"A House in the Woods": Values, attitudes and behaviours towards Forests

MARIA-LUISA LIMA[1], SIBILA MARQUES[1] AND SÉRGIO MOREIRA[2]
[1]*Centro de Investigação e de Intervenção Social, ISCTE-Lisbon University Institute;*
[2]*EsPA-Estudos de Psicologia Social e Ambiente, Lisboa*

Abstract

Forests are an important source of resources, but public attitudes towards the forests have rarely been studied. This paper focus on this topic aiming at: (a) describing the attitude towards the forest and its correlates; (b) testing the hierarchic relationship between ecologic values, attitudes and use of the forest; and (c) testing the moderating role of attitudinal ambivalence in the association between attitudes and forest related behaviours. A sample of residents living close to forests was collected (N = 1206). Results show that the attitude towards the forest is quite favourable. More positive attitudes were found in the North, among those working in the forestry and those who live close. Universalistic values are associated with the use of the forest but this relationship was partially mediated by the attitude towards the forest. Finally, attitudinal ambivalence was a predictor of the behaviour, but not a moderator of the attitude behaviour association.

Keywords: Attitudes, ambivalence, values, forests.

"Una casa en el bosque": valores, actitudes y comportamientos sobre a los bosques

Resumen

Los bosques son una importante fuente de recursos, pero rara vez se estudian las actitudes de la gente hacia ellos. Este artículo se centra sobre este tema y persigue: a) describir la actitud hacia los bosques y sus correlatos; b) comprobar la relación jerárquica entre los valores y actitudes ecológicos y uso de los bosques; y c) comprobar el rol moderador de la ambivalencia actitudinal respecto a la asociación entre actitudes y comportamientos relacionados con los bosques. Se empleó una muestra de personas que residen en zonas cercanas a bosques (N = 1206). Los resultados muestran que la actitud hacia los bosques es bastante favorable. Se encontraron actitudes más positivas en el norte, entre aquellos con trabajos forestales y aquellos que viven más cerca del bosque. Los valores universales se asocian con el uso del bosque, pero esta relación estaba en parte mediada por la actitud hacia el bosque. Por último, la ambivalencia actitudinal apareció como un predictor del comportamiento, pero no como un moderador de la asociación entre actitud y comportamiento.

Palabras clave: Actitudes, ambivalencia, valores, bosques.

Acknowledgements: An earlier version of this paper was presented at the Conference of the International Association for People-Environment Studies (IAPS, 2008) in Rome, Italy.
The research presented in this paper is part of a larger study funded by Aliança Florestal (the company that manages the forests of the Portucel Soporcel Group) and it was conducted in the context of its forest certification process by the FSC (Forest Stewardship Council). The authors are extremely grateful to Engs Paula Guimarães and Pedro Moura from Aliança Florestal for all the support during the realization of this work.
Authors' Address: Maria Luisa Lima. Centro de Investigação e Intervenção Social (CIS/ISCTE-IUL), Ed. ISCTE, Av. das Forças Armadas, 1649-026 Lisboa, Portugal. E-mail: luisa.lima@iscte.pt.

Forests are an important source of natural and environmental resources, and also a source of economic activity. Forest products are used daily in our lives when we eat fruit, use paper, furniture, certain medicines or detergents. Besides, forests are essential to the balance of life in the planet, as they provide habitats to diverse animal species and they prevent soil erosion, the destruction of the water cycle and global warming. Forests are also used for various recreational activities and they are one of the most referred favourite places (Korpela, 2003; Korpela, Ylén, Tyrväinen, & Silvennoinen, 2009). However, the lack of care about the preservation of forest areas, the increasing rate of deforestation and the impressive area of burned forest each year call our attention to the human factors associated with the threat to the forest and to the maintenance of biodiversity in our planet. Understanding the views and interests of the communities surrounding woods is thus very important to implement a sustainable governance of the forests that can preserve its future and quality. This new form of forestry management that has been promoted both in the US (Siry, Cubbage & Ahmed, 2005; Twarkins, Fisher & Robertson, 2001) and in the EU (Kouplevatskaya, 2006; Ruppert-Winkel & Winkel, 2009) emphasizes the importance of the involvement of different stakeholders associated with the forest in a community-based forestry management. However, little is known about either the pro-environmental behaviour in the forests or the attitudes towards forests. In one of the few studies on the topic, Kraxner, Yang and Yamagata (2009) have shown that there is a general agreement about the forest as a symbol of nature and about the positive aspects of forest for the environment and climate, but the uses of forest or the protection strategies were not perceived consensually among the residents in the nearby villages. For this reason, it is important to fill this gap in the research of public attitudes towards the forests: this is the main focus of his paper. We aim:

– to describe the set of beliefs that underlie attitudes towards the forest that can be useful for future research on this domain

– to identify the socio-demographic correlates of attitude towards forests, in order to help designing more inclusive ways of managing forest areas and

– to understand the relationship of attitudes towards forests with behaviour, values and attitudinal ambivalence, in order to link this research with psychological literature.

Attitudes towards forests

Attitude, the more or less favourable position towards an object (Eagly & Chaiken, 1993), is supported by beliefs and constructed either on the basis of direct experience (in this case, the opportunities of spending time in the forest either for leisure or professionally) or indirect experience (such as environmental education, information delivered by the media or others). Some studies have shown that attitudes towards forests are important to understand the relationship that the local communities have with their natural environment and thus they are fundamental in the design of environmental intervention programmes. For example, The Missouri Department of Conservation analysed the attitudes towards forests among local residents (Constance & Rikoon, 1997), flood plain landowners (Treiman & Dwyer, 2002) and among local officials (Treiman & Gartner, 2004) as the basis for their environmental intervention and communication plans included in a broader forestry program. These applied studies show some regularity in the pattern of the attitudes of the residents. Younger and more educated persons, as well as those with an economic interest in the forest present a more favourable attitude towards the forest (Constance &

Rikoon, 1997, McFarlane & Boxall, 2000). Given the scarcity of results in this area, the lack of studies about this topic in other socio-cultural contexts and the economic value of forests, in this paper we aim to describe the attitude towards the forest attending to its socio-demographic correlates. We will verify if, in a very different social cultural context, the attitudes towards the forests show the same age and education profile. Besides, and in order to have a more comprehensive view of this attitude that can be useful for intervention with nearby communities, the beliefs supporting the attitude towards the forest will be explored and described.

