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Survey

The economic influence of community-based dolphin watching on a local economy in a developing country: Implications for conservation

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ABSTRACT

This study examined the direct economic impacts of dolphin watching tourism in Lovina, north Bali (Indonesia). The study applied the direct expenditure approach to tourists who went on dolphin tours in Lovina in 2008 and 2009. This industry depends on predictable access to coastal dolphins, attracts at least 37,000 overnight visitors per annum (~60% of the region's overnight tourists) and contributes at least 46% of the total direct expenditures (USD 4.1 million p.a.) for accommodation, meals, transportation, communication and souvenirs. The 179 boatmen enjoy an above average income and thus have little financial incentive to leave the industry. Nonetheless, trip fees constitute only 3% of the total expenditures generated by dolphin watching tourism. The remainder e.g., for accommodation, restaurants and transport is spent with local businesses which become the substantial beneficiaries and hence these stakeholders should also be consulted prior to any management intervention. This profitable industry supports 35–100 tour boats operating daily. The number of boats should be regulated to address concerns over their impacts on the dolphins and visitor satisfaction.

1. Introduction

Tourism is often suggested as a tool for poverty alleviation and environmental conservation in developing countries (Van Egmond, 2007). Wildlife tourism or "tourism based on encounters with non-domesticated (non-human) animals…in either the animal's natural environment or in captivity" (Higginbottom, 2004) is often promoted as a strategic tool to support the conservation of target species because of its significant economic benefits and potential to increase tourist awareness on conservation issues (Barbier, 1992; Tisdell and Wilson, 2001), particularly in developing countries. 'Developing countries' are countries ranked 'Low', 'Medium' or 'High' in the 2011 Human Development Index (http://hdr.undp.org/en/statistics/) developed by the United Nations Development Programme (developed countries are countries ranked 'Very High' in the Index).

As a form of wildlife tourism, cetacean (whale and dolphin) watching tourism is often promoted as a panacea, particularly in contrast with consumptive practices such as whale hunting (Neves, 2010; Orams, 2002). A 2008 calculation of tourist visitation and expenditures for cetacean watching suggests that the industry attracts 13 million tourists in 119 countries, contributes USD 2.1 billion of total tourist expenditure to the global economy and supports 19,000 jobs worldwide (Cisneros-Montemayor et al., 2010; O'Connor et al., 2009). Almost 55% of the total 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 are developing nations) and nearly USD 164 million in total tourist expenditure in 22 African and Middle Eastern countries (86% of which are developing nations) (see O'Connor et al., 2009).

Whilst the cetacean watching tourism industry is becoming more important to the economies of developing countries, surprisingly little is known about the distribution of the money that flows into the local communities as a result. We are aware of only three papers discussing the economic impact of cetacean watching tourism in developing countries (Hoyt, 2001; O'Connor et al., 2009; Orams, 2002). Kumar (2010) also assessed the economic value of Chilika Lagoon in India (which supports a critically endangered population of Irrawaddy dolphins). However, Kumar did not disaggregate the total economic impact of the dolphin watching industry to the local villagers. Gaining insight into the distribution of money flowing from the industry reveals the financial beneficiaries of the industry and subsequently its major stakeholders. Identifying the major beneficiaries/stakeholders is important in the event of risks to the economic, biological or social sustainability of the industry.

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This paper explores the economic impact of the cetacean watching tourism industry in Lovina in the Buleleng Regency of Bali (Indonesia). Dolphin watching in Lovina was established in the late 1980s when the local fishers began to bring foreign backpackers to see the dolphins that were predictably found close to shore. Lovina is the first place in Indonesia where a dolphin watching industry was established, but there has been no study on the economic influence of this industry on the local community.

Prior to this study there were anecdotal reports of tourists expressing concerns about: (1) the excessive number of boats participating in the dolphin trips and (2) boat behaviours that the tourists perceived as unsustainable. These concerns could damage the reputation of the Lovina dolphin watching industry, which in return may threaten its sustainability. Moreover, the interactions between the industry and the dolphins raise concerns about biological sustainability. Individual boatmen are often unaware of the sustainability issues and because of the way that the boats are operated when aggregated around the dolphins, they have little incentive to modify their own driving behaviour.

