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# Identifying tourists with smaller environmental footprints

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# Identifying tourists with smaller environmental footprints

## **Abstract**

This paper identifies which information about tourists serves as the best predictor of their pro-environmental behavior at home and on vacation. If a small set of predictors can be identified, the tourism industry would be able to use them to focus attention on attracting tourists with smaller environmental footprints. Results from a survey asking respondents about pro-environmental behavior in their role as residents and tourists indicate that environmental concern, altruism, feeling morally obliged to behave environmentally friendly, age and regional identity are the best predictors of the segment of people who behave in an environmentally friendly way at home. Income levels and moral obligation best predict membership of the segment of environmentally friendly tourists. The two segments overlap, differences between them are due to the fact that, at home, people can create the infrastructure they require to behave environmentally friendly. On vacation they need to adjust to the infrastructure provided, which can act as a barrier to pro-environmental behavior. Results have direct practical implications, highlighting the value of demand-side approaches to environmentally sustainable tourism for protected areas, both urban and rural, such as focusing on those market segments that have the highest intrinsic inclination to protect the environment.

## **Disciplines**

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# Identifying tourists with smaller environmental footprints

Sara Dolnicar

This paper identifies which information about tourists serves as the best predictor of their pro-environmental behavior at home and on vacation. If a small set of predictors can be identified, the tourism industry would be able to use them to focus attention on attracting tourists with smaller environmental footprints. Results from a survey asking respondents about pro-environmental behavior in their role as residents and tourists indicate that environmental concern, altruism, feeling morally obliged to behave environmentally friendly, age and regional identity are the best predictors of the segment of people who behave in an environmentally friendly way at home. Income levels and moral obligation best predict membership of the segment of environmentally friendly tourists. The two segments overlap, differences between them are due to the fact that, at home, people can create the infrastructure they require to behave environmentally friendly. On vacation they need to adjust to the infrastructure provided, which can act as a barrier to pro-environmental behavior. Results have direct practical implications, highlighting the value of demand-side approaches to environmentally sustainable tourism for protected areas, both urban and rural, such as focusing on those market segments that have the highest intrinsic inclination to protect the environment.

Keywords: Measurement; environmentally sustainable tourism; destination management; market segmentation

## Introduction

Environmental sustainability is in the national interest of every country, both generally and for their tourism market. At present, two approaches dominate the portfolio of measures recommended to achieve this goal (Dolnicar, 2006): (1) supply-sided measures which can be implemented in most destinations but largely ignore the characteristics of the tourists at the destination (such as the introduction of capacity limits and increased awareness building in hospitality education) and (2) a demand-driven approach which does not take tourists as a given but instead actively targets tourists with certain characteristics; this approach is currently limited to the area of ecotourism. The underlying idea of the demand-driven approach is to target the right market segment: those tourists who are interested in ecotourism activities, enjoy and care about nature and can, as a consequence, be expected to act in an environmentally friendly way. This segment is especially important for protected areas that need the income that visitation brings to support conservation measures and local communities, but possess fragile environments that need careful visitor management.

In the area of ecotourism, such a demand-driven approach has been followed for many years now. From an environmental sustainability point of view it would be attractive if the demand-driven approach could be extended beyond the niche of ecotourism. Such an extension is reasonable given that both environmentally friendly and unfriendly behavior occurs in all tourism contexts: tourists save or do not save

water when they take a shower, tourists litter or do not litter, tourists turn the air conditioning off when they leave the hotel room or they do not. A number of researchers have discussed or empirically demonstrated the potential of demand-driven approaches as a supplementary strategy for supply-sided approaches in the context of general tourism (Ataljevic and Doorne, 2000; Crouch et al., 2005; Dolnicar, 2004; Dolnicar and Leisch, 2008a; Dolnicar and Leisch, 2008b; Fairweather, Maslin and Simmons, 2005; Inskeep, 1991).

If such a market segment can be identified in the broader tourism context purely on the basis of personal characteristics, all tourism destinations - not only those focusing on ecotourism - could make use of an integrated approach towards environmental sustainability by integrating supply-sided and demand-driven measures. The demand-driven component of this approach would entail actively targeting tourists who are likely to behave in an environmentally friendly manner. At the same time the necessary infrastructure to enable such tourists to actually translate their predisposition to act in an environmentally friendly way would have to be provided in a supply-sided manner.

An additional advantage of demand-driven approaches is that they do not place industry initiatives for environmental sustainability in a trade-off situation with their profit maximization aim. Environmentally friendly measures taken by tour operators, hotels, transport, etc, would in fact be viewed positively by tourists who behave in an environmentally friendly manner. Investing in such measures may consequently not only improve the destination's environmental sustainability, but also act as a powerful marketing message.

To make demand-driven approaches of sustainable tourism viable, however, it is necessary to be able to measure whether or not potential tourists fall into the category of tourists who behave in an environmentally sustainable way or not. Identifying which measure/s could best be used for this purpose is the aim of this study.

