Towards Sustainable Dolphin Watching Tourism in Lovina, Bali, Indonesia

Thesis submitted by
Putu Liza Kusuma Mustika
MSc. James Cook University

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PREFACE

I first heard of Lovina in 2003 when my friend told me about her honours research in a small village in North Bali, the inhabitants of which depended on dolphin watching tourism for their main income. Then in June 2006, I was approached by a Balinese journalist who suggested that I should have a look at the tourism industry in Lovina. 'They're chasing the dolphins there!' he exclaimed.

The Australian Leadership Award of AusAID invited applications for its first PhD scholarships in 2006. I submitted my application with the sustainability of dolphin watching tourism in Lovina as the proposed research project. When I was officially awarded the ALA scholarship in December 2006, it became clear that I had to visit Lovina before returning to Australia and to write my full PhD proposal as part of the Confirmation of Candidature Process at James Cook University.

Thus in January 2007, I visited Lovina for the first time as a researcher. My friend and I were at the beach before 6am. It was still dark. Our boatman started the long-tailed outboard engine and his 10m long *jukung* chugged northwards over the calm waters. I was searching the horizon with the help of the first rays of the morning sun when I saw them. No, not the dolphins.

The boats. A myriad of outriggered boats scattered along the horizon, each was moving around, making circles on the water, as the boatmen diligently searched for the dolphins. Their 5m width outriggers made the boats looked like spiders searching for victims. When the first boat saw the first dolphins, tens of other boats immediately raced towards the animals (usually with tourists screaming in excitement). The poor animals immediately dived or swam away, leaving the tourists to contemplate the empty space on the water. This peace did not last long. As soon as another boat spotted another group of dolphins, almost all the boats accelerated towards that group. The game of hide and seek, hunter and prey resumed until the dolphins were nowhere to be seen or the heat of the day was too much for the tourists.

And that was it – my first encounter with the dolphin watching industry in Lovina. Could this industry really be sustainable? Is there a future for Lovina in which dolphins, boatmen and tourists can co-exist?

This research is a first attempt to answer that question.

STATEMENT OF CONTRIBUTION BY OTHERS

Publications

Chapter #	**Details of publication(s) on which chapter is based**	**Nature and extent of the intellectual input of each author**
3	*Encounters between cetaceans and tourist vessels in Lovina, Bali (Indonesia): could this industry be biologically sustainable?* Journal of Cetacean Research and Management To be submitted to the journal in January 2012	Mustika, Birtles, Everingham and Marsh I analysed the data and wrote the chapter. Professor Helene Marsh (marine mammal scientist), Dr Alastair Birtles (marine wildlife tourism expert) and Dr Yvette Everingham (statistician) assisted in designing the study, interpreting the results and editing. Statistical advice was provided by Dr Yvette Everingham.
4	*The need for increased research on the human dimensions of wildlife tourism in developing countries: dolphin watching in Lovina as a case study* Journal of Sustainable Tourism In revision	Mustika, Birtles, Everingham and Marsh I analysed the data and wrote the chapter. Professor Helene Marsh (marine mammal scientist), Dr Alastair Birtles (marine wildlife tourism expert) and Dr Yvette Everingham (statistician) assisted in designing the study, interpreting the results and editing. Statistical advice was provided by Yvette Everingham.
5	*The economic influence of community-based dolphin watching on a local economy in a developing country: implications for conservation.* Journal of Ecological Economics	Mustika, Birtles, Welters and Marsh I analysed the data and wrote the chapter. Professor Helene

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6	*The importance of community-based involvement for managing whale watching in a developing country with decentralised management of marine resources.* Journal of Cetacean Research and Management To be submitted to the journal in March 2012	Mustika, Birtles and Marsh I analysed the data and wrote the chapter. Professor Helene Marsh (marine mammal scientist), and Dr Alastair Birtles (marine wildlife tourism expert) assisted in the development of the approach, result interpretation and editing.
7	*A comprehensive approach to determining sustainability of wildlife tourism in developing countries: Dolphin watching in Lovina as a case study.* Conservation Letters To be submitted to the journal in May 2012	Mustika, Birtles, Hamann and Marsh I analysed the data and wrote the chapter. Professor Helene Marsh (marine mammal scientist), Dr Alastair Birtles (marine wildlife tourism expert) and Dr Mark Hamann (marine wildlife ecologist) assisted in the development of the approach, result interpretation and editing.

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Primary data collection and data entry

Principal Investigator – Putu Liza Kusuma Mustika

Research assistants – Niken Puspita Sari, Juwita A. Pusposari, Made Sudana, Maulita Sari Hani, Stephanie Hoggs, Purwanto, Erdi Lazuardi, Februanty Purnomo, Khaifin, Katrin, Nara Wisesawardhana, Rika, William Cheng, Christina Kwong, Alex Lau, Kapo Tung, Susannah Musks, Dharma, Yusuf and Aldo

Data analysis

Principal analyst – Putu Liza Kusuma Mustika

Supporting analysts – Dr Yvette Everingham, Dr Riccardo Welters, Prof Helene Marsh, Dr Alastair Birtles

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Ms Rae Wiseman

Photographs

Purwanto – The Nature Conservancy Indonesia (Chapter 1, Figure 1.1)

An unidentified tourist by way of Mr Made Rudita (Chapter 3, Figure 3.4b)

Ethics Approvals

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External examiners

Dr Paul Forestell

Prof Mark Orams

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Some people say that doing a PhD is a lonely path; you have to do everything alone. While I agree that I am responsible for every number and word in this thesis, I have come to the conclusion that my PhD was not a lonesome journey. In fact, without the help of many people (only some are mentioned here due to insufficient space and memory), I would not have arrived this far.

The first acknowledgement is to Distinguished Professor Helene Marsh, who once again took me as a rather uncoordinated student under her wing. She has an amazing ability to wake up before the sun rises and provide valuable input towards my manuscripts. As I arrived in Australia, Dr Alastair Birtles joined the team with his expertise on marine tourism management. He added extra colour to this thesis by making sure I did not omit important details; not to mention that he later introduced me to the love of my life. Last but definitely not least, Dr Mark Hamann helped me during the final stages of my thesis. His input was very valuable for he made me aware of aspects that I would have otherwise ignored. I thank the external examiners Dr Paul Forestell and Prof Mark Orams for providing me with excellent suggestions for improving this thesis.

A special gratitude goes to the AusAID, particularly its Australian Leadership Awards that enables a non-government individual like me to pursue a doctorate degree and bring me back to Townsville. Alex Salvador and Katherine Elliot of the AusAID and the International Student Center at the James Cook University have provided

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ABSTRACT

This research studied dolphin watching in Lovina, North Bali, Indonesia in the theoretical context of quadruple bottomline sustainability and the prism of sustainability to investigate the biological, social, economic and managerial elements of the sustainability of the industry.

This industry depends on predictable access to coastal dolphins, particularly dwarf spinner dolphins (*Stenella longirostris roseiventris*). Dolphin watching tourism at Lovina began in the late 1980s when local artisanal fishers formed self-regulating cooperatives. Up to 179 dedicated traditional fishing vessels (*jukungs*) are available to take passengers to watch the cetaceans that are predictably found 3-4 km from the shore. An average of 34.5 tour boats from four dolphin associations operated for up to three hours each morning in Lovina during my data collection period (2007 to 2009), with up to about 100 tour boats per day searching for the animals during the high tourist visitation season. A school of dolphins could be surrounded by up to 83 boats (median 15.35). In an encounter, the number of boats generally outnumbered the number of dolphins (median spinner-to-boat ratio = 0.8:1).

The dolphins generally surfaced only briefly (<2 minutes) and were almost always travelling when first sighted in the mornings. Most dolphin schools were surrounded by boats, making the establishment of control units impossible. Many boats were driven erratically, making it very difficult to measure the impact of this industry on the local dolphin population. However, examination of the boatmen's conduct indicated that the operations at Lovina did not conform to accepted international

norms. Most boatmen attempted to get as close as possible to the dolphins (generally much closer than the recommended 50m minimum approach distance stipulated in Australian and many other national-level regulations). During 175 scan sampling efforts over 36 days I identified 64 individual boats that displayed 'behaviours of concern' at least once.

The industry generally attracts tertiary-educated international visitors. In 2007-2009, two-thirds of the dolphin tourists came from Western countries; the rest were from Asia. Average tourist satisfaction was low to medium (7.1 on a scale of 1-10). While there was no significant difference between the average satisfaction of Western and Asian tourists, the associated variables differed. The satisfaction of Western tourists was associated with encounter management, their preferred number of surrounding boats and the number of dolphins seen. Encounter management was the only variable associated with the satisfaction of Asian tourists. Western respondents disliked the mismanagement of the dolphin tour; they considered that too many boats exhibited behaviours of concern and that the approach distances were too close. Satisfaction was positively associated with the willingness of tourists to recommend the tour to others. Western respondents who felt neutral to very comfortable with the way their boatmen managed the dolphin encounters were more likely to promote the tour. Thus the low to medium satisfaction levels of Western dolphin tourists threatened to bring negative publicity for Lovina dolphin tourism from word of mouth and other sources.

In 2007-2009, the industry attracted at least 37,000 overnight visitors per annum (~60% of Lovina's overnight tourists) who contributed up to USD 9.5 million p.a. in total direct expenditures (i.e., tickets, accommodation, meals, transportation,

communication and souvenirs). At least 46% of the total direct expenditure was attributable to the dolphin watching tourism. The boatmen enjoyed an above average income but trip fees constituted only 3% of the total income generated by dolphin watching tourism; the remainder was spent on local businesses e.g., accommodation, restaurant and transport, which are the most substantial beneficiaries. As a consequence of the economic importance of this industry to the boatmen and the villages, it is important for the boatmen to improve their dolphin encounter management to meet the expectations of the highly educated international visitors. Because the industry also brings a significant economic contribution to other business sectors, the sustainability of the overall industry is very important to them. The hoteliers, restaurateurs and travel agents should also be included in the future management strategies in Lovina, including assisting the boatmen in improving their service.

Interviews with the boatmen confirmed that the industry was essentially unregulated. The boatmen were concerned about the industry's long-term sustainability, especially their encounter management practices and other operational issues such as garbage and safety. The boatmen agreed in-principle to improve their encounter management by: 1) turning off the engine/lifting the propeller, 2) keeping the boat's distance from the dolphins and 3) avoiding cutting across the dolphin's route. However, they were reluctant to limit the fleet size, very likely due to the economic importance of the industry to their livelihoods.

Reduction of the boat crowding in Lovina is important from the perspectives of animal welfare and tourist satisfaction. Replacing the *jukungs* with larger boats to

reduce the number of boats is considered impractical from funding and organisational viewpoints. This idea is also undesirable from the cultural viewpoint and because it might reduce tourist experience. Establishing an agreed minimum approach distance would be an indirect approach to managing the number of boats and viewing duration. This strategy could be achieved by establishing an agreed maximum number of boats (15 is suggested) in a 50m perimeter for an agreed viewing time for safety, comfort and tourist experience.

The in-principle agreements established by the Lovina boatmen have not yet been implemented. Training programs should be offered to the boatmen, including how to estimate approach distance and speed limit and appropriate methods to approach the animals. Once training is completed, discussions should be directed to add more management aspects to the codes of practice (e.g., speed limitation, encounter fleet size and approach behaviours) and to codify the codes of practice e.g., by including the guideline in the local Balinese *awig-awig* (customary norms/rules). The guidelines could then be adopted at regency and national levels.

Several challenges and opportunities must be considered in managing the Lovina dolphin watching industry in a sustainable manner. Working with the local community in Bali requires an appreciation of the characteristics of the people of Bali, including its patriarchal nature, the traditional codification system or *awig-awig* and the local sustainability framework (*'Tri Hita Karana'*). Bali was usually conceived as a cultural tourism destination. The inclusion of cultural elements (e.g., the daily life of a dolphin boatman and the construction, repair and maintenance of the traditional outriggered wooden canoe or '*jukung'*) can enhance the tourist experience, increase

the length of stay and reduce the focus on the dolphins themselves, which in turn could benefit the promotion of the dolphin tour and the local economy.

The biological sustainability of the dolphin watching industry in Lovina is questionable and most tourists are not very satisfied. However, because the industry is very valuable to the boatmen and the villages, the long term sustainability, viability and health of the dolphins are a priority to a socially and economically sustainable industry. Consequently, the industry needs to be sustainably managed with the consent and involvement of all boatmen and other supporting stakeholders. Despite the current concerns over its sustainability, the Lovina dolphin watching industry could potentially become an exemplar of community-based tourism in a developing country that is successfully co-managed from multiple perspectives. The four elements of sustainability used in this research provided valuable insights into the industry and should be applicable to other studies designed to inform sustainable marine wildlife tourism in developing countries.

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CHAPTER 1

INTRODUCTION

This chapter explains the background of my research on dolphin watching tourism in Lovina (Bali, Indonesia). It explores the definition and benefits of wildlife tourism, particularly cetacean (whale and dolphin) watching tourism, and introduces quadruple bottom line and prism of sustainability as the theoretical frameworks of this research. This chapter also provides basic information on tourism in Bali and introduces dolphin watching tourism in Lovina.

1.1 The context and benefits of wildlife tourism

As briefly stated in the Preface to this thesis, this research project stemmed from my visit to Lovina in January 2007. After witnessing many boats surrounding a group of dolphins (which immediately disappeared), I found myself questioning the sustainability of the local dolphin watching industry. However, before outlining the objectives of my research, I will discuss wildlife tourism and cetacean (whale and dolphin) watching tourism, with a focus on developing countries.

Figure 1.1 Traditional boats (*jukung*) that take tourists to watch the dolphins at Lovina. Each vessel is about 10 m long and takes up to four passengers and the boatman. Approximately 20 boats were captured in this photograph (Courtesy of Purwanto@TNC Indonesia 2008)

The Oxford Dictionary (Fowler & Fowler 1979) defined *tourism* as: *'organised touring; operation of tours as a business ; provision of things and services that attract tourists'* whereas a *tourist* is defined as a *'person who makes a tour, traveller, esp. for recreation'*. The most common type of tourism is mass tourism; many people perceive this type of tourism as the culprit responsible for environmental destruction at tourism sites (France 2002). Alternative styles of tourism have developed especially since the early 1980s as an antitheses to mass tourism (Lanfant & Graburn 1992; Pearce 1992; Page & Dowling 2002). Alternative tourism is defined as *'forms of tourism that set out to be consistent with natural, social and community values and which allow both hosts and guests to enjoy positive and worthwhile interaction and shared experiences'* (Wearing & Neil 2009, p. 4). Alternative tourism is ecologically sound, features smaller attractions organised by villages or communities, benefits the locals and thus has fewer negative social or cultural effects (Kadt 1992). Alternative tourism has many variants that occasionally overlap with mass tourism, e.g., cultural tourism (Lanfant & Graburn 1992), adventure tourism, nature tourism and community tourism (France 2002). These variants may also overlap with each other. In this thesis, I focus the discussion on nature tourism, although cultural tourism shall also be discussed in Chapter 7.

Nature-based tourism or nature tourism refers to *'all tourism directly dependent on the use of natural resources in a relatively undeveloped state, including scenery, topography, water features, vegetation and wildlife'*, irrespective of whether the usage is sustainable (Ceballos-Lascuráin 1996, p. 19). Although sometimes passive, nature tourism can include aspects of adventure tourism (France 2002; Williams & Soutar 2009). Nature tourism intersects with wildlife tourism when it involves encounters

with wildlife/animals. Wildlife tourism is not always conducted in a natural environment; its definition is '*tourism based on encounters with non-domesticated (non-human) animals…in either the animal's natural environment or in captivity'* (Higginbottom 2004, p. 2). As implied by this definition, wildlife-tourist interactions vary from interactions in captive facilities to interactions in wildlife habitats. Orams (2002a) grouped the interactions between humans and wildlife into captive (e.g., zoos and oceanariums), semi-captive (e.g., wildlife feeding) and wild (e.g., cetacean watching, wildlife watching in national parks).

1.1.1 Comparison between wildlife tourism and ecotourism

Wildlife tourism is often classified as consumptive or non-consumptive based on the activities of the tourists (Duffus & Dearden 1990). Consumptive wildlife tourism usually includes the removal or death of animals, e.g., wildlife hunting programs, safari or unregulated whale watching packages (Wilkie & Carpenter 1999; Orams 2000; Reynolds & Braithwaite 2001; Newsome et al. 2005). In contrast, non-consumptive wildlife tourism is defined as *'human recreational engagement with wildlife wherein the focal organism is not purposefully removed or permanently affected by the engagement'* (Duffus & Dearden 1990, p. 215). When managed properly, non-consumptive wildlife tourism is a step towards sustainable wildlife tourism that *'aims to meet the needs of present tourists and host regions while protecting and enhancing environmental, social and economic values for the future'* (Newsome et al. 2005, p. 41). When wildlife tourism achieves sustainability, it is another step closer to meeting the criteria of another type of tourism: ecotourism.

Ecotourism is the only type of alternative tourism that does not overlap with mass tourism (France 2002, p. 17). There are several definitions of ecotourism; I quote only those relevant to my doctoral study. Ecotourism has been described as *'a subset of natural area tourism and may combine elements of both nature-based tourism and adventure travel… that involves education and interpretation of the natural environment and is managed to be ecologically sustainable.'* (Newsome et al. 2005, p. 13). Page and Dowling (2002) proposed five characteristics of ecotourism: nature-based, ecologically sustainable, environmentally educative, locally beneficial and generating tourist satisfaction. Ecotourism Australia added an appreciation of the local culture to the definition of ecotourism: *'Ecotourism is ecologically sustainable tourism with a primary focus on experiencing natural areas that fosters environmental and cultural understanding, appreciation and conservation.'* (www.ecotourism.org.au). Based on these definitions, a wildlife tourism industry can be called ecotourism if it is conducted in a natural area in a manner that is ecologically sustainable, appreciates the local culture and has high levels of education and interpretation, such that it benefits the locals and generates tourist satisfaction. Following Newsome et al. (2005), Figure 1.2 below is an overview of the interactions between wildlife tourism and ecotourism:

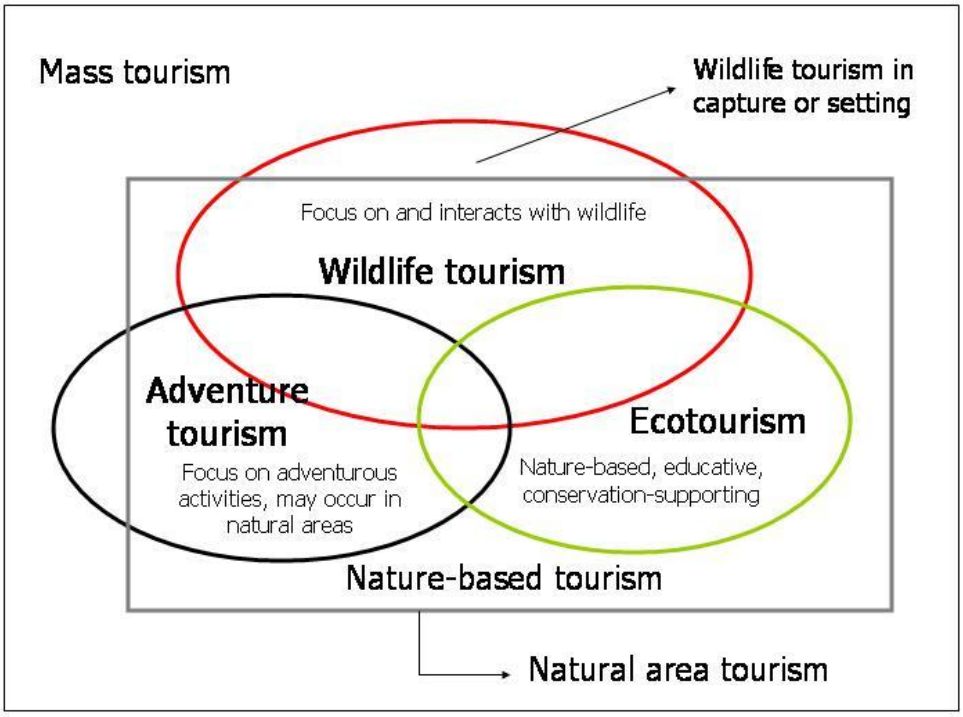


Figure 1.2 Overlap between wildlife tourism and ecotourism (re-drawn from Newsome et al. 2005, p. 19)

1.1.2 Benefits of wildlife tourism

Because my research was conducted in a developing country, this section provides an overview of the benefits of wildlife tourism in developing countries. 'Developing countries' are defined as countries with a medium to high Human Development Index in 2010 as recorded by the United Nations Development Programme (http://hdr.undp.org/en/statistics/). Wildlife tourism in developing countries has grown substantially in the past few years, providing several benefits for its stakeholders, i.e., economic benefits, better research and better protection for target wildlife species.

Economic benefits

Wildlife tourism can bring economic benefits to the tourism industry *per se*, the local people and, if managed properly, to the ecosystem that supports this activity. In

developing countries, wildlife tourism attracts an international market (typically from Western countries) that significantly contributes to the local economy (Barnes et al. 1992; Akama 1996; Okello & Yerian 2009). Gorilla tourism in three natural reserves in Africa generated nearly USD 2 million in 1990 alone (Weber 1993). In 1995-96, 30,000 tourists (93% foreigners) visited Komodo National Park in Indonesia to view the threatened Komodo dragons, thereby contributing USD 1.1 million to the local economy (Walpole & Goodwin 2000; Walpole et al. 2001). Such profit can eventually assist biodiversity conservation in the region (Dharmaratne et al. 2000; Kiss 2004). However, when managers and policy makers are reluctant to implement or increase user fees, fearing that tourist numbers may drop as a direct result (Dharmaratne et al. 2000), tourism income may not be used to assist in biodiversity conservation, or be ineffective in so doing.

Research and conservation

The targets for wildlife tourism are often animals with charismatic features that attract public interest and, therefore, support. In turn, such public support enables these animals to be used as flagship species, or as a species that *'can be used to anchor a conservation campaign because it arouses public interest and sympathy'* (Simberloff 1998, p. 247). The role of a flagship species is more socio-economical than ecological (Walpole & Leader-Williams 2002). Therefore, a wildlife tourism industry can use its target species as a flagship species to raise public awareness of an associated conservation issue.

Major wildlife tourism hotspots are often places of significance to the target animal's life cycle, e.g., migratory routes or breeding grounds (Roe et al. 1997). Hence,

wildlife tourism activities are often found on bird and whale migratory routes, sea turtle nesting sites, or in the home ranges of flagship terrestrial animals, such as pandas, rhinoceros and giant tortoises. Two prominent wildlife hotspots in Indonesia have flagship species as the major attraction. Ujung Kulon National Park in West Java has the Javanese rhino, while the Komodo National Park in East Nusa Tenggara has the Komodo dragon. Both sites are listed as UNESCO Heritage Sites (http://whc.unesco.org) and have developed wildlife tourism packages for their respective flagship species.

To understand the maximum limit of external pressure that a species population can absorb, wildlife tourism managers must ensure that adequate research on the species, the habitat and related tourism activities are properly in place. Results of such research are very useful for sustainably managing the industry. The conservation of the Komodo dragon in the Komodo National Park Indonesia (Pet & Yeager 2000), the Javanese rhinoceros (*Rhinoceros sondaicus*) in the Ujung Kulon National Park Indonesia (Cohn 1988), the giant panda (*Ailuropoda melanoleuca*) in Baoxing Jiajin Mountain in China (Environmental News Service 2004) and the Indo-Pacific humpback dolphin (*Sousa chinensis*) in Hong Kong (www.hkdolphinwatch.com) are some examples of this approach in Asia. Long term conservation initiatives that have been conducted in those locations have contributed to better conservation management of the species. Eventually, such initiatives can also benefit wildlife tourism that depends on the health of its target populations.

1.2 The context of cetacean watching tourism

Tourists are attracted to wildlife tourism because it often allows them to experience larger numbers of animals or animals of larger body mass in close proximity (Roe et al. 1997). Hence, bird watching and cetacean (whale and dolphin) watching are among the most popular forms of wildlife tourism. Although bird watching is the largest type of non-consumptive wildlife tourism (Roe et al. 1997), whale watching is a rapidly growing area (Roe et al. 1997; Hoyt 2001; O'Connor et al. 2009).

Cetacean watching is a lucrative source of income. A 2008 review of tourist visitation and expenditures for worldwide cetacean watching industries suggests that the industry attracted 13 million tourists in 119 countries, contributed USD 2.1 billion of total tourist expenditure to the global economy in 2008 and supported 19,000 jobs worldwide (O'Connor et al. 2009; Cisneros-Montemayor et al. 2010). Almost 55% of the countries mentioned in O'Connor et al. (2009) were developing countries, which suggests that cetacean watching tourism is playing an increasingly important role in the national economy of developing countries. In 2008, cetacean watching generated USD 66 million in total tourist expenditure in 19 Asian countries/territories (90% of which were developing nations) (see O'Connor et al. 2009). In particular, Indonesia enjoyed more than USD 517,000 from the direct expenditures of whale watching tourists in 2008 (i.e., the sum of admission fees and other items attributable to the tour) (O'Connor et al. 2009).

Its potential for generating considerable income makes cetacean watching tourism a good alternative to destructive activities such as whaling (O'Connor et al. 2009; Neves 2010). Whale hunting used to be a common practice in Tonga until banned in 1978

(Orams 2001). Whale watching contributed USD 550,000 to Tonga's 1999 tourism revenue (Orams 2001) . This value had increased sharply to more than USD 980,000 by 2009 (O'Connor et al. 2009). Australia officially banned whale hunting activities in 1980 (O'Connor 2004). In 2008, Australia generated almost USD 172 million in total direct expenditures from cetacean watching industries (O'Connor et al. 2009). Some stakeholders have also suggested cetacean watching tourism as an alternative to traditional whale hunting in Lamalera (eastern Indonesia), although the effectiveness of this suggestion is arguable, due in part to the cultural significance of whale hunting for the people of Lamalera (Mustika 2006).

Cetacean watching is not without risks to target wildlife populations. The behaviour of some dolphin species shifted from resting to milling or travelling when the number of boats around the school increased (Lusseau 2003; Constantine et al. 2004; Christiansen et al. 2010). The presence of tour boats has been observed to alter the target cetacean's line of travel (Williams & Ashe 2007) to the point that the animals dived to avoid the boats (Schaffar et al. 2009). As a result, experts have become increasingly vocal about the need to regulate whale and dolphin watching activities (Orams 2000; Brownell & Oosthuizen 2004; Constantine et al. 2004; Corkeron 2004; IWC 2009).

Since the 1980s, regulations or voluntary guidelines have been established in response to the increased concerns about the sustainability of boat based whale watching industries (Carlson 2004). Carlson (2010) examined the regulations and guidelines for cetacean watching tourism adopted by 42 countries or territories (20 were developed countries and 22 were developing countries, including Indonesia). Carlson (2010) also

examined two regional agreements (ACCOBAMS and the Pacific Islands) and one international territory (Antarctica). A total of 65% (13 of 20) of the developed countries had adopted voluntary guidelines (including United Kingdom and United States (in several states)); the remaining seven countries (including Australia, New Zealand and United States (in several other states)) imposed regulations. In contrast, the number of developing countries or territories which have adopted voluntary guidelines almost equals those which adopted regulations (10 versus 12). Several non-governmental organisations in Indonesia (WWF, The Nature Conservancy and the Apex Environment) have endorsed voluntary guidelines for cetacean watching in that country (Gouyon 2005; Carlson 2010). However, to date the Indonesian government has not issued any national-level endorsement of guidelines.

The development of codes of practice should be species-specific, location-specific and industry-specific (Birtles et al. 2001; Carlson 2010). International codes of practice for cetacean watching usually cover at least one of the following aspects of the encounter: (1) minimum approach distance to the animals (the condition most frequently stipulated); (2) maximum number of boats around the cetaceans at any one time; (3) maximum time allowed around the animals; and (4) speed and angle of approaching the animals, etc. (Carlson 2004; Garrod & Fennell 2004; Department of the Environment and Water Resources Australia 2005; Allen et al. 2007; Delfour 2007, see also Chapter 3). Although there is no global agreement, the codes of practice usually stipulate a minimum approach distance of either 50 m or 100 m (Garrod & Fennell 2004). Garrod & Fennel (2004) also found that more than 25% of the 58 codes they examined allowed only one boat at a time (only one code allowed a maximum of six boats at a time). These guideline/regulations will be revisited in later

chapters for they are among the many important aspects of sustainability to be discussed in this thesis.

As is the case with other wildlife tourism activities, cetacean watching tourism is not only about the whales and dolphins. Tourists in Tangalooma, Australia, were satisfied with their whale watching trips not only because of the whales but also because of other aspects of the experience such as crew hospitality and the small number of passengers on board (Orams 2000). Tourists participating in trips that allow swimming with dwarf minke whales in the waters of the Great Barrier Reef appreciated similar aspects of their experience (Birtles et al. 2002a). These tourists were not only satisfied with their encounters with the whales; the menu on board, the live-aboard experience, meeting other guests and diving also contributed to their overall experience. These additional factors need to be taken into account when designing a sustainable cetacean watching industry (later discussed in Chapter 7).

1.3 Research framework

1.3.1 The dearth of cross-disciplinary research on cetacean watching tourism

Despite many studies on how anthropogenic activities affect cetacean populations, unequivocally linking behavioural changes in the target species caused by tourism to long term population impacts is difficult. Only a few ecological assessments have documented long-term changes (i.e., 10 years or more) in the behaviour of cetaceans in response to vessels or human presence (e.g. Watkins 1986; Mann et al. 2000; Laist et al. 2001). All such studies have been conducted in developed countries and only a

few have demonstrated the link between these long-term behaviour changes to long-term demographic impacts (e.g., Bejder et al. 2006).

Research on cetacean tourism in developing countries has generally focused on the ecological aspects of the industry, i.e., the anthropogenic impacts on the animals (Stensland et al. 2006; Stensland & Berggren 2007; Schaffar et al. 2009; Christiansen et al. 2010). However, only in Zanzibar (Tanzania) has at least 10 years of research data been collected on the impact of tourism on the local dolphin populations (since 1999, Stensland et al. 2006).

Although biological knowledge is important for species management, this approach presents generic challenges including separating the impacts of tourism from confounding influences on the population of interest and the high cost of extensive fieldwork. Even if the size of the target population is found to be declining (which is very difficult to establish, see Taylor et al. 2007), it is usually impossible to unequivocally attribute the cause of the decline to tourist interactions because of confounding factors and the lack of controls (see Milinski 1997). Limited funding often forces researchers to conduct short-term rather than long-term ecological research, particularly in developing countries where researchers also rarely have access to the funding required for robust ecological surveys (Aragones et al. 1997).

Research on the human dimensions of cetacean tourism (e.g., the social and economic aspects) may potentially generate relatively low cost information quickly. This information may help managers design and implement the best strategies for managing their cetacean tourism industries in accordance with the Precautionary

Principle (Johannes 1998; Kazmierow et al. 2000; Birtles et al. 2001; Birtles et al. 2002a; Valentine & Birtles 2004). Nonetheless, relatively few studies have documented the values and drivers of the socio-economic aspects of cetacean tourism, or whether this information influences management decisions.

I reviewed 70 papers, theses and reports that discussed marine wildlife tourism including dive tourism. Only six of these studies described the experience of marine wildlife tourists in developing countries (Musa 2002; Orams 2002b; Campbell & Smith 2006; Curtin 2006; Curtin & Wilkes 2007; Kessler & Harcourt 2010). Curtin and Wilkes (2006; 2007) discussed the experiences of tourists who swam with dolphins in developed and developing countries; however, they did not differentiate between the tourist experiences based on country of origin. In his economic-focused paper, Orams (2002b) briefly discussed the profile and experience of tourists who joined the whale watching tours in Tonga. Kessler and Harcourt (2010) is the only publication that specifically documents the experience and satisfaction of cetacean watching tourists in a developing country (i.e., Tonga). Only three papers discussed the economic impact of cetacean watching tourism in developing countries (Hoyt 2001; Orams 2002b; O'Connor et al. 2009). Although the economic valuation of Chilika Lake (home to the local Irrawady dolphins) in India has been assessed (Kumar 2010), the document did not particularly mention the economic impact of the dolphin watching industry to the local villages. Clearly, more efforts must be made to examine the sustainability of the cetacean watching industry in developing countries from multiple perspectives including the human dimensions. This thesis addresses this gap by studying dolphin watching at Lovina Bali (Indonesia) from multiple perspectives.

Governance or management aspects of such industries in developing countries also need to be examined. Many developing countries (including Indonesia) are renowned for their rich natural resources. However, management of these resources is compromised by corruption resulting from many factors including lack of political will, ineffective compliance, inefficient coordination and poverty (Smith et al. 2003; Laurance 2004). These factors must be considered in designing wildlife tourism programs (including cetacean watching tourism) to ensure that the industry is sustainable; such factors will be discussed in this thesis.

1.3.2 A cross-disciplinary framework for sustainable cetacean watching tourism

In deciding whether a tourism industry (including wildlife tourism) is sustainable, one must first examine the concept of sustainable tourism. In 1987, the World Commission on Environment and Development (also known as the Brundtland Commission) defined sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED 1987). In 1992, the United Nations Conference on Environment and Development (Earth Summit) in Rio de Janeiro referred to the term 'sustainable tourism development' for the first time; this concept was further explored in the 1995 World Conference on Sustainable Tourism, the charter of which recognised 18 principles of sustainable tourism.

The first principle of sustainable tourism stated in the charter was that *'tourism development shall be based on criteria of sustainability, which means that it must be*

ecologically bearable in the long term, as well as economically viable, and ethically and socially equitable for local communities' (World Conference on Sustainable Tourism 1995; France 2002, p. 13). Sustainable tourism should also involve ecological maintenance, tourist satisfaction and the local community in its strategic approach (France 2002). In this sense, ecotourism (Page & Dowling 2002; Newsome et al. 2005) can be seen as a type of sustainable tourism. Wildlife tourism that meets the criteria of ecotourism (Section 1.1, Figure 1.2) can also be considered sustainable.

The concept of sustainable tourism was important in deciding the nature and framework of my research in Lovina. Sustainable tourism inherits a comprehensive context, i.e., it must be examined from several viewpoints instead of being scrutinised solely from a particular scientific discipline (France 2002). This view is in line with the Precautionary Principle that also demands a cross-disciplinary approach (Kriebel et al. 2001). The International Whaling Commission also acknowledged the merits of integrated assessments of biological, social and economic information and the implementation of the Precautionary Principle in the management of a cetacean watching industry (IWC 2009). For these reasons, I decided to conduct a comprehensive study (instead of just focusing on, for instance, the impacts of the tour boats on the animals). I then proceeded to identify a sustainability framework for my research.

Sustainability frameworks have progressed significantly over the last 100 years. The first classical 'bottom line', or indicator, that an activity is sustainable was the economic bottom line. This concept dates back as far as the late 19th century around the time when Walras wrote his influential 'Elements of Pure Economics' and stated

that *'In fact, the whole world may be looked upon as a vast general market made up of diverse special markets where social wealth is bought and sold'* (Walras 1874, p. 84). In the 1970s, a second element of 'success' was added: social or human capital. In this concept, an industry is considered sustainable if it can be held accountable for its economic and human capital (Marlin & Marlin 2003; Crowther & Rayman-Bacchus 2004). Then in the 1987s, in response to an increasing environmental awareness at a global level, the Brundtland Commission acknowledged that *'the interventions needed to achieve sustainable development must be conceived and executed by processes that integrate environmental, social and economic considerations'* (WCED 1987, p. 5). In 1994, Elkington coined the term 'triple bottom line' to describe a sustainability framework that encapsulated these three elements (*'people, planet and profits'*) into the definition of sustainable development (Elkington 1997; Elkington 2004, p. 2).

For more than a decade, the triple bottom line concept was used to measure the sustainability of an activity/industry (Rogers & Ryan 2001; Pope et al. 2004). In the early 21st century, good governance (which was already mentioned in the Brundtland Commission document), institution or an appropriate management framework was added as the fourth element of sustainable development. The sustainability concept in which good governance is seen as a necessary condition or tool to achieve the sustainability of the triple bottom line is called 'the prism of sustainability' (Valentin & Spangenberg 2000; Spangenberg 2002a; Spangenberg 2002b; Spangenberg 2004). The prism of sustainability is *'a means to visually represent not only the four dimensions, but also all their interlinkages'* (Spangenberg 2002a, p. 298). Here governance or institution is *'defined as in political science, including not only*

organizations, but also mechanisms and orientations, etc' (Valentin & Spangenberg 2000, p. 382).

Other authors termed the combination of the four dimensions (i.e., the triple bottom line plus governance) as the 'quadruple bottom line', focusing on *'the dynamic interaction between components which cover financial, socioeconomic, and environmental concerns, as well as governance and regulatory concerns'* (Horrigan 2002, p. 518). However, some authors also see the fourth element of the quadruple bottom line as 'culture' (Dalziel et al. 2006; Allenby et al. 2007), which may confuse those who view culture as included in the 'people' or social (socio-cultural) element (Horrigan 2002; Bendell & Kearins 2005; Durden & Pech 2006).

Both sustainability concepts have their merits. All literature on the prism of sustainability agrees that institution/governance is the fourth element (Valentin & Spangenberg 2000; Spangenberg 2002b; Meadowcroft et al. 2005). Governance in the prism literature is seen as the means that is required to achieve the three goals of improved people, planet and profits.

Unlike the prism concept, scholars who used the quadruple bottom line framework of sustainability advocate the fourth element in parallel with the first three elements (Horrigan 2002; Bendell & Kearins 2005; Dalziel et al. 2006; Durden & Pech 2006; Allenby et al. 2007). The term 'quadruple bottom line' indicates that it is derived from the triple bottom line concept. The term 'quadruple' assists the readers to understand its link to the earlier triple bottom line concept. The quadruple bottom line concept has also been used in the dwarf minke whale research in the northern Great Barrier

Reef in Australia, in which studies on whale population estimates and behaviours are combined with findings on tourist experiences, economic impacts and the management of the industry to achieve a comprehensive sustainable tourism regime (Birtles et al. 2002b; Valentine et al. 2004; Stoeckl et al. 2010; Curnock 2011; Mangott et al. 2011; Sobtzick 2011).

A comprehensive four-dimensional approach for the sustainability framework has been adopted in this thesis. Both quadruple bottom line sustainability and prism of sustainability are used to show that the sustainability framework in this thesis is derived from the triple bottom line concept, adding governance/institution as the fourth element. I will indicate with appropriate citation whenever an idea that is specifically derived from one of these concepts is used. The term 'four elements of sustainability' is used to indicate the use of both sustainability concepts in this thesis.

Figure 1.3 is a conceptual diagram that represents the use of four elements of sustainability as used in this thesis. The visual representation is taken from of the prism of sustainability (Valentin & Spangenberg 2000). The basic triangle uses the triple bottom line concept (Elkington 1997; Elkington 2004) that was later adapted to the quadruple bottom line approach (Horrigan 2002; Durden & Pech 2006).

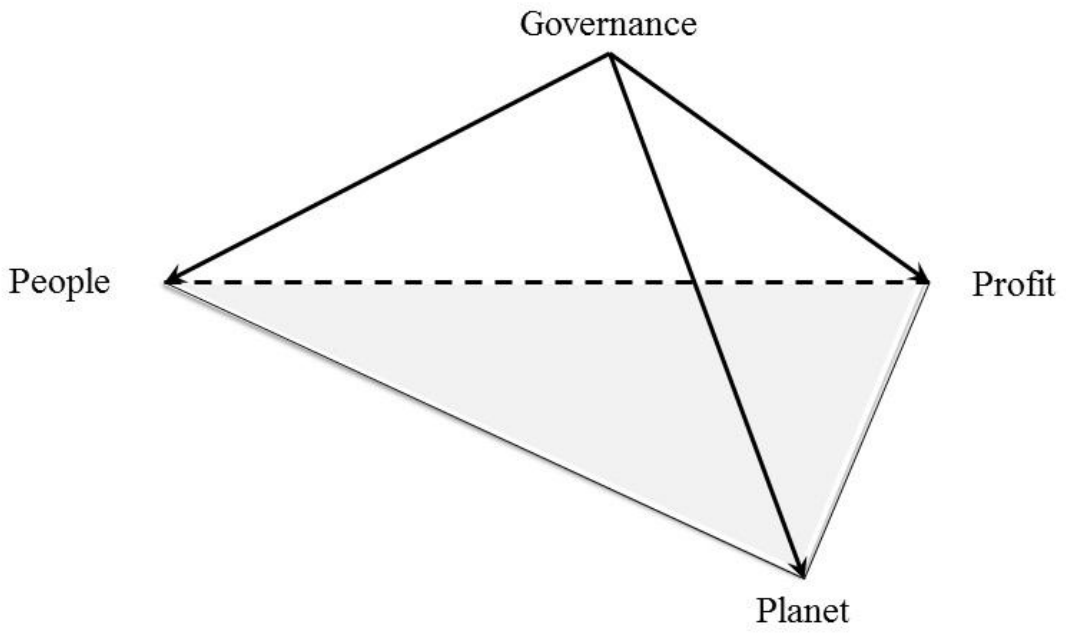


Figure 1.3 The four elements of sustainability used in this thesis which will be adapted to the situation at Lovina, Bali, Indonesia (visual representation was adapted from Valentin & Spangenberg (2000) combined with Elkington's 'people, planet and profits' (2004)).

1.4 Life, tourism and sustainability in Bali

1.4.1 Economic aspect

Bali is arguably the most famous island in the Indonesian Archipelago and one of the world's most renowned tourism destinations. Located east of Java, Bali supported a local population of more than 3.4 million people in 2008 (http://bali.bps.go.id) in an area about 143 km long and 87 km wide. Tourism is the most important source of income for the people of Bali. Tourism was initiated by the Dutch in 1924 when weekly steamships took tourists from Batavia (Jakarta during the colonial period) to Singaraja in Buleleng (North Bali) (Picard 1997). Post-independence, tourism in Bali was established in the southern region of the island in the 1970s (Gouyon 2005). Subsequently, Bali tourism experienced a sustained increase, reaching 1.5 million visitors in 2001 (BBC 2002). International tourist arrivals plummeted 20% from 2002

to 2003 after the first Bali terrorist bombing in October 2002 (Putra & Hitchcock 2006), but bounced back in 2004 with more than 1.2 million visitors (from January to October) (Baker & Coulter 2007). The second Bali bombing in October 2005 also reduced international tourist visitation and local income (Baker & Coulter 2007). However, tourism is still the prime source of Gross Domestic Product (GDP for Bali, contributing c.29% of the GDP in 2006-2008 (BPS 2009a).

Bali caters for various tourism intensities. North and east Bali are still comparatively pristine, dotted with small-scale accommodation facilities. However, south Bali is bedlam for paradise seekers who still wish to experience the same romantic image of Bali that travellers in the 1970s described in their travel notes (Picard 1996; Berkmoes et al. 2009). After recovering from the most recent bomb attack in 2005, Bali received more than 1.9 million foreign visitors in 2008, mostly from Asia (51.5%), Europe (26.3%) and Australia (15.7%) (BPS 2009b). Bali is targeting 2.6-2.8 million foreign visitors in 2011 and claims that it does not need more accommodation facilities (Bali Discovery Tours 2011). However, the likelihood of this small island being able to accommodate visitors at a level almost equivalent to its resident population is arguable.

1.4.2 Social aspect

Bali is essentially a patriarchal society where males dominate the social structures (Parker 1997). A Balinese woman typically marries into her husband's family and prays for his ancestors instead of hers. Although a woman could be adopted as the family heir in the absence of sons, she generally inherits nothing when her father passes away. Village-level governance ('banjar') involves married men and not

married women. Women are expected to be obedient and not pro-active; an independent Balinese woman is likely to invite scrutiny.

The majority of Balinese adhere to a form of Hinduism that is similar to but distinct from the Hindu traditions in other Asian nations, e.g., India, Sri Lanka, Laos and Cambodia (see also Hall 1981). The Hindu tradition places particular emphasis on caring for nature and this concept is specifically addressed in Bali as the *Tri Hita Karana*. Based on the ancient text of *Bhagavad Gita* ('The Song of God'), *Tri Hita Karana* literally means 'the three ways to prosperity' (Tri = three, Hita = prosperity, Karana = cause) and is unique to Balinese Hinduism (Wall 1993; Babad Bali 2000; Krishna 2008). *Tri Hita Karana* promotes harmony among humans, humans and nature, and humans and the Divine. In practice, *Tri Hita Karana* is a traditional concept of sustainability that embraces the Quadruple Bottom Line/Prism of Sustainability and adds a fifth element of sustainability - spirituality (see Inayatullah 2005 who promoted spirituality as a separate element from the socio-cultural dimension). *Tri Hita Karana* can also be seen as a product of the Balinese culture, which is accommodated in both the Quadruple Bottom Line and Prism of Sustainability as part of the social element of sustainability.

1.4.3 Governance aspect

From a governance perspective, the Balinese people have an organised society, as Geertz (1972, p. 37) eloquently explained: *"The Balinese have a passion – that is the only word for it – for organizing everything into specifically focused, highly corporate, structurally articulate, mutually independent, autonomous groups and then seeking to adjust relations among them in terms of a highly developed ritual system'.*

This way of 'doing things' runs through the entire society, from kinship and village organization to temple worship and state structure". The Balinese codification system is an example of this passion. The product of this codification is called *awig-awig*, written and verbal rules and norms set by members of a traditional organisation (Suradisastra et al. 2002) or a Balinese customary charter/regulations (Davidson & Henley 2007).

Awig-awig gives the 'how-to' guidance to Balinese society confined within the boundaries of a customary (*adat*) unit. A typical example is the *awig-awig* of the Balinese *subak* (the traditional irrigation system known as *subak*), where water for paddy field irrigation is divided into meticulous technical and organisational divisions to ensure that every farmer who works in a watershed receives the same amount of water (Geertz 1972; Suradisastra et al. 2002). The organisation of *subak* (and by extension, its detailed *awig-awig*) is renowned at an international level, such that it has been discussed alongside the traditional irrigation management systems in Morocco and Nepal (Geertz 1972; Ramaswami et al. 2007). However, the use of *awig-awig* in Balinese society is not only limited to water management. *Awig-awig* can be found in many aspects of life in Bali, including residency status, microfinance, townscape design and the traditional election system, from hamlet to customary village level (Samadhi 2001; Arsyad 2005; Warren 2007).

Although the early *awig-awig* were generally written on *lontars* (palm leaf parchments) (Geertz 1972), any modern day non-governmental rules in Balinese society can be an *awig-awig* in their own right. Because *awig-awig* is essentially an agreed rule among members of an organisation, it is technically possible to

incorporate this type of traditional governance system into the cetacean watching management in Bali. However, external intervention should not be the main reason for this inclusion, because it can lead to a low sense of ownership among the local communities (Satria et al. 2006).

1.4.5 Sustainable tourism in Bali

Although Bali was traditionally an agricultural society (Mitchell 1994; Robinson & Meaton 2005), its main attraction to outsiders is its unique culture (Picard 1996). From the early days of colonisation, the Dutch orientalists viewed Bali as the only living museum that preserved the Hindu-Javanese civilisation in Indonesia (Picard 1996; Picard 1997). The 1920s publications of the Tourist Bureau about Bali were full of cultural attractions, including visits to temples, holy springs and native art performances (Picard 1996). However, it was not until the early 1970s that Bali was officially designated as a cultural tourism destination (Picard 1995).

Cultural tourism is *'passive, active and interactive engagement with culture(s) and communities, whereby the visitor gains new experiences of an educational, creative and/or entertaining nature'* (Smith 2009, p. 17). Its scope ranges from visiting heritage sites, religious sites, rural environments, festival and special events, to the enjoyment of visual arts, creative activities and gastronomy (Smith 2009). Cultural tourism is not a synonym for sustainable tourism (Smith 2002). However, Bali's culture is inherently connected with nature, as expressed in the indigenous sustainability of *Tri Hita Karana* and infused in the traditional Balinese way of life (Wall 1993; Gouyon 2005; Krishna 2008; Berkmoes et al. 2009). Thus, one would

expect cultural tourism in Bali to be conducted with respect for the island's carrying capacity and other environmental considerations.

Unfortunately, tourism in Bali has not been conducted in a sustainable manner. In reality, tourism operators and policy makers in Bali have practised mass tourism. The opening of Bali's Ngurah Rai International Airport in 1969 marked the beginning of mass tourism, which eventually eroded, or at least altered, the genuine culture of Bali (Picard 1995; Barker et al. 2006). Sustainable tourism in Bali has been a particular concern of many authors (Wall 1993; Warren 1998; Gouyon 2005; Krishna 2008). As an indigenous Balinese woman, I share these concerns. Changing land use from agriculture to tourism infrastructure (hotels and restaurants) and other services (e.g., office building and malls), freshwater supplies, grey water and solid waste management, agricultural run-off, deforestation and destructive fishing are only a few of the environmental concerns.