The relationship of attitudes towards forests with behavior and values

Besides these more descriptive studies on the attitudes towards forests, others have aimed at applying theoretical frameworks to this topic. In general, these studies link attitudes to values, following a research tradition that emphasises the importance of human values to explain pro-environmental behaviours (e.g. Axelrod, 1994; Clark, Kotchen, & Moore, 2003; Dietz, Fietzgerald & Shwom, 2005; Stern, 2000). According to Schwartz (1992), a value is: "a desirable transsituational goal varying in importance, which serves as a guiding principle in the life of a person or other social entity (p. 21)." As values may affect a wide range of attitudes and behaviours, many studies in environmental psychology have examined the relationship between values, beliefs, intentions, and environmental behaviours (Nordlund & Garvill, 2002; Schultz & Zelezny, 1999; Stern & Dietz, 1994; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). Research on values has tried to identify wide categories of values that could be associated with specific beliefs and behaviours. The more general endeavour in this area was conducted by Schwartz (1992) who, based on data collected in 44 countries and 25,863 respondents, has identified 10 motivationally distinct basic values recognized across societies. Among them, universalism (one dimension of self-transcendance value orientation) was described as guiding environmental behaviour (e.g., Karp, 1996). In fact universalism includes the moral goals of tolerance and concern for the welfare of others, and in particular the protection of environment and the unity with nature (Schwartz, 2007). Other authors have proposed the aggregation of values into different sets. For example, in a specific attempt to understand environmental behaviours, Stern (2000) proposes three types of value orientations: egoistic, altruistic and biospheric values. Being focused on environmental goals, the level of specificity of the values in this proposal is much more congruent with the behaviours to be predicted. For this reason it is not surprising that this typology of values has had empirical support to predict environmental attitudes and behaviours (e.g., De Groot & Steg, 2007, 2008; Steg, Dreijerink, & Abrahamse, 2005; Stern, Dietz, & Guagnano, 1998). However, in order to maintain a more general approach to human values, other authors have used Schwartz's framework and shown that positive environmental attitudes correlate with self-transcendent value orientation (e.g., Castro & Lima, 2001, Stern, Dietz, Kalof, & Guagnano,1995), and specially universalism values are positively associated with pro-environmental beliefs and attitudes (Schwartz, 1992; Schultz & Zelezny, 1999). Whatever the content of the values studied, a hierarchical approach between values, attitudes and behaviors has been proposed and tested by different authors (e.g., Steg et al., 2005). Environmental attitudes (or sometimes environmental beliefs) are conceived as mediators between values (as general guiding frames of reference) and specific pro-environmental behaviours (e.g., Vaske & Donnelly, 1999).

As far as forests are concerned, this hierarchical model has also been tested by McFarlane and colleagues (McFarlane & Boxall, 2000; 2003; McFarlane & Hunt, 2006), using not the attitudes towards forests but the attitudes towards sustainable management of the forests. McFarlane & Boxall (2000) studied the attitudes towards forest management in a sample of Canadian forest users (about 1500 campers and hunters from Alberta). Their work shows that the attitudes toward forest management is associated to ecological values: those who held higher biocentric scores were less supportive of current economic oriented management of the forests and conversely, individuals scoring higher on anthropocentric values were more supportive of those practices. Other studies of the same team focused on the attitudes towards sustainable management of the forests among representative samples of residents in the province of Alberta (McFarlane & Boxall, 2003) and in the province of Ontario (McFarlane & Hunt, 2006). Although there are important regional differences among the two samples, the relationship between the ecological values and the favourable attitudes towards a sustainable forests management was the same: support to sustainable forest management was associated with the prevalence of ecologic values over anthropocentric ones (McFarlane & Hunt, 2006). Besides, in these studies behaviour was also assessed: they included the self-report evaluation of environmental activism in the forest sector (for example, boycotting forest-related consumer products, participating in a protest about a forest management issue, calling or writing a forestry official or attending a public meeting on forest issues). In both cases attitudes towards a sustainable forest management was well associated with the activist behaviour and mediated the association between a biocentric value orientation and behaviour.

Following these studies, the present work intends to test the hierarchic relationship between values, attitudes and behaviour. Contrarily to the other studies done in the area of forest management, we will focus specifically on the attitudes towards forests and on the behaviours associated with the use of the forest, and will try to show their association with a general human value (the universalism orientation).

The role of attitudinal ambivalence

In this study we also wanted to go a bit further and introduce in this area those results of research in social psychology that call our attention to the complex relationship between attitudes and behaviour. Among the variables that moderate this relationship, attitudinal ambivalence has recently received attention from different researchers. Attitudinal ambivalence may be defined as having (at the same time) both positive and negative evaluations towards an object, issue or behaviour (Kaplan, 1972, Thompson, Zanna, & Griffin, 1995). In the traditional conceptualization of attitudes this is as a bipolar construct, opposing positive to negative views of an attitudinal object. However, there is evidence that attitudes include often simultaneously positive and negative evaluations (i.e., they are ambivalent). For example, one person can have positive attitudes towards the forest, because it is beautiful and full of life, and simultaneously negative feelings of fear and insecurity because it is obscure and frequently home to wildlife. In fact, research has shown that attitudinal ambivalence is an important variable to consider in the prediction of pro-environmental behaviour. However, some authors consider it as a direct predictor of behaviour (Costarelli & Colloca, 2004) while others as a moderator of the association between attitudes and behaviours (Castro, Garrido, Reis & Menezes, 2009). This last suggestion is in line with recent research done in

other application areas that shows that the association between attitudes and behaviour is much stronger for non-ambivalent individuals than for those holding ambivalent attitudes (e.g., Armitage & Conner 2000; Batista & Lima, 2006; Conner & Sparks, 2002). In summary, as attitudinal ambivalence seems to be an important variable to understand behaviour, we also wanted to test its role for the particular case of forests. Following previous results in the research, we expect attitudinal ambivalence to act as a moderator in the attitudes-behaviour link: we expect that the association between attitudes and behaviours towards forests will be stronger for participants with lower levels of ambivalence.

