



Willingness to participate in marine volunteering: an international survey

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Abstract

With the launch of the UN Ocean Decade, the value of inclusive approaches encouraging better stewardship and improving the management of ocean resources has been increasingly advocated. Public engagement in marine issues through volunteering in marine conservation and science can be a tool to strengthen the connection to the ocean, stimulating behaviour change and support for solutions that can mitigate human impacts on marine environments and resources. This study investigated, through an international online survey, behavioural intentions to partake in marine volunteering among people with a vested interest in marine tourism and recreation, conservation and research. Particular focus was given to drivers, barriers and enablers in marine volunteering. The participants (N=473) were interested in marine volunteering, driven mainly by ecocentric motives, self-development, and personal well-being. Important barriers to marine volunteering included money and access, with time and skills being secondary. While the participants were convinced they would participate in marine volunteering in the future, they agreed that information and education, time, better access and incentives would enable participation. Previous volunteering experience resulted in stronger drivers to participate in marine volunteering, and perspectives also varied according to demographic variables including age and educational background. The results of this study were used to guide strategies for marine volunteer recruitment, highlighting the importance of well-designed outreach campaigns, inclusivity, and partnerships to support marine volunteering as a positive form of public engagement in marine stewardship and science.

Keywords Marine conservation · Citizen science · Voluntourism · Marine recreation · Recruitment strategies

Introduction

Coastal and marine environments globally are facing a series of impinging threats, from climate change to pollution and habitat degradation, calling for unified and effective marine conservation efforts (Hall-Spencer and Harvey 2019; Pecl et al. 2017; Vince and Stoett 2018; Visbeck et al. 2014). The United Nations (UN) recently declared the Decade of Ocean Science for Sustainable Development (2021–2030) (UNESCO, 2021). The UN Ocean Decade aims to support efforts to ensure that ocean health is restored, through the coalition of stakeholders working behind a shared framework that will guarantee the sustainable development of the ocean, with the help of science (UNESCO, 2021). The UN Ocean Decade

was established to contribute to Sustainable Development Goals (SDGs), in particular, SDG14 – life below water (Von Schuckmann et al. 2020). Specifically, SDG14 advocates international cooperation and effective governance to assess the current status of marine systems, diagnose ongoing trends, and provide information for inclusive, forward-looking, and sustainable ocean governance (Visbeck et al. 2014). Achieving this goal would protect the marine environment and promote the sustainable use of marine resources so that generational equity can be accounted for and environmental sustainability can be ensured (Von Schuckmann et al. 2020).

Two salient aspects of the UN Ocean Decade include the value of non-scientific knowledge and inclusive approaches that can encourage better stewardship and improve the management of ocean resources (Kelly et al. 2022). The Convention for Biological Diversity has also set global goals for marine environments (e.g. Aichi Target 11), intending to endorse ocean stewardship through social engagement with ocean issues (Mogias et al. 2019) and improving the connection between people and the ocean (Schuldt et al. 2016). In

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this context, enhancing active public engagement in ocean and coastal issues through marine conservation and science can be seen as a tool to strengthen the connection to the ocean, stimulating behaviour change and support for solutions that can mitigate human impacts on marine environments and resources (Kelly et al. 2022). This type of engagement can also result in the collective production of new knowledge and the exchange of non-scientific knowledge, such as local or traditional knowledge (Clarke et al. 2013).

A prime example of active public engagement through marine conservation and science is marine volunteering. In this paper, marine volunteering encompasses people volunteering their time for marine conservation and research, planning to partake in activities such as data collection and restoration, either as part of a holiday (also referred to as marine voluntourism and marine research tourism, among other terms) or as part of a project requiring public contributions during specific times under the coordination of scientists (also referred to as participatory science or citizen science, among other terms) (Cigliano et al. 2015; Lucrezi et al. 2022a, 2022b; Wood 2010).

Marine volunteering can support the objectives of the UN Ocean Decade, SDG14 and similar goals by enhancing marine conservation and research efforts through public engagement globally (Cigliano et al. 2015). When considering the citizen science aspect, marine volunteering can be a cost-effective tool to generate sound science and high-quality data that can be used by policymakers and decision-makers (Hyder et al. 2015; McKinley et al. 2017). Data collected through marine citizen science can be in high quantities and data collection can reach regions otherwise difficult to reach by scientists alone (Thiel et al. 2014). Marine citizen science can provide transformative learning experiences, improving public science and ocean literacy, environmental awareness, pro-environmental behaviours, and knowledge sharing with the wider community (Crall et al. 2013; Dean et al. 2018; Kelly et al. 2019). Data obtained through marine citizen science can contribute to monitoring change in relation to SDGs (Fritz et al. 2019). Ultimately, marine citizen science can strengthen people's ties with their local environments, encouraging stewardship and marine citizenship through 'hands-on' experiences that generate greater awareness of marine environments (Haywood et al. 2021; Kelly et al. 2020). When considering the marine voluntourism aspect of marine volunteering, participation can contribute to a promising form of tourism that benefits the natural environment, participants, host communities and society (Alexander 2012; Kitney et al. 2018). Marine voluntourism can play an important role in tourism development, especially in developing countries, by generating income and employment (Shum et al. 2021). It can also bring necessary funding for conservation projects (Rattan et al. 2012; Roques et al. 2018) demonstrated that

marine voluntourism may deliver ecosystem research and conservation benefits, such as capacity building, the production of scientific knowledge, policy and legislation, managing sites and species, and improving livelihoods. Additionally, it can deliver important services for voluntourists, such as personal growth, conservation awareness, production of active learning, a sense of achievement, and global citizenship which refers to the rights and responsibilities of individuals in relation to humanity and nature on a global level (Alexander 2012; Gray et al. 2017).