Modern Bali has become extremely dependent on tourism, such that when a series of terrorist bombs hit Bali in October 2002 and October 2005, tourism – and by extension the economy of Bali – collapsed (Putra & Hitchcock 2006). Post the 2002 and 2005 bombings, discourses focused on restoring the spiritual balance of Bali, reclaiming the island's unique cultural identity, identifying appropriate types of tourism and developing livelihood alternatives to tourism (Robinson & Meaton 2005). The past decade has witnessed an emergence of many non-governmental organisations that attempt to address various environmental issues in Bali. However, before the start of this research project, no research had examined the sustainability of the cetacean watching industry in Lovina, or in Indonesia in general.

Cetacean watching in Indonesia began in the late 1980s in Lovina (Buleleng Regency, Bali) (Gouyon 2005) and in 1991 in southern Bali (Hoyt 2001). Cetacean watching is nowadays an attractive wildlife watching activity in Bali, rivalling bird and monkey watching tourism in popularity (Gouyon 2005; Berkmoes et al. 2009). However, insufficient information exists on the extent of cetacean-watching in Bali. Southern Bali waters and Lovina (northern Bali) remain the only tourism destinations with dolphin watching programs. In southern Bali, Bali Hai Cruises (http://www.balihaicruises.com/) is the only marine-based tourism company that widely advertises dolphin watching as one of its major attractions. Although the southern Bali dolphin watching tourism presented interesting questions, the complexity of issues that I witnessed during my first visit in January 2007 prompted my decision to focus the examination on the dolphin watching industry in Lovina. I use a cross-disciplinary approach using the quadruple bottom line and the prism of sustainability concepts for my doctoral study.

1.5 Thesis objectives

This project addresses the following overall question:

> Is the dolphin watching tourism industry in Lovina Bali sustainable from biological, social, economic and managerial perspectives?

This objective was achieved by:

1. Describing and quantifying the encounters between tourist vessels and the cetacean community off Lovina.

2. Examining the evidence of the biological sustainability of the industry by comparing the local situation with internationally accepted best practices.
3. Describing the profile and experiences of the tourists and documenting their suggestions for the industry.
4. Determining the attractiveness of the industry to local villagers as a source of income as an indicator of industry expansion pressures.
5. Determining the economic impact of this industry on Lovina's local economy and its most prominent stakeholders / beneficiaries.
6. Examining the management aspects of the industry, including national laws and regulations, local management arrangements and their implementation (including on-water management), the boatmen's[1] profile and suggestions for improvement.

1.6 Thesis outline

This thesis is presented as a series of chapters that have been written in a format that facilitates publication in peer-reviewed journals. Figure 1.4 provides the general structure of this thesis.

[1] All boatmen in Lovina are male.

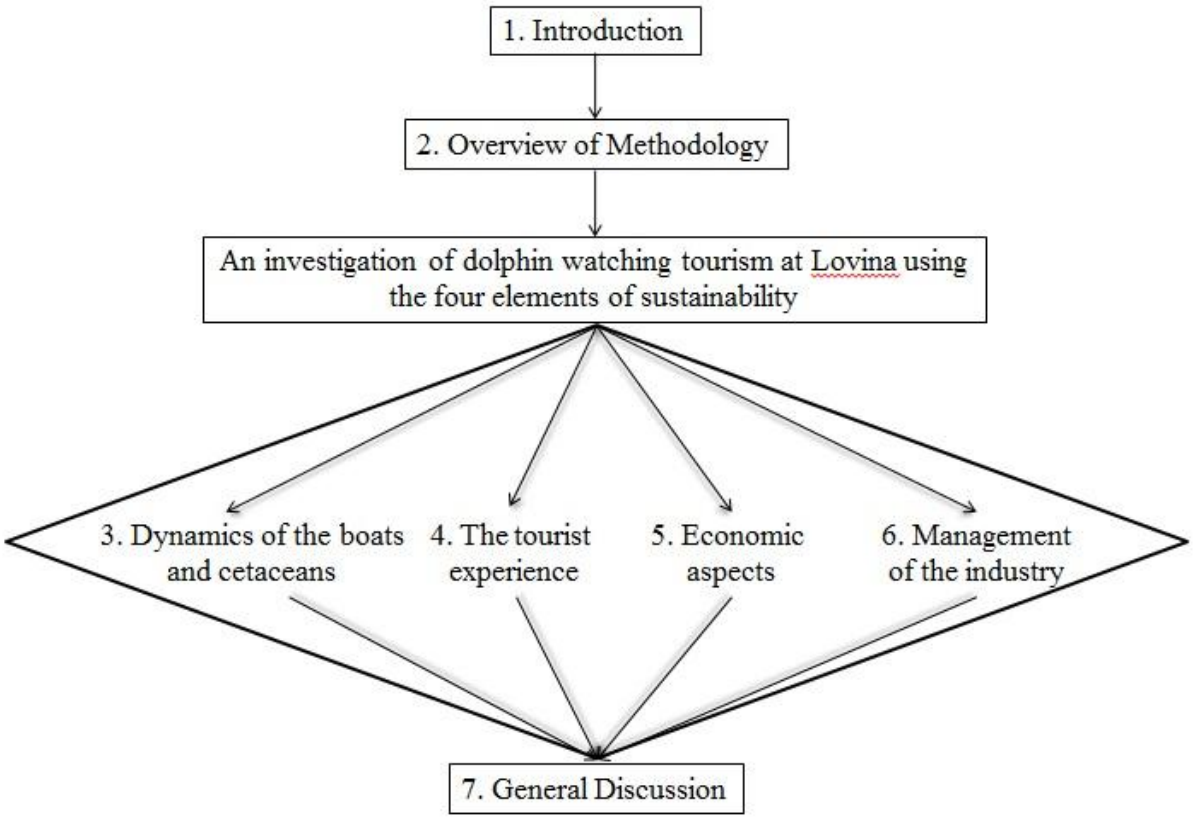


Figure 1.4 Outline of this thesis.

Chapter 1 (this chapter) describes the introduction to this thesis, including the concepts and a brief overview of the problems of wildlife tourism (cetacean watching tourism) in developing countries.

Chapter 2 outlines the methodology used in the thesis, including a general description of the dolphin watching industry in Lovina.

Chapters 3-6 detail the investigations of the Lovina dolphin watching industry from the four perspectives of the quadruple bottom line sustainability and the prism of sustainability. Elements of sustainability applicable for each chapter will be stated in the introduction to the specific chapter.

Chapter 3 explains the dynamics of tour boats and the cetacean populations in Lovina. This chapter will be submitted to the *Journal of Cetacean Research and Management*. I analysed the data and wrote the chapter. Prof Helene Marsh (marine mammal scientist), Dr Alastair Birtles (wildlife and marine tourism expert) and Dr Yvette Everingham (statistician) variously assisted with designing the study, interpreting the results and editing my writing. Statistical advice was provided by Dr Yvette Everingham. GIS advice was provided by Dr Alana Grech.

Chapter 4 examines the experiences, satisfactions and suggestions of tourists who attended the dolphin tours. This chapter is in review in the *Journal of Sustainable Tourism*. I analysed the data and wrote the chapter. Prof Helene Marsh, Dr Alastair Birtles and Dr Yvette Everingham variously assisted with designing of the study, developing the questionnaire, interpreting the results and editing my writing. Statistical advice was provided by Dr Yvette Everingham. Prof Phillip Pearce (tourism expert) provided comments on the paper version of this chapter.

Chapter 5 presents the economic aspects of dolphin watching tourism in Lovina, in terms of visitor direct expenditure and the economic impacts of this industry to the boatmen and the village. This chapter is in review in the *Journal of Ecological Economics*. I analysed the data and wrote the chapter. Prof Helene Marsh, Dr Alastair Birtles and Dr Riccardo Welters (economist) variously assisted with designing the study, interpretation of the results and editing my writing. Economic advice was provided by Dr Riccardo Welters. Prof Natalie Stoeckl (environmental economist) provided comments on the paper version of this chapter.

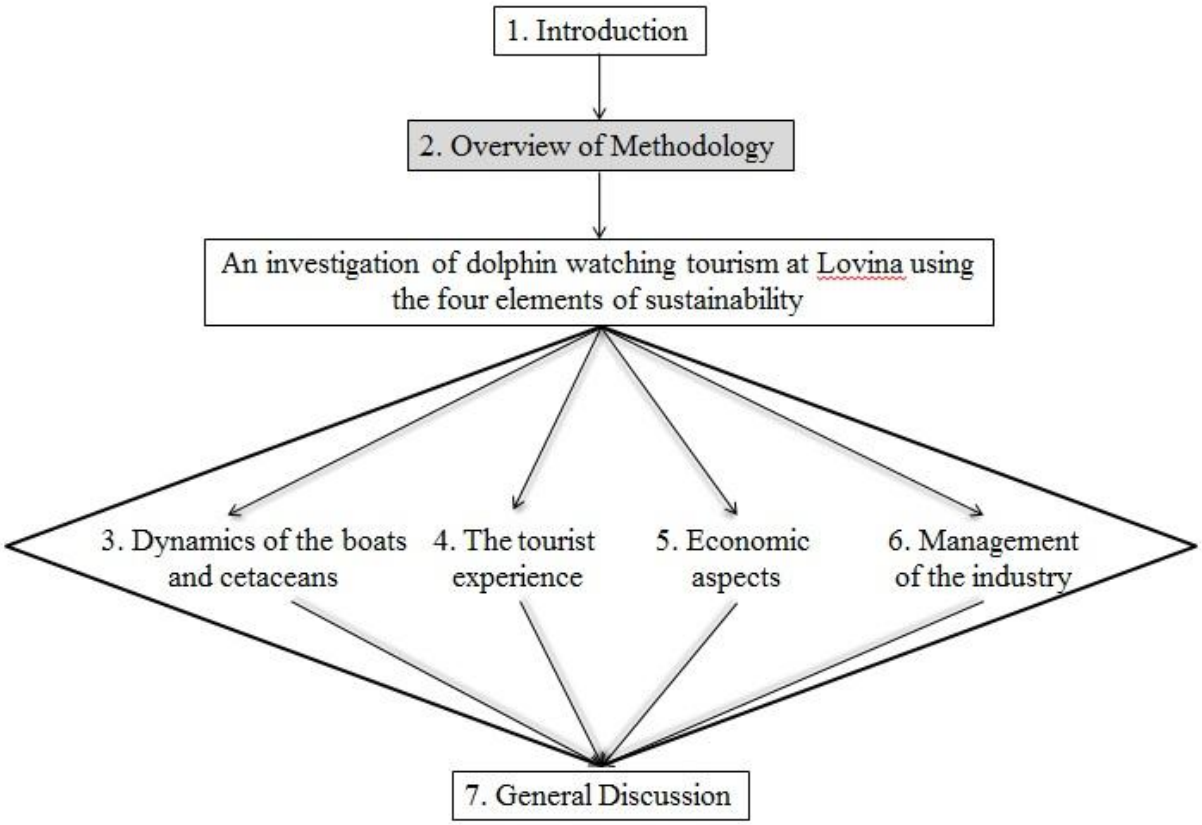
Chapter 6 discusses the management of the industry from the boatmen's perspectives and the processes and results of the stakeholder workshops. This chapter will be submitted to the *Journal of Cetacean Research and Management*. I analysed the data and wrote the chapter. Prof Helene Marsh and Dr Alastair Birtles assisted in developing the approach, developing the semi-structured interviews and stakeholder meeting arrangements, interpreting the results and editing. They also attended the stakeholder meetings in Bali. Dr Alison Cottrell (human geographer with extensive Indonesian experience) provided comments on the paper version of this chapter.

Chapter 7 synthesises the four main chapters (3-6), provides insights for future management of the Lovina dolphin watching industry and discusses challenges in implementing those ideas. This chapter also presents insights learned from Lovina for the betterment of marine wildlife tourism in developing countries. This chapter will be submitted to the Journal of Marine Policy. I analysed the data and wrote the chapter. Prof Helene Marsh, Dr Alastair Birtles and Dr Mark Hamann (sea turtle and marine conservation scientist) assisted in developing the approach, interpreting the results and editing my writing.

In the following chapter, I will introduce the generic methods used for the research and general information on Lovina.

CHAPTER 2

OVERVIEW OF METHODOLOGY



Chapter 1 explained the background of this thesis, the theories behind wildlife tourism and cetacean watching tourism, Quadruple Bottom Line Sustainability, and background information about the dolphin watching industry in Lovina. In this chapter, I explain the generic methods used in the project and throughout this thesis.

2.1 Study sites

Buleleng is a regency (local government region working under the jurisdiction of a province) in the north of Bali which had a population of 618,000 people in 2005 (http://bali.bps.go.id). In addition to having several nature-based tourism sites (e.g., diving and dolphin watching), Buleleng has a quiet, laid-back atmosphere that is different from tourist sites in southern Bali (Gouyon 2005; Berkmoes et al. 2009). The

regency government has focused on ecotourism and agritourism since 2007, with Lovina as one of the key areas.

Lovina is the collective name of several villages 20 minutes drive westward from Singaraja (the capital of Buleleng). A tourist that leaves from Denpasar will reach Lovina after 2.5 hours driving north through a scenic but winding route across the mountainous region of central Bali. As a tourist arrives in the village, he or she experiences a different cultural phenomenon to what he/she experienced in south Bali. Modern day Lovina is akin to south Bali (particularly Kuta) in the 1970s, where early explorers were treated to a quiet life and relatively pristine environment. Unlike modern Kuta, no traffic congestion exists in north Bali. The air is fresh, the sky is clear and the stars are visible at night. The night life on the beach is quiet, although music from cafes and restaurants can be heard from a distance. Walking along the footpath in the daylight, a tourist can enjoy unique local delicacies sold on the beach while watching the fishers fix their fishing nets and the boatmen clean the boat's long tailed engines.

The pace of life in Lovina is slow, even slower than the generally slow pace of life in Bali (Berkmoes et al. 2009). However, Lovina is close enough to modern facilities such as ATMs, internet cafes, travel agents and hospitals to ensure that their daily or emergency needs of the tourists are met. The restaurants offer excellent food with reasonable prices for foreign tourists, including recommended grilled fish stalls along the main road. Although many things can be done in Lovina, the underlying themes are rest and relaxation. A tourist can walk along the black sandy beach or the small lanes, looking for typical Balinese souvenirs. S/he can also rent a car to go to adjacent

waterfalls, temples or vineyards. When terrestrial attractions are exhausted, the tourist can always turn the attention to the sea.

Lovina does not have excellent waves; it is not the nature of north Bali shores. However, small reef patches in front of Lovina offer an excellent snorkelling experience for beginner snorkelers. Local diving shops are also ready to escort divers to enjoy the local reefs off Lovina or to better diving sites at the nearby Bali Barat National Park (approximately one hour's drive westward). Undoubtedly however, Lovina's main marine attraction is its dolphin watching tourism.

Kalibukbuk and Kaliasem are the two major coastal villages in Lovina. The local authorities recorded that approximately 9,800 people resided in these villages in 2007. Dolphin watching tourism in Lovina is hosted by these two villages. Kalibukbuk has three beach departure locations for dolphin trips (Banyualit, Aneka and Kalibukbuk) while Kaliasem has one (Kaliasem). Throughout the thesis, a beach departure location will be referred to as a 'port'. A three km sandy beach stretches between the Kaliasem and Banyualit ports (Figure 2.1) where traditional outriggered wooden boats ('*jukung'*) are beached on the shore. An iconic dolphin statue, which was built in 1996, stands at the end of the main lane that takes visitors to the Kalibukbuk departure port (Figure 2.2).

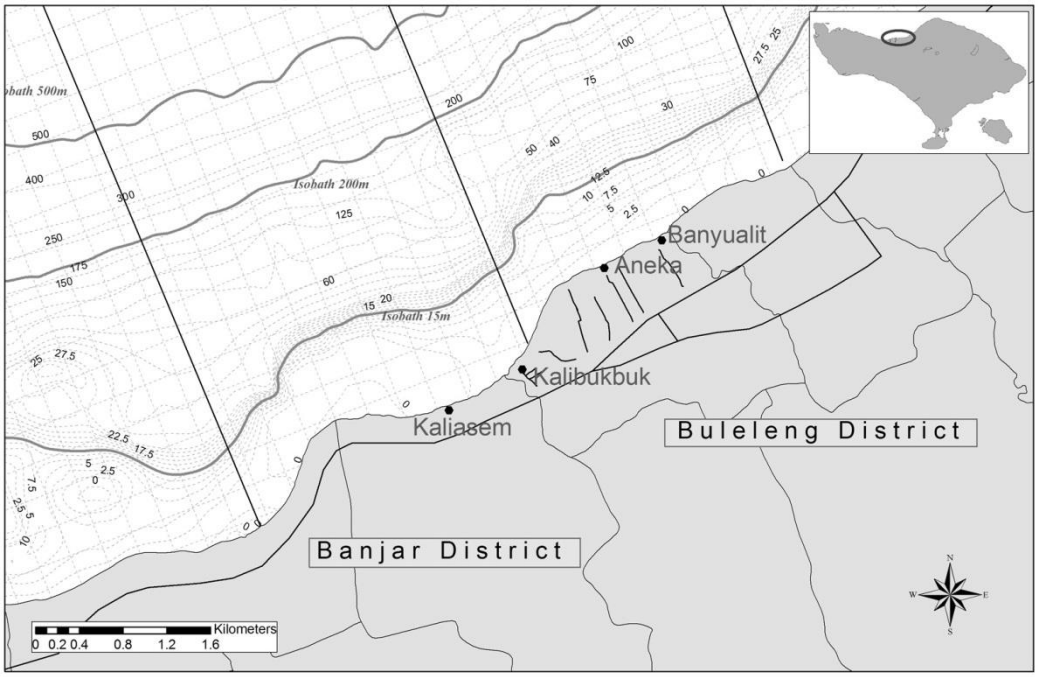


Figure 2.1 The four dolphin associations in the Kaliasem and Kalibukbuk villages of Lovina

Dolphin tourism in Lovina has operated year round since 1987. International visitors informally alerted local artisanal fishers to the tourism opportunities offered by the diverse cetacean community close to shore. Local small-scale fishers formed self-regulated dolphin watching cooperatives operating from the four major departure ports mentioned above. Each cooperative is managed by a dolphin guide association; from west to east, they are Kaliasem, Kalibukbuk, Aneka and Banyualit Associations.

Dolphin tours are conducted using *jukungs* (8-10 m long and 60-90 cm wide with two 5m outriggers – Figure 1) which take up to four passengers (IDR 60,000 or USD 6.6 per passenger per trip). When the boat is afloat, the freeboard is typically 30-40 cm higher than the water surface. There are at least 184 *jukungs* along the coast of the Kaliasem and Kalibukbuk villages, plus another 58 fishing *jukungs* at Temukus village at the western border of Kaliasem. All these vessels have the potential to take tourists to see the dolphins. The majority of *jukungs* (179) are dedicated tour boats

which are kept clean and have colourfully painted hulls and outriggers and increasingly powerful engines (currently approximately 12 HP). The remaining *jukungs* are regular fishing boats that fish daily and can take tourists for dolphin watching during the high visitation season. Each *jukung* is typically owned and captained by one boatman who is licensed by his dolphin association. The industry is otherwise unregulated.

Anecdotal information from the local boatmen indicated that the high visitation season ('High Season') lasts from June to October; the low visitation season ('Low Season') from November to May. As the baseline data on the local dolphin population dynamics were not available, my field season was designed around the pattern of tourist visitation. The Low Season coincides with the Balinese rainy season with strong winds and rough seas being more frequent. The High Season coincides with the dry season in Bali when the wind and the sea are generally calmer.

Data collection was conducted to enable some seasonal comparisons. The data were collected over four field trips: October 2007 to January 2008 (preliminary data collection), June to September 2008, February to April 2009, December 2009 and April 2010. My research was mostly focussed on the two major villages of Lovina: Kalibukbuk and Kaliasem (Figure 2.1). However, I extended the vessel survey area to cover Kalisada village (about 40min drive westward of Kalibukbuk) and the capital town of Singaraja (about 20min drive eastward of Kalibukbuk) because my pilot study indicated that the tourist vessels searched in this region in the Low Season. Singaraja was also the location for the final stakeholder meeting in April 2010.

Figure 2.2 The iconic dolphin statue at the end of the main lane in Kalibukbuk, Lovina

2.2 The field team

The field work team consisted of three research assistants (two female students from the Diponegoro University, Semarang, Central Java and a male native Balinese) who assisted me in data collection and data entry in Bali. The two university students used a portion of my data for their honours theses. In June 2008 and February 2009, Ocean Park Conservation Foundation in Hong Kong sent two teams of volunteers to help me, each of two students. Several other volunteers also assisted me in 2007/2008; all of whom are acknowledged in the Acknowledgements section of this thesis. All research assistants were trained to the same standard for data collection and data entry, particularly in distance estimation, species identification and boat and dolphin counting. A laser range finder Leupold BC800C (8 x 32) was used for distance estimation. Marine mammal identification books (Reeves et al. 2002; Shirihai & Jarrett 2006) were used for species identification. The research assistants were also

trained in the proper methods of conducting interviews and questionnaire distribution and were given official identification cards to assist those processes.

2.3 General methods

The four elements of sustainability encapsulated in the quadruple bottom line sustainability and the prism of sustainability concepts formed the basic framework of this thesis (Chapter 1). Thus, my research used two major approaches: 1) boat surveys; and 2) land-based human-dimension surveys. The boat surveys mainly aimed to answer Goals 1 and 2 (the biological element – recapitulated in Chapter 1), although some data (e.g., the number of boats) were also used for the economic element. The boat surveys involved line and point surveys, scan samplings, focal boat follows, GPS tracking and *ad libitum* observations. Details of these methods and analyses of the data will be explained in Chapter 3.

The land-based, human-dimension surveys were designed to answer Goals 3-6 (the social, economic and managerial elements – see Chapter 1). However, some information from the boatmen was later used to verify our boat-related findings. The land-based surveys included tourist questionnaires (Chapters 4 and 5), interviews with the boatmen (Chapter 6) and stakeholder meetings (Chapter 6). Details of these methods and analyses of the data are explained in the various thesis chapters. This research also aimed to suggest practical management actions. Hence, several principles of participatory action research were used in this research, i.e., aiming for action instead of just an understanding of the phenomenon, where action on the findings is integral to the process (Ramaswami et al. 2007).

Animal ethics (A1247) and human ethics (H2769) approvals have been obtained prior to the commencement of data collection. As required by my Human Ethics Approval, interviews and questionnaires were conducted as follows: 1) prior to the interviews, respondents were asked for their written informed consent; and 2) questionnaire respondents (i.e., the tourists) were provided with a written statement ensuring data confidentiality. They were also given options to provide their names or email addresses for me to inform them about the research products (e.g., thesis and papers). For convenience, I used the term 'dolphin tourist' to describe tourists who undertook dolphin tours in Lovina.

2.4 Thesis format

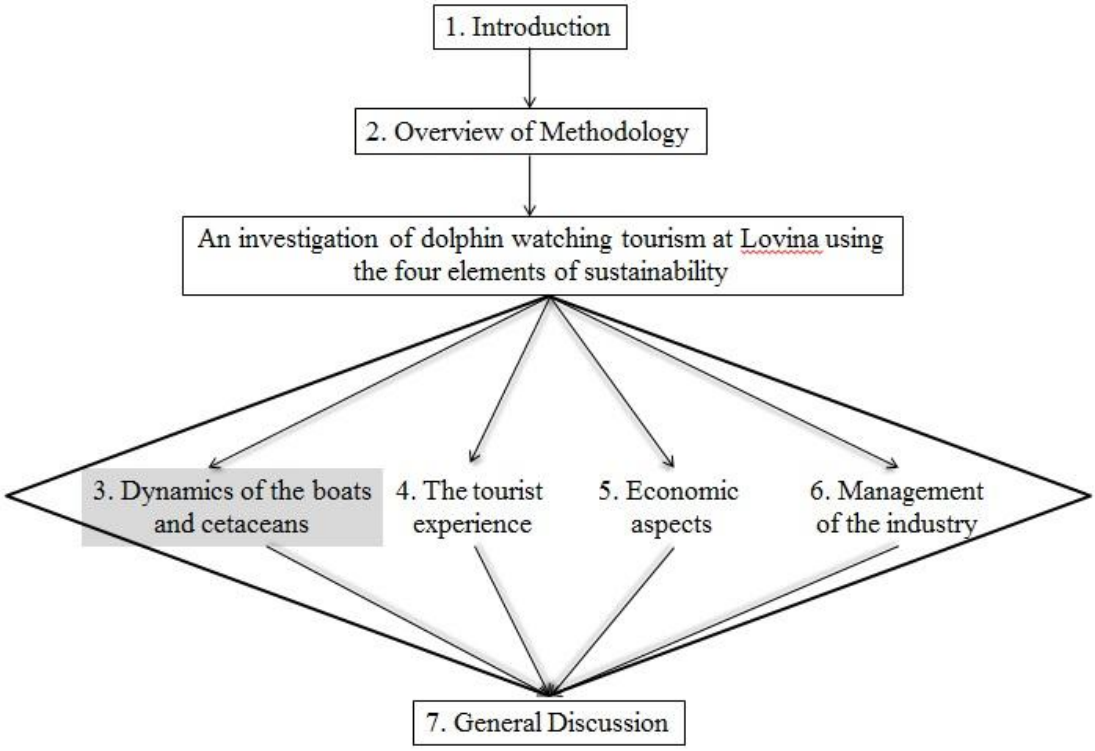
As explained above, Chapters 3 to 6 of this thesis were originally written as papers which were co-authored with Prof Helene Marsh, Dr Alastair Birtles, Dr Yvette Everingham and Dr Riccardo Welters as indicated in the introduction of each chapter (see also 'Statement of Contribution by Others'). To make this document reader-friendly, I have reformatted each paper into a chapter. To improve the readability of the thesis, I removed any redundancies and added the links or cross references between chapters.

2.5 Currency

Although I am based in an Australian university, to increase the accessibility of this thesis to international readership, all financial costs have been expressed in US dollars (averaging 2008 and 2009) and in Indonesian rupiah whenever necessary.

CHAPTER 3

THE DYNAMICS OF THE BOATS AND THE CETACEANS



This chapter[2] will be submitted to the Journal of Cetacean Research and Management as follows: "Mustika, PLK, Birtles, A., Everingham, Y. and Marsh, H. Encounters between cetaceans and tourist vessels in Lovina, Bali (Indonesia): is this industry biologically sustainable?"

Although this research examines the sustainability of dolphin watching tourism in Lovina using the four elements of sustainability, the original question which prompted my thesis was whether the tour boats posed any threat to the dolphins in Lovina. Therefore, I have decided to start the sustainability analyses from the biological viewpoint of the quadruple bottom line and the prism of sustainability concepts. In this chapter, I quantify the dynamics between the tour boats and the cetaceans and the potential problems the boats might pose to the animals.

[2] Starting from Chapter 3 to Chapter 6, I would occasionally use the plural first person narrative ('we'). However, the 'we' refers to 'my team and I', 'my supervisors and I' or the general audience, instead of 'my co-authors and I'.

3.1 Introduction

3.1.1 Traditional methods of measuring how cetaceans are affected by tourism

This chapter examines the sustainability of the dolphin watching industry in Lovina from the perspective of the biological element of sustainability. The International Whaling Commission recognised the benefits of cetacean watching as a type of non-lethal use of cetaceans (IWC 2009). However, as briefly stated in Chapter 1, while the cetacean watching industry benefits the local economy, its possible negative effects on the local cetacean populations must also be examined. Cetacean watching boats may harm the environment by discharging pollution, emitting noise or changing the behaviour or composition of the target cetaceans (Bejder & Samuels 2003; Warnken & Byrnes 2004). Several studies have demonstrated that cetacean watching can harm the target populations (Bejder et al. 1999; Constantine 2001; Lusseau 2003; Constantine et al. 2004; Orams 2004; Lusseau 2006; Christiansen et al. 2010). However, the possible impacts of the cetacean watching industry on the local cetacean populations in Lovina have never been examined.

Researchers have attempted to measure possible impacts of viewing (and swim-with) tourism on cetacean populations. Bejder and Samuels (2003) summarised three analytical designs commonly used: 1) within effect comparison; 2) control versus impact comparison; and 3) before/during/after (BDA) comparison. The definitions and examples of the three designs are presented below.

Within effect comparison is designed to examine how tourism activity affects cetaceans at a particular site where a control is virtually impossible to establish (Bejder & Samuels 2003), for instance when there is a high level of tourism activity. Controls may also be difficult to establish when the platform of opportunity (i.e., the tourist vessel) used by researchers potentially disturbs the animals. Because no control unit is available for data comparison, researchers compare the effects of several intensities or types of tourism (e.g., the number of swimmers, the number of boats or the permit status of the boats) on the animals. Because of the absence of controls, a within effect comparison requires longitudinal data. Constantine et al. (2004) used within effect comparison to examine the effects of tour boats with and without permits on the behaviours of bottlenose dolphins in New Zealand from December 1996 to February 2000. They observed a decreased frequency of dolphin resting behaviours as the number of tour boats increased. Timmel et al. (2008) compared the effect of swimmers on the behaviours of spinner dolphins in Hawaii from March 2000 to May 2002 with the 25 years of results that Norris et al. (1994) collected from the late 1940s to the 1960s. They suggested that an increased level of anthropogenic activities was associated with the likelihood and frequency of the local spinner dolphins altering their travel direction.

Researchers may choose control versus impact comparisons when control units can be established. This approach is conducted to measure the effect(s) of a treatment (e.g., X number of tour boats or Y interaction times) on the local cetacean populations (Bejder & Samuels 2003). Williams & Ashe (2007) used this design to examine the responses of *Orcinus orca* to boats in British Columbia using experimental manipulations. They found that the killer whales showed evasive movements in the presence of a certain

number of tour boats. However, when there were more than three tour boats, the whales' travel paths became more direct. Williams & Ashe (2007) attributed this change of behaviour to non-linear relationships between variables, e.g., the whale's lack of horizontal escape space due to an excessive numbers of boats. Nowacek et al. (2001) compared the inter-breathing interval of Florida *Tursiops truncatus* with and without tour boats (i.e., the boats were ≥100m away). They found that the dolphin's inter-animal distance decreased, the travel direction changed and swimming speed increased as a tour boat approached, particularly in shallow water.

Researchers can also examine the different responses of the cetaceans before, during and after treatment (before/during/after (BDA) comparisons). This approach measures the variables in three combinations: before/during treatment, during/after treatment or before/after treatment (Bejder & Samuels 2003). This design is similar to 'control versus impact' because the before and after treatment can be considered as controls although residual effects might influence the after-treatment measurements. For example, Lusseau (2003) compared the behaviours of *Tursiops spp* before tour boats approached, during encounters with tour boats and after the boats departed and found that the dolphins were more likely to travel after contact with the tour boats. Christiansen et al. (2010) also used this approach to examine the effects of tour boats on *Tursiops aduncus* behaviours in Zanzibar and found similar conclusions to those of Lusseau (2003).

In addition to choosing the appropriate research design, researchers must also consider: 1) whether the measured activities contribute to short term or long term changes in the population; and 2) possible confounding factors that may not

necessarily be included in the original design. Short term impacts, e.g., changes in surface times, dive patterns, and behavioural states, are generally easier to measure than longer-term impacts (Bejder & Samuels 2003). However, long-term data (preferably experimental data) are required to confirm that the anthropogenic activities directly contribute to long-term changes in a local cetacean population (e.g., habituation, habitat utilisation and reproductive success). Timmel et al. (2008) and Courbis & Timmel (2009) used historical data and analyses of the Hawaiian spinner dolphins (*Stenella longirostris longirostris*) since the early 1990s as evidence that the swimmers and vessels had made a measurable contribution to the behavioural changes observed.

Confounding factors are more difficult to measure, particularly when historical data are not readily available (Bejder & Samuels 2003). Although experimental design can minimise the effects of confounding variables, if experimental manipulations with different treatment scenarios are not possible, researchers must be open to such effects. Under such circumstances, a line of evidence approach may be appropriate. Currey et al. (2009) and Rowe et al. (2010) used a line of evidence approach to deduce that a hydroelectric power station in Doubtful Sound, New Zealand, was an important contributor to the decline in calf survival of bottlenose dolphins (*Tursiops sp.*). Before these studies, tourism was thought to be the major source of significant anthropogenic impact. Therefore, researchers must take extra care to consider many environmental factors before concluding that a tourism activity harms local cetacean populations.

3.1.2 Challenges in Lovina

Pilot studies were conducted in Lovina during November-December 2007 and January 2008 (22 days) to obtain initial data to inform the design of our subsequent data collection methods. A 'before/during/after comparison' was first planned, aimed at understanding cetacean behaviours before the first tour boats arrived offshore. However, during the preliminary study some tour boats were observed to leave the beach well before dawn. These boats usually encountered the dolphins before first light, making the before/during comparison impossible. Also, my team and I could not ascertain whether the cetaceans that remained in the survey areas after the boats had returned to the beach belonged to the same group as the first animals that we encountered that day. Thus, the logistical challenges of 'before/during/after comparisons' were considered insurmountable for subsequent data collection stages.

The preliminary study indicated that the tour boats generally operated from 6am to 8am in spatially localised areas. A 'control versus impact' study was therefore chosen because it enables the examination of cetacean behaviours without the presence of tour boats and outside the general encounter areas. However, the number of tour vessels at Lovina complicated this approach. Researchers studying tourist cetacean encounters in other parts of the world have reported the effects of approximately nine tour boats per encounter (mean 8.9 se$\pm$2.2, range 1-20) (Bejder et al. 1999; Hastie et al. 2003; Constantine et al. 2004; Allen et al. 2007; Courbis 2007; Williams & Ashe 2007; Duprey et al. 2008; Christiansen et al. 2010). This number was about half the average number of boats around a school of cetaceans in Lovina (pilot study mean 18.4 boats, se$\pm$2.6, range 4-41). Alternatively, some researchers have used *post-hoc* categories with two or three boats per encounter as 'few' and beyond two or three as

'many' (Stensland & Berggren 2007; Williams & Ashe 2007). This definition is almost never applicable in Lovina because a category of 'few' rarely applies. Consequently, I considered 'within effect comparison' as the main design with which to examine the possible association between the tour fleet and the local cetaceans in Lovina, while continuing to explore the 'control versus impact' approach as planned.

Many variables confound the analysis of the situation in Lovina. The number of tour boats, weather, sea state, currents and prey availability could contribute to observed differences in cetacean behaviours. A power plant eastward of Lovina is often visited by oil tankers, which may also influence the behaviour of local cetaceans. These factors were not examined during data collection, but I had to be mindful that they might present non-linear influences on the variables measured.

I did not conduct a larger scale ecological survey on the cetacean population in Lovina (e.g.,a more comprehensive study based on line transects, focal animal follows or photo-identificatoin) because of safety reasons and limited project funds. My jukung capsized in July 2008 when I was trying to do a line transect in a Beaufort 3-4 weather. A safer and slightly larger boat would have cost approximately USD 500 per day. I spent 36 days doing point surveys and 48 days doing line transects. Assuming that only 30 days were required for the larger scale ecological survey, an additional USD 15,000 would have been required (which I did not have).

As stated in the introduction to this chapter, this chapter examines evidence of the biological sustainability of the dolphin watching industry in Lovina, which corresponds to the biological element of sustainability ('planet') described in Figure

1.3. Given the logistical challenges explained above, the biological sustainability of this industry is examined through three steps: 1) describing and quantifying the encounters between tourist vessels and the cetacean community off Lovina; 2) investigating the association between the tour fleet and the cetaceans; and 3) comparing Lovina with internationally accepted best practices for cetacean tourism. The results are discussed later from the perspectives of the industry's general operation and encounters with the animals, whether the practice is biologically sustainable and the implications of such conclusions.

3.2 Methods

Boat surveys in offshore Lovina were conducted by two researchers using a hired *jukung* (see also Chapter 2). To meet various objectives of this chapter, the data collection during the boat surveys was designed to include six types of sampling: 1) line transects; 2) point surveys; 3) scan sampling; 4) focal boat follows; 5) *ad libitum* sampling; and 6) GPS vessel tracking (Figure 3.1).

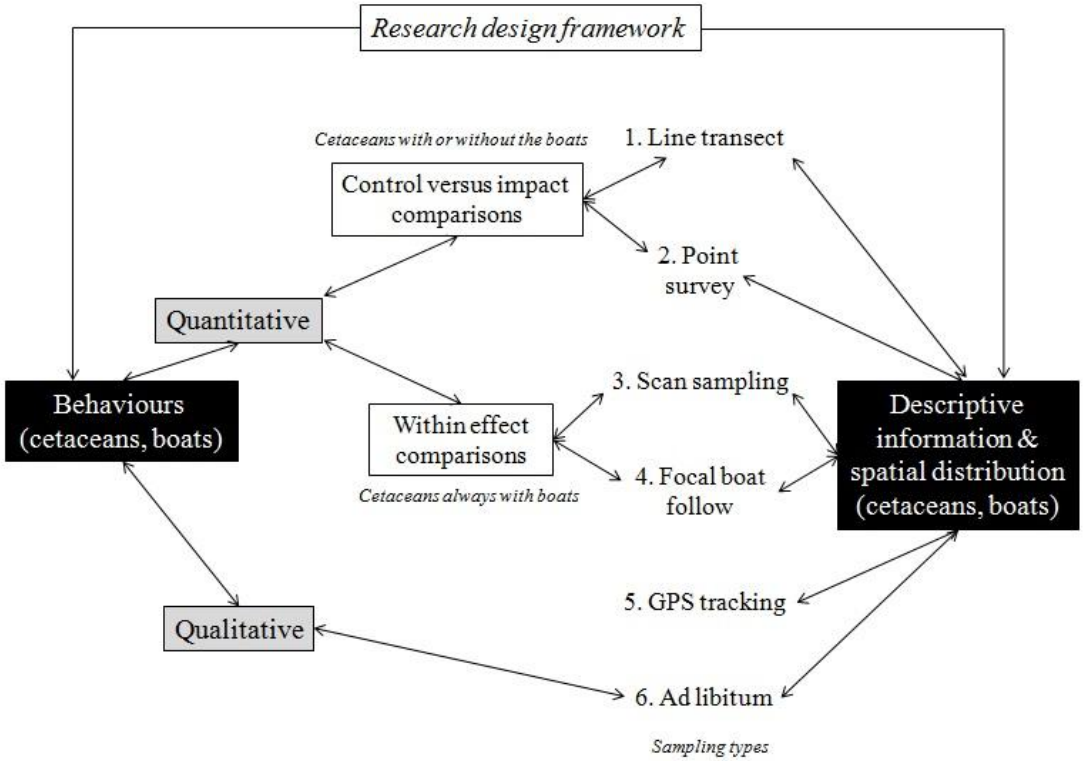


Figure 3.1 Research design framework used to understand the dynamics between cetaceans and tour boats in Lovina

As explained in Chapter 2 (Section 2.1), the field season was designed around the pattern of seasonal tourist visitation. Data were collected over four field trips: October 2007 to January 2008 (preliminary visit), June to September 2008 (High tourist season; focal follows, scan sampling, *ad libitum* sampling; GPS vessel tracking); February to April 2009 (Low tourist season; point surveys, focal follows, scan sampling, *ad libitum* sampling) and April 2010 (Low Season; point survey). Thus for the scan sampling and focal follows, season was confounded with year. Hence, the inferences that could be made about some temporal effects are limited.

A 'survey day' was defined as a day on which my team and I conducted a survey. To reduce the ambiguity associated with the term 'number of boats', I distinguished between: 1) the total fleet size: the number of boats in the fleet, in this case 179

licensed boats; 2) the daily fleet size: the maximum number of boats going out on any given day; 3) the encounter fleet size: number of boats around a school of dolphins (see Carlson 2010); and 4) the observed fleet size, i.e., the observed number of boats on the water at any given time (including vessels travelling between schools and vessels observed on the horizon).

Dolphin tour boats are more likely to threaten a cetacean population if the animals belong to a resident population (Shirakihara et al. 2002; Berghan et al. 2008). A systematic photo-identification study is the usual method of determining the residency pattern of a cetacean population (Wursig & Jefferson 1990; Shirakihara et al. 2002). Ideally, capture probabilities should be homogeneous. This situation is always difficult to achieve for marine mammals because some animals are more boat-shy than others (Wursig & Jefferson 1990), such as in Lovina. The limited timeframe for an AusAID sponsored PhD project also meant that the inclusion of photo-identification would resulted in reduced time in the data collection and analyses of other research components. Thus, my supervisors and I decided that photo-identification was beyond the scope of this project. Accordingly, I used spatial and temporal analyses of the sighting frequency of the target species to provide some insights into the residency pattern of various species of cetaceans in Lovina.

3.2.1 Data collection

The complexity of the dolphin watching industry in Lovina demands several types of data collection methods as described in Figure 3.1. A detailed explanation of each method follows.

Line transect surveys

Based on Buckland et al. (2004) and Barlow et al. (2001), this sampling protocol was to provide descriptive information on the spatial distribution of the cetaceans and boats and was designed to enable control versus impact comparisons (Figure 3.1). The objectives of the survey were to: 1) understand the species' composition, distribution and abundance of the dolphins in the area; and 2) quantify the proportion of cetaceans off Lovina targeted by dolphin watching tourism. My team and I conducted an initial series of line transects in the waters between Kalisada village (8.189° S and 114.89° E on the beach to 8.111°S and 114.86°E offshore) and Singaraja (8.103° S and 115.089° E on the beach to 8.026° S and 115.062° E offshore), a total area of approximately 364 km^2 (28 km x 13 km) (Figure 3.2). Surveys were conducted in June, July and September 2008, along nine transect lines from the shore to the 800m isobath, which is between 9 and 13km offshore depending on the bathymetry. The distance between two adjacent transect lines was 3 km. Each survey was completed in three days at a vessel speed of 7 knots (~ 13 km/h); the maximum travel time between lines was about 20 min. With an estimated effective strip width of 500 m, the total transect area was 97 km^2 or 26.65% of the total study area (sampling fraction). This design minimised the likelihood of double counting the same school of dolphins on any one day. I replicated the survey four times over 15 weeks from June to September 2008. The resultant sighting rate was too low to provide useful quantitative information. Hence a finer scale point survey was implemented, as described below.

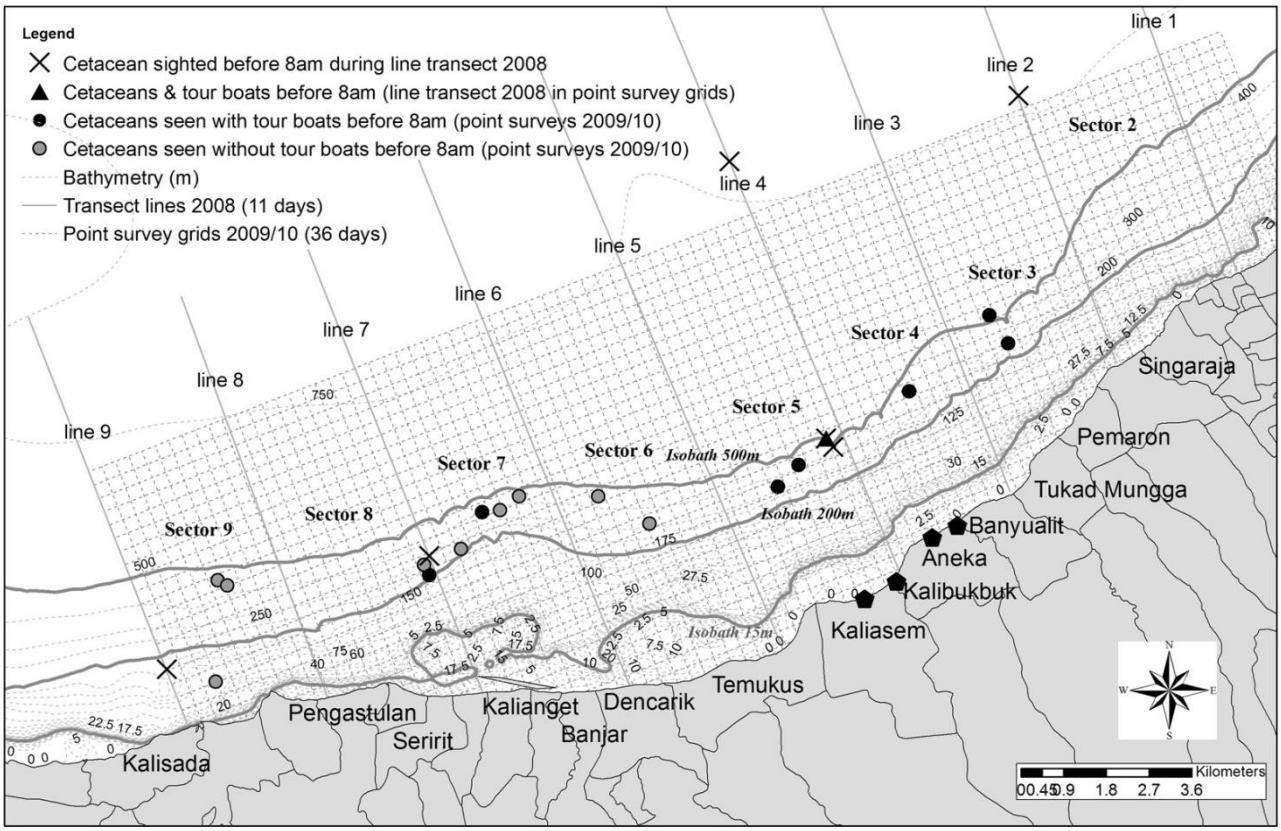


Figure 3.2 Morning sightings (before 8am) of cetaceans during the 2009 and 2010 point surveys (36 days) off Lovina, overlaid with the 2008 line transect sightings.

Point surveys

The basic design of this survey followed the point transect sampling technique of Buckland et al. (2004). Point survey protocol also provided descriptive information on the spatial distribution of cetaceans and vessels and was designed to enable control versus impact comparisons (Figure 3.1). The point surveys had the following objectives:

1. To obtain a robust index of the pattern of spatial distribution of cetaceans in the coastal waters of Lovina (survey area) between 6 am – 8 am (the time of day when the cetacean watching occurs).
2. To determine whether the relative density of cetaceans was the same in the core cetacean watching area as in the remainder of the survey region.

3. To quantify the differences in cetaceans' behaviours when they were surrounded/not surrounded by the tour boats (i.e., the control versus impact comparison, *sensu* Bejder and Samuels (2003))

The point surveys assumed: 1) that the spatial distribution of the cetaceans did not change systematically between 6 and 8 am; and 2) that the spatial distribution of the cetaceans between 6 am and 8 am was independent of the behaviour of boats.

Point surveys were conducted in two Low Seasons (February – April 2009 and April 2010) (Figure 3.2). The survey region was the coastal waters off Lovina between Kalisada and Singaraja. Following Buckland et al. (2004), sampling points were placed randomly within sectors in a stratified design along the shores of Lovina and adjacent villages and across the depth gradient stratified by water depth.

The coastline of Lovina was divided into 8 x 3 km wide sectors along the shore. Each sector extended from the 15 m isobath to the 500m isobath and was divided into an offshore and an inshore zone delineated by the 200 m isobath (Figure 3.2). The rationale for choosing these boundaries was as follows: 1) the 15 m isobath is inshore of the shallowest cetacean sightings suggested by the previous fieldwork I had conducted in July 2008 (the most inshore sightings of *Stenella attenuata* were in the vicinity of 20m isobath); 2) the 200m isobath is recognised by the UN Convention on the Laws of the Seas as one of the delineators of a continental shelf; and 3) the 500m isobath was the usual outer boundary of the area accessed by tour boats.

Each sector was divided into 300 m x 300 m grids. Each survey sampled approximately 10% of the total number of randomly chosen grids in each zone in each sector, typically five to six locations or 'points' per sector zone or 9-11 points per sector. The sector and zone surveyed each day were randomly chosen without replacement, taking weather conditions into account i.e., offshore sectors were not sampled in Beaufort > 4. A total of 80 randomised points were covered per survey. The survey was replicated three times during each of the years 2009 and 2010 for a total of six replications over 36 days over nine weeks. The target grids were re-randomised each time. Two sampling points in the 2009 survey and seven sampling points in the 2010 survey were abandoned because of bad weather. The two years of surveys yielded 471 surveyed points.

The research boat (equipped with a GPS) was positioned at the middle of the randomised point inside the target grid. The engine was switched off and the vessel allowed to drift. A protocol to note an event whereby the vessel drifted to another randomised point was made; however, such an event never took place. The compass bearing of the long axis of the boat was noted. Two observers scanned the surrounding waters (360° in total; 180° each observer) for a distance of 150 m for 10 minutes and recorded the presence and species of cetaceans and tour boats: 1) both within the 150 m radius sampling circle; and 2) outside the 150 m radius). After 10 minutes, the boat moved to the next target grid on the sampling schedule. The 150 m radius was set as the distance at which my team and I were confident that we would not miss any dolphin surfacing regardless of the sea state.

