Design and Construction of a Forest Village in Greece

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Abstract: The aim of this paper is the study for the construction of a forest village in the area of Souvardo in Kalavrita in the prefecture of Achaia. This paper presents the history and purpose of forest villages, as well as the laws that govern them. The methodology of the paper is analyzed and the particular characteristics of the study area are examined with the accompaniment of the general characteristics related to the formation of the space. Further, aerial photographs are listed with the help of Google Earth program, giving emphasis to the general plan of the study area. The reception building and the host installation of the forest village are described, as well as the building and topographic plans are designed with the use of AutoCAD and Photoshop programs. Furthermore, the cost of the development project is analyzed. Finally, the conclusions of the study and recommendations to the visitor of the area about sights, natural landscapes and archaeological sites are given. Criteria for intervention and promotion of tourism and proposals for tourism development in the area, such as ideas for the development of cultural tourism and ecotourism in the region, are suggested.

Key words: Recreational activities, cultural tourism, ecotourism, stonework, AutoCAD, Photoshop.

1. Introduction

Human progress and the development of civilization, as well as its growth and spread to ever-wider regions of the world, have resulted in the destruction of pre-existing flora, fauna and natural ecosystems. The primitive man was a balanced member of the natural bio-community, living like most animals by planting and hunting. As is well known, the objective and goal of our life is quality, a word derived from ancient Greek quality. In our everyday life, we are more easily aware of quality than its absence, despite its existence. But the concept of quality is not limited only to life, but also to constructions. Even in ancient Greece, the theoretical sciences, namely poetry and philosophy, have not emerged on their own, but in conjunction with the study, research and the achievements of the positive sciences in the construction sector [1].

Today, the quality of construction in relation to the natural environment is a prerequisite for the development and survival of a modern society. Technological development at the hands of the manufacturer is an instrument for improving or destroying, canceling or developing the relationship between human and nature. Particularly this dilemma is evident in cases where the natural environment is sacrificed for a construction. Citizens have been consciously aware of the fact that environmentally friendly construction and rehabilitation measures are “costly” in the long run less in the community. For the above reasons, in this paper, special attention is paid to the work’s compatibility with the natural environment with measured characteristics (criteria). Thus, it is currently studying the construction of the forest village in the area of Souvardo of the Municipality of Kalavrita in the prefecture of Achaia where it is located on the outskirts of the Helmos forest according to the conditions that were mentioned.

The forest villages in the broadest sense are included in the forest recreation projects which aim to
offer, in urban populations in particular, a healthy environment, tranquility of isolation, aesthetic enjoyment of the landscape, and acquaintance with the natural environment from which they have been cut off [2].

A forest village, by its very nature, works at least partly in terms of tourist accommodation. It requires some infrastructure (access, communications, water, electricity, power supply). It requires a significant installation cost and above all an operating cost. It is a kind of activity that must in principle be driven in accordance with the principles and rules of supply and demand for a product, which in this case is recreation. This product—recreation—must be competitive with all uses of the forest (logs, grazing) and other recreation in the wider area. Otherwise, this activity will not be demanded. The basic requirement is therefore that the wider area has a number of natural attractions (beautiful paths with alternating scenery, impressive vegetation, springs, lakes, waterfalls, spectacular views, animal populations, etc.). These attractive natural elements must be made accessible to the visitor with relative ease and safety. In order to better approach the issue, it is useful to look at the experience of other countries in similar constructions and operations, the efforts in Greece as well as the experience of the Greek mountaineering shelters that is suited to the forest villages. Forest villages serving mountain tourism were created in the USA. In mountainous remote areas that could not be served by existing settlements. Forest villages in mountainous areas of the Carpathian Mountains (Romania) serve warders, hunters and travelers. They are the so-called “bells” in remote high altitude areas that sleep in large rooms with many beds and food. Approach to them is by train and cable car for the most part of the journey and on foot, by footpaths, to the last part of the route [3].