### **Prior Work and Research Questions**

Despite the large body of work in the area of environmentally sustainable tourism and ecotourism, no general profile of tourists who behave in an environmentally friendly manner exists to date (Dolnicar, Crouch & Long, 2008). This is due to the fact that (1) research into environmentally sustainable tourism has centered on the supply side; and (2) ecotourism research – which has produced numerous profiles of ecotourists – as well as recent publications studying environmentally friendly tourists empirically are based on heterogeneous approaches in the empirical study, resulting in equally heterogeneous profiles. Even in studies which investigated the same personal characteristics, findings are frequently contradictory. Despite, or maybe because of, the heterogeneity of approaches and conclusions, the studies which empirically profiled ecotourists (Crossley & Lee, 1994; Khan, 2003; Wight, 1996a & b; Blamey & Braithwaite, 1997; Eagles, 1992; Eagles & Cascagnette, 1995; Kretchman & Eagles, 1990; Hvengaard & Dearden, 1998; Kerstetter et al., 2004; Uysal et al., 1994; Weaver & Lawton, 2002) are used as the basis for generating hypotheses about tourists who behave in an environmentally friendly manner. Furthermore, findings from related areas of environmental studies (Berenguer, Corraliza & Martin, 2005; Kaiser & Shimoda, 1999; Kals, Schumacher & Montada, 1999; Carrus, Bonaiuto & Bonnes, 2005; Clark, Kotchen & Moore, 2003)

inform hypothesis generation for the present study. These areas include environmental psychology and research into recycling behavior and environmental volunteering. These studies were chosen in our review because we believe that pro-environmental behavior on vacation is a subset of pro-environmental behavior in general. As such, any work that provides insight into factors which inhibit or facilitate pro-environmental behavior is relevant.

Empirical ecotourism studies prove to be a very rich source of personal characteristics which could potentially be valuable predictors of environmentally friendly behavior. Reviewing the empirical studies conducted by Ballantine and Eagles (1994), Blamey and Braithwaite (1997), Bottrill and Pearce (1995), Crossley and Lee (1994), Eagles (1992), Eagles and Cascagnette (1995), Hong, Kim and Kim (2003), Hvengaard and Dearden (1998), Juric, Cornwell and Mather (2002), Kerstetter, Hou, and Lin (2004), Khan (2003), Kretchmann and Eagles (1990), Meric and Hunt (1998), Palacio and McCool (1997), Pennington-Gray and Kerstetter (2002), Ryan, Hughes and Chirgwin (2000), Tao, Eagles and Smith (2004), Uysal, Jurowski, Noe & McDonald (1994), Weaver and Lawton (2002), and Wight (1996a & b) results in a large number of socio-demographic and psychographic variables of potential value. Interestingly, only one single characteristic – a higher level of education – has been included in most of these studies and has consistently led to the same results. Findings with respect to income and environmental concern or pro-environmental attitude indicate that ecotourists have higher incomes and are more concerned about the environment / have a more pro-environmental attitude, although a small number of studies conclude the precise opposite. Age is included as a descriptor in most studies, yet the conclusions are contradictory: half of the studies find ecotourists to be middle aged, one fifth finds that they are younger and one third concludes that they are older. Similarly no clear results have emerged from the investigation of gender. Three studies investigate gender; two find that ecotourists tend to be female. A summary of findings from this body of literature has recently been published by Dolnicar, Crouch and Long (2008) and is provided in Table 2.

*Table 1: Summary of profile findings for environmentally friendly tourists (modified from Dolnicar, Crouch & Long, 2008)*

		Percent of studies
Higher/tertiary education	Yes	50
Age	Middle	31
	Older	13
Interest in learning	Yes	38
Income	High	31
Environmental concern	High	19
Higher expenditure	Yes	13
High environmental awareness	Yes	13
Interest in culture	Yes	13
Gender	Female	13

Health concerns	Yes	6
Physically active	Yes	6
Adventure seeking	Yes	6
Professional occupation	Yes	6
Willing to forgo comforts	Yes	6

As mentioned above, the reason for the heterogeneity in results from empirical profiling studies of ecotourists lies in the heterogeneity of research approaches taken by different authors, particularly differences in how being member of the segment of ecotourist was operationalized. Operationalizations range from distributing surveys through ecotourism operators (Crossley & Lee, 1994; Khan, 2003; Wight, 1996a & b), filtering respondents on the basis of their intention to undertake a trip to increase understanding and appreciation of nature (Blamey & Braithwaite, 1997), surveying members of organizations with pro-environmental missions (Eagles, 1992; Eagles & Cascagnette, 1995; Kretchman & Eagles, 1990), to surveying visitors to natural tourism attractions, such as a Thai national park (Hvenggaard & Dearden, 1998), a coastal wetland area in Taiwan (Kerstetter et al., 2004), a conservation area in Australia (Ryan et al., 2000), a US national park (Uysal, et al., 1994), and ecolodges in Australia (Weaver & Lawton, 2002). Despite the heterogeneity of study settings and the resulting heterogeneity of results, the review of the ecotourism / environmentally sustainable literature suggests that the following hypotheses have to be empirically tested in the general tourism setting for tourists who behave in an environmentally friendly manner (as opposed to limiting such investigations to segments of the tourism population): they are characterized by a more pro-environmental attitude, a higher level of expressed environmental concern, higher levels of education, higher income levels, a distinct age profile and a distinct gender profile.

