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## The economic evaluation of estuarine dolphin (*Sotalia guianensis*) watching tourism in the Cananéia region, south-eastern Brazil

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**Abstract:** A study was conducted during 2005 and 2007, aiming at estimating the value of observation tourism of the estuarine dolphin in the Cananéia region and the satisfaction levels reported by the tourists. The measure of tourist satisfaction can be considered as high and the application of the Travel Cost Method depicted that the economic evaluation of this activity was estimated to be US\$ 556,733.98. It is anticipated that this strong evidence of the economic benefits from dolphin watching will originate a more concrete and efficient public awareness of the estuarine dolphins, as well as of the environment in which they live.

**Keywords:** Brazil; Environment conservation; Estuarine Complex of Cananéia; green economics; *Sotalia guianensis*; economic evaluation; satisfaction level; tourism; travel cost method; whale watching.

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## 1 Introduction

In the 1992 World Convention that took place in Rio de Janeiro, government representatives from all over the world agreed that it was necessary to stop or delay the over-exploitation of biological resources of protected areas (IUCN, 1994; Chichilnisky, 2010). Further they identified these areas as forming economical resources that play a key role in poverty reduction and in the maintenance of life-supporting systems in the global community (IUCN, 1998).

Despite the convention's resolutions, the biodiversity erosion rate is increasing. One way of changing the perception of governments and of the general population is to show that a sustainable use of biodiversity has a positive impact on the economic value, which is often higher than the value of the non-sustainable use of the resource, which can be a threat to biodiversity (IUCN, 1994).

The philosophy of Green Economy is to manage the economy for nature, instead of managing it for business, aiming to achieve benefits for all people, other species, nature and the planet. Theories that help to prevent the root causes of inequality and poverty, promoting equity, equality, participation, freedom and democracy with social and environmental justice, are also included in the Green economy concept (Kennet and Heinemann, 2006).

Economic evaluation is a powerful tool to help and improve the use of natural resources, supplying the means to measure and compare the value of goods and benefits (IUCN, 1994; IUCN, 1998). A better understanding of ecosystems combined with

economic evaluation techniques can influence national and international strategies and stress the global dimension of diversity reduction problems (IUCN, 1994; Chichilnisky, 2010). However, it is usually difficult to adequately explain non-market environment values in terms of sustainable development (Balmford et al., 2002; Gios et al., 2006).

To identify goods and services of a protected area, and to determine who should evaluate and measure them, is not always a direct process as the goods and services include the habitat used for recreation and tourism, plants and wild animals, genetic resources, springs, etc. Many of these goods and services are not negotiated commercially, so consequently have no evident market value (IUCN, 1998). Where markets do not exist, values invested by clients must be estimated and therefore a series of methods have been developed over the decades (IUCN, 1998), including the Travel Cost Method (TCM) which is used to estimate the economic usage value of ecosystems or places that are used for recreation and/or tourism (Loomis and Creel, 1990; Hof and King, 1992; IUCN, 1998; Chen et al., 2004; Douglas and Johnson, 2004; Oliveira, 2005).

TCM is applied by using data of the number of tourists that have travelled different distances, grouping them into classes, as the cost and time of the trip will increase with distance, and thus allowing the investigator to calculate the number of 'bought' visits by 'price differences'. This information is used to build a demand function for the locality and to estimate the surplus value, or economic benefits, of the consumer for the recreational services of the locality. The method presumes that the value of the locality or of its recreational services is reflected in how much the people are willing to pay to visit the attraction. It is consulted as 'the revealed preference value', because it uses the behaviour and real choices to infer values. Therefore, tourist preferences are revealed by their choices (King et al., 2009). The result is a demand function of the visits to a certain locality/activity. With the demand function it is possible to see that a product price reduction for people of the same income level will increase the quantities purchased and vice-versa (Sebold and Da Silva, 2004). From this function it is possible to estimate the consumer surplus value or total willingness to pay for goods or recreational services (Ozuna and Stoll, 1991; Swanson and McCollum, 1991), because it is possible to infer that the total of the differences paid, as mentioned above, represents a minimum value is the surplus (Sebold and Da Silva, 2004). The whole area below the demand curve represents the total willingness to pay, in other words, the customer surplus, which is delimited by the mean total cost value of the tourists (Swanson and McCollum, 1991).

Tourism in natural areas is especially important in the context of tenable development and can offer a potential mobilisation of resources from the private sector, thus contributing towards local and national economic development, besides helping to preserve biodiversity (Wells, 1997).

However, Balmford et al. (2002) say that under economic terms there are three major and interconnected reasons to justify the loss of natural ecosystems despite its importance to society: first, there is a lack of awareness about the numerous services and their performance, since ignorance of the possible changes in natural systems caused by increasing human impacts also exists. Secondly, there are market failures in conducting habitat losses, since there are few economic benefits from the destruction caused by the activity. Moreover, there can be private benefits such as those obtained by people or companies, often with governmental incentives, that are detrimental to the environment. Particularly, tourist cetacean observation in nature has been promoted as an economic

activity which maximises economic benefits for the communities involved. These benefits help to justify those who maintain that whale watching should substitute whale hunting (Evans, 2005; Oliveira, 2005; Oliveira et al., 2007).

Many people were economically dependent on whale hunting and hence the worldwide end of that activity, officially in 1986, decreed a big social problem. Therefore, whale watching came as a valid alternative and many whalers discovered an excellent work opportunity with a safer future. Their experience as hunters in finding and identifying cetaceans around the world was valuable (Servidio and Elejabeitia, 2003). Today, the consciousness that animals are more important and valuable alive than dead is much bigger; this has contributed towards the conservation of cetaceans and their environment (Filla, 2008; Kuo et al., 2011).