Understanding the drivers and barriers to participation in marine volunteering is considered an essential focus of research, as it enables the design of effective recruitment strategies. Research shows that common drivers or motivations to participate in marine volunteering include a positive attitude towards the environment, conservation and science; contributing to a cause (e.g. conservation, science); learning; skills development and gaining career experience; personal well-being; perceived behavioural control (e.g. access to locations, equipment and technology); and social factors (e.g. meeting people) (Carballo-Cárdenas and Tobi 2016; Lucrezi et al. 2018; Martin et al. 2016). Common documented barriers to participation in marine volunteering include time constraints (especially for people with no prior volunteering experience); money constraints; a perceived lack of skills; and a perceived lack of access (e.g. to marine volunteering opportunities, to locations) (Carballo-Cárdenas and Tobi 2016; Hermoso et al. 2021; Lucrezi et al. 2018; Martin et al. 2016). Money and time may be particularly important barriers when marine volunteering is considered through the voluntourism lens; in this case, it has been debated that marine voluntourism trips tend to require more time and money to be invested compared with regular nature-based trips (Gray et al. 2017). When barriers to participation in marine volunteering are present, enabling factors are important to investigate to assess how barriers could be overcome. For example, research has shown that outreach and information campaigns are considered essential enablers, together with incentives such as training to equip participants with the knowledge, skills and confidence needed in marine volunteering (Carballo-Cárdenas and Tobi 2016; Hermoso et al. 2021; Lucrezi et al. 2018). Other identified enablers include incentives such as free participation in recreational activities involved in marine volunteering (e.g. diving), as well as easier access to marine volunteering opportunities (e.g. being invited by tourism operators) (Carballo-Cárdenas and Tobi 2016; Lucrezi et al. 2018).

What makes the investigation of drivers and barriers in marine volunteering challenging is that these factors can be shaped by variables including demographic ones and whether or not people have previously been exposed to any volunteering. For example, Lucrezi et al. (2022b) highlighted how young people with a background in

environmental science and conservation, or university students in marine science, may be more interested in marine volunteering for self-development and career opportunities and may have more time available to volunteer, although being hindered by the lack of financial resources. Older people with more stable incomes may have the resources to participate in marine volunteering but for a shorter time and are driven by different reasons. Martin et al. (2016) discussed how studies have investigated the profile and motivations of previous participants in volunteering, while there is a paucity of information regarding motivations and barriers for potential volunteers. Filling this gap is important to promote marine volunteering not only among people with prior volunteering experience but also people without any such experience. Previous participation in volunteering may shape beliefs, motivations and other factors potentially affecting future participation, including marine volunteering (Martin et al. 2016). In this context, the literature suggests that people without prior volunteering experience may feel different drivers and barriers to participation compared with people who have been exposed to volunteering in the past (Carballo-Cárdenas and Tobi 2016; Martin et al. 2016).

In light of the above, the present study aimed to assess drivers, barriers and enablers in marine volunteering, through an international online survey. Specifically, the study gathered the perspectives of people likely to access marine volunteering, namely individuals with a vested interest in marine-based activities including tourism and recreation as well as marine conservation and research. This study also compared perspectives between people with and without previous volunteering experience and evaluated the correlation between demographic parameters and perspectives. To achieve the aim of the study, the following research questions were formulated: what are the drivers, barriers and enablers in marine volunteering among people with a vested interest in marine-based activities, marine conservation and research? Is there a difference in perspectives between people with and without previous volunteering experience? Are there correlations between demographic variables and perspectives? Answering these questions can guide the development of effective recruitment strategies in marine volunteering, indirectly supporting the objectives of the UN Ocean Decade concerning public engagement in marine and ocean issues.

Method

Research design and data collection

This research was exploratory and quantitative, based on a structured questionnaire survey (Appendix A). The questionnaire contained binary, ordinal (including Likert scales),

continuous and nominal variables, specifically interest in marine volunteering, previous volunteering experience, demographic profile (e.g. age, education), potential drivers in marine volunteering, barriers to marine volunteering, and enablers in marine volunteering. These components were selected after a review of the literature about volunteering with a focus on marine environments, conservation, research, and willingness to participate (e.g. Lucrezi et al. 2018; Martin et al. 2016; Ngah et al. 2021; Shum et al. 2021).

