

BIODIVERSITY AND ECOTOURISTIC MANAGEMENT STUDY OF THE STENI AESTHETIC FOREST (GR2420002), GREECE

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ABSTRACT

The aim of this work is: a) To study the biodiversity of Steni Aesthetic Forest (GR2420002), to track and record problems and to propose protection and ecosystem restoration measures, and b) to propose an ecotouristic sustainable management approach of the aesthetic forest, focused on the creation and organization of ecotouristic infrastructure and the management of the protected area visitors-users. To achieve the second objective, the opinions of the area visitors were recorded using the open interview method. The results reveal that the majority of the visitors (approximately 85%) visit the area on a same day basis. From this percentage, approximately 67.5% are weekend visitors who are interested in the forest ecosystem of that area. Finally, approximately two third of those questioned indicate problems, they agree on controlled activities, indicate weaknesses which are recorded by our research and demand promotion of the area.

Key words: aesthetic forest, Steni, ecotourism, Biodiversity, Natura 2000

1. INTRODUCTION

Aesthetic forests are one of the currently twelve categories of protected areas that are established in Greek territory by the Law Decree 996/71. A forest is characterized as aesthetic if it has particular aesthetic, hygiene, and touristic importance. Aesthetic forests involve particular measures to protect fauna and flora and natural beauty and landscape, and are particularly suitable for development of various recreational activities.

The Greek protected areas catalog includes nineteen (19) aesthetic forests [3]. The first aesthetic forest, proclaimed in 1973 is the phoenix tree forest of Vai, and the latest one is the oak forest of Kuri-Almyros. The Steni aesthetic forest was proclaimed in 1977 and it is the ninth in terms of proclaim order and one of the three aesthetic forests that are located in Central Greece periphery. The Steni forest is located at Evia island, the second largest Greek island with a significant number of protected areas [3,9]: one Aesthetic forest, 14 Wild Life Refugees, 3 Monuments of Nature, 6 areas in the NATURA 2000 network and more than 28 large and small Wetlands [10].

The existence of a consensus dialog between users and management bodies of a protected area contributes to a complete and sustainable management [1]. Research conducted by Papageorgiou et. al. [12] has shown that the existing structure of management bodies cannot fully achieve biodiversity protection, ecotourism organization and general management in three fundamental national parks of Greece. In this respect, the aim of this paper is to study and present the current situation in the Steni Aesthetic forest, to determine management problems and propose actions and measures for management and ecotouristic development via recording and analysis of user-visitor views of the area using the open interviews method.

2. RESEARCH AREA

The Steni aesthetic forest is located in Central Evia, at a distance of 31 Km from the prefecture capital Chalkida, and 120 Km from Athens, the capital of Greece. It is part of the Dirfi forest complex and it covers an total area of 417 hectares (Fig. 1) and it extends from an altitude of 900m to 1147m. In terms of administration the forest belongs to the Municipal Department of Steni and it is managed from the Forest Office.

Today it belongs to the European Ecological Network NATURA 2000, as Site of Community Interest (SCI) with code GR2420002: Dirfi Steni Forest – Delfi, proposed Site of Community Interest (pSCI) with area 1,297.9 hectares.

2.1 Proclaim History

The Steni public forest was proclaimed as an “aesthetic forest” in 1977 by Presidential Decree (GG 108/D/13-4-1977) on the basis of the flora diversity, the particularities of the grand relief and the landscape in general, as well as its particular aesthetic, hygienic, and touristic importance. Today the area of Steni forest is limited in an area of 417 hectares by Presidential Decree (GG 437/81/14-7-1981). Its initial area was 677 hectares and concerned the total area of the Steni Public Forest. A development study for the aesthetic forest was later approved by the Z/898/13-4-79

decision of Evia Perfect which, until 1985 when some recreational works took place, had only been