Whale watching started in 1955 in California by observing migratory grey whales (*Eschrichtius robustus*) (Hoyt, 1992). In 1991, 31 countries and territories practised this activity, and the amount increased to 65 in 1994 and to 87 in 1998 (Hoyt, 1995; Hoyt, 2001). Close to 4 million people watched cetaceans and spent 318 million dollars in 1991; in 1994 it was 5.4 million tourists spending more than 500 million dollars, and in 1998 it was 9 million tourists and 1.059 million dollars. A new analysis from 2008 shows that this type of tourism was practiced in 119 countries and that more than 13 million people took part in this kind of activity in that year, totalling 2.1 billion dollars (O'Connor et al., 2009). Cisneros-Montemayor et al. (2010) estimate that this value could reach 2.5 billion dollars and that more than 19,000 jobs could be created if this activity was practised in all the places where it were possible.

However, it is also a consensus that this recreational activity of whale watching in nature can cause serious impacts on the animals. The growing number of boats can be prejudicial to cetaceans in their habitats due to factors such as noise, pollution, disturbance, and in some cases, collisions (Richardson et al., 1995; IFAW, 1996; Ritter, 2002; Ng and Leung 2003; Lusseau, 2003; Lusseau, 2004; Santos-Jr et al., 2006; Valle and Melo, 2006; Filla, 2008; Filla and Monteiro-Filho 2009a; among others).

Only few parties in the whale watching industry have had much experience. Commonly, the biological importance of anthropological impacts is associated with long-term effects on reproductive and/or distribution parameters. Long-term data on cetaceans has already been registered, though long-term data about whale watching has not (IFAW, Tethys Research Institute and Europe Conservation, 1995).

It is difficult to be sure of the impact that human activities have on marine mammals because they live in a different environment and use their senses differently from humans (Constantine, 1999; Orams, 1999 cited in Orams, 2000; Lusseau and Highamb, 2004; Filla, 2008). Therefore, changes in behaviour are considered to be the most sensitive way of measuring the effects of human disturbances on animals; behavioural reactions are frequently used as an indication of the effects of these disturbances (Carney and Sydeman, 1999; Beale and Monaghan, 2004).

There is no doubt that the quantity of boats, the type of motors and the procedures adopted by the boat skippers strongly influence the cetacean's reactions (Gill et al., 2001). When the boats navigate at a low speed, do not get too close to the animals, do not interfere with their activities, do not split up pods and do not spend too much time with the cetaceans, they do not tend to react negatively; that is, they tend not to flee, change course, abandon the area, stop activities, separate the pod, etc. (Filla, 2008; Filla and Monteiro-Filho, 2009a).

Another question that surrounds whale watching is the eminent pollution of water and air caused by the boat's fuel. The big villains of marine pollution are deposits of petrol and its derivatives into the streams and rivers, and boats that spill small but continuous amounts of oil in the water. Furthermore, fuel combustion from the motors also causes aerial pollution with CO<sub>2</sub>.

Studies of estuarine dolphins in Cananéia proved that the best observation is done from boats that keep their motors in neutral gear when close to the animals as this eases their activity and is less disturbing. This is because the dolphins can locate, even when submerged, the boats by the noise. Therefore, even motor-less boats, such as sailing ones or those with a motor which has been turned, should not remain close to the dolphins (Filla, 2008; Filla and Monteiro-Filho, 2009a). As motorised boats are necessary for estuarine dolphin watching, the ideal way to optimise this activity would be for the boats to be well serviced mechanically and to be free of leaks. A valid alternative could be the use of biodiesel made from vegetable oils, animal fats or algae that have superior properties and a lower emission of pollutants (Lin et al., 2006; McCarthy et al., 2011; Lin and Huang, 2012).

Nevertheless, the economic benefits from tourist cetacean watching cannot be ignored and, in one of these calculations, the sale of tickets for trips in the boats is a great financial incentive (IFAW, 2004). Some surveys have been done which only take into account this direct income when propagating the financial importance of whale watching activity for the local and world economy (Mazzanti, 2001; Parsons et al., 2003; Woods-Ballard et al., 2003; IFAW, 2004; Larson et al., 2004).

However, few studies have been done to estimate the total value of cetacean watching in the world, including indirect expenditures (meals, accommodation, travel, among others) besides the trip fee, that are necessary to experience this tourism activity (IFAW, 2004). A study done by Oliveira (2005) on the Portuguese Azorean islands stands out because it is a pioneering work, specifically designed to estimate the value of watching various cetacean species in the region.

In Brazil this type of whale watching study has never been done. Considering that in the Cananéia estuarine region the estuarine dolphin, *Sotalia guianensis*, is seen as an eminent tourism attraction and income generator, it is evident that there is a need to estimate the amount raised by this tourism activity with a view to creating a model for the complex set which includes the ecosystem, the dolphins and the human population. Therefore, because of the considerable contribution, this economic evaluation analysis can be done with the travel cost method, bringing to the debate the preservation of this species and the whole environment. For these reasons, a study was conducted during the summer months of 2006 and 2007, aiming to estimate the value of estuarine dolphin watching tourism in this region.