The population under study were people with a vested interest in marine-based activities including tourism and recreation (e.g. scuba diving, wildlife watching, marine mammal tourism) but also marine conservation and research, representing good candidates for marine volunteering. To have a sample that would be as representative as possible of this population internationally, the questionnaire was created in Google Forms for the survey to be conducted entirely online. The authors opted for social media, namely Facebook groups, to reach the population. This choice was based on the understanding that people with a vested interest in marine-based activities, marine conservation and research would follow social media platforms to gain information about these topics (Day et al. 2014). Additionally, social media platforms have been demonstrated to be an effective and time-efficient recruitment strategy for online surveys (Kelly et al. 2020; McRobert et al. 2018). The link to the questionnaire was shared weekly for one year (June 2019 to June 2020) on 185 Facebook groups discussing marine-based activities, conservation, and research. The Facebook groups counted a total of 2 736 315 members. Based on this figure, a sample size of 385 was estimated (95% confidence level and 5% margin of error). The final sample was $N = 511$, however, only 473 responses were considered for statistical analysis. These represented people with an interest in marine volunteering, whereas the remaining 38 represented people not interested in marine volunteering and were considered too small a subsample to be analysed.

Concerning ethics, the study did not target any vulnerable or underage (< 18) groups. The questionnaire was accompanied by an informed consent letter with an ethical clearance number, as well as an explanation of the purpose of the study. By agreeing to take part in the research, the objectives of which were clearly outlined upon invitation, the participants provided informed consent and were free to leave the research at any moment. No unnecessary data were collected and no data mining was performed. Data were handled according to privacy laws, the Universities of SA Guidelines and the National POPI Act of South Africa. Confidentiality and anonymity were always preserved by assigning code names and numbers for participants. There was no foreseeable emotional discomfort, inconvenience, or risk to the participants, and no sensitive data were collected.

Data analysis

The data were analysed in TIBCO Statistica (Version 13.3, 2020). The final sample was divided into two subsamples, based on whether or not the respondents had previously participated in volunteering. Statistics included frequency tables, descriptive statistics, cross-tabulations (Pearson's χ^2) and non-parametric tests (Kruskal-Wallis and Mann-Whitney U) comparing the two subsamples. The Likert-scale variables (potential drivers in marine volunteering, barriers to marine volunteering, and enablers in marine volunteering) were subjected to confirmatory exploratory (CEFA) factor analyses (Stevens 2012) as well as reliability tests (Nunnally and Bernstein 1994). A priori factors were selected for CEFA based on the literature on motivations to partake in marine volunteering and factors both hindering and endorsing participation in marine volunteering (e.g. Kitney et al. 2018; Lucrezi et al. 2018, 2022b; Martin et al. 2016). CEFA and reliability tests were performed separately for the two subsamples, and average factor scores were compared between the subsamples using Mann-Whitney U tests. Some factors were characterised by standalone items; in this case, CEFA was not performed and average scores for these items were simply compared between the two groups. Spearman rank order correlations (r_s) were performed to assess unique relationships between demographic parameters and factor scores; only significant correlation coefficients ($r_s > |0.15|$, $P < 0.05$) were reported.

Study limitations

This study has limitations that need to be considered in the interpretation of the results, and in planning future research on the topic of marine restoration. While the survey reached several regions globally, the sample was not representative of the global population of people with a vested interest in marine tourism and recreation, conservation and research. The online nature of the survey, the selection of a single social media platform (Facebook) for the promotion of the survey, and the distribution of the survey in a single language (English) would have prevented the participation of several groups. Although the selection of the variables measured in this study was based on a revision of the literature on drivers, barriers and enablers in marine volunteering, other factors were not measured that could have shed more light on the perspectives of potential marine volunteers, such as safety, the validity of activities carried out, and the professionalism of marine volunteer organisations.

Results

Table 1 summarises the demographic profile of the participants in this study. The two subsamples included $n = 302$ people who never volunteered but were interested in

marine volunteering (Group 1) and $n = 171$ people with previous volunteering experience and interested in marine volunteering (Group 2). The majority of participants in the survey were female, with an even greater percentage of females (84%) in Group 2. The participants were in their mid-thirties on average, with no significant difference between Group 1 and Group 2. The survey attracted participants mainly from North America, Africa and Europe (70–82%), although there was some representation from Asia, Australia/New Zealand and South America (18–30%). The highest level of education for most of the participants was tertiary, with Group 2 comprising an even greater proportion of people with tertiary education. Around 20% of the participants had studied in the field of environmental and biological sciences, with no significant difference between the two groups. Half of the participants were employed, whereas around 30% were students and the rest were unemployed. Of the employed participants, a small proportion (9–11%) had a profession in the environmental and biological sciences.

Results of CEFA on the items in the questionnaire are given in Tables 2, 3, and 4. Four factors underpinned drivers in marine volunteering (Table 2). For the items in these factors, loadings exceeded the cut-off value of ± 0.40 . Cronbach's alpha (α) values demonstrated good factors' reliability, above the threshold of 0.60 established by Nunnally and Bernstein (1994) except for one instance (Driver 4) where the α was 0.50 for Group 2. Driver 1 was named "ecocentric" and had the highest factor score for both groups (Fig. 1a). Specifically, the participants would be driven to partake in marine volunteering to contribute to marine conservation and solve marine issues. Driver 2, called "self-development", was the second most important to the participants (Fig. 1a). Specifically, the participants would be driven to partake in marine volunteering to learn, acquire skills and explore the marine sciences. Driver 3, "personal well-being", was the third most important, and was characterised by partaking in marine volunteering for personal fulfilment (Fig. 1a). Driver 4, "social values", was neutral to the participants (Fig. 1a). This factor was characterised by partaking in marine volunteering as part of traditions and interacting with people. Drivers 1–3 were significantly more important for Group 2 compared with Group 1.