We did not conduct a social cost-benefit analysis as part of this study due to the difficulty in measuring any ecological damage that the industry imposes on the dolphins. Instead, we conducted an economic impact analysis, which would reveal: 1) the attractiveness of the industry to local villagers as a source of income, which indicates industry expansion pressures, and 2) the economic impact of dolphin watching tourism on the local economy of Lovina and its major stakeholders / beneficiaries. In the wake of possible concerns about the ecological sustainability of the industry, understanding the main beneficiaries of the industry is crucial in shaping future policies.

In addition to the two aims above, the paper has a third aim: to explore potential initiatives to ensure that the industry operates within the paradigm of Quadruple Bottom Line (Horrigan, 2002) and Prism of Sustainability (Valentin and Spangenberg, 2000), both of which include the biological, social and managerial imperatives in addition to sustainable economic growth. This is the first time that such an integrated approach has been used to study cetacean watching in a developing country.

2. Setting the Scene

Before starting the financial analysis, we first describe the region under investigation to better appreciate the environment in which the dolphin watching industry operates.

2.1. The Importance of Tourism to the Buleleng Regency

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 in Bali was initiated by the Dutch in 1924 when weekly steamships took tourists from Batavia, as Jakarta was known during the colonial period), to Singaraja in Buleleng (North Bali) (Picard, 1997, p. 190). Nowadays, tourism is one of the most important sources of income for the people of Bali. In Indonesian industrial terminology, tourism is classified under 'trade, hotels and restaurants'. In 2008, this sector contributed up to 29% of the Bali GDP, outranking the traditionally-important agriculture sector (18.3%) (http://bali.bps.go.id).

Buleleng is a regency 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 wildlife tourism sites (e.g., diving and dolphin watching), North Bali has a quiet, laid-back atmosphere that is different from the tourist sites in southern Bali (Berkmoes et al., 2009; Gouyon, 2005). Tourism is not the highest source of income for Buleleng; agriculture contributes up to 31% of Gross Regional Domestic Product (GRDP) (BPS Buleleng, 2009). In 2008, tourism (limited to 'hotels and restaurants') contributed 9% to the local GRDP. In an effort to foster tourism in North Bali, the Buleleng government has since 2007 focused on nature-based tourism and agro-tourism with Lovina as one of the key destinations. The main attraction for marine tourism activity in Lovina are the dolphins, although Lovina also offers scuba diving and snorkel tours (separate from dolphin watching tours).

Lovina is the collective name of several villages west of the provincial capital of Singaraja. In 2007, approximately 9,800 people resided in Kalibukbuk and Kaliasem, the two major coastal villages in Lovina that host the dolphin watching tourism. Kalibukbuk has three departure ports (Banyualit, Aneka and Kalibukbuk) while Kaliasem has one (Kaliasem) — see Fig. 1.

There are 56 accommodation facilities (i.e., hotels, motels and home stays) with a total of 950 rooms along the coast of Kaliasem and Kalibukbuk. Most of these facilities are non-classified (non-star rated) and are characterized as craft tourism (i.e., tourism that largely attracts independent tourists and includes family-owned home stays, small independent restaurants and souvenir shops) or small industrial tourism (the middle category between craft tourism and large scale industrial tourism facilities that typically have at least 100 rooms) (Rodenburg, 1980). In terms of employment, tourism operations in Lovina are classified as micro scale enterprises (fewer than 10 employees) or small scale enterprises (10–99 employees) (Shaw, 2004).

