

**MARINE MAMMALS IN THE SAVU SEA (INDONESIA):
INDIGENOUS KNOWLEDGE, THREAT ANALYSIS
AND MANAGEMENT OPTIONS**

Thesis submitted by

Putu Liza Kusuma MUSTIKA, BSc(Hons)

In August 2006

**For the degree of Masters of Science
In the School of Tropical Environment Studies and Geography
James Cook University**

STATEMENT OF ACCESS

I, the undersigned, author of this work, understand that James Cook University will make this thesis available for use within the University Library and, via the Australian Digital Theses network, for use elsewhere.

I understand that, as an unpublished work, a thesis has significant protection under the Copyright Act and I do not wish to place any further restriction on access to this work.

Putu Liza Kusuma Mustika

12th of August 2006

STATEMENT OF SOURCES

DECLARATION

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of reference is given.

Putu Liza Kusuma Mustika

12th of August 2006

ELECTRONIC COPY

I, the undersigned, the author of this work, declare that the electronic copy of this thesis provided to the James Cook University Library is an accurate copy of the print thesis submitted, within the limits of the technology available.

Putu Liza Kusuma Mustika

12th of August 2006

Declaration on Ethics

The research presented and reported in this thesis was conducted within the guidelines for research ethics outlined in the *National Statement on Ethics Conduct in Research Involving Human* (1999), the *Joint NHMRC/AVCC Statement and Guidelines on Research Practice* (1997), the *James Cook University Policy on Experimentation Ethics, Standard Practices and Guidelines* (2001), and the *James Cook University Statement and Guidelines on Research Practice* (2001). The proposed research methodology received clearance from the James Cook University Experimentation Ethics Review Committee (approval number H1748).

Putu Liza Kusuma Mustika

12th of August 2006

ACKNOWLEDGEMENTS

First of all, I would very much like to thank Professor Helene Marsh, who more than two years ago answered an email from a complete stranger who was eager to pursue a masters program on marine mammals. Professor Marsh has since then become my main supervisor, not only teaching me proper methods of thesis writing and research, but also to the less developed area of marine mammal management. Despite their tight schedules, Dr. Alison Cottrell and Dr. Ivan Lawler have also provided endless support as my co-supervisors for this thesis. Dr. Cottrell has helped me reveal more information from the interview transcripts I obtained from the field, thus igniting my interest and concerns to the traditional whale hunters in Lamalera and Lamakera. Dr. Lawler has given me many critical comments on my drafts to enable me to enlarge my understanding from a 'simple' study on whale hunting communities to a more comprehensive study of marine mammal management for Savu Sea. I also would like to thank Associate Professor Peter Valentine, Beth Moore and Olga Bazaka in the School of Tropical Environment Studies and Geography (TESAG) James Cook University for facilitating and supporting my research in TESAG during the writing of this thesis. Special thanks as well to Sue Bird of the School of Graduate Research Studies for her tremendous help during the finalisation of this work.

AusAid generously provided me with a stipend for two years, tuition fees for my masters program, as well as return tickets between Indonesia and Australia for initial settlement and fieldwork. I gratefully thank AusAid, especially Mr. Alex Salvador, Mrs. Larissa Siliezar and Ms. Cinzia Spinelli for helping me until the day I departed from Townsville. Professor Robin South from the International Oceans Institute Australia granted me my initial research funding. I thank him and the IOI so much. Mr. Triagung Rooswadi of the WWF Indonesia supplied, not only additional research funds, but also two dedicated staff, Mr. Widodo Prayitno and Mr. Zakarias Atapada to assist me in the field. I thank WWF Indonesia and the whole staff in Bali and Nusa Tenggara Program for their very meaningful support. The Hong

Kong-based Ocean Park Conservation Foundation also provided major funding for this thesis, enabling me to include additional information in the thesis. I thank Mr. Timothy Ng, Ms. Zoe Lam and Mr. Jonathan Fung for their support.

This thesis would definitely not be completed without the willingness of the villagers of Lamalera (Lembata Island), Lamakera (Solor Island), Alor and Rote, in addition to government agencies, private sectors and NGOs in Lewoleba, Larantuka and Kupang to supply me with information as the basis of my research. Various Indonesian national governmental agencies and NGOs helped me as well, but I would like to specifically thank the Ministry of Marine and Fisheries Affairs for their support during this research.