Barriers to marine volunteering included four factors (Table 3). For the items in these factors, loadings exceeded the cut-off value of ± 0.40 . All factors were reliable. Barrier 1, "no time", was neutral to the participants and not significantly different between the two groups (Fig. 1b). Barrier 2, "no money", was the most important barrier to marine volunteering (Fig. 1b). This factor also showed no difference between the two groups. The participants either disagreed or were neutral about the idea that they did not have the skills to partake in marine volunteering

Table 1 Participants' profile ($N=473$)

Variable	Categories	Group 1 ($n=302$)	Group 2 ($n=171$)	Significance test
Gender (%)	Male	29.5	16	10.06** ^a
	Female	70.5	84	
Age (y)	Mean	36	34	24,076 ^b
	Min-max	18–73	18–69	
	SD	12.7	13.5	
	SE	0.7	1.03	
Origin (%)	Africa	28	16	69.97 ^a
	Asia	9	8	
	Australia/New Zealand	6	18	
	Europe	24	25	
	North America	30	29	
	South America	3	4	
Education (%)	School	25.5	17.5	3.94* ^a
	University	74.5	82.5	
Subject of study (%)	EBS	22	31	2.17 ^a
	Other	78	69	
Occupation (%)	Student	27	36	4.29 ^a
	Employed	56	50	
	Unemployed	17	14	
Profession (%)	EBS	9	11	0.73 ^a
	Other	91	89	

Group 1: respondents who never volunteered but are interested in marine volunteering. Group 2: respondents with previous volunteering experience and interested in marine volunteering

EBS = Environmental or biological sciences

* $P \leq 0.05$, ** $P \leq 0.01$

^aPearson's χ^2 test, ^bMann-Whitney U test

(Barrier 3, “no skills”), with Group 1 being more confident than Group 2 (Fig. 1b). Finally, the participants from both groups similarly tended to be neutral – with a tendency to agree – about having difficulty accessing (Barrier 4, “no access”) marine volunteering opportunities (Fig. 1b).

Enabling factors in marine volunteering are displayed in Table 4. For the items in these factors, loadings exceeded the cut-off value of ± 0.40 . All factors were reliable except for one factor (Enabler 5) for both groups, where the α was 0.50–0.55. On average, the participants agreed that they were already convinced to partake in marine volunteering (“no enabling required”), with Group 2 being significantly more convinced than Group 1 (Fig. 1c). However, there were five potential enablers, with no significant difference between the two groups (Table 4; Fig. 1c). Enabler 1, “more time”, was important to the participants; similarly, the participants felt that education and different sources of information about marine volunteering (talks, websites, education) would be useful (Enabler 2, “information/education”). Enabler 4, “incentives”, was slightly less important, while Enabler 5, “better access”, was considered as important as information and education. Last, while money seemed to be a barrier to marine volunteering (Fig. 1b), it was the least important enabler to the participants (Enabler 3, “more money”) (Fig. 1c).

Spearman rank order correlations (r_s) were similar for the two subsamples, therefore, the data were pooled and assessed using a single correlation analysis. Females tended to provide higher scores for Driver 1, “ecocentric” ($r_s = 0.181$). Age was the variable with the greatest number of correlations. Specifically, younger people provided higher scores for Drivers 2, “self-development” ($r_s = 0.321$), and 3, “personal well-being” ($r_s = 0.271$). Younger people also tended to give higher scores to Barrier 2, “no money” ($r_s = 0.181$), Barrier 4, “no access” ($r_s = 0.161$), Enabler 1, “more time” ($r_s = 0.171$), Enabler 2, “more money” ($r_s = 0.231$), Enabler 4, “incentives” ($r_s = 0.201$), and Enabler 5, “better access” ($r_s = 0.221$). Finally, participants with an educational background in the environmental and biological sciences gave higher scores to Driver 2, “self-development” ($r_s = 0.311$), and Barrier 2, “no money” ($r_s = 0.281$).

Discussion

The results of this study concerning the demographic profile of the participants are in line with some findings related to research on marine volunteering. The survey attracted a large proportion of female participants (with an even greater

Table 2 Result of CEFA on drivers in marine volunteering ($N=473$)

I would participate in marine volunteering because:	Factor loading	Eigenvalue	Variance explained (%)	Cronbach alpha (α)
Driver 1: Ecocentric		3.55–4.32	59–62	0.86–0.90
I want to contribute to marine conservation	-0.78			
I want to contribute to animal protection and welfare	-0.75			
Marine conservation and marine issues are very close to my heart	-0.77			
I want to be a part of solving marine issues	-0.86			
I want to contribute to the successful management of marine areas	-0.79			
I want to give something back to the marine environment	-0.76			
I am compassionate towards threatened marine animals	-0.79			
Driver 2: Self-development		3.11–3.78	62–63	0.85–0.88
I want to understand more about the function of marine ecosystems and species	-0.81			
It is an opportunity to learn about marine life	-0.84			
I want to understand more about the interactions between people and the ocean	-0.70			
It could be an opportunity to explore career options in marine sciences	-0.82			
It could be an opportunity to meet and interact with marine scientists	-0.82			
It could provide me with an opportunity to gain important skills	-0.76			
Driver 3: Personal well-being		1.46–3.59	51–73	0.63–0.84
It could be fun	-0.65			
It could be a good escape from my daily life	-0.78			
It could help me to work through my personal problems	-0.79			
It could help me feel less lonely	-0.74			
It could make me feel important and useful	-0.75			
It could be the chance of a lifetime	-0.68			
It could be a fulfilling experience	-0.60			
Driver 4: Social values		1.33–2.74	46–67	0.50–0.76
My family and friends partake in volunteering	-0.61			
It is part of my society's traditions and/or culture	-0.66			
It is an opportunity to make new friends with similar interests	-0.73			
I want to feel part of a volunteer community	-0.76			
I want to experience the local traditions and cultures	-0.72			
It could be an opportunity to have unique interactions with people	-0.55			

