



UNIVERSIDADE FEDERAL DA BAHIA
INSTITUTO DE BIOLOGIA
PROGRAMA DE PÓS-GRADUAÇÃO EM ECOLOGIA
Mestrado Profissional em Ecologia Aplicada à Gestão Ambiental

TAIS BEMFICA ARAUJO

Embarcações à vela na conservação marinha

Uma investigação sobre a distinta percepção dos entrevistados

Salvador

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Dissertação de mestrado apresentada ao Programa de Pós-Graduação, nível de Mestrado, na área de Ecologia Aplicada a Gestão Ambiental, da Universidade Federal da Bahia, como parte dos requisitos para a obtenção do título de Mestre em Ecologia.

Orientador: Marcos Roberto Rossi Santos

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Esta dissertação foi julgada adequada para a obtenção do título de Mestre em Ecologia e aprovada em sua forma final pelo Orientador e pela Banca Examinadora.

Orientador: _____

Prof. Dr. Marcos Roberto Rossi Santos, UFRB

Doutor pela UFRN – Fortaleza, Brasil

1.1 BANCA EXAMINADORA:

Prof. Dr. Artur Andriolo, UFJF

Doutor pela USP - São Paulo, Brasil

Prof. Dr. Charbel Nino El Hani, UFBA

Doutor pela USP - São Paulo, Brasil

Coordenador do PPGEE: _____

Prof. Dr. Gilson Carvalho

Salvador, 2020

DEDICATÓRIA

DEDICO ESTE TRABALHO A MINHA FILHA SOPHIE BEMFICA LEWIS QUE ME MOTIVA A BUSCAR CONHECIMENTO E AO MESTRE ALEIXO BELOV PELA OPORTUNIDADE DE CRUZAR OCEANOS AVISTANDO ESPÉCIES MARINHAS A BORDO DE UM VELEIRO.



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O QUE É UM VELEIRO escrito por ÁLVARO SNIBWIESKY

Dentre as criações humanas, um veleiro é a que mais se assemelha a um ser vivo. Responde as forças da natureza quase como um animal.

É um cruzamento de peixe com ave, seu casco corta a água com delicadeza e força, suas velas são asas potentes que o impulsionam sem bater.

O veleiro sempre oferece nobremente o melhor de si, é um ser instintivo e natural a quem é impossível enganar com ordens erradas que pretendam impor-lhe manobras contra a natureza que o rodeia.

Não existem veleiros exatamente iguais, eles possuem alma e personalidade próprias. A personalidade é uma característica que se percebe facilmente. Basta observá-lo, ouvi-lo e senti-lo.

Cada veleiro tem seu próprio caráter que se acentua com o passar dos anos. À medida que o barco amadurece com o uso, a sua personalidade se define.

Todo veleiro tem cheiro próprio e o som que produzem é sua voz.

Sua alma é sua voz e têm origem no doce ranger de paineiros, móveis e anteparas, na vibração de seus estaimentos, no borbulhar suave do leme cortando o mar debaixo do seu casco.

Nutre-se do intelecto, do sangue, do suor e das lágrimas de quem o desenhou, o construiu, pintou, montou suas ferragens, costurou suas velas.

É a obra de sonhos altivos e merece ser tratado como um filho bem-aventurado.

Tem na alma, a esperança, a ansiedade, temores e recordações de todos aqueles que, levados pelo vento, com a mão no timão, caçam escotas e adriças.

Fundamentalmente, invoca a alegria dos bons momentos compartilhados entre homens e mulheres que amam os seus veleiros e os desfrutam passando a bordo os mais intensos momentos de suas vidas.

Os veleiros são objetos criados com arte, tempo e esforço que carregam em seu bojo um valor espiritual agregado, o “mana”, descrito em verso e prosa pelos nativos da Polinésia, reconhecidamente, os maiores navegadores a vela que o mundo já conheceu.

O “mana”, esse algo mais, é a melhor maneira que encontramos para definir este “não sei o que” tão grande, tão importante, sensação de presença viva que um veleiro sempre nos transmite.

TEXTO PARA DIVULGAÇÃO CIENTÍFICA

A conservação marinha é uma questão urgente em todo o mundo. A degradação do habitat nunca foi tão preocupante, complexa e difundida. Os ecossistemas marinhos fornecem uma variedade de serviços ecossistêmicos por meio de alimentos, regulação climática e recreação. A poluição sonora e as emissões antropogênicas de dióxido de carbono são duas das maiores ameaças ao oceano atualmente. Tradicionalmente, a energia eólica permitiu que o homem viajasse pelos mares, mas nos últimos anos, os combustíveis fósseis assumiram o controle. O uso de embarcações à vela pode ser uma alternativa para embarcações motorizadas devido ao baixo ruído e reduzido consumo de combustíveis fósseis. As embarcações à vela tem sido usadas para coletar dados científicos, educação e recreação, mas pouco se sabe sobre o que os atores envolvidos pensam sobre as embarcações à vela e seu potencial papel na conservação marinha. Foi realizado um estudo qualitativo utilizando entrevistas naturalísticas semiestruturadas para investigar o uso do veleiro como ferramenta de conservação marinha. Este estudo apresenta uma descrição e análise de entrevistas com 54 pessoas envolvidas diretamente com conservação marinha como pesquisadores (14), velejadores (10), mestres de embarcação a motor (10), gestores ambientais (10) e turistas (10). Foi empregado o modelo de análise de discurso de Gee com o objetivo de investigar a percepção do participante e identificar diferentes abordagens e concepções sobre o uso de embarcações a vela na conservação marinha. As declarações, dos entrevistados foram utilizadas para construir uma imagem, baseada em suas experiências, das vantagens e desvantagens do uso de veleiros para a conservação marinha. O programa IRAMUTEQ foi utilizado para destacar as palavras mais frequentes dos 54 discursos, agrupados em cinco categorias: ECO-EFICIÊNCIA (n = 39 pessoas / n = 119 declarações), PESQUISA CIENTÍFICA (n = 35 pessoas / n = 81 declarações), EDUCAÇÃO (n = 29 pessoas) / n = 55 declarações), LOGÍSTICA (n = 23 pessoas / n = 28 declarações) e DESVANTAGENS (n = 13 pessoas / n = 23 declarações). Embora a maioria dos entrevistados reportou aspectos positivos no uso de veleiros, poucos deles realmente utilizam este tipo de embarcação na prática. Este estudo visa aprimorar a conservação marinha através da utilização de veleiros como plataforma menos impactante de pesquisa, educação e logística por explorar o vento para sua propulsão, mantendo os oceanos calmos e limpos. Além disso, o estudo pretende encorajar pesquisadores, gestores ambientais, instituições educacionais e agências de turismo a pensar ecologicamente e economicamente em prol da conservação.

RESUMO

A conservação marinha tornou-se um assunto mundialmente importante, com sinais sem precedentes de degradação ambiental que prejudica os serviços ecossistêmicos gerados pelos oceanos a exemplo de fornecimento de alimentos, regulação climática e recreação. A poluição sonora e as emissões antropogênicas de dióxido de carbono são duas das maiores ameaças ao oceano atualmente. Tradicionalmente, a energia eólica permitiu que o homem viajasse pelos mares, mas nos últimos anos, os combustíveis fósseis assumiram o controle. O uso de embarcações à vela pode ser uma solução alternativa limpa para embarcações motorizadas devido aos baixos níveis sonoros e reduzido consumo de combustíveis fósseis. As embarcações à vela têm sido usadas para coletar dados científicos, educação e recreação, mas pouco se sabe sobre o que pessoas envolvidas com o ambiente marinho pensam sobre a utilização de veleiros e seu papel potencial na conservação marinha. Portanto, um estudo qualitativo foi realizado, utilizando entrevistas semi-estruturadas, sobre o uso de embarcações à vela na conservação marinha. Este estudo apresenta uma descrição e avaliação de 54 entrevistas sendo pesquisadores (14), velejadores (10), mestres de embarcação a motor (10), gestores ambientais (10) e turistas (10). O modelo de análise de discurso de Gee foi empregado com o objetivo de investigar a percepção do participante e identificar diferentes abordagens e concepções sobre o uso de embarcações a vela na conservação marinha. Esta metodologia foi escolhida para investigar quais padrões de entendimento eram compartilhado pelos entrevistados, já que a linguagem é usada como uma ferramenta prática de comunicação, denominada Discurso. Os discursos apresentam padrões compartilhados de comportamentos, valores e ações. As declarações dos entrevistados foram utilizadas para construir uma imagem, baseada em suas experiências, das vantagens e desvantagens do uso de embarcações à vela na conservação marinha. Os dados obtidos nas entrevistas foram processados no software IRAMUTEQ e analisados através da análise lexical (cálculo de frequência de palavras); classificação hierárquica descendente; análise de similaridade e nuvem de palavras. As declarações dos participantes (n = 306) foram identificadas e agrupadas em cinco categorias: ECO-EFICIÊNCIA (n = 39 pessoas / n = 119 declarações), PESQUISA CIENTÍFICA (n = 35 pessoas / n = 81 declarações), EDUCAÇÃO (n = 29 pessoas) / n = 55 declarações), LOGÍSTICA (n = 23 pessoas / n = 28 declarações) e DESVANTAGENS (n = 13 pessoas / n = 23 declarações). Foi constatado que, quanto mais experiência de vela o entrevistado possui, maior e mais ampla é sua percepção de como as embarcações a vela podem ser úteis para a conservação marinha. A fim de validar o estudo

qualitativo, evitando possíveis vieses, devido à experiência pessoal e profissional da autora com veleiros e conservação marinha, um auditor externo com diferente background científico revisou as declarações identificadas no discurso dos entrevistados, com suas respectivas categorias. Embora a maioria dos entrevistados tenha relatado que o uso de embarcações à vela para pesquisa científica, educação e logística aprimora a conservação marinha, eles raramente as utilizam em suas próprias atividades ambientais. Desvantagens também foram relatadas e discutidas. Com base na perspectiva geral do grupo de pessoas entrevistadas, a utilização de embarcações à vela justifica uma atualização no status em termos de uma ferramenta eco-eficiente no contexto da conservação por não ser amplamente reconhecida. Este estudo visa aprimorar a conservação marinha através da utilização de veleiros como plataforma menos impactante de pesquisa, educação e logística por explorar o vento para sua propulsão, mantendo os oceanos calmos e limpos. Além disso, o estudo pretende encorajar pesquisadores, gestores ambientais, instituições educacionais e agências de turismo a pensar ecologicamente e economicamente em prol da conservação.

