Educational briefings in touristic facilities promote tourist sustainable behavior and customer loyalty

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Abstract

Ecotourism gives tourists the opportunity to improve knowledge and awareness of environmental issues while on vacation. Recreational environmental education has been proven an effective method to raise perception of human impact on ecosystems. "Glocal Education" is an education project aimed at developing environmental interest in tourists on vacation. The present study assessed the effectiveness of Glocal Education in improving tourist environmental interest. Using specific questionnaires, we evaluated project impact on tourists, tourist satisfaction regarding the project and customer loyalty towards the tour operator hosting the project. The study took place at three mass touristic resort facilities, where tourists were asked to fill a questionnaire before and after participating in educational activities (e.g., biology lessons, excursions). The average score of both questionnaires was then compared to evaluate possible improvement of tourist knowledge, awareness and attitude. Results showed that such activities had a significantly positive impact on tourist knowledge, awareness and attitude at all localities. High levels of satisfaction and loyalty towards the host tour operator were observed at all sites, which indicate that once a person is briefed about the correct approach to natural systems, they can become increasingly interested in taking action, developing an "advocate" role. This study shows how informal education activities can act as trigger for environmental awareness and behavior among tourists, providing them with the tools, knowledge, and motivation to critically discern what is and isn't environmentally friendly, not only in terms of products and services in their everyday life, but also when choosing their vacation spots.

Keywords: Recreational activity; ecotourism; environmental education; environmental awareness; sustainable attitude.

1. Introduction

Tourism is currently the world's third largest export category. Since the global economy crisis in 2009, the tourism market has been continuously growing (UNWTO Tourism Highlights 2017). Furthermore, 2018 saw the highest growth in worldwide international trips since 2010, with a total of 1.3 billion tourists, 7% more than in 2017 (UNWTO Tourism Highlights 2018). For over 60 years, the tourism industry has been an ever-growing worldwide activity, and while it contributes to society with revenue for the global workforce, it can also impact natural resources and ecosystem services (Holden 2016), from land and water use to biodiversity loss (Tolvanen and Kangas 2016) and greenhouse gas emissions (Gössling and Peeters 2015). It is of interest for the tourism industry to find sustainable ways to use natural systems (European Union Business and Biodiversity Platform 2010) given the fragile balance that natural destinations survive on. Tourism destinations are often based on benefits from the natural landscape; consequently, environment degradation would bring negative consequences to the tourism sector (Lenzen et al. 2018).

Ecotourism is meant to be a sustainable form of nature-based tourism, preserving biological diversity, maintaining sustainable use of resources, promoting environmental appreciation to travelers and bringing economic benefits for the industry. Ecotourism can also promote the well-being of local communities, promoting local participation and learning experiences (Kiper 2013). Furthermore, when paired with first-hand experience and environmental education to contextualize the importance of given ecosystem or wildlife species (wildlife tourism), ecotourism encourages the tourist to take action in promoting ecosystem conservation, going as far as to educate other people on the importance of the subject (Tisdell and Wilson 2001; Ballantyne and Packer 2011). Such behaviors are likely to create empathy and enhanced understanding of the delicate balance that nature thrives upon, hence generating social and economic benefits (Tisdell and Wilson 2001; Buultjens, Ratnayke, and Gnanapala 2016; Ziegler et al. 2018) and thus ensuring that businesses keep profiting and the environment is preserved in the long run (Branchini, Meschini, et al. 2015; Meschini et al. 2021). However, learning experiences that happen in an informal and carefree setting tend to educate people more than in formal settings, such as in the school environment (Bueddefeld and Van Winkle 2018), and can also translate to more adequate behavior, reinforcing conservation efforts made by the population surrounding natural areas (Padua 1994; de la Torre and Yépez 2003). It is argued that "free-choice" environmental learning experiences, where individuals are in control of their own learning, might promote environmentally sustainable attitudes and behavior, such as increase in empathy, motivation or change in perceptions, lifestyle changes, talking to others about environmental issues, joining volunteer programs, or donating to environmental organizations (Ballantyne and Packer 2005; 2011).

To promote sustainable behavior through informal education activities, the Glocal Education project was created. Glocal Education is an environmental education project aimed to influence the degree of tourists' environmental knowledge, attitude and awareness through recreational activities during their vacation. Project main goals are: 1) creating a training program aimed at increasing environmental education in tourists; 2) studying the effects of the training program on tourist environmental knowledge, attitude and awareness towards the environment in the short and long term; 3) evaluating tourist appreciation for the educational program and whether this affects the level of customer loyalty towards the brand hosting the research project, (i.e., tourist willingness to travel to other destinations, and even pay extra, based on the preference for the tour operator promoting the environmental education project). In the present study, three touristic facilities were employed to perform the first stage evaluation (short-term) of the Glocal Education project, assessing: 1) the difference in environmental knowledge, attitude, awareness, and customer loyalty before and after participation in project activities; 2) the influence of demographic factors (sex, age, education and nature contact) not only on the initial level of environmental knowledge, attitude and awareness, but also on their short-term improvement; 3) the degree of tourist satisfaction regarding participation in the project.

2. Method

2.1 The Glocal Education project

Project activities were carried out at three mass touristic facilities managed by Francorosso, a tour operator specialized in package holidays under the Italian Alpitour S.p.A group, operating worldwide. The facilities were in the localities Nosy Be (Madagascar), Dhiggiri and Maayafushi (The Maldives). Upon their arrival, tourists were asked by the Glocal Education biologist to take part in the project. The Glocal Education biologists were BSc or MSc students in biological or natural sciences, selected based on their interest and experience in environmental education, and previously trained based on the activities to be performed at the touristic facilities and the content covered by the questionnaires.

In case tourists were interested in participating in the Glocal Education Project,, the first questionnaire, here referred to as questionnaire T_0, was provided before the first scheduled environment-related activity with the biologist onsite, to assess the environmental background of each tourist. After completion of the T_0 questionnaire (Fig. 1, a), tourists were invited to take part in any of the proposed activities, as follows:

- A one-hour introductory lesson focused on island geology, coral reef formation and coral biology (Fig. 1, b and c);
- An "around-the-island" interactive walk, with explanations on local fauna and flora (Fig. 1, d and e);
- A further one-hour biology lesson focused on the identification and general biology of local organisms (marine invertebrates, fish, marine reptiles and mammals in the Maldives, and both terrestrial and tropical plant species in Madagascar) (Fig. 1, f and g);
- Participation in field excursions accompanied by the Glocal Education biologist and local guides. Specifically, snorkeling excursions were organized at the Maldives facilities, and excursions through the primary forest at the facility in Madagascar (Fig. 1, h-k).