^aBased on scale of importance: 1 = not at all important, 2 = not important, 3 = neutral, 4 = important, and 5 = very important

number in Group 2 who included previous volunteers), who are known to be particularly attracted to marine volunteering (Lucrezi et al. 2022a, 2022b; Roques et al. 2018; Shum et al. 2021). The average age of the participants, mid-thirties, does not match the description of marine volunteers as millennials according to some studies (Leask et al. 2014; Malone et al. 2014; Roques et al. 2018). Instead, it corresponds to the findings of other studies on the demographic profile of marine volunteers (including citizen scientists and tourists) (Lucrezi et al. 2022b; Son and Wilson 2011) and potential marine volunteers (Lucrezi et al. 2018; Martin et al. 2016). For example, Lucrezi et al. (2022b) identified a “satisfied elders” cluster, characterised by older people who may show an interest in marine volunteering later in

life compared with the younger generations. The survey showed a good representation of participants from various areas around the world, including both the global north and south. This result shows that while interest in marine volunteering remains strong in high-income countries where a large proportion of marine voluntourists is known to come from (Lucrezi et al. 2022b; Roques et al. 2018), marine volunteering is attractive to people from various geographical areas around the world. The highest level of education of the participants in the survey confirms that marine volunteering tends to draw mainly people with tertiary education, followed by undergraduate students (Lucrezi et al. 2018, 2022b; Martin et al. 2016; Shum et al. 2021). Additionally, a proportion of the participants had a background in

Table 3 Result of CEFA on barriers to marine volunteering ($N=473$)

What makes it difficult for me to participate in marine volunteering includes:	Factor loading	Eigenvalue	Variance explained (%)	Cronbach alpha (α)
Barrier 1: No time		2.49–2.70	50–54	0.74–0.78
I do not have the time to volunteer	-0.80			
Marine volunteering does not fit into my schedule	-0.73			
I am too busy with other activities	-0.72			
I have family responsibilities to attend to	-0.54			
I have work commitments	-0.70			
Barrier 2: No money		1.76–1.86	88–93	0.87–0.93
The financial costs to partake in marine volunteering are too high	0.96			
The additional financial costs (accommodation, flights, food etc.) are too high	0.96			
Barrier 3: No skills		NA	NA	NA
I feel that I do not have the skills to volunteer with marine life and habitats		NA	NA	NA
Barrier 4: No access		NA	NA	NA
I feel that marine volunteering is not accessible to me (e.g. too far away)		NA	NA	NA

^aBased on scale of importance: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree

Table 4 Result of CEFA on enablers in marine volunteering ($N=473$)

What would help me to participate in marine volunteering includes:	Factor loading	Eigenvalue	Variance explained (%)	Cronbach alpha (α)
No enabling required		NA	NA	NA
I am already convinced to participate in marine volunteering in future		NA	NA	NA
Enabler 1: More time		NA	NA	NA
Having more time available		NA	NA	NA
Enabler 2: More money		NA	NA	NA
Earning a higher income		NA	NA	NA
Enabler 3: Information/education		2.44–2.86	49–57	0.73–0.81
Someone to come and talk about marine volunteering	-0.64			
More information on the nature and purpose of marine volunteering	-0.82			
Better media coverage of marine volunteering	-0.84			
A nice website for marine volunteering projects	-0.78			
Education on issues I can assist with through marine volunteering	-0.68			
Enabler 4: Incentives		1.54–1.60	51–53	0.50–0.55
Logistic help (e.g. assistance with transport)	0.83			
A training course	0.79			
If it is something that is offered and is incentivised in my workplace	0.53			
Enabler 5: Better access		NA	NA	NA
Better access (e.g. being invited, more projects available)		NA	NA	NA

^aBased on scale of importance: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree

environmental and biological science, in line with research showing that people with such a background find value in participating in marine volunteering (Coghlan 2006; Lucrezi et al. 2022b; Silvertown et al. 2013).