I would like to thank all my friends and families in Townsville, Bali and other parts in Indonesia for their encouragement and love, sustaining me through the hardest parts of my study. Special thanks to my parents and sister, Ketut Deddy, Atiek, Debbie, Denik, Dewi, Jagrat, Landung and Nungky for your support. Your love and trust in me have fuelled my willpower to go on and dedicate my life for something I truly believe in. I would also like to thank to Jerome Bowen who has contributed a lot of assistance during the final editing and printing stages of my thesis. Last but not least, I thank the whales, dolphins and dugongs. Even though I rarely encountered them in the field, it was their grace that dragged me back to school to undertake this research.

ABSTRACT

The Savu Sea in the Province of East Nusa Tenggara is an important area for marine mammals in Indonesia, supporting at least 19 cetacean species as well as the dugong. The deep inter-island channels of the Savu Sea are sites of upwellings and other oceanographic processes which benefit marine mammal populations. Two traditional communities (Lamalera village on Lembata Island and Lamakera village on Solor Island) hunt whales in the Savu Sea, a practice which impacts on marine mammal populations but which is poorly documented. Through this research, I examine the current status of the whale hunting cultures in the Savu Sea as well as the social construction or perception of several stakeholders concerning traditional hunting practices. I also analyse other anthropogenic activities that might adversely impact on marine mammals in the region, and provide management options for marine mammal conservation in the Savu Sea and Indonesia in general.

To gain preliminary information in a relatively short period of time, I used a RRA (Rapid Rural Appraisal) approach. I conducted my research between May and December 2004, interviewing 60 informants from various places in Solor, Lembata, Alor and Rote Islands, as well as in Kupang (the capital of East Nusa Tenggara), Jakarta and Bandung (West Java). The nature of my research question resulted in qualitative data that I examined using thematic analysis and social construction theory.

I conclude that the whale hunting traditions in Lamalera (Lembata Island) and Lamakera (Solor Island) are subsistence whaling according to the IWC (International Whaling Commission) definition. This tradition appears not to be important anymore for the villagers of Lamakera. However, it is still a very important part of the cultural and spiritual identity of the Lamalera villagers. Although recently the whale catch has been relatively low, the Lamalera fishermen have compensated by increasing the catch of small cetaceans and other marine megafauna such as whale sharks, sunfish, manta rays, etc., confirming their high

dependency on non-fish products. The preliminary nature of this research did not allow a calculation of the sustainable harvest level or PBR (Potential Biological Removal) of whale hunting in Lamalera thus this practice is still considered a threat to the local whale population. However, the research revealed that there are many other threats to marine mammals in the Savu Sea that should be considered when designing marine mammal management. These threats include IUU (illegal, unregulated and unreported) fishing, marine traffic, oil-gas exploration and exploitation, and commercial displays of marine mammals.

Several management options for marine mammals in Savu Sea are proposed. Further investigation is recommended to fully understand the magnitude of each threat to the marine mammal populations, which in the end will affect traditional whale hunting in Lamalera.

This research offers insights into issues that could be included in the recently proposed government plan to establish the Solor-Alor Marine Protected Area. Alternative livelihoods for whale hunters and destructive fishers should be appropriately designed. Alternative fisheries to reduce the dependency of Lamalera villagers on marine megafauna products might also be a feasible option.

I recommend that Indonesia consider becoming a signatory to the Convention on Migratory Species (CMS). As an international body that facilitates the management of migratory species, CMS can assist Indonesia in management of and research into marine mammals, especially the species targeted by whale hunters. So far, Indonesia is an MOU signatory to the CMS. By becoming a CMS signatory, Indonesia is more likely to engage further collaboration with Australia and other countries that have been conducting extensive research on marine mammals.

TABLE OF CONTENTS

Statement of access.....	ii
Statement of sources.....	iii
Electronic Copy.....	iv
Declaration on Ethics.....	v
Acknowledgement.....	vi
Abstract.....	viii
Table of contents.....	x
List of tables.....	xvii
List of figures.....	xviii
I. INTRODUCTION.....	1
1.1. Marine mammals and humans in Indonesia.....	1
<i>1.1.1. Marine mammal governance in Indonesia.....</i>	<i>1</i>
<i>1.1.2. Marine mammals in Savu Sea, East Nusa Tenggara.....</i>	<i>3</i>
1.2. Whale hunting in Lamalera, Savu Sea.....	6
1.3. Aim and Objectives.....	8
1.4. Location and dates of field study.....	9
II. RESEARCH METHODS.....	11
2.1. Social constructions of whale hunting in Lamalera.....	11
2.2. Rapid Rural Appraisal (RRA).....	13
<i>2.2.1. Preparation and process for RRA in Savu Sea.....</i>	<i>16</i>
2.3. Field data collection.....	18
<i>2.3.1. Observation.....</i>	<i>19</i>
<i>2.3.2. Semi-structured interview.....</i>	<i>20</i>
2.4. Qualitative research, sampling and analytical methods.....	23