All project activities were carried out at least once a week. The tourists could decide freely to attend all or some of the activities. Participation in at least one Glocal Education activity was mandatory to consider the tourist eligible for the Glocal Education project data collection. After conclusion of the last proposed activity, eligible tourists were asked to fill the second questionnaire, here referred to as questionnaire T_1 (Fig. 1, l).

2.2 Questionnaire evaluation

The questionnaires were developed by the University's Department of Psychology. Questionnaire T_0 consisted of two parts. Part 1 contained tourist personal data (Fig. A1 in Appendix A), as reported in Table 1.

Part 2 contained a series of items, to be answered by the participating tourist, which correspond to the 4 variables knowledge, attitude, awareness, and customer loyalty (Table 2, Fig. A2-A6 in Appendix A). Questionnaire T_1 was also divided in 2 parts. Part 1 asked how many project activities were attended by the tourist during their stay at the touristic facility and part 2 was equal to questionnaire T_0, with the addition of a 5th variable: tourist satisfaction, which accounts for appreciation of the Glocal Education project (Table 2, Fig. A7 in Appendix A). Tourists could indicate a single possible answer for each item.

The knowledge variable score was calculated by giving the value 0 if the answer was wrong, +2 if it was correct and +1 if it was "I don't know", with a total maximum score of the variable being 20. For the remaining variables (attitude, awareness, tourist satisfaction and customer loyalty), each item could be answered according to a Likert scale (Joshi et al. 2015), ranging from 1 to 5: 1: Strongly disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly agree. Negatively worded items (reverse items) were reverse scored to make the answer consistent with the other items within the same variable.

After all the questionnaires were recorded into a Microsoft Access database, answers were divided according to each variable (knowledge, attitude, awareness, here called sustainability variables) from which,

for each tourist, we calculated a sum score for the knowledge variable, and a mean score for the attitude and awareness variables at T_0 and T_1. We then rescaled all sustainability variable scores to a scale of 10.

The set of items pertaining to the tourist satisfaction variable comprised different topics to be evaluated by the tourist, such as appreciation of the project, identification to project goals and willingness to hire the tour operator again in the future. Since the grouping of such items might have resulted in a biased variable analysis, each of the items was analyzed individually. As for the customer loyalty variable, each item regarded different levels of customer loyalty as it relates to the project: 1. Loyalty to the tour operator hosting the project; 2. Loyalty to the presence of a biologist on site; 3. Loyalty to nature-based activities at the touristic facility. Furthermore, each item inquired how much the tourist was willing to spend besides the standard holiday package prices in order to enjoy such accommodations/activities, and so all the items were also analyzed individually.

2.3 Statistical analysis

2.3.1 Reliability analysis

In order to measure the reliability of tourists' answers in terms of internal consistency within the attitude and awareness variables, (i.e., how tourists' answers within a variable are correlated), a Cronbach's alpha (α) correlation (Peterson 1994) was conducted using IBM SPSS Statistics version 22. In fact, in case of evidence of relationship, a mean score value could be used as representative for the whole variable, instead of the scores for each separate item of that variable.

2.3.2 Sustainability variable analysis

The distribution of variable scores did not meet the assumptions of normality (Kolmogorov-Smirnov test) and equal variance (Levene's test) and differences among factors were thus analyzed using a permutational multivariate analysis of variance (PERMANOVA), which does not require homogeneity of variance or normal distributions (Anderson, Gorley, and Clarke 2008). We used the R software (R Development Core Team 2019) to run a preliminary PERMANOVA test, so as to assess if the sustainability variable scores (knowledge, attitude and awareness) presented significant differences among the three localities, in which case, they would be analyzed separately.

We performed a PERMANOVA test to compare the scores of sustainability variables (knowledge, attitude and awareness) among factor levels. The design considered the factor time (to compare the variable scores at T_0 with those at T_1) and four demographical factors nested in the factor time. This design assessed possible differences before- vs after-project activities and checked whether demographical factors influenced the sustainability variables scores. Tests were run using Euclidean distance matrixes among samples and 999 permutations in the software Primer v6 – Quest Research Limited (Anderson, Gorley, and Clarke 2008).

For this study, tourists data was not collected anonymously (name and surname were requested) to guarantee the comparison between the initial environmental education assessment and that after participation in project activities. We have treated the data confidentially, exclusively for institutional purposes (art. 4 of Italian legislation D.R. 271/2009 - single text on privacy and the use of IT systems) and according to art. 12, 13 and 14 of EU Regulation 2016/679 - General Data Protection Regulation (GDPR). Data treatment and reporting took place in aggregate form.

3. Results

From August 2016 to April 2019, 1 851 tourists participated in the project and successfully completed both questionnaires (T_0 and T_1), of which 55% were women and 45% were men; the most frequent age group was over 46-year-olds, followed by 31 to 45-year-olds and under 30-year-olds; 60% of participants had completed middle or high school, followed by college graduates; 62% were non-naturalists, while 38% were naturalists (Table 1).

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3.1 Reliability analysis

Cronbach's alpha values for both the attitude and awareness variables exceeded a threshold of 0.6 (Table B1 in Appendix B), which is considered acceptable as evidence of a relationship (Branchini, Pensa, et al. 2015; Goffredo et al. 2010). Accordingly, all items' scores of both variables were substituted by mean score values for both variables and for each tourist at T_0 and T_1.

3.2 Analysis among localities

PERMANOVA results showed a significant difference in attitude (Pseudo-F=4.482, P(perm)=0.001) and awareness (Pseudo-F=27.227, P=0.001) scores among localities, but no significant differences for knowledge scores (Pseudo-F=1.228, P=0.303). We then decided, in order to keep a consistency to the statistical analysis, to analyze all three sustainability variables in each locality separately.

3.3 Sustainability variable analysis

3.3.1 Knowledge

The analysis of PERMANOVA showed a significant increase in tourist knowledge scores from T_0 to T_1 (P=0.001, Fig. 2, Table 3, Table C1 in Appendix C) at all localities. At Nosy Be, the factor education showed significant differences (P=0.03, Table 3) at T_0 (Table C2 in Appendix C). At Dhiggiri, significant interactions were found between the factors sex and education (P=0.038, Table 3), the factor nature contact showed significant differences (P= 0.042, Table 3) at T_0 (Table C3 in Appendix C) and the factor age showed significant differences (P= 0.003, Table 3) at T_0 and T_1 (Table C3 in Appendix C). At Maayafushi, significant interactions were found between the factors sex and education (P= 0.025, Table 3) and the factor nature contact showed significant differences (P= 0.008, Table 1) at T_0 and T_1 (Table C5 in Appendix C). For details on these results, see Appendix C.