The results of this study show that people with a vested interest in marine-based activities including tourism and recreation, marine conservation and research would be driven to

participate in marine volunteering mainly by ecocentric reasons, followed by self-development, personal well-being and social values. These findings coincide with what the literature has described as the main drivers in marine volunteering, both among active and potential marine volunteers. Marine volunteering is seemingly powered above all by a behavioural intention to contribute to environmental protection,

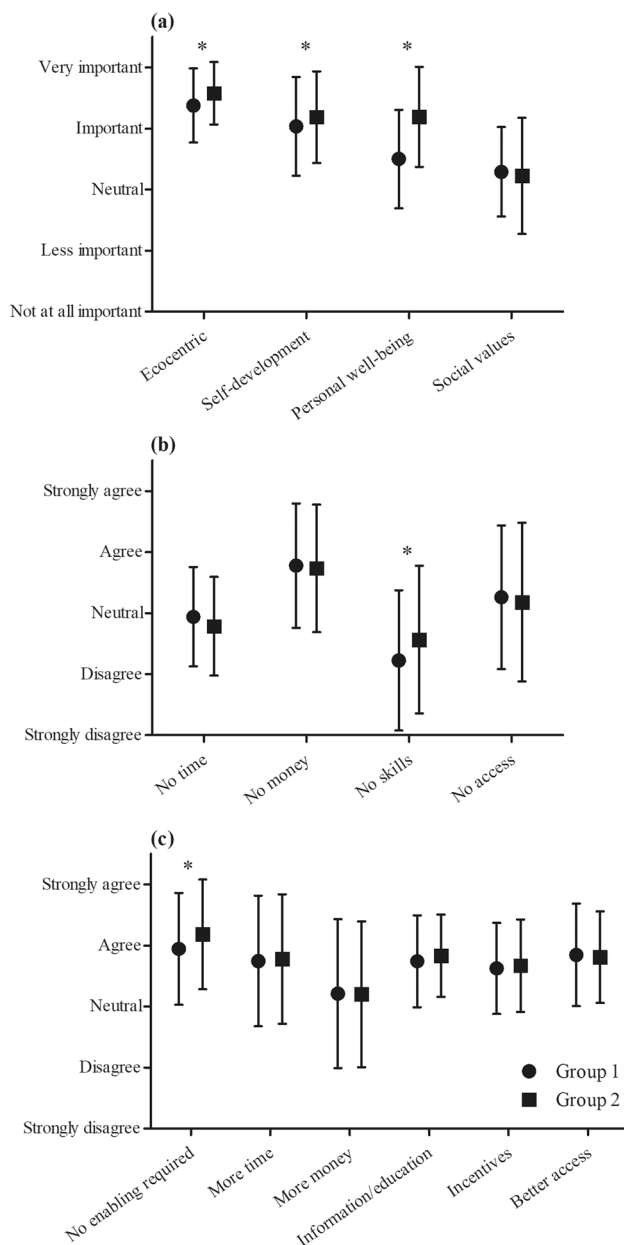


Fig. 1 Average scores of drivers, barriers and enablers in marine volunteering according to participants without (Group 1) and with (Group 2) previous volunteering experience ($N=473$)

accompanied by a desire to learn, develop new skills and grow, with social factors having less importance (Carballo-Cárdenas and Tobi 2016; Lucrezi et al. 2018, 2022b; Martin et al. 2016). In this study, the most important drivers in marine volunteering were given greater scores by Group 2 compared with Group 1. This indicates that people with prior exposure to volunteering may feel more driven to partake in marine volunteering, possibly as a result of their previous experience giving them an understanding of the intrinsic and extrinsic benefits of volunteering (He et al. 2019).

Barriers to marine volunteering reflected descriptions in the literature (Carballo-Cárdenas and Tobi 2016; Hermoso et al. 2021; Lucrezi et al. 2018; Martin et al. 2016). Money was the most important barrier, followed by access, time and skills. However, time and skills received neutral scores on average, suggesting that they were perceived as minimal barriers. Participation in marine volunteering may require no to varying degrees of spending, depending on the nature of the volunteering activity. For example, marine citizen scientists may be asked to use their financial resources to access volunteering sites and rent equipment (e.g. for scuba diving) (Lucrezi et al. 2018), while marine voluntourists would have to purchase their marine volunteering experience, which can be or perceived to be more expensive than a regular nature-based tourism experience (Gray et al. 2017; Lucrezi et al. 2022a). Concerning access, the literature describes how, despite most marine volunteering projects occurring in easily accessible coastal habitats, potential participants still perceive logistical difficulties in reaching locations where marine volunteering takes place (Cigliano et al. 2015; Kelly et al. 2020). Additionally, Shum et al. (2021) argued that environmental stewardship activities including marine volunteering are likely to be more favourable to people with easier access to such activities, especially when involving local issues and communities. This creates a participation gap for individuals who wish to partake in marine volunteering but have limited access to opportunities.

Time and skills are normally mentioned as barriers to marine volunteering (Carballo-Cárdenas and Tobi 2016; Lucrezi et al. 2018, 2022a; Martin et al. 2016; Pateman et al. 2021). However, the fact that in this study they were considered minimal is encouraging, suggesting that potential marine volunteers would make time to participate, and would trust their skills (e.g. scuba diving) or the idea of receiving some form of training before participation (Martin et al. 2016). In this study, members of Group 1 were more confident that they would have the skills to participate compared with members of Group 2. Following exposure to volunteering, people may feel that future participation will be more labour-intensive than anticipated or require an entirely different set of skills, whereas people with no prior volunteering experience may be confident due to a lack of understanding of the skills required in marine volunteering.