Method

Procedure

This study was conducted in the context of the forest certification process by the FSC of the biggest forest owner company in Portugal, and it aimed at representing the residents in the vicinity of the forest areas managed by this company; for this reason, the sample for this study was stratified according to the areas where this company operates. However, within each area the sample was representative of the sociodemographic characteristics of the residents with a .05 level of error. That was assured by the extraction of a random sample of the residents using a random route strategy to collect the participants for this study. The overall response rate (including non-contacts and refusals) was 73%. Due to the low level of education of the population in the areas, data was collected through a direct interview, with a structured questionnaire. The interviews were conducted by trained interviewers, and they took place in the resident's house, by the end of the day or during the week-ends.

Participants

1206 persons (46% men) living close to forests participated in this study. The sample included residents from the areas where there is more forestry activity in Portugal, and that included residents either from the North (49.9%) and the South (50.1%) of Portugal. Extracted mainly from the interior and rural areas of the country, this sample portraits the problems of depopulation and aging in these regions of the country. Although the age ranged from 17 to 91 years old, 50% had more than 55 years (M = 54.4; SD = 18.1) and in average, they live in the same area for 42 years (SD = 22). Besides, only 47% were active workers, as almost one third of the sample was retired (33%) and 13% were housewives (the remaining important non-active categories were students –3%– and unemployed persons –3%–). The participants had also low levels of education: 68% of the sample only completed until 4 years of education.

The sample was collected among residents in the vicinity of forest areas. The participants were asked to estimate the distance from their house to the forest. The average value of this perceived distance was 1.48 km. (= .92 miles; SD = 4.50 km. = 2.79 miles), showing that most of the sample reported high levels of proximity to the forest. In fact, 88.5% of the sample described their residence as close or very close to the forest. As a consequence of this proximity, 82% of our respondents reported having experienced forest fires at least once in their area of residence in the past 4 years. 35% of our sample were involved in fighting those fires and 24% lost something when they happened.

Many of our respondents owned land: 9% were owners of forestry, 17% owners of agricultural land and 20% owned land of both kinds, as it is common

in the traditional forms of the Portuguese agriculture. In a whole, 359 participants (30%) were direct or indirectly involved in the forestry activities: 17% of our respondents say that their work is related to forestry and 23% have family or friends who work in that area.

Instruments

Beliefs about the forest. Different consequences associated to the forest were identified through the literature and interviews with experts. A group of sixteen phrases were created in order to tap all that diversity, including items referring to the ecological functions of the forest ("It protects the wild life"; "It preserves the rivers"), its economic functions ("It creates jobs"; "It promotes tourism in this area"), its negative aspects ("It increases criminality"; "It impoverishes the soils") or its leisure aspects ("It makes the landscape more beautiful"). For each of the phrases the participant was asked to state his or her opinion in a 5 point scale (1: *completely disagree*; 5: *completely agree*).

Besides, two items were included to evaluate the support to politics that promote the expansion of the forest area. Participants were asked to give their opinion on what should be envisaged for the forest area both in their region and in Portugal. The answer was given in a 5 point Likert-type scale ranging from 1 (*the forest area should be substantially reduced*) to 5 (*the forest area should be substantially increased*; 3: *the forest area should stay as it is*). The two items presented good internal consistency (*Cronbach alpha* = .88) and an average index was computed, where high levels indicate strong endorsement to the expansion of the forest area.

Attitude towards the forest. The attitude indicator uses the average of the questions described above (after inverting the negative risk items) averaged with the affective evaluation of the forest: "When I am in the forest I feel" (1: *very badly*; 5: *very well*). The overall index includes thus a cognitive dimension (beliefs) and an affective one and ranges from 1 (*very negative attitudes towards the forest*) to 5 (*very positive attitudes towards the forest*)[1]. The value of the Cronbach alpha for the items included in the index was .72.

Attitudinal ambivalence towards the forest. Attitudinal ambivalence was assessed with the indirect closed measurement proposed by Thompson *et al*. (1995). Positive and negative evaluations of forests were done separately. For the positive component (P), we asked participants to first think about their evaluations of forests, considering only positive characteristics and ignoring negative ones, posing the question "How positive is your evaluation of forests?". The response scale ranged from 1 (*in no way positive*) to 4 (*very positive*). To access the negative component (N), we followed the reverse procedure, i.e. we asked them to answer the questions only considering negative characteristics of the forests, with responses ranging from 1 (*in no way negative*) to 4 (*very negative*). The equation proposed by Griffin was used to calculate ambivalence:

$$\text{Ambivalence} = [(P + N)/2 - |P - N|\,(+0.5)] / 4.5$$

Where *P* is the positive component, *N* is the negative component, the constant 0.5 is used to avoid negative values (Thompson *et al*., 1995) and the constant 4.5 is used so that the ambivalence indicator ranges from 0 (*in no way ambivalent*) to 1 (*highly ambivalent*) (see Batista & Lima, 2010; Conner & Sparks, 2002).

Universalism values. For the measurement of universalism values we used the corresponding items from the Portuguese version (Ramos, 2006) of the most recent values scale by Schwartz, named PVQ (Portrait Values Questionnaire, Schwartz, 2001; Schwartz, et al., 2001). Participants are instructed to indicate

their perceived individual similarity to several portraits ("A person that likes to listen to different opinions"; "A person that believes that all should be treated equally", and "A person that believes in the protection of Nature"), and the answers were given in a six point scale (1: *not at all like me*; 6: *exactly like me*). As the three items presented good internal consistency (*Cronbach alpha* = .82) an average index was computed, where high levels indicate strong endorsement of that value.

