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The impact of vessel crowding on the probability of tourists returning to whale watching in Banderas Bay, Mexico

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ABSTRACT

This article examines the influence of vessel crowding on the probability of tourists returning for whale watching at Banderas Bay in Mexico. We estimate a conditional probability model of the intention to return, which includes vessel crowding and other factors such as income and conservation attitudes as explanatory variables. We use a representative survey of 410 whale watching tourists. Our empirical results show that perceived crowding and reported crowding negatively affect the probability of tourists returning for a whale watching trip, while variables such as conservation attitude, specifically subjective norm, have positive impacts on such probability. Results show that most of the surveyed tourists would return if the number of boats around the whales were about two. These results suggest that well designed coastal management policies should include appropriate regulations on vessel crowding not only to protect the whales but also to increase the probability of tourists returning to the site. Proposed regulations on crowding might include evaluation of the actual norm and maintenance of permits as a regulation strategy, a code of conduct for all vessels and a zoning area.

1. Introduction

Promoting sustainable economic activities is often considered a key component of an innovative green growth strategy for many countries because such activities might increase rural household revenue with minimum interference with marine ecosystems. Whale watching is a tourism industry that not only generates over 2 billion dollars worldwide annually but also represents a diversified source of income for fishermen in many countries (Chung-Lin, 2010; Orams, 2000; Valentine et al., 2004; O'Connor et al., 2009; Cisneros-Montemayor et al., 2010). However, in the absence of whale watching regulations, whales as well as tourism satisfaction can be affected by the industry. Therefore, appropriate regulation with environmental and economic criteria on this matter could protect the whales without discouraging the development of alternative economic activities for the population. In this sense, the factors that affect tourism return are useful information for the decision makers involved in ocean and coastal management. Such information might provide the guidance needed for policy designed to protect whales while at the same time keeping tourists coming back to the area.

Whale watching boats are regulated in many countries (Avila-Foucat, 1998). Therefore, it is relevant to analyze if boat crowding affects tourist return to whale watching destinations in order to link aspects of conservation and economics for management purposes. Thus, the conceptual frameworks underlying this paper are crowding and intention to return. Crowding is a widely used approach in leisure studies, especially in terrestrial environments, but is used to a much lesser degree in marine environments or whale watching studies (Needham et al., 2011). Similarly, the concept of intention to return has been used in green consumption studies but not for whale watching preferences.

This article aims to analyze the influence of crowding on the probability of tourist return to a whale watching area in the context of a typical model that also includes economic factors and conservation attitudes as determinants.

This article is structured as follows. The first section provides some background about whale watching. The second section describes the theoretical framework on crowding and its relationship to the probability of tourists returning to Mexico. The third and

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fourth sections describe the research questions and methods, respectively. In the remaining two sections, we present the model and a discussion about our results.

1.1. Whale watching background

The annual average growth rate in whale watching from 1998 to 2006 was about 11.3 percent, which is equivalent to three times the growth rate of world tourism during the same period. The third most important Latin American country carrying out this type of tourism activity is Mexico. In fact, whale watching comprises a very important share in Mexico's tourism revenue; it represents almost 14 percent of the total income derived from tourism activities and has grown around 5.6 percent annually in the last decade (Hoyt and Ignígues, 2008).

One of the most attractive species for whale watchers is the Humpback whale (*Megaptera novaeanglie*), which is also one of the species most threatened by human activities worldwide. International and national organizations have tried to protect this whale in recent years. It is in the Red List of the International Union for Conservation of Nature, and the Mexican government has designed a conservation program for this whale, whose reported population, was 5924 individuals in 2004 (CONANP, 2010). However, Humpback whales are still threatened by human activities through chemical pollution exposure, collisions with boats and entanglement in nets (Vanderlaan and Taggart, 2007; Frisch, 2009). Among such threats, collisions with boats are particularly worrying because there is evidence that they might severely affect whale behavior. Such accidents might provoke changes in the direction whales swim, their breathing intervals and the duration of their exposure at the surface (Jelinski et al., 2002; Richter et al., 2006). Noise disturbances might also have severe effects on their ventilation rate and communication (Weinrich and Corbelli, 2009; Erbe, 2002). In this respect, there is empirical evidence that the ventilation rate and speed of whales near Mexico have been affected by boat noise (Medrano-González, 2002; Heckel, 2001). Although there is still much to understand about the direct and indirect human impact on whale behavior and population recovery, there is strong evidence that vessel crowding is negatively affecting them and that decision makers should continue carrying out policy measures to protect them.