The participants in this study declared, on average, to be already convinced to partake in marine volunteering and not to require enablers. This result has been encountered in other research on potential participation in marine volunteering which targeted marine recreational groups including scuba divers (Lucrezi et al. 2018). Group 2 was more convinced than Group 1, suggesting that prior volunteering experience has a positive impact on willingness to partake in future volunteering, including new experiences

such as marine volunteering (Lucrezi et al. 2022a; Shum et al. 2021). The results of this study also provided valuable indications regarding enablers in marine volunteering, of which the most important were more time, information and education, and better access, in line with previous research findings (Carballo-Cárdenas and Tobi 2016; Hermoso et al. 2021; Lucrezi et al. 2018). While the results of this study show that the participants would be willing to make time for marine volunteering, information and education represent an opportunity to shed light on all the characteristics of marine volunteering, including time-related considerations (Carballo-Cárdenas and Tobi 2016; Lucrezi et al. 2022b; Martin et al. 2016). Better access can encompass outreach campaigns including more personal contact with potential participants, as well as a variety of marine volunteering projects to choose from (Carballo-Cárdenas and Tobi 2016; Lucrezi et al. 2018). Incentives were relatively important as enablers. While potential participants may not be looking for tangible rewards, they may consider training opportunities, logistical help, and support (e.g. from their workplace) as incentives to participate in marine volunteering (Carballo-Cárdenas and Tobi 2016; Lucrezi et al. 2018; Thiel et al. 2014). Although money was perceived as a barrier to marine volunteering, it was the least important enabler in marine volunteering. This contradictory finding may be explained by the importance of other enablers which could help overcome the financial issue according to the participants' opinions. For example, facilitating access to marine volunteering locations or incentives in the workplace could reduce the costs of marine volunteering. Finally, in this study, Group 1 and Group 2 did not differ in their perspectives of enablers in marine volunteering. This suggests that, regardless of previous volunteering experience, potential participants in marine volunteering would continue to seek a set of critical enablers to motivate them to participate in future volunteering, especially in new areas.

Finally, the results of this study confirm the correlation between specific demographic variables and perspectives in marine volunteering, irrespective of previous participation in volunteering. For example, females being more driven by ecocentric reasons to partake in marine volunteering is a recurrent theme in marine volunteering research (Roques et al. 2018). Correlations related to age and education confirmed that while young people with a background in environmental and biological science tend to be drawn to marine volunteering for self-development and personal growth, they are more likely to face time, money and access challenges to marine volunteering (Lucrezi et al. 2022b).

Recommendations for marine volunteering

The results of this study provide information that can be used for the design of effective strategies to recruit marine volunteers. The study targeted people with a vested interest in marine-based activities including tourism and recreation as well as marine conservation and research. Virtually all the participants in this study were interested in marine volunteering and generally convinced that they would participate in marine volunteering in the future. Therefore, it may be assumed that the recruitment of people from the group targeted in this study would not be particularly difficult (Green and Wood 2015). Nevertheless, the study also highlights several elements, including drivers, barriers, enablers and demographic variables, that make the recruitment of marine volunteers complex and important to properly plan and execute.

The results indicate that marine volunteering can be attractive to different demographic profiles, for example, young people wanting to acquire skills – possibly as a path towards career development – and older people showing an interest in marine volunteering later in life, regardless of whether this is for skills development. This diversity calls for ways for marine volunteering to facilitate the engagement of various groups who may be drawn to the activity for different reasons while facing different barriers to participation. One of the advantages of marine volunteering is that it is characterised by an array of different programmes and activities, requiring varying degrees of time and resources (Kelly et al. 2020; Lucrezi et al. 2022a; Thiel et al. 2014). The key would be to ensure that outreach campaigns indicate the characteristics of marine volunteering projects, to assist potential participants in making informed decisions on whether a project would suit their needs, means and expectations. Additionally, marine volunteering organisations and programmes may be aware of the segments they tend to attract (Cerrano et al. 2017; Lucrezi et al. 2022a, 2022b). This information enables them to design ad hoc marketing and recruitment strategies for these segments, based on their characteristics. While it may be easier to recruit older demographic groups with an interest in marine volunteering and the resources to participate, the recruitment of younger groups studying or with a tertiary background in environmental and biological science may require some further thinking and planning. Partnerships between academic institutions and marine volunteering organisations can help to promote and incentivise marine volunteering among young environmental and biological scientists looking for development and experiential learning opportunities (Lucrezi et al. 2022a). These partnerships can create mutual benefits for academic institutions conducting research and in need of data, and marine

volunteering organisations working with conservation and environmental management authorities or offering tourism packages. This is particularly important considering how there has been much discussion around the challenges of volunteering for younger scientists, and the issues of unpaid work being almost an expected part of career/professional development across the sciences (Gewin 2022; Osiecka et al. 2021). It would be beneficial to ensure issues around equitable and inclusive access to marine volunteering are brought to the attention of both academic institutions and marine volunteering organisations.