Behaviour in the forests. A set of 9 behaviours that represent the different uses of the forest were identified. For each, the respondent was asked to assess its frequency in a five point scale (1: *never*; 2: *once a year*; 3: *a couple of times a year*; 4: *once a month*; 5: *more than once a month*). An exploratory factor analysis performed on that data identified three factors: leisure behaviour (5 items, including "To walk in the forest"; "To picnic in the forest"; "To drive in the forest (motorcycles, bicycles or jeeps)"; "To camp in the forest"; "To fish or hunt in the forest"; *Cronbach alpha* = .62); recollection behaviour (2 items: "To collect hood in the forest"; "To collect fruits or seeds in the forest", $r(1196) = .36$, $p < .001$) and destructive behavior (2 items, "To leave waste in the forest"; "To do fires in the forest", $r(1200) = .18$, $p < .001$). This last correlation although significant is very low, and this index was only considered because it addresses a very interesting group of anti-environmental behaviours; the interpretations will be very careful.

Characterization of the participants. The participants in this study were also asked to answer a set of questions that aimed at defining their sociodemographic attributes: sex, age, education, social class, region of the country (North vs. South), and length of residence in that area. Besides, some questions were introduced in order to clarify the personal interests in the forest ("Is your professional activity related to the forest?", "Do you have any friends or members of your family that have professional activities related to the forest?", "Do you own any land with forest?") and to assess the proximity to the forest (perceived distance of the residence to the forest area).

Results

This paper focus on the attitudes towards forests, and one of the goals was to describe it and identify its socio-demographic correlates. Results show that the general attitude towards the forest is positive ($M = 3.74$, $SD = .47$, see also Table II). In fact, 87% stated that they feel well or very well in the forests and only 16% expressed a negative attitude (overall index lower than 3).

The socio-demographic variables (sex, age, education, social class, region, length of residence, interests in the forest, perceived distance) were regressed to the attitude towards the forests in order to identify its predictors, but the level of explanation was low (Table III). Only the fact of having a professional activity related to the forest (*Beta* = .138), region (*Beta* = -.145), length of residence (*Beta* = .122), social class (*Beta* = .110) and perceived distance (*Beta* = -.080) were significant predictors. These results stand for more positive attitudes towards the forests among those who have interests in the forest ($M = 3.79$, $SD = .47$) and by those living in the North ($M = 3.80$, $SD = .47$), as compared to those who do not have interests in the forest ($M = 3.69$, $SD = .46$) and those who live in the South ($M = 3.68$, $SD = .46$). Long-time residents in the area, persons from higher social class and those who declare living closer to the forest presented also a more positive attitude. Contrarily to previous studies, gender, age and education were not related to the attitude towards forests.

TABLE I

Principal Component Analysis (orthogonal rotation) on items concerning the beliefs about the forest: factor loadings, explained variance of the factors and reliability indexes

Items	Factor1	Factor2	Factor3
It makes the air cleaner	**.751**	.138	-.156
It makes the landscape more beautiful	**.722**	.152	-.131
It provides wood for different uses	**.587**	.208	.027
It protects the wild life	**.512**	.445	-.233
It promotes tourism	-.016	**.689**	.039
It creates leisure spaces	.195	**.609**	-.055
It creates jobs	.182	**.576**	.074
It increases rain	-.017	**.569**	.272
It preserves the rivers	.420	**.492**	-.288
It provides food (e.g., fruits, mushrooms, honey)	.414	**.490**	-.003
It impoverishes the soils	-.190	-.022	**.646**
It increases the isolation of communities	.247	-.029	**.607**
It ruins the roads	-.369	.182	**.606**
It increases the risk of fire	.536	-.215	**.541**
It increases criminality	-.182	.149	**.524**
Explained variance	*17.77*	*15.8*	*13.23*
Cronbach alpha	*.77*	*.66*	*56*
Mean inter-item correlation	*.46*	*.24*	*.20*

TABLE II

Descriptive statistics and correlations between the variables

	1	2	3	4	5	6	7	8	9	10
1.General attitude										
2.Beliefs: Ecological benefits	.45**									
3.Beliefs: Economical benefits	.44**	.46**								
4.Beliefs: Risks	-.34*	-.19**	.07*							
5.Beliefs: Support to the expansion of forest	.19**	.19**	.17**	-.04						
6. Attitudinal ambivalence	-.15**	-.12**	-.06*	.10**	-.02					
7. Values: Universalism	.21**	.27**	.16**	-.15**	.14**	-.13**				
8. Behaviour: Leisure	.19**	.07*	.12**	.-.06	.11**	-.11**	.17**			
9. Behaviour: Recollection	.21**	.15**	.21**	-.04	.07*	-.08**	.10**	.35**		
10. Behaviour: Destruction	.07*	-.03	.08*	.00	-.00	-.01	-.02	.09**	.26**	
Mean	3.74	4.32	3.77	3.02	3.74	.39	4.61	1.82	2.09	1.10
Standard deviation	.47	.55	.53	.64	.72	.21	.83	.74	1.09	.34
Min	1.81	2.00	1.67	1.20	1.00	0.00	2.00	1.00	1.00	1.00
Max	4.86	5.00	5.00	5.00	5.00	1.00	6.00	5.00	5.00	5.00
Median	3.70	4.25	3.83	3.00	4.00	.44	4.67	1.80	2.00	1.00

** $p < .01$; * $p < .05$

Another of the goals of this study was to describe the beliefs that support the attitudes towards the forest. In order to identify the underlying dimensions of beliefs about forests, an exploratory Principal Component Analysis with orthogonal rotation was conducted on the 15 belief items. As it can be seen in Table I, three factors were extracted using the Kaiser criterion: Ecological benefits, Economical benefits, and Risks associated to the forest. Reliability analyses for this factors included Cronbach apha and the mean inter-item correlation, following the recommendations by Briggs and Cheek (1986) to include a clearer measure of items homogeneity in exploratory data analyses.