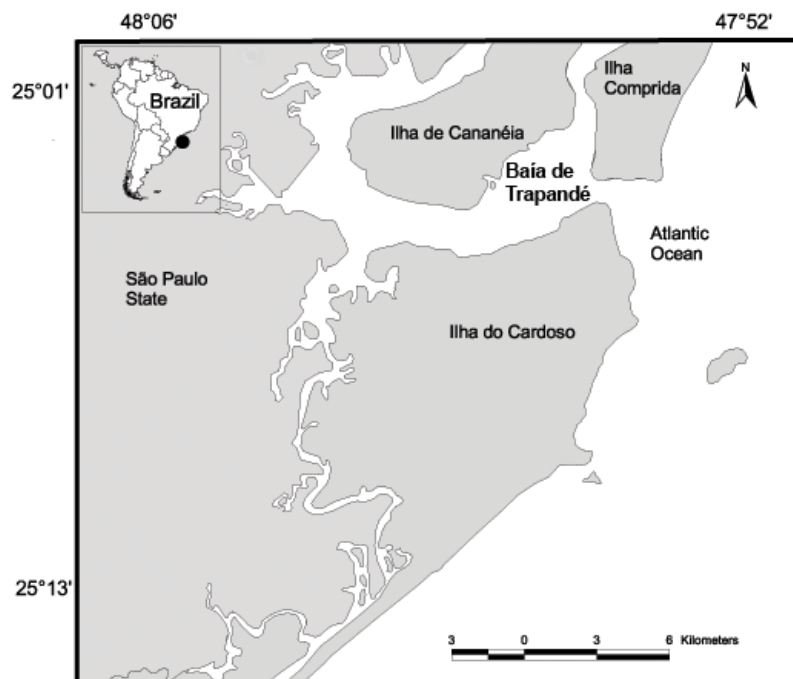
## 2 Methods

### 2.1 Study area

The Cananéia Estuarino-Lagunar Complex is situated in the south of the São Paulo State, southeast Brazil (Figure 1), is 110 km long, has three islands (called 'Ilha de Cananéia', 'Ilha Comprida' and 'Ilha do Cardoso') and a bay (called 'Baía de Trapandé') (Schaeffer-Novelli et al., 1990). It is one of the most important coastal ecosystems in Brazil

(Diegues, 1987), being internationally considered an ecological sanctuary which needs to be preserved (Mendonça and Katsuragawa, 2001). According to IUCN (1980), this region is also considered to be one of the five estuaries least degraded and most productive worldwide; a priority for conservation as stated in the World Conservation Strategy. It is legally protected as a State and Federal Environment Protection Area (Schaeffer-Novelli et al., 1990). It is also part of the largest continuous remainder of the 'Mata Atlântica' (Atlantic Forest) national reserve/biotope, which is an element of the 'Atlantic Forest Biosphere Reserve' decreed by UNESCO in 1991 and received the title of World Heritage Site in 2000 (IBAMA, 2009; UNESCO, 2009).

**Figure 1** Localisation of Cananéia estuarine region in the southern coast of São Paulo State, (southeast Brazil), showing their main islands and bay



Estuarine dolphins are small sized cetaceans with a maximum length of 2.06 metres (Barros, 1991), that can be found all year round in the Cananéia region (Monteiro-Filho, 2000). Estuarine dolphins are gregarious animals which can be found alone, especially in protected areas such as the interior of bays and estuaries (Monteiro-Filho, 2000), living also in coastal and estuarine tropical waters (Carvalho, 1963). Their diet includes mostly fish, crustaceans and cephalopods. There are some indications of prey selectivity between sexes and different development phases (Oliveira et al., 2008).

The distribution of the genus *Sotalia* is from Honduras (15°58' N, 85°42' W; da Silva and Best, 1996) to the Santa Catarina State in the south of Brazil (27°35' S, 48°34' W; Simões-Lopes, 1988). Widely distributed along the Brazilian coast, they also occur in the Amazon river.

## 2.2 Procedure

In order to measure the satisfaction of tourists in relation to dolphin watching in the region, as well as, to identify their opinion about the development of this activity, they were interviewed after their trip. In each interview a confidential form, covering various aspects of estuarine dolphin observation, was filled in. Each aspect was classified qualitatively (weak; reasonable; good). These kinds of interviews were considered as semi-structured (Albuquerque and Lucena, 2004). Among the aspects surveyed was the monthly income, the opinion about regulations observance by the boat skippers, as well as economic data to enable the evaluation of the activity.

The interviews were carried out during two summer periods (December to March, in 2005 and 2006) in three places: (a) on the tourism boats; (b) at the 'Ponto de Cultura Caiçaras' (cultural stand of the 'Instituto de Pesquisas Cananéia'), where environmental public awareness sessions (on the flora, fauna, conservation and regulations, especially on dolphin watching) were conducted; and (c) after the trip at the landing-place on the Municipal quay.

## 2.3 Economic evaluation through the Travel Cost Method (TCM)

To evaluate the estuarine dolphin watching activity in Cananéia and its contribution to local development, an adapted TCM method was used. Aiming to minimise over and under estimates, consumer surplus value for this particular case of estuarine dolphin watching activity in Cananéia was obtained. Therefore, the consumer surplus using the modified TCM was calculated using the following formula:

$$CS_{\text{total}} = CS_{\text{dw}} + CS_{\text{g}}$$

where:

$CS_{\text{total}}$ : total consumer surplus

$CS_{\text{dw}}$ : consumer surplus of tourists that went to Cananéia to specifically watch estuarine dolphins

$CS_{\text{g}}$ : consumer surplus of tourists that did dolphin watching trips, but went to Cananéia for other reasons.

To use this formula it was first necessary to verify if there was any significant difference between the average expenditures of the tourists who went to Cananéia especially to watch the dolphins and those that went for other reasons, therefore a 't-student' test was done (Zar, 1999).

