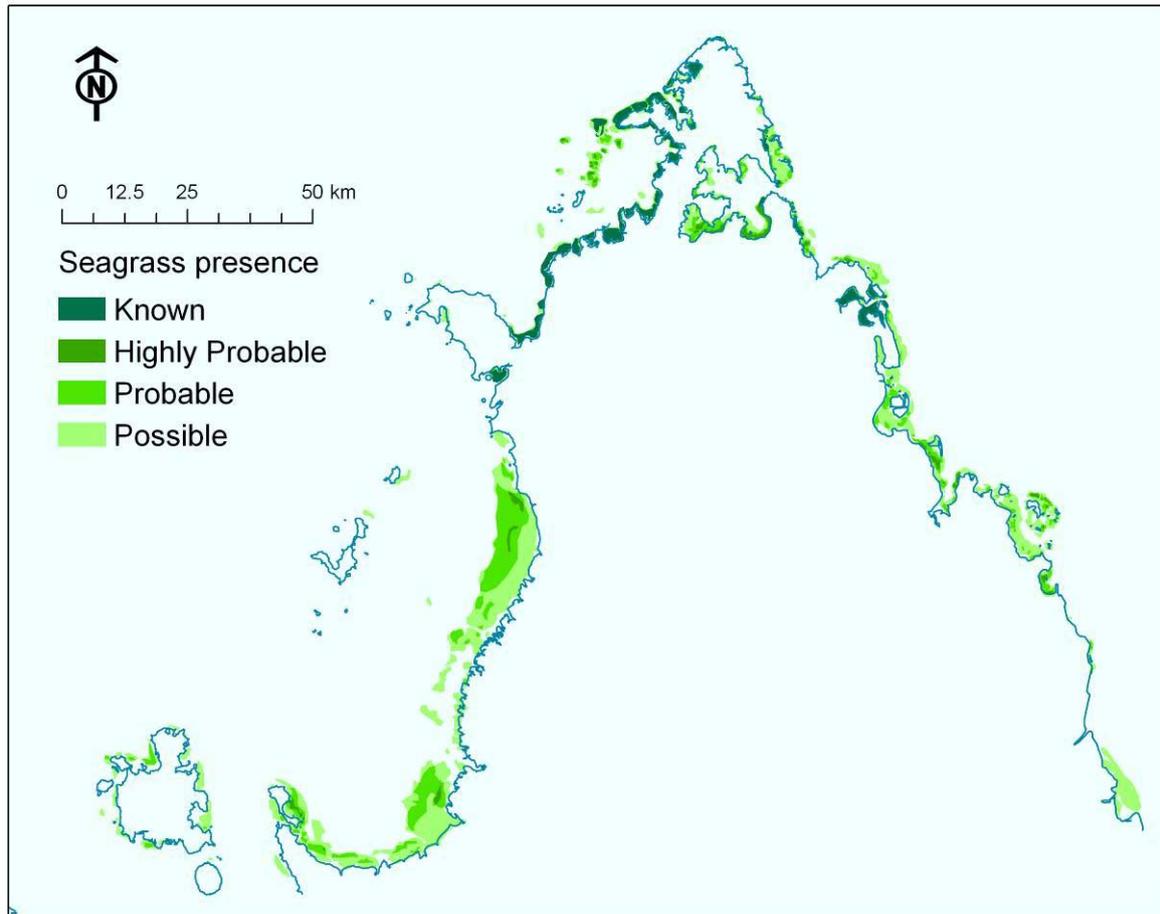
Fishers were gathered and selected for interview by local authorities, such as the village chief or council. If the interviewee had not seen dugongs but knew of them they were asked the questions relating to sale and consumption of meat, conservation status and cultural significance. Key Informants (KIs), regarded by their communities as 'dugong experts' (e.g. senior or experienced fishers / dugong hunters) took part in an open interview to provide wider qualitative information (see Appendices for KI Interview in English and Malagasy).



**Seagrass mapping using SeagrassWatch protocol**

### *Habitat Mapping*

Seagrass meadows throughout Northern Madagascar were mapped using SeagrassWatch protocols. Sites were identified using available satellite and aerial imagery which had been ground-truthed from surveys at four pilot sites (Figure 3).

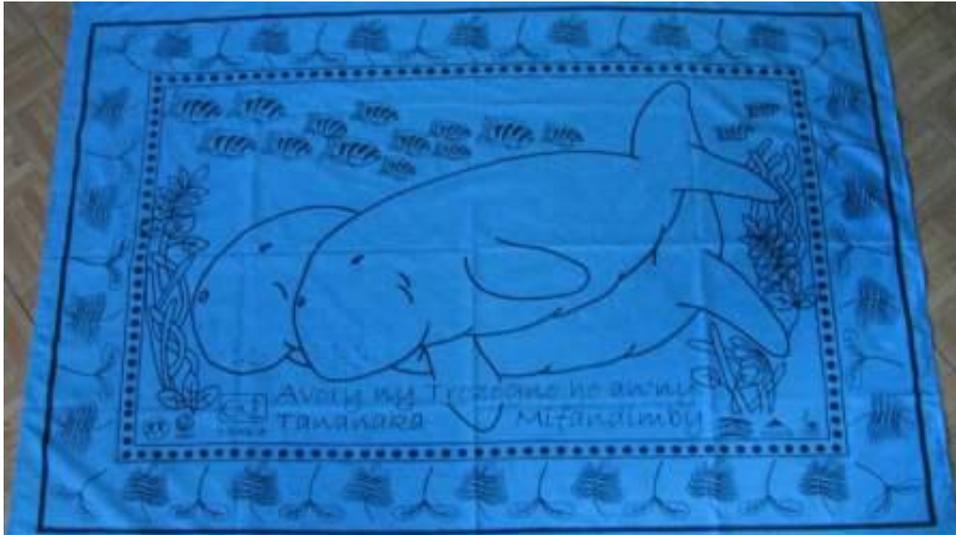


**Figure 3. Potential locations of seagrass habitat in northern Madagascar showing degree of certainty**

### *Awareness-Raising*

In addition to raising the awareness of local fishers through the interview process and village workshops, three further awareness-raising activities were conducted:

- 1) A dugong sketch was compiled and performed by a local scout group from Antsiranana who toured local villages. The sketch detailed the ecological importance of dugongs and their role in the wider ecosystem as well as threats to their future existence.
- 2) A colouring book and associated teachers' guide was produced and distributed to schools throughout the region
- 3) A dugong sarong was printed and distributed widely to villages that had participated in the study.



Dugong sarong

## OUTPUTS AND RESULTS

1. National teams of scientists trained in dugong research techniques capable of future monitoring and comprehensive training materials developed.
2. First detailed ecological information on dugongs, seagrass habitat and quantification of threats in Madagascar required for management purposes - will be written up as a paper and used for the draft Conservation Management Plan (CMP)
3. CMP compiled and presented to the Coastal Zone Management Unit at the Ministry of the Environment, Comoros based on data already collected by previous work, co-funded by CLP
4. Team members Patricia Davis and Ismael Leandre organized and facilitated the regional UNEP-CMS Dugong Technical meeting in Antananarivo in August 2010 at which project results were summarized to national and international partners.
5. Dugong Task Force established in Madagascar during August 2010, including national NGOs and government representatives. C3 has made links with Wildlife Conservation Society and Conservation International and offered to transfer

skills to their field surveyors for rapid assessments in other parts of Madagascar, subject to funding in 2011

6. Regional collaboration to lever funding and exchange information on dugong populations - resulting in increased and more informed participation in the CMS dugong MoU meetings – C3 has worked with CMS to develop a small grant programme in order to conduct similar rapid assessments in lesser known areas thought to be significant for remaining dugong populations. All range states aside from Sudan attended and project proposals are being reviewed in December 2010 with a view to starting selected projects in April 2011 in Eastern Africa and the western Indian Ocean islands.

7. International collaboration through technical assistance from international experts and conventions – the regional workshop for UNEP-CMS was a resounding success and C3 has been asked to follow up in assisting the secretariat with selection of pilot projects and administration of small grants. The team has been asked to provide technical advice and transfer training to other projects in East Africa and the western Indian Ocean islands in 2011.

8. Improved awareness of dugongs, seagrass and their importance in local communities and stakeholders at the study sites – communities showed great interest in learning about dugongs, although many fishers were aware of them, the majority of people had never seen one and did not understand life history, ecology, threats and conservation implications. The existence of cultural taboos, or fadys, relating to the capture, slaughter and consumption of dugongs reveals cultural importance and the potential for combining traditional and contemporary laws and management practices. Elders and village chiefs expressed their concern in engaging their youth in conservation given the previous intense exploitation of dugongs for their meat and their potential extinction from the area.

9. Paper in review: Poonian CNS, Bakary G FISHING FOR INFORMATION ON THE STATUS OF THREATENED MARINE MEGAFUNA IN NORTHWEST MADAGASCAR. Madagascar Conservation and Development.

10. Madagascar survey work was presented at the Society for Conservation Biology Annual Meeting in Canada July 2010.

11. Significant contribution to global research methods at the UNEP-CMS Singapore meeting in February 2010.



**Dugong sketch**

## **Achievements and Impacts**

### *Interview Surveys*

The interview surveys were effective at providing baseline data for the dugong population in Northern Madagascar. Relative dugong distribution was mapped (Figure 4) and could be overlaid on maps of seagrass habitat and fishing pressure (Figure 5) to identify hotspots for future dugong conservation action. Interviews also provided useful data on perceptions of and threats to dugongs in the region. Respondents widely noted a decline in dugongs in the region, and often attributed this to intensive hunting in the past. The current greatest threat to dugongs in northern Madagascar was accidental capture in gillnets, known locally as *jarifa*.