2.4.1. <i>Qualitative research</i>	23
2.4.2. <i>Sampling methods</i>	24
2.4.2.1. Snowball.....	24
2.4.2.2. Sampling to redundancy/Saturation.....	25
2.4.3. <i>Data integrity</i>	26
2.4.3.1. Triangulation.....	26
2.4.3.2. Field data analysis and community workshop.....	28
2.4.4. <i>Analytical methods</i>	29
2.4.4.1. Data analysis.....	29
2.4.4.2. Coding system.....	29
2.4.4.2.1. <u>Open coding</u>	29
2.4.4.2.2. <u>Axial coding</u>	30
2.4.4.2.3. <u>Selective coding</u>	30
2.5. Summary of methods.....	31
III. MARINE MAMMALS AND HUMAN IN SAVU SEA.....	32
3.1. Lamalera, the whaling village.....	32
3.1.1. <i>The village, the people and the whale</i>	32
3.1.1.1. Lamalera and its villagers.....	32
3.1.1.2. The sperm whale.....	37
3.1.2. <i>The hunting tradition</i>	38
3.1.2.1. The beginning.....	38
3.1.2.2. Traditional ecological knowledge of the marine mammals.....	39
3.1.2.3. Indigenous knowledge of hunting.....	41
3.1.3. <i>The importance of whale hunting to Lamalera</i>	46
3.1.3.1. Spiritual and cultural aspects.....	46
3.1.3.2. Socio-economic aspects.....	47
3.1.4. <i>Dolphin and dugong hunting</i>	50

3.1.5. <i>Hunting catch records of Lamalera</i>	51
3.1.6. <i>Issues to be considered in Lamalera</i>	54
3.2. Lamakera, the other whaling village.....	56
3.2.1. <i>The village and the people</i>	56
3.2.2. <i>The hunting tradition</i>	58
3.2.2.1. Hunting target and hunting ground.....	58
3.2.2.2. Traditional ecological knowledge of the marine mammals.....	59
3.2.2.3. Indigenous knowledge of hunting.....	60
3.2.3. <i>The importance of whale hunting in Lamakera</i>	60
3.2.3.1. Spiritual and cultural aspects.....	60
3.2.3.2. Socio-economic aspects.....	61
3.2.4. <i>Dolphin and dugong hunting</i>	62
3.2.5. <i>Hunting catch record of Lamakera</i>	63
3.3. Alor Island.....	64
3.3.1. <i>The island, the people and the marine mammals</i>	64
3.3.1.1. The island and the people.....	64
3.3.1.2. Marine mammals in Alor.....	66
3.3.2. <i>The importance of Alor</i>	66
3.4. Rote Island.....	67
3.4.1. <i>The island, the people and the marine mammals</i>	67
3.4.1.1. The island and the people.....	67
3.4.1.2. Marine mammals in Rote.....	69
3.4.2. <i>The importance of Rote</i>	70
3.5. Chapter summary.....	71