Palavras chave: ecoeficiência, educação, gestão ambiental, conservação marinha, embarcações à vela, pesquisa científica, veleiro.

**ESTE TRABALHO DE CONCLUSÃO DE CURSO PARA O MESTRADO
PROFISSIONAL EM ECOLOGIA APLICADA A GESTÃO AMBIENTAL
FOI ESCRITO COM BASE NAS REGRAS DA REVISTA AQUATIC
CONSERVATION: MARINE AND FRESHWATER ECOSYSTEMS**



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Sailing vessels in marine conservation

An investigation on distinct interviewees' perception

Tais Bemfica Araujo¹

¹ Institute of Biology, Federal University of Bahia, Salvador, Brazil

ABSTRACT

Marine conservation is an urgent issue worldwide. Habitat degradation was never so concerning, complex, and widespread. Marine conservation has become a globally important issue, with unprecedented signs of environmental degradation. Marine ecosystems are not only inherently valuable by themselves, but they also provide a range of ecosystem services through food, jobs, climate regulation and recreation. Noise pollution and anthropogenic carbon dioxide emissions are two of the biggest threats to the ocean nowadays. The concept of Conservation used, in this study includes protecting species from extinction, maintaining and restoring habitats, enhancing ecosystem services and protecting biological diversity. Traditionally, wind power has enabled man to travel the seas, but in recent years, fossil fuels have taken over. The use of sailing vessels can be an alternative, clean solution to motorized vessels due to their low sound levels and lack of fossil fuel consumption. Sailing vessels have been used to collect scientific data, to raise awareness, for education, and for recreation, but little is known about how the people involved think about sailing vessels and the potential role in marine conservation. A qualitative study was performed using naturalistic, semi-structured interviews about the use of sailing vessels in marine conservation. This study presents a description and evaluation of interviews with 54 people, involved directly with marine conservation as researchers (14), sailors (10), motor sailors (10), environmental managers (10) and tourists (10). Statements were used from these stakeholders to construct an experience-based picture of the advantages and disadvantages of using sailing vessels in marine conservation. Gee's discourse analysis model was used to investigate the participant's perception and to identify different approaches and conceptions about the use of sailing vessels in marine conservation. This methodology was chosen to investigate which patterns of understanding were shared by respondents, as language is used as a practical communication tool called Discourse. The speeches present shared patterns of behaviour, feelings, and actions. The data obtained through interviews were processed in IRAMUTEQ software and analyzed through lexical analyses (word frequency calculation); descending hierarchical classification; similarity analyses and word cloud. Participant statements (n=306) were identified and grouped into five categories: ECO-EFFICIENCY (n=39 people/n=119 statements), SCIENTIFIC RESEARCH (n=35 people/n=81 statements), EDUCATION (n=29 people/n=55 statements), LOGISTICS (n=23 people/n=28 statements) and DISADVANTAGES (n=13 people/n=23 statements). It was found that the more experienced a sailor, the broader his or her perception of how sailing vessels can be useful to marine

conservation. In order to validate the qualitative study, avoiding possible bias, due to the author's personal and professional experience with sailboats and marine conservation, an external auditor with a different scientific background reviewed the statements identified in the interviewees' discourse, with their respective categories. Although the majority of the stakeholders reported that using sailing vessels for scientific research, education and logistics enhances marine conservation, they rarely use them for their own environmental activities. Issues and disadvantages are also reported and discussed. Based on the overall perspective of the group of people interviewed, the use of sailing vessels justifies an update in status in terms of an eco-efficient tool in the context of conservation as it is not widely recognized. This study aims to improve marine conservation through the use of sailing vessels as a less impacting platform for research, education and logistics by exploiting the wind for propulsion, keeping the oceans calm and clean. In addition, the study aims to encourage researchers, environmental managers, educational institutions and tourism agencies to think ecologically and economically to conservation.

Keywords: eco-efficiency, education, environmental management, marine conservation, sailing vessels, sailboat, scientific research.

1. INTRODUCTION

Marine conservation is an urgent issue worldwide, because of a range of current threats. Habitat degradation was never so concerning (Harvey & Hall-Spencer, 2019), because of a range of resources (Downes & De Fontaubert, 1996), and ecosystem services (Sala & Knowlton, 2006; Smale *et al.*, 2019), such as food provisioning; jobs; climate regulation; and recreation (De Groot, 2002; McLeod & Leslie, 2009; WWF, 2016), earning about \$ 14 billion dollars annually (TEEB, 2010).

Two prominent human threats to marine biodiversity are noise pollution (National Research Council, 2000; Southall, 2007; Slabbekoorn *et al.*, 2010; Kunc *et al.*, 2016) and anthropogenic carbon dioxide emissions (Kleypas, 1999; Doney, 2009; Doney, 2012), due mostly to the expansion of trade routes (Yang *et al.*, 2018), shipping (Halpern *et al.*, 2015;) and an increase in the number of motorized vessels (Bejder, 2006).

Noise pollution, most of it from boat traffic, severely disrupts marine life, especially among whales, which communicate and orient themselves through sound, affecting survival and reproductive success (Clark, 2009). The moderate and wide anthropogenic noise from motorized vessels can affect fish distribution, growth and reproduction, pre-predator interaction and their communication (Slabbekoorn *et al.*, 2010). In addition to noise pollution, the emission of polluting gases into the atmosphere is one of the main problems for marine conservation. Ocean acidification, resulting from the emission of carbon dioxide into the atmosphere, is the main responsible for the increase of the cumulative impact globally, caused mainly by motorized vessels (Halpern, 2015).

In this study, the concept of Conservation used includes protecting species from extinction, maintaining and restoring habitats, enhancing ecosystem services and protecting biological diversity (Soulé, 1985). The more quiet and clean alternatives are still around sailing vessels because they cause less disturbance to marine biodiversity (Gerrodette *et al.*, 2011) and use the wind, renewable energy, for its propulsion. Sailing vessels need less resource than motorized vessels (fuel and crew members), and have lower environmental impact (lower noise levels and energy consumption and fewer chemical emissions). Sailing vessels can travel long distances going to remote areas as the wind is free and maybe not always equally strong, but almost omnipresent. Sailing vessels combine economic and environmental performance, for which the term eco-efficiency has been launched (DeSimone and Popoff, 1997, Megginson *et al.*, 1998, WBCSD, 2000, Huppés & Ishikawa, 2005).

Historically, sailing vessels have played a key role in the development of human civilization, facilitating contact between different cultures and allowing the dispersal of people and goods over large distances (Bailey, 2004). Ancient civilizations of sailors, such as the Chinese, Vikings, Phoenicians, Egyptians and Polynesians, have developed a multitude of technological innovations in the construction of boats and their sails (Saad, 2012). Between 8000 and 6000 years ago, sailing vessels were an essential part of developing communities and contributed to the emergence of the first cities (Davis, 2012). Also in modern society, the sailing industry has seen considerable advances, as reflected in vessels participating in the Volvo Ocean Race (Gothenburg, 2017), and has developed faster, stronger and lighter boats with high-performance design (Campbell, 2006).

Innovative sail technologies can also be seen in the shipping industry, developing marine transport strategies towards renewable solutions (Lu & Ringsberg, 2019), driven by new regulations to decrease anthropogenic dioxide emissions (IMO 2016). Wind propulsion for commercial vessels is gaining mainstream support (Erhard & Strauch, 2012; Ouchi *et al.*, 2011). Several studies have reported a reduction in fuel consumption of 8.3% (Shukla & Ghosh, 2009) up to 50% (Ouchi *et al.*, 2013), also reflected in an associated reduction in emissions. It is also important to research into the strategy of the optimum route choice and utilizing weather forecasting for great performance and time consuming.

Sailing vessels have been used for transport (Mascarenhas & Peixoto, 2009), leisure (Baader, 1960; Aversa Jr., 1986; Fernandes & Freitas, 2006) and sport (Graef, 2001). Although international shipping is a relatively efficient way of transportation compared to air, road and railway (Sherbaz & Duan, 2012), the carbon dioxide emissions in this field are growing rapidly (Haite, 2009). Another polluting activity in the sea is tourism (Filimonau *et al.*, 2014). However, it is important to bring people close to the natural environment to motivate them to preserve biodiversity and the ecosystem. Yachting can be an eco-efficient way of maritime transport and tourism. It is the nautical activity that ranks first, among cruising and coastal tourist shipping, with regard to employment (Diakomihalis & Lagos, 2008; Alcover, 2011). Additionally, nautical culture typically creates several economic side activities, which benefit the local market.