Prior to the survey, the observers were trained to estimate the outer boundary of the focal search area by practising distances calibrated using laser distance-estimating binoculars. The length of each observation period was chosen to be substantially longer than the maximum recorded dive times for Hawaiian spinner dolphins in the morning (3.5 minutes) as estimated by Norris et al. (1994).

The following data were recorded: 1) cetacean species, number, behavioural state (11 categories, Table 3.1), position and distance from research boat (laser binoculars); 2) number of vessels, the activity of each vessel (nine categories, Table 3.2) and its position relative to the research vessel; 3) number of passengers per vessel; and 4) the drifting direction. The term 'boat behaviour' or 'behaviour of the boats' used in this chapter onwards reflects the activity of each vessel or the behaviour of boatmen who drove the boats.

Table 3.1 Categories of cetacean behaviours* used in the dolphin research off Lovina (modified from Constantine et al. 2004)

Category	**Explanation**
Aerial^	Aerial displays, including spinning – *post-hoc* 'undisturbed' (see Section 3.2.2)
Bow riding^	Cetaceans bow riding at the bow or side of boats, using boat wakes
Diving	Cetaceans performing steep dives, arching their backs at the surface to increase speed of descent – *post-hoc* 'avoidance' (see Section 3.2.2)
Milling	Individuals idling, facing different directions, school often changes directions, dive intervals variable but short – *post-hoc* 'undisturbed' (see Section 3.2.2)
Resting	Cetaceans in slow movements as a tight group, no active component of other behaviours, dive interval relatively constant, synchronous and short
Socialising	Leaping, chasing, engaging in body contact with each other (including mating and playing) and slapping (including head slap)
Slow travel	Cetaceans moving in persistent directional movement < 3 knots – *post-hoc* 'undisturbed' (see Section 3.2.2)
Travel	Cetaceans moving steadily in a constant direction, > 3 knots, but not porpoising (leaping clear out of water descent – *post- hoc* 'avoidance', see Section 3.2.2)
Fast travel	Cetaceans porpoising in a persistent, directional movement descent – *post-hoc* 'avoidance' (see Section 3.2.2)
Feeding	Cetaceans capturing and consuming prey, evidenced by chasing fish on the surface, coordinated deep diving with loud exhalations, and rapid circle swimming – *post-hoc* 'undisturbed' (see Section 3.2.2)
Swimming underneath boat	Cetaceans diving then swimming underneath the boat

* the list includes behavioural states (behaviours with appreciable durations) and behavioural events (instantaneous behaviours) after Altmann (1974) and Mann (1999). Behavioural events are marked with ^

Table 3.2 Categories of boat behaviours used in the dolphin research off Lovina (modified from Allen et al. (2007))

Category	Explanation
Chase with speed faster than the cetaceans	Boat heads straight at cetacean school at a speed that exceeds that of the cetaceans but stops before the school
Approach with speed slower or the same as the cetaceans	Boat approaches cetacean school but stops before the school, not speeding
Circle to the front of the cetacean school	Boat travels to the front of the cetacean school in a semi-circling movement
Parallel with the cetacean school	Boat runs parallel within 150 m of the cetacean school
Driving or cutting through the cetacean school	Boat speeds straight to and then through the cetacean school
Following the cetaceans	Boat follows the cetaceans from behind
Stationary with engine on (neutral gear)	Boat relatively stationary within 150 m of the cetacean school, engine on
Stationary with engine off	Boat relatively stationary within 150 m of the cetacean school, engine off
Searching for cetaceans	Boat searches for cetaceans

Scan sampling

This sampling type provided descriptive information on the spatial distribution of the vessels and the cetaceans and was designed to enable within effect comparisons (Figure 3.1). Scan sampling takes *'a 'point' or 'instantaneous' sample of an individual's behaviour or location before moving to the next animal and doing the same'* (Mann 1999, p. 113). Scan sampling may begin when *'a particular behaviour occurs (e.g. whenever a particular pair of individuals interact, or whenever the*

animals enter a particular habitat)' and may end *'after a particular class of behaviours or interactions has terminated'* (Altmann 1974, p. 234).

In Lovina, scan sampling (based on Altmann 1974) was used to provide a systematic standardised snapshot of the activities of boats and cetaceans to understand the fleet's behaviours when a cetacean(s) was sighted. Sampling started whenever at least one cetacean was sighted and there was at least one boat responding to the animal(s). The data were typically recorded over a period of up to two minutes (referred to as a 'scan effort'). However, in the rare cases where the dolphin school stayed on the surface for more than two minutes (6.9% or 12 out of 175 efforts), data were recorded until the cetacean(s) disappeared or the boat(s) changed their behaviours. The first data collected in the morning were usually via scan sampling. However, when no cetaceans were sighted in the first 30 min after our boat departed from the beach, a focal boat follow (see the next section below) was initiated.

Data collected for scan sampling included: 1) coordinates of the research vessel; 2) time a scan started and ended (real time of cetacean presence on the surface, to the nearest second); 3) encounter fleet size (maximum 150 m radius); 4) cetacean species; 5) the number of animals in each cetacean school; 6) the number of calves in each school; 7) the behaviour of the cetaceans (Table 3.1); 8) the behaviours of the five closest boats (Table 3.2); 9) the distances between each of the five closest boats and the cetaceans; 10) the identity of the five closest boats; and 11) the number of observed boats adjacent to the focal school (excluding encounter fleet size). A calf was defined as an animal '2/3 or less the length of an adult, regularly accompanying a larger animal presumed to be the mother' (Karczmarski et al. 2005). Newborn calves

(1/2 or less the length of an adult animal, Karczmarski et al. 2005) were included in this definition.

As presented in Table 3.1, behavioural data were divided into states (with measurable duration) or events (instantaneous behaviours). Only two behaviours in Table 3.1 were considered events (aerial and swimming underneath boat; the latter only applied in the southern waters of Bali, the result of which were not presented here). Traditionally, researchers record the *duration* of any behavioural state and the *frequency* of any behavioural event (Altmann 1974; Mann 1999). However, for the purpose of this research, I only recorded the categories of the cetacean behavioural states or events, instead of their duration or frequency.

Distances were estimated using the span of the boat's two outriggers (5 m) or boat length (10 m) as the standard. If two encounters occurred simultaneously, my team and I also recorded the distance of the second encounter from the research vessel, the number of tourist boats and the number of cetaceans detected. The research vessel typically remained stationary with its engine off during scan sampling, unless the sea state was above Beaufort 3 (very rare occurrence).

Focal boat follow

This sampling protocol provided descriptive information on the spatial distribution of the vessels and dolphins and was designed to enable within effect comparisons (Figure 3.1). A focal follow protocol is usually conducted (Mann 1999) when a researcher wants to examine the behavioural changes of the focal animal (or a group of animals) during a course of observation (e.g., Lusseau (2003), Nowacek et al.

(2001) and Christiansen et al. (2010)). However, as previously mentioned, tour boat traffic in Lovina hampered attempts to conduct focal animal follows because I often could not determine if the composition of a group of cetaceans remained constant. In the face of such constraints, Bejder and Samuels (2003) suggested that the source of the disturbance (in this case the tour boats) should be the object of the focal follow rather than the disturbance target. I followed their recommendation.

Focal boat follows, which were typically conducted after a scan sampling, were implemented to quantify the behaviour of a tour boat over a fixed period of time (5 min), irrespective of the presence of the cetacean(s). During the focal follow, my team and I followed a tour boat for five minutes. The focal vessel was chosen by assigning random numbers to the boats closest to the research vessel. My team and I then picked a random number from a list and observed the relevant boat. My team and I recorded all of the boat's activities in the order of occurrence (sequence sampling) over each minute. A five-minute focal follow was referred to as an 'effort'. Each effort was divided into five 'sequences', each lasting one minute to facilitate data collection as the situation was dynamic .

Each time a cetacean was detected within 150 m of the focal boat, I recorded that sequence as 'positive' and recorded most of the data listed for scan sampling (see previous section) with the exception of the distance, behaviour and identity of the five closest boats and the real time of cetacean presence on the surface. In addition, I recorded the behaviour of the focal boat and its distance to the nearest cetacean. Current direction and sea state were not usually recorded during a focal follow, unless

the weather changed suddenly. The observation was cancelled if the focal boat returned to the beach.

Scans and focal follows were alternated during each day's observations. There were more focal follows than scans if there were few dolphins sighted because scans were only conducted when there was at least one cetacean and one boat. The scan sampling and focal boat follows were conducted until the last observable tourist *jukung* returned to the beach. The scan sampling and focal boat follows were conducted over a total of 39 days (over 14 weeks) in 2008 and 2009.

Opportunistic recording of boatmen's tracks

This sampling type provided descriptive information and spatial information on the paths of the tourist *jukungs* (Figure 3.1). To understand the searching patterns and length of encounter of the tourist vessels, I provided 15 boatmen with a GPS, each for one (different) day in the High Season of 2008. However, the boatmen became concerned that this research was aimed at shutting down their industry. Several months of constant interactions were required before the boatmen again accepted the benign nature of this research, i.e., our goal was not to terminate the industry. I chose to discontinue asking the boatmen to use GPS tracking during this time.

I compared the boatmen's tracks with the tracks of the research vessel, which always attempted to follow the majority of tour boats to confirm whether the boatmen's High Season tracks were representative of the fleet. The tracks of the research vessel from both seasons were used (21 days in High Season and 15 days in Low Season) as an index of the boatmen's search behaviour during the low visitation months.

To better estimate the encounter time in a typical dolphin tour day, I analysed the tracks of 14 boatmen in 2008 (one track was excluded due to an incomplete data log). The dolphin encounter time of each boat was estimated based on the path shape: a tangled, bundled or circular path was considered to be indicative of an encounter. I calculated the initial searching time for each tracked boat, i.e., the elapsed time between departure and the point where the tracks indicated the first dolphin encounter occurred.

Ad libitum

This sampling type provided descriptive information on the spatial distribution of vessels and cetaceans and qualitative information on the behaviour of the fleet (Figure 3.1). *Ad libitum* data collection (Mann 1999) was conducted as a part of the reconnaissance visit (November 2007 to January 2008) and throughout the survey periods (June-September 2008, February-April 2009 and April 2010). The data collected included encounter fleet size. The maximum encounter fleet size per day estimated from the *ad libitum* data was then combined with data from other methods to estimate the daily fleet size. *Ad libitum* data collection of the boatmen's behaviour while searching for the dolphins was also conducted. These data enabled me to interpret the behaviour of the focal vessels.

3.2.2 Data analysis

Statistics

Independent samples t-tests, nonparametric tests for independent samples, nonparametric median tests, linear regression, cross tabulation and general log linear analyses were used to examine the behaviour of tour boats and cetaceans (Zar 1999; Field 2009). Seasonal differences were checked but if the differences were not significant, I combined the data across seasons. I used Pearson Chi Square for testing the homogeneity of large samples of count data and Fisher's exact test for small samples of count data (maximum 30) (Field 2009). IBM SPSS version 19 was used to generate the statistical results.

Analyses in this chapter used several sampling units. Most analyses of the encounters between vessels and dolphins were taken from scan samplings and focal boat follows that were not independent within days. To avoid pseudo-replication, measures of central tendency per day (mean or median) or data from the first sightings of the day were used whenever appropriate. In analysing whether the approach distances of the five closest boats to the cetaceans conformed to the Australian standard (see the next section after the ArcGIS section), only data from boats that were moving around were used, as opposed to data from stationary boats. The nature of each sampling unit is reported in the statistical results.

To simplify some analyses, I conducted a *post-hoc* categorisation of the behaviours of the target cetaceans when analysing the cetacean behaviours in the presence and absence of the tour boats: undisturbed (i.e., spinning, milling, travelling slower than 3

km or feeding) and avoidance (travel, fast travel or diving) (based on Constantine 2001; Williams et al. 2002; Schaffar et al. 2009).

ArcGIS

I quantified the search area of individual boatmen using the GPS tracks (Garmin Etrex Vista) collected in the High Season (see Section 2.1.5). Kernel density estimation was used to quantify the maximum search area (Spencer & Angeles 2007). Fixed kernel density estimation with percent volume contour was used to calculate the density probability of the core activity areas (Worton 1989; Sveegaard et al. 2011). Projection UTM Zone 50S for Indonesia 1974 was used to produce the maps.

Kernel density estimation quantifies the spatial distribution of a population or feature using the geographic centre, distance from the centre and a density distribution (Spencer & Angeles 2007). I used a 500 m kernel size (radial distance from the population centre) in the fixed kernel density estimation tool of the Spatial Analyst extension of ArcGIS 9.3.1 because 500m was the maximum distance over which it is possible for a boatman to reliably identify the presence of a cetacean. I used the fixed kernel density estimation with percent volume contour and a 10 m grid size (Worton 1989; Sveegaard et al. 2011) in Hawth's Analysis Tool 3.27 in ArcGIS 9.3.1 to calculate the density probability of the boatmen's search area.

A smoothing factor (*h statistic*) is important in fixed kernel density estimation because it *'controls the amount of variation in each component of the estimate'* (Worton 1989, p. 165). The *h* value is uniform in the fixed kernel method. A smaller h value enables the observation of more detailed data and the finer shapes of volume

contour. Two methods are available for calculating the *h statistic*: *href* estimate and least-squares cross validation (Worton 1989). The appropriate method is case-specific and is ultimately determined by *'expert knowledge and careful inspection of the resulting kernel density estimate'* (Beyer 2004; see also Sveegaard et al. 2011). The results of several smoothing factor scenarios (250, 500 and 1,000) were visually compared with the result of the kernel density estimation from Spatial Analyst. I decided to use the 250 smoothing factor to achieve a detailed percent volume contour similar to the 500m kernel size produced by the Spatial Analyst tool.

The percent volume contour in fixed kernel density estimation provides several density probabilities (Sveegaard et al. 2011) and enables the calculation of individual boatmen's and the researcher's general searching areas, core searching areas and possible encounter areas. I defined the core search areas as within 50% volume contour (i.e., half of the boatmen's track points) based on visual inspection of the original track points.

Comparison with international best practices

I compared the Lovina situation as revealed by scan sampling with accepted international best practice using the Australian standard which accords with 75% of the international standards on dolphin watching tourism (Carlson 2010). The Australian standard bans all vessels from a No Approach Zone, defined as the zone within 50 m in front of, parallel to or behind a school of cetaceans. The regulation permits up to three boats in the Caution Zone, defined as the zone within 50 to 150 m from the dolphin school (Figure 3.3). I grouped the boats into those with and without 'behaviours of concern', or those that interfered with the animals' activities or did not

interfere with the animals' activities (sensu the Australian National Guidelines for Whale and Dolphin Watching 2005 in Carlson 2010). A boat exhibiting 'behaviours of concern' was one that sped towards the school, cut through or blocked the animals' line of travel within 150 m from the cetaceans. Boats that followed the animals from behind were not included in the analysis of 'behaviours of concern' because of the difficulties in measuring the angles between the animals and the boats.

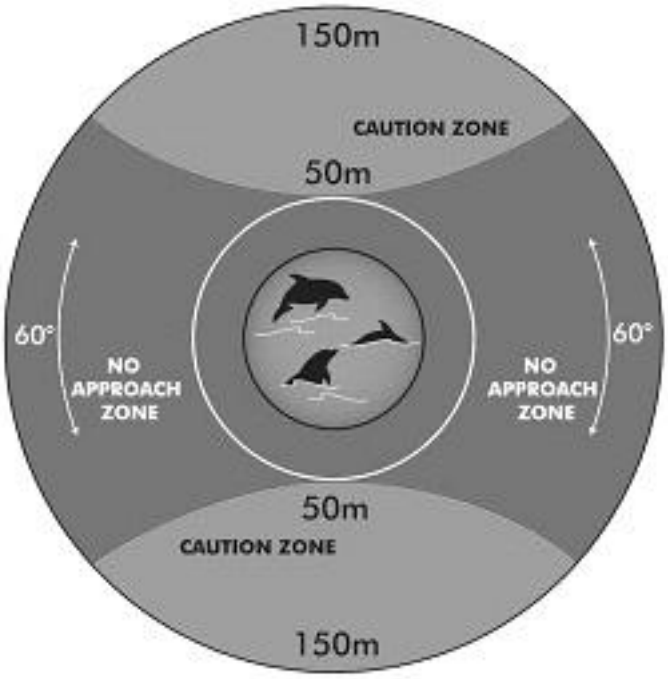


Figure 3.3 The Australian national guidelines for dolphin watching used to analyse dolphin watching off Lovina (Carlson 2010)

3.3. Results

3.3.1 Dolphin watching off Lovina

The target cetaceans and their behaviour

Eight species of cetaceans were recorded off Lovina over 108 survey days between November 2007 and April 2010 using scan sampling, focal follows, line and point surveys and *ad libitum* observations. The species observed were: *Stenella longirostris*

(spinner dolphins; dwarf *S.l. roseiventris* and Hawaiian *S.l. longirostris* subspecies), *Grampus grisseus* (Risso's dolphins), *Lagenodelphis hosei* (Fraser's dolphins), *Stenella attenuata* (Pan-tropical spotted dolphins), *Tursiops truncatus* (common bottlenose dolphins), *Globicephala macrorhynchus* (short-finned pilot whales), *Balaenoptera edeni* (Bryde's whales) and *Pseudorca crassidens* (false killer whales). Figures 3.4a and 3.4b illustrate both subspecies of the spinner dolphins off Lovina.

My team and I followed the tour boats on 61 days using scan sampling, focal follows and *ad libitum* methods. The boatmen found cetaceans on 58 out of 61 days (95%). Dwarf spinner dolphins were the most commonly sighted species; they were observed on more than 91% of the High Season days and 81% of the Low Season days (Table 3.3). There were no significant seasonal difference in the likelihood of spinner dolphin encounters; spinners were always the main species sighted (Pearson Chi Square p=0.140, n = 61 days). I concluded that the dwarf spinner dolphins were likely to be resident in the area in contrast to the other cetaceans sighted (Table 3.3).

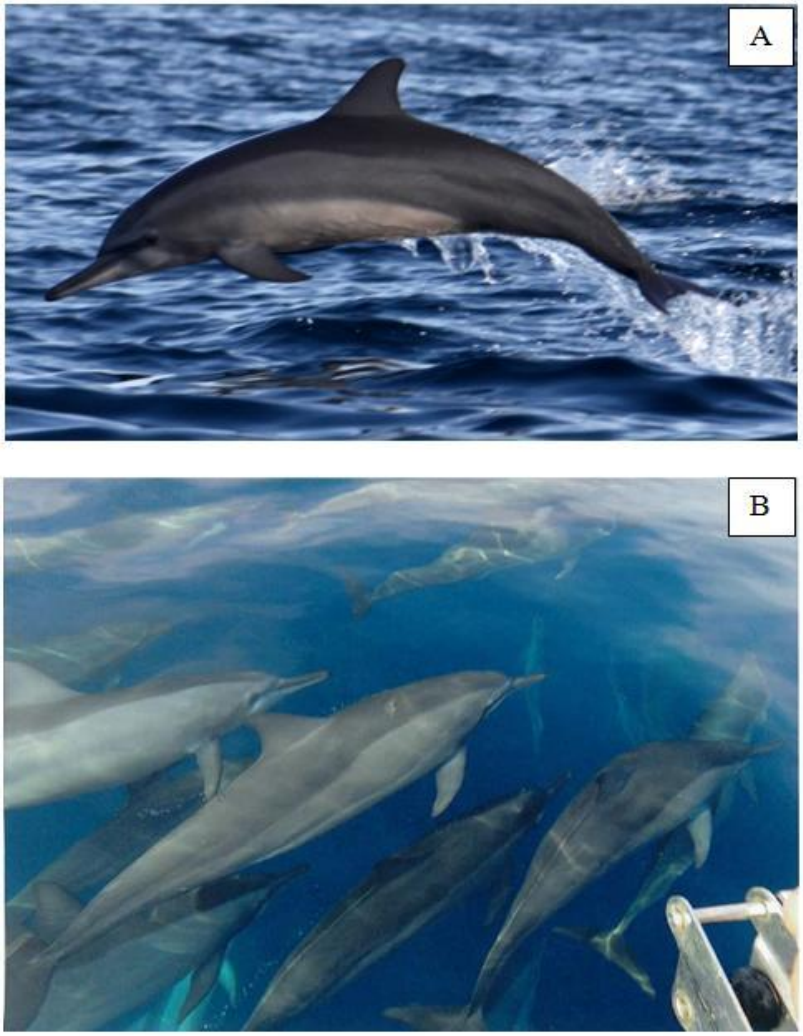


Figure 3.4 (a) A dwarf spinner dolphin (*Stenella longirostris roseiventris*) in Lovina. No scalable item is available in this picture. However, in the ocean the adult version this species is small (often less than 2m). (b) The Hawaiian subspecies (*Stenella longirostris longirostris*) that is found offshore of Lovina (photo courtesy of an unidentified tourist by way of Mr Made Rudita).

A school of dwarf spinner dolphins comprised an average of 10.2 animals (se$\pm$1.36; scan sampling with no significant seasonal difference in group size at α 0.05 (Mann-Whitney two-tailed independent test p=0.073, n_1 = 16 days, n_2 = 14 days, Table 3.4). About 40% of the spinner schools observed included at least one mother and calf pair (n = 213 schools, 95% confidence interval 34.1% to 47.58%, se$\pm$0.03).

Table 3.3 The likelihood of encountering a cetacean species off Lovina on any given day in the High and Low Tourist Seasons

Species (n day)	**High Season**	**Low Season**
Dwarf spinners	91.7% (22)	81.1% (30)
Cetaceans other than dwarf spinners	8.3% (2)	10.8% (4)
More than one species simultaneously	0% (0)	0% (0)
No encounter	0% (0)	8.1% (3)
Total	100% (24)	100% (37)

The line and point surveys indicated that the cetaceans were usually found with tour boats (75%) in locations in front of or slightly northeast of the main ports (Figure 3.2), possibly because these locations were closer to the ports and more accessible to the tour boats. Cetaceans were more frequently sighted without tour vessels in locations westward of the main ports (84.6% of 13 points where the cetaceans were seen without boats).

When first sighted in the morning with scan sampling, 77.8% of the dwarf spinners were travelling while the remainder were either conducting aerial behaviours (i.e., spinning, 11.1%), diving (5.6%) or bow-riding (5.6%). Subsequent scan samplings suggested that the spinner dolphins surfaced for an average of 1.7min (se$\pm$0.11) without significant seasonal difference (Mann-Whitney two-tailed independent test $p=0.835$, $n_1 = 16$ days, $n_2 = 14$ days, Table 3.4).

The behaviour of the tour fleet

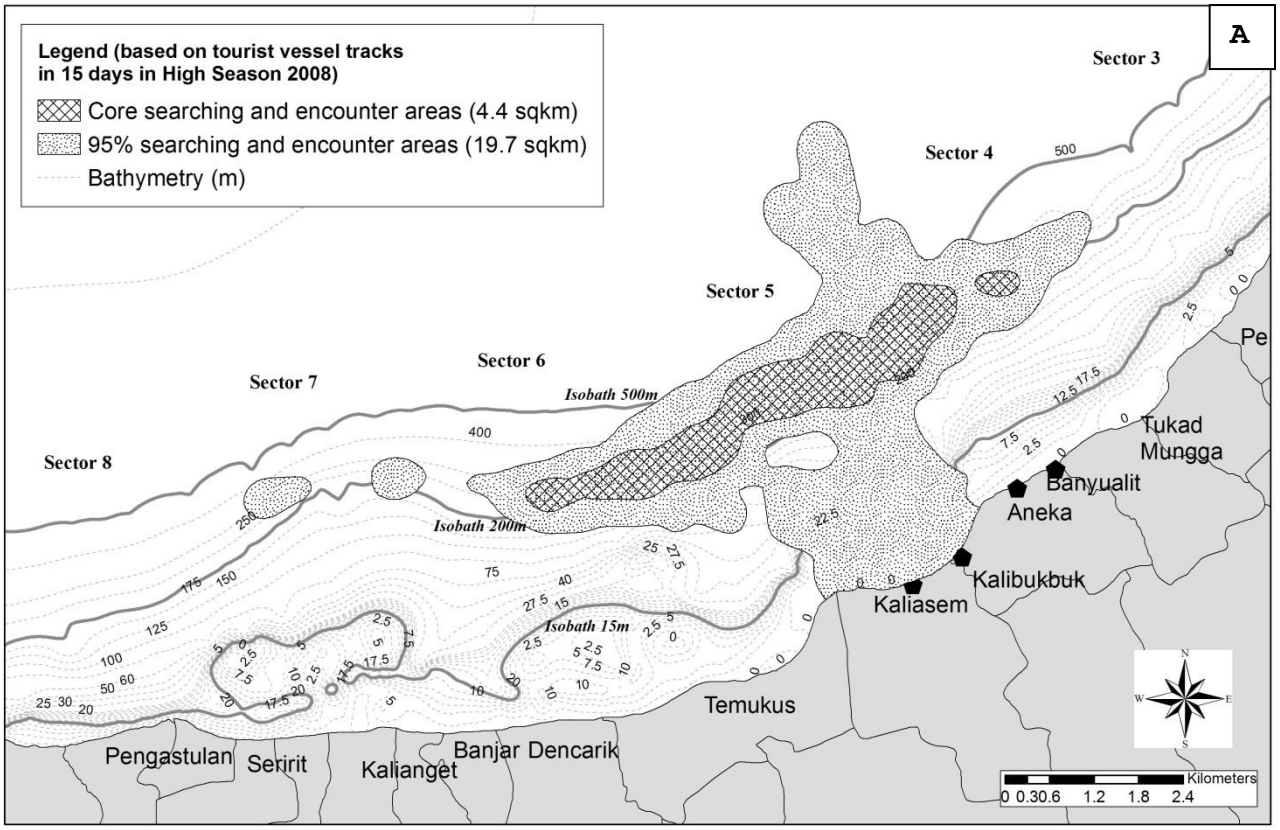
As described in Chapter 2 (Section 2.1), the fleet was based at four beach locations or ‘ports’ (each managed by a dolphin association). The ‘ports’ were spaced at 500 m to 1 km intervals along a 3km beach strip. In April 2010, the total fleet size was 179. My team and I recorded the daily fleet size over seven months from 2007 to 2009 with

scan sampling, focal follows and *ad libitum* sampling. The counts of daily fleet size were weighted to account for the different fleet sizes between weekends and weekdays. The weighted average daily fleet size across the entire survey period was 34.5 vessels (se±6.29, n = 57 days, Table 3.4) or 19% of the total fleet size. The maximum daily fleet size was 98; these data were obtained in the High Season. In the High Season, the average daily fleet size was 49.8 vessels (se±4.56, range 23-98), significantly larger than in the Low Season 26.1 vessels (se±2.95, range 4-73) (two-tailed independent sample T-test $p<0.0005$, df=55).

The *ad libitum* data indicated that most vessels left their home ports at first light, around 6am Bali time (GMT +8:00). The scan samplings, focal follows and *ad libitum* data showed that the observed number of boats sighted at first light averaged ~24 (se±2.56, range 2-53, n = 32 days, Table 3.4) with no significant seasonal difference (independent sample t-test $p=0.961$, df=30). The boatmen usually scanned the horizon with their naked eyes to locate dolphins. They also used clues such as birds (feeding dolphins are usually found in association with birds), jumping fish or camera flashes from passengers in the front boats. As the morning progressed, the boatmen kept a close watch on the behaviour of other groups of tour boats. The boatmen behaved differently when they were searching for the dolphins compared with when they were actually watching the dolphins (see also Chapter 6 Section 6.3.1). When a group of boats was watching dolphins, they would either move around or make zig-zag movements. While searching, the boats moved straight ahead as a group usually in parallel formation.

Table 3.4 Summary statistics of the cetaceans and the tour fleet off Lovina

Information	**Sampling type**	**Result**	**Statistics**	**Sampling unit**
Dwarf spinner dolphin's group size	Scan sampling	About 10 animals per group	Mean 10.2 animals, se±1.36, n=30	Day
Dwarf spinner dolphin's surface time	Scan sampling	Less than two minutes	Mean 1.7min, se±0.11, n=30	Day
Daily fleet size	*Ad libitum*, scan sampling, focal boat follow	Almost 35 boats	Weighted mean 34.5, se±6.29, n =57	Day
Observed number of boats at first light	*Ad libitum*, scan sampling, focal boat follow	About 24 boats	Mean 24.2 boats, se±2.56, n=32	Day
Boatmen's initial searching time (High Season only)	GPS track	About half an hour	Mean 34 min, se± 4 min 54sec, n =14	Day
Behaviour of tour boats when the cetaceans surfaced	Focal boat follow	Steadily approaching the animals	Pearson Chi Square two-tailed test p=0.009, n_1 = 14 efforts, n_2 = 63 efforts	Effort
Daily cumulative encounter time	GPS track	Almost 40min (conservative scenario)	Mean 37min 49 sec (se± 4min 1sec, n =14)	Day
Association between the daily cumulative encounter time and the number of encounters per day	GPS track	Significant; short encounters triggered the boatmen to have more encounters	Linear regression of conservative data, p=0.013, df=13, Pearson correlation coefficient = -0.646, R^2=41.7%)	Day
Observed fleet size	Scan sampling	More boats observed during High Season as opposed to Low Season	High Season mean=27, se±3.26, n =22 Low Season mean=18.6, se±3.82, n=15 Mann-Whitney independent sample test p=0.029, n_1=22 days, n_2=15 days	Day
Association between dwarf spinner dolphin's surface time, encounter fleet size and school size	Scan sampling	School size was the only variable associated with surface time	Linear regression R^2=27.7%, one tailed p=0.003, df=29	Day


A
Legend (based on tourist vessel tracks in 15 days in High Season 2008)
Core searching and encounter areas (4.4 sqkm)
95% searching and encounter areas (19.7 sqkm)
Bathymetry (m)
Sector 3
Sector 4
Sector 5
Sector 6
Sector 7
Sector 8
Isobath 500m
Isobath 200m
Isobath 15m
Tukad Mungga
Banyualit
Aneka
Kalibukbuk
Kaliasem
Temukus
Pengastulan
Seririt
Kalianget
Banjar Dencarik
Kilometers
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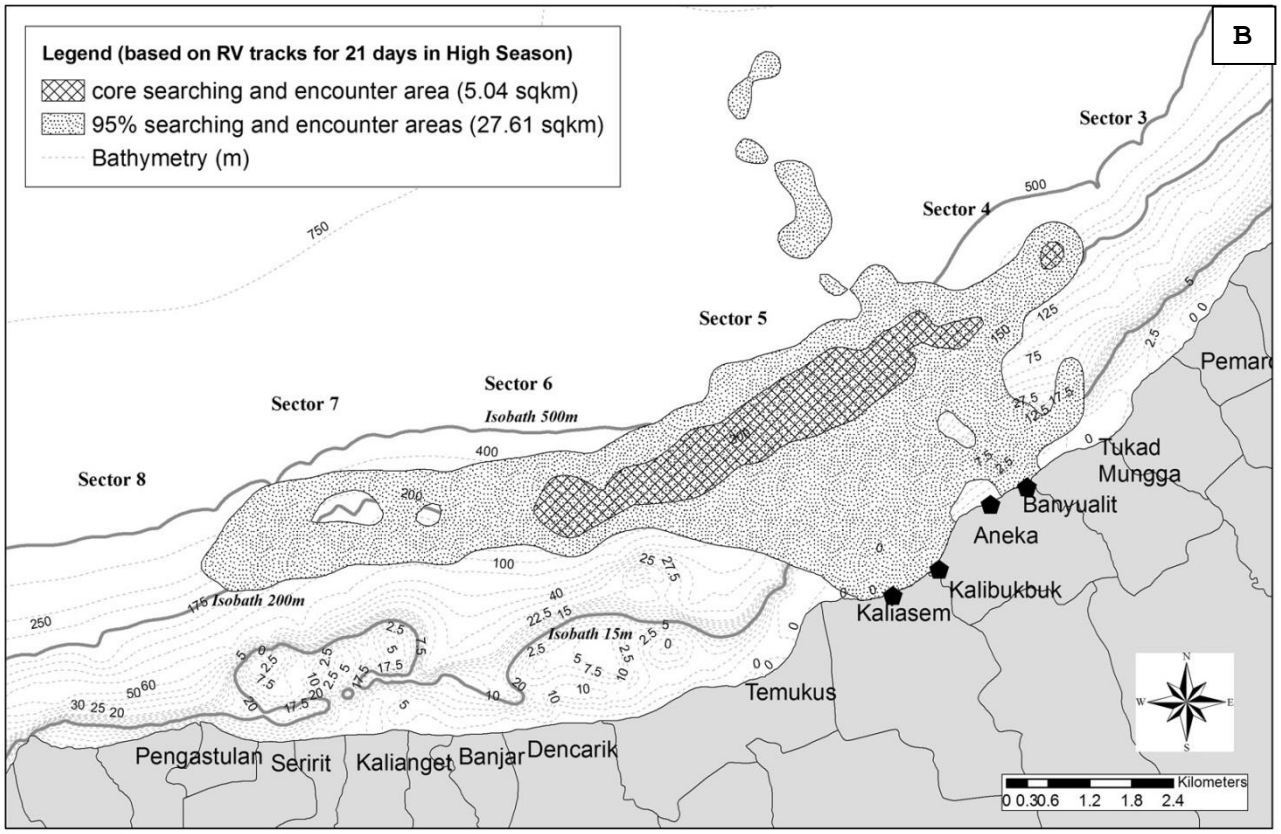
B
Legend (based on RV tracks for 21 days in High Season)
core searching and encounter area (5.04 sqkm)
95% searching and encounter areas (27.61 sqkm)
Bathymetry (m)
Sector 3
Sector 4
Sector 5
Sector 6
Sector 7
Sector 8
Isobath 500m
Isobath 200m
Isobath 15m
Tukad Mungga
Banyualit
Aneka
Kalibukbuk
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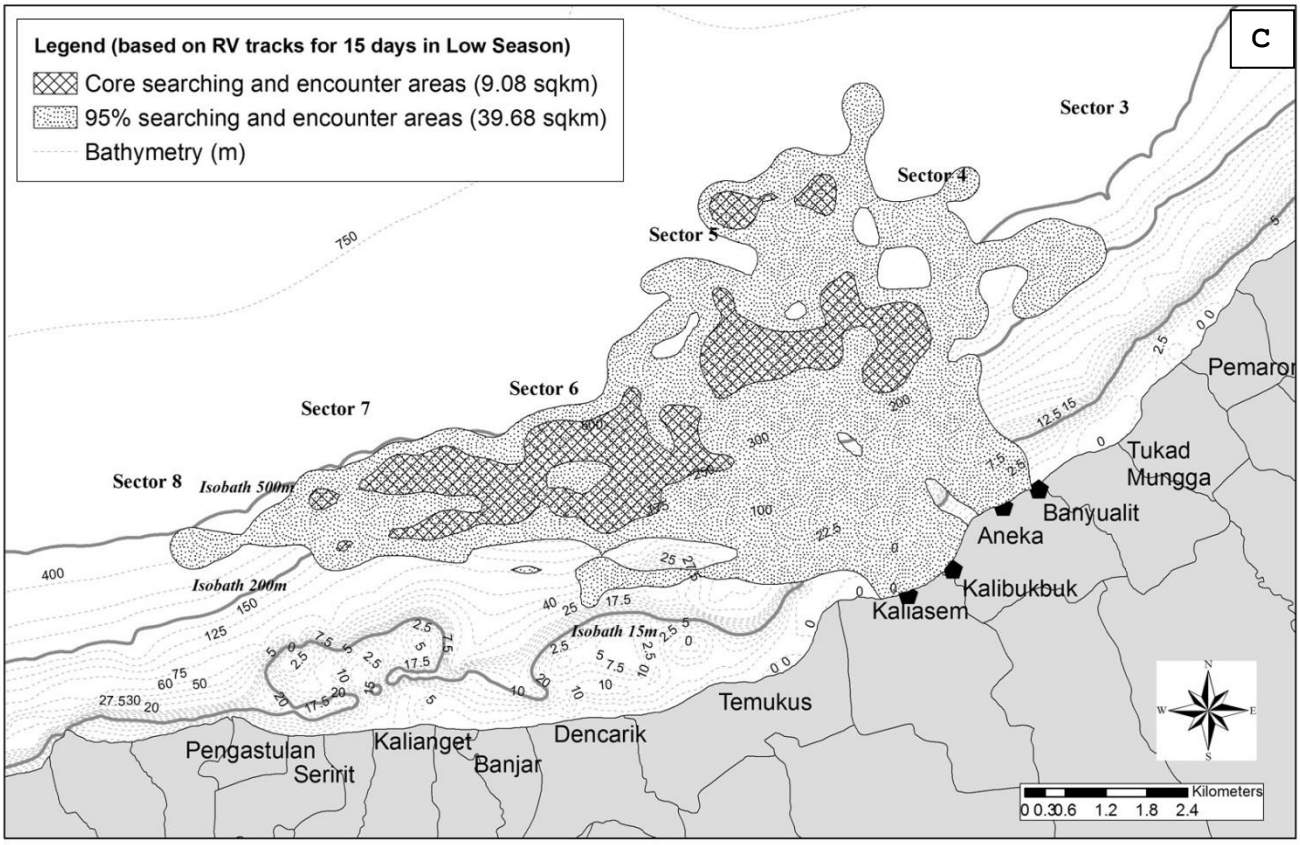


Figure 3.5 The spatial activity pattern of: (a) 15 tourist vessels in High Season 2008; (b) the research vessel on 21 days in High Season 2008; (c) the research vessel on 15 days in Low Season 2009

The High Season GPS tracks of the boatmen suggested that the boatmen searched for the dolphins from Tukad Mungga in the east to Pengastulan in the west (Figure 3.5a), a core searching and encounter area of 4.4 km^2 (Banyualit to Temukus village). The combined search and encounter area (95% contour) was 19.7 km^2, from Tukad Mungga (in the east) to Seririt (in the west).

In the High Season, the search area of the research vessel was similar to that of the boatmen (Figure 3.5 a-b: core area 5.04 km$^{2;}$ 95% contour for search and encounter area 27.61 km$^{2;}$ scan sampling and focal follow data). The search pattern of the research vessel indicated that the fleet behaved differently in the Low Season (Figure

3.5c). The core searching area was larger (9.08 km^2) and was distributed over several locations; the 95% contour extended westward to Pengastulan (39.68 km^2).

We used the GPS tracks, the scan sampling, focal follows and *ad libitum* data to estimate the search time before the first cetaceans were sighted. The GPS tracks suggested that a tour boat travelled and searched for about half an hour before finding its first cetaceans for the day (mean 34 min, se$\pm$ 4 min 54sec, n = 14 days, Table 3.4). This result is confirmed by our independent observations. In the High Season, the research vessel took an average of 32 min from first light to find its first dolphins (se$\pm$2.5 min, n days=21). This figure is significantly shorter than the initial searching time in the Low Season (mean 43.5 min, se$\pm$3.6 min, n = 15 days, Mann-Whitney two-tailed test p=0.013, n_1=21 days, n_2=15 days).

The behaviour of the tour boats changed when the cetaceans surfaced within 150 m of the boats and this response depended on whether a boat was moving or stationary (Pearson Chi Square two-tailed test p=0.009, n_1 = 14 efforts, n_2 = 63 efforts; focal boat follow data, Table 3.4). When the boats were actively searching for cetaceans, the boatmen approached the animals steadily rather than rapidly (odds ratio 6.4). However, when the boatmen scanned for cetaceans from a stationary boat, they were equally likely to remain stationary or approach the animals. No stationary boats were observed to respond with 'behaviours of concern' when they detected the animals.

The daily cumulative encounter time between a tour boat and the cetaceans was estimated using two interpretations of the GPS tracks. In the conservative scenario, only extremely tangled GPS tracks were interpreted as encounters; the liberal scenario

also included moderately tangled tracks (see Section 2.1.5). The conservative scenario suggested a median daily cumulative encounter time of 37min 49 sec (se± 4min 1sec, range 10 min 4sec – 1 hour 7.5 min, n = 14 days, Table 3.4); the corresponding figure for the liberal scenario was 55min 45 sec (se±4min 7sec, range 31min 4sec – 1 hour 20.3min, n = 14 days).

I found a strong, significant association between the daily cumulative encounter time and the number of encounters a boat experienced per day for both scenarios (regression of conservative data, p=0.013, df=13, Pearson correlation coefficient = -0.646, R^2=41.7%; regression of liberal data p=.03, df=13, Pearson correlation coefficient = -0.58, R^2=33.7%). A boatman who achieved only short encounters clearly attempted to obtain more encounters to please his tourists (Table 3.4). Tourists who experienced only one or two encounters spent 15 to 35 min with the dolphins.

Encounters between the boats and the cetaceans

Only 11 groups of cetaceans (45% were dwarf spinner dolphins) were sighted over 30.8 hours of line transect surveys over 11 days; six schools were sighted between 6am - 8am (Figure 3.2). Only 16 cetacean schools were located during almost 145 hours of point surveys over 36 days in the Low Seasons of 2009 and 2010 between 6 am and 8 am. A total of 43.5% of these schools (7/16) were within 150 m of tour vessels (Figure 3.2). The combined data from line transects and point surveys indicated that a minimum of 44.4% of cetacean schools off Lovina were encountered by tour boats before 8am (binomial confidence interval 21.01% to 67.87%, also check Figure 3.2). These results suggest that a high proportion of the cetaceans in the survey region were involved in encounters with tourist vessels over a maximum of two hours' tour time each day.

Sixteen schools of dwarf spinner dolphins were seen during the point surveys; 11 without tour boats. Eight of these schools appeared undisturbed while three schools demonstrated avoidance behaviours (Figure 3.6, also see Section 3.2.2 for the *post-hoc* categorising). Five schools were sighted in the presence of tour boats; of these, three displayed avoidance behaviours; the remainder appeared undisturbed. No significant difference was detected between the behaviours of dolphins in the presence of tour boats and without tour boats (two-tailed Fisher's exact test p=0.299, n_1 = 10 points, n_2 = 6 points), but the sample size was small.

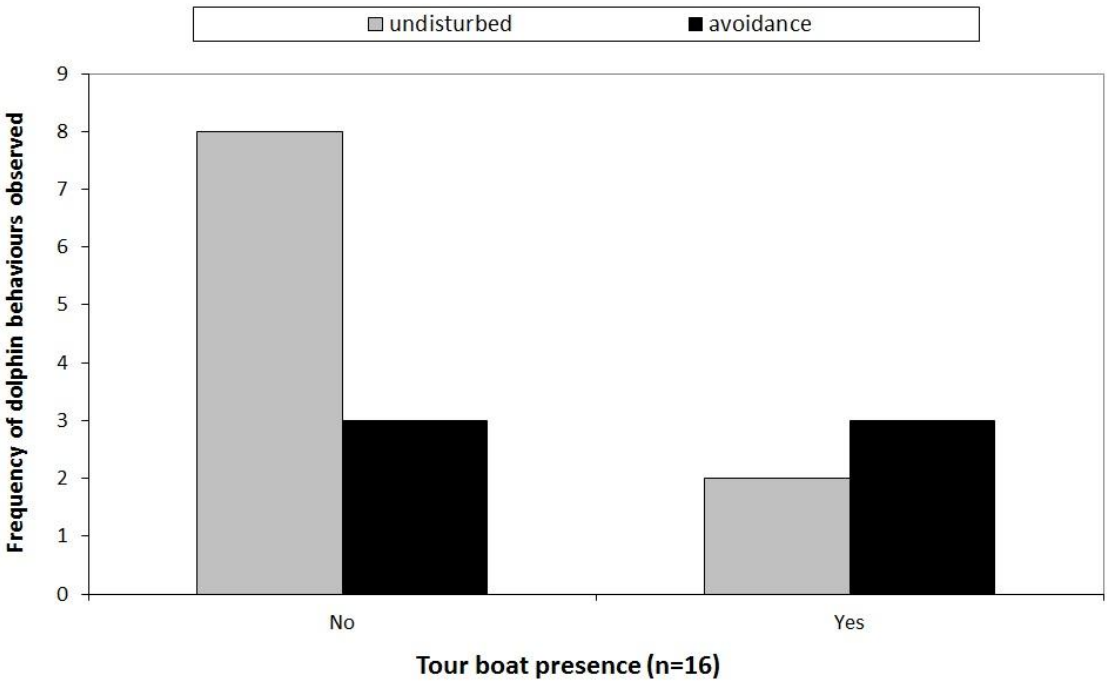


Figure 3.6 Dolphin behaviours in relation to the presence of tour boats during the point surveys for dolphins conducted in 2009-2010 from 6am to 10am (n_1 = 10 points, n_2 = 6 points, undisturbed=spinning, milling, travelling slower than 3 km or feeding, avoidance=travel, fast travel or diving)

A targeted cetacean school was typically surrounded by a large number of tourist boats, especially in the High Season when the maximum encounter fleet per effort was on average higher than in the Low Season (83 versus 73 vessels, respectively; focal boat follow). The median daily encounter fleet size for both seasons was 15.35 (range 2-49, n = 37 days, scan sampling) with no significant difference between seasons (independent sample median two tailed test p=0.842, n = 37 days). The observed encounter fleet size was generally higher than the number of dwarf spinner dolphins per encounter (spinner-to-boat ratio per encounter was 0.81:1). Scan sampling data suggested that the observed fleet size, i.e., encounter fleet size combined with the number of boats aggregating in adjacent areas was significantly greater during the High Season (mean=27, se$\pm$3.26, range 10-69, n = 22 days) compared with the Low Season (mean=18.6, se$\pm$3.82, range 2-49, n days=15)(Mann-Whitney two tailed independent sample test p=0.029, n_1=22 days, n_2=15 days).

I used stepwise regression to examine the relationship between median surface time for the dwarf spinners (independent variable), median school size and median encounter fleet size (dependent variables) based on the scan data. As there was no significant difference in median surface time between seasons (Mann-Whitney independent two-tailed p=0.835, n = 30 days), the data from both seasons were combined for this analysis. The regression identified school size as the only significant dependent variable (R^2=27.7%, one tailed p=0.003, df=29, Table 3.4). This figure indicates that mean surfacing time was not associated with encounter fleet size (p=0.101). School size also did not correlate with the encounter fleet size, either for all cetaceans combined (one tailed p=.916, df=35) or for dwarf spinner dolphins alone

(one tailed p=0.912, R^2=0.000, df=29; scan sampling). Thus, the tour boats seemed to approach the cetaceans regardless of the number of animals present.

3.3.2 Comparison with Australian standards

The tourist vessels came very close to the cetaceans, especially in the High Season (Figure 3.7). The median distance of the closest boats was 10 m (range 0-100 m, n =89 efforts; scan sampling) in the High Season and 30 m (range 5-100 m, n =73 efforts) in the Low Season. There was a significant seasonal difference; the closest boats were much nearer the dolphins in the High Season (nonparametric median test two-tailed p<0.0005, n_1=89 efforts, n_2=73 efforts). Almost 30% of these boats were stationary; 21.1% of the moving boats exhibited 'behaviours of concern' (n efforts =161).

In both seasons, the median of the five closest boats were within the 'No Approach Zone' defined by Australian regulations (High Season median 25 m, range 0-125 m, n = 89 efforts; Low Season median 50 m, range 10-150 m, n = 73 efforts; scan data; Figure 3.7). The median distance of the five closest boats was significantly closer to the cetaceans in the High Season than in the Low Season (nonparametric median test two-tailed p<0.0005, n_1=89 efforts, n_2=73 efforts).

In the High Season, the furthest of the five closest boats was in the Australian 'No Approach Zone' (median 40 m, range 5-150 m, n = 89 efforts; scan data). However, this situation was different in the Low Season where the furthest of the five closest boats was not within the 'No Approach Zone' (median 80 m, range 10-150 m, n efforts =73) (Figure 3.7). The difference between seasons was significant

(nonparametric median test two-tailed $p<0.0005$, $n_1=89$ efforts, $n_2=73$ efforts). Both these results suggest that the boats tended to approach closer to the dolphins in the High Season than the Low Season. About 20% of the five closest boats boats were stationary while 31.1% of the remainder exhibited 'behaviours of concern' (n efforts =161).