TABLE III
Regression of the socio-demographic predictors on attitude and beliefs towards the forest (Beta values and multiple regression statistics)

Socio-demographic variables	General attitude	Ecological benefits	Economical benefits	Risks	Expansion
Sex (1 = M; 2 = F)	-.020	-.003	-.039	.012	.001
Age	-.058	-.111**	-.039	.039	-.085*
Education	.020	-.036	-.010	-.036	.042
Social class	.110**	.154**	.130**	-.027	.063
Region (1 = North; 2 = South)	-.145**	-.078**	.146**	.313**	-.162**
Length of residence	.122**	.088**	.133**	-.072*	.126**
Professional interest	.138**	.110**	.134**	-.060*	.006
Perceived distance	-.080*	-.094**	-.093**	.017	-.013
Adj.R²	*.062*	*.052*	*.084*	*.099*	*.042*
F(7, 1193)	*10.96*	*9.22*	*14.75*	*17.47*	*7.68*
p	*.001*	*.001*	*.001*	*.001*	*.001*

** $p < .01$; * $p < .05$

They consider the optimal value of this indicator to be between .2 and .4 (p. 115). Average indexes were computed for each of the three factors. Overall, the most salient belief (see Table II) was the one related with ecological benefits (M = 4.31; SD = .55), followed by economic benefits (M = 3.77; SD = .53) and the risks (M = 3.02; SD = .64). One other group of beliefs related to the forest was considered: the support for the expansion of forest areas. The descriptive variables show a clear support for these politics, with 54% of the respondents stating that the forest area should be increased or significantly increased.

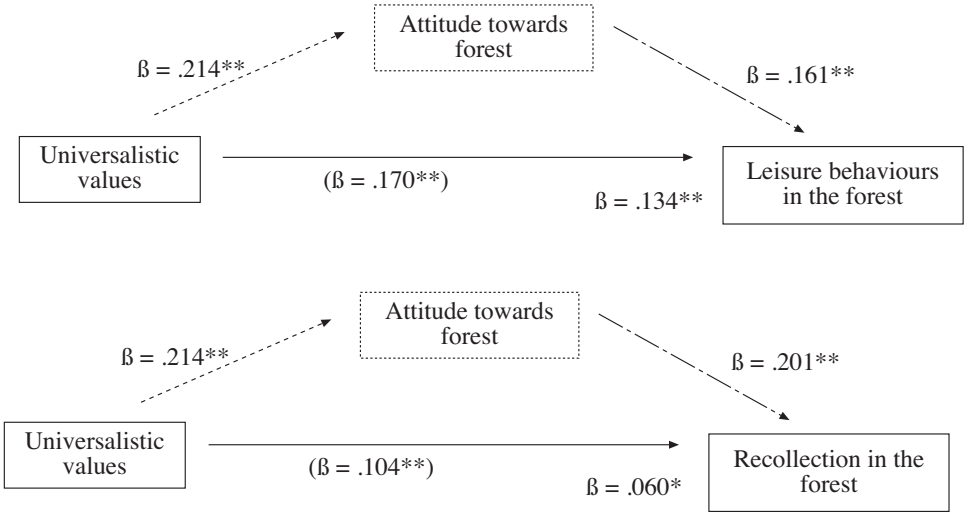
The socio-demographic predictors of these beliefs were also analyzed (Table III). In general, the level of explanation obtained is very low and the region is the most consistent predictor, with the residents in the North stressing the ecological benefits and the support to expansion of forest areas and in the South focusing more on the risks and the economic benefits of the forest. Professional interest in the forest and length of residence in the area were also consistently associated to the perception of higher benefits and lower risk. Younger respondents, as well as those from higher social origin, perceive more ecological and environmental benefits in the forest. Perceived distance was also related to these variables, with those who live closer to the forest area perceiving more benefits.

Finally, the self-reported behaviour in the forest was described (see Table II). In our sample, the most common self reported behaviour in the forest was recollection (M = 2.09; SD = 1.09), followed by leisure (M = 1.81; SD = .73). Destructive behaviour was very rarely reported (M = 1.10; SD = .34). However, these types of behaviour are consistently associated with the attitudes and beliefs towards the forest (Table II): leisure and recollection behaviours are positively associated with attitudes and perceived benefits, but they have no relationship with perceived risks in the forest. Interestingly, the self-reported destructive behaviour is weakly but positively associated with attitude and perceived economic benefits. Although the correlations are very low and the reliability of the measure is weak, this result suggests that those who state to have performed destructive behaviours have a more positive attitude towards the forest and they recognize its economical benefits.

This paper also sought to test the hierarchic model of values, attitudes and behaviour in this specific area. To this end, we analysed the data using the procedure proposed by Baron & Kenny (1986) to test mediation relationships

(results are summarized in Figure 1). As we have seen above, attitudes are associated with self-reported behaviour, which is a precondition to assume mediation. Universalistic values are associated with attitudes towards the forest, ß = .214; $p < .001$; $Adj\ R^2 = .045$; $F(1, 1202) = 57.82$; $p < .001$: the more the participants hold universalist values, the more they have positive attitudes towards the forest. Besides, universalist values also predict use of the forest for leisure activities, ß = .170; $p < .01$; $Adj\ R^2 = .029$; $F(1, 1197) = 35.44$; $p < .001$, and also for recollection behaviour, ß = .104; $p < .01$; $Adj\ R^2 = .010$; $F(1, 1194) = 13.14$; $p < .001$. However, these relationships are partially mediated by the attitude towards the forest. In fact, when attitudes and values are simultaneously used as predictors of behaviours, the importance of the value as direct predictor decreases both for leisure behaviour (ß = .134; $p < .01$) and for recollection behaviour (ß = .060; $p < .02$), while attitudes are better predictors in both cases (leisure behaviour: ß = .161; $p < .001$; $Adj\ R^2 = .052$; $F(1, 1195) = 33.70$; $p < .001$; recollection: ß = .201; $p < .001$; $Adj\ R^2 = .048$; $F(1, 1192) = 20.93$; $p < .001$). No association between values and destructive behaviour was found. The mediation of attitudes for both positive behaviours was tested with the Sobel test. As expected, it showed significant effects both for leisure, $z = 4.535$, $p < .001$, and for recollection behavior, $z = 5.119$, $p < .001$. As a whole, we could find partial support for the hypothesized hierarchical model.