The use of sailing vessels for marine conservation is an important and new theme worldwide. As a research platform (Gillespie *et al.*, 2005; Rossi-Santos *et al.*, 2007; Gannier, 2011, Cucknell *et al.*, 2013), it is less likely that the animals change behaviour when approached under sail (Corkeron, 19995) and they provide opportunities for education (Gawel

& Greengrove, 2005; McCulloch *et al.*, 2007; Capursoa & Borscib, 2013). Sail training has been shown to have a positive effect on the development of knowledge (Hamilton, 1988), self-esteem (Gordon *et al.*, 1996), social-confidence, technical skills (McCulloch *et al.*, 2010), leadership (Finkelstein & Goodwin, 2005), teamwork (Gawel & Greengrove, 2005; Finkelstein & Goodwin, 2005; McCulloch *et al.*, 2010) and engagement for learning (Henstock *et al.*, 2013). Sailing is also an excellent way to raise marine awareness by being closer to the natural environment, feeling the power of nature, and relying on it for navigation.

In this study, the interviewees' perception about the use of sailing vessels in marine conservation was investigated. As addressed above, sailing vessels have been used professionally and recreationally in several ways for a long time, but little is known about how people involved think about sailing vessels and the potential role in marine conservation. We aimed to answer the following questions: What are the advantages and disadvantages of using sailing vessels in marine conservation in the eyes of the interviewees and, does the evaluation depend on the interviewee activity or experience?

2. METHODS

2.1 Data collection

In order to produce knowledge about the use of sailing vessels as a marine conservation tool, it was employed a qualitative study focused on an in-depth analysis using naturalistic (Lincoln and Guba, 1985; Lincoln, 2007), semi-structured, interviews. It was investigated fifty-four (54) people involved directly with marine conservation as researchers (n=14), environmental managers (n=10), sailors (n=10), motor sailors (n=10) and tourists (n=10), hereafter, as a group, referred to as stakeholders. Respondents were selected based on their relationship with marine conservation and also by using the snowball method (Goodman, 1961; Bernard, 2006), whereby participants recommend other potential contributors. Interviews took place from August 24, 2018, to July 23, 2019, approved by the Ethics Committee at Pharmacy College of the Federal University of Bahia, under registration number 3.544.389, CAAE 11835217.5.0000.8035, in accordance with Resolution 466/2012 of the National Health Council.

The participants scheduled the interviews (set both time limits and the places where the interviews were conducted). The average time granted for an interview was half an hour. The longest took around 1 hour and the shortest, 10 min. The interviews happened mostly in

person, however, some happened via video call on Skype and via audio on WhatsApp. The interview was made individually so that the participants were free to tell their story and experiences and to express their ideas and opinions without any audience effect (other than that of the presence of the interviewer, who kept an objective and neutral attitude during the interview). The interviews were recorded through an iPhone 5S using the application "*voice memos*". It was registered day, time, place, name and the research or job activities of the interviewed person. All participants were asked to give a brief description of their professional experience and their relationship with marine conservation.

Regardless of the previous experience aboard a sailboat, all participants answered the question about the importance of using sailing vessels as a marine conservation tool. The interviewees were informed about the objectives and procedures of the study. The questions asked to the interviewees were:

1. Have you ever sailed? What is your experience aboard a sailing vessel?
2. Do you think the use of sailing vessels can contribute to marine conservation? Why? How?

All the interviewees gave informed consent for the interviews and for the use of the information derived from them. In order to respect the interviewees' privacy, we do not reveal their identities when mentioning their reports. The audios were transcribed and saved as text. The data was separated and assigned codes to units of meaning in the texts. The codes were examined for general patterns and specific insights, permitting the carving out of broad categories within the transcribed discourse. On coding the text, the data was identified and categorized into clusters of meaning, which were labelled statements. The statements were analyzed in order to investigate the participant's perception and to identify different approaches and conceptions. It was employed external audits to determine the validity of the study (Lincoln & Guba, 1985; Creswell, 2003), where each statement was reviewed by an external researcher from an Excel-sheet.

Gee's (2014) model of Discourse Analysis was employed to examine the knowledge of stakeholders around using sailing vessels in marine conservation. This methodology was chosen to enable investigate what patterns of shared understanding might emerge from the data. Language is used as a tool of communication within communities of practice, which feature shared patterns of behaviours, feelings, and actions (MacKay, 2003). In a Discourse, certain patterns of language are given meaning through agreement by the participants in

relation to specific social situations and contexts (Gee, 2018). Discourses are structures of knowledge which influence systems and practices (Chambon, 1999).

We are interested in the knowledge that is represented by interviewees' statements, which become a discourse when they interact with institutions and ideologies.

Interviewees' perception was identified and grouped into five statement categories for analysis: ECO-EFFICIENCY, SCIENTIFIC RESEARCH, EDUCATION, LOGISTICS and DISADVANTAGES (see Table1). Each discourse (whole speech) could be classified into more than one category of analysis. The category ECO-EFFICIENCY refers to autonomy, low cost and low environmental impact of sailing vessels. The SCIENTIFIC RESEARCH category refers to the use of sailing vessels as a research platform for the study of specific species or particular environmental issues. The EDUCATION category refers to the use of sailing vessels as a learning platform, for personal experience, development of teamwork and ecotourism. The category LOGISTICS refers to inspection of marine protected areas, transport and accommodation of researchers. The category DISADVANTAGES refers to what stakeholders perceive as problems of using sailing vessels in marine conservation.

Table 1: Description of the categories ECO-EFFICIENCY, SCIENTIFIC RESEARCH, EDUCATION, LOGISTICS and DISADVANTAGES identified in the participants' discourse about how sailing vessels can contribute to marine.

CATEGORY	DESCRIPTION
ECO-EFFICIENCY	Autonomy, low cost and low environmental impact
SCIENTIFIC RESEARCH	Research platform to study species and the environment
EDUCATION	Learning platform, personal experience, development of teamwork and ecotourism
LOGISTICS	Inspection of marine protected areas, accommodation and transport
DISADVANTAGES	Need qualified crew, lack of nautical culture, collision with cetaceans and maneuverability

In a second step of the coding process, the data processing tool IRAMUTEQ (*Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires*) (Ratinaud, 2009) was used to complement the discourse analysis. IRAMUTEQ allows different means of textual statistics analysis and it is free software developed in the Python language using functionalities provided by the statistical software R (Camargo and Justo, 2013).

IRAMUTEQ sorted and calculated the text corpus' segments, which is the division of the text corpus. The text corpus uploaded into the software was the stakeholders' answers in the interviews, most of them (n=42) were translated from Portuguese to English. The

translation was carried out in order to be able to analyze the data as a whole. The participant's discourses were also uploaded separately per category into IRAMUTEQ and the results produced by the software were then compared with the discourse-analysis-based categories.

In this study, the texts, produced from the interviews, were analysed through lexical analyses (word frequency calculation); descending hierarchical classification; similarity analyses and word cloud. The lexical analyses identified the number of words, average frequency, searched the vocabulary and reduced from words based on their roots (lemmatisation); descending hierarchical classification rated the text segments according to their respective vocabularies, and their set was divided based on the frequency of the inflected lemmatized words; similarity analyses identified co-occurrences between the words, indicating the connectedness between them; word cloud grouped the words according to their frequency and organized them graphically enabling quick identification of keywords.

The word occurrence and associations (the words which did significantly co-occur within statements to indicate meaningful associations) that were elaborated by IRAMUTEQ and which are presented by different figures in this article, supported the findings coming out of the discourse analysis. Discourse analysis and the use of IRAMUTEQ led to themes that reflected opinions and views of the participants. In addition to the figures produced with the software, the citations that seemed to be representative and that expressed the findings most clearly were included.

3. RESULTS

3.1 Stakeholders' characteristics

In this study, fifty-four (54) people were interviewed, 38 male and 16 female, aged between 20 and 76 years old, and one child of 11 years old. The interviewees were predominantly Brazilian (42), complemented with people from 9 other nationalities: Belgian (1), British (2), Canadian (1), Dutch (1), North American (3), Irish (1), Portuguese (1), Spanish (1) and Ukrainian (1) (see Figure 1).