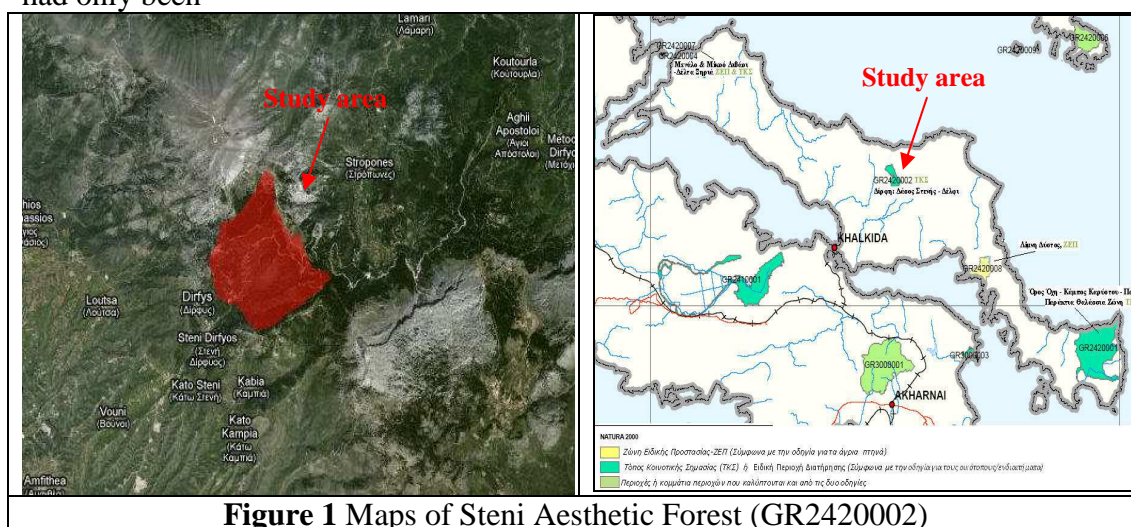


Figure 1 Maps of Steni Aesthetic Forest (GR2420002)

applied only in terms of the construction of a C class forest road in Kastaneona. Subsequently, the Steni aesthetic forest was characterized as a protected forest by the Z/2853/21-11-1979 decision of Evia Perfect. Finally, two years later with a Presidential Decree (GG 437/81/14-7-1981) 260 hectares, consisting the Steni chestnut grove, were excluded from the initial forest area, resulting in the current aesthetic forest area of 417 hectares.

2.2 Flora and Fauna of Steni Aesthetic Forest

The Steni Aesthetic forest is located at Evia, the second largest island of Greece. Various research works have traditionally focused on recording the Evia flora diversity, for example [7]. According to Trigas [8], 1484 taxa (Sp & Subsp) have been recorded in Evia, from which 299 (16.4%) are endemic and from those 42 (2.3%) are local endemic and 135 (7.4%) are Greek endemic. The largest concentration of Evia local endemics is found at the mountains of the island (Dirfi, Kandili and Xerovouni located at central Evia) followed by mountain Ohi and the northern Evia and wider Kafireas areas. Furthermore, Trigas has recorded 21 (50%) from the 42 central Evia local endemics, from which 10 species were recorded only in central Evia [8]. The dominating forest species of the aesthetic forest are *Abies cephalonica*, *Castanea sativa*, *Pinus halepensis*, evergreen broad-leaved, while *Platanus orientalis*, *Juglans regia*, *Pyrus sp* are met at the more wet locations and flumes. The local endemic species of the Steni aesthetic forest and the broader central Evia are [8,13]: *Viola dirphyia* Tiniakou, *Geocaryum euboicum*, *Silene dirphyia* Greuter, *Minuartia dirphyia* Trigas, *Campanula constantini*, *Silene dirphyia*, *Origanum liriium* (oregano from the location “Liri” of the refuge), and *Nepeta argolika susp dirphyia*. The species *Minuartia dirphyia* has been characterised as CR (Critically Endangered) according to the IUCN Red Catalog criteria (B1ab(iii,v)+2ab(iii,v)).

The diversity of fauna species in the research area is also rich comprising 8 mammal species, 23 bird fauna species and 7 reptile and amphibian species [11].

2.3 Climate – Soil - Water

The area is dominated by slates and phyllites that are evolving to crystalline limestones. Furthermore, based on meteorological data from the Dirfi Meteorological Station, the area climate is temperate mediterranean with warm summers and mild to heavy winters, with large dry period from April to October [6].

Finally, there are ample surface and underground waters in the area. There is a rich hydrographical network consisting of a) flumes such as Spiliadis, Vatas, Kerasias, Roki, Alateres and Likorema, and b) springs such as Kalovrisi, Fleva, Kerasia, Mega Dendro, Ntalaroumi, Giatroy Vrisi, Stavrodima, Vrisi Giannoukou [11].