IV. THE SOCIAL CONSTRUCTION OF TRADITIONAL WHALE HUNTING

IN THE CONTEXT OF MARINE MAMMAL CONSERVATION IN SAVU SEA.....	72
---	----

4.1. Social construction of traditional whale hunting by

international conservation groups.....	72
4.2. The Indonesian national government’s position on traditional whale hunting.....	75
4.3. Local government’s opinion on traditional whale hunting.....	77
4.4. Whale hunting from the perspective of the villagers of Lamalera and Lamakera.....	78
4.5. Personal social construction of traditional whale hunting.....	80
4.6. Resource management as a social construction.....	82
4.7. Chapter summary.....	83
V. THE IDENTIFICATION OF ANTHROPOGENIC THREATS TO MARINE MAMMAL CONSERVATION.....	84
5.1. Identifying the threats.....	84
5.2. Generic threats.....	85
5.2.1. <i>IUU (Illegal, Unregulated and Unreported) fishing</i>	85
5.2.1.1. Lamalera.....	87
5.2.1.2. Other places.....	90
5.2.2. <i>Marine traffic</i>	92
5.2.3. <i>Artisanal fisheries</i>	94
5.2.4. <i>Oil and gas industries</i>	95
5.3. Specific threats.....	99
5.3.1. <i>Lamalera (Lembata Island)</i>	99
5.3.1.1. Traditional hunting.....	99
5.3.1.2. Commercial hunting.....	100
5.3.1.3. Commercial display.....	101
5.3.1.4. Harbour plan in Wulandoni.....	103
5.3.1.5. Modernised hunting.....	105
5.3.2. <i>Lamakera (Solor Island)</i>	106
5.3.2.1. Traditional hunting.....	106
5.3.2.2. Pearl farming.....	107

5.4. Chapter summary.....	108
VI. EXISTING MANAGEMENT SCHEMES IN SAVU SEA.....	110
6.1. A brief introduction to Marine Protected Areas.....	110
6.2. Komodo National Park.....	115
6.2.1. <i>Background information</i>	115
6.2.1.1. The Park and biodiversity.....	115
6.2.1.2. The inhabitants.....	117
6.2.1.3. Threats to the Park.....	118
6.2.2. <i>Existing management regime</i>	119
6.2.2.1. Zoning.....	120
6.2.2.2. Community participation and public consultation.....	120
6.2.2.3. Law enforcement.....	123
6.2.2.4. Alternative livelihood.....	124
6.2.2.5. Tourism.....	124
6.2.2.6. Park financing.....	125
6.2.3. <i>Costs and benefits of the Park</i>	126
6.3. Pantar Strait Marine Park.....	127
6.3.1. <i>History of the Park</i>	127
6.3.2. <i>Costs and benefits of the Park</i>	127
6.4. Lessons learned from Komodo and Pantar.....	129
6.5. Chapter summary.....	129
VII. A MARINE PROTECTED AREA FOR THE SAVU SEA.....	132
7.1. Why conserve marine mammals?.....	132
7.1.1. <i>The biological rationale of marine mammal conservation</i>	132
7.1.2. <i>The socio-cultural and economic rationale for marine mammal</i> <i>conservation</i>	135
7.1.2.1. Socio-cultural aspects.....	135

7.1.2.2. Economic aspects.....	136
7.1.3. <i>Marine mammals as conservation tools</i>	136
7.2. Solor-Alor MPA.....	139
7.2.1. <i>Are marine protected areas enough for marine mammals?</i>	139
7.2.2. <i>Issues to be considered before establishing Solor-Alor MPA</i>	142
7.2.2.1. Biophysical parameters.....	143
7.2.2.2. Socio-cultural and economic parameters.....	147
7.2.2.3. Biosphere Reserve as a model for Solor-Alor MPA.....	151
7.2.3. <i>Network of MPAs and Marine Mammal Sanctuary</i>	153
7.3. Chapter summary.....	155
VIII. A WAY FORWARD.....	156
8.1. Recommended processes.....	156
8.2. Alternative livelihoods.....	160
8.2.1. <i>Sustainable cetacean watching</i>	161
8.2.1.1. Potential of cetacean watching.....	161
8.2.1.2. Possible obstacles for cetacean watching in Lamalera.....	163
8.2.1.2.1. <u>Lamalera's identity as a whale hunting community</u>	164
8.2.1.2.2. <u>A whale-watching industry versus whale-hunting</u> <u>tourism</u>	164
8.2.1.2.3. <u>The behaviour of the target species</u>	166
8.2.2. <i>Sustainable fisheries</i>	167
8.2.2.1. Sustainable small-scale fisheries.....	167
8.2.2.2. Sustainable commercial fisheries.....	170
8.3. Management of traditional whale hunting.....	171
8.3.1. <i>Traditional whale hunting</i>	171
8.3.2. <i>Small cetacean hunting</i>	171
8.4. The legal basis of a marine mammal action plan.....	172