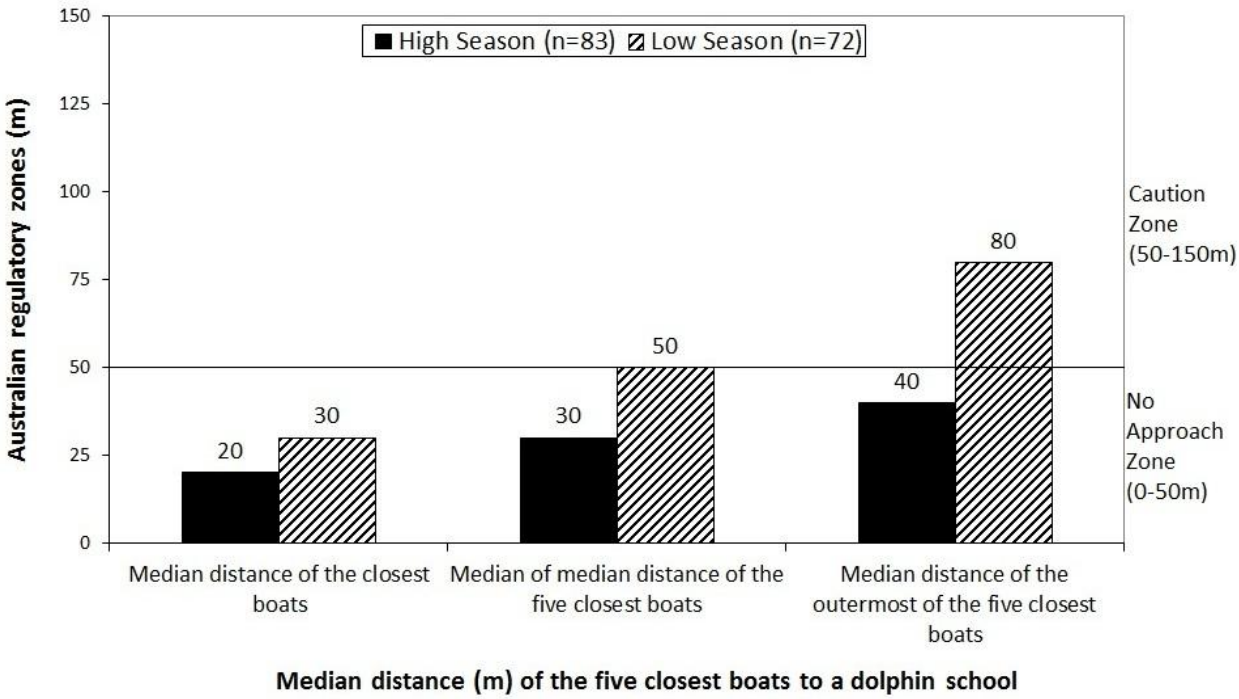


Figure 3.7 Comparison of the approach distances of the tourist boats off Lovina with the Australian National Guidelines for Whale and Dolphin Watching 2005. The data are based on scans of the five tourist vessels closest to cetaceans encountered off Lovina. (High Season n = 83 efforts, Low Season n =72 efforts)

Most boats mostly engaged in benign behaviours; e.g., approaching (48% of such behaviours) or following the cetaceans at a speed not greater than the animal's speed (14%). Nonetheless, some of the five closest boats were seen speeding towards the cetacean school (69.5% of 'behaviours of concern'), cutting through (24.2%) or blocking the cetacean's line of travel (6.3%). Fewer than one out of five closest boats were seen conducting such behaviours (median=0.8, mean=0.9, se$\pm$0.16, n = 36 days).

No significant difference was detected between seasons (two-tailed Mann-Whitney independent sample test p=0.188, n = 36 days).

I investigated repeat offenders from the scan data. During 175 scan sampling efforts over 36 days I identified 64 individual boats that displayed 'behaviours of concern' at least once. A total of 37.5% (24) were observed exhibiting 'behaviours of concern' more than once. One persistent offender exhibited behaviours of concern six times in six different efforts on four different days. The number of boats that exhibited 'behaviours of concern' was positively correlated with encounter fleet size (p=0.001, df=35, R^2=29.1%), suggesting that the drivers were competing with each other to gain access to the dolphins. Although only the five closest boats were examined, the sampled boats were observed to display contrasting behaviours. The furthest of five boats was more likely to display 'behaviours of concern' compared with the closest boat (odds ratio 5.4; Pearson Chi-Square p=0.004, df=4, n effort=161).

I examined the data from the scan samplings to see how many boats actively approached cetaceans in the 'No Approach Zone' (0-50 m) and 'Caution Zone' (50-150 m) of the Australian regulation. Slightly more boats were observed to actively approach the animals into the 'No Approach Zone' in the High Season (2.3 boats, se+0.17, range 0-5, n efforts=97) compared with the Low Season (1.9 boats, se+1.66, range 0-5, n=78, Mann Whitney Independent sample two-tailed test p=0.071, n_1 = 97 efforts, n_2 = 78 efforts).

Fewer boats were observed to actively venture into the 'Caution Zone' in the High Season (0.3 boats, se+0.06, range 0-3, n = 97 efforts) compared with the Low Season

(1.4 boats, se+0.16, range 0-5, n = 78 efforts)(Mann Whitney Independent sample two-tailed test $p<0.0005$, $n_1 = 97$ efforts, $n_2 = 78$ efforts). Less than one in five boats was observed to engage in 'behaviours of concern' in the 'No Approach Zone' (mean 0.6, se$\pm$0.07, range 0-4, n = 175 efforts). No significant differences were detected between seasons (Mann Whitney independent sample two-tailed test $p=0.687$, n = 175 efforts). These data are underestimates as they were based on the five closest boats only.

The median encounter fleet size at Lovina was about 15, which makes the observed number of boats (passive and active) in the 'Caution Zone' about 10. This figure means that the number of boats in the 'Caution Zone' in Lovina was at least three times higher than the Australian standard of three vessels per encounter.

3.4. Discussion

3.4.1 Overview of the industry

With a total fleet size of 179, Lovina may have the second largest dolphin tour boat fleets in the world, outnumbering Port Stephens in Australia (17 operators, Allen et al. 2007), Taiwan (25 operators in 2008, Chen 2011), the Philippines (30 boats, Sorongon et al. 2010) and Zanzibar (44 boats, Christiansen et al. 2010). The only dolphin watching location of which I am aware where the total fleet size outnumbers Lovina is Chilika Lagoon in India where the total fleet size is ~450 (Sutaria 2009). With more boats than dolphins per encounter (spinner-to-boat ratio of 0.81:1), Lovina offered less than what Kizimkazi in Zanzibar offered (dolphin-to-boat ratio of 2.7:1 (Stensland & Berggren 2007; Christiansen et al. 2010)).

Tourist encounters with offshore cetaceans have occurred off in Lovina for more than 20 years. The scan and focal follow data indicate that in 2008-9 encounters were typically limited to one hour per day (see Section 3.3.1). Nonetheless during that hour, the cetaceans were usually hemmed in by 20-30 tourist vessels, and up to almost 100 *jukungs* could be observed searching for the animals during the High Season. Although other cetacean species were encountered only occasionally and are likely transient, dwarf spinner dolphins were encountered almost every day by the tourist fleet, suggesting that they are resident. The absence of historical data prevents investigation of whether the cetacean community size or composition off Lovina has changed since the industry began. Nonetheless, anecdotal information from the boatmen suggested that more cetacean species were readily found off Lovina in the early 1990s, before the boatmen replaced their sails with outboard engines.

The fleet of tourist boats operates as a highly effective and co-ordinated dolphin-searching machine. Dolphins were typically found within half an hour of leaving the beach in the High Season; in the Low season the initial search took about 11 minutes longer as the animals tended to be found further west. The estimated 44.4% of dolphin groups exposed to tour boats each morning is certainly an under-estimate. Instantaneous point surveys were only conducted for 10 minutes per location; hence my team and I presumably missed interactions at other unsurveyed points. Encounters at surveyed points that happened before or after our arrival were also not included.

The statistics on the behaviours and distance of five closest boats to the dolphins are an index of the overall behaviours of the fleet and indicate that the situation is far from international best practice: 1) almost all of the five closest boats, particularly in

the High Season, were observed in the equivalent of the Australian 'No Approach Zone'; 2) at least one of the five closest boats were observed to display 'behaviours of concern'; 3) the number of boats in the equivalent of the 'Australian Caution Zone' was much higher than the allowable three vessels per encounter in Australia; and 4) about 20-30% of the farthest of the five boats at Lovina were likely to display 'behaviours of concern' upon detecting the cetaceans. Collectively, these observations raise concern about the likely impacts on the dolphins and hence on the biological sustainability of the Lovina dolphin watching industry.

As outlined below, the situation at Lovina also fails to accord with the voluntary guidelines for cetacean watching tourism adopted both in the Philippines and Tanzania. Traditional boats with similar dimensions and style to those used at Lovina are also used for dolphin watching tourism targeting spinner dolphin (*Stenella longirostris*) in Balicasag and Pamilacan Islands in Bohol in the Philippines (Sorongon et al. 2010) and the Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) in Kizimkazi, Zanzibar (Tanzania, Stensland & Berggren 2007; Christiansen et al. 2010).

3.4.2 Is dolphin watching at Lovina biologically sustainable?

I examined international studies to investigate the likely consequences of the situation I had found at Lovina. Constantine et al. (2004) studied common bottlenose dolphins (*Tursiops truncatus*) in the Bay of Islands in New Zealand. Significantly reduced resting time was associated with exposure to four or more vessels, or less than 17% of the average encounter fleet size at Lovina, even in the Low Season. Coincidentally, three was also the maximum number of vessels around a school of cetaceans endorsed

by New Zealand's Marine Mammal Protection Regulations in 1992 (Carlson 2010). The regulation also endorses a minimum approach distance of 50 m, which was also not practised in Lovina.

The voluntary guidelines at Bohol in the Philippines recommend an encounter fleet size of four and a minimum approach distance of 50 m (the average approach distance was 26.6 m). The average observed encounter fleet size was seven (range 1-16), less than half that at Lovina; the total fleet size at Bohol was 30 (Sorongon et al. 2010). Sorongon et al. (2010) found that a higher encounter fleet size generated undesirable boat behaviour at Bohol, such as a direct approach towards the animals, even though the guidelines recommended a parallel approach or following the dolphins from behind the school. However, most boats approached the cetaceans directly or blocked their path and waited in front of the animals. This result confirms my findings that a high encounter fleet size was associated with more boats displaying 'behaviours of concern' that interfered with the dolphins (Section 3.3.2).

In 1998, a dolphin watching guideline for Zanzibar was proposed to place a limit of maximum of two boats per school of bottlenose dolphins for a maximum 30 min encounter (Stensland & Berggren 2007; Carlson 2010); the guideline was silent on minimum approach distances. Surveys indicated that violations of the guidelines and increased tourism activities resulted in the dolphins spending more time travelling and less time resting, foraging and socialising (Stensland & Berggren 2007; Christiansen et al. 2010). Female bottlenose dolphins in Zanzibar travelled more when the encounter fleet size exceeded two boats per dolphin school (Stensland & Berggren 2007). This finding suggested that two boats per encounter was the tolerable level for

that dolphin population and that travelling was a response to disturbance from the tourist boasts. The Zanzibar results provide a possible explanation for the constant travelling (and lack of resting behaviour) of the dwarf spinner dolphins off Lovina.

No evidence was found that the large encounter fleet size at Lovina influenced the surface time of the dwarf spinner dolphin's school. The number of boats in Bohol was also not correlated with the dolphin surface times (mean 2.2min, se$\pm$0.202, n=175, correlation coefficient= -0.16; p=0.94, df=174; Sorongon et al. 2010). I found no other literature to support an alternative hypothetical explanation of the short surfacing time of the dwarf spinner dolphins off Lovina. However, because I could not measure the dwarf spinner's diving time at Lovina, I suggest that surface time is retained as a variable to measure in future research, coupled with improved sample size.

Dwarf spinner dolphins were encountered almost every day on the waters off Lovina, suggesting that it is possible that they belong to a resident population. This hypothesis needs to be confirmed with rigorous photo-identification and mark-recapture surveys (Wursig & Jefferson 1990). If these animals are resident then the data suggest that local dwarf spinner dolphins are constantly exposed to tourism activities, with likely negative impacts on behaviours or the dynamics of this population (Shirakihara et al. 2002; Berghan et al. 2008). Other cetacean species were not frequently encountered off Lovina, which suggested that they were transients and that cumulative impact of dolphin tourism might be less.

I am not yet able to come to a definitive conclusion about the biological sustainability of dolphin watching tourism in Lovina. However, comparisons with the studies summarised above suggests that the large encounter fleet size, short approach distances and high incidence of boats showing 'behaviours of concern' may contribute to the high levels of travelling of the dwarf spinner dolphins off Lovina and thus are of potential concern.

3.4.3 Are the dwarf spinners at Lovina habituated to vessels?

Data on sighting frequency suggest that the dwarf spinner dolphins in Lovina belong to a resident population which, according to previous studies (Shirakihara et al. 2002; Berghan et al. 2008), is likely to experience more impacts from tourism activities than a transient species or population. I failed to detect any significant correlation between tour boats and short term responses (i.e., the surface time and behaviours of the dwarf spinner dolphins). I acknowledge that this result might indeed reflect the absence of an effect. However, the lack of significant correlation between an anthropogenic activity and cetacean responses does not warrant an assumption that the animals are not disturbed (Bejder et al. 1999; Bejder & Samuels 2003). The encounter fleet size in Lovina may have reached saturation point, beyond which daily fleet size has no obvious effect on dolphin travel path, as was hypothesized for killer whales in southern British Columbia (Williams & Ashe 2007).

Unfortunately, changes in the travel trajectories of a particular dolphin school, which might have provided an association with encounter fleet size, were not thoroughly recorded during boat surveys. Dolphin travel trajectories were only recorded during scan sampling, which was designed to focus on the boats rather than the dolphins. I

could not analyse the association between the travel trajectory of a dolphin school with the trajectory of the dolphins in the previous school because I was focusing on the boats instead of following the dolphins.

In addition, the topography of Lovina did not provide the option of using a point look-out to examine possible change of travel direction of the dolphins during the encounters (see Williams & Ashe 2007); an approach that could potentially provide important additional insights on possible effects of encounter fleet size on the local dolphin population.

Another explanation for the observed lack of a significant correlation between encounter fleet size and the surface time of the dwarf spinner school is that the Lovina dwarf spinner dolphins have been habituated by repeated contacts with the local tourism industry (see Watkins 1986). Timmel et al. (2008) demonstrated possible habituation of Hawaiian spinner dolphins (*Stenella longirostris longirostris*) to swimmers and vessels. Habituation was also suggested for several species of great whales that came into contact with anthropogenic activities off Cape Cod (Watkins 1986) and for killer whales that were encountered by tour boats in northern British Columbia (Williams et al. 2002). Cultural transmission may be part of this habituation (see Harwood et al. 1996; Krutzen et al. 2005). The dwarf spinner dolphins in Lovina may possibly have been taught by their mothers to use the waters off Lovina and not to search for potential replacement sites despite changes in anthropogenic activities.

Should a habituated population be excluded from conservation efforts? Traditionally, habituated species were thought to be relatively immune to anthropogenic activities

(Gill et al. 2001). However, Gill et al. (2001) also argued that habituated species might not be the fittest of all. Instead, these species might adapt and continue living in a region simply because they have nowhere else to go, or are unaware of alternative places (due to matrilineal learning). Without suitable replacement habitat (or the knowledge thereof), a target population may choose to remain in a disturbance region, even if doing so reduces their reproductive rate or survival.

In this case, the dwarf spinner dolphins might be the most vulnerable of the local cetacean species off Lovina. Their continued exposure to dolphin watching activities might have altered their behaviours before the commencement of our study. What we see now might be the unmeasurable cumulative impact of long-term exposure.

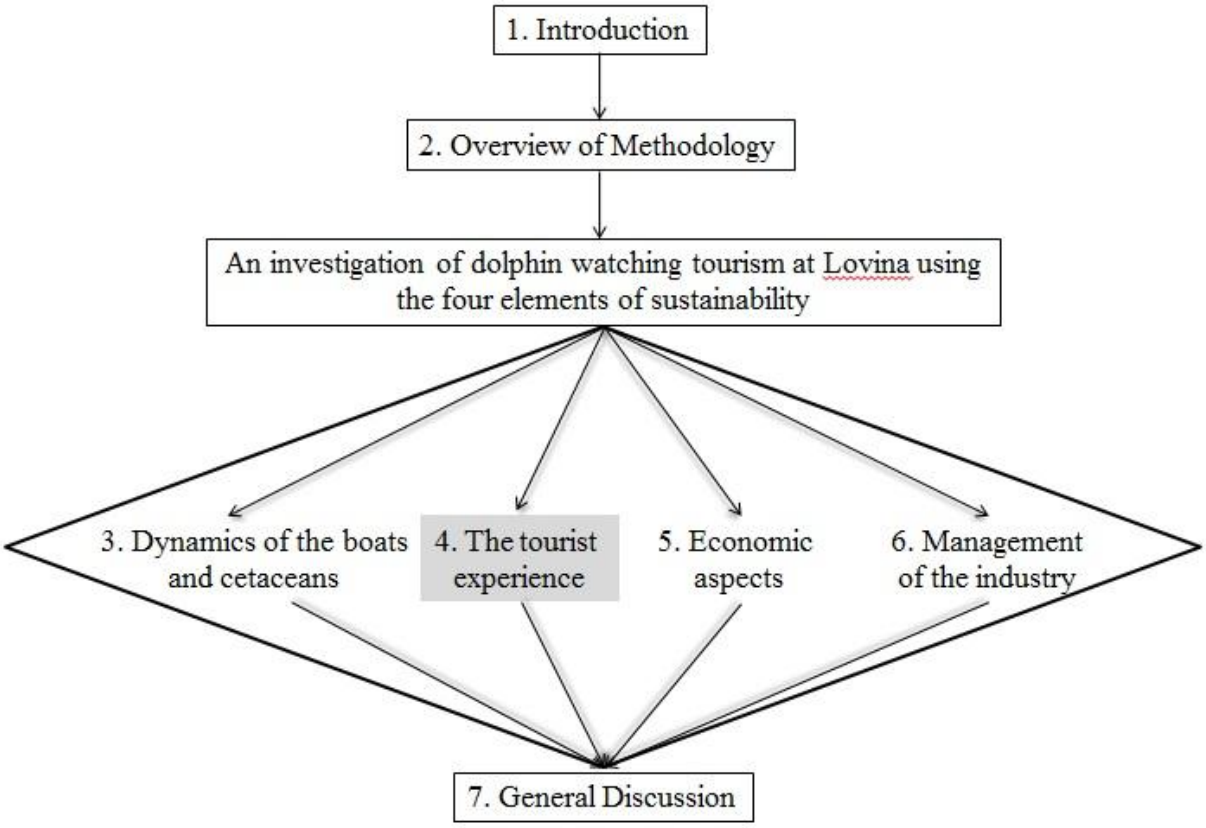
Chapter summary

- Up to almost 100 tour boats search for dolphins each morning.
- A group of dolphins can be surrounded by an average of 15 boats, while 18 to 27 vessels could be observed at any given time.
- More boats than dolphins were observed in an encounter (spinner-to-boat ratio 0.81:1).
- Dolphins typically surfaced for only two minutes and were usually observed travelling during first sightings.
- Two out of five closest boats per encounter were observed to approach the cetaceans closer than 50 m; one of them exhibiting ‘behaviours of concern’ (n=175), such as speeding towards the school, cutting through the schools or

blocking the animals' line of travel.

- The number of boats in the Caution Zone (50-150 m; *sensu* the Australian regulation) in Lovina was at least three times higher than the Australian standard of three vessels per encounter.
- The Lovina encounter fleet size was also at least five times larger than the number of boats that precluded the dolphins' resting behaviours in New Zealand and Tanzania (three and two boats, respectively).
- Although the analyses failed to find significant association between encounter fleet size and the surface time of the dwarf spinner school, other indications suggest that the biological sustainability of this industry is questionable.

CHAPTER 4
THE TOURIST EXPERIENCE



This chapter is in review in the Journal of Sustainable Tourism as follows: "Mustika, PLK, Birtles, A., Everingham, Y. and Marsh, M.. The need for increased research on the human dimensions of wildlife tourism in developing countries: dolphin watching in Lovina as a case study"

Chapter 3 quantified the dynamics between the tour boats and the cetaceans and the potential problems the boats might pose to the animals. But were the tourists aware of these problems? What did they think about the dolphin watching industry in general? In this chapter, I describe the experience of tourists who attended the dolphin tours in Lovina, including their satisfaction levels, most liked and disliked aspects of the tour and their management suggestions. This chapter covers the one of the social elements of this industry based on the quadruple bottom line and the prism of sustainability concepts.

4.1 Introduction

The level of tourist satisfaction is often considered an index of the service level of a tourist attraction and the likelihood of tourists returning or recommending a site to others (Ryan 1998; Kozak & Rimmington 2000; Turner et al. 2001; Akama & Kieti 2003). By extension, tourist satisfaction is also an indicator of social, economic and managerial sustainability. Other such indicators include visitor expectations, the most liked and disliked aspects of the experience and the general opinions and comments of tourists (Kazmierow et al. 2000; Birtles et al. 2002a; Higham & Carr 2003; Valentine et al. 2004). Satisfaction is a post-purchase attitude that can provide an evaluation of the purchased product (Pearce 2006). Visitor satisfaction is not a one-dimensional indicator. It is influenced by many variables (Ryan 1998; Orams 2000), including gender (Ryan & Harvey 2000; Musa 2002), education level (Hughes 2001; Reynolds & Braithwaite 2001), environmental conditions (e.g., weather and sea state in the case of whale watching (Birtles et al. 2002a)); emotional connection and comfort (Okello & Yerian 2009), and over-crowding (Orams 2000; Birtles et al. 2002a; Musa 2002).

Visitor nationality also influences satisfaction (Pizam & Sussmann 1995; Akama 1996; Choi & Chu 2000; Kozak 2001; Turner et al. 2001). However, the basis of the satisfaction levels of wildlife visitors of different nationalities or ethnic groups (e.g., Western visitors versus Asian visitors) is poorly understood. The cetacean watching industry often attracts international travellers as well as local tourists (Hoyt 2001; O'Connor et al. 2009; Sutaria 2009). However, only limited data exist on the composition of the ethnic mix of cetacean watching tourists or on the demography, experience and satisfaction of tourists participating in cetacean watching tourism,

particularly in developing countries that have experienced an increased interest in the industry (Hoyt 2001; O'Connor et al. 2009, also see Chapter 1).

Although the tourists are not locals (see the definition of a tourist at the beginning of Chapter 1), their concerns must be taken into account because they are also part of the stakeholders involved in this industry. In this case, the tourists in Lovina are viewed as clientele as well as the community that the company (i.e., the dolphin boatmen as a group) serves. Thus, in this thesis, the tourists are included in the social element (‘people’, also see Figure 1.3).

Anecdotes from Lovina in north Bali suggested that the local dolphin watching industry largely catered to Western tourists (defined as tourists coming from Europe, United States, Canada, Australia or New Zealand (Van Egmond 2007, p. 6)), many of whom complained about the boatmen chasing the dolphins or being too close to the animals. Pre-empted by this anecdotal information, in this chapter I aim to: 1) describe the tourist experience and profile of the dolphin watching industry in Lovina; and 2) provide information relevant to the industry’s sustainability. To address these aims, I investigated: 1) whether the variables contributing to satisfaction levels of Western tourists were different to those affecting Asian tourists; and 2) whether these variables could be a catalyst for future management suggestions for dolphin watching in Lovina.

4.2 Methods

In Chapter 2, I described the general methods used to achieve the overall objectives of this research project. The following section details the specific methods I used to understand the experience and satisfaction of dolphin tourists in Lovina.

4.2.1 Data collection

A combination of qualitative and quantitative social research methods was used to document tourists' perceptions of, and satisfaction with, dolphin watching trips in Lovina. As described in Chapter 2 (Section 2.3), I designed data collection around the pattern of tourist visitations. The Low Season (i.e., lower number of tourists visiting) usually lasts from November to May; the High Season from June to October (northern hemisphere summer holiday). Direct observation from a *jukung* was used to capture the qualitative experience of a tourist on a typical dolphin trip in Lovina. In-depth interviews with tourists were conducted during a preliminary visit from October 2007 through January 2008 (Low Season). Based on the results of the reconnaissance visit, questionnaires were constructed in English and Indonesian and distributed from June to September 2008 (High Season) and February-April and December 2009 (Low Season).

The High Season questionnaire (Appendix 1) comprised 28 questions covering some demographic information about the respondents; their reasons for going dolphin watching; details of the trip including the weather conditions, boats and passengers; the features of the experience that respondents liked the best and disliked the most; satisfaction level (scales 1-10) and suggestions for improvement. A performance-only approach was used to measure satisfaction: i.e., I did not include questions about

respondents' expectations prior to joining the dolphin trip because people could still be satisfied despite their expectations not being met (Pearce 2006).

Following preliminary analysis of the initial High Season questionnaire, the questionnaire was expanded for the Low Season surveys to 34 questions (Appendix 2). Respondents were asked to rank their opinions about several additional features of their trip including their boat's distance from the dolphins (*'How do you feel about how close your boat got to the dolphins?'*; 5 level Likert scale), the way the boatman managed the encounter (*'How do you feel about the way your boatman managed your encounter with the dolphins?'*; 5 level Likert scale) and the time spent with the dolphins (*'Was the amount of time you spent with the dolphins…'*; 5 level Likert scale). Each questionnaire took the respondent about 10 to 15 minutes to complete.

My team and I usually administered the questionnaires in Kalibukbuk, the largest of the four dolphin watching ports (see Chapter 2 Section 2.1). Depending on the number of tourists, we occasionally moved to other ports. The team was rarely split to cover two ports on the same day for safety reasons. Most of my team members were young women who more than once were verbally harassed by young male villagers.

The questionnaires were administered in the morning after the guests returned from their dolphin trip. In the High Season, my team sometimes encountered difficulties in soliciting respondents, usually because the tourists were: 1) tired and hungry after the boat trip and needed to return to their hotels for breakfast; 2) disturbed by the many souvenir sellers (we usually waited until the beach vendors finished offering their items to tourists); 3) needed to check out from their hotels; or 4) had other

commitments. In the Low Season, my team asked tourists to take the questionnaires back to the hotels for us to pick up later. This strategy helped increase the number of completed questionnaires.

To understand the demography of dolphin tourists in Lovina, my team also conducted a beach attendance survey to obtain an overview of tourist attendance at the ports where my team was collecting data. In the High Season, we asked each tourist who had just completed a dolphin tour about their nationality and year of birth. This strategy was simplified for the Low Season survey to provide more time for questionnaire collection; my team simply counted the number of tourists taking the dolphin trips and recording their gender.

4.2.2 Quantitative data analysis

Descriptive statistics, nonparametric tests (Kruskal-Wallis and Mann-Whitney, α=0.05), cross tabulation and general log linear analyses (with Pearson Chi Square test and odds ratio)(Zar 1999) were used to analyse the data (software SPSS 16.0). Multiple regression trees (De'ath 2002; Faraway 2006) using the software package R 2.10.1, and stepwise regressions (SPSS 16.0) were also used, as summarised in Figure 4.1. In line with other authors, I have assumed that the response variable (i.e., respondent's satisfaction level) is interval data (Knapp 1990; Clason & Dormody 1994; Choi & Chu 2000; Kozak 2001; Chen et al. 2010).

A three-staged selection strategy (called 'feature selection') was implemented to identify the most important variables associated with respondents' satisfaction (Figure 4.1). The first stage used nonparametric tests to identify the variables associated with

satisfaction levels. The second stage used multiple regression trees as a feature selection technique because of their ability to detect and visually present complex interactions between the dependent variable (satisfaction level) and the independent predictor variables (the number of dolphins, preferred number of surrounding boats, reason for joining the trip, distance management, time management and encounter management (i.e., the way the boatmen managed the encounter with the cetaceans)). The regression trees gave a visual representation of the variables of interest (Figure 4.3). The variables identified in the regression tree were supplied to a stepwise regression procedure (third stage) to identify the final model. The advantage of the stepwise regression procedure was that it allowed for significance testing of the final model, as well as testing the significance of the individual terms in the model.

I analysed the regression trees separately for each season (High/Low Season) because questions about encounter, distance and time management were not included in the High Season survey. To investigate possible effects of nationality type, I treated the seasonal data as follows: 1) combined nationalities; 2) Western respondents; and 3) Asian respondents. To simplify the design, I used all significant variables across all three nationality combinations (Table 4.5).

The ‘rpart’ command was used to generate the regression trees which were subsequently ‘pruned’ to optimal tree size as described in Therneau et al. (2010). The final result was a tree with a number of ‘splits’ that described the interactions between the important variables (in the splits) and the response (tourist satisfaction in this case).

The variables selected in the regression tree and the interactions between the variables were supplied as input variables to the stepwise regression. The final regression model was assessed on the basis of cross-validated R^2 (Faraway 2006).

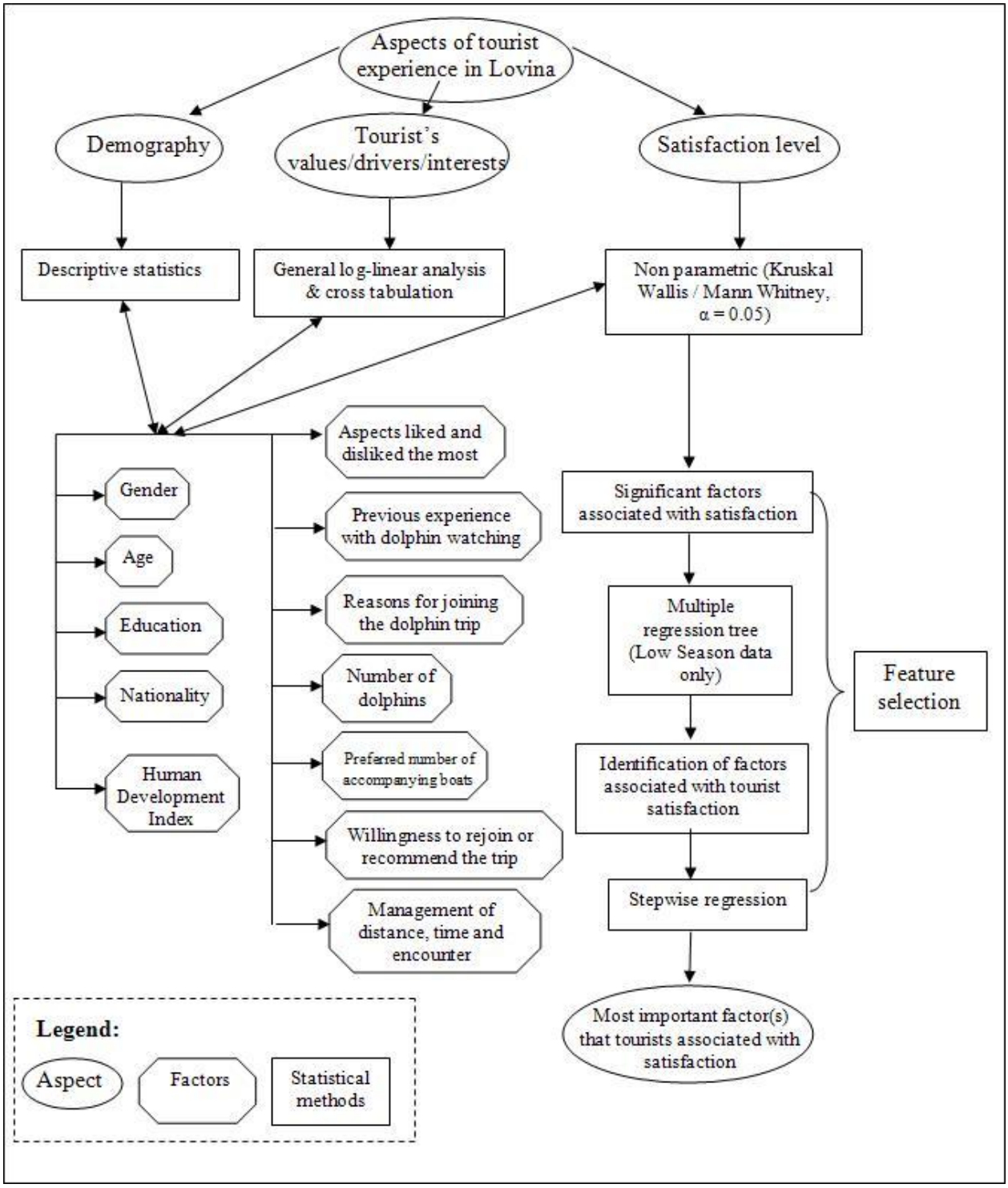


Figure 4.1 An outline of the statistical methods used to analyse the quantitative data from Lovina

Supplementary information on statistical methodology

I originally used multi regression trees as the only method to find satisfaction patterns among respondents in Lovina. Although the trees produced good explanatory trends, the predictive trends were ineffective, requiring further use of stepwise regression to confirm the 'VIP' variables. I also had to exclude analysis from High Season data collection (stepwise $R^2 \leq 15\%$, n=68), hence limiting the discussion of satisfaction patterns only to Low Season data.

The High Season data did not generate good trees, possibly because the three management questions (encounter, distance and time) were not yet included. However, because stepwise regression used feedback from CART analysis, I suspect that low R^2 were the result of the CART's need for a larger dataset (De'ath & Fabricius 2000 had 373 cases; Davis & Elder 2002 had 482 cases), and that the my dataset from High Season was too small. Experimental data analysis indicated that I required at least 120 valid responses (with all significant questions completed) to generate robust multi regression trees (tree $R^2 > 25\%$, stepwise $R^2 > 35\%$).

4.2.3 Qualitative data analysis

I analysed the qualitative data using coding and thematic analysis. Answers to open ended and qualitative questions were coded and grouped into several themes. Some coded responses were later treated as quantitative data and analysed statistically. The best and worst aspects of the tours were coded and later analysed with general log linear analysis to investigate possible associations with other variables (e.g., nationality and previous experience with dolphin watching tourism).

4.3 Results

In accordance with my research aims explained in Chapter 1 Section 1.5, I have structured the results section to reflect the tourist profile of the dolphin watching industry in Lovina and information relevant to the sustainability of the industry.

4.3.1 Lovina dolphin tourist experience and profile

A typical tourist experience of the dolphin encounter in Lovina

After a tourist *jukung* leaves the beach at 6am (see Chapter 3 Setion 3.1.2), it typically heads north to a location about 4 km offshore from Kalibukbuk and Kaliasem villages and congregates with other *jukungs* which are also searching for dolphins. If after 30 minutes of searching at this location no dolphins have been seen, the vessels go further afield as the occupants search for dolphins with their naked eyes.

Once dolphins are sighted, the vessel approaches them and positions as close as possible to the animals until they disappear or the guests have to return to the beach (see Chapter 3). Most boats return around 8am. A boatman typically conducts one dolphin trip per day. However, he may take other guests on another dolphin trip or to a small adjacent reef for snorkelling. Dolphin trips are not usually conducted in the afternoon due to the strong sea breeze. Tourists sometimes experience bad weather in the morning (e.g., strong rain, wind or swell) and this may cause sea sickness.

Characteristics of the tourists

Throughout 23 survey days in the 2008 High Season, 572 tourists from 26 countries were recorded using the beach attendance survey in Kalibukbuk, the major departure

port. Almost 72% of them were Westerners, followed by 27% Asians. More females than males (54% to 46%) participated. Most tourists were aged 16 to 35 years (51%). However, the industry also attracted older people (>65 years old, 7%) and children (12%). The average length of stay in Lovina was 2.9 nights per respondent.

Over 36 survey days in the Low Season, 1,472 tourists were recorded using the beach attendance survey method in Kalibukbuk and Aneka, the two major departure ports. More than 88% of them (1,299) were foreigners; domestic tourists comprised only 11.8% (173) of the total. As in the High Season, there were more females than males (54.3% to 45.7%) during the beach attendance survey.

A total of 533 potential respondents were approached to undertake the tourist questionnaire survey, of whom 72.6% agreed to participate. A total of 123 questionnaires were completed during the High Season (June-September 2008); 98 in English, 25 in Indonesian. In the Low Seasons (February-April 2009 and December 2009), a further 264 questionnaires (208 in English and 56 in Indonesian) were collected, making a total of 387 completed questionnaires (306 in English and 81 in Indonesian). I obtained more completed questionnaires during the Low Season than in High Season because the beach attendance survey method was simplified giving my team extra time for questionnaire distribution. The tourists were asked to fill in the questionnaires regardless of whether they saw dolphins during the trip. More than 90% of total respondents stated that they had seen dolphins during their dolphin trips in Lovina.

Table 4.1 Summary details of the respondents to the dolphin tourism surveys administered in Lovina, Bali.*

	High Season Value (%)	**Low Season Value (%)**	**Total Value (%)**
n respondents (Response rate)	123 (31.8)	264 (68.2)	387 (100.0)
Language of the questionnaire			
n	123	264	387
English	98 (79.7)	208 (78.8)	306 (79.1)
Indonesian	25 (20.3)	56 (21.2)	81 (20.9)
Gender			
n	108	242	350
Female	58 (53.7)	116 (47.9)	174 (49.7)
Male	50 (46.3)	126 (52.1)	176 (50.3)
Age (year)			
n	109	224	333
Mean individual age	34.5	36.3	35.7
Modal age group	26-35 (38.5)	26-35 (37.1)	26-35 (37.5)
Range	13 – 69	14-71	13-71
Highest education level			
n	112	244	356
Pre and high school	28 (25.0)	62 (25.4))	90 (25.3)
College and university	62 (55.4)	121 (49.6)	183 (51.4)
Postgraduate	22 (19.6)	61 (25.0)	83 (23.3)
Nationality types			
n	116	252	368
Western countries**	81 (69.8)	165 (65.5)	246 (66.8)
Asian countries ***	34 (29.3)	87 (34.5)	121 (32.9)
Latin American	1 (0.9)	0	1 (0.3)
Previous interaction with wild dolphins			
n	116	248	364
Yes	66 (56.9% of n)	122 (49.2% of n)	188 (51.6% of n)
Western	53 (80.3% of 'Yes')	91 (74.6% of 'Yes')	144 (76.6% of 'Yes')
Asian	12 (18.2 % of 'Yes')	35 (28.7% of 'Yes')	47 (25% of 'Yes')
Latin American	1 (1.5% of 'Yes')	0	1 (0.5% of 'Yes')

Note:
* Response rate = 72.61% for both seasons combined
** Western countries: Australia, Austria, Belgium, Bosnia, Canada, Czechoslovakia, Denmark, Finland, France, Germany, Ireland, Lithuania, Netherlands, New Zealand, Norway, Poland, Russia, Sweden, Switzerland, United Kingdom, United States
*** Asian countries: China, India, Indonesia, Japan, Malaysia, Singapore, Taiwan, Thailand
Latin American country: Peru

Consistent with the beach attendance survey, slightly more females responded to my questionnaires than males (Table 4.1). The respondents ranged in age from 13 to 71 years, although almost 40% were 26-35 years old. The respondents came from 30 countries, with more than two-thirds of them Westerners and the rest Asians. Almost 90% of the Westerners came from European countries; 60% of them were Dutch, French, German or British. More than 65% of Asian tourists were domestic; the remaining 25% were Malaysian, Chinese and Singaporean. More than half the respondents had had previous interactions with dolphins prior to coming to Lovina; more than 75% of these were Westerners.

Respondents learned about the dolphin tours in Lovina from various sources. Word of mouth (friends, family, the locals, etc.) was the main source (more than 35% of respondents), although printed information (e.g., guide books and brochures – 31.8%), and internet (15.2%) also played an important role. Word of mouth was a more important source of information for Asian respondents (65%, n=103) than Western respondents (n=197) who mostly learned about the dolphin tours from the internet (12.7%) and printed information (42.6%). However, 33% of Western respondents still received their initial information about the dolphin tours in Lovina by word of mouth, indicating that this method was a powerful tool for information dissemination.

Almost 40% of respondents joined the dolphin trip because they wanted to see the animals up close (65.7% Westerners, 31.5% Asians), while another 29% joined out of curiosity (55.9% Westerners, 37.9% Asians). A small proportion (8.4%) of respondents joined the trip because they had seen dolphins in captivity, and now wanted to see them in the wild. General log linear analysis found no significant

association between the reasons for joining the trip and nationality type (Pearson χ^2 p= 0.313, df=5, α=0.05).

Almost 75% of respondents were tertiary educated (undergraduate and postgraduate) (Table 4.4). General log linear analysis showed a significant association between nationality type and education level (Pearson χ^2 p = 0.008, df=2, α=0.05). Significantly more Asian respondents had or were undertaking undergraduate degrees compared with Western respondents (odds ratio 2.24).

4.3.2 Information relevant to industry sustainability

Tourist Satisfaction

Satisfaction benchmarking

Satisfaction scores were analysed in the context of the international satisfaction benchmarking study of Pearce (2006), whereby average scores < 7.1 are considered less than satisfactory (low), average scores 7.1 - 7.8 are moderate/medium, and average scores > 7.8 are good. Pearce (2006) also used the categorisation of Hanan and Karp (1989) who considered the satisfaction level high when 85-90% of the scores were > 8. When 70-80% of scores are 8 - 10, satisfaction is considered medium; when 60% or fewer responses were 8, 9 or 10, satisfaction is considered low.

The average satisfaction level of dolphin tourists in Lovina was 7.1 (se$\pm$0.11, on a scale of 1-10) and about 51% of respondents provided a score of 8 to 10 (n=354). These values place the satisfaction of the dolphin tourists between low and medium on the Pearce and Hanan-Karp scales (Pearce 2006). The opinions of Western

respondents were diverse (Figure 4.2) scores ranged from 1-4 (9.2% of respondents) to 8 to 10 (40.2%).

Nonparametric analyses (Table 4.2) showed that the satisfaction level was unaffected by field season, gender, education group, sea state, number of actual boats around, whether the respondent had seen or interacted with the dolphins before, and whether the tourist came from a developing or developed country. No significant difference was found between the satisfaction of Western and Asian respondents.

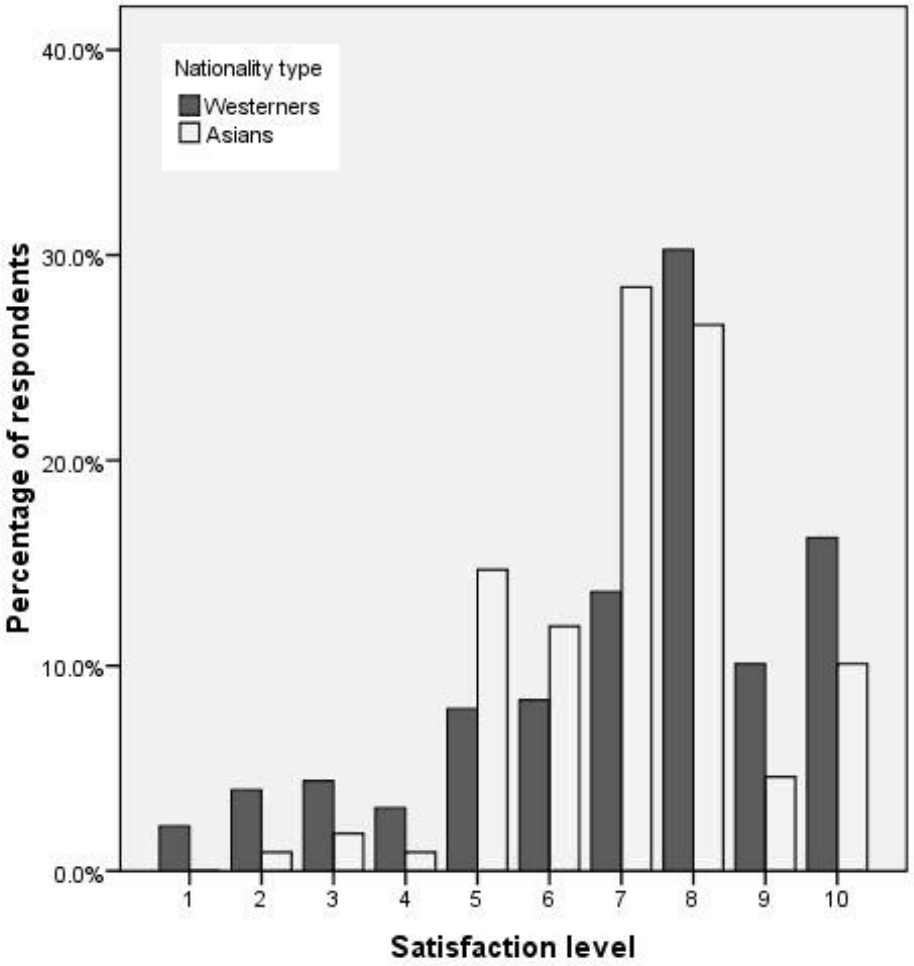


Figure 4.2 Distribution of satisfaction levels with dolphin watching tourism at Lovina, Bali according to nationality type.

The Kruskal Wallis tests (Table 4.2) showed that encounter management was the only one of these variables that was significant for both Western and Asian respondents. However, subsequent analyses indicated that the underlying variables that made the encounter management important for Westerners may be different from those that influenced Asian tourists. However, I could not ascertain the effects of nationality types due to the small number of Asians sampled (n=121).

Multiple regression tree analyses revealed that encounter management and the number of dolphins seen during the trip were the most important variables for Western respondents and all respondents combined (Table 4.3, Figure 4.3). However, as with the univariate Kruskal-Wallis analyses, encounter management *per se* was the only variable important for Asian respondents.

Stepwise regression ($18\% \leq R^2_{CV} \leq 43.3\%$) suggested that encounter management was the most important variable for all respondents (Table 4.3). An increase in the number of dolphins can prevent the satisfaction of all respondents from declining too much. However, a separate analysis of Western respondents showed that respondents who felt uncomfortable with the way the boatmen managed the encounters had lower satisfaction levels despite the high number of dolphins observed. Conversely, Westerners' satisfaction level was higher even if a low number of dolphins were observed, provided that they felt comfortable with the way the boatmen managed the encounters.

Table 4.2 Variables significantly associated with the satisfaction level of tourists who went dolphin watching at Lovina (data from Low and High Seasons combined)

Nationality of Respondent	**Dolphin-related variables (Kruskal-Wallis (KW) α=0.05 & Mann-Whitney *post-hoc*)**			**Aspects of the trip (Kruskal-Wallis & Mann-Whitney α=0.05)**		
	Number of dolphins	**preferred number of surrounding boats**	**Distance management**	**Reason for joining the trip**	**Time management**	**Encounter management**
All	KW p<0.0005, df=4, n=337	KW p=0.002, df=2, n=324	KW p=0.011, df=4, n=228	KW p=0.04, df=5, n=340	KW p<0.0005, df=4, n=232	KW p<0.0005, df=3, n=231
	Satisfaction increased with dolphin group size	Satisfaction decreased if respondents' preferred number of surrounding boats were 10 or less	Satisfaction highest when the distance was 'about right'	Those who wanted to see dolphins at close distances were most satisfied	Satisfaction highest when respondents felt the right amount of time was spent watching the dolphins	Satisfaction increased as comfort level increased, highest when respondents were very comfortable with the way the boatmen managed the encounter
Westerners	KW p=0.02, df=3, n=156	KW p=0.002, df=2, n=204	*KW p=0.066, df=4, n=146*	KW p=0.005, df=5, n=218	KW p=0.009, df=4, n=149	KW p<0.0005, df=3, n=148
	Satisfaction increased with dolphin group size	Satisfaction decreased if respondents' preferred number of surrounding boats were 10 or less	*Not significant*	Those who wanted to see dolphins at close distances were most satisfied	Satisfaction highest when respondents felt the right amount of time was spent watching the dolphins	Satisfaction increased as comfort level increased; highest when respondents were very comfortable with the way the boatmen managed the encounter
Asians	*KW p=0.109, df=3, n=88*	*KW p=0.299, df=2, n=106*	*KW p=0.056, df=4, n=73*	*KW p=0.114, df=5, n=107*	*KW p=0.157, df=4, n=74*	KW p=0.009, df=3, n=74
	Not significant	*Not significant*	*Not significant*	*Not significant*	*Not significant*	Satisfaction increased as comfort level increased, highest when respondents were very comfortable with the way the boatmen managed the encounter

Note 1: Shaded areas refer to significant variables
Note 2: Variable groups:
Number of dolphins : 1-10; 11-20; 21-30; 31-40; >40
Preferred number of surrounding boats : 1-5; 6-10; > 10
Reason for joining : curiosity; friend/family/spouse asked me; just looking for something to do; wanted to see the dolphins at close distance; wanted to see the dolphins in the wild; others
Distance management : -2, -1, 0, 1, 2 ('far too close' to 'not nearly close enough')
Time management : -2, -1, 0, 1, 2 ('much too much' to 'much too little')
Encounter management : -1, 0, 1, 2 ('very uncomfortable or uncomfortable' to 'very comfortable')

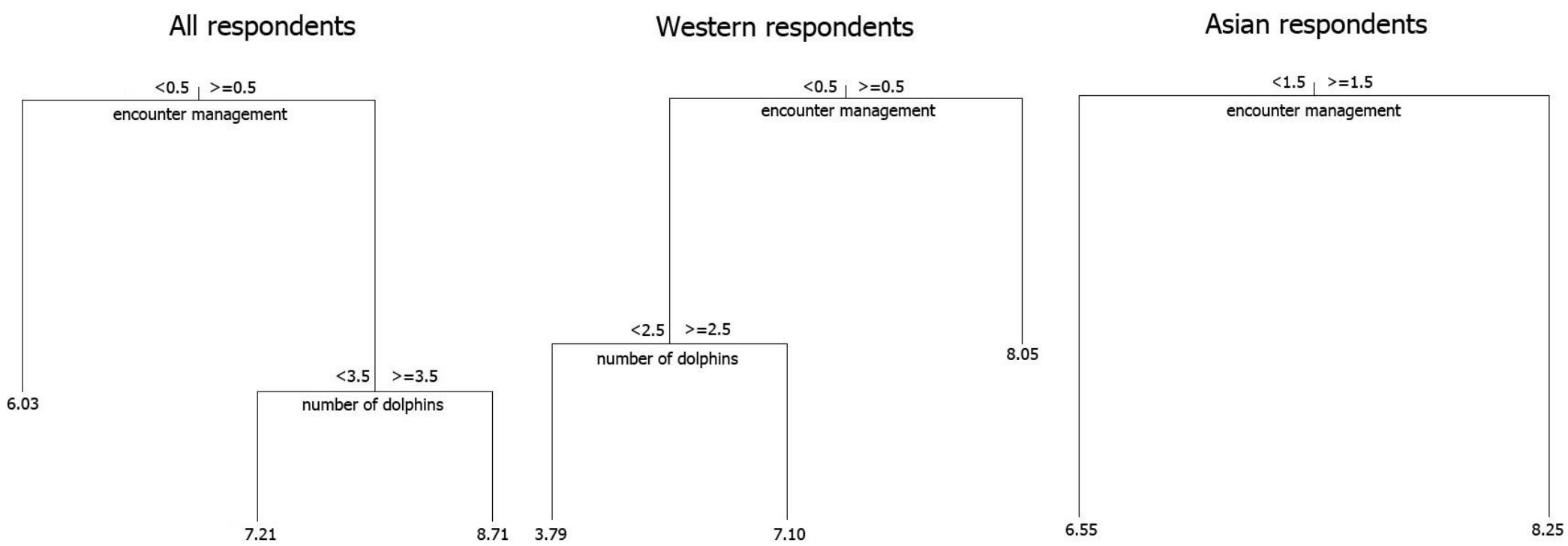


Figure 4.3 Details of the analysis of the variables associated with the satisfaction of dolphin watching in the Low Season at Lovina using multi regression trees

The numbers at the end of each branch represent average satisfaction for the relevant respondents
The High Season questionnaire was excluded because it did not contain the question on encounter management (Q26 in Appendix 2)
Encounter management: $\geq$ 0.5 ~ comfortable and very comfortable; $\geq$ 1.5 ~ very comfortable
Number of dolphins seen: $\geq$ 2.5 ~ more than 20 dolphins; $\geq$ 3.5 ~ more than 30 dolphins

Satisfaction drivers: thematic analysis

I asked the tourists to identify the features of the experience that they liked the most; many respondents gave more than one answer (Table 4.7). The respondents most often identified the dolphins (55% responses from Westerners, 62.8% responses from Asians). A female Western tourist described the highlight of her dolphin experience as *"Seeing them swim around freely, in captivity they act differently"*. A male Westerner liked the active behaviours of the dolphins (*"The sound of the dolphins as they jump out of the sea"*). A male Asian respondent said Lovina was the best location for dolphin watching (*"I have [gone to] many countries, it is #1 in the world"*).