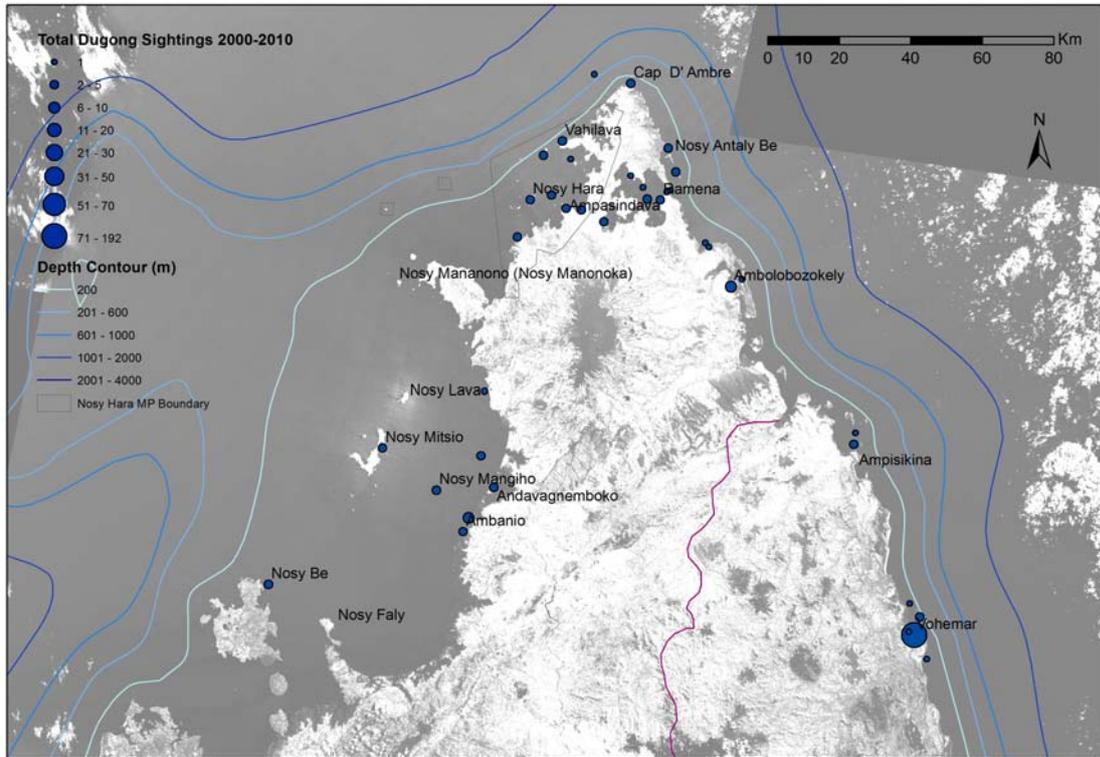


Figure 4. Dugong sightings in Northern Madagascar since 2000

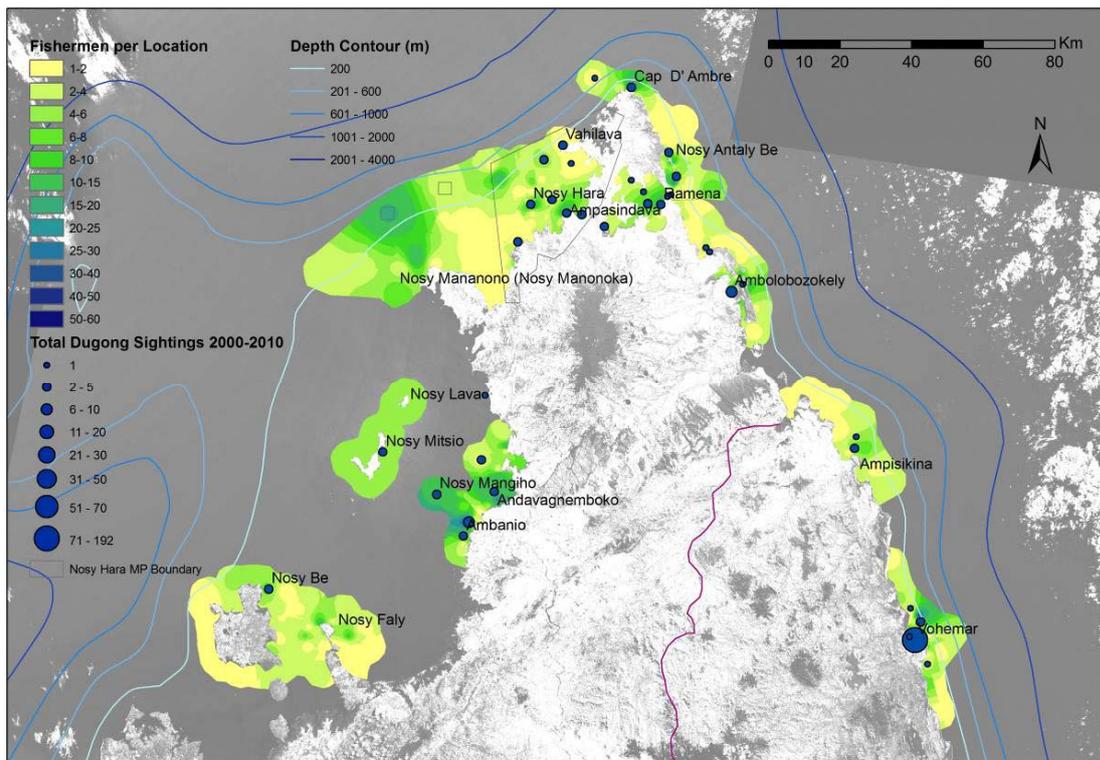


Figure 5. Overlaying dugong sightings on fishing intensity to identify hotspots of risk to dugongs

Key Informants provided insight into ancient capture methods. Traditionally, dugongs were captured using the *valkira* method where 'bamboo-structures' were set in the water to create a disturbance which caused dugongs to move out towards open water. The animal would then be pursued by boat until they became distressed and fatigued, which facilitated capture. A similar method was applied using a harpoon (*samandra, ranjo and famono hosatra*), often equipped with a wooden float so that the speared dugong could be pursued and asphyxiated once fatigued. These methods were generally reported as outdated, although a harpoon may still be kept on board for this purpose according to two KIs.