3.3.2 Attitude

The analysis of PERMANOVA showed a significant increase in tourists' attitude scores from T_0 to T_1 (P=0.001, Fig. 2, Table 4, Table D1 in Appendix D) at all localities. At Nosy Be, significant interactions were found between the factors sex and nature contact (P= 0.019, Table 4) at T_0 and T_1 (Table D2 in Appendix D), and the factor age showed significant differences (P= 0.003, Table 4) at T_0 and at T_1 (Table D2 in Appendix D). At Dhiggiri, significant interactions were found among the factors sex, age and nature contact (P= 0.002, Table 4) at T_0 (Table D4 in Appendix D). At Maayafushi, significant interactions were found among the factors age, education and nature contact (P= 0.041, Table 4) at T_0 and T_1 (Table D6 in Appendix D), and the factor sex showed significant differences (P= 0.001, Table 4) at T_0 and T_1 (Table D6 in Appendix D). For details on these results, see Appendix D.

3.3.3. Awareness

The analysis of PERMANOVA showed a significant increase in tourist awareness scores from T_0 to T_1 (P=0.001, Fig. 2, Table 5, Table E1 in Appendix E) at all localities. At Nosy Be, significant interactions were found between the factors age and education (P= 0.031, Table 5) at T_0 and T_1 and the factor nature contact showed significant differences (P= 0.011, Table 5) at T_0 and T_1 (Table E2 in Appendix E). At Dhiggiri, the factors age and sex showed significant differences (P= 0.001, Table 5) at T_0 and T_1 (Table E4 in Appendix E). At Maayafushi, significant interactions were found between the factors sex and education (P= 0.039, Table 5) at T_0 and at T_1 (Table E5 in Appendix E), and the factor age showed significant differences (P= 0.001, Table 5) at T_0 and T_1 (Table E5 in Appendix E). For details on these results see Appendix E.

3.3.4 Tourist satisfaction

Across all locations, 92-96% of tourists answered positively ("Agree" or "Strongly agree") to the project meeting their expectations (Appendix F); 94-95% felt their ideas were respected by the Glocal Education project group; 87-88% felt satisfied with having participated in the project's initiative; 64-74% would check for the presence of an environmental education project on their next vacation; 36-46% identified personally with the project; 74-79% considered themselves supporters of the Glocal Education project; 36-38% would choose to go on vacation again with the tour operator that promoted the project in the next year; 61-64% would choose to go on vacation again with the tour operator that promoted the project in the next 3 years; 87-92% were happy to participate in the Glocal Education project; 43% felt that when someone speaks ill of the project, it is as if they did it to them; and 86-91% shared the ideas behind the project.

3.3.5 Customer loyalty

Across all locations, at T_0, 41-67% of the tourists declared to be willing to pay up to 10% more than the standard price to stay in a facility owned by the tour operator promoting the project with a biologist on site who organizes activities in contact with nature (item 1; Table 6, Appendix G); 42-62% would not pay up to 5% more than the standard price to stay in a facility owned by the tour operator promoting the project, but without a biologist (item 2); 35-51% would pay up to 5% more than the standard extra price to stay in a structure of an unknown tour operator, but with the presence of a biologist on site (item 3); 31-58% would pay up to 3% more than the standard price to stay in a structure of an unknown tour operator that proposes an organized activity in contact with nature but does not have a biologist (item 4) and 40-70% would not pay the standard price for any tour operator, without biologist and without activities in contact with nature (item 5). At T_1, the answers changed to 48-71% on item 1; 60-68% on item 2; 42-52% on item 3; 48-54% on item 4 and 67-71% on item 5. Furthermore, from T_0 to T_1, the number of tourists that failed to answer any one of the items in the questionnaire changed from 1.4-36.2% to 2.1-3.6% on item 1, 3.3-38% to 3-5.2% on item 2, 2.2-36.8% to 2.3-4.8% on item 3, 2.7-38.5% to 3.2-5.7% on item 4, 3.3-38.9% to 3.2-5.9% on item 5.

4. Discussion

How people behave regarding a sustainable approach towards the environment hinges on the values underlying people's perspectives on nature and the goals of its sustainable development. In everyday usage, 'values' are portrayed through interests, pleasures or desires. These subjective dimensions are amongst others mutually formed by knowledge, attitudes, awareness associated with individuals and social and cultural groups (O'Brien and Wolf 2010). In this regard, results of this study demonstrate that participating in an environmental education project increased all three sustainability variables analyzed: knowledge of biology and ecology concepts (knowledge), willingness to engage in environmentally friendly attitude (attitude) and awareness of tourism impact on natural ecosystems (awareness). This shows that informal environmental education activities can play an important role in promoting sustainable behavioral intentions on tourists on vacation, which is an important step to create interest and sensitivity towards the environment. The analyses conducted using the demographic factors showed that, overall, females presented higher scores than males on all three sustainability variables (knowledge, attitude and awareness), with the exception of Dhiggiri at T_1 (after project activities), where male college graduates were found to have a higher knowledge score than females. This corroborates previous findings obtained on students in schools, where girls outperform boys, exhibiting higher knowledge, more positive attitude and more environmentally aware behavior in school (Olsson and Gericke 2017). In general, the higher age classes presented higher scores on all three sustainability variables. This is in agreement with previous findings showing that elderly people tend to be more ecologically engaged compared to younger generations as a result of their firsthand experiences of environmental disasters (e.g., Chernobyl, the Exxon Valdez oil spills)(Otto and Kaiser 2014). At all localities, college graduates showed higher scores than high school graduates on all three sustainability variables, except for Maayafushi, where adult high school graduate naturalists showed a

higher attitude score than adult college graduate naturalists both before and after project activities. Several studies report the development of programs regarding sustainability issues and environmental learning for higher education institutions (Felgendreher and Löfgren 2018; Harpe and Thomas 2009; Shephard 2010), which could help explain our findings. The aforementioned exception could be due to nature contact, rather than education level, which in turn relates to the overall result that naturalists show a higher score on the three sustainability variables (knowledge, attitude, awareness), in comparison to non-naturalists, at all three localities. Differences among factor significances among localities could be due to the fact that each touristic facility targets different demographics. Nosy Be offers exotic scenarios with close contact with local flora and also targeted packages for teens, families and friends on vacation. Dhiggiri offers relax for adults, as children under 12 are not allowed, with close contact with the local marine ecosystem and targeted packages for couples on honeymoon. Maayafushi encompasses both scenarios, with the proximity of the sea and entertainment that targets from children to elders, with targeted packages for kids and couples on honeymoon. These differences could explain the fact that tourists who choose to visit any of the facilities might have different inclinations and interests towards nature, attempting to actively explore the natural landscape or just enjoying the calm and relaxation such a secluded facility can provide. Overall, tourists showed a high level of satisfaction with project activities and customer loyalty answers reveal willingness to pay extra in order to enjoy touristic facilities with the presence of a biologist and environmental education activities. Moreover, the decrease in the percentage of tourists who chose not to answer the customer loyalty questions in the questionnaire T_0 as opposed to T_1 indicate that even though they were not willing to dispose of extra income in order to participate in environment-related activities before the project, they were much more inclined to do so once they became a part of Glocal Education. This positive response of the customer could lead to positive sustainability outcomes (Sheth, Sethia, and Srinivas 2011) as the tourist who identifies with the Glocal Education project tends to look for environmentally-related activities when going on vacation, generating a trend for tour operators which could result in bigger profits for the tourism industry. Furthermore, the promotion of environmental education projects in touristic destinations could lead to an initial shift towards the sustainable use of resources, involving thousands of people and increasing environmental awareness, so as to popularize the importance of conservation actions.