The positive feature next most likely to be mentioned was the scenery, e.g., the sunrise, the sea and the hills (12.5% responses from Westerners, 9.3% responses from Asians), and the traditional boats (12.5% responses from Westerners, 5.8% responses from Asians). Others liked the serenity of the experience (*"The way the dolphins swim, quietly, easily, like the boats aren't there"; "The peacefulness of being in the little boat early in the morning"*). A female Western respondents particularly liked the authentic experience of the traditional boat (*"The boat ride, I love the authentic fishing boats"*). In addition to the boat and the dolphins, the breakfast served on the boat also impressed a male Westerner (*"The boat trip, dolphins and the tea we got"*).

The respondents were also asked to comment on what they disliked most about the trip (Table 4.4). Again, many respondents gave more than one answer. Respondents disliked: 1) the mismanagement of boats in Lovina, e.g., the many boats around, the boats chasing the dolphins, boats coming too close to the dolphins (61.6% responses from Westerners, 11.9% responses from Asians); and 2) the often prolonged time,

travel distance and effort taken to find the dolphins (5.5% responses from Westerners, 32.2% responses from Asians). Western respondents particularly were displeased by the noisy boats and boats that came too close to the dolphins. Some respondents considered that the dolphins were disappointing (e.g., too few, not playful, or even not seen at all). Garbage in the sea and on the beach was a problem for tourists from both nationality groups. Other features disliked by respondents were bad weather, waking up early in the morning, sea sickness, persistent souvenir sellers on the beach and the long and uncomfortable trip.

General log linear analysis showed no association between respondents' nationality type (Westerners vs Asians) and the aspects of the experience that they liked the best (Pearson χ^2 p=0.271, df=3, α=0.05). However, the aspects that respondents disliked the most varied with nationality type (Table 4.3). Western respondents were more likely to dislike the mismanagement of boats in Lovina (i.e., boats coming too close to the dolphins, chasing the animals, the engine too noisy, or too many boats – Westerner to Asian odds ratio 8.33:1). On the other hand, Asian respondents were more likely to dislike the difficulties of finding the dolphins or when the animals were not plentiful or playful (Asian to Westerner odds ratio 3.3:1).

Table 4.3 The most important variables associated with satisfaction with the dolphin tourism experience at Lovina and the aspects of the experience that respondents disliked the most.

Nationality	**Most important variables associated with tourist satisfaction (Low Season only)**		**Aspects of the trip that respondents disliked the most (general log linear α=0.05)**
	Multiple regression tree (see also Figure 4.3) →	**Stepwise regression**	
All	Encounter management and the number of dolphins seen	Satisfaction = 4.757 + (0.503 × dolphin) + (1.086 × encounter) Encounter management was the most important variable. A respondent who felt uncomfortable with the way the boatman managed the encounter would have a lower satisfaction level. However, an increase in the number of dolphins can prevent the satisfaction from declining too much (R^2_{CV} = 35.6%, p<0.0005).	Pearson $\chi^2 < 0.0005$, df=2, n=223. See cells below for the most significant variable(s) and the odd ratio for both nationality groups.
Westerners	Encounter management and the number of dolphins seen	Satisfaction = 3.053 – (0.387 × dolphin × encounter) + (0.956 × dolphin) + (2.593 × encounter) Encounter management was the most important variable. A respondent who felt uncomfortable with the way the boatman managed the encounter would have a lower satisfaction level even if a high number of dolphins were observed. Conversely, the satisfaction level was higher even if a low number of dolphins were observed, provided that the respondent was comfortable with the way their boatmen managed the encounters (R^2_{CV} = 43.3%, p<0.0005).	Boat mismanagement (i.e., coming too close to dolphins, chasing the animals, engine too noisy, too many boats around). Odds ratio Westerners: Asians = 8.33
Asians	Encounter management	Satisfaction = 6.324 + (0.842 × encounter)] Tourists were more satisfied when they felt comfortable with the way their boatmen managed the encounters (R^2_{CV}=18%, p=0.002)	Difficulty finding the dolphins or dolphins not behaving as expected Odds ratio Asians : Westerner = 3.33

Table 4.4 Preferred and disliked features of the dolphin watching trips in Lovina

Features of the trip	Westerners		Asians	
	n	**%**	**n**	**%**
Preferred features				
The dolphins	119	55.1	54	62.8
Sunrise, the sea and the surroundings	27	12.5	8	9.3
The boat (incl the trip & boatman)	27	12.5	5	5.8
Others	43	19.9	19	22.1
Total	*216*	*100*	*86*	*100*
Disliked features				
Boat mismanagement (too many boats, boats chasing the dolphins noisy boats, boats too close to the dolphins)	101	61.6	7	11.9
Few, none, or not playful dolphins, or difficult to find	9	5.5	19	32.2
Others	54	32.9	33	55.9
Total	*164*	*100*	*59*	*100*

Willingness to rejoin and recommend the trip

A respondent's satisfaction level was significantly associated with their willingness to experience dolphin watching in Lovina again (Kruskal-Wallis $p<0.0005$, $df=9$, $\alpha=0.05$) and the willingness to recommend the Lovina dolphin trip (Kruskal-Wallis $p<0.0005$, $df=9$, $\alpha=0.05$).

The scores for the question concerning how respondents felt about the way their boatmen managed the encounters were divided into two groups: 1) very uncomfortable to uncomfortable; and 2) neutral to very comfortable. When examined against the nationality type, the associations between encounter management and the willingness to recommend the trip were significant (Figure 4.4). Western respondents who felt neutral to very comfortable with the way their boatmen managed the

encounters were significantly more likely to promote the tour[3]. My data are insufficient to conclude any significant association between willingness to recommend and encounter management for Asian respondents.

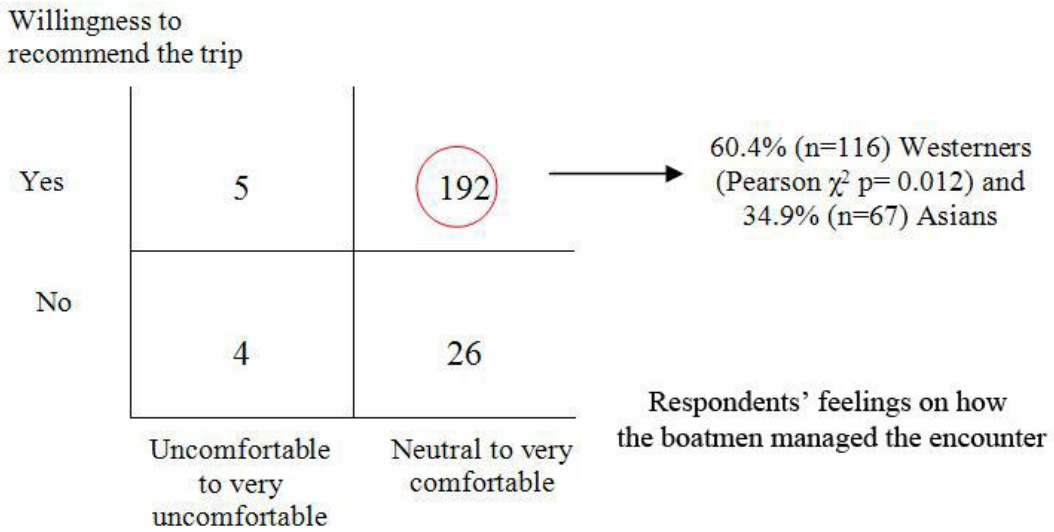


Figure 4.4 Association between respondents' willingness to recommend a dolphin watching trip at Lovina to others and how they felt about the way the boatmen managed their encounters (modified from 3-way log linear table). The number in each square is the number of respondents.

I also separated respondents who did not want to rejoin the trip *and* who did not want to recommend the trip to others (n=28) from those who were willing to rejoin *and* recommend the trip to others (n=124). General log linear analysis gave no significant association between nationality types and encounter comfort levels for the first group. However, all Western and Asian respondents who were willing to rejoin and recommend also rated their feelings on how their boatmen managed the encounters as neutral to very comfortable (Pearson χ^2 $p < 0.0005$, df=1, $\alpha=0.05$).

[3] I have considered combining respondents who were neutral with those who were uncomfortable to very uncomfortable with the way the boatmen managed their encounters to redistribute the cell sizes. However, the result remained significant (i.e. Western respondents who felt comfortable to very comfortable with the way their boatmen managed the encounters were significantly more likely to promote the tour to others, Pearson χ^2 p=0.002). Exclusion of neutral respondents would distort the interpretation. Hence, I chose to present Figure 4.4 as it is.

4.4 Discussion

Although Lovina is not yet an established ecotourism destination, my respondent profile was consistent with that of ecotourists (Eagles 1992; Wight 2001; Tao et al. 2004). Dolphin watching tourism at Lovina mostly attracts highly educated tourists who join the dolphin trips because they want closer interactions and learning experiences with the animals in a natural setting. The environmental values of dolphin watching tourists in Lovina are also reflected in their satisfaction with the experience, which ranged from low to medium (Pearce and Hanan-Karp scales (Pearce 2006)). In comparison with seven terrestrial wildlife attractions in West Africa and two marine wildlife attractions in Southeast Asia (Table 4.5), Lovina visitor satisfaction was in the lower range, although it outranked visitor satisfactions at two other developing country destinations Mt Kilimanjaro and Arusha National Parks in Tanzania.

Although there was no significant difference between the satisfaction levels of Western and Asian respondents, there were important similarities and differences in the variables contributing to the satisfaction of these groups. The way the boatman managed the encounter was of concern to both Westerners and Asians. Additional management and trip-related variables were associated with the satisfaction levels of Western tourists only, such as the number of dolphins they saw and the number of boats they would have liked around them.

The Westerners were also concerned about what they perceived as mismanagement of the dolphin watching vessels (see also Chapter 3). Examples of mismanagement included their tendency to speed (23.8% of Western respondents) and the dolphins being surrounded by a large number of boats (29.3% of Western respondents). This

result accords with the increased sensitivity of Western tourists to overcrowding compared with their Asian counterparts (Gillis et al. 1986; Yagi & Pearce 2007) and a generally higher awareness of animal welfare among Western societies (Shani & Pizam 2008). In Lovina, the number of boats in an encounter generally exceeded the number of dolphins (Chapter 3). The data may also explain the low to medium satisfaction level.

Although the observed number of boats was not significantly associated with the satisfaction level of Western respondents, the preferred number of surrounding boats was. Western respondents' satisfaction levels were lower when their preferred number of surrounding boats was 10 or less (Table 4.2); more than 80% of them preferred having a maximum of 10 boats around. Because on any given day a tourist has a 95% chance of seeing 22 to 47 boats (mean 34.5 $\pm$ se 6.29, see Chapter 3 Section 3.3.1), the likelihood of a Western tourist being satisfied with this situation is low.

Overall, Western respondents were more concerned about the environmental management of the dolphin watching industry in Lovina than their Asian counterparts. (Akama 1996) also found Western tourists were more concerned about environmental issues associated with wildlife tourism in Kenya than their local counterparts. Despite these findings, Tao et al. (2004) and Jin (2009) both observed increasing environmental awareness among Asian visitors participating in nature-based tourism, suggesting that Asian tourists are likely to be increasingly sensitive about these issues.

Table 4.5 Comparison of satisfaction levels of visitors to nine wildlife viewing attractions in developing countries.

Name	Location	Western visitors (%)	Original satisfaction	Standardised satisfaction (score out of 10)	Satisfaction level according to the qualitative scale developed by Pearce (2006)
Ngorongoro Conservation Area	Tanzania (Okello & Yerian 2009)	64	8.75 of 10	8.75	High
Bali Hai Cruises dolphin watching	Bali, Indonesia (Bali Hai Cruises official data, pers.comm to the Director of Operations)	57.9	87.4% ('good' on Bali Hai rank)	8.74	High
Serengeti National Park	Tanzania (Okello & Yerian 2009)	64	8.68 of 10	8.68	High
Tsavo West National Park	Kenya (Akama 1996)	60	76.9% between 6 and 7 (scales 1-7)	76.9% scoring between 8.6 and 10	High
Lake Manyara National Park	Tanzania (Okello & Yerian 2009)	64	8.05 of 10	8.05	High
Sipadan diving sites	Malaysia (Musa 2002)	24.5	87.8% between 4 and 5 (scales 1-5)	87.8% scoring between 8 and 10	High
Tarangire National Park	Tanzania (Okello & Yerian 2009)	64	7.84 of 10	7.84	High
Lovina dolphin watching	Bali, Indonesia (this publication)	70	7.1 of 10	7.1, with 51% scoring 8 to 10	Low to medium
Arusha National Park	Tanzania (Okello & Yerian 2009)	64	7.00 of 10	7.00	Low to Medium
Mt. Kilimanjaro National Park	Tanzania (Okello & Yerian 2009)	64	6.60 of 10	6.60	Low

The satisfaction level of Western respondents was significantly associated with their willingness to recommend the dolphin trip to others: the more comfortable they felt with the way their boatmen managed the encounters, the more likely that they would recommend the trip. This tendency is important because more than 65% of visitors come from Western countries; many of whom had learned about the dolphin tour in Lovina from word of mouth. For all respondents, high levels of comfort with how their encounters were managed were also significantly associated with their willingness to repeat the visitation or recommend the trip. This propensity should be an incentive for the boatmen to drive their boats considerately around the dolphins, even if they are not concerned about the possible impact on the target species. Consequently, knowledge of the tourist experiences (including satisfaction levels and corresponding factors) is important in designing future management interventions in Lovina (see Chapters 6 and 7).

Chapter summary

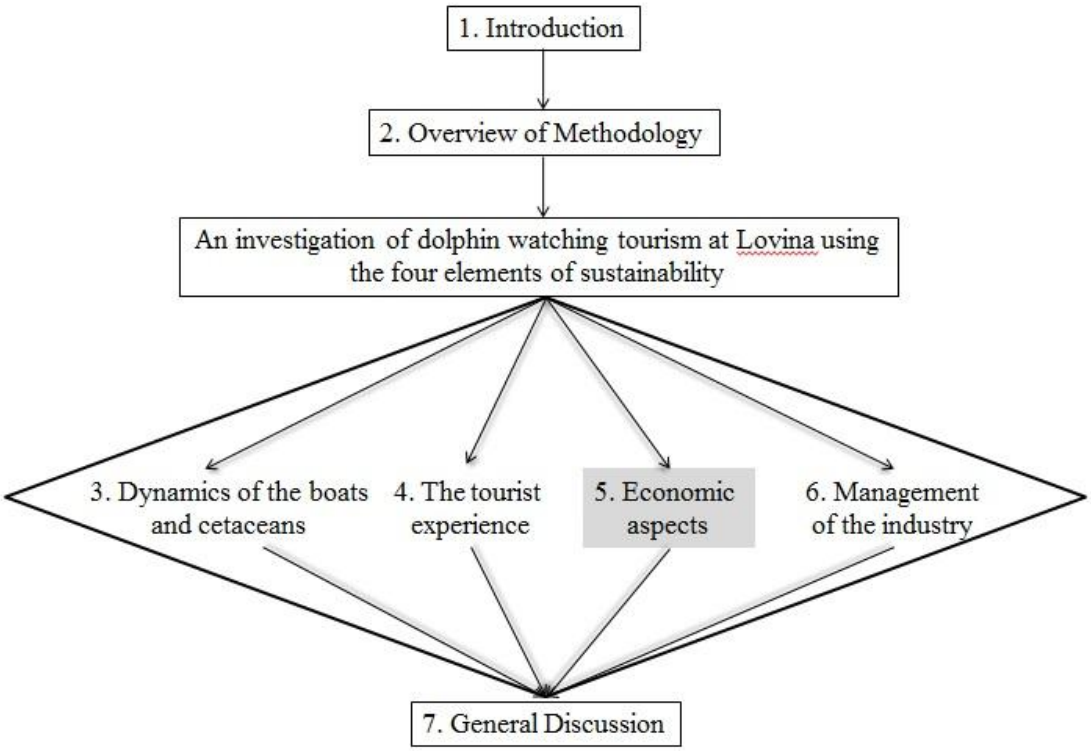
- Most dolphin tourists in Lovina come from Western countries, although the industry also attracts Asian visitors.
- Most visitors are tertiary-educated.
- Tourist satisfaction ranges from low to medium.
- While there was no significant difference between the average satisfaction of Western and Asian tourists, the associated variables were different.
- The satisfaction of Western tourists was associated with encounter

management, preferred number of surrounding boats and the number of dolphins seen.

- Encounter management was the only variable associated with the satisfaction of Asian tourists.
- Satisfaction was positively associated with willingness to recommend the tour: Western respondents who felt neutral to very comfortable with the way their boatmen managed the dolphin encounters were more likely to promote the tour.
- Knowledge of tourist experience is useful in designing future management interventions based on the quadruple bottom line and prism of sustainability concepts

CHAPTER 5

ECONOMIC ASPECTS OF THE DOLPHIN WATCHING TOURISM



This chapter is in review in the Journal of Ecological Economics as follows: "Mustika, PLK, Birtles, A., Welters, R. and Marsh, H. The economic influence of community-based dolphin watching on a local economy in a developing country: implications for conservation."

Chapter 4 described the experiences of tourists attending the dolphin watching tours in Lovina. The dolphin tourists were not very satisfied with their experience, particularly because of the way the boatmen managed the encounters with the cetaceans. Eventually, this dissatisfaction may lead to reduced promotion for this industry, which – if the industry brings significant benefits to the boatmen and the village – may lead to negative economic consequences. Therefore, in this chapter I describe the economic aspects of this industry and what is at stake if the dolphin tourist visitation declines. This chapter covers the economic element of this industry based on the quadruple bottom line and the prism of sustainability concepts.

5.1 Introduction

Although the cetacean watching tourism industry is becoming more important to the economies of developing countries (Hoyt 2001; O'Connor et al. 2009), surprisingly little is known about the distribution of the money that flows into the local communities surrounding the industry. Only one detailed study on the economic impact of cetacean watching tourism focusing on a developing country (see Orams 2002b) was available, in addition to Hoyt's (2001) and O'Connor et al.'s (2009) worldwide economic calculation. Gaining insight into the distribution of money flowing from the industry reveals the financial beneficiaries of the industry and subsequently the major stakeholders in the industry. Identifying the major beneficiaries / stakeholders is important in the event of risks to the sustainability of the industry (be it the economic, biological or social aspects of sustainability – see Chapter 1 Section 1.3).

This chapter therefore explores the economic impact of the cetacean watching industry in Lovina (the economic bottom line or 'profit' in Figure 1.3). This chapter has three separate aims: 1) determine the attractiveness of the industry to the boatmen as a source of income, which indicates industry expansion pressures, 2) determine the economic impact of dolphin watching tourism on the local economy of Lovina and its most prominent stakeholders / beneficiaries; and 3) develop potential initiatives to ensure that the industry operates within the paradigm of the quadruple bottom line and the prism of sustainability (see Chapter 1), which includes the biological, social and managerial imperatives in addition to sustainable economic growth.

5.2 Methods

5.2.1 Tourist expenditure in the context of total economic value

The tourist expenditure approach was used to examine the influence of the dolphin watching industry on the Lovina economy. This approach is useful to understand the direct economic impact of a tourism industry and estimate various tourism-induced impacts (Fritz et al. 1984). A total economic valuation analysis of the dolphins in Lovina was not conducted since it was beyond the aims of this study. Total economic value is the annual net benefit generated from a resource, in this case the dolphins (Samonte-Tan et al. 2007). Total economic value is determined by the total of the use and non-use values (which include pure existence value, option value and bequest value) (Tisdell & Wilson 2004). Tourist expenditure is a proxy for just one of the use values of a resource, which includes both direct and indirect values (Samonte-Tan et al. 2007). In wildlife tourism, the direct economic value is divided into consumptive and non-consumptive use value (Tisdell & Wilson 2004). The use value of the dolphin watching industry in Lovina falls into the category of non-consumptive direct use value; this is what I concentrate on in this chapter. As such the estimates generated here are unambiguous under-estimates of the total economic value of the dolphins. Figure 5.1 describes the overall context of the total economic value of an industry, in this case the dolphin watching tourism in Lovina.

Expenditure is a measure of the financial benefits of an industry (in this case dolphin watching tourism) (Duffield 1982). In wildlife tourism, tourist expenditure is usually analysed in two ways: direct expenditure and indirect expenditure (Hoyt 2001; Orams 2002b; O'Connor et al. 2009). Direct expenditure is a proxy of direct gross revenue of

tourism (Samonte-Tan et al. 2007). Hence, direct expenditure involves the direct ticket price (O'Connor et al. 2009) which, after deducting boat trip related costs, can be used to determine boatmen's income levels generated by this industry (Figure 5.1). Comparison of these income levels to per capita regional income indicates whether the industry is a lucrative employment option for the boatmen, which in turn signals the pressure on the industry to expand.

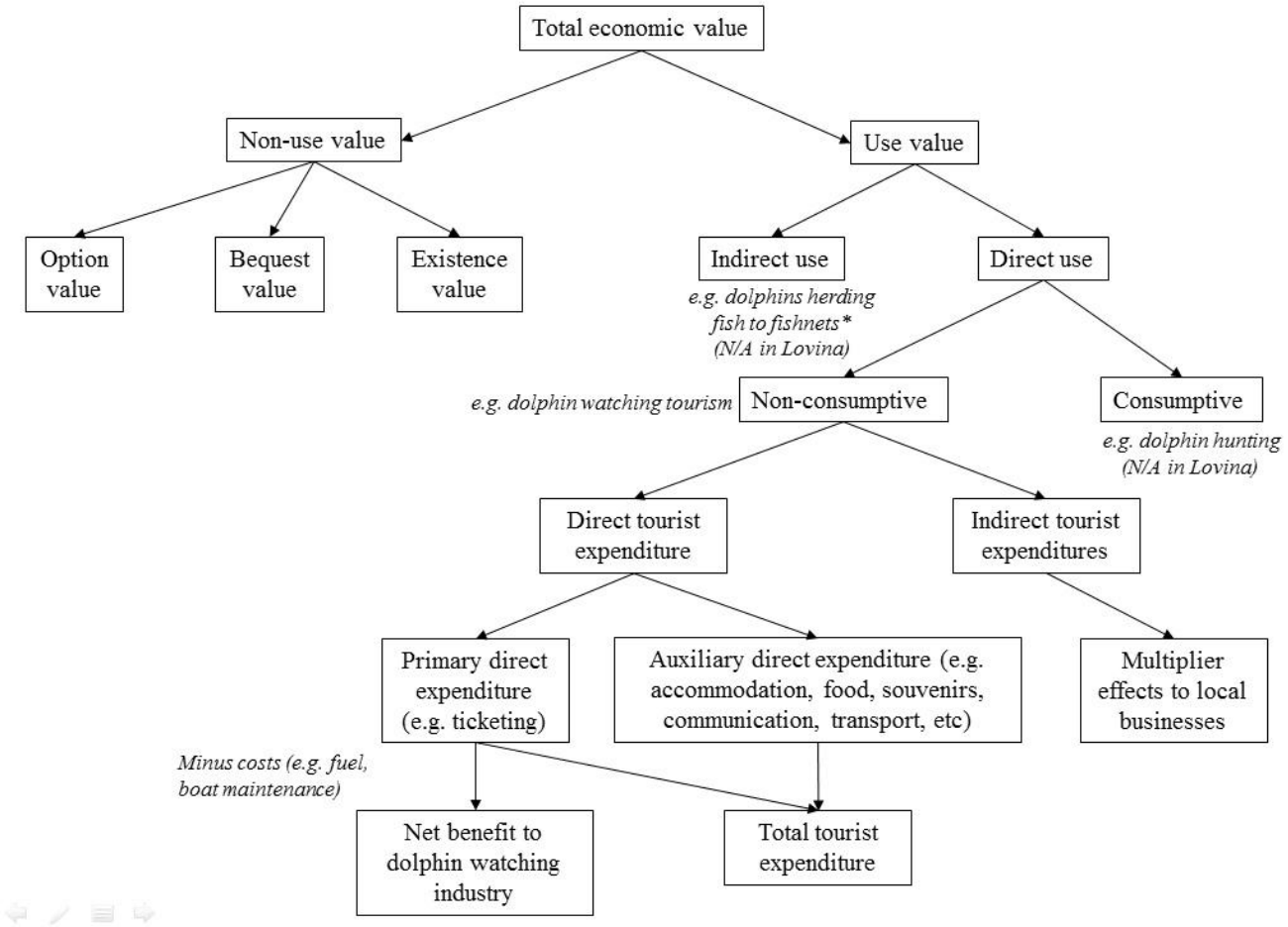


Figure 5.1 Total economic value and its association with direct tourist expenditures in Lovina
* *pers.comm. Coralie D'Lima 2010 for dolphin-fisheries interaction in Chilika Lagoon, Orissa, India*

Indirect expenditure is a proxy for the indirect gross revenue of tourism (Samonte-Tan et al. 2007). Many economists define indirect expenditure as a part of the multiplier effect: the money spent by the business provider in support of their service (Duffield 1982; Dwyer et al. 2000; Orams 2002b). However, Hoyt (2001) and O'Connor et al. (2009) define indirect expenditure as other expenditures that can be attributed to participation in wildlife tourism, e.g., accommodation, food, communication, souvenirs and domestic travel costs (Hoyt 2001; O'Connor et al. 2009; Cisneros-Montemayor et al. 2010). The benefit of this definition is that one can distinguish the real beneficiaries of the industry: the boatmen or other business sectors (e.g., hotelier, restaurants and transport services). However, such a definition may confuse economic practitioners (Stoeckl et al. 2005).

To identify the industry's true beneficiaries while adhering to the definitions generally used by economists, the ticket/admission price was defined as *primary direct expenditure*. Consequently, tourist expenditure on other items attributable to the dolphin tour (i.e., accommodation, food, communication, souvenirs and domestic travel costs) was defined as *auxiliary direct expenditure*. This approach should reveal the wider economic benefits of the dolphin watching tourism industry in Lovina while still exploring the direct benefit of the industry to the boatmen. The term 'indirect expenditure' was not used here because estimating the multiplier effect is beyond the scope of this research.

5.2.2 Data collection

My data collection involved: 1) direct observation and the use of secondary data; 2) distribution of questionnaires to the tourists; and 3) interviews and meetings with the dolphin boatmen in Lovina.

Official records of the number of dolphin tourists (see Chapter 2 Section 2.3 for definition) are not available, hence I estimated them onsite through direct observation. The estimation of the maximum number of observed boats was based on the data obtained during 57 survey days from November 2007 to May 2009 from a *jukung* (traditional tour boat). Although the tour boats departed from the four Lovina ports, they tended to aggregate in adjacent locations, making it possible to undertake a total count. I used the average passenger capacity from my boat surveys (3.2 passengers per boat) and secondary data from the local government agencies to estimate the number of visitors who joined the dolphin tours in comparison to the number of overnight visitors in Lovina with appropriate adjustments for data seasonality.

I conducted an associated study into visitor satisfaction (see Chapter 4) over 70 survey days in 2008 (June, July and September) and 2009 (February-April and December). The tourist questionnaires were distributed to 533 tourists immediately after they had returned from their dolphin trips. One of the questions was designed to understand respondents' auxiliary direct expenditures on accommodation, meals, communication (internet and phone), and local transports (Q= "Approximately, what is your expenditure PER DAY in Lovina? (This will help us to understand the contribution of dolphin watching to the local

communities)”). Interviews with 28 boatmen were used to estimate the costs involved in operating the boat trips (see Chapter 6 for the detailed methods and results of the interviews).

5.2.3 Data analysis

Dolphin tourist visitation

There were significant daily and monthly fluctuations in the number of boats, as well as monthly and yearly fluctuations in the number of tourists staying overnight in Lovina. The empirical data were therefore used to weight these factors when estimating the annual number of dolphin tourists. The weekly fluctuations were weighted to achieve an average number of boats per day in a month. Here it was assumed that each boat conducted only one trip per day. Although I have occasionally observed boatmen conducting two or more trips per day, multiple trips a day are very rare. The number of passengers per boat was estimated based on the boat surveys. The average number of dolphin tourists per month was obtained based on the actual number of operational days per month. I assumed that the boatmen operate all year round (except for the Balinese Silent Day or Nyepi in April), even during bad weather (which often occurs in December and January). This assumption is in line with my field observations that documented trips in very bad weather. Based on the 2009 questionnaire data, the number of overnight dolphin tourists is 88.6% of the overall number of tourists conducting the dolphin trips. I used this percentage to estimate the number of overnight dolphin tourists in 2007 and 2008.

The number of monthly overnight dolphin tourists was then compared with the number of monthly overnight visitors (regardless of whether they undertook the dolphin trips) in Lovina. The data of monthly overnight guests in Lovina from 2007 to 2009 are available (courtesy of the Cultural and Tourism Agency of Buleleng). These data were used to produce the percentage of overnight guests conducting the dolphin trips for a designated month.

The above steps were replicated to obtain the respective percentages for other months and years. I assumed that the overnight dolphin tourist to overnight tourist ratio is applicable for the same month of different years. The percentages for months without data were obtained from the average seasonal data. Here low season was defined from November to May and high season was defined from June to October (which includes the national school holiday and northern hemisphere summer holiday). The flow of tourist visitation throughout my survey period confirms this seasonal pattern. Once all the estimated percentages of overnight dolphin tourists in 2007-2009 were available, I calculated my estimates of the number of overnight and day dolphin tourists in a year based on the official records of overnight tourists.

Direct dolphin tourist expenditure

The questionnaires were distributed in 2008 and 2009. Hence the expenditure of overnight and day tourists was analysed using the estimated number of dolphin tourists in Lovina in those two years. In the Results (Section 5.3), all expenditures were expressed in 2009 US Dollars. That is, the appropriate monthly Indonesian Rupiah (IDR) – US

Dollar (USD) exchange rates were used to convert the survey findings expressed in IDR into USD. Subsequently I corrected for inflation to express 2008 USD expenditures into their 2009 equivalents.

Primary direct expenditure is the admission fee of all tourists joining the dolphin trips (day-tourists and overnight tourists). I use IDR 60,000 per tourist per visit for the admission fee.

Annual primary direct expenditure (admission fee)
= # tourists per annum × admission fee

Boatmen's net benefit

The net benefit received by the boatmen equals their direct gross revenue (i.e., total ticket/admission revenues) minus related costs (fuel, boat depreciation, outrigger replacement, boat repainting). Average fuel usage is 3.5 liters per day (IDR 5,000 or less than 50 US cents per liter). A boat costs IDR 15 million (USD 1,600 including the engine) and was assumed to last for 18.5 years (information collected from 10 respondents, ranging from 10 to 30 depreciation years). On average, a pair of bamboo outriggers is replaced every two years, costing IDR 400,000 (less than USD 45) per pair.

Boat mortgage was not included in the cost because about 70% of my interview respondents have paid off their boat mortgage and on average, those who still had to pay by December 2009 only had to pay the mortgage for another 1.6 years (stdev$\pm$0.94 year). The fees the boatmen must contribute to their associations were also not included,

because monthly fees varied across association (Kalibukbuk and Banyualit USD 1 per guest, Aneka less than 50 US cents per guest and Kaliasem less than 20 US cents per guest). In addition, the monthly fee (which was voluntarily agreed upon by the members) was placed into a trust fund that could be used for the member's benefit (e.g., for boat repair, school fees for the children or medical emergencies). Breakfast was not included for not all boatmen served the tourists breakfast while onboard. The boatmen were not subjected to income tax, hence tax was excluded from the analysis.

All associations operate licensing systems whereby a boatman is allowed to operate as an association member after purchasing his membership (this membership is the equivalent of an internal licence). The membership fee varied across the association: USD 27 (Kalibukbuk), USD 165 (Kaliasem), less than USD 1 (Aneka) and USD 110 (Banyualit). Because the membership fee was a one-off rather than an annual fee and because it varied greatly across association, including this fee would make only trivial difference to the cost.

Boatmen's net benefit = primary direct expenditure – cost

An individual boatman's net financial benefit is the total boatmen net benefit divided by 179 (total dedicated boatmen offering dolphin tours in Lovina).

Auxiliary dolphin tourist expenditures

The total tourism expenditure associated with dolphin watching in Lovina is the gross revenue that the industry injects into the local economy. These expenditures include

money spent on accommodation, meals, internet/communication, souvenirs and local transport over a period of stay (i.e., 2.95 nights per overnight tourists based on the questionnaires). For each expenditure item, tourists were provided with five options of expenditure range (IDR 1-100,000; IDR 101,000-200,000; IDR 201,000-300,000; IDR 301,000-400,000; and > IDR 400,000). I modified the methods used by Stoeckl et al.(2005) by using the mid point of each expenditure range for the first four categories, resulting in the following expenditures: IDR 50,000; IDR 150,000; IDR 250,000; and IDR 350,000. To make the range equal, the last expenditure range was fixed at IDR 450,000. The expenditure of each range was multiplied by the number of respondents in that category to achieve the total expenditure of an item (e.g., meals) for that expenditure category (e.g., IDR 50,000 per day). Average length of stay in 2009 was used to estimate the auxiliary direct expenditure (AE) of overnight dolphin tourists in 2008 and 2009. Daily dolphin tourists had a length of stay equal to one.

$$\mathrm{AE}_{\mathrm{tourist}}(\mathrm{item}) = \frac{\mathrm{AE}_{\mathrm{total}}(\mathrm{item})}{\#\mathrm{respondents}(\mathrm{item})} \times \mathrm{average\quad length\quad of\quad stay}$$

To understand the relative contribution of this industry to the economy of Lovina, the auxiliary direct expenditures were compared to the Buleleng Gross Regional Domestic Product, i.e., the sum of the added values of various economic sectors within the region for a particular year (BPS Buleleng 2009). This calculation only includes hotels and restaurants as the indicators for tourism growth. Hotel gross added value was obtained from several production indicators, i.e., the number of rooms, beds, hotels, employees and overnight tourists. The price indicators are the average rate per room, average output (production value) per bed, average output per hotel, average output per employee and

average output per overnight tourist (BPS Buleleng 2009). As a result of the difficulty in calculating the income of small unregistered restaurants, only gross added value of hotels was used. I particularly focused on Banjar and Buleleng districts, which are the districts that cover Kaliasem and Kalibukbuk villages respectively.

Auxiliary direct expenditures solely attributed to the dolphin watching industry

The proportion of local tourism income attributable to the dolphin watching industry is an index that demonstrates the significance of the industry to the region. To estimate this variable, I needed to estimate how many tourists come to Lovina because of the industry (coded as ‘dedicated dolphin tourists’). These are the tourists who would not come to Lovina if the dolphin watching tourism did not exist.

I did not directly ask the tourists whether they would still have come to Lovina in the absence of dolphin watching tourism. Therefore, the responses to three questions in the tourist questionnaires were triangulated to estimate the number of dolphin tourists who specifically visited Lovina because of the dolphin watching industry. The three triangulation questions were as follow:

- 'Ha[d] you heard of the dolphin watching tour in Lovina before arriving here?’
- ‘Was dolphin watching on your list of holiday activities in Bali before coming here?’, and;
- ‘What influenced you to go dolphin watching?’

The first two questions have binary answers ('No' or 'Yes'). The third question has six possible answers which were later grouped into two themes: 1) intrinsic values (e.g., affinity with the dolphins and the desire to see the dolphins in their natural habitat) and 2) extrinsic values (e.g., recommendation by others, trying to find something to do, and accompanying others).

Tourists who had (1) heard of dolphin watching in Lovina, (2) had 'dolphin watching' on their list of holiday activities before arriving there and (3) intrinsic pulling factors to the dolphins, were coded as 'dedicated dolphin tourists'. The remaining tourists were coded as 'non-dedicated dolphin tourists'. To identify members of the two groups, I used a three-way contingency table (SPSS 19.0) among the three questions. The first was later coded as 'Prior knowledge', the second as 'Wish list' and the third as 'Reason to join' (Figure 5.2). The auxiliary direct expenditures of dedicated dolphin tourists and non-dedicated dolphin tourists were later analysed separately.

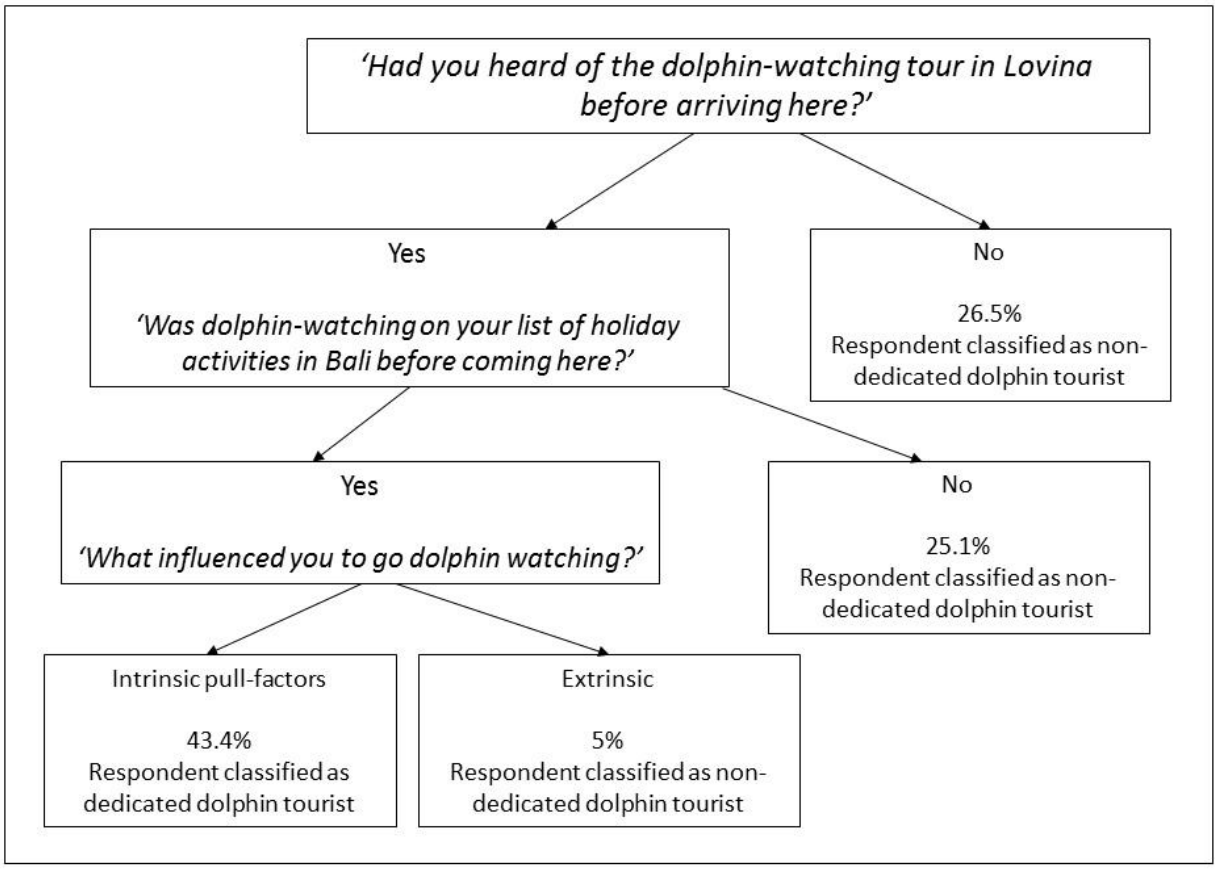


Figure 5.2 A decision tree that explains the characterization of the respondents to the 2008 and 2009 surveys as dedicated and non-dedicated dolphin tourists.

Total dolphin tourist expenditures

The total tourist expenditure on the dolphin watching industry in Lovina is the total primary direct expenditure (i.e., tickets) and the weighted means of total auxiliary direct expenditures (five items: accommodation, meals, internet/communication, souvenirs and local transport).

Total expenditures = total primary direct expenditure + total auxiliary direct expenditures

The total expenditure was compared with the expenditures of similar wildlife watching tourism in other developing countries to understand the situation at Lovina compared to other places.

5.3. Results

As detailed in Chapter 4, a total of 387 questionnaires were completed (306 in English and 81 in Indonesian), making a 72.6% response rate. A total of 265 respondents filled in the expenditure sections (results below). The number of questionnaires may seem small compared with the total estimated visitors for this industry. The data were collected over 70 days and stratified across both high and low visitation seasons (low visitation season from November to May and high visitation season from June to October – see Chapter 2 Section 2.1). I cannot confirm or reject whether my data were statistically representative of tourists who joined the dolphin tours in Lovina because no such information is officially available. However, the high response rate and the stratified sampling ensured that I had done my best to achieve representativeness.

5.3.1 Dolphin tourist visitation in Lovina

The official number of overnight visitors in Lovina has more than doubled in the past seven years (Figure 5.3). Although the visitation stagnated between 2004 and 2006, it experienced a steady growth over the last four years (from 2007 to 2010). Because the dolphin tourist data were collected from 2007 to 2009, I focused on the 2007-2009 visitation data only. During these years, the visitation numbers increased nearly 1.75 times (Figure 5.3). Of these visitors, about 30,800 to 53,200 visitors were estimated to

join the annual dolphin tour in 2007-2009 (average 42,000 dolphin visitors per annum). The questionnaire data were used to estimate the proportion of dolphin visitors that stayed overnight in Lovina (88.6%). By extrapolation, it means that between 27,300 to 47,200 dolphin visitors per annum (2007/09) stayed overnight in Lovina (average 37,190 overnight dolphin visitors per annum). The local tourism agency recorded a total of 179,635 tourists visiting Lovina from 2007 to 2009 (about 59,900 tourists per annum). The calculation suggests that dolphin watching tourism in Lovina attracted at least 60% of annual overnight visitors to Lovina (i.e., guests staying overnight in Lovina for various reasons) in order to participate in the dolphin tours over the period of 2007-2009.

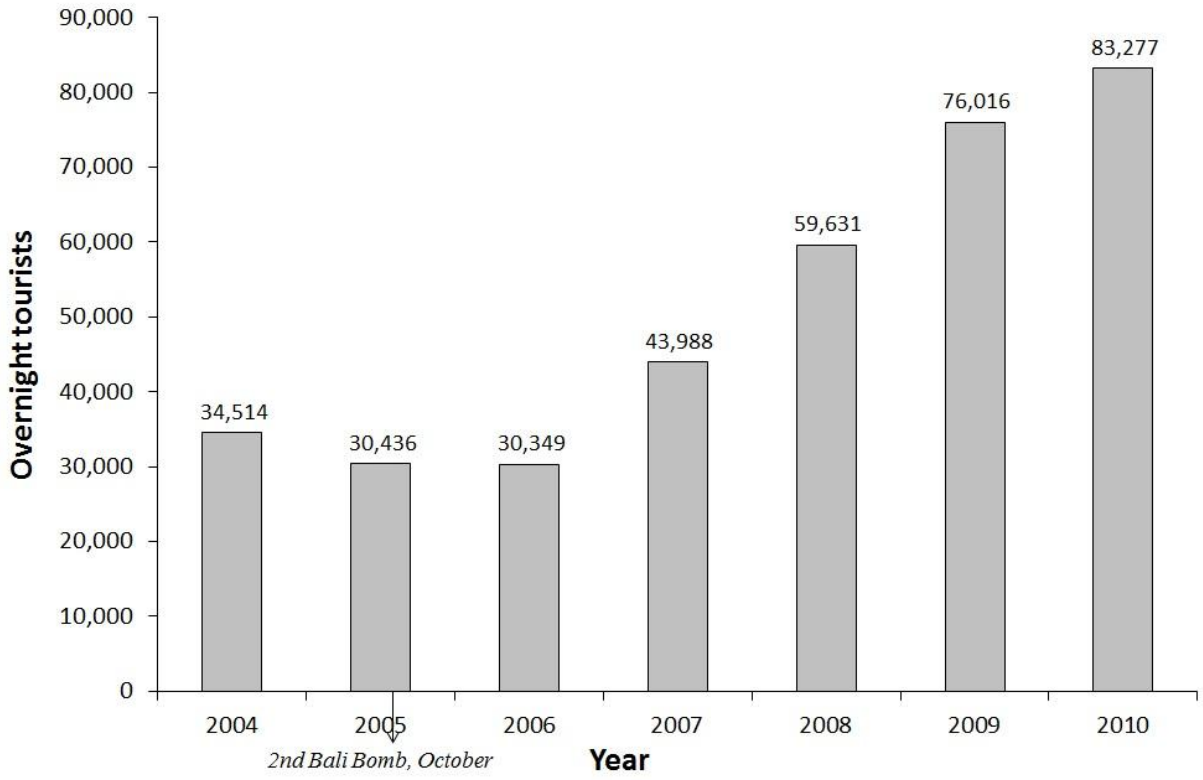


Figure 5.3 Number of overnight tourists in Lovina from 2004-2010 (Source: Cultural and Tourism Agency of Buleleng)

More than 80% of the 56 accommodation facilities distributed along the coast of Kaliasem and Kalibukbuk have less than 20 rooms per facility, which is in accord with the average number of rooms per hotel in Banjar and Buleleng districts (17.5 and 17.9 rooms per hotel, respectively) as recorded by the Cultural and Tourism Agency of Buleleng (2009). More than 80% of the accommodation facilities are home-stay facilities or non-classified hotels (commonly termed 'hotel melati' or 'jasmine hotels'). Most facilities are located in Kalibukbuk (Figure 5.4).