For the  $CS_{\text{dw}}$  calculation, the following total expenditures as declared by the interviewed tourists were accounted: trip to Cananéia; boarding; meals; transport; dolphin watching and total time expended. The different distances of the trips were taken into account when calculating  $CS_{\text{dw}}$ , as proposed by Loomis and Walsh (1997 cited in Hackett, 2000):

$$CS_{\text{dw}} = T + [n \times (1/4 \text{ daily yield})]$$

where:

$T$ : total cost of the trips as declared by the tourist  $n$

$n$ : number of days that the tourist remained in Cananéia.

To calculate  $CS_g$ , the total cost of the dolphin watching trips were included, taking into consideration that the people spent approximately half a day to complete one trip. Therefore, the following formula was used as a basis for the calculation:

$$CS_g = T + [(1/4 \text{ daily yield})/2]$$

where  $T$  is the total cost of the trip as declared by the tourist.

In both cases, the value of the time expended by the visitors was estimated by calculating 1/4th of their daily yield, which, according to Loomis and Walsh, has to be treated as a constant (1997 cited in Hackett, 2000). As the trips of the second group lasted an average half day, the time expended for the activity was divided by two (Oliveira, 2005) as the other half of the day could be employed in other activities, bearing in mind that those tourists could be considered occasional in relation to dolphin watching.

Demand curves for each group of tourists were set up through linear regression analysis (Zar, 1999). Using the costs calculation for each group, it was possible to adjust the cost data models with the Ordinary Least Square Method (OLSM) with the help of 'R' software (R software, 2007). For the consumer surplus value, the area of the triangle below the curve was calculated, in which the base of the triangle is defined by the line that intercepts the axis of the ordinates at the average value of costs (Sebold and Da Silva, 2004; Oliveira, 2005; King et al., 2009). The total consumer surplus appraisal for the years 2006 and 2007 together, meaning that the economic benefits from tourist estuarine dolphin watching activity is valid for all the months of activity of the respective years.

Data about the quantity of tourists during the year that visit the region looking for boat trips was made available by teams/owners of the companies and schooners, by the Cananéia Nautical Association and by fishermen and boat people that use their wooden boats to transport tourists, above all in the summer months. According to Sebold and Da Silva (2004), the TCM needs data from two years to have a precise average of the environmental evaluation. Therefore, the 2006/2007  $CS_{total}$  value was calculated as follows (c.f. Oliveira, 2005):

$$CS_{total} = CS_{dw} \times (w \times n_{total}) + CS_g \times (g \times n_{total})$$

where:

$w$ : rate of tourists that went to Cananéia specifically to watch estuarine dolphins, taken from the interviews

$g$ : rate of tourists that participated in the trip to watch estuarine dolphins, but went to Cananéia for other reasons, taken from interviews

$n_{total}$ : total number of tourists that did the trip to watch estuarine dolphins in Cananéia in 2006 and 2007, taken from information supplied by companies and boat owners.

Conversion of foreign currency to the Brazilian Real (R\$) was calculated using the monthly average exchange rate during the months the tourists from abroad visited Cananéia. Final economic results are presented in US dollars, using a general average exchange rate (R\$ 2 = 1 US\$).



### 3 Results and discussion

A balanced whale watching activity promotes maximum benefits for the tourists and cetaceans (Hoyt, 1999) by offering an observation experience to the tourists and contributing to the preservation through investigations, environmental interpretations and economic evaluation (Woods-Ballard, 2000).

In almost 90 days of field activity, during the summer months (December to March) of 2005/2006 and 2006/2007, a total of 619 people were interviewed.

Tourists that visited Cananéia to specifically watch dolphins had a lower income (~70%) when compared to the other tourists (Table 1).

**Table 1** Comparison of monthly incomes of tourists who came to Cananéia during the summer months from 2005 to 2007

|   | <i>Monthly income</i> |                |              |                           |
|---|-----------------------|----------------|--------------|---------------------------|
|   | <i>Minimum</i>        | <i>Maximum</i> | <i>Mean</i>  | <i>Standard deviation</i> |
| Tourists that visit Cananéia specifically to watch dolphins | US\$ 0.00             | US\$ 4700.00   | US\$ 966.30  | 1089.40                   |
| Tourists that visit Cananéia for others reasons             | US\$ 0.00             | US\$ 10,000.00 | US\$ 1396.93 | 1262.90                   |
| All tourists that visit Cananéia                            | US\$ 0.00             | US\$ 10,000.00 | US\$ 2929.06 | 2668.93                   |

Tourists that were interviewed and did the estuarine dolphin watching trip, regardless of the reason for visiting Cananéia, have an average monthly income that can be considered as high by Brazilian standards (IBGE, 2009). Tourists that went to Cananéia especially to see the dolphins had a lower average monthly income than of those who went to the region for other reasons, which is contrary to studies carried out in Australia and Canada (Hoyt, 2001), Scotland (Parsons et al., 2003) and Azores – Portugal (Oliveira, 2005), where the tourists who went there with the purpose of watching cetaceans had a higher monthly income than the others. However, taking into account that 92% of the interviewed tourists were from São Paulo State, where the population average monthly income ranges from US\$ 1000 to US\$ 1400 (IBGE, 2009), together with the data from other studies (Parsons et al., 2003; Oliveira, 2005), it is possible to infer that these people have a higher budget, which would allow them to be willing to spend more on this type of trip.

Three types of boats were used by the tourists to do estuarine dolphin watching trips, with 74% using schooners (large wooden touring boats with inboard diesel motor), 20% using motorboats (small aluminium boats with an outboard gasoline motor) and 6% using 'baleeiras' (medium size open deck fishing wooden boats with an internal engine amidships). According to the interviewed tourists, trip tickets cost between US\$ 5 and US\$ 135. Most of them (77%) considered the price as being reasonable, 14% as being expensive and 9% as cheap.

