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Perception of Visitors' Environmental Impacts of Ecotourism: A case study in the Valley of Butterflies protected area, Rhodes Island, Greece

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ABSTRACT: Visitor management is considered important for the sustainable development of protected areas as the presence of visitors may cause negative impacts on wildlife and vegetation. Within this framework, visitor impacts and perceptions are considered critical for decision-making and planning of future management regimes. This paper resumes opinions of visitors of the Valley of Butterflies in Rhodes Island, Greece, a very popular tourist destination in both national and international level, with more than 300,000 visitors per year. These opinions record perceptions on the environmental impacts of eco-tourism in the Valley and are necessary for the formulation and implementation of a visitor management strategy in the area. Descriptive statistics are estimated, as well as a probit model exploring factors affecting visitors' satisfaction. Results call for more information and education of the visitors about the Valley's conservation and ecological value, better facilities and services provided, site hardening and a better policy of prices.

Key words: Ecotourism, visitor management,Valley of Butterflies, Rhodes Island,Greece

INTRODUCTION

The Island of Rhodes is situated in south-eastern Greece (Fig. 1) and is a particularly popular tourist destination for both Greek and foreign visitors. Mass tourism is the dominating tourism form on the island and is supported by high quality hotel infrastructure. One of the most frequently visited sites on the island of Rhodes is the Valley of Butterflies, an area of exceptional natural beauty and conservation value, where the butterfly species *Panaxia quadripunctaria* is present in large numbers. Valley of Butterflies belongs to the Natura 2000 network of protected areas in Europe (site code: GR4210006).

Overcrowding of the Valley's visiting area has generated, over the years, a series of negative impacts on the natural environment, mainly due to improper visitor behaviour. This led to the creation and implementation of a visitor management plan to protect the area, manage, inform and educate visitors (Georgiadis *et al*. 2004). The recording of visitor profiles is necessary to make this system work and may lead to successful management practices of tourism in the area (Buckley and Pannell, 1990; Morin *et al*., 1997). The preferences of visitors help determine the desired management objectives thus strengthening the relationship between visitors and park authorities. In addition, information obtained from visitors helps identify context-specific impacts that the experts may fail to recognise (Lahdelma *et al*. 2000).

There have been similar studies conducted in Greece on the perception and suggestions of visitors of protected areas (Papageorgiou and Brotherton, 1999; Trakolis, 2001a, 2001b; Papageorgiou, 2001; Machairas and Hovardas, 2005; Arabatzis and Grigoroudis, 2010). However, this study is the first one conducted in the Valley of Butterflies and also the first one conducted in an area located within the boundaries of Rhodes Island, which is a very popular Greek island attracting a lot of tourists.

We have outlined visitors' profiles, attitudes and suggestions by using specially designed questionnaires. The main features studied were their general characteristics (age, sex, educational level, etc.), their environmental awareness and their expectations from a visit to a protected natural area. They were also asked to evaluate a number of parameters concerning infrastructure and information provided on site, and finally to make their own suggestions for the amelioration and improvement of the Valley and on-site offered services.

In this respect, the purpose of this study is to identify and evaluate the multiple dimensions of

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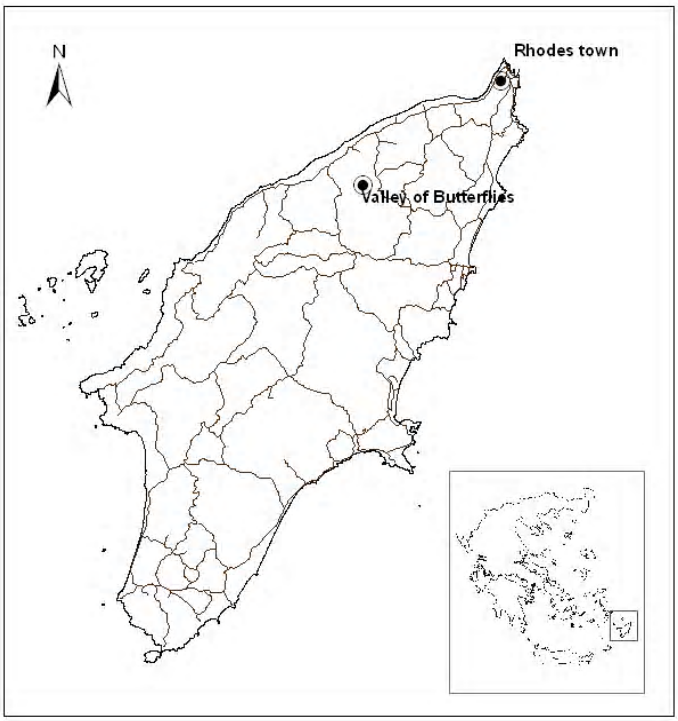

Fig.1. The location of the Valley of Butterflies in Rhodes Island, Greece

perceived value (Zeithaml, 1988; McDougall and Levesque, 2000) for tourism at the Valley of Butterflies and to investigate by using a probit model how that value influences visitors' satisfaction and recommendations to others. The article commences with a brief literature review. Then a description of the case study area and the problems it is facing, sampling procedures and methods used follow. Descriptive statistics portray the findings arising from the survey and factors influencing visitor satisfaction are examined with the use of a probit model. Finally, findings are summarized and policy implications are discussed.

