TOURISTS' PERSPECTIVES OF MARINE ECOSYSTEM SERVICES AS THE FIRST STAGE OF PARTICIPATORY MODELING IN THE SOUTH COAST OF SAO PAULO *, **

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Abstract

Although the tourism sector is tightly connected to environmental issues, it is one of the least prepared to deal with changes in environmental conditions, especially with climate changes. Monitoring environmental quality in consolidated coastal destinations becomes fundamental to face the complexity involving marine and coastal ecosystems and tourist afflux. The assessment of stakeholders' perspective of the benefits these ecosystems provide can be a first step towards the use of modeling approaches to assist coastal planning. As part of a modeling process, this work explores tourists' perspective of marine ecosystem services, conditions considered in destination choice, and their reaction to changes in seawater quality through a semi structured survey at the municipality of Ubatuba, Sao Paulo, Brazil. The results show that the most perceived ecosystem services are cultural (recreational and aesthetic) and provision (fishery). Also, they identified water quality as the most important aspect of beach selection, which was considered a factor of destination choice. In addition, sewage and solid waste were the most significant factors perceived as responsible for altering seawater quality. The results reinforce the potential of including tourists' point of view to subsidize the design of socio-ecological modeling approaches.

Keywords: Marine Ecosystem Services; Mental Models; Coastal Planning; Tourism Demand; Brazil.

PERSPECTIVAS DE LOS TURISTAS SOBRE LOS SERVICIOS DE LOS ECOSISTEMAS MARINOS COMO PRIMERA ETAPA DE LA MODELIZACIÓN PARTICIPATIVA EN LA COSTA SUR DE SAO PAULO

Resumen

Aunque el sector turístico está estrechamente relacionado con cuestiones medioambientales, es uno de los menos preparados para hacer frente a los cambios en las condiciones ambientales, especialmente con los cambios climáticos. El seguimiento de la calidad ambiental en destinos costeros consolidados se convierte en fundamental para hacer frente a la complejidad que involucran los ecosistemas marinos y costeros y el aporte turístico. La evaluación de la perspectiva de las partes interesadas de los beneficios que estos ecosistemas proporcionan puede ser un primer paso hacia el uso de enfoques de modelado para ayudar a la planificación costera. Como parte de un proceso de modelado, este trabajo explora la perspectiva de los turistas de los servicios de los ecosistemas marinos, las condiciones consideradas en la elección del destino y su reacción a los cambios en la calidad del agua de mar a través de una encuesta semiestructurada en el municipio de Ubatuba, Sao Paulo, Brasil. Los resultados muestran que los servicios ecosistémicos más percibidos son culturales (recreativos y estéticos) y provisiones (pesca). Además, identificaron la calidad del agua como el aspecto más importante de la selección de la playa, que se consideraba un factor de elección de destino. Además, las aguas residuales y los residuos sólidos fueron los factores más significativos percibidos como responsables de alterar la calidad del agua de mar. Los resultados refuerzan el potencial de incluir el punto de vista de los turistas para subvencionar el diseño de enfoques de modelado socioecológicos.

Palabras clave: Servicios Ecosistémicos Marinos; Modelos Mentales; Planificación Costera; Demanda turística; Brasil.

AS PERSPECTIVAS DOS TURISTAS SOBRE OS SERVIÇOS DOS ECOSSISTEMAS MARINHOS COMO PRIMEIRA ETAPA DA MODELAGEM PARTICIPATIVA NA COSTA SUL DE SÃO PAULO

Resumo

Embora o setor de turismo esteja intimamente ligado às questões ambientais, é um dos menos preparados para lidar com alterações nas condições ambientais, principalmente com as mudanças climáticas. O monitoramento da qualidade ambiental em destinos costeiros consolidados torna-se fundamental para enfrentar a complexidade que envolve os ecossistemas marinhos e costeiros e seu afluxo turístico. A avaliação da perspectiva das partes interessadas sobre os benefícios que esses ecossistemas fornecem pode ser um primeiro passo para o uso de abordagens de modelagem com a finalidade de auxiliar o planejamento costeiro. Como parte de um processo de modelagem, este trabalho explora a perspectiva dos turistas sobre os serviços ecossistêmicos marinhos, as condições consideradas na escolha do destino, e sua reação às mudanças na qualidade da água do mar, através da aplicação de questionários semiestruturado no município de Ubatuba, São Paulo, Brasil. Os resultados mostram que os serviços ecossistêmicos mais percebidos são culturais (recreativos e estéticos) e de provisão (pesca). Além disso, a qualidade da água foi identificada como o aspecto fundamental na escolha das praias, sendo fator preponderante na escolha do destino a ser visitado. Além disso, esgoto e resíduos sólidos foram os fatores mais significativos percebidos como responsáveis pela alteração da qualidade da água do mar. Os resultados reforçam o potencial de incluir o ponto de vista dos turistas para subsidiar o desenvolvimento de abordagens de modelagem socioecológica.