In relation to the number of boats that followed the same group of dolphins at the same time, 65.3% of the tourists declared that only their boat followed a particular group, 25% that there were two or three boats; 6.7% that there were between four and seven boats and 3% declared that there were eight or more boats in the same group.

The majority of the interviewees (58%) also declared that they were not given any instructions about conduct regulations when in the presence of estuarine dolphins. Of those who said that they had received such instructions, 41% received them on the boat (most of them when researchers/trainees of this project were present); 34% during talks at the cultural stand; 13% in the 'Parque Estadual Ilha do Cardoso' (Cardoso Island State Park); 6% in Cananéia town commercial installations and 6% declared having received them at school, on TV, from newspapers and their own experience.

In relation to the information imparted, both quantitative and qualitative, tourists have displayed extensive satisfaction. Similar outcomes were reported in the Azores Archipelago (Oliveira, 2005), indicating that tourists who look for this kind of trip expect to receive information about the species observed as much as about the ecosystem they are visiting.

In Cananéia, the information was given to the tourists by the skippers and boatmen, trainees and researchers in the schooners and during other public occasions, where basic information about the ecosystem and organisms, with a strong focus on the correct manner of approaching estuarine dolphins and general conduct regulations, was imparted. This outreach activity should not be seen as a complete environmental education programme which requires a longer process, more elaborate and formal, with a clear beginning and end. Usually, environmental education programmes are taught in schools to students by professors (Hammit, 1984). Therefore, this activity is considered as an environmental interpretation which will make the visitors' trip richer, by supplying varied, though informal, information.

Seeking to know if tourists wish to receive information during their trips, some studies have been conducted (Oliveira, 2005), detecting the existence of a 'new tourist' who is more mature, experienced, has a special interest in learning and understanding the place being visited, as well as seeking the truth and authenticity of other cultures. As with studies in other countries, this demand for information is also clear as 83% of the tourists declared they liked receiving information during their trip in Cananéia. Therefore, this preference, as observed in other whale watching places (Orams, 1997; Oliveira, 2005), shows the importance of implementing information programmes for these activities.

Many times, a trip to watch cetaceans is the only opportunity to draw attention to the importance of preserving the species and their habitat. Transmitting information not only benefits the tourists, who have an enriched trip, but also the companies and boatmen, as clients with a higher degree of satisfaction are more likely to recommend such trips to others. This can also help the environment conservation as tourists can pass on the information to those who, once emotionally involved, could contribute financially towards conservation as a way to feel involved in the context.

Most of the tourists (89%) also believed that the boat skippers respected the dolphin watching steering regulations. This could reflect the efforts of the crews or the lack of information of the tourists, as many declared not having received information about this.

It is worth highlighting that, in the opinion of the Cananéia tourist, the continuity of the work, effective supervision, and specifying acceptable standards are fundamental for the preservation of the environment and the estuarine dolphins. This statement points out the need for continuity and reinforcement of acceptable actions and an environmental interpretation in the region. Information need to be transmitted correctly and transformed into conduct (Filla, 2008). Tourist conduct in relation to environment preservation must be the same as those adopted by the local municipality or, at least, be in conformity with their environmental policy (de Conto and Posser, 2005).

Researchers and research institutions should adopt interdisciplinary practices in their study programs so as to understand how local communities relate to nature as well as valorising the experiences of tourists who visit those communities. The government, people from the local community, and national and international organisations should be motivated to preserve biological diversity and cultural integrity (IUCN, 2002). Such measures would help to transform the focus of conservationist interventions, using a top down approach, into socially responsible and culturally ethical actions. This type of approach allows communities to take part in the decisions, so that proposed agreements and the responsibilities for the management of space and natural resources can be prepared and distributed to all involved parties (Oliveira, 2007).

This interdisciplinary context generates concrete proposals, that are ethically coherent and include the responsibility of human beings, for conservation of the species (Filla et al., 2008) and the avoidance of conflicts and misuse of conservation areas as reported by Wedekin et al. (2002) in the North Bay of Santa Catarina and by Silva and Silva Jr. (2002) in the Dolphins Bay in the Fernando de Noronha Archipelago.

Interviewees were asked if skippers respected boat commanding regulations. Most of the tourists believed that they did (89%), whereas 11% declared that they did not. From the latter, the majority (71%) were aboard motorboats. These boats are smaller and less stable than the others, resulting in swaying motions and water spills on the boat. Also, as motors boats can go fast, many skippers are tempted to steer at excessive speed. The main complaints identified were about non compliance with the regulations concerning the boats' proximity to the dolphins and/or high speed navigation near the animals, especially by jet skis.

#### **4 Levels of satisfaction from the estuarine dolphin observation trip**

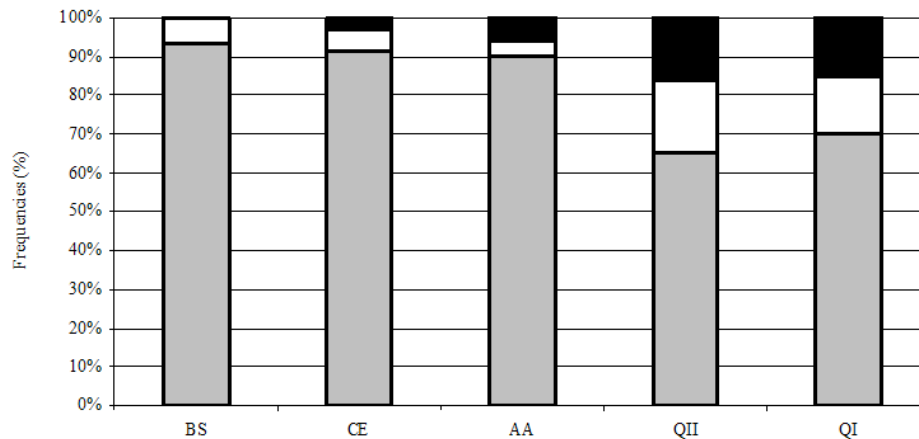
Tourists classified their level of satisfaction according to different aspects of the trip (Figure 2; Table 2). It is worth pointing out that, during the interview, most tourists mentioned the name of the boat used to do the trip. Thus it was possible to note the high levels of satisfaction in relation to the two schooner companies, with all crew members of one of them standing out positively on all issues. The satisfaction level from tourists on the other boats (motorboats and *baleeiras*) that also offer this type of service in the region was more diverse. A degree of homogeneity could be found in the tourists answers to questions about the 'attitude towards the animals', stating it as negative for some skippers.