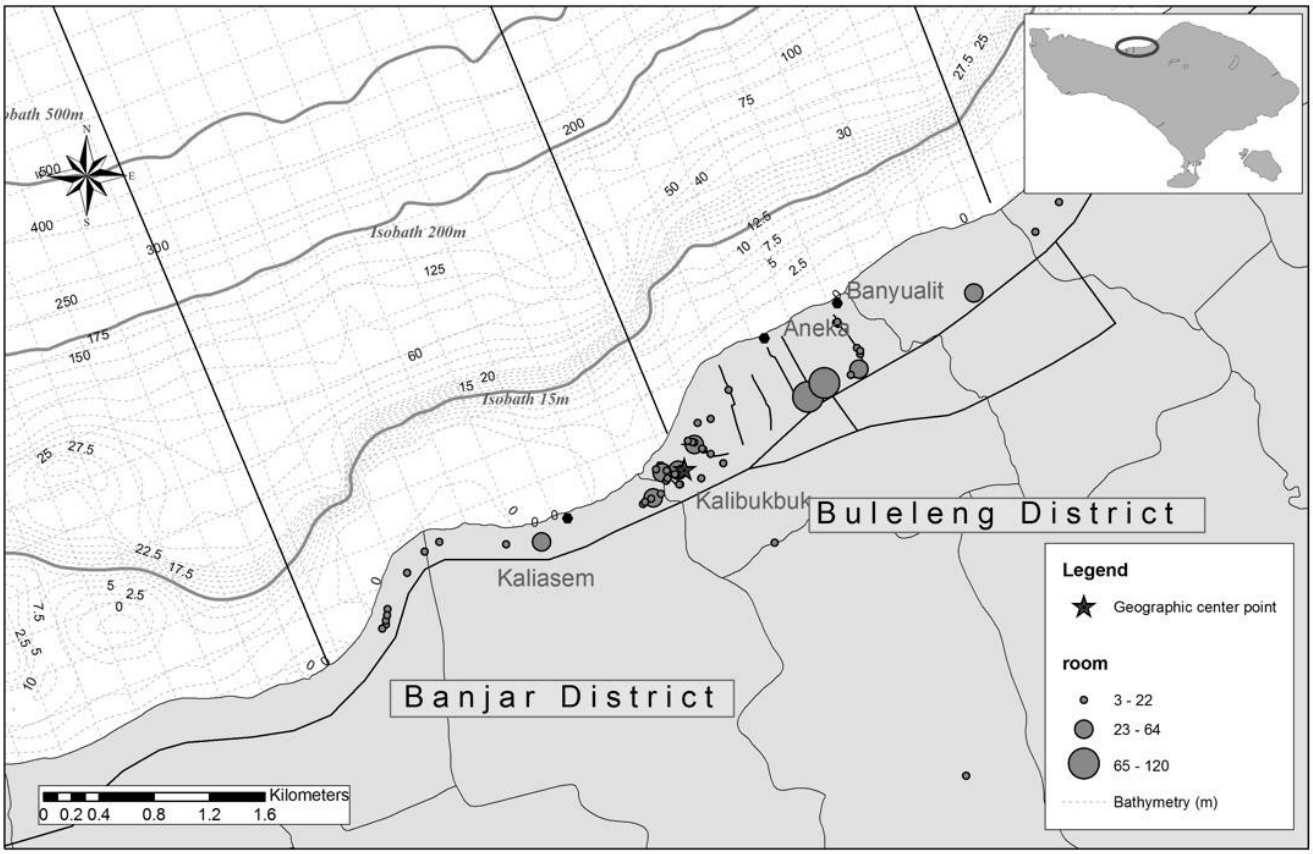


Figure 5.4 The distribution of accommodation facilities in Lovina (insert shows Bali and the position of Lovina on the north coast)

5.3.2 Total expenditure

Primary direct expenditure

I estimate that the overnight and day tourists spent USD 267,000 and USD 285,700 on admission fees to dolphin tours in 2008 and 2009, respectively (Table 5.2). This is the annual direct gross revenue for the whole dolphin watching industry in Lovina (179 active boatmen), which implies that the average boatman in Lovina received gross revenue between USD 1,490 to USD 1,600 per annum. When the related costs (fuel, boat depreciation, outrigger replacement, boat repainting) were deducted, the net benefit for a boatman is reduced to USD 1,240 to USD 1,390 per annum, or between 1.3 to 1.8 times the annual per capita Gross Regional Domestic Product of an average Balinese in Buleleng Regency (USD 938 per annum for 2007 and 2008, using the 2008 rate (BPS Buleleng 2009)).

Auxiliary direct expenditure

The auxiliary direct expenditures of dedicated dolphin tourists and non-dedicated dolphin tourists (see Method) were analysed separately. The three-way contingency table between the three questions demonstrated a significant association among them (Pearson Chi-Square $p < 0.0005$ for intrinsic values and $p = 0.003$ for extrinsic values). I found 159 respondents (43.4%) who had prior knowledge about dolphin tours in Lovina, had wanted to see the dolphins during their holiday and held intrinsic values about the dolphins. These respondents were the dedicated dolphin tourists who might not have visited Lovina in 2008 and 2009 in the absence of the dolphin watching industry. When their length of stay was analysed, I found that 40.3% of total overnight dolphin tourists and 26.9% of

total day dolphin tourists in 2009 came to Lovina because of the dolphins. I used this percentage to analyse the 2008 data. Based on the 2009 data, an overnight dedicated dolphin tourist spent on average 3.56 nights in Lovina, while an overnight non-dedicated dolphin tourist spent on average 3.29 nights in the same area.

I estimated that a dolphin tourist spent an average of USD 58 on auxiliary direct expenditures per day in 2008 and 2009 (detailed items explained in Table 5.1). Based on my personal experience and observation, the estimated expenditures are plausible. Auxiliary direct expenditure on accommodation suggests that the typical dolphin tourist stayed in a non-classified accommodation facility as opposed to a star-rated one. Auxiliary direct expenditure on transportation suggests that these tourists/respondents rent cars to explore Lovina and surroundings (instead of using public transport e.g., bus).

Table 5.1 Estimated daily auxiliary direct expenditures* of dolphin watching tourists in Lovina from tourist questionnaires in 2008 and 2009.

Auxiliary direct expenditures	**USD 2008 (in 2009 prices)**	**USD 2009**	**Average**
Food	16.9	12.6	14.7
Accommodation	11.5	16.4	14
Internet and telephone	6.7	4.4	5.5
Souvenirs	13.0	6.1	9.6
Local transportation	16.5	12.1	14.3
Total	64.6	51.6	58.1

* Tourist expenditures on non-ticket items attributable to the dolphin tour (i.e., accommodation, food, communication, souvenirs and domestic travel costs)

With almost 41,700 day and overnight visitors per annum, the auxiliary direct expenditure of dolphin tourists in Lovina reached at least USD 9 million per annum (Table 5.2). At least 46% of this expenditure (USD 4.1 million) was solely attributed to the dolphin watching industry; i.e., this was the auxiliary direct expenditure of the dedicated dolphin tourists who comprised 43.4% of the total tourists going on dolphin trips in Lovina.

The total dolphin tourist expenditure in Lovina in 2008 and 2009 was USD 9.5 million and USD 9.3 million, respectively (Table 5.2). Almost 60% of the 2008 total expenditure and more than 45% of the 2009 total expenditure was spent by dedicated dolphin tourists (USD 5.6 million and USD 4.3 million respectively – Table 5.2). About 3% of the total expenditure went to the dolphin boatmen (primary direct expenditure) and the rest went to supporting tourism services (auxiliary direct expenditures). The total attributable expenditure to the dolphin industry (i.e., auxiliary direct expenditures of dedicated tourists and total ticket expenditure) was USD 4.5 million in 2008 and USD 5.7 million in 2009.

Table 5.2 Total expenditures of dedicated and non-dedicated dolphin tourists in Lovina from tourist questionnaires in 2008 and 2009.

	2008 (in 2009 USD)			**2009 (USD)**		
	Day	**Overnight**	**Total**	**Day**	**Overnight**	**Total**
*Primary direct expenditures**						
Dedicated	11,144	122,133	133,277	8,760	102,001	110,761
Non-dedicated	19,287	114,376	133,663	23,806	151,103	174,909
Total primary direct expenditures	**30,431**	**236,509**	**266,941**	**32,566**	**253,103**	**285,670**
*Auxiliary direct expenditures***						
Dedicated	88,886	5,353,925	5,442,811	43,802	4,143,623	4,187,424
Non-dedicated	185,730	3,662,569	3,848,299	148,126	4,759,068	4,907,194
Total auxiliary direct expenditures	**274,616**	**9,016,494**	**9,291,110**	**191,928**	**8,902,691**	**9,094,619**
Total expenditures	**305,047**	**9,253,003**	**9,558,050**	**224,494**	**9,155,794**	**9,380,289**

* tourist expenditures on dolphin tour ticket

** tourist expenditures on non-ticket items attributable to the dolphin tour (i.e., accommodation, food, communication, souvenirs and domestic travel costs)

5.4. Discussion

5.4.1 Dolphin watching industry in Lovina is a lucrative business

The dolphin watching industry is very important for the Lovina economy. Approximately 60% of the annual overnight tourists in Lovina were estimated to participate in local dolphin tours, much higher than Hoyt's (2001) estimate of 20%. When compared to the annual per capita income of Buleleng, the direct net benefit for the boatmen shows that the business is more profitable than most other earning opportunities. Because of the higher opportunity costs (i.e., 'the best alternative sacrificed for a chosen alternative'

(Layton et al. 2009, p. 37)), the boatmen are unlikely to be willing to quit the industry. On the contrary, the higher net benefit is likely to attract other villagers into becoming dolphin boatmen, hence adding pressure to the industry.

The dolphin tourists' total annual expenditure of more than USD 9.3 million is more than ten times higher than the 1999 annualised expenditure of whale watching tourists in Tonga (adjusted inflation), another developing country with a significant whale watching industry as reported by Orams (2002b). The total annual expenditure of dolphin tourists in Lovina is also three times higher than the 2000 total annualised visitor expenditure of sea turtle tourism in Mon Repos and 27% of the 2000 total annualised visitor expenditure of humpback whale tourism in Hervey Bay, both in Australia (adjusted inflation, Tisdell & Wilson 2004). Unlike the year-round dolphin tourism in Lovina, each wildlife tourism venture in Tonga, Mon Repos and Hervey Bay is conducted for only four months (Orams 2002b; Wilson & Tisdell 2003). Therefore the expenditures for these three destinations are reported as annualised totals (i.e., the expenditures are distributed throughout the year).

The gross revenue (i.e., tourists' total expenditure) of dolphin watching tourism in Lovina is generated by the activity of only 3% of the total Kalibukbuk and Kaliasem population. The 3% composition was obtained from 179 dedicated boatmen out of the 5,800 village work force (calculated based on the village's population of 9,800 people and 59.52% work force of Balinese population in 2008 (BPS 2011)). This number indicates the importance of dolphin watching tourism to the broader community. The auxiliary direct

expenditure of dedicated dolphin tourists is also considerable. Suppose the dolphin watching industry ceased to exist (e.g., because dolphins were no longer found off Lovina), Lovina would lose at least 46% of its auxiliary direct tourist income (accommodation, food, internet/phone, souvenirs and local transport). Table 5.1 shows the main beneficiaries of the industry (restaurateurs, hoteliers and transport agents) and therefore the main economic stakeholders in preserving the industry.

The dedicated dolphin tourists spent an average of USD 1.3 million on accommodation facilities in Lovina in 2008 and 2009 (the average accommodation expenditures for all dolphin tourists was USD 2.6 million). This number was slightly higher than the hotel Gross Domestic Regional Product (GRDP) in Banjar and Buleleng districts in 2008 (USD 1 million, BPS Buleleng 2009). Assuming average hotel maintenance cost of 70% (which was later deducted from the USD 1.3 million), the dedicated dolphin tourists contribute at least USD 403,000 (38%) to the local hotel GRDP.

The dolphin watching industry at Lovina has many of the positive characteristics of locally-managed alternative livelihoods (local boats owned by local boatmen, small scale hotels, restaurants and other businesses) which fit the definitions of micro and small scale tourism enterprises (Shaw 2004). The rate of overnight visitations of dolphin tourists in Lovina is within the normal range of overnight visitation in Bali. The ownership of hotels in Lovina was not investigated. However, most hotels are not star-classified and do not belong to international hotel chains. Some accommodation facilities and restaurants are owned by expatriates who have married locals or formed joint ventures with local

business people. I thus suspect that Lovina suffers little economic leakage from the dolphin watching industry and its related tourism services, which suggests that the multiplier effects of the expenditure patterns I found are substantial. However, further research is needed to draw firm conclusions about such multiplier effects.

5.4.2 Concerns over the sustainability of the industry

The economy is usually perceived as *'a driving force behind most of the problems, but it could also be a force for the better, contributing to the solution of problems by creating enough wealth to solve them'* (Spangenberg 2004, p. 75). In the section above, I have examined the economic implications of Lovina dolphin watching from this perspective. I conclude that the high profit the industry generated could also be the downfall of dolphin watching in Lovina.

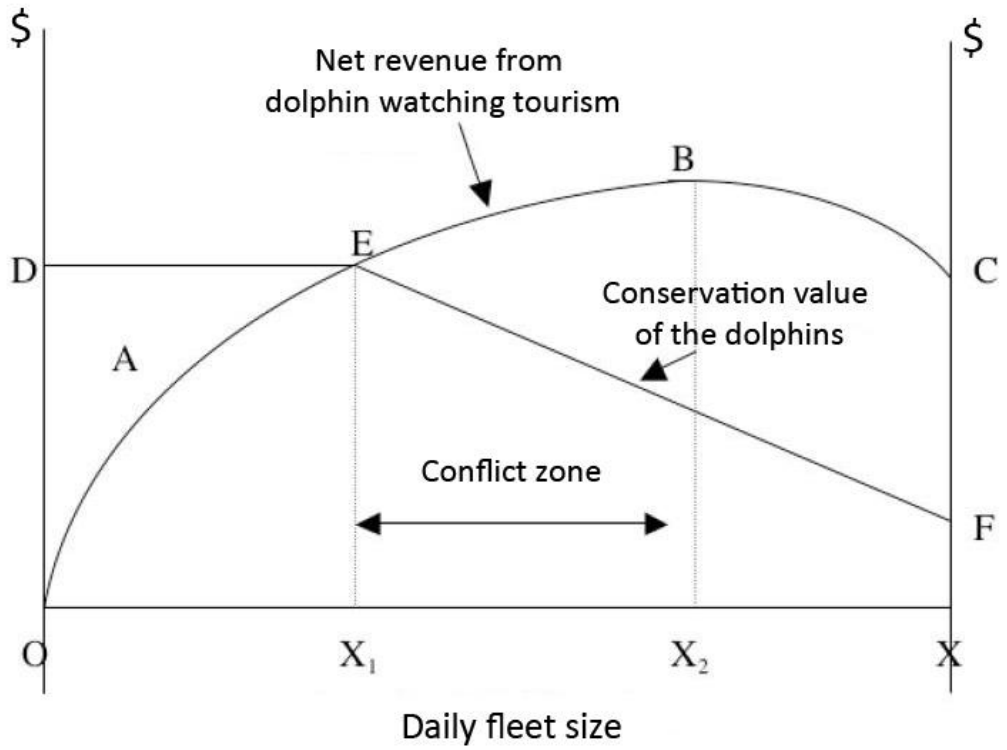
Despite the positive impacts of dolphin watching tourism on the local economy in Lovina, my associated study on tourist satisfaction in Lovina (Chapter 4) suggested that tourists are concerned about dolphin encounter management which may be causing adverse biological impacts on the dolphin population. Increasing visitation to Lovina (Figure 5.3) would presumably increase the number of dolphin tourists in the future and the number of tour boats operating daily.

Figure 5.5 illustrates the need to manage the number of boats in this context. Suppose X is the number of boat trips per day (tourism intensity), which is the daily fleet size (or maximum boats conducting dolphin trips per day) in Lovina multiplied by the number of

daily trips per boat (I assumed the latter to be one). Line D-E-F represents the conservation value of the dolphins. That is, if tourism intensity remains below X_1, there is no biological damage to the dolphin population, which implies its conservation value remains constant. However, tourism intensity beyond X_1 adversely impacts the dolphin population, which implies a declining conservation value.

Curve A-E-B-C represents the net revenue from dolphin watching tourism, which reaches a peak at point B, where tourism intensity is X_2. Beyond point B, tourism intensity is, for example, too high for the liking of the tourists who no longer enjoy the trips and hence do not recommend the trips to others, which will harm the industry over time. Point E (with X_1 daily fleet size) represents the maximum tourism intensity that poses minimum disturbance to the dolphins.

The total conservation value of dolphins is essentially the non-use economic value of the animals (Figure 5.1). This value can be substantially higher than the net revenue from the tourism industry (Figure 5.5). However, economic pressures drive tourism intensity towards point B (X_2 intensity). Consequently, if point X_1 (the biologically-acceptable daily fleet size) is to the left of point X_2 (the daily fleet size with maximum economic revenue), a conflict zone will occur between X_1 and X_2. However, it is worth noting that my analyses in Chapter 3 could not give insights as to whether X_2 exceeds X_1.



Source: Adapted from Tisdell and Wilson 2004

Figure 5.5 The potential conflict between the economically optimum daily fleet size (X2) and the biologically acceptable daily fleet size (X1) (adapted from Tisdell and Wilson 2004, p. 153)

Other related studies in cetacean watching tourism in several developed and developing countries have shown that excessive numbers of boats have detrimental effects on the target species viewed (Bejder et al. 1999; Constantine et al. 2004; Evacitas 2005; Courbis 2007; Christiansen et al. 2010, see also Chapter 3). These studies suggested that the described conflict zone exists in similar industries elsewhere.

If Figure 5.5 is applicable to the Lovina dolphin watching industry, such a conflict zone should be avoided so that the industry does not cause biological damage to the dolphin population (which in return would lead to financial damage to the tourism industry in the future). However, since the industry as a whole will try to maximize its profits (strive towards X_2 daily fleet size, instead of X_1) and no individual boatman has an incentive to leave the industry, X_2 will be the outcome in the absence of sound conservation management.

5.5 Concluding remarks

This chapter has demonstrated that dolphin watching tourism in Lovina is lucrative for the boatmen involved, as it provides them with above average regional income levels, which implies it is unlikely that boatmen will leave the industry voluntarily.

Though the boatmen derive above average earnings from the industry, the main benefactors are outside the dolphin watching industry. The Lovina economy would lose about 4.5 million USD in annual auxiliary direct expenditures in the event that the dolphin watching industry ceased to exist, and the unexpected victims would include restaurants, hoteliers and transport agents. They are therefore the substantial beneficiaries of the dolphin watching industry and subsequently should join the boatmen as partners to achieve and maintain the sustainability of the industry.

Earlier in this chapter, I presented Spangenberg's (2004, p. 75) argument that although the economy is the driving force behind most environmental problems, it can also be used

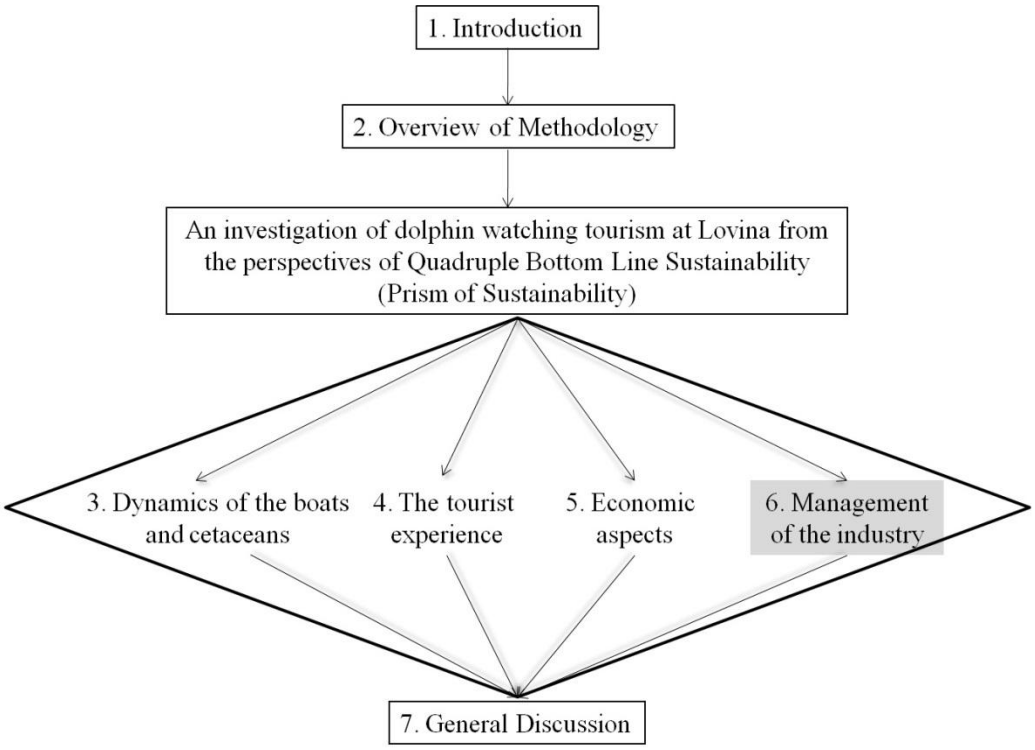
as a part of the solution. The results of this chapter suggest that the individual boatmen lack the incentives to reduce the intensity of the industry in the event that biological sustainability is at risk. Thus, sustainable management of the industry must involve not only the boatmen but also related tourism industries (e.g., hoteliers, restaurants and transport agents).

Chapter summary

- The dolphin watching industry in Lovina attracts at least 37,000 overnight visitors per annum (~60% of the region's overnight tourists).
- The industry contributes USD 9.5 million p.a. to the local economy.
- At least USD 4.5 million p.a. may be lost if the industry ceases to exist.
- The 179 boatmen enjoy an above average income.
- However, trip fees constitute only 3% of the total expenditures generated by dolphin watching tourism; the remainder is spent on local businesses e.g., accommodation, restaurant and transport which become the substantial beneficiaries.
- The number of boats should be regulated to address concerns over their impacts on the dolphins and on visitor satisfactions (see Chapter 3).
- Other beneficiaries, e.g., hoteliers, restaurateurs and transport agents, must also be included in future management decisions due to the share of income they receive from this industry.

CHAPTER 6

MANAGEMENT OF THE INDUSTRY



This chapter will be submitted as a paper to the Journal of Cetacean Research and Management as follows: "Mustika, PLK, Birtles, A., and Marsh, H. The importance of community-based involvement for managing whale watching in a developing country with decentralised management of marine resources."

Chapter 5 described the economic aspects of the dolphin watching industry and how much is at stake if the dolphin tourist visitation were to decline. The dolphin watching industry in Lovina is very lucrative and attracted 60% of Lovina's overnight tourists. A boatman's annual income was higher than the income of an average Balinese. Thus, although previous analyses suggested that this industry was unlikely to be biologically sustainable (Chapter 3) and the tourists were not always satisfied with their encounters (Chapter 4), the boatmen are unlikely to refrain from their current activities. This industry needs management options that consider the welfare of the animals, the tourists' satisfaction and the boatmen's source of income. Understanding boatmen's demography, opinions, suggestions and current management arrangements is a prerequisite for the development of such a management option; all of which will be detailed in this chapter. This chapter covers some of the social and managerial elements of this industry based on the quadruple bottom line and the prism of sustainability concepts.

6.1. Introduction

Chapter 1 briefly explained that the number of countries (particularly from the developing world) participating in cetacean watching tourism has expanded in the last decade (Hoyt 2001; O'Connor et al. 2009). Garrod and Fennell (2004) examined 58 codes of practice[4] for whale watching and found that almost 47% were developed by relevant government agencies at various levels. Non-governmental organisations and research institutes also played a very important role in developing these instruments (22%). However, only 7% of the codes were developed by the tourism operators. This finding suggests that top-down management (initiated by state/provincial governments such as in Argentina and national governments such as in Australia, New Zealand, South Africa, Brazil and Mexico (Carlson 2010)) had played an important role in the development of whale watching codes of practice.

The sustainability of wildlife tourism in developing countries is often hindered by governmental regulations, lack of political will, enforcement and/or corruption (Smith et al. 2003; Laurance 2004). Governments in many developing countries initially adopted a top-down approach to conservation that privileged national agendas over the needs and aspiration of local peoples (Carr 2002; Andersson et al. 2006). Many studies have pointed out the problems of this approach and have argued that bottom-up conservation initiatives are more effective because top-down management often undermines community aspiration and involvement and overlooks the potential for locals to manage their own resources (Ostrom et al. 1999; Carr 2002; Ostrom 2009).There is an increasing awareness

[4] Garrod and Fennell (2004) used the 2001 version of Carlson's data. However, their analyses were based on the number of codes rather than the number of countries where the codes were applied.

that sustainable environmental stewardship requires the involvement of both community groups and government agencies, particularly when dealing with programs that require effective facilitation and complex networks of stakeholders (Carr 2002; UNEP 2006). Devolved governance or decentralisation is an increasingly common method of balancing the top-down and bottom-up approaches, particularly when the decentralisation seeks to devolve the property rights of natural resources to local communities (Andersson et al. 2006).

Top-down and bottom-up agents may vary according to time and context. A central government's instruction to a local government is a top-down approach. Once the central government devolves its authority to the local government, it decentralises its governance and no longer practises a top-down approach. However, when a local government officer conveys a policy to local villagers, he/she is still conducting a top-down approach. Non-governmental organisations and researchers who come to a village to assist the villagers with some conservation management initiatives can also be considered as part of the top-down approach (Carr 2002, p. 228). This understanding is important because many non-governmental organisations and university researchers often consider their roles as agents of a bottom-up management approach, although in reality the locals still view them as outsiders coming to implement a top-down initiative.

Through Law 22/1999 and Law 31/2004, Indonesia is committed to devolved (decentralised) marine resource management (Table 6.1). Both provincial and regency governments are legally responsible for environmental conservation in their jurisdictions.

Regency governments have the right to manage their marine resources to four nautical miles offshore (Table 6.1). Cetacean biodiversity is protected by a number of national instruments, rather than regency or sub-national instruments (Table 6.1). All marine mammals are protected and cannot legally be harvested, killed or traded. However, Indonesian law is silent on wildlife tourism including cetacean watching.

Top-down approaches (led by government at various levels, research institutes and even non-government organisations (see Carr 2002, p. 228) has been pivotal in the development of whale watching codes of practice in many countries (Garrod & Fennell 2004). I expect this pattern to be repeated in Indonesia. Nonetheless, the decentralisation of environmental management in Indonesia to the regency level is often compromised by a lack of local capacity and the imperative for local authorities to maximise their income (Aden 2001), further exacerbating the lack of capacity and funding. Thus, a top-down approach (albeit decentralised) for the development of cetacean watching guidelines in Indonesia would need to be combined with bottom-up initiatives.

This chapter explores the boatmen's demography and perspectives (the 'people' in Figure 1.3) and the industry's managerial aspects (the 'governance' in Figure 1.3). This chapter aims to 1) understand the boatmen's demography, opinions, suggestions and current management schemes; and 2) provide insights into the challenges associated with developing sustainable whale watching in developing countries by analysing the strengths and limitations of the management of the Lovina dolphin watching industry. These insights were obtained from interviews with the boatmen before they learned of the

results of our research and subsequently during workshops convened to share the results of the other components of this research (Chapters 3-5).

6.2 Methods

6.2.1 Overview of approach

Qualitative research in Lovina was conducted in two stages (Figure 6.1) to develop, as Marshall (1996, p. 523) put it, *'an understanding of complex issues relating to human behaviour'* associated with the dolphin watching industry in Lovina. The first stage comprised two rounds of interviews: 1) with the dolphin association coordinators and 2) with association members. Interview questions were informed by the results of a tourist survey (Chapter 4), although I did not inform the respondents of the survey results. Purposeful sampling was used for both rounds of interviews. Interviews were continued until data saturation was reached, i.e., when *'new categories, themes or explanations stop emerging from the data'* (Marshall 1996, p. 523) or when, as Mead put it, researchers are 'bored' from hearing the same thing time and again (Morse 1995).

Two types of purposeful sampling were used in this research. Key informant semi-structured interviews (Marshall 1996) were chosen for the first round of interviews because the association coordinators were considered as people with special expertise. Maximum variation sampling (Sandelowski 1995; Marshall 1996) was used to choose respondents for the second round of interviews, with dolphin boatman's age (younger and older) and experience (new in the business or have been in the business for a long time) as criteria for stratifying the sampling of members within each dolphin association. In

the second stage of the research, the results of the interviews were presented to stakeholder workshops (Figure 6.1) which aimed to: 1) inform the boatmen of some of the results of our research (Figure 6.2); 2) obtain additional insights after the boatmen learned about our results; and 3) keep their faith in our research by sharing the results with them.

Table 6.1 List of Indonesian regulations relevant to cetaceans and species conservation

Legal basis for species/environmental conservation in Indonesia	
• Law 5/1990	Conservation of living natural resources and their ecosystems
• Law 23/1997	Environmental Management
• Law 22/1999	Local Autonomy
• Law 32/2004	Local Governance
• Law 31/2004	Fisheries
• Law 27/2007	Coastal and Small Islands Management
• Law 32/2009	Environmental Protection and Management
• Government Regulation 35/1975	Protection of wildlife
• Government Regulation 68/1998	Nature Reserves and Protected Areas
• Government Regulation 19/1999	Pollution or Marine Contamination Control
• Government Regulation 27/1999	Environmental Impact Assessment
• Presidential Decree 43/1978	Ratification of Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)
• Presidential Decree 32/1990	Management of protected areas
• Ministerial Decree 30/2010	Management plan and zoning of MPA
• Local Government Regulation 16/2009	Bali Spatial Planning
Legal basis for cetacean conservation in Indonesia*	
• Law 17/1985	Ratification of 'Principles of the Archipelagic Concept' and the United Nations Convention on the Law of the Sea – UNCLOS (first chapter of the UNCLOS document, Section 1.1)
• Law 5/1994	Ratification on the United Nations Convention on Biological Diversity (fourth chapter of the Convention)
• Government Regulation 327/1978	Protection of wildlife (addendum)
• Government Regulation 716/1978	Protection of wildlife (addendum)
• Government Regulation 7/1999	Preservation of Flora and Fauna (fifth chapter of the regulation)
• Government Regulation 8/1999	Exploitation of Wild Flora and Fauna (complimentary regulation to Government Regulation 7/1999)
• Ministerial Decree 802/2011	The prohibition of dolphin harvesting in Indonesia

* Cetaceans are mentioned in brackets

Source: Hoyt 2004; Indoregulation (2005), Ministry of Environment (2011), Ministry of Marine and Fisheries Affairs (2011)

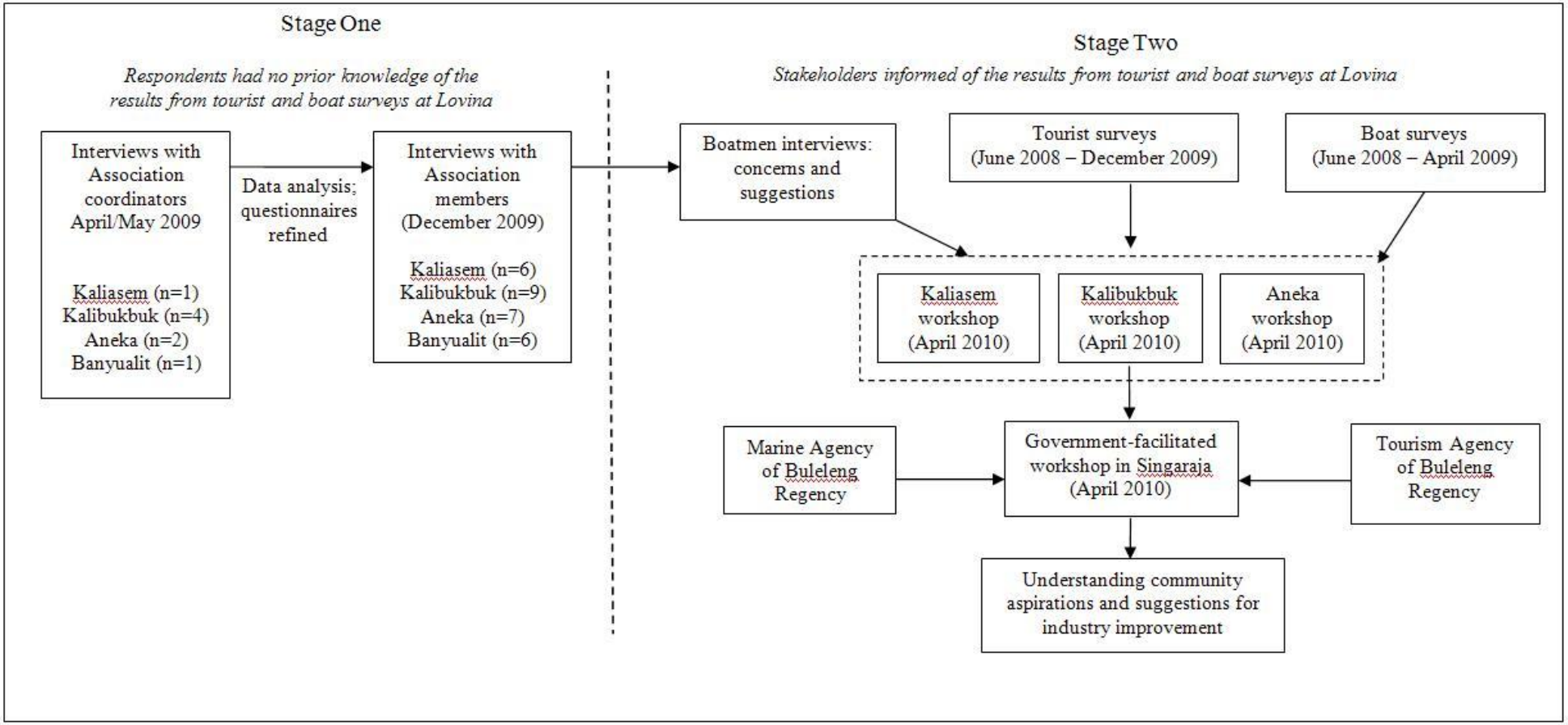


Figure 6.1 Organisation of the interviews and stakeholder workshops in Lovina (the numbers in brackets in Stage One refers to the number of people interviewed)

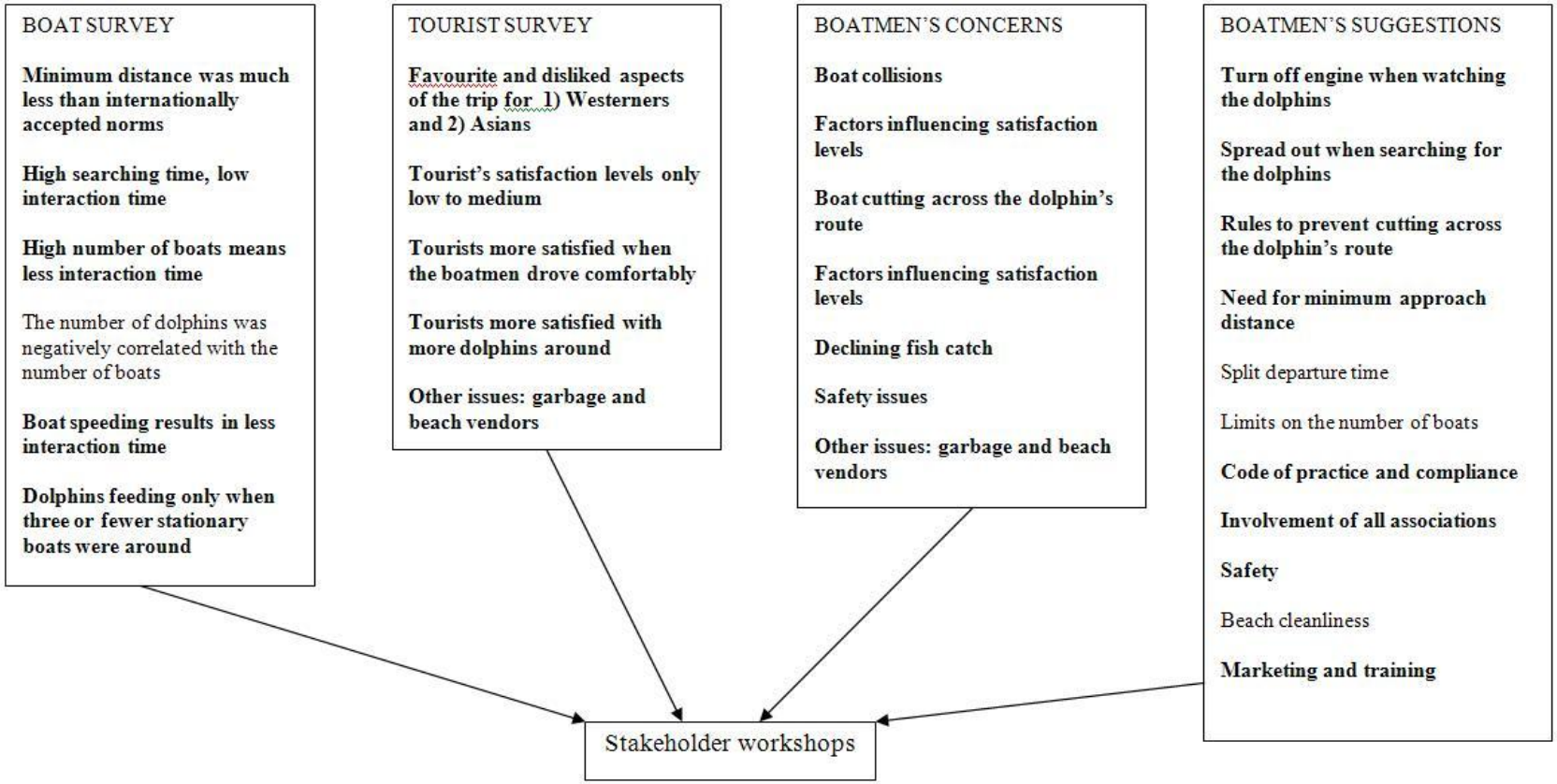


Figure 6.2 Details of the information presented during the community and stakeholder workshops (the participants identified the topics in bold for further discussion during the workshops)

6.2.2 Interviews

Interviews with the association coordinators

In April and May 2009, my team and I interviewed the coordinators of the four dolphin associations in Lovina: Kaliasem, Kalibukbuk, Aneka and Banyualit (Figure 6.1). We intended to conduct separate semi-structured interviews with each association leader. However, Kalibukbuk asked for a group interview that involved their leader, secretary, treasurer and field coordinator. The interview with Aneka was conducted with the field coordinator because he was the most knowledgeable and active person in the association. He was joined by the leader of the organisation half-way through the interview.

To avoid taking too much of each respondent's time, I planned to discuss 65 questions (Appendix 3) over three meetings as follows: 15 questions (first interview), 36 questions (second) and 14 questions (third). Each meeting was expected to last for less than an hour. Nonetheless, all the associations except for Kaliasem (which adhered to the original plan) decided to limit the interview to one meeting, which lasted for about 1.5 hours. All respondents were Balinese residents. I conducted the interviews in Indonesian, the national language in which all respondents and I were fluent. The interviews were recorded with a digital recorder after obtaining the respondents' written consent. No respondents declined this request.

This first phase of the interview(s) covered the history of each respondent's time in Lovina and their involvement in the industry, their opinions about why the dolphins were present and the changes they had seen in the dolphins, the tourists, the industry and the information given to the tourists. The second phase covered the dolphins (abundance, behaviour, distribution, areas of use and changes in areas of operation), the background of the association and its

members, the origin of their boats, pricing, other sources of income, boat ownership, organisational structure, interactions with other groups, marketing strategies, membership rules, strengths and weaknesses of the industry, the importance of the industry to the village (scale 1 to 10) and the importance of the industry to the individual boatman (scale 1 to 10). The third phase discussed the concerns of the industry and possible scenarios if dolphin abundance or behaviour changed in a manner that would negatively impact the industry. Questions about boat accidents at sea and other safety matters and suggestions for better management were also asked.

Interviews with association members

After completing the interviews with the association leaders, a subset of the members of each association were interviewed (Figure 6.1). The semi-structured interview questions were modified by: 1) omitting the questions about the management of the association(s) and 2) adjusting the other questions to make them appropriate for a single boatman respondent. The second interview covered 64 questions (Appendix 4). One of the management questions invited the interviewee to suggest operational changes to improve dolphin watching tourism in Lovina. After the eleventh respondent suggested limiting the number of boats around a group of dolphins, I developed a follow up question that asked interviewees to indicate the number of boats that he felt comfortable with when around a group of dolphins. To avoid prompting the respondents, this supplementary question was only asked when the respondent mentioned regulating the number of boats.

These interviews were conducted in December 2009 with 28 respondents (nine from Kalibukbuk, six from Kaliasem, seven from Aneka and six from Banyualit). Respondents

often asked to be interviewed in pairs. However, because I wanted to capture each boatman's opinions without peer influence, my team and I conducted two interviews at the same time.

Two teams of two researchers interviewed two boatmen at the same place and at a comfortable distance apart (so no one could hear the other's conversation). The interviews were conducted in Indonesian. The interviews were recorded after obtaining each respondent's written consent. Two of the 28 interviewees did not consent to recording; their responses were written down during the interviews.

6.2.3 Stakeholder workshops

In April 2010, I presented the summary information obtained from the above interviews, our tourist questionnaires and boat surveys to: 1) three community workshops with the dolphin boatmen (i.e., Kalibukbuk, Kaliasem and Aneka), and 2) a multi-stakeholder workshop in the Regency capital Singaraja that also included local government representatives (Figures 6.1 and 6.2). The workshops were conducted in Indonesian. The interviews were recorded using digital recorders after obtaining the participants' oral consent.

The community workshops were conducted in beach locations. To optimise participants' involvement, the use of computer-based tools was deliberately avoided. I adopted the Metaplan Method (Habershon 1993) and presented the results verbally in Indonesian, guided by thematically coded colour cards that were attached individually to a wall or whiteboard. After the presentation, each participant was invited to identify three topics per theme (Figure 6.2) that he wished to discuss further using colour-coded stickers (four stickers for three themes, totalling 12 stickers per boatman). The five topics identified as of greatest interest for

each theme were then discussed further. Details of this technique are explained in Appendix 5.

My supervisors (Prof Helene Marsh and Dr Alastair Birtles) came to Lovina to assist with the stakeholder workshops. To accommodate schedules, we conducted the workshops in the following order: Kalibukbuk, Kaliasem and the government-facilitated workshop. During the workshops, I summarised the conversation in English to assist my supervisors who in turn helped the workshop processes by giving encouraging overviews and comments on the participants' ideas and the overall workshop processes. The workshop with the Aneka boatmen was conducted a few days after my supervisors returned to Australia.

6.2.3 Data analyses

Interviews

The interviews with both the association coordinators and the boatmen were transcribed verbatim in Indonesian. Ten transcripts were translated from Indonesian to English to assist Marsh and Birtles' comprehension of their content. Because I am fluent in Indonesian and English, I analysed all transcripts in both languages using both quantitative and qualitative methods. Descriptive statistics (SPSS ver 19.0) were used to analyse the quantitative data, e.g., the boatmen's demography, contribution of the dolphin industry to the boatmen's monthly income, the importance of dolphin watching to the village and the importance of dolphin watching to the individual boatmen. Thematic analysis was used to analyse the qualitative data. This process involved creating categories through coding focusing on the context of the information during analysis (Joffe & Yardley 2004). As appropriate to the nature of the data, I conducted inductive coding, i.e., drawing themes from the raw information itself instead of from established theoretical ideas (Joffe & Yardley 2004). Small

codes were merged into a theme and, if required, clustered with other themes to form a broader theme.

In line with the concept of thematic analysis (Joffe & Yardley 2004), I identified both popular themes (i.e., mentioned by many respondents) and infrequent themes (i.e., mentioned only once or twice). Respondents were de-identified to protect their privacy. However, to assist in management discussions, I retained the identity of their association in reporting the results of the interviews.

Workshops

Thematic analysis was used to analyse the workshop results. Upon the completion of the last workshop with the Aneka boatmen (Figure 6.1), the workshop results were transcribed verbatim in Indonesian. The coding and thematic analyses were conducted in English. In the final analyses, management concerns and suggestions were thematically grouped following the themes resulting from the boatmen interviews. To promote data integrity (Caelli et al. 2003), any themes that had not been identified during the previous interview process were treated as new themes, unless they were combinable with previous themes.

Data integrity

The validity of qualitative research does not rely on sample size *per se*, although too small a sample might, in some cases, sacrifice data richness (Sandelowski 1995). Instead, qualitative research should stop when the data are saturated (Morse 1995; Sandelowski 1995; Marshall 1996; Caelli et al. 2003). In line with data saturation theory (Morse 1995; Caelli et al. 2003), I selected several management-related questions to determine whether the responses had reached saturation. These questions included questions about: 1) the dolphin searching

strategies adapted by the boatmen, 2) changes in the behaviours of dolphins since the boatman joined the industry, 3) suggestions to improve the industry and 4) his reaction to dolphin watching codes of practice. Generally, I reached saturation after the 23rd interview or after I interviewed the members of three (out of the four) dolphin associations. After the 25th interview, no new themes that could not be combined with previous themes were found. My supervisors examined the data coding for the verification process.

6.3. Results

6.3.1 Insights into the industry

The Kaliasem Association (official name: *Sinar Bahari* or 'The Ocean Light'), which was established by artisanal fishers in 1987, is the oldest among the four dolphin associations in Lovina. The Kalibukbuk Association (official name: *Catur Karya Bhakti Segar*a or 'Four Devotional Works for the Ocean') was established in 1989. The Aneka Association (official name: *Wisata Tirta Aneka* or 'The Aneka Marine Tourism') was established in 1991, followed four years later by the Banyualit Association (official name: *Bhakti Segara* or 'Devotion to the Ocean'). The association coordinators advised that their membership usually reflected a potential member's home address. For instance, the members of Kalibukbuk association usually live in Kalibukbuk village. However, in recent years, some boatmen from other villages have joined the Kalibukbuk association because of their preference for its marketing system (see below).

In 2008/2009, the dolphin watching industry in Lovina had 179 dedicated tour boats distributed among the associations as follows: Kaliasem 49 boats, Kalibukbuk 58 boats, Aneka 48 boats and Banyualit 24 boats (see Figure 6.1). The number of boats did not always match the number of association members: Kaliasem had 49 members, Kalibukbuk 58,

Aneka 53 and Banyualit 21. The association coordinators explained that these discrepancies occur because several boatmen operated the same boat (Aneka) or several members own more than one boat (Banyualit). As explained in Chapter 5 Section 5.2.3, all associations operated licensing systems whereby a boatman was allowed to operate as an association member after purchasing his membership which also serves as an internal licence. The membership fee varied across the association: USD 27 (Kalibukbuk), USD 165 (Kaliasem), less than USD 1 (Aneka) and USD 110 (Banyualit). All associations had a moratorium on membership and no longer accepted new members. However, existing members could sell their membership for prices ranging from USD 270 (Aneka) to USD 890 (Kalibukbuk).

Interviews with the association members in April 2010 indicated that the average boatman had been operating for 14.3 years (se $\pm$1.7, range 3 months to 31 years). The boatmen's average age was 37.7 years (se $\pm$1.7, range 21 to 55). Generally, the boatmen had joined the industry when they were in their early 20s (mean 23.6 years, se $\pm$1.4, range 11 to 41). A quarter of respondents had secondary school education (12-15 years old, the equivalent of Year 7 – Year 9 in Australia), while almost 40% of them did not complete or attend secondary school. About 32% of respondents had high school as their highest education level (16-18 years old, the equivalent of Year 10 – Year 12 in Australia).

Dolphin watching was the primary occupation of almost 60% of the boatmen. About 25% of them also fished for a living, while 18% of them had other jobs, e.g., teaching, farming and guiding or driving tourists. Almost 35% of respondents had previously worked in other tourism sectors; almost 18% used to be fishers. Almost 75% of respondents either changed their occupation or added dolphin watching to their existing job(s) because of the prospect of increasing their income.

During the interview, the association leaders were asked to identify the strengths of their industry (*'In your opinion, what are the strengths/good things about the dolphin watching industry in Lovina?'*). Members of all four dolphin associations identified the sunrise, seeing the dolphins close to the boats and the calm sea. Different strategies were used to market these strengths in the dolphin tour package. Kalibukbuk and Banyualit preferred a 'free-marketing' strategy which gave every member the freedom to find his own guests by actively offering his services to any tourist. This strategy allowed a boatman to keep marketing until 6:30am on the day of the trip. In contrast, Kaliasem and Aneka applied a roster system which gave a rotating subset of members an equal chance of obtaining guests on any given day. On average, this system meant that Aneka boatmen went out only about once a week. The roster system also enabled a boatman to know if he would take guest(s) the next morning, because bookings were usually finalised at least a day ahead. These two associations also allowed their members to conduct free-marketing occasionally, particularly when the boatmen conducted trips for repeat customers.

Some boatmen waited at the entrance gates to the beaches and offered their services to approaching vehicles. Anecdotal information suggested that this habit annoyed some tourists; the boatmen could be very persistent in their attempts to secure a trip. A Kalibukbuk respondent who did not approve of this method explained that he left the industry and became a full time fisher because of this dissatisfaction. At the time of interview (December 2009), this boatman took tourists to see the dolphins only during the high tourist season.

The association members were asked about the methods they used to find the dolphins *('How do you find the dolphins'* and *'What other clues or indications do you use to find dolphins?').* Scanning the horizon with their naked eyes was the most common method. The boatmen also

used clues such as birds (feeding dolphins are usually found in association with birds), jumping fish or the flashes of tourist cameras. The boatmen also kept a close watch on the behaviour of groups of tour boats, which tended to behave differently when watching rather than searching for dolphins (see Chapter 3 Section 3.3.1). When a group of boats was watching dolphins, they would either move around or make zig-zag movements. While searching, the boats moved straight ahead in parallel.