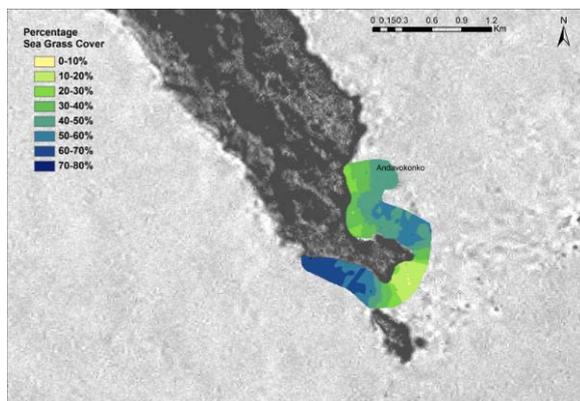
According to the reports from KIs, contemporary methods for intentional capture are conducted from a 6-8m motorized dugout canoe (*pirogue*) using gill nets (*ragaridy jarifa, zedazedada*), typically with a mesh size 3-7 fingers, 3-7m in height and anywhere from 100 to 900m long, normally used to target large fish. These nets are also thought to be the primary cause of incidental captures. Six men are required to capture a dugong, four to manipulate the net and two to manage the boat. This is also to ensure compliance with *fady*, local taboo, which requires six men from different families to confirm that sexual intercourse has not taken place with the animal. The dugong is encircled with the net and the fishers create noise to cause the animal to panic and become entangled in the net and asphyxiated.

The number of dugong experts (defined here as fishers who were skilled in hunting dugongs and had therefore regularly targeted them in the past) estimated for each community varied greatly between sites. Key Informants in Ramena reported the highest number of experts, with almost all fishers in the village believed to have captured dugongs at some time (including incidental captures, not just deliberate hunting). At Ampasindava, estimates of between 10 and 50 dugong experts were mentioned, with a list of names provided in one case. In contrast, at Nosy Faly, only four were thought to exist. Key Informants claimed to have killed between 10 and 200 dugongs during their lifetime with five of them capturing dugongs when they encountered them on a normal fishing excursion and one (who caught 200) targeting dugongs exclusively.

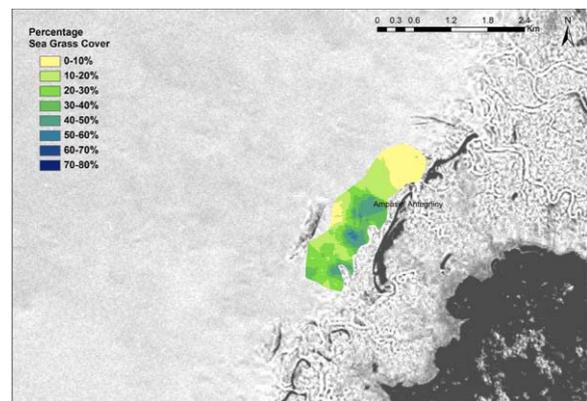
### Habitat Mapping

Detailed maps of seagrass distribution were produced for 16 study sites and some example outputs are given in Figure 6. The methods used were found to be effective, for the following reasons:

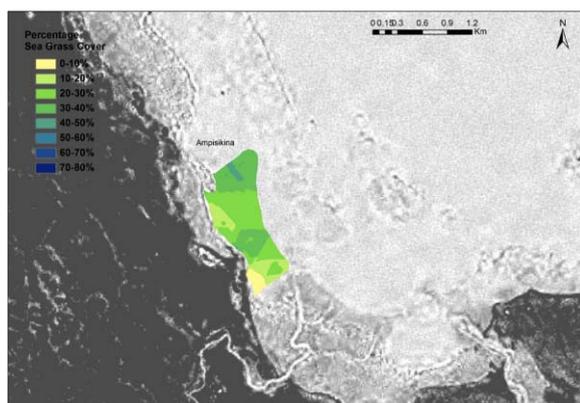
- **Low cost** – all imagery and software can be sourced free of charge
- **Rapid** – Previously unstudied Northern Madagascar region mapped in a few months of fieldwork
- **Simple** – fieldwork can be conducted by local communities after 1 or 2 days' training
- **Useful** – resulting maps may be overlaid with dugong sighting and bycatch data to identify priority sites



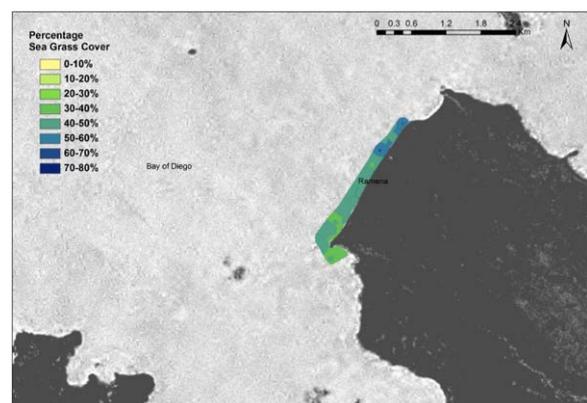
(a) Andavokonko



(b) Ampasin Antegniny



(c) Ampisikina



(d) Ramena

Figure 6. Examples of seagrass maps produced for each study site

## SECTION 3:

### CONCLUSION

Our results show that the dugong populations in Madagascar have been greatly depleted based on comparison with historical anecdotal records and local knowledge. Dugongs appeared in large herds in the 1960s and were quickly exploited by coastal communities for their meat and oil. Exploitation became more efficient with the introduction of motorised crafts and accidental bycatch escalated with the introduction and proliferation of monofilament gillnets in artisanal fisheries. The greatest threat now is from accidental bycatch as organised dugong hunting is no longer viable following the decimation of the population. Our results indicate areas of high priority where dugongs have been sighted alive recently and also high incidence of bycatch has been recorded. These areas will be the priority for extension of protected areas and community-driven bycatch reduction incentive schemes.



