



## Differences in perception and reaction of tourist groups to beach marine debris that can influence a loss of tourism revenue in coastal areas



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### ARTICLE INFO

#### Keywords:

Marine debris  
Second home  
Public perception  
Economic effects  
Tourism

### ABSTRACT

Marine debris is the most conspicuous pollutant that makes beaches aesthetically unappealing to users. The perceptions and reactions of beach users to stranded litter were compared between second-home owners and users (SHOU) and non-recurrent tourists (T). A questionnaire was applied to obtain socio-economic characteristics; assessment of the overall beach quality and perception of beach litter pollution (perception); hypothetical scenarios of marine litter pollution and deterrence (reaction); and potential alternative destinations in the case of deterrence (economic effect). Questionnaires ( $n = 319$ ) were applied at two Brazilian subtropical beaches, with different physiographical settings (Pontal do Sul, PS, estuarine beach; Ipanema, I, open-ocean beach). Beach users' groups differed regarding daily expenses ( $T > SHOU$ ), period of permanence per trip ( $SHOU > T$ ) and trip frequency ( $SHOU > T$ ). The open-ocean beach (I) was rated the worst regarding overall beach quality. Marine debris generation was mainly attributed to local "beach users", in the open-ocean beach (I). "Marine" (or non-local) sources were four times more frequently cited in the estuarine beach (PS). Perception on actual litter pollution and litter deterrence scenarios, did not vary between beaches or groups. More than 85% of beachgoers would avoid a beach visit if a worst scenario ( $> 15\text{items/m}^2$ ) occurred and most users would choose a neighboring state beach destination. Stranded litter may potentially reduce local tourism income by 39.1%, representing losses of up to US\$ 8.5 million per year. These figures are proxies to support the trade-off local authority's make between investments to prevent/remove beach litter and the potential reduction in income from a tourist destination change.

### 1. Introduction

Coastal systems, such as beaches, coral reefs and estuaries, are the main worldwide providers of ecosystem services of leisure and recreation, with a high cultural and aesthetic value [1]. Human pressure over coastal resources compromises the quality of the environment, which is crucial for several local coastal communities and national economies [2]. Some stressors are globalized across coastal areas, such as, marine debris [3,4], which impacts coastal tourism [5].

The amount of marine debris in the ocean and beaches is a growing problem [6,7]. Preventing its generation at source is an accepted worldwide mitigation strategy [8], but debris removal from the environment is recalled as an additional measure to reduce marine litter impacts [9]. Once in the sea, marine debris may become a trans-boundary problem, crossing political limits (municipal, state or

national) that demands new management arrangements. In trans-boundary contexts, the synergy between marine debris and tourism is especially complex since items may originate in regions other than the places where the litter is stranded and where tourism activities occur. In such locations, the main motivation of local authorities to remove beach litter is the potential negative economic impacts caused by litter presence to tourism revenues [10], which have rarely been evaluated and used as a contribution to management actions [11].

It is known that several aspects influence visitors' beach choice, such as, beach length and shoreline characteristics [12], as well as scenery, water quality, landscape, crowding and amenities [5,13–15]. Also, among several factors that influence the return of visitors to a certain destination, the overall trip satisfaction is consensually one of the most important [15]. As can be seen, in order to improve the beach users' experience, not only over-crowding should be taken into account,

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but also other aspects that users may consider important [16], such as, marine debris.

Specifically for the selection of beaches for recreation, marine debris is an important aspect taken in account by visitors [17–20]. Stranded litter is considered by beach users to be one of the five most important aspects regarding beach quality in Europe [21], USA [22], Mexico [22] and in the Caribbean [13,14]. Even though there is allochthonous marine debris generation, items may also be locally generated by tourists [23] and socio-economic aspects may influence littering behavior in different ways. For instance, some studies indicated that lower income and educational levels are related to a higher littering behavior [17,24]. On the other hand, other researchers found that these factors did not influence littering behavior, but age did with youngsters tending to litter more [25]. Even though factors influencing littering behavior may vary, the very presence of litter is generally perceived as unpleasant, especially for beach users [26,27]. For example, beach award programmes consider marine litter as a negative aspect when assessing beaches [28] and the European Union classify marine debris as an indicator of environmental quality [29].

Besides littering behavior, a previous study suggested that socio-economic characteristics of users influence their perceptions regarding the amounts and impacts of marine debris [30]. The authors observed that lower levels of education, in association to the location (beach) where the respondent was approached, could explain their concern about beach marine debris [30]. If this is a general pattern, it is expected that groups with different socio-economic characteristics, visiting different beaches, will have different perceptions of the environment.

Regarding beach users' groups, there are several possibilities of segregating user groups in a certain environment, depending on the issue under investigation or the study objective [31]. For instance, beach users may be divided by the uses they make of the beach (e.g., sun bathing and sports), geographical origins, income, age or gender. However, the type of accommodation, which underlie the level of attachment to the place, is rarely addressed [32–34], including the possible distinction of socio-economic profile and perception between Second Home Owners/Users (SHOU) and other type of tourists in coastal areas.