Although there are many options for protecting whales, such as restricting access to some ocean areas, issuing codes of conduct and respecting voluntary rest periods (Duprey et al., 2008; Casis-García, 2010), most of the international whale watching regulations only control the maximum number of boats that get close to the whales by restricting the distance to the whales and reducing the tourist's observation time (Avila-Foucat, 1998). However, such a regulation is far from perfect; while the existing norms limit the number of permits issued to some boats, there are many other unregulated boats (those in transit or navigation) that are currently engaged in whale watching. More stringent regulation is needed to protect the whales without ignoring that tourism activities might be affected by such regulations. In what follows, we try to empirically determine how vessel crowding might affect tourism, shedding light on the appropriate policies for costal managers, who must keep two objectives in mind: protecting the whales and avoiding an effect on tourism activities. In this research, we try to show through empirical evidence that boat crowding might decrease tourists' intention to return, which implies that there is a need to standardize boat codes of conduct and regulations on this matter.

1.2. Conceptual foundation

Our first theoretical construct is the concept of crowding, which refers to an over-congestion of vessels close to whales (Needham et al., 2011). Vessel crowding might be problematic because it could reduce tourists' return intentions for future whale watching and could affect whale behavior. The crowding concept includes the so-called reported, perceived and norm crowding concepts (Vaske and Donnelly, 2002). "Reported crowding" refers to the number of boats that an individual saw during a trip. "Perceived crowding" reveals a subjective perception of the number of boats encountered that affects tourist satisfaction. Finally, "norm crowding" refers to what people believe the appropriate number of boats should be around whales, that is, the number of boats that a respondent would be willing to accept while whale watching (Manning et al., 2002; Needham et al., 2011; Vaske and Donnelly, 2002; Vaske and Shelby, 2008). The crowding concept is a useful approach in coastal tourism management and has been used for regulating the number of visits at a tourist destination in methods such as Limits of Acceptable Change, Visitor Impact Management (VIM), the Tourism Optimization Management Model (TOMM), and Visitor Experience and Resource Protection (VERP) (Jakus and Shaw, 1997; Flores-Palacios and Valencia-Díaz, s/f, 2007).

Our second theoretical construct is the so-called "intention to return", which can be approximated by estimating the probability of a tourist returning for future whale watching. According to the literature, the intention to return is determined by different aspects, such as satisfaction, perceived quality, past vacation experience destination image and cultural preferences (Asseker et al., 2011). Here, we posit the hypothesis that vessel crowding might negatively affect satisfaction and thereby tourists' intention to return. That is, more crowding in an area will reduce the intention to return to the area.

The "intention to return" has been widely addressed in the "theory of planned behavior" (TPB), which establishes that tourists' intention to return will depend on attitudes, subjective norms and perceived behavioral control (Ajzen, 1991). Attitudes toward the behavior are "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (Ajzen, 1991). Perceived behavioral control "refers to people's perception of the ease or difficulty of performing the behavior of interest" and the subjective norm refers to "the perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991). The theory of planned behavior has been used to predict tourists' sustainable choices, such as choosing green hotels over traditional hotels (Han et al., 2010; Han and Kim, 2010). It has also been used to analyze subjective norms and environmental attitudes, where the results of such studies highlight how much more significant the individual's attitudes are compared to perceived behavioral control (Chan, 1998; Karpinnen, 2005; Fielding et al., 2008). In this paper, we are interested in measuring attitudes toward conservation in accordance with Kaiser's (2006) study of general conservation attitudes. Leisure studies have also shown that attitudes are relevant to predictions of satisfaction and future behavior (Hung-Lee, 2009).