A number of studies from areas other than tourism research provide interesting insights which are of relevance to the present study. Berenguer, Corraliza and Martin (2005) review prior work into determinants of environmental concern and conclude that determinants can be grouped in socio-demographic and psychological ones. Socio-demographic characteristics that have been shown to be associated with environmental concern include age, ethnic group, place of residence, income, occupation, gender, religion and political ideology. Psychological factors include society's environmental values, altruism, and egoistic motives. In their own empirical study Berenguer et al. (2005) find that moral obligation displays the strongest association with pro-environmental behavior. This result is in line with the earlier empirical results reported by Kaiser and Shimoda (1999) in relation to moral responsibility and was consequently used as the core construct of investigation by Dolnicar and Leisch (2008a). Kals, Schumacher and Montada (1999) introduce a new construct, emotional affinity towards nature, to explain nature-protective behavior. They view this construct as distinctly different from a cognitive approach. An example of such an emotion is feeling guilty for causing negative effects on the environment. These findings are strongly in line with studies that investigated the role of a sense of moral obligation in environmentally friendly behavior.

Carrus, Bonaiuto and Bonnes (2005) draw attention to the construct of regional identity. They show that higher levels of regional identity amongst residents of areas with parklands are associated with higher levels of support. While this construct cannot be translated directly into the tourism context, the level of identity with the area in which people live may influence people's environmental behavior at home. Clark, Kotchen and Moore (2003) show that not only environmental attitudes, but also altruism as measured by the Schwartz norm-activation model (Schwartz 1977), are predictors of environmentally friendly behavior.

An area that has developed similarly to empirical ecotourism studies is the field of water recycling research: a large number of researchers have attempted to profile early adopters of recycled water, a highly informative pro-environmental behavior because it not only has positive impacts on natural resources but because using recycled water is perceived as being a sacrifice due to the perception of dirtiness and health risks. Based on the studies by Hanke and Athanasiou (1970), Johnson (1979), Carley (1973), Sims and Baumann (1974), and Kasperson, et al. (1974) the following characteristics describe early adopters of recycled water most reliably: high income, high education levels and older age.

In the area of environmental volunteering studies the following personal characteristics are found to be associated with higher levels of environmental volunteering: the level of education (Curtis, Grabb & Baer, 1992; Edwards & White, 1980; Florin, Jones & Wandersman, 1986; McPherson & Rotolo, 1996; Reed & Selbee, 2000; Yavas & Riecken, 1985; reviewed in Dolnicar & Randle, 2004), engagement of the parents in environmental volunteering (Harris 1990; Wymer 1998) and involvement in volunteering activities as a child (Reed & Selbee 2000; Rohs 1986). Results vary with respect to age, gender, family status, and cultural background, similarly to the empirical tourism studies of ecotourists and environmentally responsible tourists.

The review of prior work conducted outside the field of tourism supports the inclusion of all the socio-demographic variables included on the basis of the tourism research review, and leads to the inclusion of two additional hypotheses: Tourists who behave in an environmentally friendly manner will feel more morally obliged to behave in an environmentally friendly manner, and people will behave in more environmentally friendly ways in general if they identify strongly with the place in which they live. Another important insight derived from the study of non-tourism related studies of environmental behavior is that, typically, lists of behaviors are used as dependent variables, an approach that has – to the authors' knowledge - not been used in tourism research so far.

To the author's knowledge only two studies have to date investigated differences between pro-environmental behavior at home and on vacation. Dolnicar and Leisch (2008a) authors investigate the relationship between pro-environmental behavior at home and on vacation at an aggregate level and for segments that display different patterns of feeling morally obliged to engage or not engage in behaviors that have environmental consequences. However, they do not identify which individual level indicator could be used to discriminate between tourists that do and tourists that do not behave in an environmentally friendly manner. This study demonstrated that pro-environmental behavior at home is strongly related to pro-environmental behavior on vacation, indicating that a demand-driven approach is promising (in attracting the right tourists), but that supply-side measures are needed to enable environmentally

friendly tourists to actually behave in the way they would like to behave. To examine which independent variables are associated with people's pro-environmental behavior when they are on vacation, Dolnicar and Leisch (2008b) only presented a regression analysis, finding that a number of motivational items, including moral obligation, gender and age significantly predicted the extent of pro-environmental behavior. The second study was conducted by Dolnicar and Grün (2009) and focuses primarily on studying heterogeneity with respect to pro-environmental behavior patterns. Heterogeneity is found to exist and, generally, it is shown that the level of pro-environmental behavior drops on vacation as opposed to the home context, thus providing evidence that situational factors play a significant role, even if people are inherently motivated to behave in a way that does not harm the environment.

The present study extends previous work in the following ways: (1) the aim is to identify the smallest possible set of measures that can differentiate between environmentally friendly and unfriendly tourists. Such a set of measures could be used by the tourism industry to actively select and target the environmentally friendly group, a fundamental pre-requisite for the demand-driven approach to work. (2) Measures best predicting pro-environmental behavior will be studied separately for the home and the vacation context. Knowing that the two behaviors are strongly related makes it possible to investigate both settings separately and compare which behavior can be predicted more effectively (explaining more of the variance in behavior) or more efficiently (using a smaller set of measures). (3) The initial set of measures to be included in the investigation is selected in a strictly hypothesis-driven manner based on prior results which have emerged from the tourism and social science literature in general. The hypotheses used as the basis for analysis are as follows:

H1 Some people behave systematically in more environmentally friendly ways than others in the home context.