Ecotourism Society defines ecotourism as 'responsible travel to natural areas, which conserves the environment and improves the welfare of local people' (Chin *et al*., 2000). Ecotourists travel to these areas to experience natural environment with minimum impacts (Jenner and Smith, 1992). Ecotourism has grown as a consequence of the dissatisfaction with conventional forms of tourism, which have ignored social and ecological elements of foreign regions in favour of a more anthropocentric and strictly profit-centered approach to the delivery of tourism products (Fennel, 2003). Some of the key variables and principles of ecotourism, that separate it from the more broadly-based nature tourism, include an educative component and a sustainability component, along with the ethical nature of the experience.

In Greece, the institution of protected areas was applied for the first time in 1938 (Papageorgiou and Arabatzis, 1998). At present, 10 national parks, 19 aesthetic forests, 51 protected natural monuments and 11 Ramsar sites have been instituted, while the NATURA 2000 network includes 390 sites (239 sites of Community Importance and 151 Special Protection Areas for wild birds) (Papageorgiou and Vogiatzakis, 2006).

According to Eagles *et al*. (2002) 'protected areas need tourism, and tourism needs protected areas; tourism is always a critical component to consider in the establishment and management of protected areas'. Wheat (1994), cited in Goodwin (1996), defines ecotourism as 'a niche market for environmentally aware tourists interested in observing nature'. Through ecotourism remarkable ecosystems are marketed to attract visitors from around the world (Steele 1993). However, for Wheeller (1991, 1993) and Ryan *et al*. (2000) ecotourism has opened new locations to visitors and finally caused more problems than it was supposed to solve.

Among the benefits of ecotourism is the opportunity it provides to visitors to appreciate the

natural environment and the need for motivation for its protection and conservation, as also the educational value it includes (Chin *et al*., 2000). Millions of people travel to see and experience natural environments each year and the scale of such movements leads inevitably to some disturbance or damage to visited sites, which in turn may affect negatively the visitors' experience of nature (Marion and Leung, 2001). Some negative impacts may be destruction of plant and wildlife, trampling of vegetation, erosion of soil, alteration of geological regimes, litter, air and noise pollution caused by people and cars. Promoting satisfaction of visitors is an important task and a way to combat behaviours, such as misuse or vandalism, which are often rooted in dissatisfaction (Hornback and Eagles, 1999).

In order to achieve successful ecotourism and sustainable management of protected areas, visitor impacts should be identified and avoided or minimized through the appropriate location and maintenance of visitor facilities and through visitor education (WCED, 1987; Alderman, 1990; Giongo *et al.,* 1994; Cole *et al*., 1987; Leung and Marion, 2000; Farrell and Marion, 2001). It is always useful to record the type and quality of knowledge that visitors have in order to propose directions and actions about what visitors should know (Papageorgiou, 2001).

Visitor perceptions are also necessary to predict the impact of certain actions or to provide useful suggestions about improving existing facilities or creating new ones. When understood, tourist experiences can be designed to meet tourists' needs. All these should be taken into account when creating management plans in order to achieve ecological well-being and satisfaction of visitors (McCool *et al*., 1990). Papageorgiou (2001) argues that park management should put emphasis in knowledge enhancement in the short run and change in visitor behaviour in the long run. Seabrooke and Miles (1993) propose integrated interpretative facilities to offer a rewarding educative experience to visitors that will help them appreciate the protected area.

The Valley of Butterflies is situated in the western part of the Island of Rhodes (SE Greece), 26 km south-west from the town of Rhodes and approximately 5 km south-east from the community of Theologos (Fig. 1). It was formerly named 'Pelekanos' as it was crossed by the river Pelekanos, but later named 'Valley of Butterflies' due to the large number of butterflies occurring there in the summer months. The first to exploit the Valley of Butterflies in 1928 was an Italian company since Rhodes was occupied by Italy from 1912 untill 1945. However, the Valley of Butterflies became more widely known after 1957 and ever since the number of its visitors continuously increases.