Palavras-chave: Serviços Ecossistêmicos Marinhos; Modelos Mentais; Planejamento Costeiro; Demanda turística; Brasil.

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1. INTRODUCTION

Despite some advances, the overall understanding of interactions between tourism and the environment, particularly within coastal areas, requires greater consistency, with debates over the impacts of tourism development often dealing in generalities rather than the outcomes of scientific research specifically on tourist impacts (Hall, 1996).

While tourism sector has a general economic increase (UNWTO, 2016), the marine biodiversity and geodiversity is passing by a continuously decreasing process (Sanchirico & Wilen, 2002; UNEP, 2006; Sala & Knowlton, 2006; Cinner *et al.* 2006, *Comer et al.,* 2015). Marine resources are either overexploited or at a critically endangered level; consequently, the services they provide, including the attractiveness for tourists are also endangered.

Added to the overexploitation (human effects), the research regarding climate change (human and non-human causes) have shown that the number of pressures on the marine ecosystems is swelling to levels that might assume irreversible changes.

They show that changes are likely to be perceived in a late stage because coastal ecosystems (CEs) are some of the most heavily impacted and threatened natural systems globally (Lotze *et al.,* 2006; Worm *et al.,* 2006; Halpern *et al.,* 2008). Such widespread and rapid transformation of CEs suggest that it is imperative to understand what is at stake in terms of critical benefits and values (Barbier *et al.*, 2011).

This scenario requires new strategies to deal with emerging conflicts and complexities predicted for the next decades. With the perspective of climate change and possible migration to a low-carbon economy, the governments might be prepared to have alternative pathways to work with (Bulkeley, 2010; Strachan, 2015). If the projections of the Intergovernmental Panel on Climate Changes (IPCC, 2013) related to climate change on the 21st century became a reality, we might face several consequences like sea level rise, loss of sea ice, and longer and more intense heat waves.

According to a report of the consulting firm KPMG (2008), tourism is among the sectors least prepared for and the most vulnerable to climate change. In addressing disaster risk management in the tourism sector, the complexity, dynamism, and importance of this sector to the world and small island economies are recognized, along with the potential risks to coastal tourism investments (Shurland & Jong, 2008).

Therefore, coastal management strategies might evocate the concept of Ecosystem-Based Management (EBM), that elucidates a new way of considering the relationship between humans and nature, seen as a necessary approach to deal with resource scarcity and biophysical changes (Arkema *et al.*, 2006).

Brazil, like many other countries with expressive coastal length, is passing by excessive land use and land cover changes in the last decades. The State of São Paulo, as the main economic producer pole of Brazil, follow this transformational trend by accelerated changes on its development dynamics.

Recent researches have focused on socio-environmental changes on coastal areas of Ubatuba municipality (Luchiari, 1999; Barbosa *et al.,* 2010; Albergaria-Barbosa *et al.*, 2011; Moreno and Carvalhal, 2013) and presented the tourism sector as the main driver of changes and source of Gross Primary Product (GDP). According to IBGE (2010), the services sector responsible for around 80% of Ubatuba's GPD (Agriculture RS 14.635 / Industry R$ 223.319 / Services R$ 860.469).

The "3 S" (Sun, Sea and Sand) is recognized as the main type of tourism in Ubatuba, also as a driver of the global tourism sector (Amelung & Viner, 2006). By the significance of this tourism type, the assessment of tourists' perception becomes a significant step for coastal planning and social control.

In this sense, investigating the perceptions of tourists who visit Ubatuba about the marine ecosystem services can be useful to understand their behavior during their stay, also how changes of ecosystem services can alter their willingness to visit the municipality, and the potential for local empowering to drive changes of public policies.

Although it is a place with unique preserved beauties, the region it is inserted is going through an economic growth process with the implementation of large infrastructure projects (port and harbor expansion) and offshore oil and gas activity. The latter associated with deep-water reserves known as "pre-salt" (exploration), both having high potential impacts for changing human-natural systems. Those investments will promote severe land use changes and new conflicts involving the local communities, tourists, the economic sector, local and regional government.

Assessments of the northern coast of São Paulo state GDP showed a growth of 7.8% per year, from 2003 to 2007, indicating a pathway of continuous changes, higher than the average for São Paulo State IBGE, 2010These constant changes tend to generate impacts as the ones associated with the touristic occupancy in the last decades (Inouye *et al.,* 2015); pressure suffered by marine zones from different scales, such as overfishing (Jackson *et al.,* 2001), oil spills (Lopes *et al.*, 1997) and mangrove deforestation (De Rezende *et al.,* 2015). In this sense, it is essential to understand how actors from the tourism sector perceive changes in the coastal and marine ecosystem

and what problems they consider priorities to tackle (Santos & Cândido, 2014).