The following measures are hypothesized to be good predictors of any randomly chosen individual being a member of the environmentally friendly group of people

- H1.1 more pro-environmental attitudes
- H1.2 higher level of expressed environmental concern
- H1.3 higher level of education
- H1.4 higher income level
- H1.5 distinct age profile with older people displaying more pro-environmental behavior
- H1.6 distinct gender profile with females displaying more pro-environmental behavior
- H1.7 higher level of altruism
- H1.8 higher feeling of moral obligation to behave in an environmentally responsible manner
- H1.9 higher level of regional identity with the place of residence.

H2 Some tourists behave systematically in more environmentally friendly ways than others in the vacation context.



The following measures are hypothesized to be good predictors of any randomly chosen individual being a member of the environmentally friendly group of tourists

- H2.1 more pro-environmental attitude
  - H2.2 higher level of expressed environmental concern
  - H2.3 higher level of education
  - H2.4 higher income level
  - H2.5 distinct age profile
  - H2.6 distinct gender profile
  - H2.7 higher level of altruism
  - H2.8 higher feeling of moral obligation to behave in an environmentally responsible manner
- H3 Being an individual who behaves environmentally friendly at home is strongly associated with being a tourist who behaves in an environmentally friendly way on vacation.

## **Methodology**

### *Survey administration*

Fieldwork was conducted in April 2006 using a permission-based internet panel. Permission based internet panels maintain a data base of respondents who have expressed their interest to participate in market research. Internet panels work just like traditional panels which are maintained by market research companies, with the only difference that data collection occurs online. Panel recruitment is conducted in a way to ensure that people representative of the entire population are included. When invitations to participate in a survey are sent out to panel members via email, a subset of the panel, usually representative of the population, is selected. Respondents then access the questionnaire online. If they complete the survey, they are compensated with a small amount of money which varies in dependence of the amount of time it took to answer all questions, in this case each respondent was paid 8 Australian Dollars. As soon as 1000 completed questionnaires were available the survey was disconnected. These 1000 respondents formed the sample used in the study. After the 1000<sup>th</sup> respondent completed the survey the survey was closed and taken offline.

### *Survey instrument*

The predisposition to behave in an environmentally friendly manner was measured by asking respondents to state whether they engage in 30 different behaviors *never*, *rarely*, *sometimes* or *always*. The 30 behaviors (mostly environmentally friendly, some environmentally unfriendly) were chosen from lists developed by Corraliza and Berenguer (2000), Johnson, Bowker and Cordell (2004) and Trumbo and O'Keefe (2001). Respondents were asked to complete this question separately for the home and the vacation context; respondents were surveyed both in

their role as residents and in their role as tourists. For the vacation context they were asked to think about the last vacation they had undertaken. The reason for this instruction was to make sure that respondents had a concrete setting in mind and would, as a consequence, not respond hypothetically but actually report their past behavior. A *not applicable* option was provided. In order to be able to discriminate between respondents with differing strong tendencies of pro-environmental behavior, highly heterogeneous items were chosen, ranging from *switching off the light when leaving a room* to *joining in political action*.

A respondent's predisposition to act in an environmentally friendly manner was computed by summing up responses to the behavioural items listed in the questionnaires. The subset of variables to be used for the computation of the variable indicating pro-environmental behavior on vacation was determined in an empirical manner by computing the number of "not applicable" responses to the behavioral items in the vacation context. The following items are included in this subset: *I saved water, I damaged trees or shrubs, I picked up litter that was not my own, I littered, I engaged in outdoor leisure activities, I read nature or environmental magazines, I sealed doors and windows to avoid heat / coolness escape, I took bags from home when going shopping, I switched off the heating / air conditioning in unoccupied rooms, I bought products that protect the environment, I recycled cans or bottles, I looked for ways to reuse things, I switched off the light whenever leaving a room, I used public transport instead of the car, I walked instead of using the car.*

Four items were formulated as environmentally unfriendly (littering, washing the car, watering the lawn, damaging trees or shrubs). These items were reverse-coded for further analysis. In dependence of the context (home or vacation) and the number of behavioral items included (all or only items that are highly relevant to both the home and the vacation setting), the following dependent variables were derived:

EBhome30 Sum of 30 environmentally friendly behaviors completed for the home setting (theoretical range: 0-120)

EBvacation15 Sum of 15 environmentally friendly behaviors completed for the vacation setting (theoretical range: 0-60)

Four groups were constructed by splitting respondents into the top half and the bottom half in terms (using median splits) of both pro-environmental behavior at home and on vacation. This decision was made after investigating whether or not a posteriori market segmentation would provide any additional insights. The framework proposed by Dolnicar and Leisch (2009) was used for the determination of the most suitable number of segments in a posteriori market segmentation. Achieving high reliability levels for any segment number higher than two segments would indicate that pro-environmental behavior is not sufficiently well represented by simply comparing people with a high tendency and people with a low tendency to behave in an environmentally friendly manner. Results indicated, however, that only the two segment solution led to highly reproducible and thus highly reliable results, confirming the suitability of the median split approach chosen.

Pro-environmental attitude was measured using the New Ecological Paradigm (NEP) Scale (Dunlap, Van Liere, Mertig & Jones 2000). It consists of 15 items covering five dimensions using three items each. The five dimensions are referred to as Reality of limits to grow, Anti-anthropocentrism, Fragility of nature's balance, Rejection of exemptionalism, and Possibility of ecocrisis. An individual-level score

was derived by adding the responses to all items, with negatively worded items being reverse-coded prior to summation. The NEP scale has been used in a large number of studies and has consistently been shown to be associated with environmental behavior. Examples include Floyd, Jang and Noe's study (1997) in which the NEP score was found to be associated with the extent to which people were willing to accept environmental impacts on national parks; Hunter and Rinner's study (2004) in which the NEP score is associated with how much priority individuals place on species preservation; and Kotchen and Reiling's study (2000) supporting the hypotheses that NEP scores are predictive of people's willingness to pay for species protection funds.