FIGURE 1
Partial mediation of attitudes in the values-behaviour relationship: leisure and recollection behaviours



Note: A full line corresponds to the direct link between values and behaviour, while the others correspond to the mediation path. Values in brackets correspond to the initial Beta of the regression, before the introduction of the mediator -attitudes- as predictor.)

Finally, in order to answer our last research question, the role of attitudinal ambivalence was tested. Although the level of ambivalence was low (in a 0-1 scale, $M = .39$; $SD = .21$; $Me = .44$), we could still find 178 persons with levels of ambivalence higher than .50, the theoretical mean value of the scale that ranges from 0 to 1). Attitudinal ambivalence was negatively associated with leisure, $r(1193) = -.109$; $p = .001$ and recollection behaviour, $r(1190) = -.082$; $p = .005$, but no relationship was associated with destructive behaviour in the forests, $r(1194) = -.012$; $p = .677$. Although the behaviour of ambivalent

participants is more inconsistently associated to attitudes, the moderator role of attitudinal ambivalence in the attitude behaviour relationship had no empirical support, following the procedure developed by Baron and Kenny (1986). Results showed non significant R square changes after the introduction of the interaction (attitude * ambivalence) term in the regression, in order to predict behaviour, even when the sample was reduced to the more extreme participants as some other authors have done (e.g. Castro et al., 2009). This result does not support the moderating role of ambivalence in this context, but suggests the importance of attitudinal ambivalence as a direct predictor of behaviour.

Discussion

This paper described attitude towards forests and analysed its determinants and consequences in a national sample of Portuguese residents who live near woodland areas, and who have a strong experience with this type of environment. This study was conducted as part of a larger survey included in the certification process of a forest company. The aims of this survey were mainly applied ones, and for this reason some limitations were imposed to the length of the data collection instrument that should be considered when analysing these results.

First of all, our results showed a very positive attitude and a very low level of attitudinal ambivalence towards the forest. This result is not unexpected, as previous research has shown that forests are locations often referred as favourite places (Korpela, 2003; Korpela *et al.,* 2009). Besides, attitudes based on direct experience are usually stronger and more stable than those based on indirect experience (e.g., Fazio & Zanna, 1978; Regan & Fazio, 1977). As the sample had a direct experience of forests, their attitude should be stronger and thus less ambivalent.

The sets of beliefs that support this positive attitude were summarized into three types: ecological benefits, economical benefits and risks. Similarly to what had been found in previous research (Kraxner *et al*., 2009) our results show that the ecological dimension is more salient than the economic one. As other authors have found (Constance & Rikoon, 1997, McFarlane & Boxall, 2000), residents with professional interests in the forest showed more positive attitudes. However, we could not replicate previous results that indicated a relationship with age, gender or education. In our sample only the region (living in the North) and the proximity to the woods were associated to more favourable attitude towards the forest. The different pattern of socio-demographic predictors in our study needs more investigation, as it calls our attention to either possible cultural effects in the relationship with the forest, or to different patterns of human interaction with specific types of trees, climates or ground relief. In fact, in the North the forest has more pine trees and levels of water in atmosphere are higher, while in the South *Quercus* and *Eucalyptus* are predominant and the weather warmer and drier. Those differences can induce dissimilar types of activities and interactions with nature. However, we should also underscore the very low level of explanation of these variables in the prediction of attitudes towards the forest (especially if we consider the dimension of the sample and power of the statistical tests used). In fact, only 7% of the variance was explained by socio-demographic variables, and that value rises to 37% when beliefs are introduced in the regression equation. This group of fragile associations can be interpreted in different ways. First of all we should note that the reliability of our measures was not high. As this research had an applied character, short versions of two or three exploratory items were

included, and that made it difficult to achieve high levels of internal consistency. Another factor to be considered was the lack of variability that some items showed. A possible explanation for this result can be a ceiling effect, considering the high positivity of the attitude towards the forest and the low standard deviations. We should bear in mind that our sample was very homogeneous. It only included residents who live near the forests and thus excluded urban participants, with less direct experience of forests. But the high level of consensus in the response to some questions calls our attention to a possible normative value of the responses (for example, beliefs about the environmental functions of the forest, or self-reported destructive behaviour) inducing, by social desirability, a consensual response that hides the diversity of positions. This bias should be considered in future research. However, we think that this set of items is a good start to develop a scale of beliefs about the forest that can be used in certification processes, instead of unreliable single item measures as it is often the case. As a whole, however, the associations between variables are extremely weak, and that was a major disappointment for us as researchers.

The hierarchical model between universalistic values, attitudes towards forest and behaviour in the forest received partial support in the case of leisure behaviour and recollection behaviour in the forest. In fact, holding values that stress equality, tolerance and the protection of nature seems to enforce positive attitudes towards the forest and that leads to positive behaviours in the woods. These results are congruent with others found either for environmental behaviours in general (e.g., Stern 2000; De Groot & Steg, 2007, 2010) or for the management of forests in particular (McFarlane & Boxall, 2000; McFarlane & Boxall, 2003; McFarlane & Hunt, 2006). However, the hierarchic model is not applied to the destructive behaviour in the forest. Thus, although there is a positive association between the attitude towards the forest and the destructive behaviour, attitude does not seem to play a mediator role in the relationship between values and behaviour. This result needs some reflection, because it is the first time that this variable has been evaluated. In fact, participants with destructive behaviours have positive attitudes towards the forest, they use it for leisure and for recollection, and they recognize the benefits of the forest. One possible explanation is that this group of persons does not recognize as environmental problems doing fires in the forest or leaving waste there. Another possibility is that they do not consider themselves responsible of preventing fires. Both these interpretations have the same applied consequence: the need for specific information campaigns about good practices in the use of the forest.