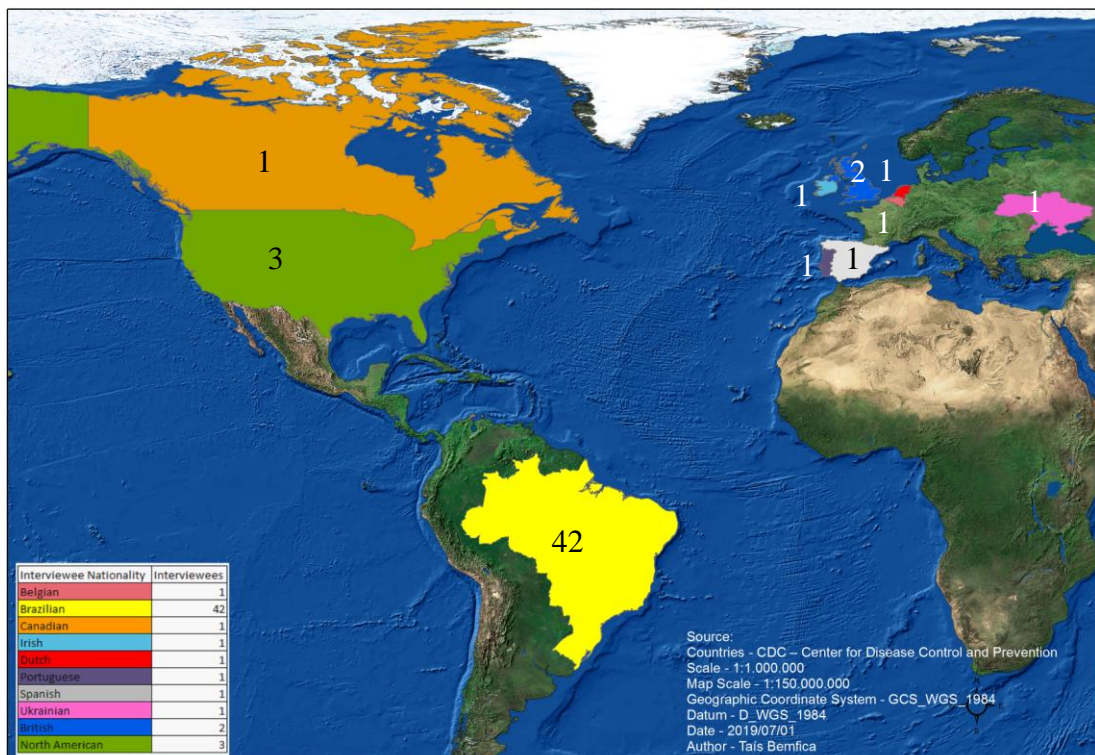


Figure 1: World map showing the nationalities of the interviewed stakeholders

3.2 Stakeholders' perception

Among fifty-four interviewees, fifty-one were generally supportive and positive about the potential for sailing vessels in marine conservation using a variety of arguments, while only three disagreed about that sailing vessels can contribute in any way to marine conservation. The statements brought different justifications, which may have been influenced by personal, professional or individual values.

Discourse analysis revealed several perceived statements on how sailing vessels can contribute to marine conservation through ECO-EFFICIENCY, SCIENTIFIC RESEARCH, EDUCATION and LOGISTICS (Figure 2). DISADVANTAGES are presented in Figure 3.

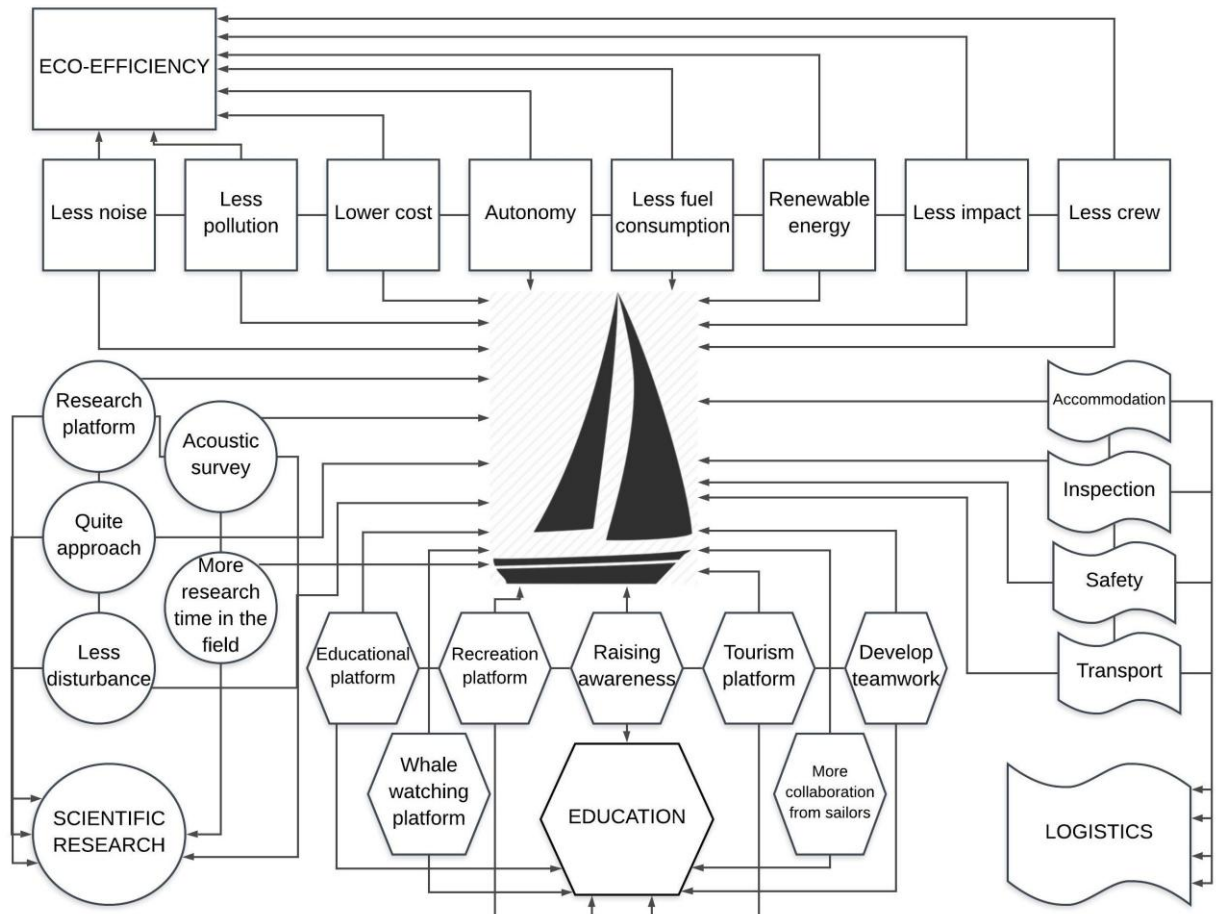


Figure 2: Statements identified in the stakeholders discourses are presented inside different shapes and represent their perception about how sailing vessels can be used in marine conservation. Eco-efficiency statements are represented by a square shape; logistics statements are represented by a flag shape; education statements are represented by a trapeze shape and scientific research statements are represented by circle shape. The bigger shapes are the category they are related to as eco-efficiency, scientific research, education and logistics.

The different statements (n=9) identified in the participants’ discourses as disadvantage of using sailing vessels in marine conservation are: *“need qualified crew”*; *“harder on using drones”*; *“lack of nautical culture”*; *“more collision with cetaceans”* / *“more accidents with tourism because cetaceans jump on the top of boat”*; *manoeuvrability complicated*; *“whale/dolphin watching is commercially unprofitable”*; *“lack of whales reaction (due to low noise) can be dangerous”*; *“more time consuming”*; and *“difficult to approach animals”*.

Figure 3 also shows that interviewees who use sailing vessels in their environmental activities and have sailing experience addressed different disadvantages statements than interviewees who do not have sailing experience and do not use sailing vessels in their professional activities.

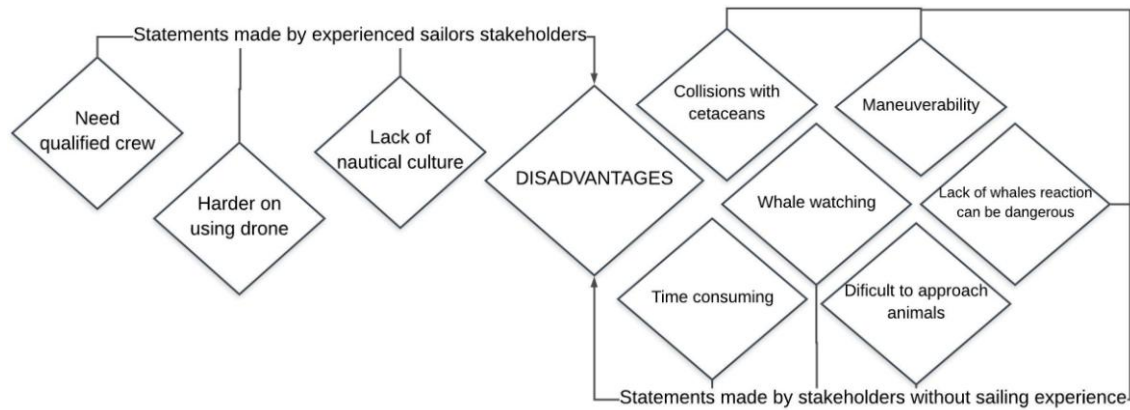


Figure 3: Disadvantages statements perceived by stakeholders about using sailing vessels in marine conservation.

The category ECO-EFFICIENCY (n=39) was the most cited by the interviewees (see Figure 4), followed by SCIENTIFIC RESEARCH (n=35), EDUCATION (n=29), LOGISTICS (n=19) and DISADVANTAGES (n=13).