4.1 Implications for conservation

Our results corroborate the finding that when informal education activities are proposed in a stress-free environment, participants are more likely to take interest and even retain more information about concrete measures that can be taken in order to alleviate some of the pressure our daily activities put on natural ecosystems (Ballantyne and Packer 2011; Ballantyne, Packer, and Falk 2011; Branchini, Meschini, et al. 2015; Meschini et al. 2021). When people discover the consequences of their actions upon the environment, they are able not only to change their own attitude, but also to become advocates in enlightening other people to do the same (Tisdell and Wilson 2001; Gössling 2018). People who are made aware of the local and global scale of an environmental problem are found to be more likely to take action in mitigating said problem, supporting conservation efforts (through financial contribution to environmental organizations), as well as acting individually in favor of the environment (like reducing their own carbon footprint) (Rabinovich et al. 2009).

Environmental education projects such as Glocal Education can be developed by the tourism sector in a smaller or larger scale, acting as triggers for advocate behavior in tourists, using informal education activities to create a web of sustainability and action towards the conservation of the environment.

4.2 Study limitations

Additional limitations of this study lie in the fact that we assessed changes over the period of one week, which did not account for how such increments in all sustainability variables translate to permanent changes in the population, promoting environmentally friendly actions triggered by the same tourists who participated in the project. The next step of this study is to resurvey tourists after one year of participation in the project, to evaluate possible long-term outcomes.

5. Conclusion

Investigating variables such as knowledge, attitude, and behavior could have extensive implications for environmental conservation, described as the management of environmental resources (Budowski 1976), as peoples' behavior has the power to affect biodiversity and sustainability in a positive or negative manner (Newhouse 1990). Even though demographical factors showed some influence in our results, we conclude that overall, informal environmental education experiences as those provided by the Glocal Education project may increase environmental sensitivity and ultimately promote correct environmental behavior.

Nowadays the word ecotourism is often misused for self-promotion. However, the Glocal Education activities could be a first step towards a trend in environment awareness, providing them with the tools and knowledge to critically discern what is and isn't environmentally friendly, not only in terms of products and services, but also when choosing their vacation spots. Correctly educating tourists to what "sustainability" really means could lead tourists to choose tour operators promoting environmentally friendly resorts, ultimately enhancing their economic gain (Fig. 3).

Glocal Education could be an appealing attraction to be added to the plethora of activities that tourists are offered by tour operators while on vacation, as tourists could become more satisfied with the vacation experience. This would provide a "win-win" situation for tourists, tour operators and also - albeit in a smaller proportion and in a longer time-frame - biodiversity conservation. The Glocal Education project could become a best practice for tour operators worldwide, generating not only further environmental awareness within tourists, but also higher profits for the entrepreneurs that host the project. Furthermore, such activities could possibly be extended to other informal contexts beyond the touristic environment (e.g., museums, zoos, parks). In order to assess how this environmental knowledge, awareness and attitude can translate into actual behavioral change, further (follow-up after at least one year) studies are required, by including also psychological variables to assess how personal response to the project might influence long-term retention of the studied variables (knowledge, attitude and awareness).

Acknowledgements

References

Anderson, Marti, Ray N Gorley, and K Robert Clarke. 2008. "PERMANOVA + for PRIMER User Manual."

Ballantyne, Roy, and Jan Packer. 2005. "Promoting Environmentally Sustainable Attitudes and Behaviour through Free-choice Learning Experiences: What Is the State of the Game?" *Environmental Education Research* 11: 281–95.

———. 2011. "Using Tourism Free-choice Learning Experiences to Promote Environmentally Sustainable Behaviour: The Role of Post-visit 'Action Resources.'" *Environmental Education Research* 17: 201–15. https://doi.org/10.1017/CBO9781107415324.004.

Ballantyne, Roy, Jan Packer, and John Falk. 2011. "Visitors' Learning for Environmental Sustainability: Testing Short- and Long-Term Impacts of Wildlife Tourism Experiences Using Structural Equation Modelling." *Tourism Management* 32 (6): 1243–52. https://doi.org/10.1016/j.tourman.2010.11.003.

Branchini, Simone, Marta Meschini, Claudia Covi, Corrado Piccinetti, Francesco Zaccanti, and Stefano Goffredo. 2015. "Participating in a Citizen Science Monitoring Program: Implications for Environmental Education." *PLoS ONE* 10 (7): 1–14. https://doi.org/10.1371/journal.pone.0131812.

Branchini, Simone, Francesco Pensa, Patrizia Neri, Bianca Maria Tonucci, Lisa Mattielli, Anna Collavo, Maria Elena Sillingardi, Corrado Piccinetti, Francesco Zaccanti, and Stefano Goffredo. 2015. "Using a Citizen Science Program to Monitor Coral Reef Biodiversity through Space and Time." *Biodiversity and Conservation* 24 (2): 319–36. https://doi.org/10.1007/s10531-014-0810-7.

Budowski, Gerardo. 1976. "Tourism and Environmental Conservation: Conflict, Coexistence, or Symbiosis?" *Environmental Conservation* 3 (1): 27–31. https://doi.org/10.1017/s0376892900017707.

Bueddefeld, Jill N.H., and Christine M. Van Winkle. 2018. "The Role of Post-Visit Action Resources in Facilitating Meaningful Free-Choice Learning after a Zoo Visit." *Environmental Education Research* 24 (1): 97–110. https://doi.org/10.1080/13504622.2016.1198952.

Buultjens, Jeremy, Iraj Ratnayke, and Athula Gnanapala. 2016. "Whale Watching in Sri Lanka: Perceptions of Sustainability." *Tourism Management Perspectives* 18: 125–33. https://doi.org/10.1016/j.tmp.2016.02.003.

European Union Business and Biodiversity Platform. 2010. "Finance Sector and Biodiversity Conservation: Best Practice Benchmarking."

Felgendreher, Simon, and Åsa Löfgren. 2018. "Higher Education for Sustainability: Can Education Affect Moral Perceptions?" *Environmental Education Research* 24 (4): 479–91. https://doi.org/10.1080/13504622.2017.1307945.