The level of expressed concern about the environment was measured with two simple direct statements introduced by Berenguer et al. (2005): *I am concerned about the situation of the environment in general*, and *I consider myself in favor of the defense of the environment*. An individual-level score was derived by adding the responses to both items.

Moral obligation was measured using Berenguer et al.'s (2005) wording: *To what extent do you consider yourself morally obliged to carry out the following behaviors?* The scale was changed from a seven to a five point scale because pre-tests of the questionnaire indicated that respondents did not feel competent to discriminate their moral obligation on a seven point scale. Pre-testing included presenting alternative answer formats to respondents in person and asking them if they felt they could express their extent of moral obligation well on this scale. Respondents commented that they did not feel they required seven points, in fact the seven point scales made it hard for them to differentiate between the precise meanings of the neighboring options. Moral obligation was measured for each one of the 30 behaviors measured for the home and vacation context. An individual-level score was derived by adding the responses to all items.

Altruism was measured using Clark et al.'s (2003) altruism scale with the underlying factors personal norms, awareness of consequences, and description of responsibility. The original five-point scale was maintained. An individual-level score was derived by adding the responses to all items. Examples of items used are *It is my duty to help other people when they are unable to help themselves*, *Households like mine should not be blamed for environmental problems caused by energy production and use*, *My responsibility is to provide only for my family and myself*, *My personal actions can greatly improve the well being of people I don't know*.

Finally, regional identity was measured by asking respondents to state how strong their feeling of belonging and attachment to the region they live in was, whether they have listened to regional or local radio, TV or read a regional or local newspaper in the last week, and whether or not they would prefer to stay in the region or prefer to move. A sum across all five responses was computed and used as an individual level score indicating regional identity.

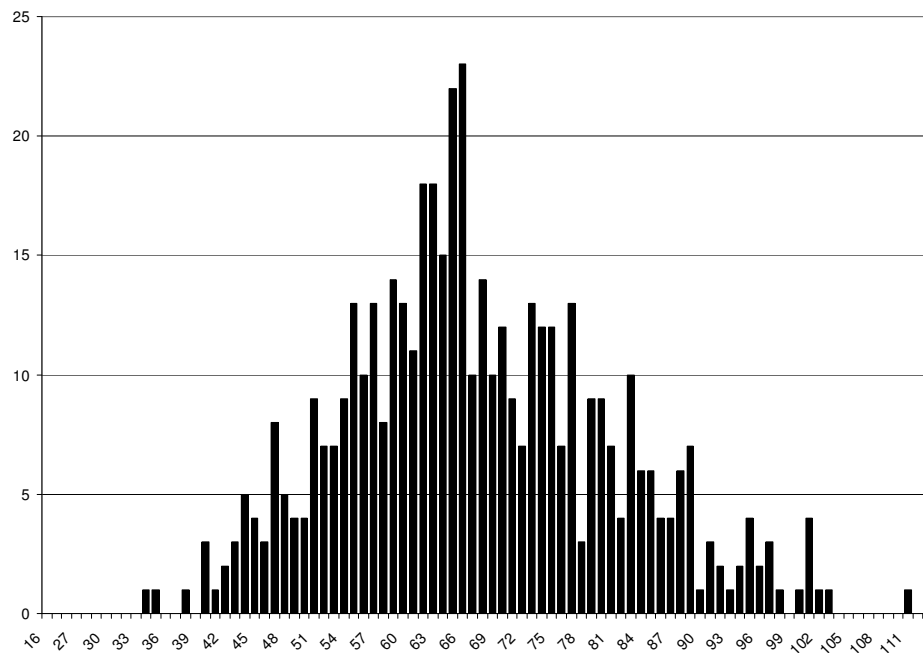
Income, education, age and gender were not sought in the questionnaire as this information was directly available from the fieldwork company.

## Results

### *Identifying people who behave in an environmentally friendly way at home*

The frequency distribution of the dependent variable EBhome30, which indicates the predisposition to behave environmentally friendly at home, demonstrates a significant amount of variability, indicating that some people do indeed behave systematically in an environmentally friendly way whereas others behave systematically in an environmentally unfriendly way. For instance, the respondent with the highest score of 113 always undertakes the majority of the environmentally friendly behaviors listed in the questionnaire. The respondent with the lowest score, on the other hand, rarely engages in any one of those activities. The exact distribution of EBhome30 is shown in Figure 1.

*Figure 1. Distribution of EBhome30*



Respondents who scored in the top half of this distribution are classified as environmentally friendly and are compared to respondents in the bottom half of the distribution in order to test hypotheses 1.1 – 1.9 and, in so doing, identifying which measure or measures can most effectively and efficiently be used to identify people who behave in an environmentally friendly manner. This is achieved by computing a forward stepwise logistic regression which selects the best predictors among all the independent variables iteratively by using the information on the significance of the change in the -2 Log Likelihood when additional variables are added to the model. The final model contains only a subset of variables which best predict the dependent variable. Given that all independent variables for the model have been chosen in a hypothesis oriented manner (as opposed to entering a large set of potential

independent variables for which there is no theoretical evidence or reasoning to predict pro-environmental behavior) and given that the aim of this study is to identify the smallest possible subset of measures that can be used to predict membership of the environmentally friendly or unfriendly segment, the stepwise method is considered to be suitable.