2.2. Dolphin Watching at Lovina

Dolphin watching tourism in Lovina began in the late 1980s when the interest of international visitors informally alerted local artisanal fishers to the tourism opportunities offered by the diverse cetacean community (particularly Southeast Asian spinner dolphins Stenella longirostris roseiventris) close to shore. Local small-scale fishers formed self-regulating dolphin-watching cooperatives operating from the four major departure ports mentioned above. Each cooperative is managed by a dolphin guide association. Dolphin tours are conducted using jukungs (traditional fishing vessels, 8–10 m long and 60–90 cm wide plank-sided canoes with two 5 m outriggers) which take up to four passengers. There are 179 jukungs along the shores of Kaliasem and Kalibukbuk villages, plus another 58 fishing jukungs at Temukus village at the western border of Kaliasem that also have the potential to bring tourists to see the dolphins. Almost all jukungs are dedicated tour boats which are kept clean and have colourfully painted hulls and increasingly powerful engines (currently mostly ca. 12 HP). The remaining jukungs are regular fishing boats which fish daily and 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. Each association has a different fixed price per tourist per dolphin watching trip ranging from IDR 50,000 (approx. USD 5.5 for Aneka), IDR 60,000 (approx. USD 6.5 for Kaliasem and Kalibukbuk) and IDR 65,000 (approx. USD 7.2 for Banyualit). Two of the associations (Aneka and Kaliasem) use roster systems to determine which boatmen take the tourists on a particular day. The industry is otherwise unregulated.

The dolphins off Lovina meet the criteria of a common pool resource as defined by Ostrom et al. (1999), i.e., high cost of excluding other beneficiaries by physical or institutional means and exploitation by one user (in this case a boatman) reduces resource availability for other users (other boatmen). Ostrom et al. (1999) further defined four groups of property rights in managing common pool resources: open access, group property, individual property and government property. The dolphins off Lovina are best classified as a group property due to the presence of the four associations who proclaimed exclusive rights to conduct dolphin watching tours off Lovina by issuing self-made internal licences. However, as yet no mechanism exists to prevent other groups of boatmen to assemble a new association and enter the business. Nonetheless, no new associations have been created since the early 1990s. Consequently, we consider the Lovina

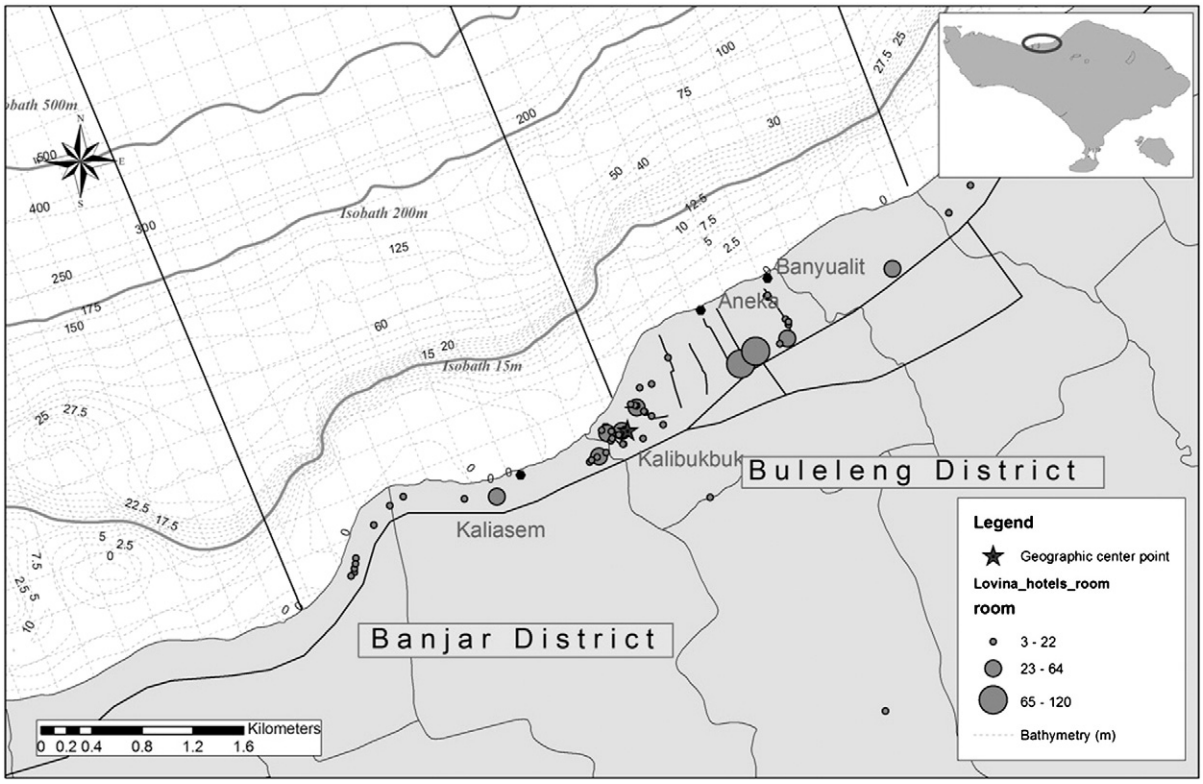

Fig. 1. Map of Lovina(Insert shows the Island of Bali; the circle is the position of Lovina in Bali).

dolphins as semi-open access, which makes it rather difficult to organise the industry, unless the managers directly involve the four associations in management plans.