Goffredo, Stefano, Francesco Pensa, Patrizia Neri, Antonio Orlandi, Maria Scola Gagliardi, Angela Velardi, Corrado Piccinetti, and Francesco Zaccanti. 2010. "Unite Research with What Citizens Do for Fun: Recreational Monitoring of Marine Biodiversity." *Ecological Applications* 20 (8): 2170–87. https://doi.org/10.1890/09-1546.1.

Gössling, Stefan. 2018. "Tourism, Tourist Learning and Sustainability: An Exploratory Discussion of Complexities, Problems and Opportunities." *Journal of Sustainable Tourism* 26 (2): 292–306. https://doi.org/10.1080/09669582.2017.1349772.

Gössling, Stefan, and Paul Peeters. 2015. "Assessing Tourism's Global Environmental Impact 1900–2050." *Journal of Sustainable Tourism* 23 (5): 639–59. https://doi.org/10.1080/09669582.2015.1008500.

Harpe, Barbara de la, and Ian Thomas. 2009. "Curriculum Change in Universities." *Journal of Education for Sustainable Development* 3 (1): 75–85. https://doi.org/10.1177/097340820900300115.

Holden, Andrew. 2016. *Environment and Tourism*. 2nd ed. London: Routledge. https://doi.org/10.4324/9781315767659.

Joshi, Ankur, Saket Kale, Satish Chandel, and D. Pal. 2015. "Likert Scale: Explored and Explained." *British Journal of Applied Science & Technology* 7 (4): 396–403. https://doi.org/10.9734/bjast/2015/14975.

Kiper, Tuğba. 2013. "Role of Ecotourism in Sustainable Development." In *InTech*. https://doi.org/http://dx.doi.org/10.5772/57353.

la Torre, Stella de, and Pablo Yépez. 2003. "Environmental Education: A Teaching Tool for the Conservation of Pygmy Marmosets." *Neotropical Primates* 11 (2): 73–75.

Lenzen, Manfred, Ya Yen Sun, Futu Faturay, Yuan Peng Ting, Arne Geschke, and Arunima Malik. 2018.

432   "The Carbon Footprint of Global Tourism." *Nature Climate Change* 8 (6): 522–28.
433   https://doi.org/10.1038/s41558-018-0141-x.
434 Meschini, Marta, Francesca Prati, Ginevra A Simoncini, Valentina Airi, Erik Caroselli, Fiorella Prada,
435   Chiara Marchini, et al. 2021. "Environmental Awareness Gained During a Citizen Science Project in
436   Touristic Resorts Is Maintained After 3 Years Since Participation   ." *Frontiers in Marine Science* 8
437   (February): 92. https://doi.org/10.3389/fmars.2021.584644.
438 Newhouse, Nancy. 1990. "Implications of Attitude and Behavior Research for Environmental
439   Conservation." *Journal of Environmental Education* 22 (1): 26–32.
440   https://doi.org/10.1080/00958964.1990.9943043.
441 O'Brien, Karen L., and Johanna Wolf. 2010. "A Values-Based Approach to Vulnerability and Adaptation to
442   Climate Change." *Wiley Interdisciplinary Reviews: Climate Change* 1 (2): 232–42.
443   https://doi.org/10.1002/wcc.30.
444 Olsson, Daniel, and Niklas Gericke. 2017. "The Effect of Gender on Students' Sustainability
445   Consciousness: A Nationwide Swedish Study." *Journal of Environmental Education* 48 (5): 357–70.
446   https://doi.org/10.1080/00958964.2017.1310083.
447 Otto, Siegmar, and Florian G. Kaiser. 2014. "Ecological Behavior across the Lifespan: Why
448   Environmentalism Increases as People Grow Older." *Journal of Environmental Psychology* 40: 331–
449   38. https://doi.org/10.1016/j.jenvp.2014.08.004.
450 Padua, Suzana M. 1994. "Conservation Awareness through an Environmental Education Programme in the
451   Atlantic Forest of Brazil." *Environmental Conservation* 21 (2): 145–51.
452   https://doi.org/10.1017/S0376892900024577.
453 Peterson, Robert A. 1994. "A Meta-Analysis of Cronbach ' s Coefficient Alpha." *Journal of Consumer*
454   *Research* 21 (2): 381–91. https://doi.org/10.1086/209405.
455 R Development Core Team. 2019. "R: A Language and Environment for Statistical Computing." *R*
456   *Foundation for Statistical Computing*. http://www.r-project.org.
457 Rabinovich, Anna, Thomas A. Morton, Tom Postmes, and Bas Verplanken. 2009. "Think Global, Act
458   Local: The Effect of Goal and Mindset Specificity on Willingness to Donate to an Environmental
459   Organization." *Journal of Environmental Psychology* 29 (4): 391–99.
460   https://doi.org/10.1016/j.jenvp.2009.09.004.
461 Ramadoss, Alexandar, and Gopalsamy Poyya Moli. 2010. "Biodiversity Conservation through
462   Environmental Education for Sustainable Development - A Case Study from Puducherry, India."
463   *International Electronic Journal of Environmental Education* 1 (2): 97–111.
464   https://doi.org/10.18497/iejee-green.99495.
465 Shephard, Kerry. 2010. "Higher Education's Role in 'Education for Sustainability.'" *Australian*
466   *Universities' Review* 52 (1): 13–22.
467 Sheth, Jagdish N., Nirmal K. Sethia, and Shanthi Srinivas. 2011. "Mindful Consumption: A Customer-
468   Centric Approach to Sustainability." *Journal of the Academy of Marketing Science* 39 (1): 21–39.
469   https://doi.org/10.1007/s11747-010-0216-3.
470 Tisdell, C., and C. Wilson. 2001. "Wildlife-Based Tourism and Increased Support for Nature Conservation
471   Financially and Otherwise: Evidence from Sea Turtle Ecotourism at Mon Repos." *Tourism Economics*
472   7 (3): 233–49. https://doi.org/10.5367/000000001101297847.
473 Tolvanen, Anne, and Katja Kangas. 2016. "Tourism, Biodiversity and Protected Areas - Review from
474   Northern Fennoscandia." *Journal of Environmental Management* 169: 58–66.
475   https://doi.org/10.1016/j.jenvman.2015.12.011.
476 Tourism Highlights, U.N.T.W.O. 2017. "UNWTO World Tourism Barometer January 2017." Vol. 15.
477   http://media.unwto.org/press-release/2015-01-27/over-11-billion-tourists-travelled-abroad-2014.
478 ———. 2018. "UNWTO International Tourism Trends 2017." https://doi.org/DOI:
479   https://doi.org/10.18111/9789284419876.
480 Ziegler, Jackie A., Joshua N. Silberg, Gonzalo Araujo, Jessica Labaja, Alessandro Ponzo, Rick Rollins, and
481   Philip Dearden. 2018. "A Guilty Pleasure: Tourist Perspectives on the Ethics of Feeding Whale Sharks
482   in Oslob, Philippines." *Tourism Management* 68: 264–74.
483   https://doi.org/10.1016/j.tourman.2018.04.001.
484