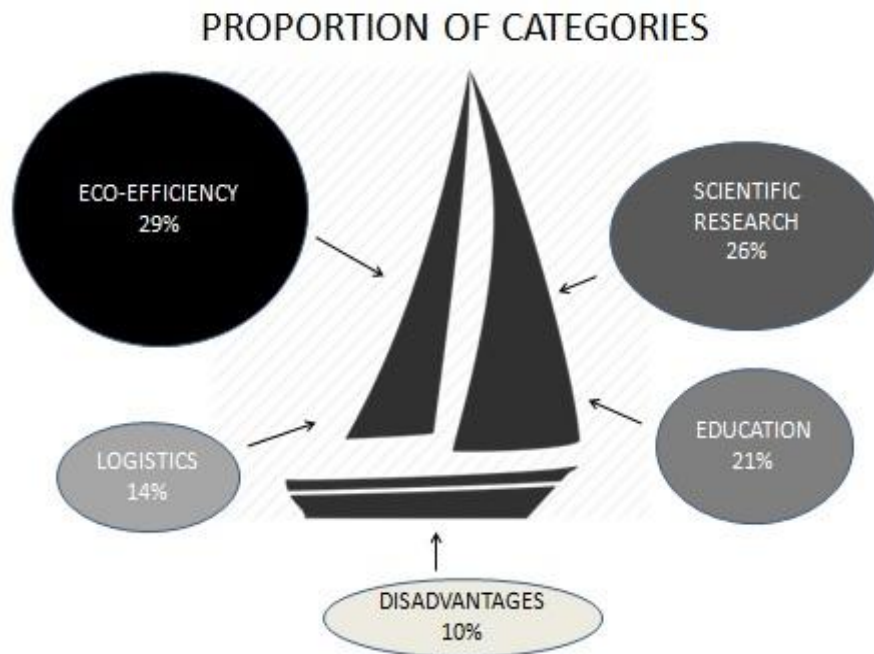


Figure 4: Proportion of the categories ECO-EFFICIENCY, SCIENTIFIC RESEARCH, EDUCATION, LOGISTICS and DISADVANTAGES identified in the stakeholders' discourse about how sailing vessels could contribute to marine conservation. The size of each item, determined manually, represents how often stakeholders reported a statement from a particular category.

Words were issued from the discourse analysis and represent perceived statements by interviewees within the categories ECO-EFFICIENCY, SCIENTIFIC RESEARCH, EDUCATION and LOGISTICS. The statements about disadvantages were also identified within the categories.

Similarity Analysis (Figure 5) enabled the identification of co-occurrences and connectedness between the words. The words associations supported the findings coming out of the discourse analysis as the words presented are aggregated to each other according to their categories. The figure shows four big groups of words that represent the categories Eco-efficiency, Scientific Research, Education and Logistics. The size of each word is related to its frequency of occurrence. The words related to eco-efficiency seem to be bigger compared with any of the other categories, as it was the category most reported by all participants. As expected, the word "sailboat" connects all the other words.

Different shapes identified the group of words, showing proximity between them and distance from the other words. Words are connected to each other by pathways that describe their relation; their distances and position have no specific meaning.

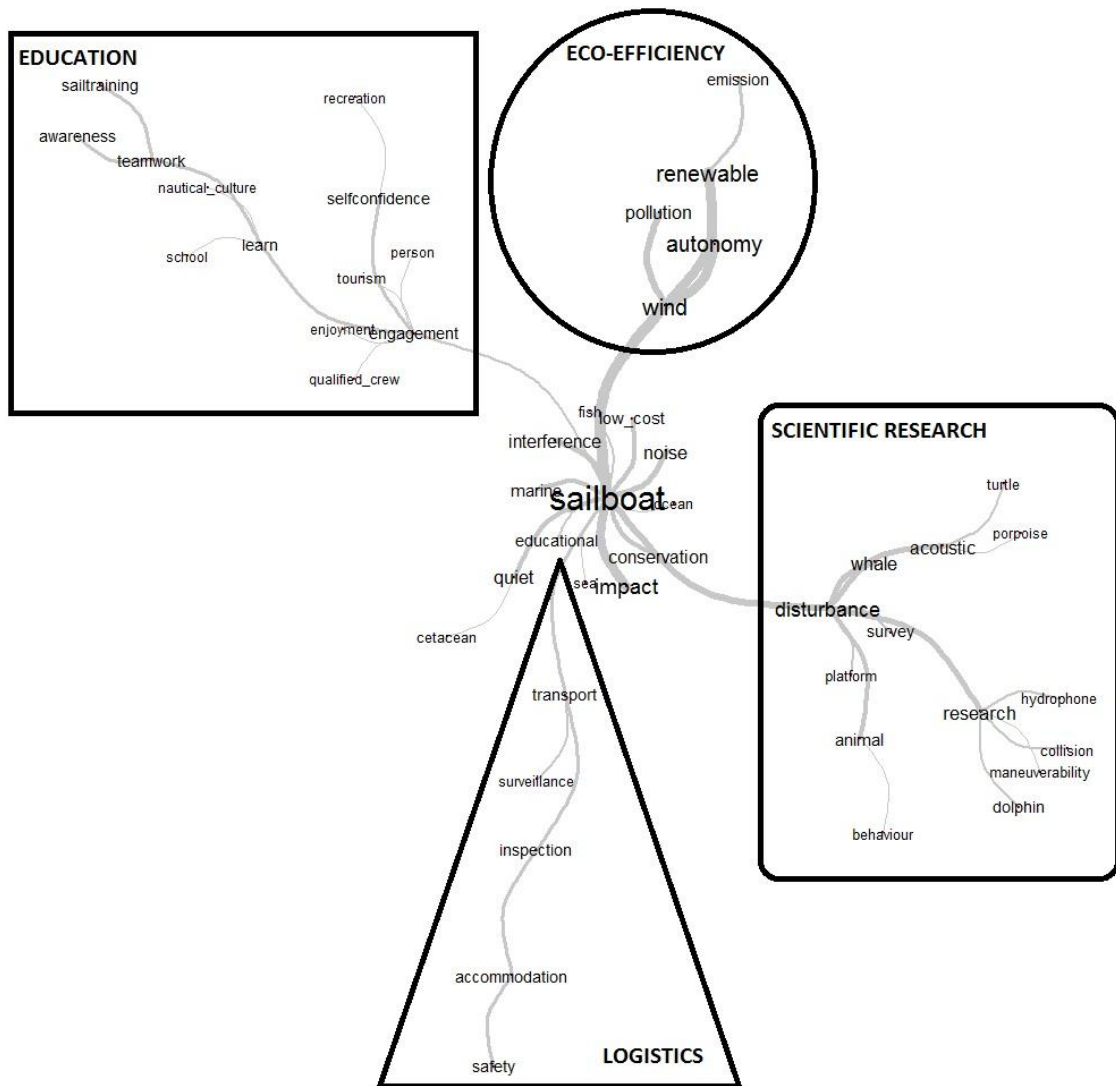


Figure 5: Similarity Analysis provided by IRAMUTEQ software showing the words most reported by stakeholders organized by categories and the connectedness between the words; their distances and position have no specific meaning.

Discourse analysis and the use of IRAMUTEQ, which groups words and organizes them graphically according to their frequency, led to themes that reflected opinions, views and terms used by the stakeholders.

The word-cloud presented in figure 6 shows that the terms “sailboat”; “wind”; “quiet”; “less_noise”; “research” and “autonomy” have been used very frequently by the interviewees. Other words reported relatively often are “low_impact”; “disturbance”; “whale”; “lower_cost”; transport and interference.

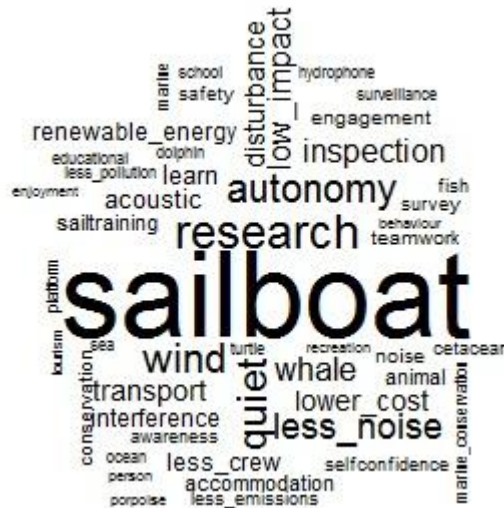


Figure 6: Word-cloud from interviewee’s discourse using IRAMUTEQ software. The size of a word represents its frequency of occurrence.

3.2.1 ECO-EFFICIENCY

Most interviewees argued that sailing vessels can contribute to marine conservation because of reasons related to ECO-EFFICIENCY (n=39; 32%). It was identified 119 of 8 different statements. The words presented by the word-cloud using IRAMUTEQ software within the categories supported these findings and they are depicted in Figure 7. These perceptions are supported by the discourse:

“The sailboat would be a much more sustainable way of transport because it uses less fuel, releasing less pollution, using the wind that is a renewable resource for its propulsion and it is cheaper” (participant #5).

“The great advantage of a sailing boat is the operational cost. It demands a smaller crew and it can be travelling great distances without consuming fuel” (participant #6).

The word-cloud presented in figure 7 shows that the term “sailboat”; “wind”; “less_noise”; “autonomy”; “low_impact and “lower_cost” have been used very frequently by interviewees because their sizes are bigger than the sizes of other terms. Other words often reported were “renewable_energy” and “less_crew”.