**Preparing the nets for a fishing trip**

The project aimed to also increase trans-boundary collaboration and lever regional action for dugong conservation. Notable contributions have been made to design of an internationally-standardized protocol for rapid assessment of this species and its habitat and the team's coordination of the first regional technical

meeting for governments in the WIO demonstrates the success of the team and confidence and recognition of its scientific and community conservation achievements at the international level. The meeting resulted in several proposals for trans-boundary cooperation for dugong conservation which will be pivotal to sustaining this species in the WIO.

At the community level the excellent relations developed with village associations and fishers, the request for follow up and the stakeholder interest in brainstorming for solutions to bycatch is extremely encouraging for future conservation management actions throughout northern Madagascar and Comoros.

## **PROBLEMS ENCOUNTERED AND LESSONS LEARNT**

The data collection phase in Madagascar went well due to great support from the communities and the interest and readiness of fishers to participate in interview surveys. The development of the CMP for Comoros proceeded as expected due to good relations with Ministry of Environment and Ministry of Fisheries staff. Awareness-raising was welcomed in the villages and the theatre was received with great interest and humour. Dugong sarongs were appreciated as a token of appreciation for communities' participation in the study. We were surprised by the project having a much wider impact in terms of endorsement by UNEP-CMS and their international protocol being based heavily on specific methodologies developed by the CLP team. The success of the team in running the first regional technical meeting on dugongs in Madagascar resulted in a continuing technical advisory role with UNEP-CMS and potential involvement with new dugong surveys in other countries from April 2011.

## **IN THE FUTURE**

In the immediate future the team will be assisting UNEP-CMS in the administration of small grants to conduct rapid assessments of dugongs, particularly those emphasizing national and trans-boundary collaboration, in other WIO nations from April 2011.

Based on the research we have conducted and CMPs being drafted the next stage is implementation of tangible and immediate conservation activities at the community level in those hotspots.

The most beneficial management approach in terms of assuring food security through (i) protection of habitats for juvenile fish species (ii) sustenance of current artisanal fish stocks and (iii) maintenance of current dugong populations (and many other species sharing the same habitat) is the creation of locally-managed marine areas (LMMAs).

Although Marine Parks exist at the national level, they are critically under-funded, compromising their effectiveness due to little or no surveillance and enforcement, lack of baseline data and monitoring of species and habitats and lack of community understanding and engagement in their functioning. LMMAs however offer the only realistic means of achieving conservation objectives whilst safeguarding resources that poor coastal communities depend upon. Resulting empowerment of communities will enable local monitoring and management to be sustained with little funding and the natural concern of these stakeholders to protect their resources for future generations.

Funding will also be solicited for the piloting of incentivised bycatch reduction schemes (IBRS) in hotspot areas whereby fishers are encouraged to release live animals, compensated for any resulting net damage and also report carcasses for collection and scientific research. Key members of each community will be appointed as community outreach officers and liase with the team to report mortality including accidental and deliberate capture of this species. They will also inform the village authorities of progress made in conservation actions and act as a conduit for awareness-raising about all aspects of the LMMAs and IBRS.

**SECTION 4****APPENDICES**

Itemized expenses	Total CLP requested (USD)	Total CLP used (USD)
<b>PHASE I - PROJECT PREPARATION</b>		
<b>Administration</b>	500	500
Communications (telephone/internet/postage)	900	1,100
Books and printing journal articles/materials	200	0
Insurance	200	400
Visas and permits	200	250
<b>Equipment</b>		
Scientific/field equipment and supplies	1,800	2,476
Photographic equipment	800	616
Camping equipment	300	522
Field guides	100	196
Maps	200	0
Medical supplies/first aid	100	14
Boat/engine/truck	1,850	2,000
<b>PHASE II - IMPLEMENTATION EXPENSES</b>		
<b>Transportation</b>		
Fuel	2,000	120
Accommodation for team members and local guides	2,000	2,450
Food for team members and local guides	1,500	2,130
Transportation	3,850	6,500
<b>Workshops</b>	4,000	3,089
Outreach/education activities and materials (brochures, posters, video, t-shirts, etc.)	2,500	2,018
<b>PHASE III - POST-PROJECT EXPENSES</b>		
<b>Administration</b>		
Report production and results dissemination	2,000	1,118
<b>Total</b>	<b>25,000</b>	<b>25,000</b>

A dugong catch/incidental catch survey tool, developed by a group of technical advisors, has produced some quality data from 20 countries in the Pacific Islands, South Asia and the United Arab Emirates. The data will be combined into a geographical information system to identify the trouble spots, provide crucial information on existing populations and map important habitat areas. In 2011, the survey will be extended to range states in East Africa and the Western Indian Ocean littorals, Northwestern Indian Ocean, as well as South Asian regions. Other solutions to protect valuable dugong habitat include establishing spatial closures as marine reserves and temporal constraints to fishing operations. Incentives, such as loans for buying dugong-friendly fishing gear, educational campaigns and measures to improve the livelihood of local communities were also considered as a way to complement conservation efforts. Potential pilot projects will be developed to implement these new incentive based tools, from which other marine species may benefit as well.