Fig. 1. Glocal Education project activities. Some examples of activities performed by the Glocal Education biologists onsite, at Nosy Be, Madagascar, Dhiggiri and Maayafushi, Maldives. Pictures are freely available on the Glocal Education Project website: http://glocaleducation.eu/.
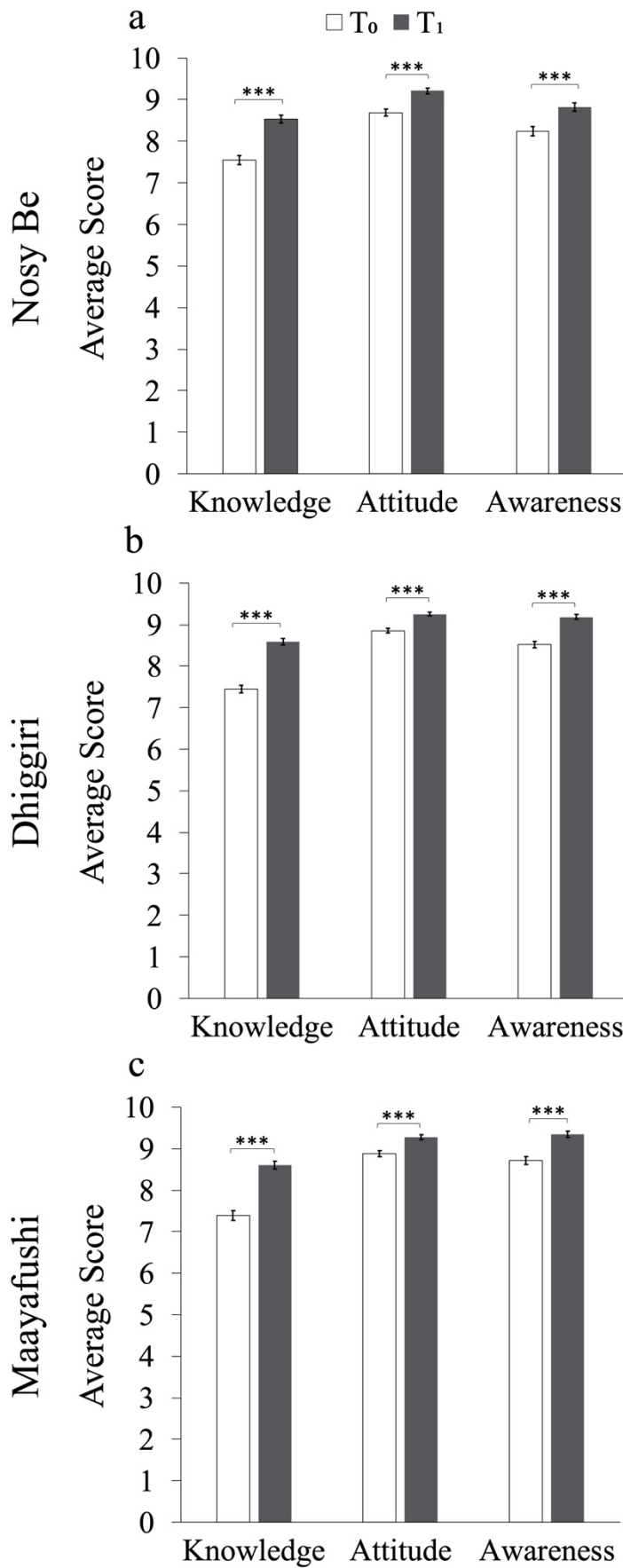
494
495 **Fig. 2. Before and after scores.** Permutational multivariate analysis of variance (PERMANOVA) results
496 representation for comparisons of knowledge, attitude and awareness scores between T_0 and T_1 (before and
497 after project activities). Error bars represent 95% CI. Significant effects are indicated with asterisks
498 (p=0.001).
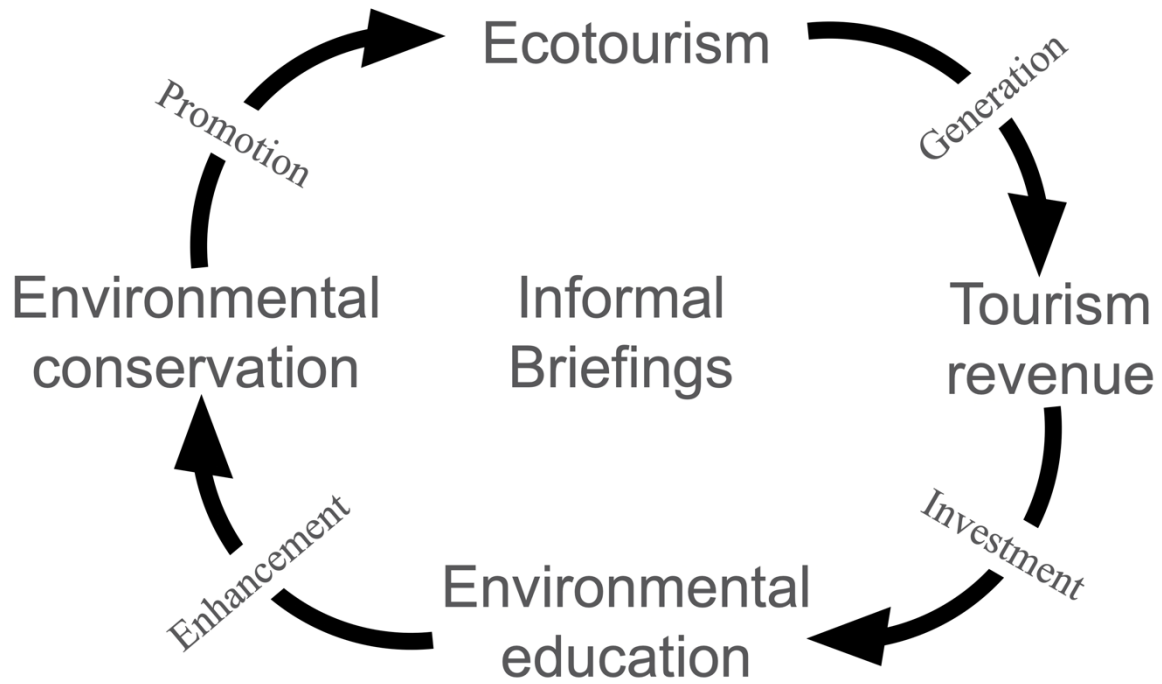
499
Fig. 3. Representative diagram of contribution of Glocal Education to tourism sustainability. The
diagram illustrates how environmental education informal briefings can have meaningful implications for
environmental conservation, while helping advertise ecotourism, bringing revenue to the tourism industry,
who ultimately can reinvest in environmental education projects, creating a network of sustainability that
bolsters environment conservation and economic growth (based on Ramadoss and Moli 2010)).