Females continue to represent the largest proportion of people interested in marine volunteering. Reasons for this could include females being more likely to travel for non-work related activities or to join organised voluntourism programmes while males may prefer to travel independently and plan their activities (Roques et al. 2018). This gap creates an opportunity to specifically target the male population in marine volunteering propositions. For example, males may be more inclined to partake in projects involving scuba diving, as the sport is currently dominated by males and often requires technical skills and the use of advanced equipment, which are favoured by the male diving population (Cerrano et al. 2017; Lucrezi et al. 2018). The interest in marine volunteering displayed by people from both the global north and south call for special attention to ensuring that marine volunteering opportunities are equally made available to different economic groups. Considering that the UN Ocean Decade and SDGs have a distinct objective to expand public engagement in ocean conservation and science across geographical boundaries globally, it is important to effectively use marine volunteering as a tool to achieve this objective by enabling geographic, socio-economic, and other types of inclusivity. It would be advisable that marine volunteering programmes abide by current initiatives to promote inclusivity, such as the European Citizen Science Association's working group Empowerment, Inclusiveness and Equity, which establishes collaborations with approaches like community-based research to engage people from different backgrounds in citizen science and other activities that can yield positive outcomes for them (Paleco et al. 2021; Bonney et al. 2016) also discussed the importance of Community Science Projects as a way to engage people in volunteering in their environments and around values and interests that concern them, making participation more accessible. Finally, scholars have advocated for the endorsement of marine volunteering that is not simply based on the commodification of nature or altruistic intent (Smith and Font 2014). This would require that marine volunteering programmes, especially those that are business-centred (voluntourism), are designed and explained in a manner that justifies all relevant expenses and minimises unnecessary costs when possible.

The results of this study confirm that people with a vested interest in marine-based activities including tourism and recreation, marine conservation and research are mainly attracted to marine volunteering by a desire to protect marine environments and species, followed by self-development and personal well-being reasons. These factors can be considered in the characterisation, promotion and implementation of marine volunteering activities. Marine volunteering programmes should pay attention to the ecocentric value placed on the activities by prospective participants, and emphasise the nature, purpose and potential outcomes of these activities during outreach and recruitment campaigns (Lucrezi et al. 2022b). The opportunities offered by marine volunteering in terms of skills development and science exposure should be highlighted to attract people who prioritise these elements (Roques et al. 2018; Silvertown et al. 2013). Finally, other benefits of marine volunteering, like physical and mental well-being, socialisation opportunities, and community engagement should be advertised (Koss and Kingsley 2010).

The results of this study concerning barriers to and enablers in marine volunteering provide some insight into ways that participation can be facilitated. For example, the perceived barriers of money, time and access may result from limited knowledge of existing local projects, simply calling for better promotion and advertising. When projects require investments in terms of money, time and resources, recruitment could be endorsed by reaching out to "communities" of like-minded people (e.g. scuba diving clubs and schools, dive centres, and student groups) who can share in these investments, thus minimising barriers to participation. This may be particularly relevant in the case of marine citizen science projects, where people may be required to commit to certain activities regularly over a stretched period, as opposed to marine voluntourism, where activities are organised in a single trip. In the case of marine voluntourism, ways to incentivise participation could include partnerships not only with academic institutions but also with corporate companies (e.g. promoting marine volunteering as a form of team building) (Patrick et al. 2022). The benefits of participation in marine volunteering may ultimately be perceived to outweigh the costs, thus marine volunteering projects need to be clear about their outcomes and the incentives that are offered (e.g. training, education), to ensure that potential participants can make informed decisions on whether an investment will be worthwhile through positive intrinsic and extrinsic gains.

The results of this study concerning the comparison between previous volunteers and non-volunteers suggest that marine volunteering recruitment strategies can be similar for both groups, given the perspectives they share on drivers, barriers and enablers. However, the study also shows that prior volunteering has positive effects on drivers and behavioural intention to participate in marine volunteering (He et al.

2019). This effect highlights the importance of exposing people to any type of volunteering that could result in positive attitudes towards future participation, including marine volunteering. Exposure could be promoted via several strategies. Volunteer work could be introduced as an extra-credit activity in schools but could also be promoted in recreational and working contexts by non-governmental organisations. Collaborations between volunteering programmes dealing with different issues (e.g. terrestrial wildlife rehabilitation, marine wildlife monitoring) under a broad theme (e.g. conservation) are encouraged as a way to stimulate participation in different programmes while retaining competitiveness and displaying cooperation that can provide volunteers with a bigger picture of environmental issues requiring attention from different perspectives. These types of collaborations can also create a more uniform image of volunteering, as opposed to a fragmented one (deriving from a large number of volunteering projects available) which could deter potential participants.

Conclusion

This study presented the findings of an international online survey evaluating drivers, barriers and enablers in marine volunteering among people with a vested interest in marine-based activities including tourism and recreation as well as marine conservation and research. The results showed that potential marine volunteers were mainly driven by ecocentric motives, followed by self-development, personal well-being and social values. The main barriers included money and access, while time and skills seemed less important. While the participants were on average convinced they would partake in marine volunteering in the future, potential enablers encompassed information and education, time, better access and to a lesser extent, incentives and money. Compared with people without prior volunteering experience, people who had been exposed to volunteering were more driven and convinced to participate in marine volunteering, although they felt more hindered by a perceived lack of skills. The findings of this study can assist with designing recruitment strategies in marine volunteering, thus potentially contributing to the agenda to support public engagement in ocean and marine conservation and research in line with the objectives of the UN Ocean Decade and SDGs (in particular, SDG14). Marine volunteering programmes are encouraged to strive for inclusivity while retaining their core structure and consider cooperation with other volunteering programmes as well as key stakeholders including academic institutions, schools, corporate companies and tourism and recreation businesses. These actions can help to promote marine volunteering and increase the effectiveness of public engagement in marine conservation and research.

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Data Availability The data that support the findings of this study are available from the corresponding author, SL, upon reasonable request.

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