In an associated study, Mustika (2011) recorded that more than 65% of tourists who joined dolphin watching trips in Lovina from June 2008 to December 2009 came from Western countries (Western countries are defined as Europe, United States, Canada, Australia or New Zealand (Van Egmond, 2007, p.6)). Examination of 354 tourists of Western and Asian nationalities revealed that their satisfaction levels ranged from low to medium (average 7.1 on a scale of 10; 51% of them provided a score of 8 to 10) based on the Pearce and Hanan-Karp scales (Pearce, 2006). The satisfaction of Western tourists was associated with several variables, including encounter management, the number of dolphins seen and the preferred number of boats. Western respondents who felt neutral to very comfortable about their encounters with the dolphins were more likely to promote the tour.

The Westerners were also concerned about what they perceived as mismanagement of the dolphin watching vessels, e.g., the tendencies of the boatmen to drive their boats at speed and/or to surround the dolphins with a large number of boats. Our boat surveys estimated an average of 34.5 boat trips per day (se + 6.29, ranging from 4 to 98) in Lovina, which was 19% of the total tourist fleet capacity. Overcrowding was significantly associated with the satisfaction level of Western respondents. Their satisfaction levels were lower when their preferred number of surrounding boats was 10 or less; more than 80% of them preferred having a maximum of 10 boats around. Because on any given day a tourist has 95% chance of seeing 22 to 47 boats, the likelihood of a Western tourist having high levels of satisfaction with this situation is low.

Consequently, there are economic sustainability concerns which may threaten the future of the cetacean watching industry in Lovina and its associated economic beneficiaries. These concerns are compounded by the semi-open access nature of the industry, which makes it all the more relevant to study the economic motives of the various beneficiaries.

3. Methods

3.1. Tourist Expenditure in the Context of Total Economic Value

We used the tourist expenditure approach to examine the economic influence of the dolphin watching industry on the Lovina economy because this approach is useful for understanding the direct economic impact of a tourism industry and estimating various tourism-induced impacts, which is what we need to address our aims (Fritz et al., 1984).

Since it was beyond the aims of our study, we did not conduct a total economic valuation analysis of the dolphins in Lovina, i.e., the annual net benefit generated from the dolphins (Samonte-Tan et al., 2007). Total economic value is determined by total use and non-use values (which include pure existence value, option value, bequest value) (Tisdell and Wilson, 2004). However, because the dolphins in Lovina were already utilised at the onset of this research (see Stoeckl et al., 2011), we applied the 'use value' approach as the proxy of the dolphin's total economic value. 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 and Wilson, 2004). The use value of the dolphin watching industry in Lovina falls into the category of non-consumptive direct use value, which is what we concentrate on in this study. As such the estimates generated here are unambiguous under-estimates of the total economic value of the dolphins.

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 analyzed in two ways: direct expenditure and indirect expenditure (Hoyt, 2001; O'Connor et al., 2009; Orams, 2002). Direct expenditure is a proxy for the 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 in the industry. 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 encourages the industry to expand.

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, 2002). 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 (Cisneros-Montemayor et al., 2010; Hoyt, 2001; O'Connor et al., 2009). The benefit of this definition is that one can distinguish the real beneficiaries of the industry: the boatmen or other business sectors (e.g., hoteliers, restaurants and transport services). However, such a definition may confuse economic practitioners (Stoeckl et al., 2005).

To identify the industry's true beneficiaries while staying true to the definitions generally used by economists, we define the ticket/admission price as primary direct expenditure. Consequently, we define tourist expenditures on other items attributable to the dolphin tour (i.e., accommodation, food, communication, souvenirs and domestic travel costs) 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. We do not use the term 'indirect expenditure' in this paper because estimating the multiplier effect is beyond the scope of this research.