Table 1. Demographic variables. Personal data requested in part 1 of the questionnaire T_0 and grouping levels of the factors considered in the statistical analysis.

Factor	Questionnaire answers	Level	N*		
			Nosy Be	Dhiggiri	Maayafushi
sex	male	male	183	407	251
	female	female	259	475	276
age	under 15	under 30	97	183	103
	16-30				
	31-45	31-45	142	325	179
	46-60	over 46	203	374	245
	over 60				
education	elementary school	high school diploma	272	530	305
	high school				
	undergraduate degree	college degree	170	352	222
	master's degree				
	Ph.D.				
nature contact	up to three times a year	non-naturalist	268	544	331
	at least once a month				
	up to three times a month	naturalist	174	338	196
	at least once a week				
	more than once a week				
	total		442	882	527
				1851	

*Number of participating volunteers in each locality.

513 **Table 2. Questionnaire variables.** List of variables in part 2 of the questionnaires used for project
514 effectiveness assessment, followed by the number of items included for measuring its score and description
515 of the topic each variable was designed to cover.
516

Variable	Number of items	Description
knowledge	10	basic coral reef biology and ecology of the Maldives/endemic fauna and flora of Madagascar
attitude	8	behavioral intentions towards the environment and the project
customer loyalty	5	customer loyalty towards the brand hosting the research project
awareness	9	personal opinion about actions that may or may not impact the local environment
tourist satisfaction	11	tourist evaluation regarding project activities and identification with project goals

517
518

Table 3. Knowledge scores PERMANOVA. Permutational multivariate analysis of variance
(PERMANOVA) results for comparisons of knowledge scores by Time, sex, age, education (edu) and
nature contact (nat), and their interactions[a,b].

		Knowledge							
		Nosy Be			Dhiggiri			Maayafushi	
Source	df	Pseudo-F	P(perm)	df	Pseudo-F	P(perm)	df	Pseudo-F	P(perm)
time	1	86.979	**0.001**	1	264.53	**0.001**	1	157.1	**0.001**
sex	2	0.946	0.411	2	2.203	0.111	2	0.742	0.472
age	4	1.420	0.231	4	4.472	**0.003**	4	1.339	0.235
edu	2	3.549	**0.030**	2	12.289	**0.001**	2	5.242	**0.010**
nat	2	2.562	0.081	2	3.248	**0.042**	2	5.760	**0.008**
sex x age	4	0.222	0.919	4	0.607	0.650	4	0.667	0.614
sex x edu	2	0.468	0.664	2	3.296	**0.038**	2	3.420	**0.025**
sex x nat	2	0.209	0.819	2	0.598	0.540	2	1.042	0.354
age x edu	4	0.585	0.657	4	0.536	0.729	4	1.825	0.111
age x nat	4	0.992	0.389	4	1.111	0.365	4	0.376	0.810
edu x nat	2	0.0313	0.962	2	1.018	0.364	2	0.942	0.392
sex x age x edu	4	0.643	0.648	4	0.302	0.856	4	1.682	0.141
sex x age x nat	4	1.908	0.105	4	0.943	0.444	4	0.653	0.616
sex x edu x nat	2	1.486	0.233	2	0.525	0.566	2	1.759	0.166
age x edu x nat	4	1.367	0.255	4	0.797	0.527	4	0.345	0.838
sex x age x edu x nat	4	0.347	0.827	4	0.316	0.874	4	0.525	0.707
Residuals	836			1714			1006		
Total	883			1761			1053		

		Knowledge							
		Nosy Be			Dhiggiri			Maayafushi	
Source	df	Pseudo-F	P(perm)	df	Pseudo-F	P(perm)	df	Pseudo-F	P(perm)
time	1	86.979	**0.001**	1	264.53	**0.001**	1	157.1	**0.001**
sex	2	0.946	0.411	2	2.203	0.111	2	0.742	0.472
age	4	1.420	0.231	4	4.472	**0.003**	4	1.339	0.235
edu	2	3.549	**0.03**	2	12.289	**0.001**	2	5.242	**0.01**
nat	2	2.562	0.081	2	3.248	**0.042**	2	5.760	**0.008**
sex x age	4	0.222	0.919	4	0.607	0.65	4	0.667	0.614

sex x edu	2	0.468	0.664	2	3.296	**0.038**	2	3.420	**0.025**
sex x nat	2	0.209	0.819	2	0.598	0.54	2	1.042	0.354
age x edu	4	0.585	0.657	4	0.536	0.729	4	1.825	0.111
age x nat	4	0.992	0.389	4	1.111	0.365	4	0.376	0.81
edu x nat	2	0.0313	0.962	2	1.018	0.364	2	0.942	0.392
sex x age x edu	4	0.643	0.648	4	0.302	0.856	4	1.682	0.141
sex x age x nat	4	1.908	0.105	4	0.943	0.444	4	0.653	0.616
sex x edu x nat	2	1.486	0.233	2	0.525	0.566	2	1.759	0.166
age x edu x nat	4	1.367	0.255	4	0.797	0.527	4	0.345	0.838
sex x age x edu x nat	4	0.347	0.827	4	0.316	0.874	4	0.525	0.707
Residuals	836			1714			1006		
Total	883			1761			1053		

524 [a]Tests were run using Euclidean distances among samples and 999 permutations in the
525 software Primer.
526 [b]Significant effects (P(perm)<0.05) are indicated in bold.
527

Table 4. Attitude scores PERMANOVA. Permutational multivariate analysis of variance
(PERMANOVA) results for comparisons of attitude scores by Time, sex, age, education (edu) and nature
contact (nat), and their interactions[a,b].

		Attitude							
		Nosy Be			Dhiggiri			Maayafushi	
Source	df	Pseudo-F	P(perm)	df	Pseudo-F	P(perm)	df	Pseudo-F	P(perm)
time	1	41.868	**0.001**	1	96.206	**0.001**	1	52.307	**0.001**
sex	2	2.582	0.060	2	17.444	**0.001**	2	13.546	**0.001**
age	4	4.55	**0.003**	4	15.532	**0.001**	4	10.629	**0.001**
edu	2	1.106	0.319	2	0.145	0.868	2	2.367	0.106
nat	2	5.545	**0.004**	2	6.256	**0.004**	2	3.610	**0.032**
sex x age	4	0.617	0.662	4	2.083	0.089	4	0.511	0.739
sex x edu	2	1.904	0.153	2	0.783	0.473	2	0.572	0.576
sex x nat	2	3.882	**0.019**	2	1.987	0.131	2	0.406	0.692
age x edu	4	1.211	0.300	4	2.243	0.066	4	5.04	**0.001**
age x nat	4	0.457	0.782	4	1.143	0.317	4	0.719	0.556
edu x nat	2	1.223	0.299	2	0.400	0.700	2	0.012	0.99
sex x age x edu	4	0.831	0.489	4	0.732	0.572	4	1.035	0.371
sex x age x nat	4	0.800	0.541	4	4.251	**0.002**	4	0.799	0.519
sex x edu x nat	2	0.262	0.77	2	0.240	0.797	2	0.231	0.776
age x edu x nat	4	1.982	0.092	4	0.653	0.615	4	2.612	**0.041**
sex x age x edu x nat	4	1.848	0.128	4	0.587	0.658	4	0.823	0.536
Residuals	836			1714			1006		
Total	883			1761			1053		