The binary logistic regression – which took five steps to reach the final solution - leads to an insignificant Hosmer and Lemeshaw value of 7.7 (p-value: 0.466) indicating that the difference between the empirical data and the model prediction does not differ significantly. The membership of 75 percent of respondents into one of the two groups was predicted correctly based on only five explanatory variables (environmental concern, altruism, moral obligation, age and regional identity). Table 2 contains the Wald statistic (fourth column) and the corresponding significance test, indicating that all variables remaining in the model at the final step contribute significantly to being able to predict respondents’ membership. The Wald statistic is computed as the squared ratio of the coefficient B (provided in the second column) to the standard error (S.E., provided in the third column). The odds ratio is given in the last column (Exp(B)). An odds ratio of 1 means that the dependent variable is not influenced by the independent variable in each of the rows of Table 1, a value higher than 1 indicates an increase in odds and a number lower than 1 indicates a decrease in odds.

*Table 2: Final Regression Coefficients for Forward Stepwise Binary Logistic Regression Predicting Membership of the Segment of People who behave Environmentally Friendly at Home*

	B	S.E.	Wald	df	Sig.	Exp(B)
Environmental concern	.229	.066	11.999	1	.001	1.258
Altruism	.045	.020	5.032	1	.025	1.046
Sense of moral obligation	.068	.006	115.093	1	.000	1.071
Age	.015	.006	7.094	1	.008	1.015
Regional Identity	.118	.058	4.149	1	.042	1.125
Constant	-7.735	.624	153.587	1	.000	.000

The regression coefficients and p-values lead to the following conclusions: having a higher level of environmental concern, being more altruistic, feeling more morally obliged to behave environmentally friendly, being older and feeling a higher level of regional identity with the place of residence increases the likelihood that respondents are members of the environmentally friendly segment.

These results support prior findings reported by Berenguer et al. (2005) and Kaiser and Shimoda (1999) with respect to the importance of moral obligation for environmentally friendly behavior, as well as results reported by Carrus, Bonaiuto and

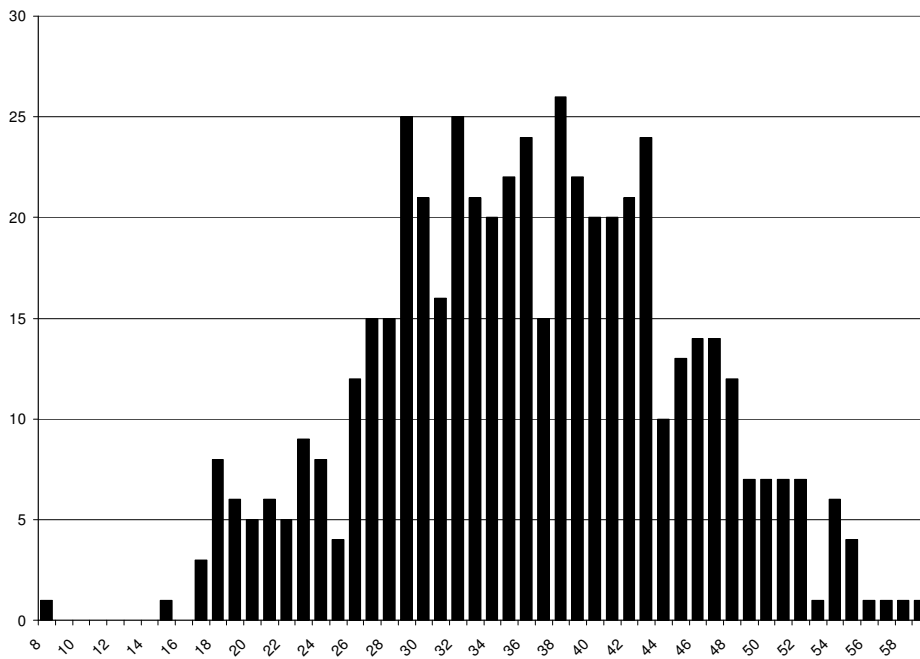
Bonnes (2005) with respect to the effect of regional identity. Prior reports about the importance of education as a predictor which have emerged both from empirical ecotourism studies and studies on environmental volunteering are not supported. The conclusions drawn by Clark et al. (2003) about the role of both altruism and pro-environmental attitude, however, are only partially supported by the present study. Nor is there support for the findings of numerous studies in the areas of ecotourism and water recycling that income is associated with pro environmental behavior. Note, however, that variables are associated with one another. So it may well be that some of these variables would be significant if other associated variables had been excluded from our computations.

Results indicate that five measures would be required to most effectively (with a 75 percent probability of classifying each individual correctly) identify environmentally friendly people; environmental concern, altruism, sense of moral obligation, age and regional identity.

*Identifying tourists who behave in an environmentally friendly way on vacation*

The frequency distribution of the dependent variable EBvacation15, which indicates the level of environmentally friendly behavior on vacation, demonstrates that there is a significant amount of variability in people's behavior, indicating that some people behave systematically in an environmentally friendly way and some people behave systematically in an environmentally unfriendly way when on vacation. The respondent with the highest score of 59 always undertakes all the behaviors listed except for one. The respondent with the lowest score, on the other hand, never engages in almost half of the behaviors. The exact distribution is shown in Figure 2.