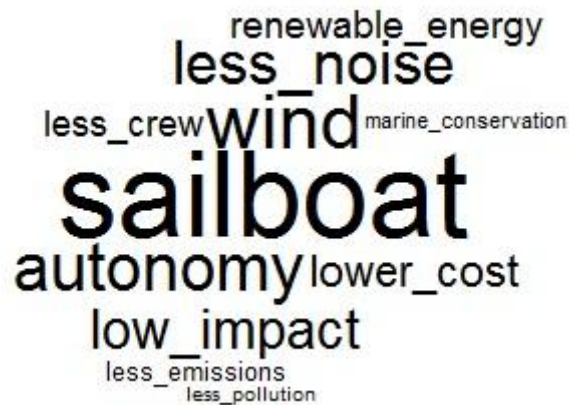


Figure 7: Word-cloud from interviewees discourse within the eco-efficiency category generated by using IRAMUTEQ software. The size of the words is related on how often that specific word appeared into the participants discourse related with eco-efficiency.

3.2.2 SCIENTIFIC RESEARCH

SCIENTIFIC RESEARCH (n=35; 29%), was also frequently reported by the participants as a way to exploit sailing vessels and make them contribute to marine conservation. It was identified 81 of 6 different statements. The words presented by the word-cloud using IRAMUTEQ software within the categories supported these findings (Figure 8). These perceptions can be identified in the discourse:

“We’ve been doing playbacks using sailing boats. When we playback sounds to the animals and we don’t want them to associate the sounds with the boat, we do that under sail. We sail to where we want to be, put the speaker down and playback the sounds. It’s less likely the whale says: Oh! That’s just that stupid boat! (participant #23)”.

The word-cloud presented in figure 8 shows that the term “sailboat”; “research” and “quiet” have been used very frequently by interviewees. Other words well-reported were “disturbance”; “interference”; “acoustic” and “whale”.

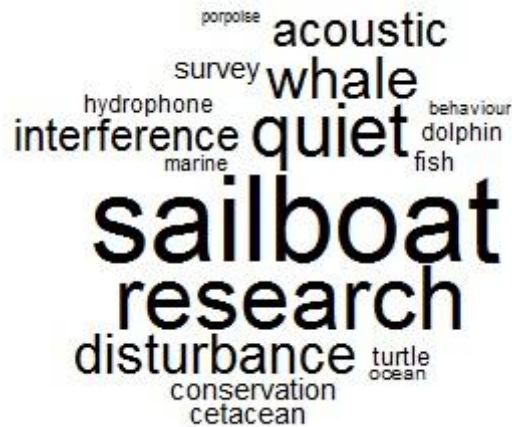


Figure 8: Word-cloud from interviewees’ discourse within the scientific research category using IRAMUTEQ. The size of the words is related on how often that specific word appeared into the participants discourse related with scientific research.

3.2.3 EDUCATION

Several participants perceived that through EDUCATION (n = 29; 24%) the use of sailing vessels could contribute to marine conservation. It was identified 55 of 7 different educational statements through the discourse analysis. The word-cloud supported these findings (Figure 9).

”Sailing is a great way to learn. People come on this project to learn how to do observations, how to use hydrophones, record data, photo ID projects, and also a little bit about sailing the boat. There is a huge amount to learn. I think it’s really useful to people” (participant #11).

The Sea Education Association combines sail training, marine education and research using sailing vessels for that, take on ten to thirty students as crew. They can do acoustics surveys because they’ve got hydrophone, visual surveys because they’ve got this lovely mast. They can put students to look out whales, dolphins, boats. I think this is a good way to encourage to have a role” (participant #23).

The word-cloud presented in figure 9 shows that the terms “sailboat”; “learn” and “education” have been used very frequently by interviewees. Other words often reported were “teamwork”; “awareness” and “tourism”.

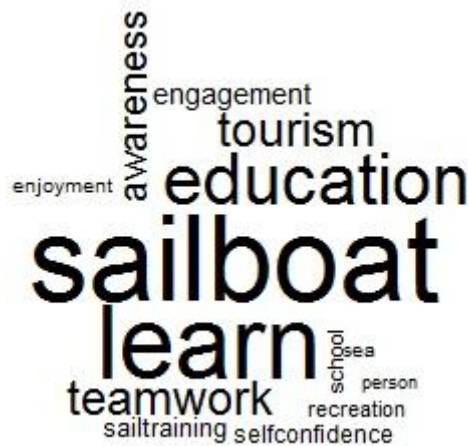


Figure 9: Word-cloud from interviewees’ discourse within the Education category using IRAMUTEQ software. The size of the words is related on how often that specific word appeared into the participants discourse related with education.

3.2.4 LOGISTICS

A few participants perceived that through LOGISTICS (n=19; 15%) the use of sailing vessels could be a marine conservation tool. It was identified 28 of 4 different statements. The words presented by the word-cloud, using IRAMUTEQ software, within the categories supported these findings (Figure 10). These perceptions were reflected in the discourse in the following way:

“People, who are going to visit a restricted area, as San Blas in Panama, are required to stay on sailboats. These vessels work as accommodation, like mobile lodges” (participant #6).

“Sailing vessels are important for the conservation of marine protected areas because they are the most difficult to be controlled. One of the efforts of Conservation International in these 20 years in Abrolhos National Park is to intensify surveillance. Therefore, the use of sailboats can increase inspection with low cost and low impact” (participant #48).

The word-cloud presented in figure 10 shows that the term “sailboat” and “inspection” have been used very frequently by interviewees. Other words well-reported were “transport” and “accommodation”.



Figure 10: Word-cloud from interviewees’ discourse within the Logistics category using IRAMUTEQ software.

3.2.5 DISADVANTAGES

DISADVANTAGES (n=13; 10%) were mentioned the least, but I still collated remarks for this negative category as perceived by the participants. It was identified 23 of 7 different statements. The disadvantages reported by interviewees with sailing experience were especially related to the need of qualified crew and lack of nautical culture.

The issues reported by interviewees without sailing background were especially the number of collisions between cetaceans and manoeuvrability being more complicated. Other disadvantages are also reported as shown in the word-cloud using IRAMUTEQ software (Figure 11). These perceptions are supported by the discourses:

“The disadvantages would be first the expertise to crew a sailing boat. I don’t find many people who are both good marine biologist and an experienced sailors” (participant #23).

“There are some studies that report a large number of collisions between whales and sailing vessels precisely because they make no noise. Because they make no noise, whales often do not detect the presence of the vessel. Even in the Brazilian legislation that regulates whale-watching tourism, the use of sailing boats is not recommended” (participant #35).

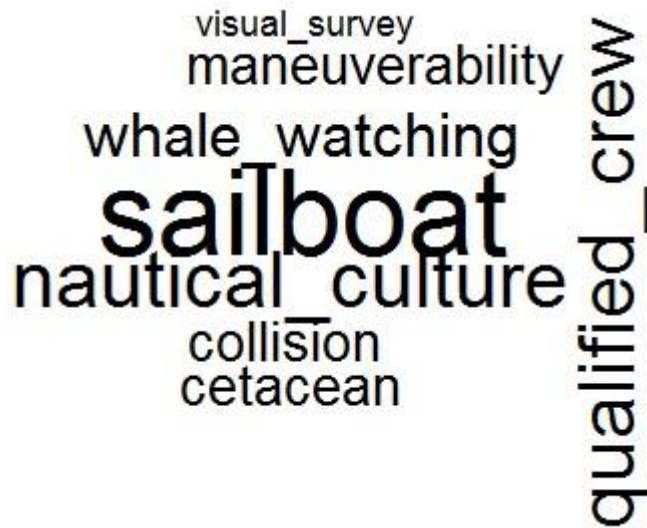


Figure 11: Word-cloud from interviewees' discourse within the Disadvantages category using IRAMUTEQ.

Perception is related to interviewee's activity category

The number and variation in statements by the participants are related to their activity category (Figure 12). Sailors were the category with more number of statements, followed by researchers, tourists, environmental managers and motorsailors. The activity category is related with their relationship with the marine environment.

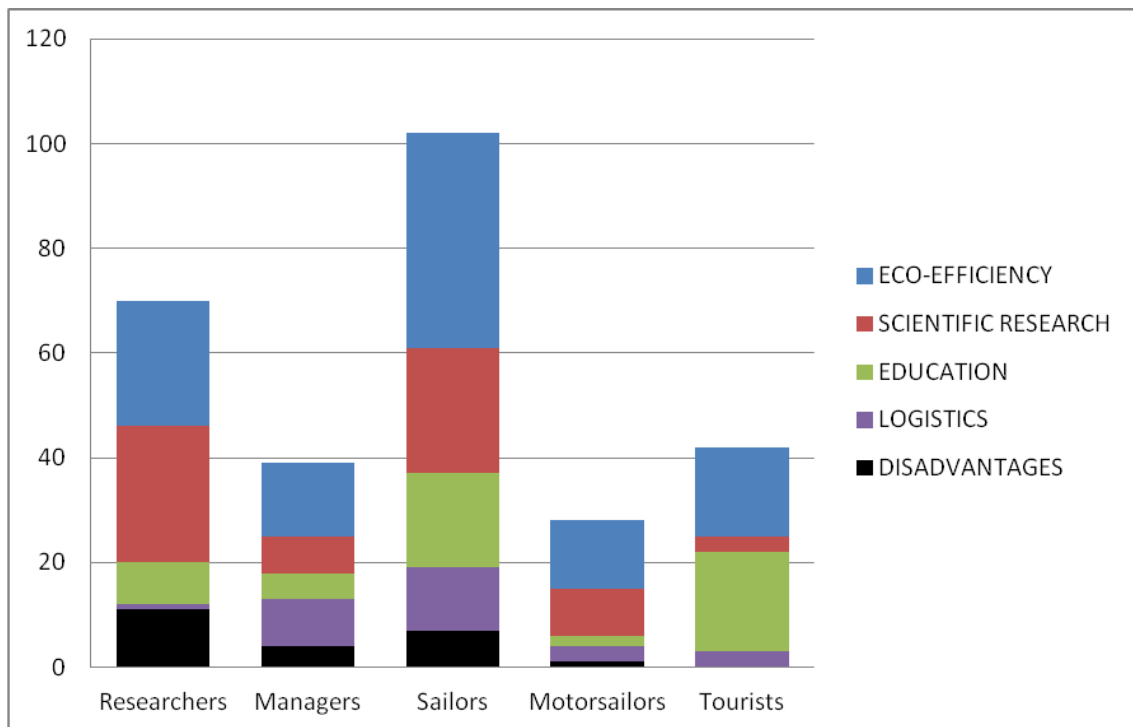


Figure 12: Number of statements per 10 persons perceived by interviewees into the categories ECO-EFFICIENCY, SCIENTIFIC RESEARCH, EDUCATION, LOGISTICS and DISADVANTAGES related with their activity category.