It should also be noted that the majority of the interviewed tourists (96%) said that they would like to do another trip, mainly because of environmental attractiveness and the wish to see estuarine dolphins more times. The few tourists that had an opposite opinions stated that they would prefer to spend the time seeing new places and animals of the region. Curiously, one tourist said he would not repeat the trip because dolphins need to be free and therefore need a degree of distance from humans.

These results show that the tourists are satisfied with the estuarine dolphin watching in Cananéia, but that operators should pay more attention to some aspects that can easily be improved, such as transferring knowledge to tourists. 83% of the tourists declared having liked to receive information during the trip, while only 2% did not (without any further justification) and 15% stated not having received any information. Simple measures like the improvement of knowledge transfer could improve and increase the

development of this economic activity. The survival of the activity lies in the hand of the tourists, as their impressions about the quality of the experience are used by others to determine which actions and locations they will choose for recreational activities (Petrocchi, 2001).

**Figure 2** Degree of satisfaction frequency (%) about different aspects during estuarine dolphin watching trips in the Cananéia region, São Paulo State, during the summer months from 2005 to 2007. Grey bars represent 'good' opinions; white for 'reasonable', black for 'weak'



**Table 2** Levels of satisfaction about different aspects during estuarine dolphin watching trips in the Cananéia region, São Paulo State, during the summer months from 2005 to 2007

|     | <i>Levels of satisfaction</i> |                   |             |                   |                   |             |                    |                   |             |
|-----|-------------------------------|-------------------|-------------|-------------------|-------------------|-------------|--------------------|-------------------|-------------|
|     | <i>Schooners</i>              |                   |             | <i>Motorboats</i> |                   |             | <i>"Baleeiras"</i> |                   |             |
|     | <i>Weak</i>                   | <i>Reasonable</i> | <i>Good</i> | <i>Weak</i>       | <i>Reasonable</i> | <i>Good</i> | <i>Weak</i>        | <i>Reasonable</i> | <i>Good</i> |
| BS  | 0                             | 3.91%             | 96.09%      | 0                 | 21.05%            | 78.95%      | 0                  | 10%               | 90%         |
| CE  | 3.87%                         | 5.43%             | 90.7%       | 0                 | 9%                | 91%         | 0                  | 0                 | 100%        |
| AA  | 5.65%                         | 4.84%             | 89.51%      | 8.82%             | 0                 | 91.18%      | 0                  | 0                 | 100%        |
| QII | 19.38%                        | 21.71%            | 58.91%      | 6.06%             | 9.09%             | 84.85%      | 11.11%             | 11.11%            | 77.78%      |
| QI  | 17.46%                        | 17.46%            | 65.08%      | 6.06%             | 6.06%             | 87.88%      | 11.11%             | 11.11%            | 77.78%      |

Notes: BS = Boat steering/navigation; CE = Crew's Empathy; AA = Attitude towards Animals; QII = Quantity of Information Imparted during the trips; QI = Quality of the Information.

Tourists also check the price of products, realise if the relationship of quality and price is consistent and also if they are being respected as clients (Petrocchi, 2001). Most of those who were interviewed considered prices fair with only 13% regarding them 'expensive'. The same type of relationship was found in the Azores Archipelago (Oliveira, 2005), where most of the tourists also declared that, although the majority considered that the prices were reasonable, they were not willing to pay a higher price for the cetaceans watching trip. Therefore, the price calculation has to be done cautiously, as an activity will only have a positive economic value if people consider it to be desirable and are willing to pay for it (Chee, 2004).

Values of tourism and recreation are particularly attractive because they are relatively easy to obtain and they can be a significant source of income (IUCN, 1998). However, the willingness to pay (or acceptance of the value) should not be the only criteria used in the decision-making process of developing activities in nature. The IUCN (1980) recommends the promotion and/or preservation of the diversity to maintain the biological stability (consequently also the economic stability, as it depends on the biological resources). Many natural systems are overloaded by human economic activity impacts. Even when just few ecosystem services are considered, its loss in the conversion generally exceeds the gains in marketed benefits (Balmford et al., 2002). It is time to reconsider nature, respect the limits of the planet and focus on an economy of increasing plenty and not of an economy of scarcity (Goldsmith, 2005).

Whales and dolphins, for example, arouse a great empathy and curiosity in people, creating a new industry of cetacean observation, especially in the tourism field where people are authorised to watch cetaceans in nature: the whale watching (Coscarella et al., 2003; Filla and Monteiro-Filho, 2009b). This generates jobs and economic benefits for several local communities around the globe and can promote conservation of the cetaceans and the environments in which they live (IFAW, Tethys Research Institute and Europe Conservation, 1995). On the other hand, if this kind of tourism is not organised, it can cause population disturbance of the animals, changing of their natural behaviour and migration, and can also exponentially modify its distribution, survival or reproduction (Coscarella et al., 2003; Filla and Monteiro-Filho, 2009a).