Exploring their perspectives of the coastal socio-ecological dynamics and the value of ecosystem services is, therefore, an important step towards deepening the understanding of problems involving touristic activities and natural resources management and assessing how to better direct investments to guarantee long-term visitation.

General public perception and values of ecosystems services can be severely discrepant from the view of academics (Kumar & Kumar, 2008). Therefore, exploring how tourists, as a protagonist actor in coastal tourism destinations, perceive the relations of coastal ecosystems and human activity systems; understand their role in the context; and value the maintenance of environmental quality can be useful to subsidize a dialogue with other groups of stakeholders that can directly influence or be influenced by the tourism activity. To this end, some studies have assessed the perspective of tourists in human-environment relations to inform the decision-making process. To exemplify, Ghilardi-Lopes *et al*. (2015) demonstrated that evaluation of tourist perception about climate changes is a relevant analysis method for the environmental education process in São Paulo coastal zones.

Moscardo *et al.* (1999) also investigated how the perception of the public who visits the Great Barrier, in Australia, can guide policies to deal with possible environmental impacts. Esteves & Fernandes (2016) identified the factors of destination choice in Alto Trás-os-Montes – Portugal – to inform policymakers. D'Mello *et al. (*2016) assessed tourist´s perception of infrastructure Availability in GOA – India – comparing their perception before and after their trip.

Besides the relevance of this studies to demonstrate the potential of incorporating the perspectives of tourists in policy-making agendas, initiatives to include tourists in participatory modeling (PM) efforts are scarce but useful to deepen the understanding of problematic situations in coastal zones.

Besides the difficulty of involving tourists in time-demanding approaches of PM, such as long interviews or participation in workshops, motivating tourists to participate in different phases of PM such as data collection and discussion of results is even more challenging. However, the inclusion of tourists in PM through surveys or other less time-demanding techniques has the potential of producing relevant data to be inserted in modeling efforts and help to overcome the constraints of collecting *in situ data.*

This research underscores the potential value of qualitative approaches to the retrospective assessment of environmental changes. It assumes that with the absence of adequate quantitative data, qualitative data can yield useful information (Agrawal & Henderson, 2002). It advocates for the potential of exploring the perspective of stakeholders as a valuable source of data to complement the analysis of coastal ecosystem dynamics, understanding it as a socio-ecological system.

According to the exposed, this work aims to answer the questions: (1) What is the profile of tourists who visit Ubatuba and the characteristics of their trips (kind of accommodation, transport)? (2) What is the perspective of tourists about marine ecosystem services? (3) Which activities tourist performed on the beach and how they get informed about environmental conditions before going to Ubatuba? (4) What is the tourist`s perspective about seawater quality in Ubatuba? (5) Are tourists willing to visit Ubatuba in case of changes in seawater conditions?

Based on survey results, the study discusses the importance of assessing the perspective of tourists, as an important and frequently neglected group of stakeholders, about ecosystem services to help to prioritize actions to improve socio-ecological conditions in coastal destinations.

2. MATERIALS AND METHODS

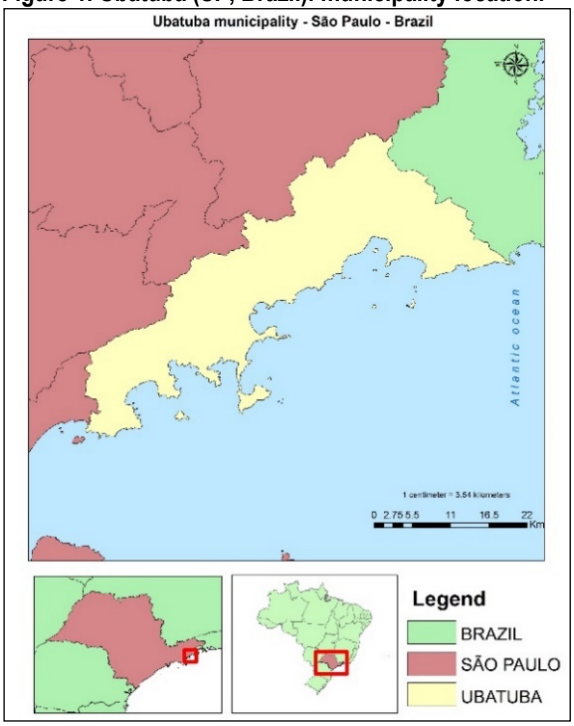
2.1 Study area

The study area comprises the municipality of Ubatuba (Figure 1), on the northern coast of São Paulo State, Brazil. The city has around 91,824 inhabitants within an area of 70810500 ha, which is 87.04% covered by native Atlantic Rainforest, inserted in several protected areas, such as Bocaina Mountain Range National Park and the Sea mountain Range State Park (IBGE, 2020).