During the last years, the butterfly population of the Valley has decreased. The population reduction is due to the general perturbation of the ecosystems' equilibrium by numerous factors. It is believed that the reduction in the butterfly population is only partly due to abiotic factors (e.g. climatic conditions) and mainly due to human impact (activity and presence) in the Valley. The presence and attitudes of the thousands of visitors each year, with their main volume visiting the Valley during summer months, seems to be the main factor threatening butterfly population (Georgiadis *et al*., 1999). *Panaxia quadripunctaria* is a moth, mainly active at night. Visitors often make butterflies fly during daytime, by whistling or clapping their hands, in order to take pictures of them. This results in serious loss of energy for the butterflies and thus in mass butterfly deaths in the Valley site or during their migration. It has to be noted here that the Valley had to be closed to the public for over a decade, in 1984, as butterflies had almost completely disappeared from the Valley. It took several years and great effort from numerous experts to re-establish butterfly population.

Due to the spatial limitations on recreation activities, the major activity in the Valley of Butterflies is walking/sightseeing along the specially designed walking trails and photo shooting. Therefore, soil and vegetation along the sides of the trails are the most vulnerable to trampling elements. Visitor trampling on the low vegetation of the Valley has resulted in limiting it along the Pelekanos' river banks. Goats grazing inside the Valley are also responsible for the destruction of low vegetation, as grazing suppresses regeneration of natural vegetation with disastrous results for the populations of butterflies (Georgiadis *et al*., 2004).

As far as the butterfly population is concerned we are now aware that disturbed animals often interrupt temporarily vital activities such as feeding or breeding, which may reduce survival or breeding success (Müllner *et al*., 2004; Yasué, 2005; Ellenberg *et al*., 2006; Murison *et al*., 2007; Remacha *et al*., 2011). If disturbance events are strong and repeated, many animals may end up abandoning the affected area, which may reduce the size of local populations and alter community assemblages (Fernández-Juricic, 2000; Mallord *et al*., 2007). Therefore, the large number of visitors may also result in a change of temperature and change in the microclimate of the Valley and, especially during rather warm summers, it may result in the reduction of the population of *Panaxia quadripunctaria*. In general, the perturbation of the ecosystems' equilibrium has resulted in a reduction in the population of butterflies during the last years. This fact has raised the concern of all actors involved in the management and conservation of the Valley.

Today, the Valley of Butterflies receives a great number of visitors every year (approx. 300,000 per year). Visitors may cross the Valley on foot by following specially paved walking trails and may obtain information on the butterfly species of the Valley (*P. quadripunctaria*), and the flora and fauna of the area, from the Natural History Museum, operating since 2000, at the northern part of the Valley. The summer months, especially June to August are considered as 'high season' for the site as this is the period when it receives the largest amount of visitors. Also, the greatest number of butterflies appears in the Valley during these months. Table 1 shows available data on the number of tickets sold per year. Data for the period 1985-1991 and 1993-1999 are not available. An increase of 25% is made in order to roughly estimate and include the visits of children aged less than 12 year old and pupils, who have free entrance to the Valley.

Table 1. Number of tickets sold per year

Year	Number of tickets sold	Increase (25%)
1971	63,507	79,383
1972	63,704	79,630
1973	70,195	87,743
1974	16,404	20,505
1975	50,703	63,378
1976	54,192	67,740
1977	66,100	82,625
1978	93,254	116,567
1979	109,781	137,226
1980	102,738	128,422
1981	112,695	140,868
1982	106,734	133,417
1983	125,534	156,917
1984	136,830	171,037
1992	272,000	340,000
2000	375,204	469,005
2001	375,262	469,077
2002	331,922	414,902
2003	358,631	448,288

MATERIALS & METHODS

The research was carried out by means of a two-page questionnaire, administered through personal interviews. There was both a Greek and an English version of the questionnaire. The questionnaire remained short in order not to irritate visitors by keeping them occupied for long periods during their trip (following the guidelines of Hornback and Eagles, 1999). The majority of the questions were closed, simply requiring of the interviewee a number, ticking-off a series of options, or a response to an attitudinal scale. The period during which the survey was conducted was from May 1st to September 30th 2006 and 2007, when the Valley is open to the public and during the hours that the area was open to visitors. There was a systematic sampling procedure in which every fifth visitor passing in front of the person responsible for the interview was selected. The interviews took place once a week (either during Friday or Saturday) between 10:00 a.m. and 4:00 p.m. Each interview lasted approximately 10 minutes. Interviewers were university students working voluntarily in the Valley. They were given instructions before conducting the survey by an environmental expert working as permanent scientific staff in the Valley.