Some of the possible impacts of watching estuarine dolphins were verified at the Pipa Beach (Rio Grande do Norte State) on the north-east of the Brazilian coast (Valle and Melo, 2006; Santos-Jr et al., 2006) and at Cananéia, south-east of the Brazilian coast (Filla, 2008; Filla and Monteiro-Filho, 2009a), showing that the animals modify their behaviour in the presence of boats, especially when the vessels get too close to the groups or approach them in high speeds.

To guarantee that whale watching will be practiced in sustainable ways, it is necessary to undertake research using strict scientific techniques and spreading the results of each research in an agile way. Moreover, the whole environment must be holistically considered, and also social and political questions must be considered (Filla, 2008; Filla et al., 2008; Filla and Monteiro-Filho, 2009a).

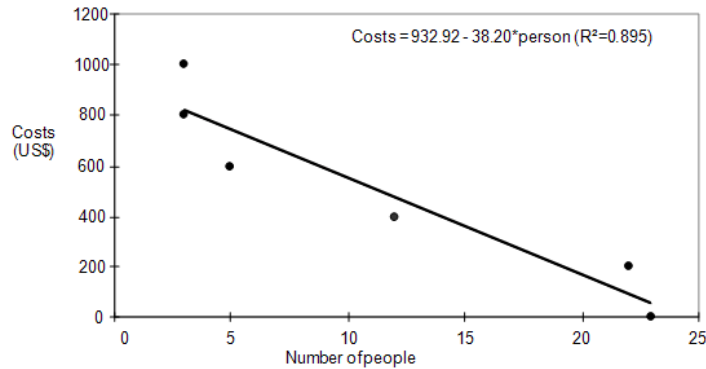
This balance between diversity, environmental conservancy, equity and economical and ethical questions are the green economy focus that firmly re-enters the economy within the ecological and social structures. A new approach is necessary to handle social and environmental problems, on both: a global scale (Kennet and Heinemann, 2006) and a regional scale, as in Cananéia. Planet resources have to be appreciated and conserved by the human species; the human species must be mobilised to support the planet as it is known that every human action has impacts that must be understood and correctly managed (Kennet and Heinemann, 2006).

## **5 Applying the Travel Cost Method (TCM)**

The average individual expenditure of each tourist that visited Cananéia with the purpose of watch the dolphins was US\$ 228.97, while the average individual expenditure of tourists who went to the region for other reasons was US\$ 17.25 ( $t = 7.39$ ;  $df = 22$ ;  $p = 0.001$ ).

Despite the considerable number of tourists that went to Cananéia specifically to see the dolphins, only 23 supplied all necessary data about their expenses and incomes in the interview. Therefore, only these were considered to construct the demand ‘curve’ (Figure 3).

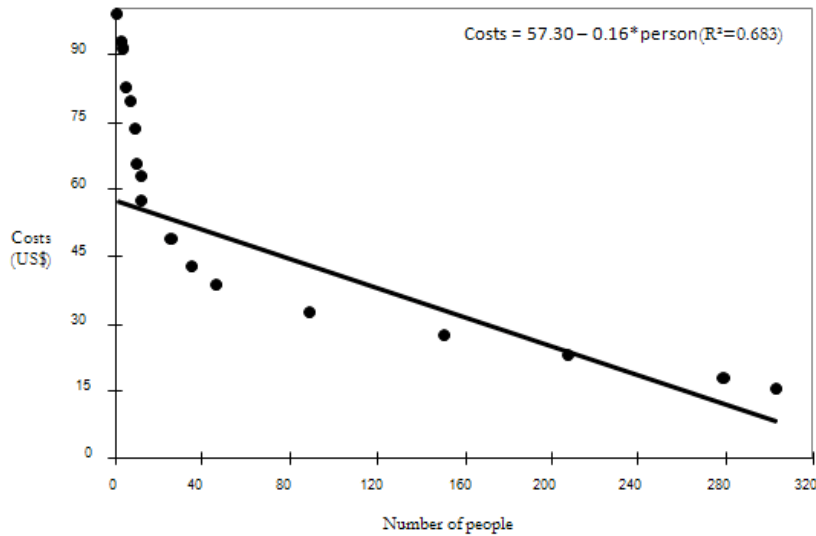
**Figure 3** Demand curve obtained from expenditures mentioned by tourists that were interviewed and intentionally visited Cananéia to watch estuarine dolphins



To calculate the consumer surplus value for this group of tourists, the average total cost (US\$ 228.97;  $d = 286.70$ ) was calculated. With the evaluation of the area using a triangle, it was possible to obtain the value of US\$ 1710.30 as being the consumer surplus value of the 23 visitors; US\$ 74.36 per visitor.

From the total number of tourist that said they visited Cananéia for other reasons than estuarine dolphin watching, but did at least one trip ( $n = 545$ ), 303 supplied all the necessary information about their income and costs which were used to construct the demand ‘curve’ (Figure 4).

**Figure 4** Demand curve obtained from expenditures mentioned by tourists that were interviewed and visited Cananéia for other reasons, but that ended up doing estuarine dolphin watching trips



To calculate the consumer surplus value for this group of tourists, the average cost of a boat trip was calculated with 1/4 of the daily yield/(1/2 day) (\$ 17.25;  $d = 19.49$ ). With the evaluation of the area of a triangle, it was possible to compute US\$ 1645 as being the consumer surplus value of the 302 visitors; US\$ 5.45 per visitor.