Each boatman was asked how important the dolphin industry was to his village on a scale of 10 *('How important is the dolphin industry for your village?')*. On average, the boatmen rated the importance of the industry to the village at 8.8 (se $\pm$0.34, range 4-10); > 85% rated 7 - 10. The most popular reason for this high rating was the additional income to the village (93%). When asked about the importance of dolphin watching to them individually, the boatmen averaged 9.2 (se $\pm$0.36; range 1-10, 93% 8 - 10). The most popular reason (93% of respondents) for rating the industry as very important was because it provided them with income (additional or sole).

The Aneka dolphin association was the only association that formally collaborated with major travel guides and agents to attract visitors. Their capacity to do this was enhanced by their rotating roster system that enabled travel agents to deal with the coordinator who offered them a fixed price. The travel agents usually prepared a tight schedule for their tourists, thus the dolphin tourists taken by the Aneka boatmen usually had to return to the beach by 7:30am. Assuming an average initial search time of 36 min from 6am (Chapter 3 Section 3.3.1), the tourists and the boatmen had a maximum of 30-45 min to watch dolphins before they headed back to the beach. This schedule only worked if the dolphins were located quickly. However, there were days when the boatmen had to spend almost an hour before

they found the animals, after which the pressure to maximise encounter time before returning to the beach forced some boatmen to prioritise the opportunity for the visitors to interact with the dolphins over the dolphins' welfare (see Chapter 3 Section 3.3.1).

Although the other dolphin associations also worked with travel agents, negotiations tended to be conducted with individual boatmen. For instance, Kalibukbuk boatmen had their own contacts with independent small travel agents who typically developed individualised tour packages that were not so tightly scheduled, and were thus more accommodating of the variable time required to locate the dolphins.

6.3.2 Management concerns

Managing encounters with the dolphins

The association members were asked to identify any problems they had encountered with other boatmen during their dolphin trips. 'Collisions with other boats', 'boats cutting across the dolphins' route' and 'speeding boats' were the most frequent complaints. A few boatmen also complained about 'other boats cutting across their boats'. One boatman was particularly concerned with the habit of 'boats cutting in front of the dolphins':

> *'Sometimes a boat cut my way, or hit my boat. I often reminded them to turn off the engine or lift the propeller. Some listened, some just didn't care.'*

My team and I asked about the possibility of limiting the number of boats *('Should there be any limit on boat numbers at Lovina? What do you think that limit should be? Higher, about the same as now, or less?').* The coordinators of all associations responded that this option

would be difficult to implement, although the coordinator of Kaliasem agreed that they must limit the number of boats:

> *'If there are too many boats, it's possible that the dolphins won't visit Lovina anymore. We must limit the number of boats; no more additions. It will also avoid too much competition'.*

The Kaliasem leader also stated that it would be difficult to reduce the number of boats because each boatman had purchased a licence to obtain association membership. This sentiment was echoed by coordinators of the other associations. However, all associations reported that they had no intention of expanding their membership because of the lack of boat parking space on the beach. The coordinator of Kalibukbuk questioned whether the number of boats influenced dolphin behaviour because of the short daily interactions with the animals:

> *'I don't think that the boats influence a lot. The boats are not there for too many hours anyway.'*

The association coordinators were asked about the approach distances between the boats and the dolphins and asked if this distance should be limited *('Should there be any limit on the distance between boats and dolphins at Lovina? What do you think that limit should be?').* The Banyualit and Kalibukbuk coordinators admitted that they had 'no rules on a minimum approach distance'. Kaliasem was the only association to advocate the desirability of limiting how close the boats should approach the dolphins. Nonetheless, the coordinator explained that the rationale for such a limitation would be to remove any advantage associated with

engine power rather than to address animal welfare concerns. The Aneka coordinator claimed that the boats crowded closely around the dolphins only when a small number of dolphin groups could be located and that the boats spread out if they found dispersed groups of dolphins.

Association coordinators were given several questions about the potential maximum viewing duration and the possibility of having staggered departure times (‘*Do you think it would be appropriate to limit the viewing duration? What about different times of departure for dolphin watching? e.g., some boatmen depart at 6am, some at 7am, and some departing at 8am?’).* Generally, the associations allowed their boatmen to extend the viewing time if they found the dolphins late into the morning. The heat of the morning sun in Lovina was a natural limitation; by 9am the heat was considered too harsh for most tourists. ‘Splitting the departure time’ (e.g., 6am and 7am) was not an acceptable option for some boatmen who wished to promote the sunrise as a feature of their dolphin tour. However, others were indifferent about ‘split departure times’ provided they were acceptable to their guests.

Other matters

‘Concerns about safety at sea’ often emerged during interviews. Both association coordinators and boatmen lamented that many boatmen could not swim. They also complained about the absence of an officially trained Search and Rescue team for Lovina. Life jackets were rarely observed in Kalibukbuk prior to June 2009 when the equipment was purchased at the instigation of that association’s new coordinator who was concerned about the increased incidence of maritime accidents. When I visited Lovina in April 2010, almost all Kalibukbuk boats had been equipped with life jackets. However, when I left Lovina in the

same month, the region still had no dedicated Search and Rescue (SAR) team. No boatman had received formal first aid or life-saving training.

Interviews with association members revealed that they were concerned about the 'persistent beach vendors' who attempted to force their products on dolphin tourists. They also disliked 'the sea and the beach being littered with garbage' delivered by the rivers from upstream villages or left on the beach.

Some Kaliasem boatmen (all were also fishers) complained about the 'decline in fish catch' over the years, but no records were available to substantiate their concerns. However, these fishers explained that they were not involved in dolphin tourism because of declining fishing stocks. They diversified into dolphin watching tourism because it was a more lucrative business than fishing.

6.3.3 Management suggestions

The association members were asked about how they envisioned dolphin tourism in Lovina in 10 years' time. About half of the respondents predicted that 'there would be more boats'. As a consequence, they were concerned that they would have to 'search further to find the dolphins' because the increased boat traffic might deter the dolphins. However, other boatmen did not think that the changes would affect the dolphins, or did not anticipate any changes. Some boatmen feared that 'fewer tourists would visit Lovina', thereby reducing their income.

During interviews with association coordinators, my team and I explained that dolphins in other parts of the world had reacted negatively to boat-based tourism (Constantine et al.

2004; Bejder et al. 2006; Stensland & Berggren 2007; Christiansen et al. 2010). We asked the coordinators if they anticipated such changes in Lovina. The coordinator of Aneka did not think that it would happen off Lovina because:

> *'Lovina is the home for the local dolphins.'*

The leader of Banyualit accepted that 'tour boats could alter dolphin behaviour'. However, he was still of the opinion that the dolphins would not leave Lovina.

The association coordinators were asked for suggestions to improve their industry. The Kaliasem coordinator suggested that:

> *'[they] improve [their] behaviours around the dolphins; not too close, don't chase them, don't disturb the animal's journey'.*

The respondents also recognised 'the need to improve boat behaviours' by, for example keeping to a minimum distance, not chasing the dolphins, slowing down, turning off the engine or lifting the propeller when the dolphins were around and not cutting across the dolphin's route or the path of other boats.

Each association member was asked to specify the number of boats that he felt comfortable with when around a group of dolphins as a means of identifying a possible limit for a code of conduct. The boatmen's answers suggested that they were most comfortable with an average of 13.6 boats around a group of dolphins (sd $\pm$7.6, range 5 to 30, n=9), which is substantially less than the mean daily fleet size (34.5, see Chapter 3 Section 3.3.1). However, this number

still exceeded the number of surrounding boats the tourists generally preferred (10 or less, Chapter 4, Table 4.5).

My team and I also discussed the possibility of the dolphin associations developing and adopting a code of practice for dolphin watching in Lovina. Most boatmen supported the idea of developing and implementing such a code. Some respondents emphasized 'the importance of coordination among boat associations' in Lovina while others argued that 'the boats should be divided into several observation areas'. When asked about 'compulsory training' for new boatmen, the majority of respondents agreed that it would be a good idea. Some respondents specifically asked for training in swimming, safety and Search and Rescue. Marketing, the need for a dedicated Search and Rescue team and the development and implementation of a dolphin tourism code of practice were the common themes identified when the interviewees were invited to make open ended closing statements.

6.3.4 Stakeholder workshops

The stakeholder workshops enabled the respondents to discuss these issues further in the context of some of the results in Chapters 3-5 (Figures 6.1 and 6.3). During the four workshops, the issue most frequently-identified for further discussion was 'encounter management', i.e., 'approach distance', 'driving behaviour', 'speeding and cutting across the dolphins' route'.

During the workshops, some discussion occurred about the distance between the boats and the dolphins. Kalibukbuk boatmen explained that when there was a large number of boats around the dolphins, the boats competed to get their guests as close as possible to the

dolphins (sometimes at the guests' request), even though this behaviour tended to reduce each vessel's interaction time with the dolphins.

In a discussion about speeding, some boatmen from Kaliasem explained that even if a boatman wanted to stay calm and quiet while watching the dolphins, the behaviour of the other boatmen would induce him to speed in order to provide his tourists with the opportunity to observe the dolphins (see Chapter 3).

All participants agreed that a code of practice for dolphin watching in Lovina must be 'approved and adhered to by all dolphin tour associations'. Three important initiatives were suggested during the meeting with Kaliasem: 1) turning off the engine (or, if this is impractical, lifting the propeller), 2) keeping their distance from the dolphins and 3) avoiding cutting across the dolphin's route. Participants at the four meetings (Figure 6.2) agreed in principle to turn off the engine and that compliance with the dolphin tourism code of practice was necessary. The participants also agreed in principle to keep the boats at a safe distance from the dolphins, although the actual minimum distance was not discussed. However, despite the boatmen's increased understanding that excessive numbers of boats resulted in less interaction time and less satisfied tourists, the participants did not appear to support a quota on the number of boats because of various reasons discussed in Section 6.4.1.

At the Aneka workshop (the last workshop), the participants raised two additional issues: 1) 'the role of travel agents' in the reduced observation time (see Section 3.1), and 2) 'the problem of old boat engines'. Many boatmen had old engines with a fragile starter rope. A boatman who attempted to turn off the engine while watching the dolphins was frequently concerned that he would not be able to start the engine again because the rope might break.

Several boatmen had experienced this problem, preventing their tourists from enjoying the dolphin tour. The boatmen eventually abandoned the practice of turning off the engine and minimised acceleration instead.

'Garbage' was the most frequently identified non-dolphin issue during the workshops. 'The absence of a designated, trained Search and Rescue (SAR) team in Lovina' was another concern. The participants stressed the need for training for boatmen in search and rescue techniques, codes of practices, basic English and swimming.

The government-facilitated workshop was designed to generate broad stakeholder feedback. Thus, it was attended by the four dolphin associations, the village leaders and government officers from the Cultural and Tourism Agency and the Marine and Fisheries Agency. The topics discussed in this workshop were similar to those identified at the association workshops. The presence of the two government agencies provided the opportunity for information exchange between the boatmen and the government officers. The Head of the Tourism Agency underlined the importance of dolphin tours in Lovina to other stakeholders (e.g., accommodation and restaurants), while the Fisheries officer acknowledged the importance of conserving the local cetacean resources. The event also provided a rare opportunity for members of the four associations to meet.

The villagers agreed with our explanation that the dolphins and the visitors could not associate a boat with a village, thus it was important that all ports/associations established an agreed dolphin tourism code of practice. After the workshop, the Kalibukbuk coordinator informed us that he was ready to collaborate with the Kaliasem and Aneka coordinators to better coordinate dolphin watching in Lovina.

Figure 6.3 Dolphin boatmen deciding on topics they would like to discuss during the stakeholder meeting in Kalibukbuk, April 2010

6.4 Discussion

The interviews and stakeholder workshops confirmed that the Lovina dolphin watching industry is very important both for the villages and individual boatmen. However, the boatmen considered the personal benefit to be higher than the community benefit. I conclude that the boatmen were not aware of the wider economic significance of their industry to their regency (see Chapter 5).

The boatmen were concerned about the long-term sustainability of their industry, especially encounter management and other operational issues such as garbage and safety. Although the boatmen agreed in-principle to better encounter management (including driving behaviour, speed limits, a minimum approach distance and not to cross the dolphins' route), they resisted the concept of limiting the number of boats.

As briefly discussed in Section 6.1, no formal cetacean watching guidelines exists in Lovina or other parts of Indonesia. Passenger capacity (maximum four passengers per *jukung*) is the only condition applicable in Lovina; the dolphin watching cooperatives agreed on this restriction for reasons of safety and profit equity. The maximum allowable numbers of boats or minimum approach distance to a school of dolphins are not regulated.

Protocols for driving behaviour and minimum approach distances feature in most national codes of practice or regulatory measures for cetacean watching; the number of boats and the maximum interaction time are often not limited. All the guidelines, regulations and international agreements reviewed by Carlson (2010; see also Table 6.2) stipulated approach protocols and driving behaviour that included reduced speed (mean 6.6 knots (se±0.7, mode 5) for developed countries and mean 4 knots (se±0.4, mode 5) for developing countries) or turning off vessel engines in the vicinity of the cetaceans. Although most Lovina boatmen agreed to limit their speed, some boatmen are likely to find it challenging to adhere to such a requirement because the fragile starter ropes of their old engines made it risky to turn off their engine when in proximity to the animals.

All developed countries also include a minimum approach distance in their regulations or guidelines (mean 70 m (se±6.6, modal 100)); only one developing country (Tanzania) did not specify a minimum approach distance (Carlson 2010, Table 6.2, see also Chapter 3). From an operational perspective, implementing a minimum approach distance should be possible in Lovina with appropriate training. Initially, I had a problem in convincing the Lovina boatmen of the practicality of the Australian standard (50 m, Department of the Environment and Water Resources Australia 2005); the boatmen claimed that 50 m was too far for the tourists to see the dolphins properly. When I let them use my digital range finder, they realised that

this distance was appropriate for viewing dolphins (see also Chapter 7 Section 7.3.2). This finding is not novel as many people find it difficult to judge distances over water; boat captains that took tourists on whale watching trips in Hawaii also experienced significant errors in distance estimation (Baird & Burkhart 2000).

Thirteen of the countries or territories (31%; 9 developed and 5 developing countries) reviewed by (Carlson 2010, Table 6.2) did not limit the interaction time between tour boats and cetaceans. The countries that imposed a time limit generally recommend a maximum of 30 min interaction time (average 32 min (se $\pm$5.1) for developed countries and average 29.1 min (se $\pm$ 2.2) for developing countries). The surface time for dwarf spinner dolphins at Lovina is already short (on average less than two minutes; Chapter 3 Table 3.4). Thus stipulating maximum interaction times is probably less urgent than the other aspects of encounter management. However, as previously discussed in Section 6.3, the need to return visitors to the beach by 7:30am often caused the dolphin boatmen to speed and to position the tourists as close as possible to the dolphins to increase tourist satisfaction. Thus, I consider that speed and distance management are the most crucial aspects of encounter management at Lovina (see also Chapter 3).

Table 6.2 Matters included in cetacean watching codes of practice by Carlson (2010)

Themes	Number of developed countries (total=20)			Number of developing countries (total=22)		
	No (n)	**Yes (n)**	**Mean of variable limit**	**No (n)**	**Yes (n)**	**Mean of variable limit**
Driving behaviour (with average speed limit in knots)	0	20	6.6 (se±0.7, mode 5, n=13)	0	22	4 (se±0.4, mode 5, n=7)
Approach distance (m)	0	20	70 (se±6.6, mode 100, n=20)	1	21	138.9 (se±9.5, mode 50, n=19)
Encounter time limit (minutes)	9	11	32 (se±5.1, mode 30, n=10)	5	17	29.1 (se±2.2, mode 30, n=17)
Number of encounter fleet size vessels	8	12	2.6 (se±0.2, mode 3, n=12)	5	17	1.9 (se±0.18, mode 2, n=15)

6.4.1 Management of fleet size

The term 'number of boats' is ambiguous in the cetacean watching industry. As has been explained in Chapter 3 Section 3.2, the term may variously refer to: 1) total fleet size: the number of boats in the fleet, in this case 179 licensed boats; 2) daily fleet size: the maximum number of boats going out at any given day; 3) encounter fleet size: number of boats around a school of dolphins (see Carlson 2010) and 4) the observed fleet size, i.e., the observed number of boats on the water at any given time (including vessels travelling between schools and vessels observed on the horizon). The International Whaling Commission considers that limiting the encounter fleet size is an important component of encounter management (see Carlson 2004). Regulations generally specify a maximum encounter fleet size of three vessels (mean 2.6 (se ±0.2)) for developed countries and two (mean 1.9 (se ±0.18)) for developing countries (Table 6.2). I have chosen to consider all four aspects of the fleet together here as they are not independent.

Nonetheless, because we only talked about 'the number of boats' during the workshop, it is likely that the boatmen were confused by this ambiguity. In view of the importance of this industry to the local economy and to themselves (Chapter 5), the reluctance of the boatmen to consider a fleet size reduction is understandable. Because the number of boats has been shown to negatively alter dolphin behaviour (Berrow & Holmes 1999; Constantine et al. 2004; Stensland & Berggren 2007; Williams & Ashe 2007), I regard controlling the encounter fleet size in Lovina as central to sustainable dolphin watching.

Inspection of dolphin watching guidelines and regulations (Table 6.2) suggest that limits on actual fleet size, daily fleet size or encounter fleet size are less accepted worldwide than encounter controls. A total of 13 countries or territories (31%) did not include a quota on the fleet size (8 developed and 5 developing countries). Such a limit would be particularly difficult to implement at Lovina. Lovina has a very large daily fleet size (up to 100 on a busy day) compared with other cetacean watching operations. Limiting the daily fleet size would reduce a boatman's chance to operate on any given day and, by extension, his takings (Chapter 5). Nonetheless, there is clearly considerable latent effort in the fleet. The maximum number of boats I counted on the water was 98 out of a potential 179 (201 if fishing boats are included. The average number of boats on the water per day (34.5 – Chapter 3 Section 3.3.1) was only 19% of the dedicated fleet.

Limiting the number of dolphin tour boats at Lovina may have to be addressed in a staged process. Limiting the encounter fleet size should be more difficult to regulate than the daily fleet size or the total fleet size due to the boatmen's desire to provide their guests with maximum interactions with the dolphins. The maximum encounter fleet size could presumably be stipulated as part of a voluntary code of conduct focused on encounter

management. In accordance with the mean encounter fleet size acceptable to the boatmen we interviewed (mean 13.6, sd ±7.6, range 5 to 30), approximately 15 boats per group of dolphins is suggested in this thesis (see also Chapter 7 Section 7.3.2 for the detailed calculation).

A shared licencing and tradeable daily permits may be options for limiting the daily fleet size. A shared licence system would require the profit to be divided between the licence owners according to an agreed system. For instance, a number of boatmen (two is suggested) share a boat licence and, by consequence, share the boat as well (the same *jukung* used every day in Lovina). From the boatmen's perspective, having only one boat to manage (instead of two) could reduce the cost of boat maintenance. However, because the aim of a shared licence is to reduce the daily fleet size, two boatmen who share the same licence cannot take tourists on the same day. To compensate for their loss, the following strategies are recommended: 1) the admission fee is increased to cover the 'loss'; 2) the two boatmen must not have a large overlap between their usual schedule (e.g., one is usually active only every first and third week and the other every second and fourth week, or one person is only active on the first half of the week and the other the second half of the week). Having both boatmen from the same association would simplify this arrangement.

A tradeable permit is 'a transferable right to a common pool resource' (Ellerman 2005), which is commonly applicable in pollution control (Tietenberg 1995) or in fisheries as Individual Transferable Quota (Grafton 1996; Ellerman 2005). One of the most commonly used type of tradeable permit is 'allowance trading' (Ellerman 2005), which can be modified for Lovina. A system of tradeable daily permits could operate as a daily queue ticket for Lovina. In this system, a boatman may own the right to operate on a particular day based on

'first come, first served' basis. Only a limited number of tickets (allowable permits) would be available, encouraging the boatman to book at least one night in advance for the following day's departure. Such a system would require consequential changes to the marketing systems that would presumably be more easily accommodated by Kaliasem and Aneka's roster systems than the systems of the other associations. The introduction of such systems would be demanding, particularly for illiterate boatmen and would require considerable investment in building the leadership capacity of the associations.

The total fleet size in Lovina is already capped by limited landing space on the beach. However, should it deemed necessary in the future, reducing the total fleet size would almost certainly be the most challenging and expensive change to implement, although examples from developed countries e.g., whale shark tourism in Ningaloo, Australia (Davis et al. 1997) are available. Gjertsen and Niesten (2010) provided examples of economic incentives for marine conservation efforts operating in several developing countries including: 1) cash incentive payments; 2) scholarships in exchange for changed behaviour; 3) grants to develop alternative livelihoods; and 4) purchase and/or lease of licences or permits. The last one seems the most applicable to Lovina and would require a third party (government or, very likely, non-government organisation) to purchase the licence (and the rights to conduct dolphin tours) of some tour boats thus reducing the effective fleet size. The adoption of this approach would be facilitated by the considerable latent effort in the fleet and may produce little change on the water except in peak periods. There would need to be associated caps on the number of boats to prevent boatmen returning to the industry.

6.4.2 A Way Forward

The challenges discussed above need to be considered in the context of: 1) the lack of information on the status of the dwarf spinner dolphins (Data Deficient according to the 2010 IUCN Red List, (IUCN 2010)), 2) the decentralised nature of resource management in Indonesia that often has the unintended consequence of encouraging local governments to excessively exploit their natural resources (Aden 2001) and 3) the consequent lack of capacity and control at local level in Indonesia (Aden 2001).

Experience (Alder et al. 1994; Gjertsen & Niesten 2010) suggests that Indonesia would elect to adopt a top-down management approach in which the government or non-government organisations play an important role in the establishment of voluntary guidelines and subsequent regulation. A consequence of the decentralised management system is that the local environmental agencies are short of capital and capacity, which makes it unlikely that they would be able to take the lead in industry restructuring.

As of December 2010, the Buleleng Marine and Fisheries Agency, the government agency in charge of marine conservation in Buleleng Regency, was in the process of establishing the Central Buleleng Marine Protected Area at Lovina, focusing on the conservation of the regency's coral reefs and dolphins. This process potentially provides a vehicle for working with the boatmen to design dolphin watching codes of practice and to address the safety issues raised by the boatmen. Indonesia has an established national marine Search and Rescue Team (SAR) in Jakarta, with branches in provincial cities e.g., Denpasar. However, the government needs to invest in training appropriate personnel for a Lovina Search and Rescue team.

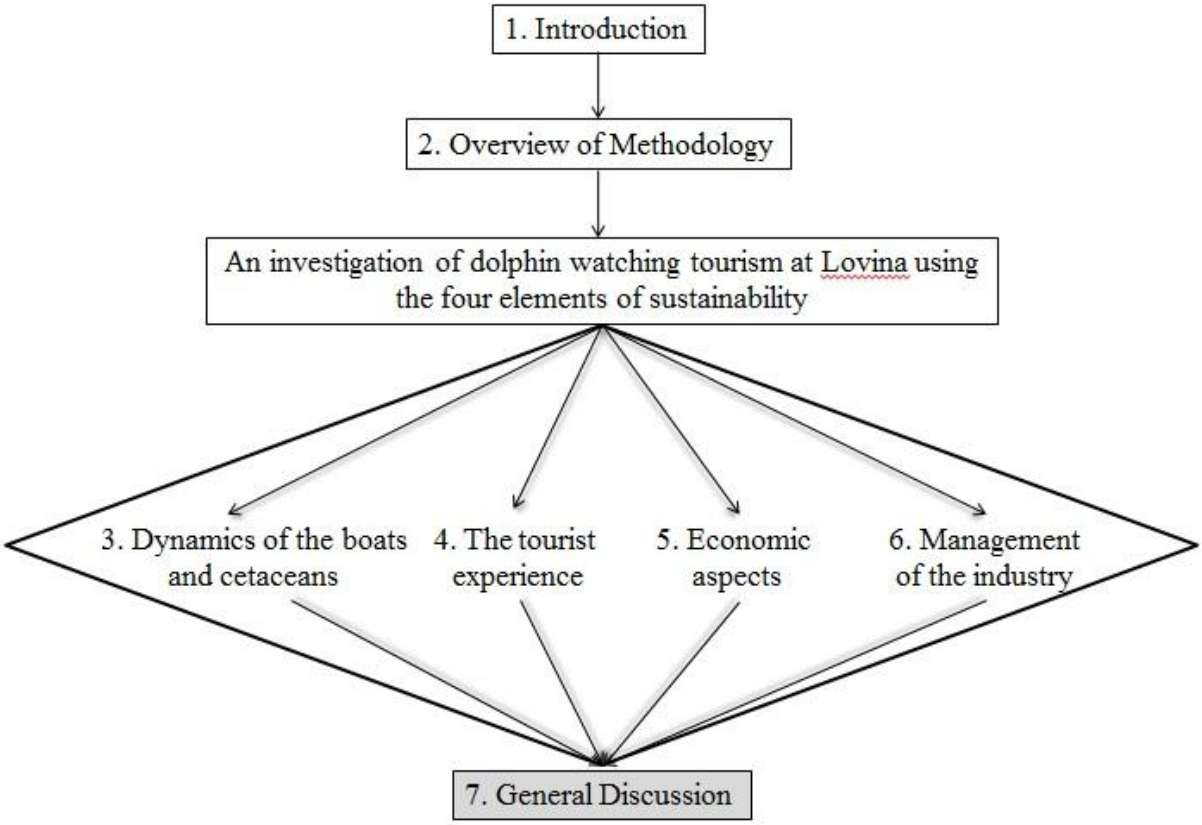
This chapter demonstrates that the core stakeholders (the boatmen and their associations) already recognise that there is a problem and are in-principle willing to improve their encounter management. The regency government (which should be able to garner support from the national level government) also knows there is a problem as do non-government organisations and at least one research institution. These stakeholders need to work together towards a sustainable dolphin watching industry in Lovina; the potential development of which will be discussed in Chapter 7.

Chapter summary

- The interviewees confirmed that the industry has some sustainability issues.
- The industry is essentially unregulated.
- The boatmen were concerned about the industry's long-term sustainability, especially the encounter management practices and other operational issues such as garbage and safety.
- Although the boatmen agreed in-principle to improved encounter management, they resisted the concept of limiting fleet size.
- Insights from primary stakeholders have the potential value in formulating operational marine resource management options in developing countries.

CHAPTER 7

GENERAL DISCUSSION



In Chapters 3-6, I described among other things the nature of the encounters between tour boats and cetaceans, tourist experiences, economic aspects of the industry and how the boatmen currently manage the industry. The sustainability of the Lovina dolphin watching industry has also been examined from the viewpoint of the four elements of sustainability. In this chapter, I synthesise the key findings of the four data chapters and discuss the implications of my study on the cetacean watching industries at Lovina and elsewhere in the world, particularly in developing countries. The theoretical frameworks of quadruple bottom line concept and the prism of sustainability are also revisited; actions are recommended based on the Precautionary Principle.

7.1 How I achieved the research objectives of my study

Chapters 3-6 describe the results of my comprehensive investigations into the sustainability of dolphin watching off Lovina. I investigated whether dolphin watching tourism at Lovina was sustainable from the biological, social, economic and managerial perspectives , threby addressing the overall objective of this thesis. I attempted to seek some answers by examining the industry from all four viewpoints. From the biological perspective, the encounters between the tour boats and the animals were described and quantified (Chapter 3; Objective 1). I also compared the Lovina operations with international best practice (*sensu* the Australian National Guidelines for Whale and Dolphin Watching 2005, Chapter 3; Objective 2). From the social perspective, the tourists' and boatmen's experiences and profiles were described in two separate chapters (Chapters 4 and 6, respectively; Objectives 3 and 4). Chapter 5 outlined the economic impacts of the industry on the boatmen and the village communities to improve understanding of economic sustainability (Objective 5). Finally, Chapter 6 examined the managerial perspective including the boatmen's opinions on the management of their main livelihood (Objective 6). In this final chapter I will briefly summarise my findings and, most importantly, discuss their implications for Lovina and the cetacean watching tourism industry both in Bali and other parts of the world, particularly developing countries. Figure 7.1 shows the flowchart of this chapter.

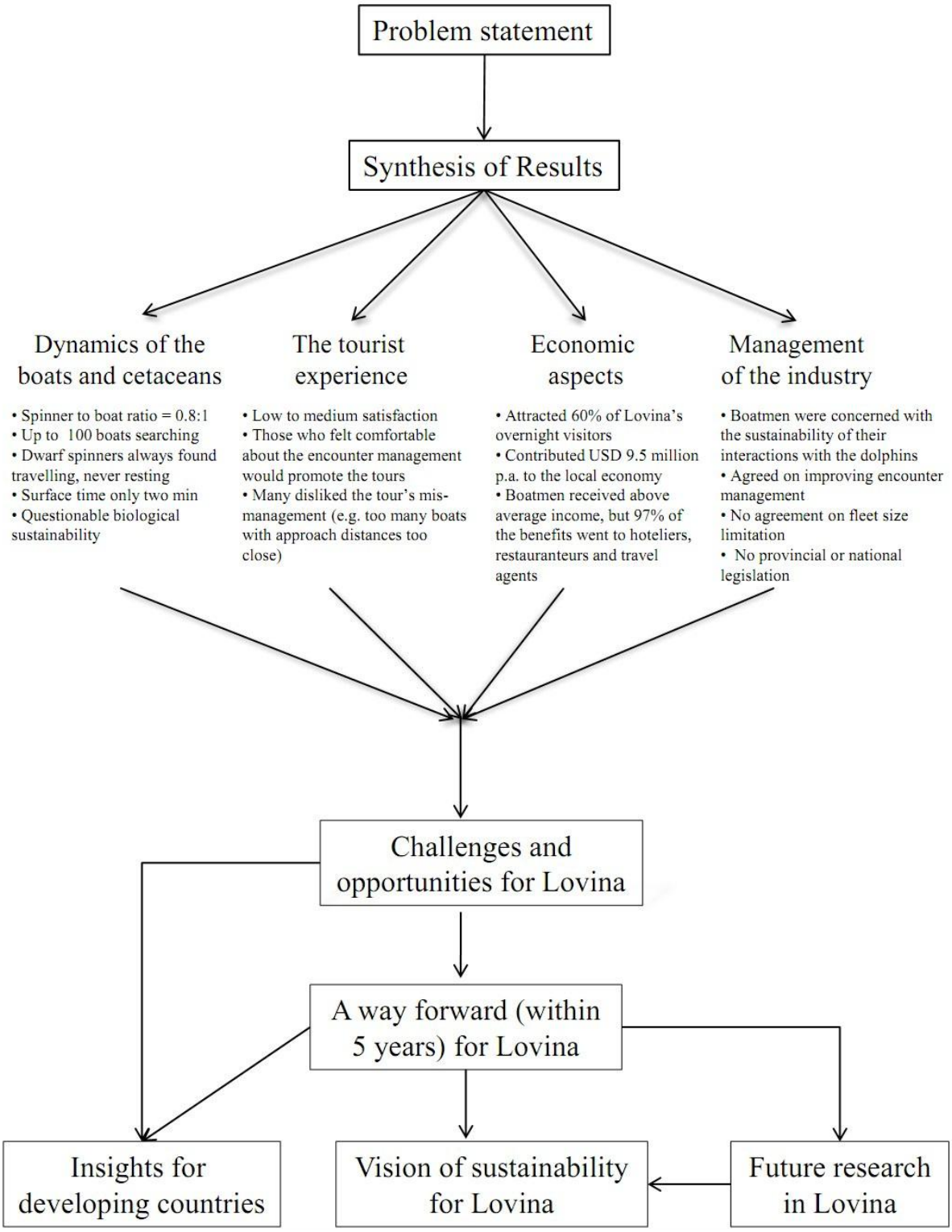


Figure 7.1 Flowchart of the general discussion

7.2 Synthesis of results

My examination of boat and cetacean data indicated that the biological sustainability of the dolphin watching industry in Lovina is highly questionable (Chapter 3). A school of dwarf spinner dolphins (approximately 10 animals per school) was usually hemmed in by at least 15 tourist vessels that were often at distances of less than 50 m from the animals. In an encounter, the number of boats generally outnumbered the number of dwarf spinner dolphins (median spinner-to-boat ratio = 0.8:1). Almost 100 tour boats could be observed searching for the animals during the high tourist visitation season. Their targets, dwarf spinner dolphins (*Stenella longirostris roseiventris*), were seen almost every day in predictable locations adjacent to the villages, suggesting that this species is likely resident in the area., although a photo-identification study is required to prove this assertion. The animals were always travelling when first sighted in the morning, and I did not observe any resting behaviour by the dolphins, although this may have been because of the restricted period of the day when observations were made. The surface time of a school of dwarf spinner dolphins at this study site was two minutes. Comparisons with the Australian regulations (Carlson 2010) and studies from New Zealand, Tanzania and the Philippines (Constantine et al. 2004; Christiansen et al. 2010; Sorongon et al. 2010) suggested that the boatmen's 'behaviours of concern' and crowding by boats may contribute to the constant travelling and the presumable habituation of the dwarf spinner dolphins to tourist vessels, although more research is needed to confirm this.

I also examined the questionnaires distributed to the tourists who attended the dolphin tours to understand their experiences, including satisfaction level, opinions and suggestions for the industry (Chapter 4). Dolphin watching tourism in Lovina generally attracted tertiary-educated international visitors. Two-thirds of the dolphin tourists came from Western

countries; the rest were from Asia. Tourist satisfaction ranged from low to medium. While there was no significant difference between the average satisfaction of Western and Asian tourists, the associated variables differed. The satisfaction of Western tourists was associated with encounter management, their preferred number of surrounding boats and the number of dolphins seen. Encounter management was the only variable associated with the satisfaction of Asian tourists. Western respondents disliked the mismanagement of the dolphin tourism (e.g., too many boats with 'behaviours of concern' (see Chapter 3 Section 3.2.2 for definition) and approach distances that were too close). Satisfaction was positively associated with the willingness to recommend the tour: Western respondents who felt neutral to very comfortable with the way their boatmen managed the dolphin encounters were more likely to promote the tour to others. As a consequence, the low to medium satisfaction levels of Western dolphin tourists could attract negative publicity to Lovina dolphin tourism from word of mouth and other sources.

Given the nature of the dynamics between the boats and the cetaceans, the low to medium visitor satisfaction level was to be expected. The analyses of impacts of this industry on the individual boatmen and the local economy were conducted to understand the extent of financial damage should visitors cease to join the dolphin tours (Chapter 5). The industry attracts at least 37,000 overnight visitors per annum (~60% of the Lovina's overnight tourists) who contributed up to USD 9.5 million p.a. in total direct expenditures (i.e., tickets, accommodation, meals, transportation, communication and souvenirs). At least 46% of the total direct expenditure was attributable to dolphin watching tourism in 2009/2010. The boatmen have an above average income but trip fees constituted only 3% of the total income generated by dolphin watching tourism; the remainder was spent on local businesses e.g., accommodation, restaurants and transport which are the substantial beneficiaries. As a

consequence of the economic importance of this industry to the boatmen and the villages, the boatmen must improve their dolphin encounter management to meet the expectations of highly educated international visitors. Because the industry also brings significant economic benefits to other business sectors, the sustainability of the overall industry is important to them. Hoteliers, restaurateurs and travel agents must also be included in future management strategies in Lovina. These beneficiaries could also assist the boatmen in improving their service (further discussed in Section 7.4.3).

Chapter 6 addressed various issues in the industry's current management practices and the processes the boatmen and my team undertook to reach common ground. My interviews with the boatmen confirmed that the industry was essentially unregulated. The boatmen were concerned about the industry's long-term sustainability, especially the encounter management practices and other operational issues such as garbage and safety. Although the boatmen agreed in-principle to improve their encounter management, they resisted the concept of limiting the size of the fleet. The general challenges, opportunities and possible solutions for Lovina and marine wildlife tourism in developing countries arising from the study are discussed below.

7.3 Challenges and opportunities for Lovina

7.3.1 Embracing the Balinese culture

Chapter 1 described the nature of *awig-awig* (the traditional Balinese codification system) in the governance of the Balinese society. Because *awig-awig* is essentially an agreed rule among members of an organisation, the norms/rules of each dolphin association in Lovina consiitute an *awig-awig*, which regulates various aspects of its operations ranging from member admission, membership fee, money lending business and sanctions. Thus, it is

technically possible to incorporate cetacean watching guidelines into a dolphin association's *awig-awig*, although I did not explicitly investigate this aspect.

In Chapter 1, I also briefly discussed *Tri Hita Karana* as the traditional Balinese sustainability framework. In the context of Lovina, *Tri Hita Karana* would require the harmonious relationship between the people (i.e., the boatmen and the tourist) and nature (i.e., the dolphins) to be promoted to foster the prosperity of humans (i.e., the boatmen, the tourists and other stakeholders such as hoteliers, travel agents and restaurateurs) based on the gratitude or responsibility to safeguard the resources that Nature/God has bestowed upon them (referring to the relationship between human and the Divine). Inclusion of *Tri Hita Karana* as a philosophical background in future discussions on better management of dolphin watching tourism in Lovina may become an effective cultural strategy. However, consideration of this aspect is beyond the scope of this thesis.

Nonetheless, *awig-awig* and *Tri Hita Karana* may not be applicable to all dolphin associations in Lovina. By tradition, the terms *'awig-awig'* and *'Tri Hita Karana'* apply only to a Balinese community that adheres to Hinduism. These concepts, therefore, are not applicable to the Kaliasem boatmen, all of whom embrace Islam. The Kaliasem boatmen are not original Balinese; they are descendants of the Bugis fishers in South Sulawesi (however, they do speak fluent Balinese and respect the local cultures). Far from practising destructive fishing that the Bugi fishers are famous for (Halim 2002), the Kaliasem fishers and boatmen were in fact the first association to formally embrace the idea of cetacean watching guidelines, to the extent that they proposed the three in-principle operational rules themselves (Chapter 6 Section 6.3.4). This positive inclination may most likely be attributed to the Kaliasem boatmen's main occupation as fishers. These boatmen are aware that speeding

towards dolphins would just make the animals disappear. An elderly Kaliasem fisher who had been a dolphin boatman for more than 20 years explained that *'New captains like to speed and cut through the dolphin's route, making the dolphins disappear'*. On the other hand, members of the Kalibukbuk, Aneka and Banyualit associations are original Balinese and were not fishers before joining the tourism industry. Instead, their former occupations were as tour guides or drivers, which encouraged them to put 'tourist satisfaction' (or at least what they thought as factors important to tourist satisfaction) before animal welfare considerations.

7.3.2 Management practices

Would a bigger boat be better?

Management of the fleet size is not a simple matter in Lovina. Analyses in Chapter 3 (boats) did not show a significant association between the encounter fleet size and the dwarf spinner dolphin's surface time or behaviour. Comparisons with other studies and with Australian regulations (Chapter 3) and Western respondents' negative attitudes towards excessive fleet size (Chapter 4) warrant the management of fleet size. During interviews with the boatmen, my team and I asked for their suggestions for managing the number of boats (Chapter 6). Nine boatmen suggested limiting the number of boats to an average of 13.6 around the dolphins (range 5-30). However, during stakeholder workshops, the boatmen did not agree to limit the number of boats. The possible economic reasons for this reluctance were explained in Chapter 5.

In Chapter 6, I explained the possible confusion surrounding the 'number of boats' concept that might have led to the boatmen's reluctance to manage the fleet size due to because this term is ambiguous (Section 6.4.1). I also explored several economic incentives for reducing daily and total fleet size in Chapter 6 (Section 6.4.1). However, encounter fleet size remains

the most complicated aspect to manage in Lovina. This concern is shared by expatriates in Lovina (mostly hoteliers, restaurateurs and shop owners) with whom I often interacted during my stay in the village. Replacing *jukungs* with larger[5] boats that carry more tourists was often suggested during my informal conversations with the expatriates. This idea seemed reasonable, because the deployment of larger-capacity boats may actually reduce encounter, daily and total fleet sizes in Lovina.

However, increasing the size of boats could have many other consequences such as massively reduced employment and a complete change to the nature of the experiences towards less authentic mass tourism, which is already available in many parts of the world. Dolphin watching tourism with a larger vessel exists elsewhere in Bali. The Bali Hai Cruises (Chapter 1 Section 1.4) is the only company that actively markets its dolphin cruise in the southern waters of Bali, although 14 other companies occasionally take visitors to view the dolphins in the same area. The Bali Hai Cruises operates a 12 m long *Ocean Rafting* (24 passengers capacity), which explores the choppy waters around the Bukit Peninsula using three 250 HP Yamaha engines. In terms of passenger satisfaction, the company's performance is better than Lovina. With approximately 3,500 visitors in 2008/9, the average visitor satisfaction level in Bali Hai was 8.74 out of 10 (n=5,715, see also Chapter 4 Table 4.5). Encounter fleet size in southern Bali is small compared with Lovina. During opportunistic observations with *Ocean Rafting* over 62 days, I once observed six vessels in a single encounter, although I usually only saw two other boats in addition to *Ocean Rafting*.

[5] For the sake of argument, 'large' here refers to a boat larger than a *jukung*, or more than 10m long, but still comfortable enough to maneuver around the cetaceans

With Bali Hai Cruises in mind, the suggestion that Lovina replace the *jukungs* with larger boats seems reasonable. However, several considerations make this suggestion impractical or undesirable without further investigation:

1) Altering the dimensions of tourist boats in Lovina involves a significant amount of funding that is unlikely to be available for all the boatmen unless external institutions (i.e., foreign aid) are involved. Without external support, only financially-capable boatmen would be able to convert the dimension of their boats, depriving the financially-disadvantaged boatmen of their livelihood.

2) Funding permitted; there is no guarantee that expanding boat dimension would reduce encounter fleet size. Instead, increased carrying capacity of the tourist vessel might trigger an increasing encounter fleet size because of the temptation for increased profit.

3) A possible solution to problem #2 would be limiting the encounter fleet size of the larger vessels. This suggestion is possible if each of the larger boats is co-owned by two to three boatmen. Although the boat dimension would be larger, the basic strategy for the boat sharing would be similar to the strategies for shared licences (Chapter 6 Section 6.4.1).

4) The introduction of larger boats is likely to diminish the significance of *jukungs* in the tour package. The dimensions of the *jukung* have been carefully designed for aesthetics and balance, such that if the size were enlarged, the balance would be disturbed. If the boatmen agreed to use larger boats, it is unlikely that they would

> build a larger *jukung* for fear of compromising the balance and the difficulty in launching the boat from the beach. Instead, they would build ordinary boats (without outriggers) that would require a jetty or a mooring system. These boats, although made of wood, would lack authenticity. Such a lack of authenticity would defeat the purpose of extending the dolphin tour to include the cultural aspects (as described in the previous section). Mr Bahruddin (former leader of the Kaliasem dolphin association) explained why using boats of larger dimension would be counter-productive: *"It is to conserve the traditional value of the jukung that we make ourselves."*

The idea of a larger boat was once proposed in Lovina. A few years ago, the managers of a local hotel attempted to operate a larger tour boat to cater for their own guests. The boatmen, who were not previously informed, did not like the plan. They conducted a rally against the hotel's decision, and eventually the hotel cancelled the plan. This case corroborates the arguments against installing larger boats as discussed above, because in essence the boatmen argued that they might suffer a possible loss of income and employment if the hotel's plan was embraced by other hoteliers. This experience also illustrates how the failure to include the boatmen in the decision making process would inevitably lead to project annulment. As this section shows, replacement of the *jukungs* with larger boats is considered impractical and undesirable.

Distance estimation

Despite the difficulties discussed above, indirectly managing encounter fleet size may be possible through approach distance management. Here I would like to acknowledge the process that the boatmen and I shared in distance estimation (see also Chapter 6 Section 6.4).

During my initial conversations with the boatmen, I explained that dolphin watching industries in other parts of the world applied a minimum approach distance of 50 m. Although I did not suggest that this was the specific distance that should be implemented in Lovina, many boatmen immediately objected because they considered 50 m to be too far away for their tourists to see the dolphins properly. I did not pursue the matter further; I realised that any code of practice would only be successful with the boatmen's support. However, one day when I was conducting one of my boat follow protocols, I lent my Bushnell digital range finder binoculars to my boatmen. I asked him to measure the distance between our boat and another boat. He was left in awe. Until then, he had not realised that distance perception at sea is different from distance perception on land, such that the animals were easily observed at 50 m approach distance.

Other researchers have acknowledged the differences between terrestrial and nautical distance estimation (Baird & Burkhart 2000). However, for this research, the experience recounted above was very important. It was the moment when I realised that the boatmen and I could actually work together; that the previous misunderstandings between us were mostly due to different perceptions of scientists and seamen.

Whenever possible during the remaining days of my boat surveys in Lovina, I continued lending my range finder binoculars. I did not manage to circulate the gear to many boatmen. However, I witnessed how those who used the binoculars informed their colleagues that approach distance management was actually achievable. During the government-facilitated stakeholder workshops in Singaraja in April 2010 (Chapter 6 Section 6.3.4), three out of four dolphin associations agreed in principle to limit their approach distance to the dolphins. I

believe that the simple act of lending the boatmen my binoculars may have paved the way to that particular agreement.

In 1994-1995, whale shark researchers in Ningaloo (Western Australia) conducted research on the satisfaction of visitors who joined whale shark tours (Davis et al. 1997). They found that the visitors were not very satisfied with their encounters due to the frequent fin-kicking among snorkelers, which was triggered by the close approach distance to the shark (about one meter away). Davis et al. (1997) then suggested the perimeter be expanded from one to three meters to reduce the crowding of swimmers around the perimeter, less fin-kicking and higher satisfaction rate among snorkelers. Most importantly, this strategy also resulted in less touching and disturbance to the animals, which was the primary objective of the suggested management revision.

The same principles can be applied in Lovina. Although during the stakeholder workshops (Chapter 6 Section 6.3.4) the Lovina boatmen had agreed to limit the distance from the dolphins, no definitive distance was agreed upon. If the boatmen were willing to formally adopt a 50 m minimum approach distance, this compliance would result in a closest tour boat perimeter of 314 m (a circle's perimeter formula is 2π r). The *jukung*'s end-to-end length is 10 m; which means that a 314 m perimeter would allow 31 boats along the perimeter. Space is important for making the tourists feel comfortable (Gillis et al. 1986; Yagi & Pearce 2007). In addition, space between each boat improves the safety to both the boatmen and the passengers (some boatmen did admit that too close an approach distance had caused some boat collisions, Chapter 6). I suggest that one boat body length (10 m) distance be placed between each boat. The 314 m perimeter would thus accommodate 15 boats around the dolphins. This number is, coincidentally, similar to the average number of boatmen's

description of an acceptable encounter fleet size (mean 13.6, range 5 to 30, n=9, see Chapter 6 Section 6.3.3). If the 50 m approach distance and one boat body length distance between boats were adhered to, the fleet would have to split into several encounter groups of approximately 15 boats per encounter, as opposed to aggregating just around one school of cetaceans. If only one cetacean school were available, the boatmen could also wait for their turn to view the animals outside the immediate circle of vessels. Thus, approach distance management would be an indirect approach to managing encounter fleet size and viewing duration.

7.4 A way forward for Lovina

7.4.1 Implementing a dolphin tourism code of practice in Lovina

The three in-principle agreements achieved during stakeholder meetings in Lovina and Singaraja provide a good starting point for better management of this industry (Chapter 6). For the benefit of this discussion, I reiterate the three principles: 1) turning off the engine/lifting the propeller; 2) keeping the boat's distance from the dolphins; and 3) avoiding cutting across the dolphin's route. I estimate that these agreements would need at least one year of constant community engagement and training before they are practised by all boatmen in Lovina.

The stakeholder meetings elaborated in Chapter 6 did not discuss the exact minimum approach distance. Thus, this matter needs to be addressed in the future, preceded by training the boatmen on distance estimation to obtain a collective sense of several distance scenarios (e.g., 30 m, 40 m and 50 m). Involving a high number of boatmen will be important to create collective understanding about estimating the distance, particularly because no boat is yet equipped with a digital range finder.

Before the boatmen can agree upon improving their encounter management, they must be properly informed. Speed limit estimation can be included in the distance estimation training to enable the boatmen to attribute the sound of their engines to a particular speed. In a way similar to the agreement on limiting approach distance, an understanding of the impacts of a particular speed on the animals may pave the way for an agreement about speed limits. Considerations behind the elimination of 'behaviours of concern' must be explained properly during training. The boatmen must receive sufficient information about why certain approach strategies are detrimental to the dolphins.

Given that no boat is equipped with digital range finders or speedometers, investment on tools such as a Global Positioning Systems (GPS) and digital laser range finders for each dolphin association could be beneficial for ongoing training. However, the association coordinators must be committed to regularly circulating these tools among their members.