Through its commitment to the Dugong MoU, the EAD and UAE Government have taken the lead in international efforts to conserve the dugong across its global distribution. Although much more work, effort and funding will be required, this meeting made a substantial contribution toward ensuring the global conservation of dugongs. The meeting concluded that the conservation strategy should address the need for greater protection of marine biodiversity by combining different conservation tools. At the meeting, Bahrain, Palau, Seychelles, Vanuatu and Yemen signed the CMS Dugong agreement bringing the number of signatories to 18. More countries are likely to follow in the near future. The next Dugong MoU meeting is planned to take place in 2012. **-Donna Kwan and Jenny Rennell** (dkwan@cms.int; jrennell@cms.int)

## **HISTORIC TECHNICAL MEETING ON DUGONG RESEARCH AND CONSERVATION HELD IN MADAGASCAR**

As one of the first Signatory States of the UNEP Convention on Migratory Species of Wild Animals (CMS)'s Memorandum of Understanding (MoU) for the Conservation and Management of Dugongs and their Habitats throughout its Range, it was particularly apt that Madagascar played host to the first regional technical meeting on this species. The meeting was held on 4-6 August 2010 at the Colbert Hotel in Antananarivo, with government, UNEP/CMS and fisheries and wildlife management representatives in attendance as well as NGOs currently engaged in dugong research. Representatives from the Environment Agency – Abu Dhabi, the host agency and sponsor to the Secretariat of the Dugong MoU, were also present at this significant event. After three days of sharing information and brainstorming, the meeting was felt to be a resounding success by its organizers and participants.

Opening speeches were given by the Honorable General de Brigade Herilanto Raveloharison, Minister of the Environment, Forests and Water and Dr. Donna Kwan, the Program Officer from the UNEP/CMS Dugong Secretariat in Abu Dhabi and the momentous event was broadcast on national television, raising awareness about this elusive and highly endangered marine mammal, believed to be the source of the legendary mermaid myth.

The Dugong MoU came into effect on 31 October 2007 after only 2 years of consultation with experts and relevant officials from range state governments. A non-binding instrument, it seeks to conserve and protect the dugong throughout its global range across over 40 range states. A number of range states including those from the region have indicated interest in signing the Dugong MoU in the near future. In the lead-up to the First Official Signatory State Meeting of the Dugong MoU (held in Abu Dhabi on 4-6 October 2010, see above), a number of sub-regional projects were initiated, including the convening of technical workshops to support dugong conservation efforts in range states and the implementation of the Dugong MoU.

The workshop, organized by Community Centred Conservation (C3), a non-governmental organization now in its fifth year of dugong research and conservation in the western Indian Ocean region, saw representation from the majority of range states in the region, including Comoros, Kenya, Madagascar,

Mayotte, Mozambique, Somalia, Seychelles and Tanzania. In fact, it was a historic occasion in that this was the first ever dugong meeting attended by Somalia. Of all the sub-regions of the Dugong MoU, this region is the one with the highest number of signatories, perhaps in recognition of the degree to which this species is threatened with extinction in the waters of the western Indian Ocean.

After decades and in some cases, centuries, of intensive hunting for its tasty meat, the dwindling remnants of dugong populations number only handfuls of individuals around small island groups and just hundreds off eastern African states. Clinging precariously to the coastlines where their sole source of food, seagrass, grows, they are frequently entangled in artisanal gill nets, currently the greatest threat to their existence.

The main barrier to dugong conservation in East Africa and the West Indian Ocean islands is the lack of technical and financial capacity to implement suitable actions. The Dugong MoU Conservation and Management Plan (CMP) for dugongs in the West Indian Ocean now provides a framework to progress conservation and management actions in this region. This meeting provided a vital opportunity for the countries to present updates on the status of their dugong populations and associated habitat, as well as to seek grounds for future collaboration in the fields of both research and management. Furthermore, in-depth analyses were conducted on the current financial and technical capacities of range states to implement dugong research and conservation activities.

The UNEP-CMS Standardised Survey methodology was presented and explained in detail and will be launched in various countries in early 2011, supported in part by small grants provided via the Secretariat and administered by C3. The surveys will help to identify key dugong habitat, population numbers and trends, and impacts including direct harvest, habitat degradation and fisheries by-catch. Since the methodology is questionnaire-based it is sufficiently flexible and low-cost to be adapted regionally and will yield comparable data, to be housed by the Secretariat in its coordinating role. The survey and an accompanying Project Manual can be downloaded from the Secretariat's website at [http://www.cms.int/species/dugong/dugong\\_noticeboard.htm](http://www.cms.int/species/dugong/dugong_noticeboard.htm) under the relevant notices posted. The meeting report with details of discussions and presentations will be available from the same site later this month.