2.4 Legal Status – Management

The area of the Steni Aesthetic Forest apart from being a Site of Community Importance (GR2420002) of the network NATURA 2000, has also been proclaimed the Steni of Dirfi Wildlife Refuge (K35) with an area of 677 hectares (GG 700/25-7-80). Furthermore, the whole Dirfi area, including the aesthetic forest, belongs to the network Important Bird Areas (I.B.A.) with code GR111.

The Steni aesthetic forest belongs to the Dirfi forest complex for which until 1947 the yield of forest products was done using woodcutting tables. The first management plan for the forest complex was compiled in 1947 and additional management plans are regularly compiled until today. The aesthetic forest, and particularly the chestnut grove, is not included in the management plans. The applied management must concern the development of ecotouristic infrastructure and alternative tourism actions.

2.5 Alternative Tourism Infrastructure

There are many natural beauties within the aesthetic forest boundaries, as well as in the wider area, which in combination with artificial infrastructure can create opportunities and possibilities for exercising alternative tourism forms. There are many springs, some of which have been shaped to operational faucets for the visitors' needs. The most known ones are two: the Ntavelis' spring and the Doctor's spring. Furthermore, there is the M. Nikolaou refuge which is built at the "Liri" of Dirfi location at an altitude of 1,120 m. After renovation works that took place 10 years ago the refuge can host about 55 persons. In addition, to facilitate ecotourism such as hiking or nature watching 5 hiking paths have been constructed complemented by 3 climbing routes starting at the location "Vrahos" or "Karaouli ton Stenion".

The Aggali gorge is one of the most beautiful gorges of Greece and in combination with other small and large ravines of the area, together with small and large caves such as the Nimfi cave (where according to the Dirfi nymph was living) can serve as the basis for an infrastructure supporting organized adventurous tourism [2].

Finally, the existence of a folkloric museum, promotes the everyday activities of the locals, while cultural activities taking place at Steni (e.g. Dirfia 2010) and in other villages close to the aesthetic forest, the religious formal gatherings and the annual trade fair are main tourist attractions of the area. In Steni there are two hotels having more than 12000 overnight stays per year. However, there is room for improvement, for example, events organised to promote local products such as the "honey festival"

organised at Steni at the beginning of August from the apicultural association of Steni need to be extended to include promotion of other local products such as the chestnut.

3. METHODOLOGY

A number of onsite visits to the research area was conducted to record the species biodiversity, and to assess the current situation regarding ecotouristic infrastructure and determine any relevant problems. To record and explore the visitors' view the method of open interviews (questionnaires) was applied. For the needs of the work described in this paper, 250 questionnaires were filled in, half of which were distributed at the Steni village and the other half at the M. Nikolaou refuge, namely within the aesthetic forest. The objective of the distributed questionnaire was to record the visitors profile, their interests and their opinion about the area condition and status. The statistical analysis of the questionnaires was carried out with the SPSS 14.0 statistical package. The visitor profile has been determined by using statistical charts and frequency and percentage tables, and the dependencies between various factors were examined using crosstabulation and the Pearson's chi-square statistic.

4. RESULTS

The questionnaire analysis has shown that 54.8% of the visitors were male and 45.2% female. Furthermore, in terms of occupation 36.8% are private employees, 18.4% free professionals, 18% public servants, and only 11.6% are pensioners. The two-third of the visitors is middle-aged, 44.2% of them are between 31-45 years old, and 31.2% are between 46-60 years old, while the younger visitors between 18-31 years old are 12.8%. The visitors with age more than 60 years old are only 8.8%.

The vast majority of the visitors come from the same periphery of Central Greece. From those questioned, 30% did not reveal their place of origin and from those two out of three were visiting the Refuge. The 47.6% from the visitors originate from the urban centre of Athens and statistical analysis has revealed that there is a strong correlation ($P=0.001<0.05$, $DF=6$ at a confidence level of 0.005) between origin of visitors (Athens) and their destination (Steni village of M. Nikolaou refuge). Furthermore, it has been revealed that the study area has regular visitors since the 58.8% from those questioned has visited the area more than 3 times. In addition, the 38.5% from those that would recommend the area to their friends has visited the area more than 5 times.