In total, 322 completed and usable questionnaires were collected. Answers were at first codified and inserted into a database and then were statistically elaborated with the use of SPSS version 16.0 (SPSS, 2007). programme for statistics.

RESULTS & DISCUSSION

From our sample 61.7% of the visitors interviewed were women and 38.3% men. Concerning their origin, 16.2% were residents of Rhodes Island, 45.8% were residing in Greece, but not in Rhodes, and 38% were residing abroad. Tables 2 and 3 present information concerning visitors' age groups and level of education respectively. More than two thirds of the interviewed visitors belong to the age groups of 16-30 and 31-45 years old. In these groups more women than men were interviewed. Only the age group of 46-60 years old has a higher percentage of men interviewees. As far as their education level is concerned, more than half (both men and women) have a university or higher education degree. From the results of Table 4 we conclude that the education level of *primary school* refers mostly to the age group *up to 15 years old* (count 31 out of 32), which means that the big majority of the adult visitors has completed at least secondary education, a result which shows that most visitors in the Valley of butterflies are well educated. Finally, according to Table 5, about 44.5% of people interviewed have visited the Valley with friends or other company and 48.6% with family.

Providing visitors with information material is crucial to raise awareness on the area and gain compliance to the rules. For the purposes of the survey, it was sought to find out how much visitors knew about the Valley. Thus the interviewees were asked about their source of information on the protected area. Table 6 presents their answers. Half of them report that they have learned about the Valley and the respective museum from tourist guides and brochures,

Table 2. Crosstabulations: Age group – gender

Age Group	Women %	Men %	Total %
up to 15 years old	56.6	43.4	100.0
16-30	71.3	28.7	100.0
31-45	60.6	39.4	100.0
46-60	35.7	64.3	100.0
over 61	60.0	40.0	100.0
Age Group	**Women %**	**Men %**	**Total %**
up to 15 years old	15.4	19.3	16.6
16-30	47.2	31.1	40.8
31-45	30.8	32.8	32.3
46-60	5.1	15.1	8.8
over 61	1.5	1.7	1.6
Total	100.0	100.0	100.0
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	13.723(a)	4	0.008
Likelihood Ratio	13.574	4	0.009
Linear-by-Linear Association	2.977	1	0.084
N of Valid Cases	314		

(a): 2 cells (20.0%) have expected count less than 5. The minimum expected count is 1.89.

Table 3. Crosstabulations: level of education completed- gender

Education	Women%	Men %	Total %
Primary school	62.5%	37.5%	100.0
High school	51.4%	48.6%	100.0
Secondary school	57.7%	42.3%	100.0
Post-secondary education	65.2%	34.8%	100.0
University/ Polytechnic School	67.0%	33.0%	100.0
Msc/PhD	60.8%	39.2%	100.0
Total	62.0%	38.0%	100.0
Education	**Women%**	**Men %**	**Total %**
Primary school	10.5%	10.3%	10.4
High school	9.4%	14.5%	11.4
Secondary school	15.7%	18.8%	16.9
Post-secondary education	7.9%	6.8%	7.5
University/ Polytechnic School	40.3%	32.5%	37.3
Msc/PhD	16.2%	17.1%	16.6
Total	100.0	100.0	100.0
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	3.406(a)	5	0.638
Likelihood Ratio	3.379	5	0.642
Linear-by-Linear Association	0.982	1	0.322
N of Valid Cases	308		

(a): 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.74.

Table 4. Crosstabulations: age group-level of education completed

		Age group (Count)					Total
		up to 15 years old	16-30	31-45	46-60	over 61	
Education	Primary school	31	0	0	1	0	32
	High school	16	12	7	2	0	37
	Secondary school	6	27	14	4	1	52
	Post-secondary education	0	12	8	3	1	24
	University/ Polytechnic School	0	56	43	14	1	114
	M.Sc/PhD	0	19	28	3	2	52
Total		53	126	100	27	5	311

Table 5. Who are you visiting the Valley with

Visiting the Valley with	Valid Percent (319 valid cases)
Alone	4.7
With friends or other company	44.5
With your family	48.6
With tour operator	2.2
Total	100.0

Table 6. Knowledge about the Valley of Butterflies

Where did you learn about the valley/museum?	Valid Percent (311 valid cases)	By coming to the Valley of Butterflies you expected to see:	Valid Percent (309 valid cases)
Tourist guide/brochure	50.2	One species	29.1
Press	6.4	More than one	70.9
Internet	3.2	**Total**	100.0
By chance	15.8		
Other	24.4		
Total	100.0		

while a remarkable percentage (15.8%) report that they learned about it by chance. A very surprising result indicating the lack of accurate information is the fact that 70.9% of the people interviewed report that they expected to see more than one species of butterflies inhabiting the Valley, ignoring that only one species is present on the area.