Around 80% of São Paulo north coastland has Atlantic Rainforest remnants, established in protected areas, with very restricted policies of use, besides sandbanks and mangroves (SÃO PAULO, 2006). The dense vegetation and the diversity of beaches are considered its main characteristics for tourist attraction, with austral summer tourism as the most relevant economic activity of the region.

The research was based on a survey with 387 tourists at Ubatuba municipality. The survey was performed one week before and after the carnival´s season, the period when the city usually receives more tourists comparing to other months. We understand that in this period the coastal and marine environment changes are more likely to be perceived due to the presence of massive tourism and the impacts associated with it.

Figure 1. Ubatuba (SP, Brazil). municipality location.



Source: developed by the authors (ArcGIS 2015).

We selected seven beaches (Lázaro, Itamambuca, Praia Grande, Enseada, Toninhas and Domingas Dias) according to their physical characteristics (morphological and infrastructural), and they position in the municipality, to cover the whole area and to represent the diversity of tourist's profiles and beaches' characteristics. The method for surveying tourists was inductive, by systematic observation, non-participant and individual, through semi-structured quantitative and qualitative questionnaires, applied face-to-face (Lakatos & Marconi, 2007). The questions were made openly for the interviewees and according to their answer, marked in a category, whenever was possible, to facilitate data tabulation. The average time for the interviews was around fifteen minutes.

2.2 Methods

We did the sampling using the method suggested by Barbetta (Barbetta, 1998) where the number of samples is calculated according to the expression:

$$n = \frac{N.n_{\circ}}{N + n_{\circ}}$$

Where N is the total sample, and $n_{\circ}$ is obtained from the following expression:

$$n_{\circ} = \frac{1}{E^2}$$

Where E is the sampling error, considered for this research the value of 0.05 (5%), therefore, with a quota of 2 million tourists, estimated for the whole northern coast of the State (Atzingen, 2015), we worked with 387 interviews. We performed the interviews during the two weekends in the summer period (February), on weekends before and after the carnival. Municipality public authorities from the Tourism Secretary estimated that 300.000 tourists visited Ubatuba during the carnival period of 2016 (Oliveira, 2016).

Table 1. Questionnaire sections applied to tourist at the beaches in Ubatuba, Brazil.

Category	Question	Objective
Tourist profile	Gender Age City/State of origin Average household income	To investigate the profile of the tourist who visits Ubatuba
Travel details	How long visit Ubatuba How often visit Ubatuba	To investigate the profile of the tourist who visits Ubatuba
Perception of marine ecosystem services	Which benefits the sea provides to you?	To identify the ecosystem services perceived by tourists.
Activities on the beach and what is consulted before going to the beach	Kind of activities What is important to realize activities Verification of weather/water quality characteristics	To investigate the activities performed on the beach and the importance of water quality and weather conditions for the tourists. Also, if it is fundamental for travel planning.
Water quality assessment	Changes at Ubatuba marine ecosystem Factors that tourists believe in changing seawater quality in Ubatuba	To evaluate perceived changes in the marine ecosystem and the factors associated with them.
Willingness to visit the beach after environmental changes	What would you do if the color of the seawater was different (muddy appearance)? What would you do if the seawater had lots of seaweed?	To verify how water quality disturbance influences beach choice.

Source: Developed by the authors.

Table) was designed to investigate (1) the profile of the tourists who visits Ubatuba; (2) the importance of water quality and weather conditions for travel planning; (3) identify the ecosystem services (MEA, 2005) perceived by them (4) evaluate perceived changes in the marine ecosystem and the factors associated to them; (5) how changes in seawater quality influence tourists reaction. The primary condition to participate was to be classified as non-resident, although some tourists have private properties in Ubatuba, living part of the year there, what we considered as summer tourists.

3. RESULTS AND DISCUSSION

3.1 Profile of tourists

Our attempt to correlate tourists' profile with perception about ecosystem services among gender, age or family income presented very low correlation, and we decided to skip analyses. The gender distribution of total respondents corresponds to 50.40% male and 40.60% female.

The average age of respondents was 40.6 years-old, and the average family income was USD 1.883[1], which is seven times the minimum wage in Brazil (BRASIL, 2015). Income groups that had higher incidence were USD 557 to USD 1.109 and USD 1110 to USD 2.218, with 25.66% and 34.40%, respectively. Respondents were mostly from the State of São Paulo, followed by the State of Minas Gerais.