Apart from eco-efficiency, scientific research statements were most frequently mentioned by people in all activity categories, except tourists. Half of all researchers interviewed (n=7 among 14) uses sailing vessels in their activities as a research platform. Education statements were well perceived by tourists as ecotourism is classified into education category. Logistics statements were well perceived by environmental managers and scientific research statements were well perceived by motor sailors as all motor sailors interviewed (n=7 among 7) work with whale watching tours. Tourists were the only category which did not report disadvantage' statement.

The majority of interviewees (n=51) had a positive attitude toward using sailing vessels for marine conservation, except for three who disagreed: two motorsailors and one sailor (Figure 13). The interviewees' positive perception is reflected in the statements related to eco-efficiency; scientific research, education and logistics well reported before. The interviewees' negative perceptions are 1. *“Sailing vessels do not contribute to marine conservation, they need qualified crew which is hard to find”*; 2. *“Sailing vessels do not contribute to marine conservation, what would contribute to marine conservation is take people to the sea independent if are aboard a sailing vessel or motor vessel*; and 3. *Sailing vessels have no connection to marine conservation and whale watching aboard sailing vessels are commercially unprofitable.*

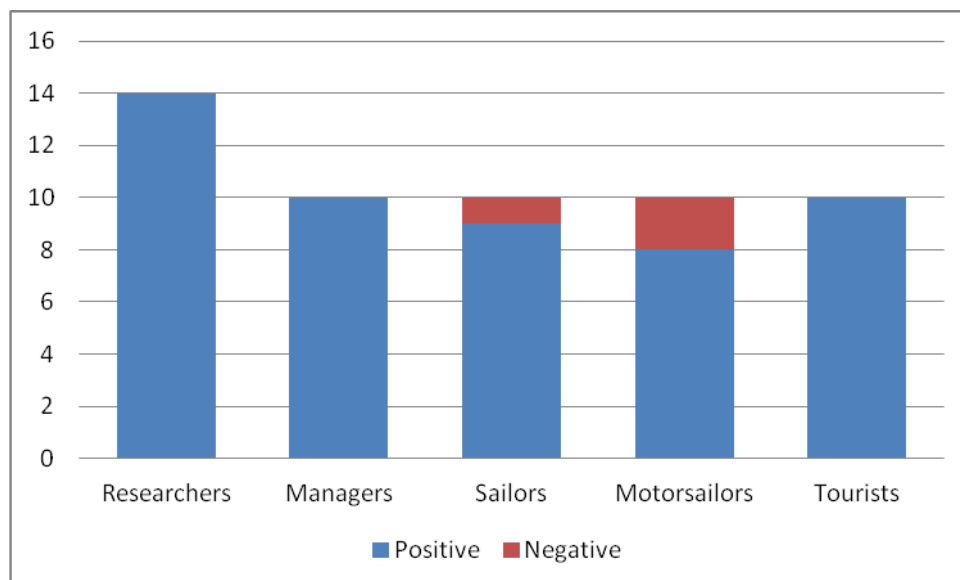


Figure 13: Number of positive and negative perception of interviewees per socio-economic category

Evaluation versus sailing experience

Experienced sailors and researchers who use sailing vessels in their environmental activities reported more number of statements than interviewees without sailing experience, showing that the evaluation about how sailing vessels could contribute to marine conservation are also related to knowledge based on sailing.

4. DISCUSSION

For the first time, a qualitative study involving environmental interviewees' perception was used to discuss sailing vessels as a way to explore the sea with respect to the conservation value of the marine environment. The majority of interviewees had a positive attitude to using sailing vessels for marine conservation due to its ECO-EFFICIENCY and through SCIENTIFIC RESEARCH, EDUCATION and with respect to LOGISTICS. Interviewees with sailing experience perceived more benefits across categories. The themes will be discussed separately by the five categories of analysis: ECO-EFFICIENCY, SCIENTIFIC RESEARCH, EDUCATION, LOGISTICS and DISADVANTAGES in line with the knowledge now available and data the collected in the current study. I believe that the current findings have high potential to encourage decision-makers in environmental management, education and research institutions to make more use of sailing vessels.

4.1 ECO-EFFICIENCY

Although the term eco-efficiency is usually related to business management (De Simone & Popoff, 1997), most interviewees (39 among 54), perceived that the use of sailing vessels can contribute to marine conservation due to its eco-efficiency. The majority of statements (119 among 306) were also from that category. The term ECO-EFFICIENCY, developed by the World Business Council for Sustainable Development, means “*creating more goods and services with ever less use of resources, waste and pollution*” (WBCSD, 2000). It refers to doing things with fewer supplies, less budget, fewer people and reduced environmental impact (Megginson *et al.*, 1998).

As addressed by interviewees through the statements: “*less fuel consumption*”, “*autonomy*”, “*lower-cost*”, “*less crew*”, “*less noise*”, “*less pollution*”, “*renewable energy*” and “*less impact*”, sailing vessels can be considered an eco-efficiency tool to enhance marine

conservation. As sailing vessels use wind, a renewable energy, for their propulsion, they have autonomy to travel long distances with lower cost and lower impact through fuel consumption, noise pollution, while gas emissions are reduced.

All interviewees reported pollution awareness as the main reason sailing vessels can be used in marine conservation due to their eco-efficiency. This statement is also supported by De Simone & Popoff (1997), as the use of natural resources and the cost of pollution yield the final product to be more expensive and by Huppes & Ishikawa (2005), who also argued that the goal should be creating value while decreasing environmental impact.

Sailing vessels can reach an average speed of 9 knots (Ritter, 2012), using only the propulsion of the winds, clean and renewable energy, for its displacement. This is the average speed normally used by motor vessels on research, tourism and passenger transport. However, motor vessels spend a lot of more fuel, emit much more pollutant gases into the atmosphere, are more expensive, and generate a greater amount of noise. When the sailing plan and the conditions to sail are adequate, there is no need to burn fuel to travel, which avoids high environmental costs by reducing the impact by emissions, discharges, and noise pollution. The perception of interviewees reflects well the current state of the art of eco-efficiency.

4.2 SCIENTIFIC RESEARCH

Many interviewees (35 among 54), perceived that the use of sailing vessels can contribute to marine conservation through scientific research, especially because they are “quiet” and cause “less interference” and “disturbance” (statements most reported). As a quiet research platform, sailing vessels interfere less with the study species. Interviewees, who use both sailing vessels and motor vessels in their activities, reported that it less likely the animals change behaviour when approaching under sail as suggested by Corkeron (1995). The noise generated underwater by motor vessels could potentially impact larger numbers of fish (Slabbekoorn *et al.*, 2010) and the underwater noise pollution can also induce a behavioural disturbance in marine mammals (Southall, 2008).

Another well-reported statement made by researchers with sailing experience is that “*sailing vessels are ideal for doing acoustic surveys*” due to the quality of sound collected, the possibility to record continuously and because it is not necessary to have high-tech equipment to avoid motor vessel sound interference. Sailing vessels would allow collection of acoustics data while minimizing disturbance (Gerrodette *et al.*, 2011). Noise levels are steadily rising,

so ocean noise must be managed in a precautionary way before irreversible damage to biodiversity and the marine ecosystem occurs (Weilgart, 2007). I believe that the awareness about noise pollution is likely to be an important one as worldwide there is growing concern about this factor in conservation as reflected by several recent publications (Williams *et al.*, 2015; Jones, 2019; Sueur, 2019). The perception of interviewees is generally positive about the use of sailing vessels as a research platform to enhance marine conservation, however, only a few interviewees use them in their environmental activities. This discrepancy could be related to the lack of nautical culture as sailing vessels need specific knowledge to run.