3.2. Data Collection

Our 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. We use the term 'dolphin tourists' for tourists who undertook the dolphin tours.

Official records of the number of dolphin tourists are not available, hence we estimated them onsite through direct observation. We based our estimate on the maximum number of boats seen during 57 survey days from November 2007 to May 2009 using a jukung (traditional tour boat) as our research platform. 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. We used the average passenger capacity from our 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. Data seasonality has been adjusted.

We conducted an associated study into visitor satisfaction 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.

3.3. Data Analysis

3.3.1. 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. We therefore used our empirical data to weight these factors when estimating the annual number of dolphin tourists.

We weighted the weekly fluctuations to achieve an average number of boats per day in a month. We assume that each boat conducted only one trip per day. Although we have occasionally observed boatmen conducting two or more trips per day, multiple trips are very rare. We estimated the number of passengers per boat based on our boat surveys. We obtained the average number of dolphin tourists per month based on the actual number of operational days per month. Here we assume 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 our 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. We used this percentage to estimate the number of overnight dolphin tourists in 2007 and 2008.

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

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

3.3.2. Direct Dolphin Tourist Expenditure

Our questionnaires were distributed in 2008 and 2009. Hence the expenditure of overnight and day tourists was analyzed using the estimated number of dolphin tourists in Lovina in those two years. In the Results section we present all expenditures expressed in 2009 US Dollars. That is, we used the appropriate monthly Indonesian Rupiah (IDR)–US Dollar (USD) exchange rates to convert the survey findings expressed in IDR into USD. Subsequently we corrected for inflation to express 2008 USD expenditures into their 2009 equivalents.

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

$$\text{Annual primary direct expenditure (admission fee)} = \#\,\text{tourists per annum} \times \text{admission fee}$$

3.3.3. Boatmen's Net Benefit

The net benefit received by the boatmen equalled their direct gross revenue (i.e., total ticket /admission revenues) minus related costs (fuel, boat depreciation, outrigger replacement, boat repainting). Average fuel usage was 3.5 liters per day (IDR 5,000 or less than 50 US cents per liter). During our research, a boat cost 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 was replaced every two years, costing IDR 400,000 (less than USD 45) per pair.

We did not include boat mortgage in the cost because about 70% of our 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 +0.94). Furthermore, we did not include the fees the boatmen must contribute to their associations, 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 each association's 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 because not all boatmen provided breakfast for their guests while onboard.

All associations operate licensing systems whereby a boatman is allowed to operate as an association member after purchasing his membership which also serves as the internal licence mentioned in Section 2.2. 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 average net financial benefit was the total boatmen net benefit divided by 179 (total dedicated boatmen offering dolphin tours in Lovina).

3.3.4. Auxiliary Dolphin Tourist Expenditures

The total tourism expenditure associated with dolphin watching in Lovina was the gross revenue that the industry injects into the local economy. These expenditures included 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). We 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, we fixed the last expenditure range 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. The length of stay of day visitors was considered to be one day.

$$AE_{tourist}\,(item) = \frac{AE_{total}\,(item)}{\#\,respondents\,(item)} \times\ average\ length\ of\ stay$$

To understand the relative contribution of this industry to the economy of Lovina, we compared the auxiliary direct expenditures to the Buleleng Gross Regional Domestic Product, i.e., the sum of 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, we only used the gross added value of hotels. We particularly focused on Banjar and Buleleng districts, which are the districts that cover Kaliasem and Kalibukbuk villages respectively.

3.3.5. 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, we needed to estimate how many tourists come to Lovina because of the industry (coded as 'dedicated dolphin tourists'). These tourists would not come to Lovina if the dolphin watching tourism did not exist.

We tried to estimate the number of dolphin tourists who visited Lovina specifically because of the dolphin watching industry by triangulating the responses to three questions in the tourist questionnaires. The three triangulation questions were:

- 'Have 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 had binary answers ('No' or 'Yes'). The third question had five defined answer options and one open answer option ('other influences') 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) '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, we used a three-way contingency table (SPSS 16.0) among the three questions. The first was later coded as 'Prior knowledge', the second as 'Wish list' and the third as 'Reason to join' (Fig. 2). The auxiliary direct expenditures of dedicated dolphin tourists and non dedicated dolphin tourists were later analyzed separately.