Considering that the rate between the number of tourists who intentionally visited Cananéia to observe estuarine dolphins and those who went for other reasons is representative for all the months when this recreational activity is carried out, it is possible to extrapolate the grand total consumer surplus for the years 2006 and 2007. Therefore, 7% of all clients (3.780 according to data supplied by the companies and boatmen of the region) visited Cananéia in 2006 and 2007 to observe estuarine dolphins, and 93% (50.220 according to the same source as before) went there for other reasons. Finally, the total consumer surplus for 2006/2007, or the evaluation of the estuarine dolphin watching activity in those two years, attained a value of US\$ 556,733.98.

Ecosystem economic evaluation has the potential of promoting decision-making by demonstrating the benefits of a sustainable management (Chee, 2004; Gios et al., 2006), thus helping in tourism planning and management through a better understanding of visitor preferences. It also shows the potential of tourism (often hidden) when evaluating public and social investments and the success of policies with a direct, or indirect, impact on tourism (Petrocchi, 2001). However, it is worth noting that, even though pure economic evaluation is a part of economy and consequently a subject for economists, the evaluation of areas such as estuaries and activities like whale watching also requires knowing the profile of the tourists, understanding the functions of an estuary and the organisms found therein, therefore requiring a complex interdisciplinary approach.

With the Cananéia whale watching economic evaluation, the TCM was efficient for calculating estimates as it takes into account not only market values, but also non-market ones (Wells, 1997). Besides that, TCM is relatively non controversial, because it is modelled on standard economic techniques to measure the value and uses the information of real behaviour to verbal answers, being much more realistic than hypothetical scenarios. The method closely imitates the most conventional empiric techniques used to estimate economic values based on market values, is based on the real behaviour of people, is relatively cheap, can count on large samples because visitors tend to be interested in participating and its results are relatively easy to be understood and explained (King et al., 2009).

Many studies have been done to estimate the economic value of tourist attractions and recreational activities. In a review work, Rosenberger and Loomis (2001) collected studies about the non-market values of these activities between 1967 and 1998. They identified 163 studies covering the value of these activities in the USA and Canada. This revision was based on four revisions in literature which included activities such as camping, picnicking, boating trips, sport fishing and others, with the first revision using data from 1960 to 1982; the second from 1968 to 1988, focusing principally of 1983 to 1988; the third from 1968 to 1993; and the fourth from 1988 to 1998.

It is also possible to cite other studies done in South Africa (Turpie et al., 2003); Greece (Birol et al., 2006); Australia (Brown, 2006; Rolfe and Prayaga, 2007); Italy (Alberini et al., 2007) and Brazil (Mikhailova and Barbosa, 2004; Sebold and da Silva, 2004). Also, biodiversity evaluation has been estimated (Nunes and van den Bergh, 2001; Ramsar, 2007). The many studies about the financial advantages of the whale watching

profess that the activity generates income, jobs and economic benefits in various parts of the world (Ris, 1993; Mazzanti, 2001; Parsons et al., 2003; Woods-Ballard et al., 2003; IFAW, 2004; Larson et al., 2004), to an extent that Mazzanti (2001) suggested that the name IWC 'International Whaling Commission' should be changed to 'International Whale Commission'. However, these studies are limited to values invested directly in the activity, based on the sale of tickets for boat trips.

The existence of only a few specific studies about the whole economic value of this activity limits the possibility of making a comparison between this study and Oliveira's (2005) altered TCM study. In this modification, the intention was to estimate the consumer surplus value as close as possible to reality, trying to increase the precision of the estimate. All expenses related to a visit to Cananéia were considered proportionally to the motivations of the visitors. When dolphin watching was done because they happened to be in region, only the costs attributed directly to the activity (trip price and time spent on it) were considered. When the trip was intentionally made to watch the dolphins all the costs (expenditures and time) were considered. In Cananéia, contrary to what was detected by Loomis et al. (2000) in California (USA), it was evident that the consumer surplus of the group who went to the region especially to watch estuarine dolphins, when compared to that of those who went there for other reasons, was significantly greater. A similar result was also reported for the Azores Archipelago (Oliveira, 2005). This shows that the values attributed to these resources in these regions is much greater than the values received from direct income. Even so, estuarine dolphin watching tourism is little publicised or valued by the local community.

## 6 Conclusions

Cananéia is a privileged place for watching estuarine dolphins in nature because the trip to observe the animals is done in protected waters and the dolphin population is resident.

The cetacean watching activity can substitute for the hunting of these animals, thus valuing natural heritage and contributing towards biodiversity conceptualisation and preservation.

The degree of satisfaction observed in tourists that go estuarine dolphin watching in Cananéia can be considered, on the whole, as being satisfactory. As in other places, the demand for information in Cananéia during the trips is evident. A large part of the tourists believe that conduct norms are respected when in the presence of dolphins.

It is evident that the study of the degree of tourist satisfaction associated to an economic evaluation of estuarine dolphin watching in Cananéia furnishes indicators that are essential when attempting to improve the activity and the environment planning, and also when measuring the sustainability of local and regional ecosystems. It may be possible to promote *S. guianensis* to species flag of the region because, if done in an organised and conscientious manner, this initiative could bring greater financial benefits and even contribute towards improving the conservation of the estuarine dolphin and its natural habitat in this stretch of coast in southeast Brazil.

The value attributed to estuarine dolphin watching activities in Cananéia is far greater than the value obtained from direct income. The economic valuation of areas such as estuaries and activities such as whale watching requires a complex and interdisciplinary



approach. The economical benefit brought to Cananéia through estuarine dolphin watching is that it can be used to draw attention to the fact that this cetacean population and their habitat need to be preserved so that the activity can be guaranteed. Similarly and consequently, a tangible and efficient conservation effort must be done with local communities, tourists and administrators.

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