The questionnaire also captures how the visitors perceive their visit experience. In this framework, the questions of Table 7 are being asked and answers are provided according to an attitudinal scale (1 to 5 Likert scale, where 1 corresponds to 'not at all' and 5 to 'very much'). More than two thirds have chosen 4 and 5, reporting that the Valley has met their expectations very much. When asked if the presence of other visitors spoiled their experience of nature, 29.8% have chosen 3, which may be interpreted as that they were indifferent and 20.6% reported that they were very much annoyed. A big number of interviewees have chosen 3 also when expressing their opinion about the exhibits of the museum, something that stresses the need to improve its infrastructure and exhibits. Finally, the majority of visitors believe that walking along the Valley is safe.

Conclusively, visitors appear to be more annoyed by trash and litter existing along the walking trails and into the Valley, animals grazing and other visitors' improper behaviour. This finding is in accordance with studies reporting that the quality of visitor experience may be degraded by perceived impacts, caused for example by non-appropriate behaviour (garbage, trees and vegetation in poor condition etc.) (Vaske *et al.*, 1982; Rogeenbuck *et al.*, 1993).

Respondents were asked to rate the facilities and services provided inside the Valley. Techniques for valuing ecosystem services are still relatively new and untested, and the results of such calculations must be interpreted with care (Dehghani *et al*. 2010). Facilities and service were rated from one to five (see Table 8). Visitors' answers show that they do not seem to be satisfied with the information and guidance provided by the staff of the museum, as the majority ascribes a very low grade to this question. Moving towards and into the Valley was rated mostly with 4 and 5, and this shows the satisfaction of the majority of visitors regarding the 'natural experience' of their visit. As far as the price of the entrance ticket is concerned, 47% of the visitors found it reasonably priced and about 46% found it expensive.

Regulations within the borders of protected areas are applied to restrict actions and access and become obvious through appropriate signs, printed information material and security staff (Papageorgiou, 2001). According to Ivy *et al*. (1998) cited in Papageorgiou (2001), environmental awareness is crucial to produce a proper attitude. In order to assess how much environmentally aware and compliant to the regulations the respondents were, they were asked if they had read and followed the rules concerning

Table 7. Rate from 1 to 5 (1= Not at all - 5= Very much)

	1=not at all	2	3	4	5=very much	Valid cases
Did the natural site of the Valley meet your expectations?	6.6%	7.9%	18.7%	31.3%	35.4%	316
Do you think that the presence of other people in the Valley spoils your 'experience of nature'?	15.9%	14.0%	29.8%	19.7%	20.6%	315
How content are you with the Museum (exhibits etc.)?	8.9%	11.1%	34.1%	26.9%	19.0%	305
How safe was in your opinion walking along the Valley of Butter-flies?	6.1%	7.4%	17.6%	31.7%	37.2%	312

Table 8. Rate from 1 to 5 (1=Very poor - 5=Excellent)

	1= very poor	2	3	4	5= excellent	Valid cases
How would you rate the information /guidance provided by the staff of the Museum?	29.1%	17.6%	24.2%	16.0%	13.1%	306
How would you rate the road accessibility to the Valley of Butterflies?	7.1%	9.0%	23.1%	35.6%	25.3%	312
How did you find your moving around the Valley? How do you rate the convenience of movement inside the Valley and within the walking paths?	5.8%	11.5%	19.2%	35.8%	27.8%	313

their behaviour when visiting the protected area. The vast majority of them (around 90%) stated that they have read and followed the rules. Another aspect measured was their activities and attitudes concerning environmental issues. 87.5% would choose a protected area to visit during their holidays, 17.7% have actively participated in an environmental protection programme and 10.6% are a member of an environmental group or NGO. Some of them are trying to be up to date with environmental issues; 33.5% via books, 37.6% via T.V., via radio, 36.6% via press, 24.5% via the internet and 15.8% via other sources.

Finally, the questionnaire records the visitors' remarks, comments and proposals. Table 9 presents their suggestions and remarks cross-tabulating the results with their origin. The need for more specially-trained personnel is considered very important for respondents of all origins, something that is also obvious from the poor rating they give to the guidance provided by the already existing personnel. A better pricing policy seems to be more important for people coming from Greece except Rhodes, as foreigners usually come from countries with higher cost of life and are willing to pay more. People from Rhodes are the most disturbed by the presence or inappropriate behaviour of other visitors and they are also the ones that urge more for the improvement of the museum exhibits and the information material. Foreigners are the ones that seem to need better signing and information points, as they most of them have the experience of better facilities of similar areas in their home countries.