C3 has been generously supported via the BP Conservation Leadership Programme since the inception of its first community-based dugong research in the western Indian Ocean in 2006 and more recently by the CMS Dugong secretariat. -**Patricia Z.R Davis**, (Community Centred Conservation (C3), [www.c-3.org.uk](http://www.c-3.org.uk))



**Madagascar Meeting Participants**



## DUGONG QUESTIONNAIRE

FORM #

### Fisher information

Date	Landing site	Interviewer
Age	Occupation	Name (optional)

**Make sure you've shown the interviewee a photo of the dugong and that they have seen a dugong in the past.**

1. How often do you observe dugongs? (If never skip to #10)

- |   |  |   |  |
|---|--|---|--|
| <input type="checkbox"/> Never              | <input type="checkbox"/> Once in my life | <input type="checkbox"/> A few times in my life | <input type="checkbox"/> Less than once a year |
| <input type="checkbox"/> A few times a year | <input type="checkbox"/> Once a month    | <input type="checkbox"/> A few times a month    | <input type="checkbox"/> Once a week           |
| <input type="checkbox"/> A few times a week | <input type="checkbox"/> Every day       | <input type="checkbox"/> N/A                    |  |

2. In which area(s) have you seen dugongs? – (indicate each site on the map with the corresponding form # and specify the exact name of the beach, the bay or the nearest village for each locality)

Site	# individuals	Habitat	Size	Number of times	Day / Night	Year	Month	Dead /Alive	Cause

Habitat types: seagrass / mangrove / reef edge / open sea ; Size: small (<1m) /medium (1<m<2m) / large (>2m); Cause : eg. net / N/A

3. What were you doing at the time of observation or at the time of accidental/deliberate capture?

- |                                  |   |  |                              |
|----------------------------------|---|--|------------------------------|
| <input type="checkbox"/> Fishing | <input type="checkbox"/> Saw from the coast | <input type="checkbox"/> Other (specify) | <input type="checkbox"/> N/A |
|----------------------------------|---|--|------------------------------|

If fishing were you fishing by:

- |                                  |  |                               |                              |
|----------------------------------|--|-------------------------------|------------------------------|
| <input type="checkbox"/> Pirogue | <input type="checkbox"/> Vedette (motorized craft) | <input type="checkbox"/> Foot | <input type="checkbox"/> N/A |
|----------------------------------|--|-------------------------------|------------------------------|

4. How often do you catch dugongs by accident or on purpose?

- Never       Once in my life       A few times in my life       Less than once a year  
 A few times a year       A few times a month       Once a month       Once a week  
 A few times a week       Every day       N/A

Site (Draw on map)	# individuals	Habitat	Size	Number of times	Day / Night	Year	Month	Dead / Alive	Cause

Habitat types: seagrass / mangrove / reef edge / open sea ; Size: small (<1m) /medium (1<m<2m) / large (>2m); Cause : eg. net / N/A

5. Do you observe or catch MORE / SAME / LESS dugongs since you started fishing?

- MORE       SAME       LESS       NEVER       N/A

If more or less, when did this change? (decades) \_\_\_\_\_

Why do you think this is? \_\_\_\_\_

6. The dugongs you have observed or captured were they:     In groups     In pairs     Alone     N/A

If in group, how many individuals? \_\_\_\_\_

7. Have you even observed a female and her calf?     YES     NO     N/A

If yes: Date \_\_\_\_\_ Site \_\_\_\_\_

8. At what time of day/night do you observe or capture the most dugongs? \_\_\_\_\_  N/A

9. If you catch a dugong, what do you do with it?

- Eat       Sell       Release it (alive)       Discard (already dead)       Kill and discard

other (specify)  N/A

10. How many fishermen hunt Dugong in the village?

11. Market value (if relevant): What parts of the dugong are eaten/sold? \_\_\_\_\_

How is the dugong sold? \_\_\_\_\_

What is the price per unit for dugong meat? (specify the unit and the amount in Ar or FMG) \_\_\_\_\_

12. Have you ever eaten dugong meat?     YES             NO             N/A

If yes: Date \_\_\_\_\_

13. Do you know of another name for dugongs? \_\_\_\_\_

14. Do you know if there are MORE / LESS / SAME number of dugong now compared to when you started fishing?

MORE             LESS             SAME             N/A

Why? \_\_\_\_\_

15. Are dugongs endangered?             YES             NO             N/A

16. Are dugongs protected by law?             YES             NO             N/A

17. Are there any fadys about dugongs?             YES             NO             N/A

What are they? (Specify village) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

18. Do you know any stories about dugongs? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**IF INTERVIEWEE HAS CAPTURED DUGONGS, DO A KEY INFORMANT INTERVIEW**



## FANADIHADIHANA MIKASIKA LAMBOHARA

# FICHE

### Mombamomba ireo mpamintana

Daty	Fonenana	Mpanadihady
Taona	Asa atao	Anarana (isankarazany)

### **Fahazoana antoka tsara mpamintana iray mba ahafantatra tsara mombamomba ilay lambohara sady efa nahita izany lambohara izany**

1. Impiry nahita lambohara anareo tatotato ? (raha tsiaro mandeha amin'ny # 10)

- Tsiaro                       indraiky taminy fiainako                       Indrakindraiky fo taminy fiainako                       Ambanin'ny indraiky isantaona  
 Indrakindraiky isaka taona                       Indraiky isaka fanjava                       Matetiky isaka fanjava                       Indraiky isaka herinandro  
 Matetiky isaka herinandro                       Isanandra                       N/A

2. Aiza avy ireo faritra efa nahitanao lambohara ? – (Indiquer chaque site d'observation sur la carte avec le # de fiche correspondant et préciser le nom exact de la plage ou du village le plus proche pour chaque localité)

Toerana	Isany (# individus)	« Habitat »	Alavany	Impirynahina hita	Alinfa sa matsagna	Taona	Fanjava	Maty sa velona	Antony

Karazany tany ipetrahanany: Ahitry andranomasina / Honko / Ivelany riva / Any aminy lalina ; Karazany alavany: Fohy (<1m) / erany na antonony (1<m<2m) / Lava (>2m);  
 Antony : eg. Harato / Tsy haiko