Although the majority of research platforms are motorized vessels, there are a few initiatives as the R/V Song of the Whale, a 21-meter sailing research vessel, designed and built for the International Fund for Animal Welfare (IFAW). Other important research efforts that happened aboard sailing vessels concern studies by Alexandre Gannier (2019), Arthur Andriolo (2018), Corkeron (1995), Daniel Lewis (2016; 2017; 2018; 2019), Gerrodette (2001), Hal Whitehead (1983; 1991; 1996; 2009; 2018), Jennifer Jackson (2018), Luke Rendel (2001), Marcos Rossi-Santos (2019), Mauricio Cantor (2013; 2015) and Roger Payne (1986).

4.3 EDUCATION

4.3.1 Sailing vessels as an education platform through sail training

As an education platform, interviewees reported that sail training and marine research aboard sailing vessels is an opportunity to learn about the biodiversity, the ocean and how to collect data. Sail training involves the development of knowledge, skills and attitudes from sea experience (Hamilton, 1988) and should be understood not solely as adventurous recreation but as a powerful educational experience (McCulloch *et al.*, 2010). Experimental learning is the most effective means of education and is dependent on the platform chosen (Gawel & Greengrove, 2005).

“Engagement and self-confidence” were statements also reported by interviewees, however, to a lesser extent. In the process of learning how to sail, students can develop commitment, responsibility in the accomplishment of tasks and gain confidence (McCulloch *et al.*, 2007). Their confidence can be transferred to their studies developing greater interest in science (Gawel & Greengrove, 2005). A sailing experience enhances education and it

approaches student learning from a much broader perspective (Gawel & Greengrove, 2005). Sail training shows a positive effect on the development of self-concept, social networks and engagement with learning (Henstock *et al.*, 2013).

Interviewees reported that: 1. *“people can develop teamwork with sailing”* as addressed by McCulloch (2007); 2. *“a sailing vessel crew must be both physically and mentally well prepared”* as sailing requires that participants face challenges, both physical and emotional, including instruction in all aspects (Henstock *et al.*, 2013); and 3. *Sailors are good collaborators”* as addressed by McCulloch (2010) that sailing has positive benefits in terms of participants' self-perceptions to work collaboratively with others

The perception of interviewees as reflected by their statements is supported by the available knowledge in the literature. Most studies related to sailing vessels are conducted in the context of an educational purpose and it seems to be well integrated with communal knowledge.

4.3.2 Whale-watching tour aboard sailing vessels

In this study, we considered whale-watching as an ecotourism activity, therefore, as an educational purpose. Ecotourism is a recreational activity within the natural environment (Hall, 1994; Diamantis, 1999). The value of ecotourism lies in the possibility of enriching the human experience and increasing knowledge (Primack & Rodrigues, 2001), promoting a better understanding of the target species and their habitat (Wilson & Garrod, 2003).

Whale-watching, as an ecotourism activity, was a subject well reported by the interviewees. This may have been due to the number of people interviewed related to this field as a researcher (1 person), environmental manager (1), sailor (1), motor sailors (7) and tourist (1) who did a dolphin-watching aboard a sailing vessel generally called whale-watching. We discuss the advantages and disadvantages of the use of sailing vessels on whale-watching in order to reduce the impact of this activity.

As the advantage of using sailing vessels on whale-watching, the main arguments reported by the interviewees are 1. Whale-watching on sailing vessels has high educational potential because it is an opportunity to bring other values and perceptions to people. However, it was also mentioned that this only applies to long trips; and 2. The value of a whale-watching tour aboard a sailing vessel could be a modifying experience for both client and operator, bringing environmental and conservation quality to the tourist experience.

The whale-watching industry is an alternative against commercial whaling (O'Connor *et al.*, 2009) and it has grown into a profitable sector of the international ecotourism market (Hoyt, 2009), generating socio-economic benefits to a country over time (Cisneros-Montemayor *et al.*, 2010). However, there are many impacts on the target species that need to be minimized (Parsons, 2012). Numerous studies have shown that whale-watching vessels do affect whales' behaviour (Corkeron, 1995; Lundquist *et al.*, 2013; Rossi-Santos, 2016). Boat noise can mask cetacean vocalizations (Jensen *et al.*, 2008) and whale-call response (Foote, 2004), reducing reproductive rates (Bejder, 2006). The effect of noise from whale-watching traffic on the target species requires more attention (Martinez & Orams, 2011). Additionally, the use of fossil energy is one of the major environmental problems associated with this kind of tourism (Gossling, 2005).

Interviewees (n=10) reported consciousness about the whale-watching impacts related with disturbance of the target species, noise pollution, emissions and discharges from motor vessels used in this activity. Despite the acknowledgement of these issues, interviewees (n=3) did not consider to use sailing vessels in the whale-watching industry as an alternative to reduce this impact, because they reported that the number of collisions between vessels and whales is bigger between sailing vessels than motor vessels. However, this issue is not supported by science.

“Even in the Brazilian legislation that regulates whale-watching tourism, the use of sailboats is not recommended” (participant #35). The law made by the Brazilian Environmental Federal Agency (IBAMA 117/96) that regulates whale-watching does not mention any restriction to a sailing vessel either recommended it or not.

This belief might be attributed to good media coverage on global ocean race when the majority of sailing vessel-whale collision happens (Ritter, 2012), due to the exceptionally high boat speed (Laist *et al.*, 2001). Collisions of sailing vessels with cetaceans have significantly less reports than collisions with motor vessels as published by Ritter (2012) and IWC (2011; 2014). A total of 111 collisions of sailing vessels with cetaceans were identified from 1966 until 2010 (Ritter, 2012). In 2011, The IWC Global Ship Strikes database contained 452 cases (IWC, 2011). An update on ship strikes with cetacean's database had over 1100 reports (IWC, 2014).

Collisions between cetaceans and any type of vessel are of growing concern worldwide (Ritter, 2012). Any species of cetacean can be involved in collisions with large ships, whale-watching vessels, and sailing boats (Laist *et al.*, 2001; Jensen and Silber 2004; Panigada *et al.*,

2006; Van Waerebeek *et al.*, 2007; Ritter 2012). Whales have been injured or killed as a result of collisions with high-speed whale-watching vessels, decreasing the possibility when the vessel speed is below 14 knots (Laist *et al.*, 2001). The majority of sailing vessels sail around 9 knots (Ritter, 2012). It's assumed that collision with sailing vessels are less frequent than with motorised vessels (Lammers *et al.*, 2007).

Another interesting statement reported by participants #34 and #35 is that “*lack of whale reaction can be dangerous*” and “*sailing vessels do not produce noise*”. So, “*whales cannot hear the boats and collide with them*”. Little is known about the sound generated by sailing vessels, but it seems possible that cetaceans may hear an approaching sailing vessel, at least under ‘ideal’ conditions. Sailing vessels produce faint sounds by the flow of the water along the hull (Richardson 1995 cited in Koschinski, 2003), and daggerboards may contribute their own frequencies. However, under less than ideal circumstances, it may be difficult for whales to detect the faint sound of sailing vessels noise, due to a variety of biological and physical factors (ACCOBAMS, 2005) or masking through ambient sounds generated by wind and shipping noise (WDCS, 2006). Nonetheless, some collisions occurred while the vessel was motor sailing” (Parsons, 2012).

The statement about “more collisions with cetaceans and sailing vessels” does not seem to be picked up from the available science but is still, potentially erroneously, part of the communal knowledge as 3 people (2 environmental managers and 1 researcher) reported it.

4.4 LOGISTICS

Logistics is defined as "the movement of materials and products from source to the user" (Magee, 1968). In this study, the ‘material’ concerns environmental workers on a job. The main logistics’ arguments perceived by interviewees are that sailing vessels can be used for inspection of marine protected areas and transport and accommodation of researchers with low operational cost. Logistics includes cost and choices of transportation (Davies, 1987). Sailors followed by environmental managers were the socio-economic category that yielded most statements related to logistics.

Interviewees’s perceptions on logistics may not be confirmed yet by scientific study due to a lack of studies on this subject. The topic was addressed especially by sailors and environmental managers.

4.5 DISADVANTAGES

Manoeuvrability was a subject well reported by interviewees either way as an advantage (made by experienced sailors and researchers with sailing experience) and disadvantage (made by stakeholders without sailing experience). It was identified 3 main arguments: 1. Sailing vessels are hard to manoeuvre, however, it does not need to be an issue if you have qualified crew; 2. Sailing vessels are hard to use for research and ecotourism because they are difficult to manoeuvre and 3. Sailing vessels are very easy to manoeuvre and their manoeuvrability is straight forward.

The perception that sailing vessels are difficult to manoeuvre may be related to lack of navigation knowledge about sailing because manoeuvrability was reported as an issue only for interviewees whose do not use sailing vessels on their activities and from interviewees without sailing experience. Other statements reported by interviewees with sailing experience are the need for qualified crew and lack of nautical culture. Those statements seem to reflect the reality on this field and might be the main issue of using sailing vessels in marine conservation, however, a educational and training program could be a solution for that.

CONCLUSIONS

In the eyes of interviewees the advantages and disadvantages of using sailing vessels in marine conservation are related to four main themes: eco-efficiency, scientific research, education and logistics. The reason most interviewees reported that sailing vessels can contribute with marine conservation is because they have low noise in the oceans and reduced of fossil fuel consumption. The evaluation of what interviewees think about this subject depends on the interviewees' activity and their sailing experience.

In this study, the findings indicate areas worthy of further investigation in future studies. Additionally, it would provide a framework to situate the language of interviewees to describe their practice. The current results have a high potential to encourage decision makers in environmental management, education and research institutions to make more use of sailing vessels.

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