Visitors from Greece except Rhodes point out more the need for the aesthetic improvement of the Valley, as also the improvement of the existing infrastructure (for example better footpaths, fencing, maintenance of the facilities or access to disabled people, etc). There are also some respondents asking for zoning in the Valley (ie. prohibit access to certain very sensitive areas) or improving the transport infrastructure to the Valley, such as the road network, road signs, parking areas, local public transport to the area etc. Finally, we also have to mention the lack of environmental awareness of certain respondents, as they ask for more species of butterflies to be present in the Valley, something that urges the need to provide more

Table 9. Cross tabulations visitors' suggestions - visitors' origin

Visitors' origin / Visitor's suggestions	Rhodes Island	Greece apart from Rhodes Island	Abroad	TOTAL (124 questionnaires)
Need for more specially trained/qualified personnel	30.0%	29.7%	22.5%	27.4%
Better pricing policy – reduction of ticket price etc.	10.0%	17.2%	12.5%	14.5%
Disturbance from the presence /inappropriate behaviour of other visitors	25.0%	18.8%	20.0%	20.2%
Better signs/information points and printed information material	40.0%	29.7%	42.5%	35.5%
Aesthetic improvement of the Valley-facilities, footpaths, souvenir shops, more naturalness etc.	5.0%	26.6%	20.0%	21.0%
Better infrastructure for moving in the Valley – better footpaths/fencing, access to disabled people, maintenance of facilities etc.	25.0%	29.7%	17.5%	25.0%
Improvement of Museum exhibits, guided tours, printed information material etc.	20.0%	7.8%	10.0%	10.5%
Need for zoning of the visiting area of the Valley.	5.0%	1.6%	2.5%	2.4%
Better transport infrastructure to the Valley, road network, signalling, parking areas, means of public transport	0.0%	4.7%	2.5%	3.2%

information and environmental education to those visiting the area.

Visitors were asked whether the Valley met their expectations by using a 1 to 5 Likert scale (1 corresponds to 'not at all' and 5 to 'very much'). We recoded this variable and created a new one where 1 stands for "the Valley met very much my expectations" (values 4 and 5 of the previous variable) and 0 stands for "otherwise". We assume that the probability that the Valley met the expectations of the visitor is the well-known probit specification:

$$\Pr ob(GRA = 1) = \int_{-\infty}^{\beta' x} \varphi(t)\, dt = \Phi(\beta' x) \qquad (1)$$

where $\varphi(t)$ is the standard normal density, Φ is the standard normal distribution, x is a vector of covariates assumed to influence the satisfaction of visitors and β a vector of unknown parameters to be estimated. The marginal effects of the covariates on the probability that the Valley met the expectations of the visitor are:

$$\frac{\partial \mathrm{E}[y / x]}{\partial x} = \phi(\beta' x)\beta \qquad (2)$$

Marginal effects show how much the probability that the Valley met the expectations of the visitor, expressed in percentages, will change if the independent (explanatory) variable changes by a marginal amount from its sample mean. The marginal effects for dummy independent variables are estimated as a difference between the variable's two values, i.e. 0 and 1 (Greene, 2011). A goodness of fit measure based on the likelihood ratio test statistic, usually reported as McFadden's ρ^2 measure (Maddala, 1995), is:

$$\rho^2 = 1 - \frac{\log L_{\Omega}}{\log L_{\omega}} \qquad (3)$$

where L_{Ω} is the maximum of the likelihood function when maximised with respect to all parameters and L_{ω} is the maximum when the likelihood function is maximised with respect to the constant term only, i.e. setting all the βs equal to zero.

The definition and descriptive statistics of the variables used in the estimation of the probit model are shown in Table 10, while Table 11 shows the estimated coefficients for the probit model.

Table 12 presents the estimated marginal effects. The probability that the Valley has met the expectations of the visitor decreases by 12.9% if the visitor expected to see more than one species of butterflies with all other variables held constant at their sample means (statistically significant at 10% level). This result reveals the lack of information about the Valley, which has an important effect on visitor satisfaction.

Rules taking effect within the borders of a protected area may affect visitor satisfaction (Frost and McCool, 1988). This probability decreases by 26.6% if the visitor claimed that he/she did not read the signs giving information and instructions on which the appropriate behaviour inside the Valley should be (significant at 1% level). As Frost and McCool (1988) report, visitors having more knowledge on the area and who are aware of the regulations applied are more likely to believe that restrictions enhanced their experience and are thus more satisfied. Visitors not reading the signs do not usually become aware of the particular conditions and rules taking effect inside the Valley. As a result, they do not seem to evaluate the high environmental importance and the quality of the landscape.