3.2 Perception of benefits from the marine ecosystem

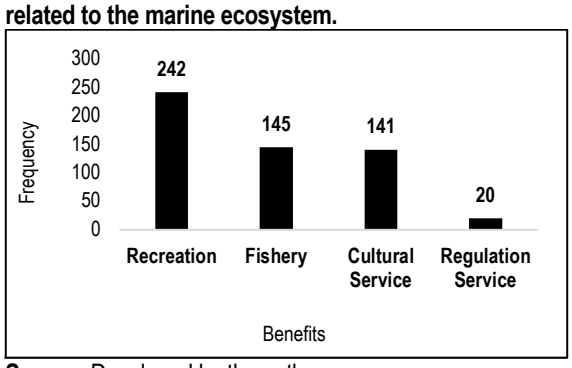
We investigate the tourists' perception of marine ecosystem services according to the concepts of Costanza *et al.* (1997), which define ecosystem services as "the benefits human populations derive, directly or indirectly, from ecosystem functions," and MEA (2005) "the benefits people obtain from ecosystems." Although the progress on the concept of ecosystem services (Fisher, 2009) and the critics to the way the Millennium Ecosystem Assessment – MEA classify ecosystem services (Schröter *et al.,* 2014), we decided to use the concept and the classification to facilitate the understanding of the question asked.

To facilitate data tabulation, we followed the MEA classification of supporting, regulating, provisioning and cultural services. According to MEA (2005:60), the cultural services are a category of Ecosystem Service classified as "*the nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experience*," including, for example, knowledge systems, social relations, and aesthetic values. Accordingly, recreation fits into this category.

Conversely, due to the high incidence of the term recreation by respondents, and because of the relation with the activities most carried out by tourists (swimming and sunbathing), it was presented separately to emphasize its representativeness. In this sense, the cultural services mentioned correspond to benefits for rest, relaxation, contemplation, wellness and health promotion.

When asked about the benefits the sea provides to the interviewees, the purpose was to identify their perspective of the marine ecosystem services. The most mentioned benefits were recreation (62,53%), fishery (37,46%) and cultural services (36,43%). It is interesting to notice that only 5,16% of the respondents identified the regulation services (Figure 2). It is evident that regarding marine ecosystem services, the cultural and provisioning services are the most perceived, as well as that regulatory functions like climate regulation and CO_2 capture are less perceived.

Figure 2. Ecosystem services perceived by tourists related to the marine ecosystem.



Source: Developed by the author.

The results corroborate, partially, the finds of the international symposium "Future Management of Ocean Ecosystem Services", held at the University of Tokyo, on October 1 (2013), which recognized that ocean management activities are primarily focused on fisheries and other provisioning services, and important regulatory, supporting and cultural services, however, are often largely overlooked (Blasiak *et al.,* 2014). On the one hand, our case study also revealed the relevant recognition of provisioning service (fishery). On the other hand, the recreational services had a prominent recognition. However, the fact of all respondents were in a breather can have biased their focus on recreation,

[1] Conversion used (1 BRL = 0.3081 USD).

opposingly, if they were in a different routine, the answers would likely to be different.

Hein *et al.* (2006) notice an important aspect regarding the assessment of ecosystem services by stakeholders when indicating that spatial scale may be well defined before the investigation of their perception. Their analysis shows that stakeholders at different spatial scales can have very different interests in ecosystem services. To assess the perception of ecosystem services we asked: "What are the benefits you think the sea provides to the human being?"

Analyzing the answers, we realized that the question could lead the interviewees to think about several boundaries, driving their focus to range from shallow to very deep seawater, but probably biasing their focus to their visual distance. Therefore, their thought would be less directed to regulatory services as carbon uptake, once it is more likely relatable to the ocean as a whole. The boundary choice, beyond being challenging, has a trade-off associated with it.

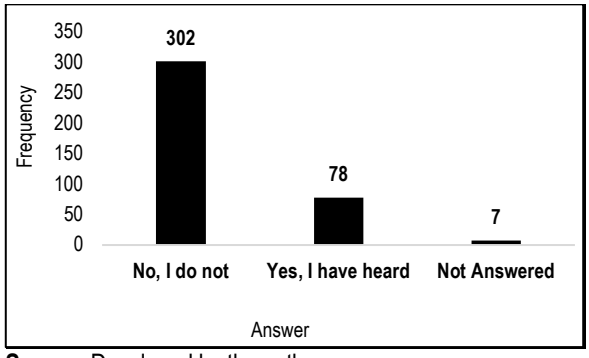
On the one hand, specific boundaries, such as a beach or a bay, facilitate a mental model to be constructed and the answers to be more precise, consequently, facilitating data interpretation and analysis. On the other hand, unclear boundaries, such as the sea or the coast, are harder to be conceptualized by the respondents but increases their creative capacity, consequently the chances of unexpected answers. This aspect can be discussed in the phase of designing and testing the questioners.