The choice of final visitor destination (Steni village or M. Nikolaou refuge) was found to be influenced by various factors. More specifically, it has been found that there is a correlation between chosen destination and whether they were recommended to visit the Steni Aesthetic forest by friends ($P=0.024<0.05$, $DF=1$) or whether they read about it in the Internet ($P=0.03<0.05$, $DF=1$). In particular, the 67.7% of the Steni aesthetic forest area visitors was introduced to it by friends, while only the 7.6% of them had found about it in the Internet. Even if one out of two believes that the aesthetic forest and its surrounding area are not properly advertised and promoted, the majority (88.8%) propose the establishment of an Information and Promotion Centre since the 73.6 of those questioned do not have any knowledge about the biodiversity and the importance of the area in terms of natural environment. Furthermore, the 2/3

(75.3%) of them are positive in the establishment of controlled actions in the aesthetic forest.

The majority of those questioned (67.5%) were weekend visitors and there is no correlation between visit duration (same day, weekend, or holidays) and the visit

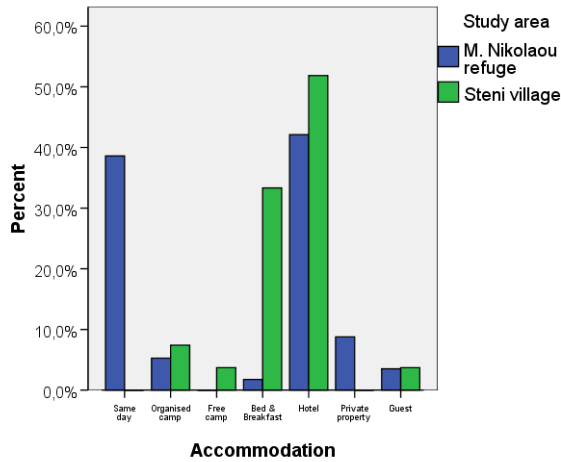


Figure 2 Accommodation type percentages for Steni village and M. Nikolaou refuge

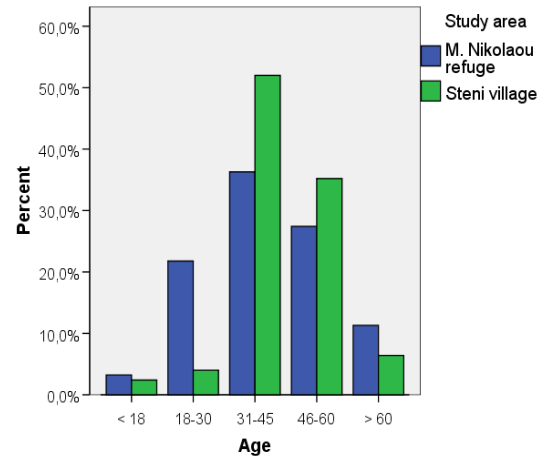


Figure 3 Visitor age percentages for Steni village and M. Nikolaou refuge

destination (village or refuge). The 85.4% was doing same day visit and only the 14.2% remained for second or third day. Furthermore, strong correlation between visit duration and visit destination was found ($P=0.000<0.05$, $DF=6$). Finally, with respect to accommodation, even if only 33.6% of those questioned responded, the 45.2% of them stays at a hotel and the 11.9% in bed & breakfast accommodation (Fig. 2).

The 78% of visitors seemed satisfied from the local services, considering them as good or adequately good, and only one out of three (32.1%) has assessed the natural environment condition from good to very good. With respect to the activities carried out by visitors, it was found that there is correlation ($P<0.05$ at a confidence level of 5%) between visitor activities and visit destination (Table 1). The most popular visitor activities were found to be hiking, landscape watching and relaxation.

TABLE 1. Correlation of visitor activities with destination choice.