SHOU are conceptually, the intermediate level between non-recurrent tourists and year-round residents regarding site fidelity [32]. SHOU presents a higher sense of place than tourists, emphasizing the importance of local environmental quality and consider the region as an important escape for everyday activities. Non-recurrent tourists (hereafter referred as Tourists, (T)) would be considered as holding a weak and inconstant destination connection, being deterred to visit a given site that does not anymore fit in with their interest, due to loss of environmental quality or perceived/presumed obsolescent socioeconomic status. Similarly, SHOU also values the quality of environmental attributes, while selecting vacation places [33] and a degraded environment represents a potential decline in second-home market values, also declining SHOU's topophilia [34,35]. However, it is hypothesized that SHOU would be more tolerant to tourist destination discouragement, since there exists a higher attachment with the location (e.g., property investment and connection to local people), when compared to Tourists [34,36]. It is expected then that threats to the beach environment, such as, marine debris, will be perceived differently by these groups (see below), eliciting different responses in terms of site deterrence and change of destinations.

Even though holding distinct levels of site attachment, both groups represent income to coastal tourism. As marine debris influences the perception/satisfaction of beach users, especially regarding overall beach quality, an increase in the amount of debris may generate a potential loss of income to the coastal economy and municipalities [12]. Consequently, varied economic effects may occur depending on the proportion of discouragement between these groups. The way marine debris affects tourism depends on the perception of beach users and is

site specific [19,20]. Therefore, it is fundamental to understand which tourist groups use a given beach together with their perceptions and reactions to marine debris. Ultimately, these users' characteristics may influence the intensity and extension of potential economic impacts to a given locality, due to the presence of marine litter. Identifying the income from tourism and the possible losses due to marine debris allow estimating thresholds of acceptance of pollution levels by tourists. Nonetheless, it is expected that litter will affect differently each user group, i.e. deter tourists more than SHOU.

Economic losses due to stranded litter should consider not only costs involved for cleaning the environment but also the reduction of visitors' interest for a certain site [12,37,38], which may cause revenue reduction to tourist municipalities and countries. Identifying tourism income may also enlighten the limits of investing in palliative measures even though, essential analysis of the effect of aesthetical deterioration has not been fully explored regarding marine litter's economic impacts on tourism [39–41].

A case study in New Jersey and New York, in 1987–1988, estimated mean potential losses due to beach closures of US\$1.1 billion, 14.2% associated to waste wash-ups [38]. Another study on 21 economies in the Asian-Pacific region in 2008 estimated an impact of *circa* US\$622 million on the marine tourism industry due to marine litter [42]. Other authors observed that 97% of the Cape Peninsula's (South Africa) beach visitors would avoid visiting if there were more than 10 litter items per square metre [43]. The same authors estimated that beach cleaning expenditures represented approximately 20% of the recreational value (income) to the Cape Peninsula [43]. Another study, identified a reduction of 63% of visitors to Geogje Islands, in South Korea, due to marine debris coming from an estuarine area and estimated the economic effects to be between US\$29 – 37 million in 2011 [44]. Considering the results of these studies, understanding the economic effects of discouraging visitors, due to the growing marine litter problem over tourism is a relevant step in supporting valid decision-making.

Therefore, the present study aimed at providing new information on the socio-economic aspects of marine litter by addressing the role of tourist groups (Second Home Owners/Users and Tourists) on the potential economic impacts of beach debris. Sources of information were socio-economic profile, perception on the actual litter contamination and the overall beach quality, together with reaction to stranded marine debris scenarios. The rationale of this study was structured on four hypotheses.

The socio-economic characteristics (yearly income, level of education, daily per person expenditure, frequency of trips and period of permanence) and the perception on beach environment and beach litter (actual beach pollution scenario and the overall beach quality and/or probable marine debris origins) were supposed to vary between beach user groups and beaches (Hypothesis I). It was also hypothesized that the “detering scenario”, defined by number of items/m<sup>2</sup> that elicit users to change vacation destination, will depend on user groups, i.e., tourists will be dissuaded by smaller amounts of litter than SHOU, and on beaches, i.e., the worse the actual beach scenario, the higher the user's tolerance to future litter scenarios (Hypothesis II; Ipanema (I) > Pontal do Sul (PS)). Alternative vacation destinations (beaches within the same municipality, in a different municipality in the same state or in a different state) were supposed to differ between user's groups, with SHOU presenting a smaller mobility than tourists (T; Hypothesis III). Finally, it was hypothesized that an increase in stranded litter will cause a potential negative economic effect, which will also depend on user's group (Hypothesis IV; T > SHOU). The estimated economic impact will be discussed regarding the trade-off between costs of cleaning and loss of tourist revenue under a transboundary approach along the estuarine gradient.

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