Finally, the role of ambivalence towards the forest was analysed (the first time this variable was used in this context), and the pattern of results can be useful in the field of studies on attitudinal ambivalence. Similarly to the results of Costarelli and Colloca (2004) attitudinal ambivalence was found to be a predictor of behaviour towards the forests: ambivalence was associated with less leisure and recollection behaviour in the forests, although the associations were weak. The moderator role of attitudinal ambivalence in the attitude-behaviour link was also tested, but our analyses could not find any support for this hypothesis. Once again a floor effect can also be invoked to justify the lack of clearer results, as only 15% of the respondents showed levels of attitudinal ambivalence superior to .50.

This research was done in the applied context of the forest certification where the views of the residents were taken into account in order to promote a sustainable governance of the forests. If the different stakeholders are to be involved in the forestry management, it is important to know not only their information level, but also how they think and feel about this important

resource and their role in this process. Local involvement and engagement with the forest management is essential either to ensure that the forest fits the community needs and to guarantee a stable ecological balance. This paper is the first one to clearly address this topic with psychometrically based measures, and with theoretically validated instruments from environmental and social psychology. However, our sample was limited to residents living near the forests and a more general one (especially including urban areas) should be used in order to understand the specific characteristics of the group we studied. In particular, as the research published in this area is mainly from overseas (USA, Japan), and as we found some differences between regions within Portugal, more research is needed to understand cultural differences in the way people relate to the forest, and therefore to develop more efficient ways of promoting sustainable ways for managing our woodlands.

Notes

[1] The measures of attitude towards the forest and beliefs about the forest are partially confounded, since the same items are used to compose scores on both constructs. However, the concept of attitude is very well connected with that of belief, which constitutes its cognitive component. Moreover, in the analyses to test the hypothesis the two variables were never used together.

References

ARMITAGE, C. J., & CONNER, M. (2000). Attitudinal ambivalence: A test of three key hypotheses. *Personality and Social Psychology Bulletin, 26*, 1421-1432.

AXELROD, L. J. (1994). Balancing personal needs with environmental preservation: identifying the values that guide decisions in ecological dilemmas. *Journal of Social Issues, 50*, 85-104.

BARON, R. & KENNY, D. (1986). The moderator-mediator variable distinction in social psychology research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173-1182.

BATISTA, M., & LIMA, M. L. (2006). Ambivalência e consistência entre atitudes e comportamentos alimentares. In N. R. Santos, M. L. Lima, M. M. Melo, A. A. Candeias, M. L. Grácio, & A. A. Candeias (Orgs.), *Actas do VI Simpósio Nacional de Investigação em Psicologia* (CD - Vol. I, pp. 161-177). Évora: Departamento de Psicologia da Universidade de Évora.

BATISTA, M. T., & LIMA, M. L. (2010). Selecção de estímulos alimentares ambivalentes e comparação de medidas em quatro indicadores de ambivalência atitudinal. *Laboratório de Psicologia*, *8* (1), 121-148.

BRIGG, S. R., & CHEEK, J. M. (1986). The role of factor analysis in the development and evaluation of personality scales. *Journal of Personality, 54* (1), 106-148

CASTRO, P., & LIMA, M. L. (2001). Old and new ideas about the environment and science: an exploratory study. *Environment & Behavior, 33,* 400-423.

CASTRO, P., GARRIDO, M., REIS, R., & MENEZES, J. (2009). Ambivalence and conservation behaviour: An exploratory study on the recycling of metal cans. *Journal of Environmental Psychology, 29*, 24-33.

CLARK, C. F., KOTCHEN, M. J., & MOORE, M. R. (2003). Internal and external influences on pro- environmental behavior: participation in a green electricity program. *Journal of Environmental Psychology, 23*, 237-246.

CONNER, M., & SPARKS, P. (2002). Ambivalence and attitudes. *European Review of Social Psychology, 12*, 37-70.

CONSTANCE, D., & RIKOON, J. (1997). *Missouri Citizens' Attitudes Towards Forest Resources: Comparative and Present Perspectives*. Available online at http://www.mdc.mo.gov/forest/research/survey.htm

COSTARELLI, S., & COLLOCA, P. (2004). The effects of attitudinal ambivalence on pro-environmental behavioural intentions. *Journal of Environmental Psychology, 24*, 279-288.

DE GROOT, J. I. M., & STEG, L. (2007). Value orientations and environmental beliefs in five countries: validity of an instrument to measure egoistic, altruistic and biospheric value orientations. *Journal of Cross-Cultural Psychology, 38*, 318-332.

DE GROOT, J. I. M., & STEG, L. (2008). Value orientations to explain environmental attitudes and beliefs: how to measure egoistic, altruistic and biospheric value orientations. *Environment and Behavior, 40* (3), 330-354.

DE GROOT, J. I. M., & STEG, L. (2010). Relationships between value orientations, self-determined motivational types and pro-environmental behavioural intentions. *Journal of Environmental Psychology, 30,* (4), 368-378. DOI:10.1016/j.jenvp.2010.04.002

DIETZ, T., FIETZGERALD, A., & SHWOM, R. (2005). Environmental values. *Annual Review of Environmental Resources, 30,* 335-372.

EAGLY, A. H., & CHAIKEN, S. (1993). *The psychology of attitudes.* Fort Worth: Harcourt Brace Jovanovich

FAZIO, R. H., & ZANNA, M. P. (1978). On the predictive validity of attitudes: The roles of direct experience and confidence. *Journal of Personality, 46*, 228-243.