Aminzadeh and Ghorashi (2007), after a visitor survey on the quality of recreational activities and users preferences in an Iranian forest, conclude that visitors' stated preferences for recreational activities are more likely to be similar to aesthetic preferences rather than revealed ones, because revealed preferences are more influenced by practical opportunities/constraints. Therefore, facilities within the site, such as well-maintained walking trails, are important visitor conveniences and at the same time provide safety and protection of the natural resources (Cole, 2002). Thus, the visitor who claimed that he considered walking inside the Valley very safe increased the probability that he was satisfied by 16.8% (significant at 1% level). Belonging to the age group of 16-30 years old decreased the same probability by 10.2% (significant at 10% level). This finding is in accordance with the findings of Fransson and Garling (1999). They support that younger persons seem to be more environmentally concerned, with one explanation of this being that older people have not been informed and educated on environmental matters in the same extent as young people nowadays have. As a result, their expectations seem to be higher and they cannot be so easily satisfied.

Visitors' suggestions and remarks seem to play an important role. Both variables increase the probability that the Valley met the expectations of the visitor, implying that even the satisfied visitor has his or her remarks and suggestions to make. Making suggestions about the Museum and the improvement of its infrastructure increases the probability by 22.5% (statistically significant at 10% level). This raises the need for more environmental education, which will

Table 10. Definitions of variables

Variable Name	Definition
GRA	Dummy variable, Did the natural site meet your expectations? 1= very much, 0= otherwise
EXPECT	Dummy variable, 1=Expected to see more than one species of butterflies, 0=otherwise
SIGN1	Dummy variable: Have you read the signs giving instructions about the appropriate behaviour inside the Valley? 1= No, 0= Yes
PRICE2	Dummy variable: 1= found the entrance ticket expensive, 0=otherwise
FAMVIS	Dummy variable: 1=visiting the Valley with other family members, 0=otherwise
SAFEWALK	Dummy variable: 1=considering walking along the Valley of Butterflies very safe, 0=otherwise
AGEGR2	Dummy variable: 1= belonging to age group 16-30 years old, 0=otherwise
SUGG7	Dummy variable, 1= Suggestions/remarks made about the improvement of Museum infrastructure and exhibits, 0= otherwise
SUGG2	Dummy variable, 1= Suggestions/remarks made on price policy and better "value for money" policy, 0= otherwise
MSC	Dummy variable, 1=MSc or PhD holder, 0=Otherwise

Table 11. Estimates of the probit model

Variable	Coefficient	SE	b/SE	P[Z>z]	Mean of x
Index function for probability					
Constant	-0.468	0.578	-0.810	0.418	
EXPECT	-0.394	0.206	-1.911	0.056*	0.721
SIGN1	-0.811	0.260	-3.115	0.002***	0.107
PRICE2	-0.713	0.184	-3.877	0.0001***	0.475
FAMVIS	0.253	0.200	1.260	0.208	0.479
SAFEWALK	0.513	0.195	2.629	0.009***	0.386
AGEGR2	-0.312	0.193	-1.621	0.105*	0.411
SUGG7	0.688	0.404	1.705	0.088*	0.954
SUGG2	1.006	0.372	2.704	0.007***	0.943
MSC	0.061	0.243	0.250	0.803	0.171
ρ	0.194				
Log-L_{Ω}	-138.500				
Log-L_{ω}	-171.881				
% of correct predictions	75.71%				
Sample size	280				

Note: One asterisk indicates significance at the 10% level, two at 5% and three at 1% level.

Table 12. Marginal effects of probit model

Variable	Coefficient	SE	b/SE	P[Z>z]	Mean of x
Index function for probability					
Constant	-0.153	0.190	-0.804	0.421	
EXPECT	-0.129	0.067	-1.923	0.054*	0.721
SIGN1	-0.266	0.086	-3.097	0.002***	0.107
PRICE2	-0.233	0.059	-3.935	0.0001***	0.475
FAMVIS	0.083	0.065	1.263	0.206	0.479
SAFEWALK	0.168	0.063	2.656	0.008***	0.386
AGEGR2	-0.102	0.063	-1.621	0.105*	0.411
SUGG7	0.225	0.131	1.714	0.087*	0.954
SUGG2	0.329	0.123	2.669	0.008***	0.943
MSC	0.020	0.079	0.250	0.803	0.171

Note: One asterisk indicates significance at the 10% level, two at 5% and three at 1% level.

contribute to the visitors' knowledge and understanding about the area and their proper behaviour during their visit.