The importance given by tourist to cultural services, including recreational, highlights the capacity of including tourist's perspective in PM practice. The results are useful to subsidize future stages of PM, such as scenario building and model simulation (Walker *et al.*, 2002). By "playing" with a model, decision-makers can simulate socio-ecological consequences of changes in driving forces, such as sewage treatment and fishery regulation.

3.3 Awareness of the Term Ecosystem Services

The interview also investigated visitors' awareness of the term ecosystem services to assess their familiarity with the term. We first asked if they have ever heard the expression "Ecosystem Services", once this expression is recurrent in management policies, NGO's communication materials, regulatory instruments, etc. The results showed that 78,03% never heard the expression before (Figure 3).

Figure 3. Tourists knowledge about the term ecosystem services



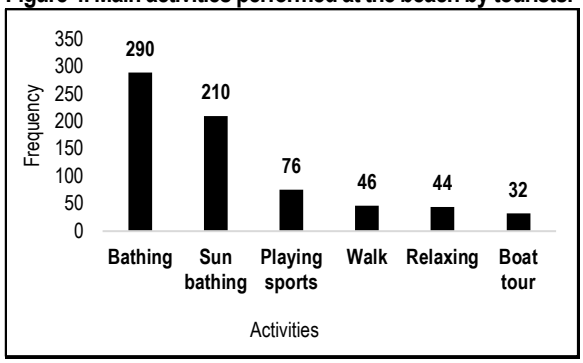
Source: Developed by the author.

Although most of the respondents affirmed never heard the expression, those who have affirmed knowing the term (20,15%), when questioned about the meaning, were incapable of describing it correctly. Most of the respondents associated the term with the public services of coastal management, such as beach cleaning and actions to reduce pollution.

3.4 Activities

Figure 4 represents the most mentioned activities performed at the beach. Bathing (74,93%) and sunbathing (54,26%), were most frequently mentioned activities, followed by sports practices (19,63%), walking (11,88%) and relaxing or resting (11,36%).

Figure 4. Main activities performed at the beach by tourists.



Source: Developed by the author.

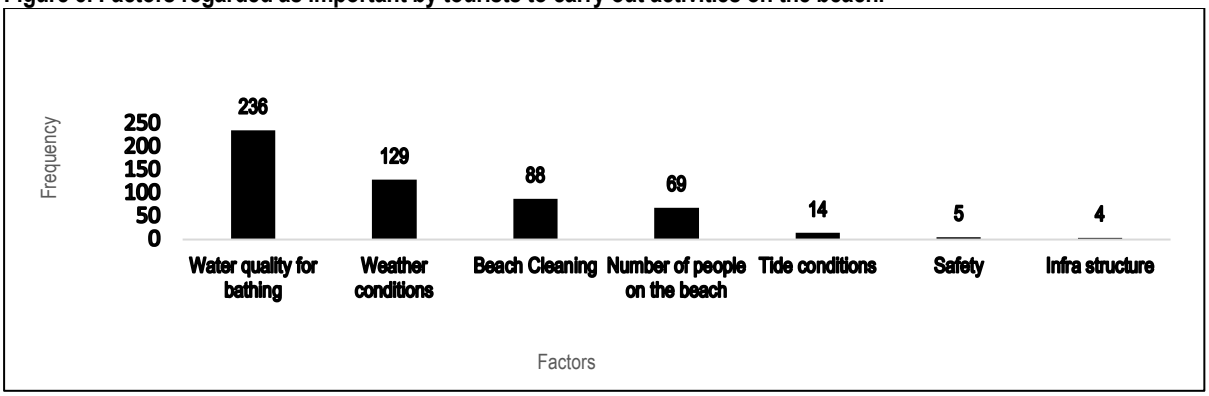
Considering the number of mentions of a particular activity, the results demonstrate the potential to engage surveyed tourists in seawater quality monitoring activities, since the vast majority go to bath when visiting the beaches of Ubatuba. As most of them have contact with seawater, their perception of the marine environment is likely to be more accurate than other stakeholders who have any relation with the beaches but do not usually bath there. Some studies corroborates this idea when indicate that as closer as someone is to some environment, more perceivable is the changes on its dynamics (Steel *et al.,* 2005; Ruiz-

Frau *et al.,* 2011), even though contradicted by the finds of Blasiak *et al.* (2014), showing that distance is not a relevant aspect to determine better environmental perception.

3.5 Conditions to Carry Out Activities on the Beach

The most mentioned factors tourists considered important to carry out activities at the beach were seawater quality for bathing (60,98%), weather conditions (33,33%), beach cleanness (22,73%) and the number of people on the beach (17,82%), respectively (**Erro! Fonte de referência não encontrada.**). The section revealed a contradictory fact. Most respondents considered seawater quality as fundamental to perform the most mentioned activity (bathing). However, only 43,26% of tourists claimed to check seawater quality before choosing the beach to the bath.

Figure 5. Factors regarded as important by tourists to carry out activities on the beach.