8.5. Law enforcement.....	176
8.6. Community awareness.....	179
8.7. Indonesia and the CMS (Convention on Migratory Species).....	179
8.8. Chapter summary.....	181
IX. CONCLUSIONS AND RECOMMENDATIONS.....	182
9.1. Summary of the research.....	182
9.2. Major results.....	183
9.3. Recommendations.....	185
9.3.1. <i>Management implications</i>	186
9.3.2. <i>Research implications</i>	188
Reference.....	190
Personal communications.....	210
Appendix 1. List of marine mammals in Indonesia.....	218
Appendix 2. IUCN Categories and Criteria.....	220
Appendix 3. Several questions asked during the interviews in Lamalera, Lamakera and other places in Savu Sea.....	227
Appendix 4. Codes emerged from thematic analysis of the transcripts.....	229

LIST OF TABLES

Table 1. Summary of threats to marine mammals in Savu Sea.....	108
--	-----

LIST OF FIGURES

Figure 1.1. Savu Sea in the East Nusa Tenggara Province.....	3
Figure 1.2. The Indonesian Throughflow leakage through the Savu Sea (red box) between the Pacific and Indian Oceans (Courtesy of http://www.esr.org/instant/instant_intro.html).....	4
Figure 3.1. Lembata Island.....	33
Figure 3.2. Migration map of early settlers in Lembata as told by Mr. Petrus Hidang from Lamalera.....	34
Figure 3.3. The traditional marine mammal hunting grounds of Lamalera and Lamakera as confirmed by the communities in both villages.....	42
Figure 3.4a. Paledang of Lamalera (traditional sailing boat without machine).....	43
Figure 3.4b. Jonson in Lamalera (with outboard machine, without sail).....	43
Figure 3.5. Whale meat division system in Lamalera (picture by Benjamin Ebang).....	48
Figure 3.6. Drying meat and the whale oil (in the bucket).....	49
Figure 3.7. A woman is weaving a whale-hunting patterned sash.....	50
Figure 3.8. Lamalera Sperm Whale Catch 1959-2004.....	51
Figure 3.9. Lamalera Catch for Small Cetaceans 1996-2004.....	53
Figure 3.10. Migratory routes of baleen whales as reported by the villagers of Lamakera.....	57
Figure 3.11. Whale meat sharing in Lamakera (Solor island) as depicted during the interviews and village meetings.....	61
Figure 3.12. Dolphin meat, taken in the village of Lamakera.....	62
Figure 3.13. Dugong bones (<i>Dugong dugon</i>), found in Lamakera.....	63
Figure 3.14. Teeth of killer whales (<i>Orcinus orca</i>), found in Lamakera.....	63
Figure 3.15. Alor Islands (Pantar Strait Marine Park is circled in red).....	64
Figure 3.16. Rote Island.....	68
Figure 5.1. Indonesian Fisheries Management Areas (courtesy of www.dkp.or.id).....	86

Figure 5.2. Traditional hunting grounds of the Lamalera and Lamakera fishermen and the fishing zone of commercial long liners.....	89
Figure 5.3. Main marine navigation routes around Solor Island (adapted from C.V. Kendali Handal (2003)).....	92
Figure 5.4. Marine traffic in Savu Sea (adapted from C.V. Kendali Handal (2003)).....	93
Figure 5.5. Gas deposits in Indonesia. The rectangle outlines my study area. (courtesy of JATAM/Anti Mining Network Indonesia).....	96
Figure 5.6. Oil deposits in Indonesia. The rectangle outlines my study area. (courtesy of JATAM/Anti Mining Network Indonesia).....	97
Figure 5.7. Fibre cylinders used to make floating cage for killer whales in Lamalera.....	101
Figure 5.8. The proposed site of the harbour is Wulandoni village, Lembata Island.....	104
Figure 5.9. Pearl farm industries around Solor Islands based on my observations in 2004...	107
Figure 6.1. Komodo National Park (zoning courtesy of www.komodonationalpark.org).....	116
Figure 6.2. Map of Pantar Island and the Park areas.....	128
Figure 7.1. The Savu Sea and the surrounding islands.....	145
Figure 7.2. Hypothetical example of the biosphere concept (Hoyt, 2004, p. 27).....	152
Figure 7.3. A network of MPA consists of Komodo National Park in Flores, Wakatobi Marine National Park in Southeast Sulawesi, Solor-Alor MPA (proposed) and Banda Naira MPA (proposed).....	154
Figure 8.1. Flowchart for participatory processes for the proposed Solor-Alor MPA.....	158
Figure 8.2. Map of fishing boats in Arafura Sea from September to October 2003 Compilation of VMS and Radarsat, courtesy of Marine and Fisheries Research Agency – Ministry of Marine Affairs and Fisheries.....	178