The fact that the visitor has found the entrance ticket expensive decreases the probability that the Valley satisfied him by 23.3% (significant at 1% level). However, the fact that the visitor was satisfied by the price of the entrance ticket does not mean that he considers it "good value for money". As a result, the satisfied visitor has more probably suggested better price policy and "value for money" policy (increase the probability by 32.9% (significant at 1% level) implying that better services or facilities should be offered for this price).

When considering the effect of education on environmental concern there are studies that support the view that the higher the visitor's level of education, the more difficult it is to satisfy him or her (Dietz *et al*., 1998; Fransson and Garling, 1999; Roovers *et al*., 2002; Deng *et al*., 2003). On the other hand, there are also studies supporting that environmental concern is distributed across all educational levels (Jones and Carter, 1994; Gooch, 1995). In our case, we examined highly educated visitors holding a M.Sc. or PhD degree and found that the level of education has no effect on the probability of the Valley meeting the expectations of the visitor. Before finalizing the model, we also tried the effect of University Degree holders, but the results were also non-significant and did not improve its fit. Finally, visiting the Valley with family members does not seem to affect the probability that the Valley has met the expectations of the visitor.

CONCLUSION

When tourism takes place in protected areas, environmental management strategies are necessary to maintain and preserve the areas' natural value and resources. The key to successful management of such an area is to carefully specify objectives and apply continuous monitoring to detect changes. In order to implement management strategies, visitors' opinion is considered to be essential. According to Eagles *et al*. (2002), visitors of protected areas tend to be demanding high- quality services, such as safety, appropriate information material, guiding and generally they need to feel welcome and comfortable. Moreover, according to Wight (2001), these visitors, defined as 'eco-tourists', are usually highly-educated.

Most of our results are in agreement with the findings of similar studies. The large majority of visitors are well-educated and half of them visit the Valley with other family members. When examined in the framework of their origin (locals, coming from other places in Greece and foreigners), locals seem to be irritated the most by the presence of too many other visitors in the Valley, while foreigners report their need to be offered better and more information material and signs.

The large majority of visitors interviewed replied that they were aware of the regulations applied within the Valley and that they have followed them. However, the need for the provision of more information and actions for educative purposes seems to be essential for the enhancement of the environmental awareness of visitors. One major finding pointing out this need is the fact that almost 70% of persons interviewed reported that they expected to see more than one butterfly species in the Valley, which is the habitat of exclusively one species, *P. quadripunctaria* population. Moreover, half of the interviewees found the entrance ticket expensive and in addition reported that the Valley lacked good guidance and supporting information material. A lot of them also commented that the exhibits and the general infrastructure of the Museum need improvement.

Many authors suggest that softer techniques, such as information and education on the protected area, should be adopted before applying strict regulations, so that autonomy and visitor satisfaction may be achieved (Frost and McCool, 1988). In this case study, we consider important to apply both techniques (rules and information) in order to ensure the protection of the area and of *Panaxia quadripunctaria.* As Lucas (1990) cited in Chin *et al*. (2000) notes, visitors in protected areas can be a very good audience for environmental education, and this kind of activity can only be beneficial, as it does not have a negative impact on the area and moreover it enhances the environmental awareness of visitors and their respect to the regulations implied by the managers.

All factors mentioned above had their influence on visitor satisfaction. Our probit model estimations show that lack of knowledge on the Valley reduced the probability that visitors were satisfied by their experience. People interviewed reporting that they expected to see more than one species of butterflies were most probably not satisfied by their visit. These people were not usually aware of the regulations applied within the protected area. Another finding is that young visitors belonging to the age group of 16-30 years old are not really satisfied by their experience, implying their higher expectations.

As far as factors related to facilities offered on site and their value for money is concerned, our survey shows the importance of redefining a new policy of prices in a combination with a better quality of services. Although satisfied visitors do not complain about

ticket prices, they indicate the need to redefine price policy, supporting at the same time the need to improve the Museum exhibits and infrastructure.

No type of tourism can be sustainable in the absence of appropriate planning, monitoring, evaluation, and management; and ecotourism development can only be achieved when the behaviour of environmental managers, stakeholders, and tourists is ecologically, economically, and ethically responsible. That is why it is argued that, if practiced rationally, ecotourism, at least in terms of its economic revenues, can contribute to the conservation of the protected area's resources.

In conclusion, one may comment that the conservation of the Valley of Butterflies may be achieved through a combined strategy, including not only measures for environmental management and education, but also an integrated marketing strategy adapted to the special characteristics and needs of the site. Our future research should define these proper marketing strategies and the way that they could be implemented within the framework of a sustainable development scheme for the protected area.

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