We did not ask the tourists directly whether they would have come to Lovina in the absence of dolphin watching tourism. In addition, our questionnaire was not designed to detect visitors who joined the dolphin tour without prior knowledge of Lovina, nor those who had extended their stay to participate in the tour. We therefore acknowledge that we might not have accurately assessed the expenditure solely attributable to the presence of dolphin industry and that our data are likely to be a conservative estimate.

3.3.6. Total Dolphin Tourist Expenditures

Total tourist expenditure on the dolphin watching industry in Lovina is the total primary direct expenditure (i.e., ticket) and the weighted means of total auxiliary direct expenditures:

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.

4. Results

In total, 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 to the total estimated visitors for this industry. However, the data was collected over 70 days to adjust to Lovina's seasonality (low visitation season from November to May and high visitation season from June to October).

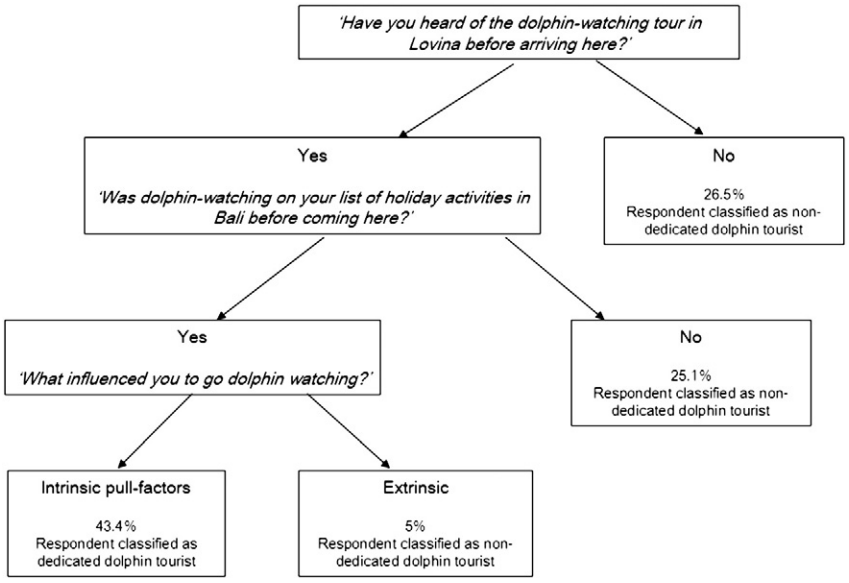

Fig. 2. Decision tree that explains the characterization of the respondents to our 2008 and 2009 surveys as dedicated and non-dedicated dolphin tourists.

Thus, in addition to the response rate, we argue that our sampling is representative and will allow generalizations.

4.1. Dolphin Tourist Visitation in Lovina

The official number of overnight visitors in Lovina has more than doubled in the past seven years (Fig. 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, we focused on the 2007–2009 visitation data only. During these years, the visitation numbers increased nearly 1.75 times (Fig. 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%). Extrapolating these results suggested that between 27,100 and 46,900 dolphin visitors (2007/09) stayed overnight in Lovina (average 37,000 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 in Lovina (i.e., guests staying overnight in Lovina for various reasons) to participate in the dolphin tours in 2007–2009.

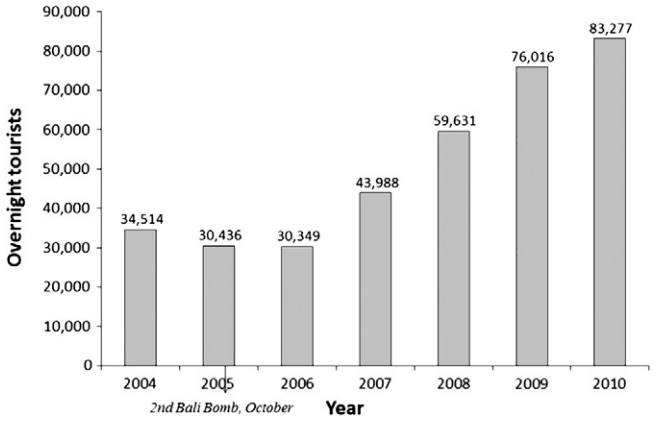

Fig. 3. Number of overnight tourists in Lovina from 2004–2009(Source: Cultural and Tourism Agency of Buleleng).