Similar facilities exist in the mountains of Bulgaria, ranging from organized hotels to simple accommodations and visiting organized groups of students, employees during their summer holidays or even individual visitors and hunters. There are specially trained guides-guides and printed information material. In general, continental European countries have developed their tourism in mountain areas.

Although Greece is one of the most mountainous countries in Europe (mountainous areas cover 60% of the country’s land area), classical tourism was developed almost exclusively in coastal and island regions where significant sums were invested. Today, however, global tourism focuses on alternative forms of tourism (ecotourism, agrotourism and forest tourism) and thus opens opportunities for alternative tourism. The concept of Forest Village is a set of simple lodgings in mountainous, remote forests, intended for visitors to the mountain and the forest, and provide simple facilities to those who want to experience the mountainous area with great forests and excellent scenery [4].

The term forest village has been used in the past, but in the sense of a set of simple buildings in remote productive forests, intended to serve forest workers (loggers, forestry officers, guards, etc.). Such resilient wood-burning or permanent stone-made forest facilities were made in several Greek forests, smaller or larger depending on the extent and the cycle of forestry work in each forest complex. Such a forest village with permanent facilities was constructed in the 1970s in Elatia of Drama, at the “Central Construction Site”, but it did not work with the prospect that was built. It was recently maintained and used by forest employees as well as students from the Orestiada Forestry and Management of the Environment and Natural Resources Forestry School who practice their summer practice. Also the Forest Village was used for the permanent buildings in the University Forest of Pertouli, designed by the great architect Dimitrios Pikionis, and are still used for the residence of students of Forestry and Natural Environment of Thessaloniki practiced during the summer period.
1.1 Laws Governing Forest Villages [1]

1. The provisions of the Law. 86/1969, as amended, were replaced and supplemented with the relevant provisions of the Law no. 996/1971 and 177/1975.
2. The provisions of Law 998/1979 and in particular Article 48 par. 4.
3. The number 156057/1317/1985 circular order of the Ministry of Agriculture.
4. The provisions of Law 2040/1992 and in particular paragraph 7d of Article 31.
5. Decision No. 66102/970/23.2.1995 of the Deputy Minister of Agriculture, as amended and supplemented by the Ministry of Agriculture’s decision 99278/5712/8.2.1997, on the “regulation of issues related to the creation of day-care and outdoor recreation areas in forests and forests of the country”.
6. The decisions of the Ministry of Agriculture issued on a case-by-case basis on the “approval of the study and construction of forestry villages”.
7. The fact that six Forest Villages have already been built on the above provisions.
8. The provisions of Law 3208/2003, in particular paragraph 7 of article 1, replacing Article 21 par. 5 of Law 998/1979 as added par 10 of article 40 of Law 3105/2003, repealed respectively in paragraph 10 of article 40 of Law 3105/2003.
9. The need to organize the management of the Forestry Village for the better fulfillment of their aims.
10. The PD. 121/2004 “Appointment of Ministers and Deputy Ministers”.
11. The PD. 202/2004 “Appointment of the Minister of Rural Development and Food”.
12. The number Y131/11.10.2004 Joint decision of the Prime Minister and the Minister of Rural Development and Food “Delegation of responsibilities to the Deputy Minister of Rural Development and Food Alexandros Kontos”.
13. The PD. 122/2004 “Reconstruction of the Ministry of Tourism”.
14. The PD. 123/2004 “Appointment of Minister, Deputy Minister and Deputy Ministers”.
15. The number 1153/20.4.2004 joint decision of the Prime Minister and the Minister of Tourism “Assignment of responsibilities to the Deputy Minister of Tourism Anastasios Liakos”.
16. Law 3270/2004 “Competences of the Ministry of Tourism Development and Tourism Issues”.

The aim of this paper is the study for the construction of a forest village in the area of Souvardo in Kalavrita in the prefecture of Achaia.