Source: Developed by the author.

Comparing the results with previous studies about reasons for beach choice (Botero *et al.,* 2013), we found similar results of relevant parameters for beach choice.

While our work demonstrates water quality as the most important parameter to carry out preferred activities at the beach, worldwide studies present differences according to geographical and regional characteristics.

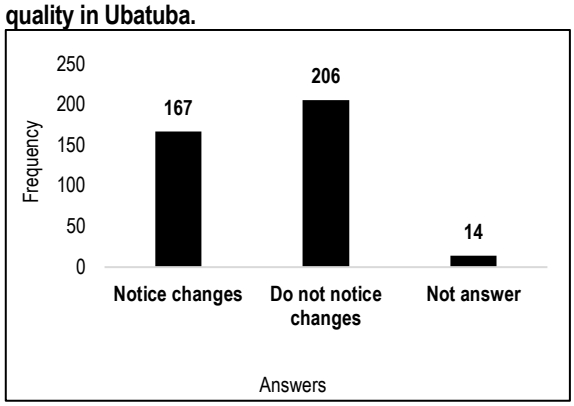
In Europe, for example, the most important parameter is safety, while our study shows only 1,29% of respondents' preference. However, beach users' preference in the Caribbean was "water and sand quality," partially corroborating our results.

It is worth noting that 21,45% of respondents simply do not check any aspects before going to the beach. Another factor that can influence the result is the comments of some respondents affirming they do not check seawater quality because ''the quality there is usually much better than the nearby destinations".

3.6 Perception of Changes in the Marine Ecosystem

Regarding tourists' perception of alterations along years, the majority stated that they did not notice any change in the marine environment (Figure 6). Many tourists were visiting the municipality for the first time or had visited a few times in recent years, which can explain the results.

Figure 6. Tourists' perception of changes in seawater quality in Ubatuba.



Source: Developed by the author.

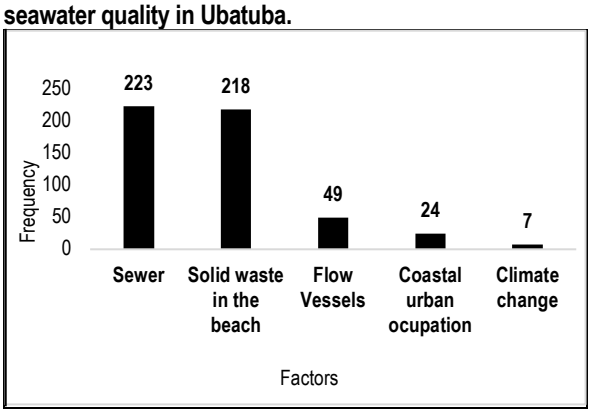
Among the noticed aspects, the main changes were biodiversity reduction, sea level rising, turbidity increase, and solid waste increase. Regarding biodiversity reduction, the most common comments were about shells and sand-dollars, which according to the tourists "have disappeared."

Another interesting aspect was the seawater temperature. There was a discrepancy of opinions when some tourists affirmed that seawater temperature seems to be colder than before, and others thought it was warmer. This reality corroborates works that demonstrate the difficulty to involve stakeholders in long-term planning tackling issues like climate change (Becken, 2004; Semenza *et al.,* 2008; Moser, 2010) once the perception tends to be linked to short-term time scale.

3.7 Factors that Can Alter the Quality of Seawater

When asked what factors are more likely to alter seawater quality, sewer (57,5%), solid waste on the beach (56,5%) and marine vessel traffic (12,5%) were the most cited factors (Figure 7). The results corroborate the ideas of Cervantes *et al.* (2008) that visual factors influence users' perception, which associates absence of litter with clean water or evidence of a drain or discharge with questionable water quality. It is possible to notice that changes with large time scale like coastal urban occupation and climate change are rarely mentioned, reinforcing the hypothesis that the perception is much more linked with small scale changes and visual factors.

Figure 7. Factors that tourists believe can affect seawater quality in Ubatuba.

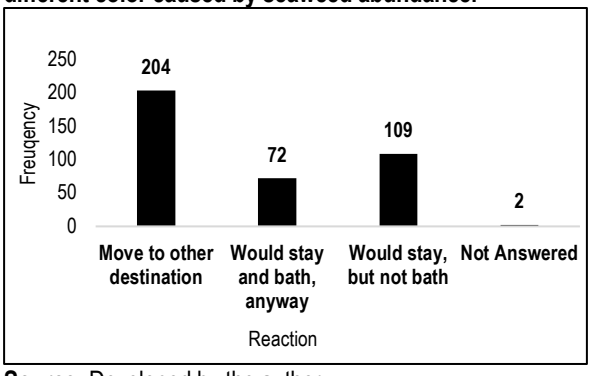


Source: Developed by the author.