532

Source	df			df			df		
sex x nat	2	3.882	**0.019**	2	1.987	0.131	2	0.406	0.692
age x edu	4	1.211	0.3	4	2.243	0.066	4	5.04	**0.001**
age x nat	4	0.457	0.782	4	1.143	0.317	4	0.719	0.556
edu x nat	2	1.223	0.299	2	0.400	0.7	2	0.012	0.99
sex x age x edu	4	0.831	0.489	4	0.732	0.572	4	1.035	0.371
sex x age x nat	4	0.800	0.541	4	4.251	**0.002**	4	0.799	0.519
sex x edu x nat	2	0.262	0.77	2	0.240	0.797	2	0.231	0.776
age x edu x nat	4	1.982	0.092	4	0.653	0.615	4	2.612	**0.041**
sex x age x edu x nat	4	1.848	0.128	4	0.587	0.658	4	0.823	0.536
Residuals	836			1714			1006		
Total	883			1761			1053		

[a]Tests were run using Euclidean distances among samples and 999 permutations in the software Primer.

[b]Significant effects ($P(perm) < 0.05$) are indicated in bold.

Table 5. Awareness scores PERMANOVA. Permutational multivariate analysis of variance
(PERMANOVA) results for comparisons of awareness scores by Time, sex, age, education (edu) and nature
contact (nat), and their interactions[a,b].

		Awareness							
		Nosy Be			Dhiggiri			Maayafushi	
Source	df	Pseudo-F	P(perm)	df	Pseudo-F	P(perm)	df	Pseudo-F	P(perm)
time	1	31.618	**0.001**	1	169.52	**0.001**	1	66.893	**0.001**
sex	2	0.463	0.611	2	24.401	**0.001**	2	16.967	**0.001**
age	4	2.529	**0.038**	4	13.339	**0.001**	4	8.5417	**0.001**
edu	2	6.776	**0.005**	2	0.3356	0.736	2	0.755	0.481
nat	2	5.008	**0.011**	2	0.846	0.423	2	0.654	0.525
sex x age	4	0.166	0.955	4	1.474	0.188	4	1.124	0.315
sex x edu	2	0.085	0.921	2	0.016	0.984	2	3.273	**0.039**
sex x nat	2	0.678	0.499	2	0.344	0.712	2	0.692	0.492
age x edu	4	2.632	**0.031**	4	0.174	0.958	4	0.080	0.991
age x nat	4	1.904	0.104	4	1.143	0.358	4	2.217	0.075
edu x nat	2	1.109	0.328	2	0.986	0.376	2	0.252	0.772
sex x age x edu	4	0.872	0.462	4	0.593	0.682	4	0.372	0.832
sex x age x nat	4	0.785	0.516	4	0.648	0.644	4	0.905	0.448
sex x edu x nat	2	0.145	0.867	2	0.338	0.732	2	1.452	0.239
age x edu x nat	4	0.777	0.512	4	0.589	0.683	4	1.107	0.341
sex x age x edu x nat	4	0.441	0.769	4	0.132	0.968	4	1.552	0.183
Residuals	836			1714			1006		
Total	883			1761			1053		

[a]Tests were run using Euclidean distances among samples and 999 permutations in the
software Primer.
[b]Significant effects (P(perm)<0.05) are indicated in bold.

546 **Table 6. Customer loyalty**. Customer loyalty answers for questionnaires T_0 and T_1 at all three localities.
547
548

		Item									
		1[a]		2[b]		3[c]		4[d]		5[e]	
		T0	T1	T0	T1	T0	T1	T0	T1	T0	T1
Nosy-Be	% no answer[f]	4.3	3.6	5.9	5.2	5.9	4.8	6.8	5.7	6.8	5.9
	% negative answer[g]	11.8	12.7	9.0	11.5	22.6	19.5	18.1	15.8	4.5	4.1
	% neutral answer[h]	16.5	13.1	23.3	23.3	24.0	23.3	26.9	27.6	21.3	20.6
	% positive answer[i]	67.4	70.6	61.8	60.0	47.5	52.5	48.2	50.9	67.4	69.5
Dhiggiri	% no answer[f]	1.4	2.3	3.3	3.2	2.2	2.3	2.7	3.2	3.3	3.2
	% negative answer[g]	14.1	15.9	9.1	10.2	21.9	23.1	18.8	13.7	5.4	3.7
	% neutral answer[h]	19.4	22.9	20.9	21.5	25.1	30.7	26.4	29.5	21.4	22.1
	% positive answer[i]	65.2	59.0	66.8	65.1	50.9	43.9	52.0	53.6	69.8	71.0
Maayafushi	% no answer[f]	36.2	2.1	38.0	3.0	36.8	3.4	38.5	3.2	38.9	3.6
	% negative answer[g]	10.4	23.1	7.8	9.1	12.3	21.6	14.6	18.6	4.6	3.8
	% neutral answer[h]	12.3	26.6	12.0	20.3	16.1	33.0	15.9	30.2	16.9	25.8
	% positive answer[i]	41.0	48.2	42.3	67.6	34.7	41.9	30.9	48.0	39.7	66.8

549 [a]Customer willing to pay up to 10% more than the standard price to stay in a Francorosso
550 facility with nature-related activities and a biologist on site;
551 [b]Customer willing to pay up to 5% more than the standard price to stay in a Francorosso
552 facility, without a biologist;
553 [c]Customer willing to pay up to 5% more than the standard price to stay in another tour
554 operator facility with a biologist on site;
555 [d]Customer willing to pay up to 3% more than the standard price to stay in another tour
556 operator facility with nature-related activities but no biologist on site;
557 [e]Customer willing to pay standard price for any tour operator, with neither nature-related
558 activities nor a biologist on site.
559 [f]Percentage of tourists who didn't answer each of the items at both times.
560 [g]Percentage of tourists who answered "disagree" or "strongly disagree" to each of the items at
561 both times.
562 [h]Percentage of tourists who answered "neutral" to each of the items at both times.
563 [i]Percentage of tourists who answered "agree" or "strongly agree" to each of the items at both
564 times.
565