3. Inona ny raha nataonareo aminy fotoagna nahitanareo azy na nahazoanareo azy (antsitrapo na tsy kiniagna) ?

Teo ampamintanana     Tazana avy antety     Hafa (omeo)     Tsy hay

Raha ohatra mamintana :

Laka/sambo     Vedette     Miaka     Tsy hay

4. Impiry namintana lambohara kiniagna na tsy kiniagna anareo ?

Tsiary     Indraiky taminy fiainako     Indraikindraiky fo taminy fiainako     Ambanin'ny indraiky isantaona  
 Indraiky isaka taona     Indraiky isaka fanjava     Matetiky isaka fanjava     Indraiky isaka herinandro  
 Matetiky isaka herinandro     Isanandro     N/A

Toerana ( sorato eo amin'ny carte)	Isany (# individus)	« Habitat »	Alavany	Impiry nahitanao azy /ireo	Alinfa sa matsagna	Taona	Fanjava	Maty sa velona	Antony

Karazany tany ipetrahan'ny: Ahitry andranomasina / Honko / Ivelany riva / Any aminy lalina ; Karazany alavany: Fohy (<1m) / erany na antonony (1<m<2m) / Lava (>2m);  
 Antony : eg. Harato / Tsy haiko

5. Nahita na nahazo lambohara maro / mira / vitsy anaro rango namintananareo?

MARO     MIRA     VITSY     TSIARO     TSY HAY

Izy koa maro na vitsy, ombiana ny niovary? \_\_\_\_\_

Nagnino anareo mieritreritra izany? \_\_\_\_\_

6. Mandeha miaraka sa mandeha manokana ilay lambohara hitanareo na hoe nazonareo ?

Miaraka     Tokana     Kiroroa     Tsy hay

Raha miaraka, firy eo ho eo ny isany ? \_\_\_\_\_

7. Efa navy nahita reniny sy zanany moa anareo?     ENY     TSIA     TSY HAY

Raha eny : Daty \_\_\_\_\_ Toerana \_\_\_\_\_

8. Aminy fotoana (ora) ino no fahitanareo na fazahoanareo lambohara ? \_\_\_\_\_  TSY HAY

9. Izy koa mahazo lambohara anareo, atao ino ?

- Ahanina       Alafo       Avela (velona)       Ariana (maty)       Vonena sady ariagna  
 Hafa (omeo)       Tsy hay

10. Firy ny isany mpamintana mangala lambohara eto amin'ny tanana eto? \_\_\_\_\_

11. Ny vidiny (si *pertinent*): Aia eo aminy tenany no azo alafo na mety ahanina? \_\_\_\_\_

Magnano akory fandafosana lambohara ? \_\_\_\_\_

Ohatrinona no vidiny nofiny isaka lanjany (omeo aminy Ar na FMG) ? \_\_\_\_\_

12. Efa nihinana lambohara va anareo ?       ENY       TSIA       TSY HAY

Raha eny: Daty \_\_\_\_\_

13. Misy anarana hafa ahaizanareo lambohara ? \_\_\_\_\_

14. Rango anareo namintana, araka ny fahaizanareo, nihegny/nihamaro/mira ny isan'ny lambohara?

- MARO       VITSY       MIRA       TSY HAY

Naninona? \_\_\_\_\_

15. Mihalany taranaka moa ireo lambohara ireo ?       ENY       TSIA       TSY HAY

16. Arovana moa ireo lambohara ireo ?       ENY       TSIA       TSY HAY

17. Misy fady ve miaraka aminy lambohara ?       ENY       TSIA       TSY HAY

Ino avy izy ireo ? (*ambarao amin'ny tanana dia ireo fady ireo*) \_\_\_\_\_

18. Mahafantatra ny tantara mikasiky lambohara va anareo ? \_\_\_\_\_

**Izikoa ilay mpamintagna efa nahatratra lambohara, ampaminoa Key informant interview.**













**Awareness**

**LEAD QUESTION**

Have you noticed a change in their abundance? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**PROBES**

Do you think there are more or less as there were 30 years ago?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**LEAD QUESTION**

Do you know if dugongs are protected by law? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**PROBES**

- Who enforces their protection?
- Are they protected in any other way?
- Do you know of any local groups that are helping to protect dugongs?
- Do you think their protection is working?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

LEAD QUESTION

Dugongs were hunted in Tanzania and Comoros and have now disappeared. What could we do in Madagascar to stop them from disappearing? \_\_\_\_\_

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\_\_\_\_\_

PROBES

- Would you suggest any alternative methods of fishing that would not affect dugongs and their habitat or fishermen livelihoods?
- What can other stakeholders do to stop their disappearance?
- Who do you think is responsible for their conservation?

\_\_\_\_\_

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## Awareness

### LEAD QUESTION

Moa ve nahatsapa fa misy fiovagna aminy hamaroandreo ? \_\_\_\_\_

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### PROBES

☞ Moa ve nitombo sa nihengny ny amaroany izikoa hioarigny aminy 30 taona lasa ?

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### LEAD QUESTION

Moa ve misy lalagna miharo lambohara \_\_\_\_\_

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### PROBES

- ☞ Azovy miantoko ny fiarovagna lambohara?
- ☞ Moa ve misy fomba hafa entinaro miharo lambohara?
- ☞ Moa ve misy olo na Association magnampy aminy fiarovagna lambohara?
- ☞ Haraka hevitrinao mandeha tsara io fiarovagna lambohara io sa tsia ?

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