Figure2. Distribution of EBvacation15



The stepwise forward binary logistic regression developed to predict membership of the environmentally friendly tourists segment produced a Homer and Lemeshow p-value of 0.953 indicating that the predicted data does not significantly differ from the observed data. Sixty-nine percent of all cases could be correctly predicted as members of the environmentally friendly tourist segment by only two variables: income and moral obligation. Results are presented in Table 3.

Note that the Homer and Lemeshow test indicates that the model fit for the vacation context is better than the model fit for the home context. Although the classification results are reported, these are less reliable in the context of binary logistic regressions as they round the membership assignment probabilities up to 1 or down to 0, as opposed to the Homer and Lemeshow test which is in fact based on the actual probabilities.

*Table 3: Final Regression Coefficients for Forward Stepwise Binary Logistic Regression Predicting Membership of the Segment of People who behave Environmentally Friendly on Vacation*

	B	S.E.	Wald	df	Sig.	Exp(B)
Income	.105	.047	5.038	1	.025	1.111
Moral obligation	.064	.005	148.762	1	.000	1.066
Constant	-5.653	.481	137.829	1	.000	.004

For the vacation context, results strongly confirm prior findings by Berenguer et al. (2005) that moral obligation is a strong predictor of pro-environmental behavior. Our findings indicate that moral obligation to behave in an environmentally friendly manner significantly increases the likelihood of a respondent being a member of the environmentally friendly segment. In addition, the repeated findings from ecotourist profiling studies that higher income is associated with pro-environmental behavior in the tourism context are confirmed. Note that results differ from Dolnicar and Leisch (2008b) because both the variables used as starting points for the regression were different and the method used was different in two ways: linear regression was used rather than binary logistic regression because the aim was not classification, and backward stepwise variable selection was applied which starts with the saturated model as opposed to the forward stepwise algorithm which starts by including the variables that contributes most to model fit in the first step. In both analyses, however, moral obligation emerged as the most significant explanatory variable.

The ability to predict membership of the environmentally friendly tourists segment by only two measures is very efficient, although moral obligation is likely to be more difficult for the tourism industry to use than income. A single item measure of moral obligation would be preferable to the current summated score measure across a number of behavioral variables.

#### *Are Environmentally Friendly Individuals also Environmentally Friendly Tourists?*

Given that factors intrinsic to the person play a major role in predicting environmental behavior (as postulated in the Model of Responsible Environmental Behavior by Hines et al. (1986) as well as the Model of Ecological Behavior by Fietkau and Kessel (1981)) and given prior findings that pro-environmental behavior in different contexts is highly associated, it is hypothesized that a large proportion of individuals who behave in an environmentally friendly way at home will also behave in an environmentally friendly way on vacation. This is tested by constructing a contingency table and using a Chi-squared test to assess the significance of association. Table 4 contains frequencies and percentages of the contingency table. Note that the groupings of respondents are the same as they were for the binary logistic regression: defined on the basis of a median split among both the EBhome30 and EBvacation15 variables.



*Table 4. Contingency table of Environmentally Friendly Individuals and Environmentally Friendly Tourists (including column and total percent)*

	Not env. friendly at home	Env. friendly at home	Total
Not env. friendly on vacation	356	152	508
	75% (36%)	29% (15%)	51%
Env. friendly on vacation	122	368	490
	26% (12%)	71% (37%)	49%
Total	478	520	998

As can be seen from Table 4 the association of Environmentally Friendly Individuals and Environmentally Friendly Tourists is very strong (Pearson Chi-squared 204, 1 df,  $p < 0.001$ ) with 71 percent overlap between the two environmentally friendly groups (and 75% overlap between the two groups with are not behaving in an environmentally friendly way). This can be considered a very high degree of overlap, especially because the segments used for comparison in the present study were not extreme groups, they included the full set of respondents and those respondents with average pro-environmental behavior scores are much more difficult to classify correctly than those with extreme values.

These findings provide further empirical evidence for the fact that a group of individuals exist who engage strongly in environmentally friendly behavior and that, consequently, demand-driven measures of sustainable tourism would be a valuable complement to supply-sided measures. While external circumstances clearly play a role in how much or how often individuals are in the position to behave in such a way, the predisposition to do so is a personal one. Furthermore, this study has identified a small number of indicators that can be used by the tourism industry to identify who potential tourists are that should be targeted if a demand-driven approach to sustainable tourism is chosen. For behaving in an environmentally friendly way on vacation the two key indicators are high income and high level of moral obligation to behave in an environmentally friendly manner. This finding is encouraging as it highlights that selecting tourists who intrinsically care for the environmental does not imply that tourist expenditure or profit has to be sacrificed.

## **Conclusions**

The aim of this study was to investigate which measures could best be used to identify tourists who would behave in an environmentally friendly manner on vacation. Extending the approach of actively targeting individuals who behave in an environmentally friendly manner from the tourism niche market of ecotourism to the general tourism context has the potential to reduce the environmental footprint of

tourists at destinations significantly. The only condition is that such individuals can be identified before they arrive at the destination.