However, to the best of our knowledge, no article has emphasized the relationship between crowding and the "intention to return", although many studies have highlighted that the outdoor experience is optimized in different ways by different agents (Daigle et al., 2002). In this research, we are interested in determining if crowding and the intention to behave toward general conservation issues has an effect on whale watcher return.

In general, our framework holds that the intention to return will strongly depend on vessel crowding, attitudes and economic factors. That is, we are interested in studying whether the intention to return to Banderas Bay for whale watching is associated with vessel crowding and attitudes rather than only to individual characteristics and other economic variables such as income or prices, which are emphasized in conventional approaches to the topic.

1.3. Research questions

The main objective of this article is to determine whether vessel crowding has some influence on the odds of tourist return for whale watching to Banderas Bay in Mexico so that we are able to disentangle the role of crowding in an integrated coastal management strategy. More specifically, we want to investigate the influence of perceived and norm crowding on the intention to return in the context of a probability model that also contains conventional factors, such as individual attitudes and economic factors, as determinants. Finally, based on our database, we seek to assess the number of boats that tourists consider appropriate in the Banderas Bay area such that they have the incentive to return.

2. Methods

2.1. Study site and current regulation

Banderas Bay belongs to the states of Jalisco and Nayarit, which are located on the Pacific coast of Mexico. Although the main tourist attractions in this area are the beaches around Puerto Vallarta, there is an important demand for ecotourism. In fact, surveys have shown that the third most important attribute enjoyed by international and national tourists is the landscapes of this area (Gobierno del Estado de Jalisco, 2007).

Ecotourism in this area started in the early 1990s as an income diversification strategy. In fact, Punta Mita's fishermen were among the first to offer whale watching services. Such services are provided by specialized and non-specialized companies. The former are companies with small boats carrying 8 to 16 passengers at a cost that oscillates between $25 and $95 USD (Hoyt and Igníguez, 2008). The latter are companies offering other services in addition to whale watching. The number of boats offering such services grew from 60 in 2000 to 200 in 2009 (Frisch, 2009), and the revenues generated by whale watching in Banderas Bay represent 1.6 percent of the total income from nature tourism in Mexico (Hoyt and Igníguez, 2008).

Whale watching in the area is regulated through permits required by the Mexican Official Regulation (NOM-131-ECOL-SEMARNAT -2010). This regulation has been modified recently and states that 4 boats having a permit may be within a radius of 60 m around the whales. Previously, 2 boats could be within 30 m. Boats without a permit are not supposed to be within 240 m of whales, but this rule is not enforced. Thus, management of whale watching boats can be complemented by assessing tourist satisfaction.

2.2. Model description

We approximate the intention to return by modeling the probability of tourists returning to Banderas Bay for another visit. Return was coded as a binary variable, denoted by T_i, such that $T_i = 1$ if the individual decides to visit the site again and $T_i = 0$ otherwise. As Darnell and Johnson (2001) suggested, the probability of visiting an attraction should be linked to the individual's characteristics (Darnell and Johnson, 2001). In this sense, as described by Ávila-Foucat and Eugenio Martin (2008), it is assumed that $\Pr(T_i = 1)$ is linked to a set of socioeconomic characteristics. However, we also include perceptions of vessel crowding and individual attitudes as explanatory variables.