3.8 Reaction to Environmental Changes

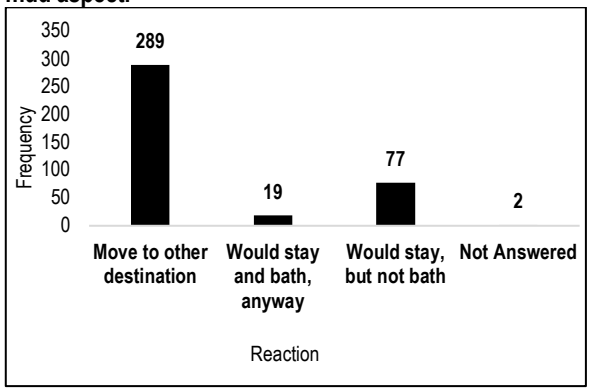
When tourists were asked about their reaction to environmental changes that affect seawater aspect/quality, the great majority affirmed they would move to a different destination. Few of them claimed to stay but would avoid going into the water. A small amount affirmed they would go bathing anyway, especially when referring to seaweed abundance (Figure 8 and Figure 9).

Figure 8. Tourists´ reaction if the seawater presented a different color caused by seaweed abundance.



Source: Developed by the author.

Figure 9. Tourists´ reaction if the seawater presented mud aspect.



Source: Developed by the author.

Here again, more than half of the tourists that assumed moving to a different destination in case of changes in seawater claimed not checking seawater quality before going to the beach. Nevertheless, the result highlights the vulnerability of tourist destinations regarding seawater quality alterations, and the risk of significant socioeconomic impacts if destinations are unable to react accordingly and be prepared to try alternative solutions.

The lack of proper planning has threatened consolidated touristic destination such as the Yucatán Peninsula, by algae blooms (Inskeep & Kallenberger, 1992), and the Caribbean and South American coastal zone, by marine debris (Do Sul & Costa, 2007; Costa *et al.,* 2010). Furthermore, many destinations are facing impacts because of the increase of marine diseases, as the decline of coral reef ecosystems at the Great Barrier Reef in Australia (Bruno & Selig, 2007; Maynard *et al.,* 2011), and human infectious diseases caused by marine bacteria in the Baltic sea (Baker-Austin *et al.,* 2013).

As Cottet et al., (2013) have found, the visual parameters like water transparency and color, the presence and appearance of aquatic vegetation, the presence of sediments, seems to be more reliable to influence human perception than ecological parameters. The fact that some ecologic impacts have visually imperceptible changes in temporal/size scale such as phytoplankton, climate change (Cartea &Angel, 2008; Brody *et al.,* 2008), and microplastics, can explain difficulties of perceiving associated impacts, what could boost social mobilization, effective cross-sector and multidisciplinary collaboration involving all relevant stakeholders.

4 CONCLUSION

The work focused on the assessment of tourists' perception about ecosystem services and how alterations of these services, if noticeable, could lead to

destination choice reaction. The general results show that most tourists who visit Ubatuba are from São Paulo State, with relatively medium/high family income and the average age of 40.6-year-old.

Regarding the perception of benefits from the marine ecosystem, the most mentioned benefits (understood as ecosystem services) were recreation, fishery and cultural services, demonstrating they perceive ecosystem services more locally and by visual parameters.

The most common activities performed at the beaches were bath and sunbath, showing that their activities are dependent on seawater to be performed. Also, seawater quality was a crucial aspect of destination choice, and most respondents indicated sewer and solid waste as the main factor that affected its quality declaring to move for a different destination in case of changes in seawater quality.

The results reinforce the potential of including tourists' perspective into processes of marine/costal planning as a key player in touristic destinations, as suggested in the literature above mentioned, to broadening the understanding of its dynamics and better predict possible changes. As part of a long-term process of participatory modeling, the results are useful to incorporate the perspectives of tourists in the first stage of the modeling process.

Considering their view of the problem increase the chances of having a wider view of the context as well as to input a variety of elements and processes in the socio-ecological model that without them would be neglected.

The next step of the modeling process will use the results presented to design a conceptual model relating coastal/marine ecosystem services with the tourism in Ubatuba, which might be presented to and redesigned by other groups of stakeholders, such as fishermen, dive and sailing operators, and public authorities.

The experience of exploring stakeholder`s perspectives demonstrated the trade-offs of defining the problems together with the actors that directed affect or can be affected by changes in the dynamics of coastal/marine ecosystems.

Consequently, the practice increases the potential of using modeling tools and techniques to deepen the understanding of the situation being modeled, and if necessary, propose informed decision or actions to be taken.

Moreover, it increases the efficiency of the modeling process by reducing the risk of producing robust models that are difficult to communicate, or even models that prioritize elements and processes irrelevant to the objective of the situation it intends to improve.

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