More than 80% of the 56 accommodation facilities distributed along the coasts 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 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 (Fig. 1).

4.2. Total Expenditure

4.2.1. Primary Direct Expenditure

We estimate that the overnight and day tourists spent USD 267,000 and USD 285,700 on admission fees in 2008 and 2009, respectively (Table 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 1490 and USD 1600 per annum. When we deducted the related costs (fuel, boat depreciation, outrigger replacement, boat repainting), the net benefit for a boatman is reduced to USD 1240 to USD 1390 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)).

4.2.2. Auxiliary Direct Expenditure

We separately analyzed the auxiliary direct expenditures of dedicated dolphin tourists and non dedicated dolphin tourists (see Methods section). 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). We 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. We analyzed these visitors based on their overnight status and 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. We used this percentage to analyze the 2008

Table 1
Estimated daily auxiliary direct expenditures[a] 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

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

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.

We 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 1). Based on our 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).

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 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.

Total dolphin tourist expenditure in Lovina in 2008 and 2009 was USD 9.5 million and USD 9.3 million, respectively (Table 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 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.

5. Discussion

5.1. Dolphin Watching Industry in Lovina is a Lucrative Business

The dolphin watching industry is important for the Lovina economy. 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 already saturated industry.

Tourists' total expenditure of more than USD 9.3 million is more than ten times higher than the 1999 expenditure of whale watching tourists in Tonga (adjusted inflation), another developing country with a significant whale watching industry as reported by Orams (2002). The total expenditure of dolphin tourists in Lovina is also three times higher than the 2000 total visitor expenditure of sea turtle tourism in Mon Repos and 27% of the 2000 total visitor expenditure of humpback whale tourism in Hervey Bay, both in Australia (adjusted inflation, Tisdell and Wilson, 2004). Unlike the year-round dolphin tourism in Lovina, the wildlife tourism ventures in Tonga, Mon Repos and Hervey Bay are conducted for only four months (Orams, 2002; Wilson and 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 (179 dedicated boatmen out of 5800 village work force (calculated based on the village's population of 9800 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 considerable. If the dolphin watching industry ceased to exist (e.g., because dolphins were no longer found off Lovina), the area would lose at least 46% of its auxiliary direct tourist income (accommodation, food, internet/phone, souvenirs and local transport). Table 1 shows the main beneficiaries of the industry and consequently the main economic stakeholders in preserving the industry. These beneficiaries include restaurants, hoteliers and transport agents.

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 GRDP in Banjar and Buleleng districts in 2008 (USD 1 million, BPS Buleleng, 2009). Assuming average hotel maintenance costs 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 fits the definitions of micro and small scale tourism enterprises (Shaw, 2004). The rate of overnight visitation of dolphin tourists in Lovina is within the normal range of overnight

Table 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[a]						
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[b]						
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

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

visitation in Bali. We did not investigate the ownership of hotels in Lovina. 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 cooperative ventures with local business people. We 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 we found are substantial. However, further research is needed to draw firm conclusions on such multiplier effects.

5.2. Concerns Over the Sustainability of the Industry

In the theory of Prism of Sustainability (Valentin and Spangenberg, 2000), 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, we have examined the economic implications of Lovina dolphin watching from this perspective. We 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, our associated study on tourist satisfaction in Lovina suggested that tourists are concerned about dolphin encounter management which may be causing adverse biological impacts on the dolphin population. Increasing visitation to Lovina (Fig. 3) is very likely to increase the number of dolphin tourists in the future and therefore the number of tour boats operating daily.

Fig. 4 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 number of daily fleet size (or maximum boats conducting dolphin trips per day) in Lovina multiplied by the number of daily trips per boat (we 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 can be substantially higher than the net revenue from the tourism industry. However, economic pressures drive tourism intensity towards point B (X_2 intensity).