Using responses about actual past behavior as the dependent variable and variables which have been found in prior studies to be associated with pro-environmental behavior as potential explanatory variables, small subsets of the most predictive variables were identified. For pro-environmental behavior at home these variables were; feeling more morally obliged to behave in an environmentally friendly way, having a higher level of environmental concern, being older, being more altruistic and feeling a higher level of regional identity with the place of residence. Only two measures were needed to predict the membership of more than two thirds of tourists correctly with respect to their membership to the environmentally friendly tourist segment: income and moral obligation. The fact that moral obligation was found to be the most predictive of the environmental measures is likely to be due to the fact that, while environmental attitudes, environmental concern and moral obligation are all measure related constructs, the moral obligation question is the least abstract of the three and thus the measure most closely associated with behavioral consequences.

The differences between the two models are not surprising because the level of control individuals have over their behavior at home is significantly higher than it is at a tourist destination. At home they can arrange living conditions in ways that enable them to act in an environmentally friendly manner if they so wish. On vacation, however, they are faced with infrastructural circumstances beyond their control. This interpretation is supported by Berger and Corbin (1992), who state that central behavioral control enables individuals to translate attitudes into action. Further evidence is provided by the fact that the segment of Environmentally Friendly Individuals and the segment of Environmentally Friendly Tourists overlap to a very high extent. It is therefore reasonable to assume that these same individuals would have behaved in an environmentally friendly manner during their vacation just as they did at home had they had the opportunity to do so. The only factor other than behavioral control that could reduce tourists' environmentally friendly behavior on vacation would be the lack of identification with the region, a factor which has proven to play a role in environmental behavior in the home context.

These results have direct practical implications: firstly, additional empirical support has been provided for the fact that a segment exists which behaves in more environmentally friendly ways than others on vacation. This segment is strongly associated with the segment of those who behave in environmentally friendly ways at home. So while the association indicates that behaving in environmentally friendly ways is an intrinsic characteristic of some people, the fact that the overlap is not perfect also highlights that context factors, such as infrastructure available at the destination, do impact on the actual level of pro-environmental behavior on vacation. By attracting tourists who behave in an environmentally friendly manner, the environmental footprint of tourism at the destination can be reduced. It should be noted, however, that it is unlikely that this measure will reduce the global environmental footprint of tourist as an industry, because those tourists who do not behave in an environmentally friendly manner will take their vacations elsewhere. Secondly, if tourism destinations choose to supplement their supply-sided approach to environmental sustainability with a demand-sided approach, two pieces of information about tourists can provide some indication of their likelihood of behaving

in an environmentally friendly manner: their moral obligation to behave in an environmentally friendly way and their income.

These findings are of direct practical benefit to tourism industry. They can help to guide marketing strategies for environmentally sensitive areas, such as rural protected areas, sensitive urban historic areas, world heritage sites, etc. Also, findings could inform synergy marketing: mailing list of environmentally friendly consumers could be – with their permission – used to inform them not only about products which are environmentally friendly, but also about tourism destinations, accommodations, tourist attractions that are operated in an environmentally sustainable manner.

Future work is needed to develop the most efficient measure for moral obligation, the construct that appears to be central to pro-environmental behavior. The measure used in this study is a summated score over a number of behavioral variables. It is unlikely that tourists – when inquiring about travel options – would be willing to respond to a list of 30 behaviors. Preferably a single item measure should be developed to capture this personal characteristic. The use of a single item measure would make it practically viable to investigate up-front the likelihood of behaving in an environmentally friendly manner. The disadvantage, however, may be that the full range of possible pro-environmental behaviors is not captured. This could be addressed by identifying which single or small set of behaviors are perceived as most critical to the destination. Furthermore, it would be interesting to test whether one single question asking respondents about their pro-environmental behavior in general would be sufficient. In the present study a summated score across 30 variables was used for analysis. This was done in order to have a broad range of behaviors which were concrete and thus tangible for respondents. The disadvantage of this approach is that respondents have to respond to 30 questions. It may be, however, that one general item will not be able to capture environmental behavior as well, due to the higher level of abstraction and increased space for interpretation on the side of the respondent.

The present study is also limited by the fact that the dependent variable was not actual behavior but reported past behavior. One could hypothesize that respondents who would respond to questionnaire items in a biased way (be it because of specific scale usage patterns or social desirability bias) would do so for all questions, thus contributing to the strong association of reported moral obligation and reported pro-environmental behavior. To exclude this possibility with certainty follow-up research is needed with alternative measures of moral obligation and – optimally – observational data on pro-environmental behavior.

Another limitation is the fact that data was only collected in Australia. It is possible that results would differ in countries in which environmental issues are not as prominent a topic (e.g. USA) or more prominent a topic of public debate (e.g. Germany) as well as in developing countries.

Finally, this study led to new questions which should be studied in future. Given the central role of moral obligation, do people generally feel more or less morally obliged to behave in an environmentally friendly manner at a tourism destination? A hypothesis cannot be easily formulated. On the one hand it may be assumed that high regional identity will lead to higher moral obligation at home. On the other hand, it could be expected that being a guest in someone else's home increases the perceived moral obligation to behave appropriately on vacation.

Answering these questions would enable tourism destinations to better understand what prevents tourists behaving environmentally friendly and – if possible – provide the support they may be lacking. By doing so it may be possible to develop additional supply-sided measures informed by the demand side, and reduce the barriers of tourists to behaving environmentally friendly on vacation.

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