KAPLAN, K. J. (1972). On the ambivalence-indifference problem in attitude theory and measurement: A suggested modification of the semantic differential technique. *Psychological Review, 77,* 361-372.

KARP, D. G. (1996). Values and their effect on proenvironmental behavior. *Environment and Behavior, 28,* 111-133.

KORPELA, K. M. (2003). Negative mood and adult place preference. *Environment & Behavior, 35*, 331-346.

KORPELA, K. M., YLÉN, M., TYRVÄINEN, L., & SILVENNOINEN, H. (2009). Stability of self-reported favourite places and place attachment over a 10-month period. *Journal of Environmental Psychology, 29* (1), 95-100.

KOUPLEVATSKAYA, I. (2006).The involvement of stakeholders in a forest policy reform process: Democracy promotion and power redistribution. *Swiss Forestry Journal, 10*, 483-490.

KRAXNER, F., YANG, J., & YAMAGATA, Y. (2009). Attitudes towards forest, biomass and certification – A case study approach to integrate public opinion in Japan. *Bioresource Technology, 100*, 4058-4061.

MCFARLANE, B. L., & BOXALL, P. C. (2000). Factors Influencing Forest Values and Attitudes of Two Stakeholder Groups: The Case of the Foothills Model Forest, Alberta, Canada. *Society & Natural Resources, 13*, 649-661.

MCFARLANE, B. L., & BOXALL, P. C. (2003). The role of social psychological and social structural variables in environmental activism: an example of the forest sector. *Journal of Environmental Psychology, 23*, 79-87.

MCFARLANE, B. L., & HUNT, L. M. (2006). Environmental activism in the forest sector: Social psychological, social-cultural, and contextual effects. *Environment & Behavior, 38*, 266-285.

NORDLUND, A. M., & GARVILL, J. (2002). Value structures behind proenvironmental behaviour. *Environment and Behaviour, 34*, 740-756

RAMOS, A. (2006). Social values dynamics and socio-economic development. *Portuguese Journal of Social Science, 5*, 35-64.

REGAN D. T., & FAZIO R. (1977). On the consistency between attitudes and behavior: Look to the method of attitude formation. *Journal of Experimental Social Psychology, 13*, 28-45.

RUPPERT-WINKEL, C., & WINKEL, G. (2009). Hidden in the woods? Meaning, determining, and practicing of 'common welfare' in the case of the German public forests. *European Journal of Forest Research*. DOI: 10.1007/s10342-009-0335-x.

SCHULTZ, P., & ZELEZNY, L. (1999). Values as predictors of environmental attitudes: Evidence for consistency across 14 countries. *Journal of Environmental Psychology*, *19*, 255-265.

SCHWARTZ, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology, 25*, 1-65.

SCHWARTZ, S. H. (2001). A proposal for measuring value orientations across nations: suggestions for ESS core module. Retrieved March 19, 2010 from http://www.europeansocialsurvey.org/index.php?option = com_docman&task = doc_view&gid = 126&Itemid = 80.

SCHWARTZ, S. H. (2007). Universalism values and the inclusiveness of our moral universe. *Journal of Cross-Cultural Psychology, 38*, 711-728.

SCHWARTZ. S. H., MELECH. G., LEHMANN. A., BURGESS. S., HARRIS. M., & OWENS. V. (2001). Extending the cross-cultural validity of the theory of basic human values with a different method of measurement. *Journal of Cross-Cultural Psychology, 32,* 519-542.

SIRY, J. P., CUBBAGE, F. W., & AHMED, M. R. (2005). Sustainable forest management: global trends and opportunities. *Forest Policy and Economics, 7*, 551-561.

STEG, L., DREIJERINK, L., & ABRAHAMSE, W. (2005). Factors influencing the acceptability of energy policies: testing VBN theory. *Journal of Environmental Psychology, 25* (4), 415-425.

STERN, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues, 56*,407-424.STERN, P. C., & DIETZ, T. (1994). The value basis of environmental concern. *Journal of Social Issues, 50*, 65-84.

STERN, P. C., DIETZ, T., ABEL, T., GUAGNANO, G. A., & KALOF, L. (1999). A value belief norm theory of support for social movement: The case of environmental concern.*Human Ecology Review*, *6*, 81-97.

STERN, P. C., DIETZ, T., & GUAGNANO, G. A. (1998). A brief inventory of values. *Educational and Psychological Measurement, 58*, 984-1001.

STERN, P. C., DIETZ, T., KALOF, L. & GUAGNANO, G. A. (1995). Values, beliefs, and pro environmental action: Attitude formation toward emergent attitude objects. *Journal of Applied Social Psychology, 25,* 1611-1638

THOMPSON, M. M., ZANNA, M. P., & GRIFFIN, D. W. (1995). Let's not be indifferent about (attitudinal) ambivalence. In R. E. Petty & J. A. Krosnick (Eds.), *Attitude Strength: Antecedents and Consequences* (pp. 361-386). Hillsdale, NJ: Lawrence Erlbaum

TREIMAN, T., & DWYER, J. (2002). *Missouri River Floodplain Landowners Survey – Final Report. Forest Research Report No. 3*. Jefferson City: Missouri Department of Conservation.

TREIMAN, T., & GARTNER, J. (2004). Community forestry in Missouri, U.S.: Attitudes and knowledge of local officials. *Journal of Arboric*, *30,* 205-213.

TWARKINS, M., FISHER, L., & ROBERTSON, T. (2001). Public Involvement in Forest Management *Planning. Journal of Sustainable Forestry, 13*, 237-251. DOI: 10.1300/J091v13n01_04

VASKE, J. J., & DONNELLY, M. P. (1999). A value–attitude–behaviour model predicting wildland preservation voting intentions. *Society and Natural Resources, 12,* 523-537.