Activities	Count (N)	% of Total	Df	Pearson Chi-square (P)
Hiking	178	71.5%	1	0.019
Cycling	11	4.4%	1	0.031
Hunting	5	2.0%	1	0.024
Landscape watching	157	62.8%	1	0.001
Archaeological site visiting	12	4.8%	1	0.018
Relaxation	55	22.0%	1	0.022

After examining visitor profile, it was found that the age category is strongly correlated with final destination selection ($P=0.000<0.01$, $DF=4$). More specifically, there is a strong preference to M. Nikolaou refuge by young ages which deteriorates as age increases (Fig. 3). Visitor preferences turn to M. Nikolaou refuge again at old

age, implying that elder people that visit the Steni aesthetic forest area have specific preferences to activities related with nature. A more detailed examination reveals that this correlation is concentrated to particular educational levels of visitors. In particular, the correlation between visitor age and final visitor destination concerns visitors that are high school or tertiary education graduates ($P=0.003<0.05$, $DF=4$ and $P=0.001<0.05$, $DF=3$ respectively) while that is not suggested by the statistical results for visitors that are primary school graduates or hold postgraduate degrees.

With respect to ranking the main problems that found in the area, the 70.8% of those questioned has indicated garbage as the primary problem, while the inadequate signing and infrastructure was ranked as second from the 25.6%. Finally, the lack of landscape protection has been ranked as the third most serious problem by 29.2% of the respondents. Finally the 91.3% of those questioned stated that they are satisfied from the area, while the vast majority of the respondents (97.8%) declared intention to visit the area again, and furthermore the 95.1% of them intends to recommend the area to friends.

5. CONCLUSIONS

Based on the analysis results concerning visitor profiles it has been revealed that more than half of the visitors are young people in their most productive age that are private employees originating from Athens that direct to Steni village, obviously because of the local taverns and the local products available there. It is therefore imperative to promote and advertise the natural wealth of the aesthetic forest and the broader area by creating an appropriate infrastructure (establishment of an Information Centre, installation of proper signing), so that a larger part of arriving visitors will be directed to the nature and hence the general environmental sensitivity will be increased. The encouraging sign is that approximately 60% of the visitors have visited the area for more than 3 times, while 40% have made a visit more than 5 times. The maintenance and increase of this ratio must become a priority for the local authorities and it will be supported by creation of infrastructures for various alternative tourism activities. The grant of motives, such as organization of events and competitions is a secure way to attract more visitors to the aesthetic forest area. Furthermore, the main visitor request and exhortation seems to be the preservation and improvement of the biodiversity of the area, the landscape improvement, the reduction of garbage, the installation of signs and the creation of infrastructure for ecotouristic activities.

Hence, the correctly designed organisation of ecotouristic activities and infrastructure, and the short distance from Athens and other urban centres such as Chalkida, Thiva and Lamia, will provide their citizens with easy and quick access even at the same day. Additional assistance in this respect is provided by the contemporary road infrastructure existing upto Chalkida. The improvement of the provincial road Chalkida-Steni, the organised promotion of aesthetic forest and the systematic organisation of cultural and ecological events on a yearly basis are only a few measures that can be taken to increase the number of visitors, but also the number of overnight stays in the area of Steni, which at the beginning of this decade was more than 12,000 per year.

6. AESTHETIC FOREST MANAGEMENT PROPOSALS

Being a Site of Community Importance of NATURA 2000 network, various scientific management guidelines must be followed for the restoration and rehabilitation of the Steni aesthetic forest. More specifically it is proposed:

- a) To speed up the creation of a Natural History Museum or of an Information Centre concerning the biodiversity of the area and the large number of the endemic species and herbs of the Dirfi area.
- b) A new scientific recording of the flora and fauna of the aesthetic forest is necessary to highlight and protect the ecological places of the local endemic species. At the same time scientific monitoring programs should start.
- c) Visitor attraction is desirable; however it is necessary to conduct a study concerning the visitor capacity of the area to ensure better spatial visitor distribution.
- d) The inhabitants of the villages surrounding the aesthetic forest will have to get involved to growing endemic aromatic and medicinal plants, since there is a large variety in the area. At the same time suitable marketing and promotion points for these plants should be established, primarily at Steni village because of its high tourist traffic and its high popularity at both peripheral and national level.
- e) Local authorities should support private investment initiatives concerning alternative tourism. In particular certification with ecological certificate of quality ecotourism should be established [4].
- f) The creation of a Management Body at prefecture level for all protected areas will result in benefits concerning their proper development and management, given the possibilities available from the existing legislation [5].

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