More precisely, for some appropriate function $g(\cdot)$,

$$\Pr(T_i = 1) = g\left(\alpha + \sum_{j=1}^{k} \beta_j \mathrm{SE}_{ij} + \sum_{l=1}^{h} \beta_l C_{il} + \sum_{m=1}^{o} \beta_m A_{im}\right), \quad (1)$$

where $0 \le g(\cdot) \le 1$, α denotes a constant, SE_{ij} denotes the jth socioeconomic variable of individual i, C_{il} denotes crowding of attribute l (boats) as seen by individual i, and A_{im} is the attitude toward general conservation issues m by individual i. β_m, β_i and β_l denote parameters associated with the previous variables. The model can be represented as:

$$T_i^* = \alpha + \sum_{j=1}^{k} \beta_j \mathrm{SE}_{ij} + \sum_{l=1}^{h} \beta_l C_{il} + \sum_{m=1}^{o} \beta_m A_{im} + \varepsilon_i, \quad (2)$$

where ε_i denotes the unobserved part or error term. For our purposes, the latent variable T_i will operate as an index function, such that we will set $T_i^* = 1$ if $T_i^* > 0$ and $T_i^* = 0$ if $T_i^* \le 0$.

Let $S_i = \alpha + \sum_{j=1}^{k} \beta_j \mathrm{SE}_{ij} + \sum_{l=1}^{h} \beta_l C_{il} + \sum_{m=1}^{o} \beta_m A_{im}$, such that $T_i^* = S_i + \varepsilon_i$. Then,

$$\begin{aligned} \Pr(T_i = 1) &= \Pr(S_i + \varepsilon_i > 0) = \Pr(\varepsilon_i > -S_i) = 1 - \Pr(\varepsilon_i \le -S_i) \\ &= 1 - F_\varepsilon(-S_i) \end{aligned} \quad (3)$$

where F_ε denotes the cumulative density function of the unobserved part. Due to a problem of identification of location and scale of T_i^*, it is necessary to choose a distribution and a value for the variance of ε_i. In our case, we assume ε_i is independently and identically distributed, following a normal distribution with a mean of zero and a variance of one. Maximum likelihood estimation is applied to the model in order to estimate parameters of interest.

In accordance with the model described previously, we will be analyzing our data using Probit and Logit econometric models, which allow us to determine the probability of return conditional on crowding, individual attitudes and other economic factors.

2.3. Data collection and survey

In order to determine the relevant variables affecting the probability of return, we use survey data extracted from the population of interest. A representative sample of 410 individuals was selected after their whale watching experience in Banderas Bay with the help of two tourist companies: Ecotours and Pegasso. In what follows, we briefly discuss the structure of the questionnaire and the constructed variables to determine the impact of crowding and attitudes on the probability to return.

The questionnaire included information on tourists' socioeconomic characteristics, travel motivation and crowding perceptions. We included questions that allow us to construct indicators of crowding. Reported crowding was measured as the number of boats seen by tourists close to the whales. Perceived crowding was measured by asking if the number of boats affected their trip satisfaction. Norm crowding was measured as the maximum number of acceptable boats to detect individuals' intention to return to Banderas bay. The questions for measuring norm crowding and perceived crowding used a multiple level format proposed by Manning et al. (2002), employing a range from 2 to 10 boats.

Tourists' knowledge about the effects of boats on whales was considered by asking them to identify false or write information provided about possible injuries to whales from boats. The latter is important because environmental knowledge might influence crowding acceptance (Frick et al., 2004). Satisfaction with the tour company was also assessed in order to be sure that return was not related to company performance, as mentioned by Noe and Uysal (1997). Moreover, whether the number and behavior of whales were the most important attributes influencing return was measured, as suggested by Orams (2000). Substitute activities were also considered, such as scuba diving, snorkeling, and rafting.

As mentioned previously, we were interested in determining whether general conservation attitudes influence return. Attitudes were measured by asking if environmental conservation should be a priority, as prioritizing this reflects a positive interest toward the environment. As described by Frick et al. (2004) action is a predictor of behavior; thus, conservation activities that tourists might carry out at home were included, such as waste disposal. The presence of a subjective norm was analyzed by asking if the society in their country is concerned about the environment, as subjective norms are "the perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991). Lastly, perceived behavioral control was addressed, asking if the respondent thinks she/he has an important role in conserving the environment, as this variable "refers to people's perception of the ease or difficulty of performing the behavior of interest" (Ajzen, 1991).