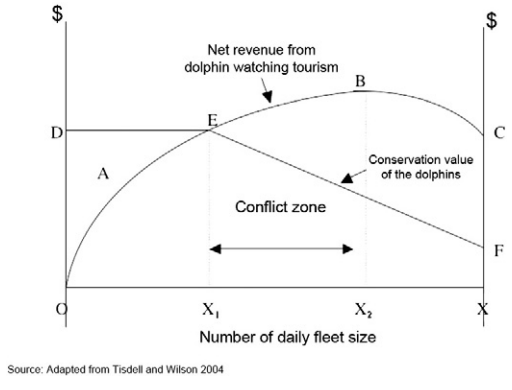

Fig. 4. The potential conflict between the economically optimum daily fleet size (X2) and the biologically acceptable number of daily fleet size (X1) (adapted from Tisdell and Wilson, 2004, p. 153).

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.

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; Christiansen et al., 2010; Constantine et al., 2004; Courbis, 2007; Evacitas, 2005), suggesting the described conflict zone exists in industries similar to the one we focus on in this study.

If Fig. 4 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.

Ostrom et al. (1999) emphasized two key elements in the management of common pool resources, i.e., access restriction and incentives. Tisdell (2009a) pointed out two alternatives to restrict access to natural resources: 1) effort reduction, and 2) complete exclusion of some users (which is often problematic, particularly for rural users who have limited economic mobility). Thus, managers are left with option #1, bearing in mind that the nature of dolphins as k-selected species (i.e., slow breeder) means that the positive impacts of this intervention to the dolphins may not be apparent in the near future (Tisdell, 2009a).

Several economic incentives have the potential to regulate the maximum daily fleet size, e.g., a shared-licence system and implementation of tradable daily permits. A shared licence system would require the profit to be divided between the licence owners according to an agreed system. For instance, suppose a number of boatmen (say two) share a boat licence and, by consequence, share the boat as well (the same *jukung* used every day in Lovina). 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. 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 (Ellerman, 2005; Grafton, 1996). 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. To increase economic efficiency, these permits could also be auctioned.

However, measures aimed at improving economic efficiency, though potentially successful in the long run, may disrupt the livelihood of those affected in the short term, especially in developing countries. People in developing countries typically live at subsistence level and have few alternate employment opportunities (Tisdell, 2009a, 2009b). Consequently, as in the case of Lovina, introducing conservation policies in the dolphin watching industry (by means of licence sharing, tradeable permits or otherwise) will have severe consequences for those who lose (part of) their job in that industry. As a result, such policies will be met with fierce opposition and unlikely to be successful if not supplemented by targeted poverty alleviation policies (e.g., increasing admission fees).

The two aforementioned economic tools could be implemented in addition to sustainability mechanisms associated with the biological, social and managerial aspects of the dolphin watching industry thus achieving a full quadruple bottom line sustainability approach. These

generic conclusions are presumably also relevant to other cetacean watching operations and illustrate the need to broaden cetacean tourism research to include the economic dimension.

6. Further Management of the Industry

Dolphin watching tourism in Lovina is lucrative for the boatmen involved, providing them with above average regional income levels. Thus, it is unlikely that boatmen will leave the industry voluntarily. The previous section demonstrated how restriction of daily fleet size might be beneficial to the animals. However, without being paired with economic incentives (e.g., shared licence and tradeable permit), such restrictions may not achieve the intended outcomes, nor be easily implemented (Tisdell, 2009a).

Even though the boatmen derive above average earnings from the industry, the main benefactors are outside the dolphin watching industry. We found that 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 be restaurants, hoteliers and transport agents. They are therefore substantial beneficiaries of the dolphin watching industry and consequently should join the boatmen as partners to achieve and maintain the sustainability of the industry. We note that our findings do not represent what the locals (including the extra beneficiaries mentioned above) think of the industry because they were not included in the interviews or questionnaires. We hope to address this limitation in future work in Lovina.

Several economic avenues are suggested for future research. Use value as a proxy of total economic value of the Lovina dolphins will be investigated through: 1) direct tourist expenditure (improving upon the previous research approach) and 2) multiplier effect (input–output analyses) as a proxy for the indirect tourist expenditure. We will also conduct a willingness to pay analysis among tourists to find out the potential scope of increasing admission ticket prices as compensation for reduced fleet size or contribution towards the trust fund of the Lovina Marine Protected Area which was established in December 2011.

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