Once the three in-principle agreements are in place and practised, the next step in Lovina would be to expand the agreements into a more comprehensive dolphin tourism code of practice. Once again, internal and combined association meetings should be conducted to report on the progress of boatmen training and whether the three agreements could be expanded further. An example of a dolphin tourism code of practice that might be developed from the three in-principle agreements is as follows:

1) Turn off the engine/lift the propeller while waiting for the cetaceans to surface and in the presence of the animals;

2) Keep the boat at a minimum active distance of [insert agreed number] from the dolphins (only for boats that cannot turn off their engines for practical reasons, e.g., the old starter rope or to avoid seasickness);
3) Limit the boat speed to [insert agreed number] knots;
4) Avoid the following behaviours: a) cutting across the dolphin's route; b) following the cetacean school from behind; and c) the J approach (the 'boat blocks the path as it goes in front of the individual or the pod' (Sorongon et al. 2010, p. 84));
5) Limit the encounter fleet size of [insert agreed number] boats around the perimeter of the No Approach Zone at any given time; and
6) Keep the interaction time to a maximum of [insert agreed number] minutes.

During the meetings, each association could be asked to codify the agreed guidelines in their internal rules or *awig-awig* (*sensu* Chapters 1 and 2) Inter-association meetings could also be conducted to communicate these codifications. During such meetings, the associations could assign a person or two as a 'sheriff' who would monitor the dolphin tourism code of practice implementation. A possible way to fund the monitor is described in Section 7.4.2.

The code of practice could be adopted at national level by applying it to emerging cetacean watching sites (such as in Raja Ampat and Kaimana, West Papua). With the consent of the boatmen, the local Lovina guidelines could also be legally codified at regency level. It may take a few years, but hopefully Indonesia will eventually adopt national guidelines or laws on cetacean watching tourism. Figure 7.2 describes a staged approach for the implementation of a dolphin tourism code of practice in Lovina and its strategies for adaptation at local and

national level and incorporation into legal codification. Changes like this are not immediate; a sense of ownership and a broader acceptance by stakeholders in these processes is important.

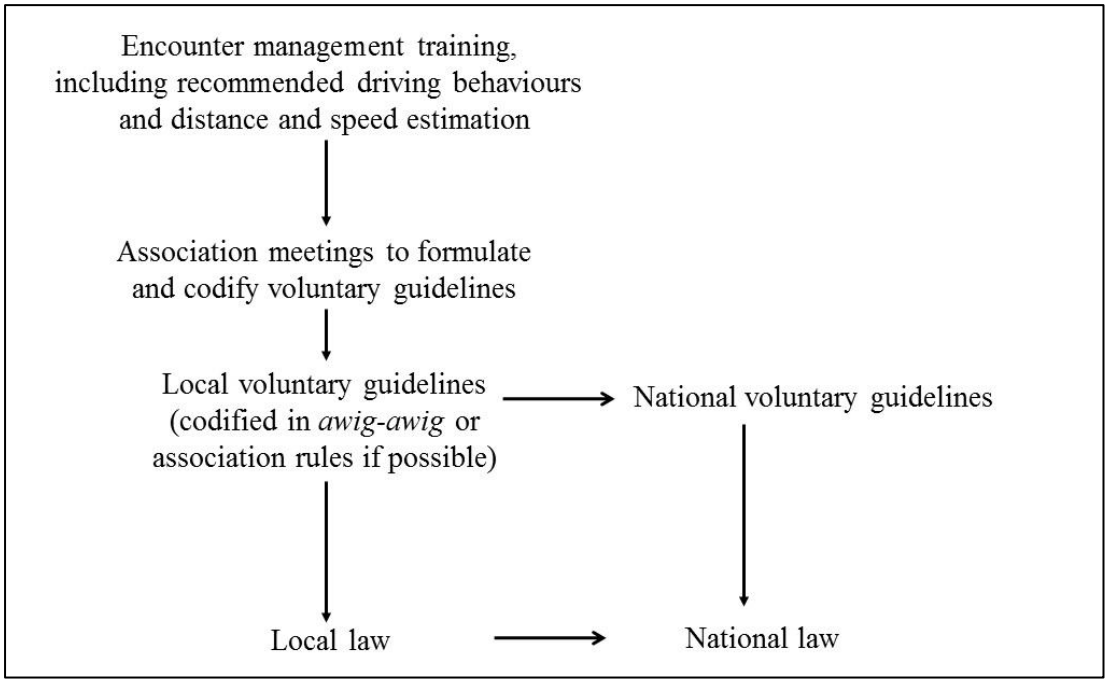


Figure 7.2 Staged approach for a dolphin tourism code of practice in Lovina and the adaptation strategy at national level

7.4.2 Economic incentives

Economic incentives will play an important role in creating a better managed dolphin watching industry in Lovina. For instance, an incentive could be created for every association that agrees to codify the guideline in its internal rules or *awig-awig*. These associations could be granted new starter ropes for all members to encourage turning off the engines in the presence of dolphins without experiencing engine disruption afterwards because of fragile old starter ropes (see Chapter 6 Section 6.3.4). Additional funding could be directed to providing the association with several laser range finders and GPSs to be circulated among members for practical distance and speed limit estimation. Funding[6] for such endeavours might be sought

[6] It will require approximately $19,000 as follows:
$600 x 4 association x 5 range finders per association = $12,000

from Indonesia-based international non-governmental organisations that are interested in marine conservation.

Economic incentives could be introduced to reduce the daily fleet size. In Chapter 6 (Section 6.4.1), I discussed several management tools for regulating the daily fleet size (i.e., shared licences and tradeable daily permits) and total fleet size; those arguments are not reiterated here. The daily fleet size could also be managed by increasing the tour admission fee (ticket) over several stages. In the first stage, the daily fleet size would be limited to an agreed number by way of tradeable daily permits or a rostering system (Chapter 6 Section 6.4.1), making a boatman unlikely to take tourists over two consecutive days. Tour admission fees could be raised to offset the boatman's possible income reduction. In the second stage, a rigorous willingness-to-pay study (see e.g., Walpole et al. 2001 for a study on the willingness-to-pay of tourists in Komodo National Park in eastern Indonesia) and consent from all associations would precede the raising of admission fees. The last stage would be the implementation of increased admission fees with a price discrimination policy, i.e., the higher fees would only apply to foreign tourists. Domestic tourists and expatriates would be exempted from the fee rise. In theory, a price discrimination policy is useful for encouraging the participation of tourists from lower income classes (Walpole et al. 2001; Cohen 2002). However, Walpole et al. (2001) warned against too large an increase in admission fees as they could cause a decline in visitation. Thus, any rise of tour admission fees in Lovina should be calculated as the optimum increase that would still benefit the boatmen (who would otherwise have experienced reduced income) while heeding the result of the willingness-to-pay study and the consent of the boatmen.

$100 x 4 association x 5 GPS per association = $2,000
Starter rope for 180 boats (3-4 ropes per boat) = $5,000

A conservation fund could be included in the willingness-to-pay study. The study in the Komodo National Park suggested that setting aside a portion of the hypothetical increased fee for conservation initiatives would encourage visitors to pay a higher entrance fee (Walpole et al. 2001). Tourists' willingness to pay into a conservation fund could be included in the willingness-to-pay study, perhaps with a particular mention that the funding would be used, for example, to pay a designated person to monitor the implementation of the dolphin tourism code of practice in Lovina (see Section 7.4.2).

7.4.3 Vision of sustainable dolphin watching tourism in Lovina

Figure 7.3 summarises possible management steps that could be implemented with a view to achieving sustainable dolphin watching industry in Lovina. The five elements are: 1) the development of a dolphin tourism code of practice; 2) encouraging involvement of hoteliers, restaurateurs and travel agents; 3) management of daily and total fleet size (see Chapter 6); 4) expansion of tours by promoting *jukung* and other aspects of the tours; and 5) research. Various research components employing the quadruple bottom line and prism of sustainability concepts were used to formulate recommendations in this research. It is thus proper that the same framework should be used again to conduct research that will inform future management decisions (see last section of this chapter).

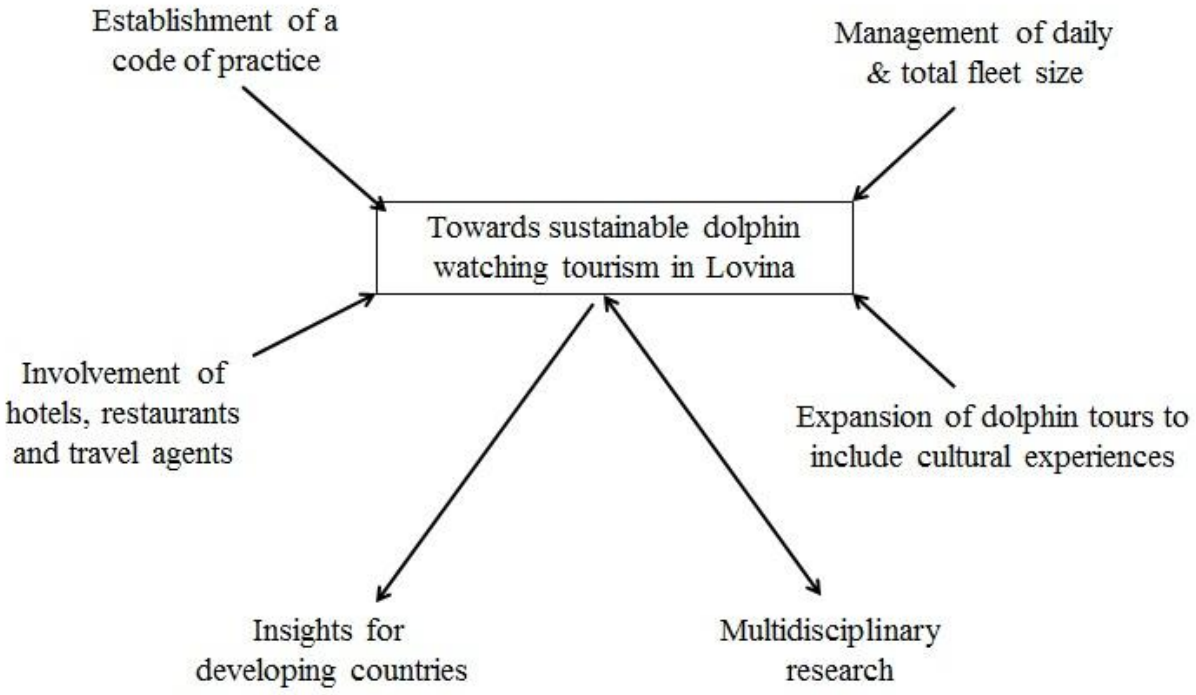


Figure 7.3 Management steps towards sustainable dolphin watching tourism in Lovina

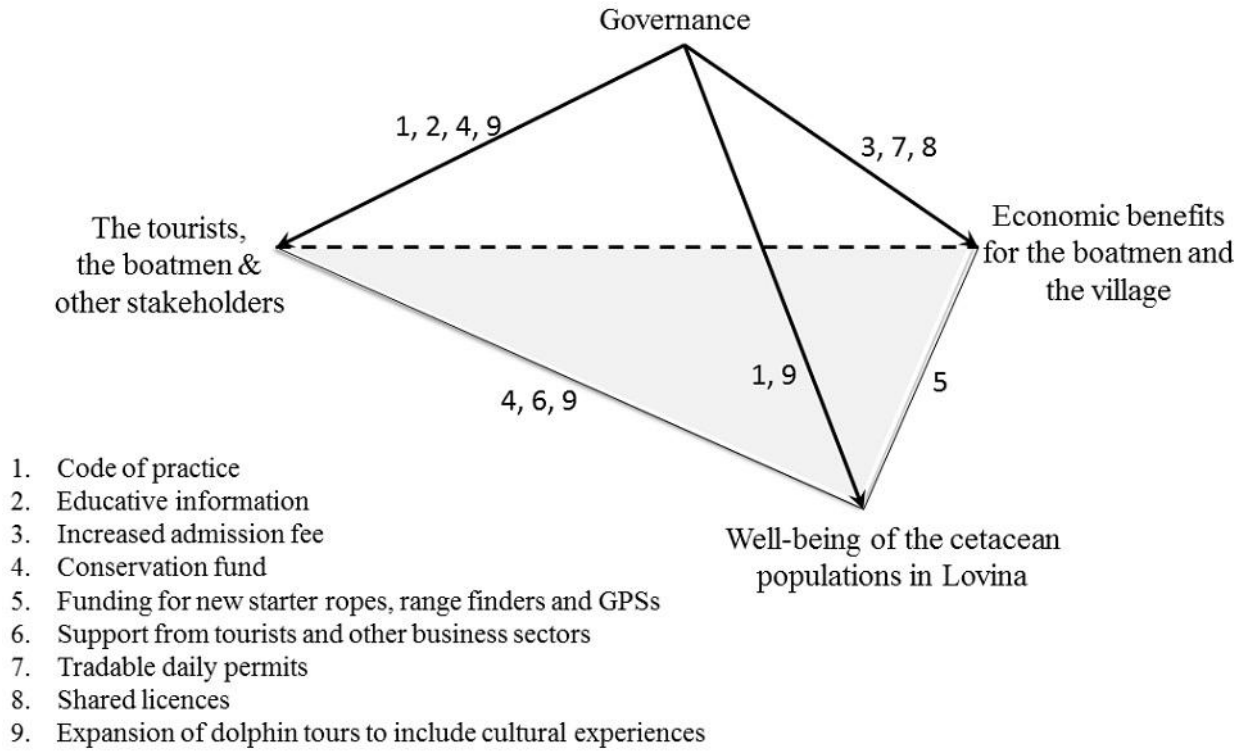


Figure 7.4 Management options to improve the dolphin watching industry in Lovina (each number represents a management option that directly links two elements of sustainability)

The sustainability framework of this thesis was visually represented in Chapter 1 (Figure 1.3). I now present my results in a summary diagram (Figure 7.4) which is very similar to Figure 1.3. As discovered in Chapter 5, 'other stakeholders' in Figure 7.4 now specifically include non-boatmen stakeholders who also receive benefits from the industry, e.g., hoteliers, restaurateurs, travel agents etc. The locals who work for these businesses are also included. Each number in Figure 7.4 represents a management option that directly links two elements of sustainability, although it would eventually benefit other elements as well.

7.5 Insights for developing countries

To my knowledge, this project is the first to examine the sustainability of cetacean watching tourism (either cetacean watching or swim-with-cetaceans) in a developing country from the viewpoints of the quadruple bottom line and the prism of sustainability concepts (see Chapter 1). Despite the importance of sound biological data collection and interpretation of those data (the problems of which were discussed in Chapter 3), more research is needed to understand the human dimensions of cetacean tourism, especially in developing countries. Research on the tourist experience (e.g., tourist satisfaction and opinions – Chapter 4) coupled with research on the economic (Chapter 5) and managerial aspects of the industry (Chapter 6) are likely to be significantly cheaper than ecological research. These types of research are also likely to be seen as more relevant to local stakeholders. Involving social scientists in cetacean tourism research will greatly increase its potential to influence managers and decision makers.

Throughout this research project, I have demonstrated that the quadruple bottom line and the prism of sustainability concepts are suitable frameworks for conservation efforts that are in

line with the Precautionary Principle (see Chapter 1). These frameworks are particularly suited, but not limited, to developing countries. Biological or ecological surveys are very important but typically require significant funding, local capacity and infrastructure, long term data collection and trained observers (Aragones et al. 1997). As I experienced during my data collection, those prerequisites can be very challenging in developing countries. Consequently, a team of cross-disciplinary researchers or a project with an cross-disciplinary approach would be more effective in addressing the research question as opposed to a project that applied one particular approach (Kriebel et al. 2001). Developing countries often do not have strong environmental legislation and compliance (Smith et al. 2003; Laurance 2004). Accordingly, local support and involvement become essential factors in sound management intervention.

Cross-disciplinary environmental management coursework is an increasingly popular niche among postgraduate students in Indonesia. Such programs are offered by many universities, chiefly among them the University of Indonesia and the Gadjah Mada University, two of the largest and oldest universities in the country. Launched in 1982, the University of Indonesia postgraduate environmental science program includes courses on environmental economics, human ecology and regional economic cooperation (University of Indonesia 2009). The postgraduate environmental management program of the Gadjah Mada University includes the socio-cultural aspects of environment, environmental economics and environmental law and institutions (University of Gadjah Mada 2008). Young scientists produced by these postgraduate programs will be useful for any cross-disciplinary environmental research in Indonesia.

Cross-disciplinary research seems to be an increasingly accepted concept among Asian scientists. During a regional collaborative workshop on threats to Asian coastal cetaceans in

Kuching, Malaysia in February 2011, I became aware of a heightened appreciation among Asian marine mammal scientists who combined cross-disciplinary approaches in their projects. Out of 20 participants, five of them (including myself) presented results of integrated research projects, or at least projects that included interviews or questionnaires in their components. Hopefully, this trend will be adopted by marine mammal researchers in other parts of the world.

During my data collection in Lovina, I also witnessed the growing interest among young staff members of local government agencies (particularly the local Marine and Fisheries Affairs office) in assisting our line transect surveys. This new trend has been witnessed elsewhere in Indonesia (Benjamin Kahn, 2011, *pers.comm*). This encouraging phenomenon promises more intrinsically-driven involvement from government staff, as opposed to the traditional top-down approach where officers were involved in a research project because of instructions from their supervisors. Whether this trend emerges in other developing countries remains to be seen and encouraged.

7.6 Future research for Lovina

Several research components and participatory action research approaches are recommended to assist management processes in Lovina. Research suggestions #1-3 below are relatively low-budget which may be co-funded by local or national government. Research suggestions #4-7 require a considerable budget not necessarily available through local or national government and might require the involvement of foreign aid agencies.

1) Visitor experience surveys to examine differences in experience and satisfaction during and after my PhD project, whether the three in-principle agreements were

implemented and whether the inclusion of cultural tourism in the dolphin watching tour is likely to be feasible;

2) Economic surveys to examine direct expenditures, multiplier, willingness-to-pay extra for the trip to reduce daily fleet size and for conservation efforts, the total economic values (use and non-use values) of the local dolphin populations and the feasibility of tradeable daily permit and shared-licences;
3) Participatory action research to guide the establishment and compliance with the guidelines;
4) Photo-identification and mark-recapture to understand the spinner dolphin's population size and residency pattern (both sub-species if possible) and whether the boats target the same dolphins every day (the consequences of violating the assumption of homogeneous capture probabilities would have to be considered in the analysis);
5) Aerial or vessel surveys and habitat modelling to provide a regional context for other sites in Balinese waters where cetaceans predictably occur close to shore. If other habitats supporting high densities of spinner dolphins are found, they could serve as control units for the Lovina situation. Management interventions might also be required to pre-empt unsustainable tourism being developed at such sites.
6) The examination of dolphin school's trajectory changes that might be attributed to the presence of tour boats
7) Research on the oceanography along the Balinese coast may identify the nature and extent of bio-physical characteristics that make the waters off Lovina a good habitat for spinner dolphins and other cetaceans.

The boatmen and government agencies must always be informed and, whenever possible, involved in these research projects to increase support and a sense of ownership in the resulting management decisions. In the end, the benefit of these research projects must be directed at the communities as the primary users and the cetaceans as the primary target.

7.7 Concluding remarks

Over the past four years, through this research I have attempted to obtain a comprehensive understanding of the sustainability of dolphin watching tourism in Lovina. My supervisors and I designed the research based on the four elements of sustainability as covered by the quadruple bottom line and the prism of sustainability theoretical frameworks. Looking back, this decision was appropriate because it has provided us with a wealth of information from a rising tourism industry in a relatively unexplored location. I conclude that the biological sustainability of the dolphin watching industry in Lovina is questionable and the tourists are not very satisfied. However, because dolphin tourism makes an essential economic contribution to the boatmen and the villages, the industry must be sustainably managed with the consent and involvement of all boatmen and other supporting stakeholders. Despite initial concerns over its sustainability, this industry could be an exemplar of community-based tourism in a developing country which is successfully co-managed from multiple perspectives, including the human dimension. The challenge remains to ensure that this sustainable future is brought to fruition at Lovina.

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Appendix 1 Tourist questionnaire in High Season

QUESTIONNAIRE FOR DOLPHIN-WATCHING TOURIST IN LOVINA

Date questionnaire filled in: D/M/Y
Date of dolphin-watching: D/M/Y
Name: (optional)

Email: (optional)
Year of birth:
Gender: Male/Female

Occupation:
Nationality:
Country of residence:

Highest educational level:

- ☐ Attended elementary school
- ☐ Completed elementary school
- ☐ Attended secondary school
- ☐ Completed secondary school
- ☐ Attended high school
- ☐ Completed high school
- ☐ Attended uni/college
- ☐ Completed uni/college
- ☐ Undertake postgraduate study
- ☐ Completed Postgraduate study

1. What spring to mind when I say "dolphin"?

_____

_____

2. Did your perception of the dolphin change after your encounter with them during this trip?
☐ No ☐ Yes, please explain

_____

3 Have you seen or interacted with dolphins before? ☐ No ☐ Yes, location: _____

4. Had you heard of the dolphin-watching tour in Lovina before arriving here? ☐ No ☐ Yes

5. If your answer to #4 is "yes", where did you learn of the Lovina dolphin watching tour from?
☐ Internet ☐ Brochures/leaflets ☐ Friend/family ☐ Others_____

6. Was dolphin-watching on your list of holiday activities in Bali before coming here? ☐ No ☐ Yes

7. What influenced you to go dolphin watching?

- ☐ Curiosity
- ☐ My friend/family/spouse asked me to go with him/her
- ☐ We/I was just looking for something to do here
- ☐ I wanted to see them at a close distance
- ☐ I'd seen them in captivity, so I wanted to see them in the wild
- ☐ Others, please explain_____

8. What aspect of your experience with the dolphin trip in Lovina **did you like best**?

_____

9. What aspect of your experience with the dolphin trip in Lovina **did you dislike the most**?

_____

10. Did you see any dolphins during your trip? ☐ No ☐ Yes

11. If you saw dolphins, **how many** dolphins approximately did you see?
☐ 1 – 10 ☐ 11 – 20 ☐ 21 – 30

☐ 31 – 40 ☐ more than 40 ☐ I didn't see dolphins; I saw whales, amount_____

12. How many **different types (species)** of dolphins did you see today?
☐ 1, type_____ ☐ 2, types_____ ☐ 3, types_____
☐ more than 3, types_____ ☐ I didn't see dolphins; I saw whales, type_____

13. How was the **weather** during your dolphin watching trip?
☐ Sunny ☐ Cloudy ☐ Raining ☐ Other, please explain_____

14. How was the **sea state** during your dolphin watching trip?
☐ Calm ☐ Choppy (small waves without white caps) ☐ Rough (big waves, lots of white caps) ☐ Other, please explain_____

15. Did the weather and sea state influence your experience with the dolphins? ☐ No ☐ Yes, please explain _____ _ _____

16. What were you supplied with for your dolphin watching trip ?(you can tick more than one option):
☐ Life jacket
☐ Do's and don'ts (i.e. "code of practice") during a dolphin-watching trip
☐ Explanation about the dolphins by your guide/boatman
☐ None
☐ Safety briefing

17. Do you consider that you were well-briefed or well-informed about this dolphin-watching activity? ☐ No ☐ Yes

18. Would a brochure about dolphins and dolphin-watching tourism in Lovina have enhanced your experience? ☐ No ☐ Yes

19. What kind of information would you want to be included in such a brochure?
_____
_____

20. **How many people were there on your boat** including your boatman? (please include children travelling with you)
☐ 2 ☐ 3 ☐ 4
☐ 5 ☐ 6 ☐ more than 6, how many? _____

21. How many other tour boats did you see around your boat **during your encounter** with the dolphins today?
☐ 0 ☐ 1 – 5 ☐ 6 – 10 ☐ 11 – 15
☐ 16 – 20 ☐ 21 – 25 ☐ 26 – 30 ☐ more than 30, how many? _____

22. If having no other boat around your boat would be difficult to arrange, please indicate number of boats **you would have liked** around your boat while watching the dolphins.
☐ 1 – 5 ☐ 6 – 10 ☐ 11 – 15 ☐ 16 – 20
☐ 21 – 25 ☐ 26 – 30 ☐ More than 30, how many? _____

23. On a scale of 1-10, how satisfied were you about your dolphin trip? (Circle one appropriate number)

Absolutely not satisfied 1--------2--------3--------4--------5--------6--------7--------8--------9--------10 Very satisfied

24. Would you join the trip again? ☐ No ☐ Yes

25. Would you recommend the dolphin trip to others? ☐ No ☐ Yes

26. **If you have seen dolphins in oceanariums** or other confined environment before, which experience do you prefer:
☐ In captivity, because: _____ ☐ In the natural habitat, because: _____

27. Approximately, what is your expenditure PER DAY in Lovina? *(to understand the contribution of dolphin-watching to local tourism)*

Item \ Cost per day	**IDR 1 - 100,000**	**IDR 101,000 – 200,000**	**IDR 201,000 – 300,000**	**IDR 301,000 – 400,000**	**More than IDR 400,000**
Food and drinks	☐	☐	☐	☐	☐
Accommodation	☐	☐	☐	☐	☐
Internet & phone	☐	☐	☐	☐	☐
Souvenirs	☐	☐	☐	☐	☐
Transportation	☐	☐	☐	☐	☐

28. Have you any suggestions to improve the quality of dolphin-watching tourism in Lovina?

_____

_____

- thank you very much-

Appendix 2 Tourist questionnaire in Low Season

QUESTIONNAIRE FOR DOLPHIN-WATCHING TOURIST IN LOVINA

Date questionnaire filled in: D/M/Y
Gender: Male/Female

Year of birth:
Nationality:

Country of residence:
Occupation:

Highest educational level:

- ☐ Attended elementary school
- ☐ Completed elementary school
- ☐ Attended secondary school
- ☐ Completed secondary school
- ☐ Attended high school
- ☐ Completed high school
- ☐ Attended uni/college
- ☐ Completed uni/college
- ☐ Undertake postgraduate study
- ☐ Completed Postgraduate study

1. What aspect of your experience with the dolphin trip in Lovina **did you like best**?

_____

2. What aspect of your experience with the dolphin trip in Lovina **did you dislike the most**?

_____

3. Have you seen or interacted with wild dolphins before? ☐ No ☐ Yes, location:_____
4. Was this a commercial boat tour? ☐ No ☐ Yes
5. Had you heard of the dolphin-watching tour in Lovina before arriving here? ☐ No ☐ Yes

6. If your answer to #5 is "yes", where did you learn of the Lovina dolphin watching tour from?
☐ Internet ☐ Brochures/leaflets ☐ Friend/family ☐ Others_____

7. Was dolphin-watching on your list of holiday activities in Bali before coming here? ☐ No ☐ Yes

8. How many nights are you staying in Lovina? _____nights at _____(name of hotel/home stay)

9. What influenced you to go dolphin watching?
- ☐ Curiosity
- ☐ My friend/family/spouse asked me to go with him/her
- ☐ We/I was just looking for something to do here
- ☐ I wanted to see them at a close distance
- ☐ I'd seen them in captivity, so I wanted to see them in the wild
- ☐ Others, please explain_____

10. Did you see any dolphins during your trip? ☐ No ☐ Yes

13. If you saw dolphins, **how many** dolphins approximately did you see?
☐ 1 – 10 ☐ 11 – 20 ☐ 21 – 30
☐ 31 – 40 ☐ more than 40 I didn't see dolphins; I saw whales. Number of whales_----------

14. How many **different types (species)** of dolphins did you see today?
☐ 1, type_____ ☐ 2, types_____ ☐ 3, types_____
☐ more than 3, types_____ ☐ I didn't see dolphins; I saw whales, type_____

13. How was the **weather** during your dolphin watching trip?

☐ Sunny ☐ Cloudy ☐ Raining ☐ Other, please explain_____

14. How was the **sea state** during your dolphin watching trip?

☐ Calm ☐ Choppy (small waves without white caps) ☐ Rough (big waves, lots of white caps) ☐ Other, please explain_____

15. Did the weather and sea state influence your experience with the dolphins? ☐ No ☐ Yes, please explain _____

17. What were you supplied with for your dolphin watching trip ?(you can tick more than one option):

☐ Life jacket
☐ Do's and don'ts (i.e. "code of practice") during a dolphin-watching trip
☐ Explanation about the dolphins by your guide/boatman
☐ None
☐ Safety briefing

17. Do you consider that you were well-briefed or well-informed about this dolphin-watching activity? ☐ No ☐ Yes

18. Would a brochure about dolphins and dolphin-watching tourism in Lovina have enhanced your experience? ☐ No ☐ Yes

19. What kind of information would you want to be included in such a brochure?

_____

20. **How many people were there on your boat** including your boatman? (please include children travelling with you)

☐ 2 ☐ 3 ☐ 4

☐ 5 ☐ 6 ☐ more than 6, how many? _____

21. How many other tour boats did you see around your boat **during your encounter** with the dolphins today?

☐ 0 ☐ 1 – 5 ☐ 6 – 10 ☐ 11 – 15

☐ 16 – 20 ☐ 21 – 25 ☐ 26 – 30 ☐ more than 30, how many?

22. How do you feel about this (#21)? _____

23. Having no other boats around your boat would be difficult to arrange, but please indicate the number of boats **you would have liked** around your boat while watching the dolphins.

☐ 1 – 5 ☐ 6 – 10 ☐ 11 – 15 ☐ 16 – 20

☐ 21 – 25 ☐ 26 – 30 ☐ More than 30, how many? _____

24.. Please explain the reason for your choice #22?

_____

25. How do you feel about **how close your boat** got to the dolphins? (please circle the appropriate number)

-2 ---------- -1 ---------- 0 ---------- 1---------- 2

Far too close | too close | about right | not close enough | not nearly close enough

26. How do you feel about **the way your boatman managed your encounter** with the dolphins?

-2 ---------- -1 ---------- 0 ---------- 1 ---------- 2

Very comfortable | comfortable | neutral | uncomfortable | very uncomfortable

27. Why do you feel this way? _____

28. Was **the amount of time you spent with the dolphins:** (Circle one appropriate number)

-2 ---------- -1 ---------- 0 ---------- 1 ---------- 2

Much too much | too much | just right | too little | much too little

29. How satisfied were you about **your overall dolphin trip**? (Circle one appropriate number)

Absolutely not satisfied 1--------2--------3--------4--------5--------6--------7--------8--------9--------10 Very satisfied

30. Would you join the trip again? ☐ No ☐ Yes

31. Would you recommend the dolphin trip to others? ☐ No ☐ Yes

32. If you have seen dolphins in oceanariums or other confined environments before, which experience do you prefer:

☐ In captivity, because: _____ ☐ In their natural habitat, because: _____

33. Approximately, what is your expenditure PER DAY in Lovina? *(This will help us to understand the contribution of dolphin-watching to the local communities)*

Item \ Cost per day	**IDR 1 - 100,000**	**IDR 101,000 – 200,000**	**IDR 201,000 – 300,000**	**IDR 301,000 – 400,000**	**More than IDR 400,000**
Food and drinks	☐	☐	☐	☐	☐
Accommodation	☐	☐	☐	☐	☐
Internet & phone	☐	☐	☐	☐	☐
Souvenirs	☐	☐	☐	☐	☐
Transportation	☐	☐	☐	☐	☐

34. Have you any suggestions to improve the quality of dolphin-watching tourism in Lovina?

_____

_____

If you would like more information about the progress of this project, please provide your details here:

Name: _____Email:_____

Appendix 3 Questions for semi-structured interviews with dolphin association coordinators

QUESTIONS FOR SEMI-STRUCTURED INTERVIEWS
DOLPHIN-WATCHING TOURISM IN BALI
Group: fishers/dolphin guides in Lovina

Thank you for participating in our interview about dolphin-watching tourism in Bali. As indicated in the information letter, the interview will last for approximately 30 minute and I hope will be the first of three interview sessions. Your identity will be kept confidential during the analysis of data obtained from this interview.

Name: (optional)
Year of birth:
Village of residence:

Gender: Male/Female
Occupation:
Region of origin in Indonesia:
Location of interview:

Latest educational level:

- o Attended elementary school
- o Completed elementary school
- o Attended secondary school
- o Completed secondary school
- o Attended high school
- o Completed high school
- o Attended uni/college
- o Completed uni/college

FIRST MEETING

Introduction to my project

(Note for self)I will give a brief description of my project, provide the Indonesian version of the flyer and explain why their help is so important to my project. I will then ask if the interviewee if he is willing to fill in the informed consent forms.

History of his time at Lovina and involvement in dolphin tourism

1. How long have you been living in this area?
2. What did you do before becoming in involved in dolphin tourism?
3. How did you get involved in dolphin tourism?
4. How long have you been involved in dolphin tourism?
5. What is your role in the industry?

History of dolphin watching tourism at Lovina and their port

6. Can you tell me how dolphin watching tourism in the Lovina area started?
7. How did dolphin watching tourism start at your port?

The dolphin's presence in Lovina

8. Why do you think the dolphins are here?

Changes you've seen over the time (dolphin, tourist, industry/boat, info)

The dolphins

9. Could you please tell be about the types of dolphins you see, how they behave, and (if possible) how their behaviour has changed through time. How abundant were the dolphins when you joined the industry, or about 10 years ago)? Do you detect changes compared to the current situation? What do you think caused such changes? (*only ask last question if he reports change)*

The tourists

10. Could you please tell me about the tourists coming to Lovina (nationality, type of tourists, etc) in the past (say, about the first time you joined the industry, or about 10 years ago)? Do you detect changes compared to now? What do you think caused such changes? (*only ask last question if he reports change)*

The boats

11. Could you please tell me about the boats used at Lovina (design, materials, size, engine, etc) in the past (say, about the first time you joined the industry, or about 10 years ago)? Have the boats used changed over time. What do you think caused such changes? (*only ask last question if he reports change)*
12. Can you recall the numbers of dolphin boat in the 80s and 90s? Why do you think the dolphin boat number have increased to their preesnt levels?

Information for tourists

13. About the first time you joined the industry, or about 10 years ago, what kind of information did the guides provide to the tourists? Has this information changed over time. What do you think caused such changes? (*only ask last question if he reports change)*

Thank and set time for future meeting(s)

14. When would it be convenient to you for us to meet again?

-xxx-

SECOND MEETING

About the dolphins (abundance, behaviour, distribution, areas of use, changes)

1. Tell me your views about the dolphins? What are the reasons for your views?
2. How many dolphins do you usually spot per encounter?
3. In your opinion, how many dolphins are there in Lovina?
4. How far you typically travel during a dolphin watching trip in the wet seasons? How about the dry seasons? Please explain further?
5. Do you recognise any individuals among the dolphins? Any animals with particular marks or scars?

Income dependency

6. How many people depend on your income as a dolphin guide?

Background of operators at their port

7. Are all the operators at your port dolphin guides? Or are some of them mainly fishers, farmers, etc?

8. Are the operators at your port all native to Lovina, or do any of them come from another village/region?

The origin of their boats

9. How do you and your members obtain their boats? Were they made locally? Where do the materials come from? What about the engines?
10. Do you (or your member) have to borrow money from the bank or other institutions to pay for the boats?
11. How long does it take a typical member to pay back their loan?

Pricing

12. How is the dolphin watching fee charged by operators in your group determined?
13. If you need to increase/change the price, do you consult with the other groups of operators?
14. How do you avoid being forced to drop your prices by other groups undercutting you?

Other income source

15. What else do the boatmen in your group do for income?
16. How many days per week (or hours per day) are they typically engaged in work other than dolphin watching?

Boat ownership

17. Are there any members of your group who do not own their own boat?
18. How the revenue shared between boat owners and operators in such cases?

Structure of dolphin guide group

19. How is your group organised? (Leader, secretary, treasurer, etc)
20. How are the office bearers chosen?
21. What is the process of decision making in your group?

How their dolphin co-operative group works/interacts with other groups

22. Does your group meet regularly? How often do they meet?
23. What sorts of matters do you discuss during the meetings?
24. Do you discuss revenue sharing and how?
25. Do you have regular meetings with the other groups of dolphin operators in Lovina?
26. If not, how do you achieve agreements amongst each other with regard to pricing and other matters?

Marketing strategy

27. How does your group handle marketing?
28. Do you receive any help from the government, or just word of mouth?

Joining the group/industry

29. What are the rules for operators that want to join your group?
30. What are the rules for operatorsthat want to leave your group?
31. If the boat driver is different from the boat owner, are both members of your group?

Strengths of your industry

32. In your opinion, what are the strengths/good things about the dolphin watching industry in Lovina?
33. What do the tourists like about the industry here?

Importance of industry to Lovina/their port

34. How important is the dolphin industry for Lovina/ your port/village?

Importance of the industry to you personally

35. How important is the dolphin industry in Lovina to you personally? What do you value?

Thank and set time for future meeting(s)

36. When would it be convenient to you for us to meet again?

-xxx-

THIRD MEETING

Weaknesses/concerns of the industry

1. Are there any things that worry you about the future of dolphin tourism in Lovina?

The 'what-if' scenario for interruption in dolphin abundance/behaviours

2. In other parts of the world, there are instances where the dolphins stop coming, or becoming harder to find, or move away from the usual spotting points because too many tourists or boats get too close to the dolphins. Such activities interrupted the dolphin's life cycle (e.g. breeding, feeding, etc), hence the dolphins changed their behaviours and avoid the boats. What do you think would happen in Lovina if similar things also happened here?
3. Depending on your concerns above, how do you think those concerns can be avoided?
4. How do you think your proposed solutions would help solve the problems?

Accident at sea

5. Do marine accidents happen often at Lovina? (e.g boat capsize, people/ tourists/ fishers lost at sea)
6. What are your strategies to ensure the safety for tourist? (e.g. does Lovina/North Bali have a rapid search capacity?)
7. Do you have plans to improve the safety measures used by the operators in your group? By you personally Please tell me about your plans? (*only ask last question if he reports plans to change)*

Suggestions for management

(Read to the respondents) In other parts of the world, because of the impacts on dolphins, people have been implementing several regulations/agreements to make sure that the future dolphin guides and tourists still can enjoy the dolphin watching tourism. This time, what about if we explore some possibilities in Lovina?

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8. Should there be any limit on **boat numbers** at Lovina? What do you think that limit should be? Higher, about now the same as now, or less?

9. Should there be any limit on the **distance** between boats and dolphins at Lovina? What do you think that limit should be?

10. Should there be any restrictions on **where the boats go** searching for dolphins in Lovina? Where do you think such limits should be? (*Spatial closure*)

11. Should there be any restrictions on **when the boats go dolphin watching** in Lovina? What do you think these should be? (*Seasonal or daily closure*)

12. Do you think it would be appropriate for there to be different times of departure for dolphin watching? e.g. some boatmen depart at 6 a.m., some at 7 a.m., and some departing at 8 a.m.?

13. Should there be any restrictions on **interaction times with the dolphins** at Lovina? If so what do you think these limits should be?

14. Do you have any other suggestions for the management of dolphin watching tourism in Lovina?

- thank you very much-

Appendix 4 Questions for semi-structured interviews with dolphin boatmen

DOLPHIN-WATCHING TOURISM IN BALI: INTERVIEWS
Group: fishers/dolphin guides in Lovina

Say this:
Thank you for participating in our interviews about dolphin-watching tourism in Bali, which will take about an hour. Your name will be kept confidential at all times during the analysis and presentation of any data obtained from this interview. You are an expert on dolphin watching tourism in this village and your help is therefore very important to us. Your knowledge and ideas will assist us greatly in working for a sustainable future for dolphin watching in Lovina.
(Note: Icha's team will fill in this form, which serves as the interview guide)

Name: (optional)
Year of birth:
Village of residence:

Occupation:
Village of origin in Indonesia:

Highest education level achieved:

- o Attended elementary school
- o Completed elementary school
- o Attended secondary school
- o Completed secondary school
- o Attended high school
- o Completed high school
- o Attended uni/college
- o Completed uni/college

About yourself and how to find the dolphins

15. How long have you been living in the Lovina area? _____years
16. What was your occupation before becoming a dolphin boatman? _____
17. If you had a previous job, why did you change?

    _____

18. How long have you been involved in dolphin tourism? _____years, or from what year_____
19. In your opinion, what do the tourists **like** best about Lovina?

    _____

    _____

20. In your opinion, what do the tourists **dislike** most about Lovina?

    _____

    _____

21. Why do you think the dolphins are here (off Lovina)?

    _____

22. I understand that you depart around 6am every morning for a journey lasting about two hours. When you depart from the port, how do you decide where to go to search for dolphins?

_____

23. How do you find the dolphins?

_____

24. What other clues or indications do you use to find dolphins?

_____

25. When you spot your first dolphins for the day, what do you usually do next with the boat? (*Probe further if needed as follows: Do you start your engine and go towards the dolphins? Or, if you're already nearby, do you continue travelling at the same speed as the dolphins?)*

_____

26. Do you think the behaviour of the dolphins has changed since you first became a dolphin tour guide/boatman?

Yes No

27. If so, how?

_____

_____

28. How do you drive/manoeuvre your boat to give your tourists the best possible dolphin experience?

_____

_____

29. Do you ever encounter any difficulties with other boats/boatmen?

Yes No

30. What sort of problems do you encounter?

_____

_____

31. How do your passengers feel about these problems?

_____

_____

32. How do you see the dolphins reacting to these problems?

_____

_____

About your tourists & safety issues

33. Tell me about your tourists. Which countries do they mainly come from?

_____

34. How do you like tourists to behave on your boat?

_____

35. Are some tourists more likely to behave like this than others?

Yes No

36. If you can predict their behaviour, what factors do you use to predict tourist behaviour according to the above question? (*probe: their nationalities? Gender? Age? Skip if they said that all tourists behave the same)*

_____

37. Are there any tourist behaviours on the boat that you don't like?

_____

38. Are some tourists more likely to behave like this than others?

Yes No

39. If you can predict their behaviour, what factors do you use to predict tourist behaviour according to the above question? (*probe: their nationalities? Gender? Age? Skip if they said that all tourists behave the same)*

_____

40. Please tell me about the best dolphin watching trip you have ever had?

_____

41. Please tell me about the worst dolphin watching trip you have ever had?

_____

42. How do you handle safety issues for the tourists?

_____

43. Do you have any safety equipment in your boats? If yes, what do you carry?

_____

The Brochure

44. We distributed this dolphin tourism brochure free of charge to the guide association last July *(show them a copy).* Have you seen the brochure before?

Yes No

45. Have you used the brochure with your passengers?
Yes No

46. Have you found it useful?
Yes No

47. What did you like most about it?
_____

48. What didn't you like about it?
_____

49. Do you need more brochures?
_____

50. Do you have any suggestions to improve the brochure?
_____

Dolphins and fishing boats

51. Do you ever go out fishing without tourists?
Yes No

52. If yes, have you ever seen dolphins when fishing?
Yes No

53. If yes, what did the dolphins do?
_____

54. Do you think the dolphins behave differently with boats when the boats are fishing versus when there are tourists onboard? Why do you think this is?
_____

55. Do you notice any changes in the way the dolphins behave when you get close to them while you are fishing)?
_____

Now we talk about the economic benefits. Feel free not to answer if this is uncomfortable for you – but do remember that all responses are kept completely confidential.

56. How many people depend on your income as a dolphin guide (NOT including yourself)?
_____

57. How much time do you usually spend on your dolphin watching activities in an average week?
a. How many trips did you do last week?_____
b. Over how many days _____

58. Aside from being a dolphin tour guide/boatman and occasionally taking people snorkelling, what else do you do for income? *(all dolphin guides offer snorkelling as an additional package)*

_____

59. How much time do you usually spend in doing this other work?

…. days per week; **or** …. hours per day

How many hours did you spend last week?
Over how many days

60. What percentage of your total monthly income is derived from your dolphin tourism activities?

_____

61. Where does the remaining % come from? _____

62. Do you own the boat you use daily for the trip? _____

63. **If you do NOT own your boat**, who owns it? How is the revenue shared between the boat owner and you? _____

64. **If you own your boat**, where did you buy it? _____

65. Did you borrow the money to buy the boat?
Yes No

66. From where did you obtain the money? _____

67. (If you took out a loan) How many years do you still have to pay your loan?

_____

68. Do you think the dolphin tourism is important for your village? Why?

_____

69. How important is the dolphin industry for your village? (show flash card)

Not at all important 1--------2--------3--------4--------5--------6--------7--------8--------9--------10 Very important

70. Do you think the dolphin tourism is important for you personally? Why?

_____

71. How important is the dolphin industry in Lovina to you personally? (show flash card)

Not at all important 1--------2--------3--------4--------5--------6--------7--------8--------9--------10 Very important

72. What do you think dolphin tourism in Lovina will look like in 10 years time?

_____

_____

73. If there are changes as you predict, do you think the changes you predict will affect the dolphin's behaviour?

Yes No

74. If yes, how?

_____

_____

75. Do you have any other suggestions to improve dolphin watching tourism in Lovina? For instance, for better management of the boats?

_____

_____

76. What is your reaction to the suggestion that dolphin operators develop and adopt a Code of Practice?

_____

_____

77. What do you think about a request that new boatmen must receive training?

_____

_____

78. Is there anything else you would like to tell me?

_____

_____

- Thank you very much for your time. You have given me very valuable insights-

Appendix 5 The card technique for Lovina stakeholder meetings

This method was developed based on the Metaplan Method and was used during the stakeholder meetings in Lovina where some results of this research were presented as outlined in Chapter 6. Developed in Germany in 1972, the Metaplan Method (Habershon 1993) aims to facilitate participants brainstorming opinions and ideas in a short period of time using basic facilitation techniques including large pinboards, butcher's papers and colourful cards. The technique was modified to present ideas, to record issues and to obtain input from stakeholders during the meetings. Below is the step by step guideline to the technique that I used.

1. Personnel

At least four people are needed during the meeting to perform the following tasks:

a. talk through the cards,
b. stick the cards to the wall/board,
c. write notes of the meeting (including recording the audio (if agreed by the participants),
d. deliver the stickers, take photographs and other errands

2. Preparation for the meeting

- Decide the aim(s) of the meeting.
- Group the cards into several themes, one colour per theme.
- Write points or topics in colour cards, one point or topic per card.

3. Meeting presentation and discussion

- Talk through the cards, the first person delivering one topic per card as the second person attaches each card to the wall/board.
- Hold discussions after the conclusion of each theme to prevent people forgetting their ideas and to focus the discussions on the topic. In Lovina, I asked the participants to discuss each card. I used cards of the relevant colours (but different marker colours) to record points/themes of discussion and to park them next to the topic cards.
- Continue the explanations and discussions until all themes have been discussed.
- Go through the 'take home message' cards.

4. Voting and second discussion

- Conduct voting during the coffee break. Use voting for participants to identify three topics per theme they wanted to discuss during the short 'panel' discussion (held over the next 30 min). Ask each participant to identify the topics of most importance to them by placing three coloured stickers per theme (preferably using the same colour family as the theme cards). In Lovina, I gave each participant 12 stickers for each participant (three per theme) and told them that all stickers must go (all participants must use their voting chance). This stage tends to be the most interesting of this method, for all participants have the same chance to vote. Participants may be involved in internal lobbying (The facilitator decides whether lobbying is allowed or not).

- At the end of the coffee break and voting time, count the number of stickers per topic and select the most popular topics (my team discarded topics with less than 5 stickers).
- Rearrange the topic cards. Place the most popular cards at top list; park non popular cards elsewhere. Where there is tie, place tied cards at the same level
- After the cards of all themes are rearranged, talk through the voted topics for the first theme. Ask participants why they think a topic is the most popular one.
- After one theme is discussed, give the participants time to give more comments before moving to the next theme. Continue the same discussion pattern until all voted cards for all themes are discussed.
- Write an account of the discussion (one card per suggestion) and place it next to the related cards.

5. Concluding activities

- Hold a final Question & Answer session after all topics have been explained to give participants time to ask questions or give additional comments
- Wrap up the meeting by summarising the results. The 'take home message' cards may be revisited and added with 1-2 more messages, but should be kept simple.
- Important feedback can be included as new topic cards for the next meeting round. Remember to mention that the new topic emerged during the previous meeting. Include this card in the voting stage and see if the idea is embraced by other group(s)

Appendix 6 Short project flyer


Hello there!

My name is Icha (short for Putu Liza Kusuma Mustika). I am a Balinese, and also a PhD student from James Cook University in Australia. From February to May 2009, I'm conducting research on dolphin-watching tourism in Bali. Lovina is one of my study sites.

My projects aims to collect information that will help the local dolphin guides run their operation in a way which minimises impacts on the dolphins while taking account of their views and needs. It will help my research project a great deal if you can fill in this questionnaire, which will take approximately 5 minutes.

The information you provide will be used for research purposes only. You are welcome to remain anonymous, and if you do give us your name and contact details, your responses will still be kept completely confidential.

If you cannot complete the questionnaire now, but are interested in completing it later today, may I or another member of my team come to your hotel this afternoon or whenever is convenient for you to pick up your completed questionnaire?

My cell phone (mobile) is: 0815 588 57547 and my email is putu.liza@jcu.edu.au
Thanks a lot for your help!