3. Results

A preliminary statistical analysis of our data shows that our sample includes mostly middle income young tourists (39 years average age) from different parts of Mexico and the United States who are whale watching for the first time. Another interesting fact is that only 39 percent have a university degree (see Table 1). These facts reveal that whale watchers visiting this beach are likely to be relatively young people who have a job, but are not necessarily highly educated people.

A deeper analysis can be performed using a conditional probability model like the one suggested in our methodology section. Table 2 below shows our estimates of the probability to return equation. The probit model confirms our hypothesis that perceived (−.3281) and reported crowding (−.0747) are actually very significant variables (standard error between parentheses) that explain the intention to return (Table 2). Norm crowding was not significant, meaning that the experience is more important than the desirable number of boats. The logit coefficients confirm such results. More specifically, the probability of return seems to be negatively associated with perceived and reported crowding. This result implies that the number of boats is important for tourist satisfaction and that more crowding decrease the odds of return. The odds ratio, obtained from the logistic regression, confirms that more perceived and reported crowding will decrease the odds of tourists returning to the Bay by more than a half, .57 and .88, respectively. Our regression results also show that the level of environmental consciousness in the place of origin of the tourists seems to positively increase the odds of returning to Banderas Bay (.2567), which means that conservation issues in society are also important in explaining the return intentions of visitors to Banderas Bay in Mexico.

On the other hand, economic variables such as income and the price of substitutes have a positive impact on the intention to return (Table 2), as predicted by the standard economic models. That is, if tourists' income or the prices of alternative eco-tourism activities increase, the probability of tourists returning to the Bay is greater. It is worth mentioning that 'substitutes' are activities that tourists might do in the Bay instead of whale watching, such as rafting or scuba diving.

Finally, making use of our database, we also find that tourists will choose to return with a higher probability if the number of reported boats in the area is close to 2. This number is below the current regulations on the matter. Such results suggest that the current number of boats allowed in the area exceeds the optimal level that would make tourists more inclined to return for a second visit (Fig. 1).

Table 1
Socioeconomic characteristics and whale watching travel motivation.

Variables	Percent
Women	56%
Mexican	36%
USA	40%
Working	60%
University degree	39%
Monthly income from $2000–$4000	48%
First time whale watching	65%
Whale watching planned before leaving their country	59%

Table 2
Probit and Logit econometric results.

Variable	Probit coefficient (Standard Error)	Logit coefficient (Standard Error)	Odd-ratio (Standard Error)
Perceived crowding	−.3310 (.1459)	−.5630 (.2476)	.5694 (.1410)
Reported crowding	−.0755 (.0336)	−.1245 (.0590)	.8829 (.0521)
Subjective norm	.2558 (.1267)	.4207 (.2169)	1.523 (.3304)
Income	.3134 (.1924)	.5403 (.3292)	1.716 (.5651)
Prices of substitute	.1020 (.0629)	.1718 (.1058)	1.187 (.1256)
Log-likelihood	−114.11		

4. Discussion

The determinants of the intention to return have been described in different studies (Asseker et al., 2011; Darnell and Johnson, 2001; Jang and Feng, 2007). Among them, we can find consumer satisfaction, perceived quality, past experience, destination image and culture. In addition, the role of crowding has been addressed in marine studies by a few authors, showing that the number of boats is more important than the size (Needham et al., 2011). As we have said, crowding is a variable that, in some sense, measures tourist satisfaction and affects the probability of return. Therefore, we estimated an econometric model including crowding as a determinant of the probability of return. Our empirical results suggest that the probability of return is statistically associated with perceived and reported crowding, showing that the number of boats is actually a very important variable. In fact, reported crowding seems to have more influence in respondents' probability of return. Norm crowding is not significant meaning that tourist will return independently to the desired number of boats. Tourist can identify if the actual experience affected their satisfaction but future expectations influence less their decision to return.

We also find that subjective norms were significant in the model, which implies that social pressure toward conservation does have an important effect for the type of tourists visiting Banderas Bay. Attitude and perceived behavioral control were not

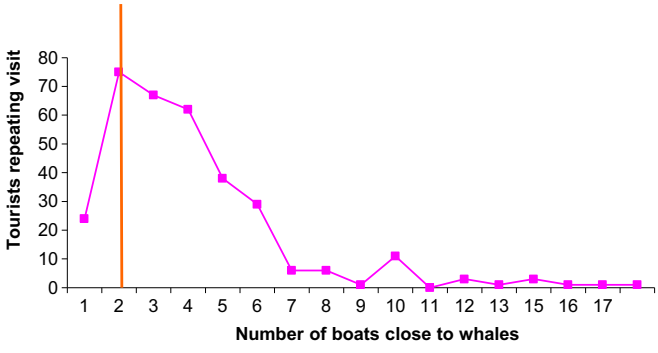

Fig. 1. Tourists return according to the number of boats.

significant in this case, and further exploration through studies of specific attitudes toward whale watching as mentioned by Ajzen (1991) is suggested, even if the interviewees do not have previous experience with that activity.

In general, we conclude that crowding and attitudes do affect the intention to return and should not be ignored while designing coastal management policies.

According to our descriptive statistical results, 2 is the optimal number of boats for tourist satisfaction. This means that no more than 2 boats should be close to the whales (30 m). However, this estimate does not coincide with the actual regulation, which allows 4 boats around the whales. It would be important to review the actual legislation on this matter to ensure tourist satisfaction as well as to protect the whales. That implies revisiting the actual economic and biological impacts of the current legislation. Besides policy instruments for whale watching regulation are required these days, given the rise in this type of ecotourism activity in environmental areas in Mexico and around the world. Different management recommendations have been issued, as described by Casis-Garcia (2010). For instance, there are codes of conduct, zoning, closure areas, time of season, boats permits and performance and education programs.

In Banderas Bay, the main management issue is the increase in the number of vessels and boats without permits that are in transit and stop to do whale watching. Because results show that the number of boats is relevant to intention to return, permits seem to be a useful management option. Our findings also show that because perceived and reported boats are significant, a code of conduct applicable to all boats in order to maintain 2 or 4 boats as the maximum can be constructive. This code of conduct can be combined with boats labels that behave correctly, as in Taiwan (Chung-Lin, 2010), and to education programs to improve the tourists and locals awareness to whales (Duprey et al., 2008). Whale's behavior depends on reproductive or breathing seasons. For instance, cohort groups behave differently than mother with calves. Respondents were not sensitive to the whale's behavior, so that a zoning regulation protecting for example mothers with calves in the northern area of the bay, where they are more often found to rest, might be appropriate In sum, the management recommendations derived from our results are as follows: assess the norm modifications but maintain permits as a regulation strategy; institute a code of conduct for all vessels; and institute a zoning area. It is also important to highlight that because crowding affects return and tourist satisfaction, it is a useful approach for coastal management, specifically when the biological effects of anthropogenic pressures are difficult to quantify.

Finally, in coastal regions with diversified economies, socioeconomic studies can provide complementary solutions to coastal management.

5. Conclusions

The main objective of this article is to determine whether vessel crowding has some influence on the odds of tourists returning to Banderas Bay in Mexico for whale watching. Our results showed that reported and perceived crowding are negatively associated with such probability, while subjective norm toward conservation are positively associated. That is, the more crowding there is in the bay, the less likely tourists are to return for a second visit. Economic variables such as income and the price of alternative activities have a positive impact on the intention to return, as predicted by conventional economic theory; we included economic variables so that we can avoid the bias generated by omitted variables in this type of modeling. Finally, our database shows that most of the surveyed tourists would return to this very specific touristic destination if the number of boats around the whales was about two, which is fewer than that allowed by the current Mexican regulation on this matter. Based on our results, evaluation of the actual norm and maintenance of permits as a regulation strategy, creation of a code of conduct for all vessels, and creation of a zoning area are all recommended. Assessing crowding is an interesting analytical approach, especially in coastal environments where ecosystem quantitative effects are sometimes difficult to assess.

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