2. Materials and Methods

2.1 Research Area

Mount Helmos is located in the Northern Peloponnese and is characterized by a variety of geological substrates and soil types (limestones of the geological zone of OIone-Pindos, flysch and conglomerate rocks. More specifically, Helmos occupies the central part of the northern wall of the Peloponnese and stretches between Krathi and Vouraikos River and from the Aoranios River to the sea. The main features of the Helmos Mountains landscape include well-forested slopes of the Meso and Hyper-Mediterranean vegetation floors with Abies Cephalonica forests and Pinus Nigrapallasiana, rugged limestone rocks, Mavrolimni Lake (2,050 m, the only “alpine” lake of the Peloponnese) and the impressive ravine of Styga (Water Stygos), which is framed by the most important mountain slopes and is associated with a small wet cave and a waterfall at its base. The name Helmos or Aroania Mountains is distinguished by a rich hydrographic network. It consists of numerous natural springs, rivers, tributaries and lakes. The sources of the Helmos peaks (Water Stygos, Kokkinovrisi, Kalithari, Pitsi, Aspro Lithari) owe their existence to the thin layer of the flysch that spreads over a thick and strongly calcified layer of limestone. Debris and erosion of the limestone substrate have contributed decisively to the formation of a sharp relief with precipitous limestone rocks and carvings. The enclosed, shady, “shaved”
meadows with trifolion parnassi and participate in the formation of a modern mosaic vegetation that clearly differentiates into four main types of vegetation (open rock formations, limestone cliffs, calcareous limestone and closed dense “shaved” meadows). Trees of particularly good structure are present on the eastern slopes of Mount Helmos and are characterized by a more diverse flora than the northern slopes of the mountain [5]. The area studied (Fig. 1) at Luka Souvardou is located on the northeastern side of the Municipality of Kalavrita at a distance of 8 km. It lies at an altitude of 1,220 meters with coordinates of 38°3’0’’ N 22°10’29’’ E. The total area of Helmos Public Forest (Municipality of Kalavrita) amounts to 8,856.9 Ha, and is the result of the most accurate measurement of the area (GIS) on a 1:5,000 scale map and is divided into various land uses formations as shown in Table 1 [6]. Souvardo is a lively destination with a history of evolution. Unlike many mountainous villages in Greece, who have flourished in the past and have almost deserted today, Souvardo was never abandoned. It has been constantly developing since the beginning of its creation; it retains an important permanent population and eliminates significant tourist activity. The relief of the soil has contributed to a relatively sparse construction because, due to the

![Google Earth Image](image_url)

**Fig. 1** Picture from the Google Earth of the region.

**Table 1** Land uses of Helmos Public Forest.

| Land use                  | Area (Ha) | Percentage (%) |
|---------------------------|-----------|----------------|
| Forest area               | 4,290.9   | 48.45          |
| Partly forested area      | 1,412.2   | 15.94          |
| Agricultural lands        | 1,863.2   | 21.03          |
| Bare lands                | 1,094.3   | 12.36          |
| Barren, settlements, roads| 196.3     | 2.22           |
| **Total**                 | **8,856.9**| **100.00**     |
absence of intense slopes, the need for dense construction and full utilization of the sloping land is not a common characteristic of many mountainous villages. In addition, because of this feature, Souvardo has large open-plan surface areas, the largest area of which is untapped and unused. Souvardo is located on Mount Helmos and has an exceptionally rich natural landscape. It is surrounded by dense fir forests and a healthy and rare ecosystem particularly diverse in flora and fauna. Within walking distance of the forest village, there are rivers and the water abounds in the area [7].

The studied flat is located about 2 km north of Souvardo at an altitude of 1,220 meters and an area of 24 acres with a very small slope not exceeding 30 degrees across its surface. It could be characterized by the most ideal of the fact that it is “bathed” by sunshine most of the day in combination with the unique scenery of the rich stands of the Abies Chephalonica stretch around the village.

2.2 Methodology

For this research is used:

1. GPS type GARMIN 60 that provides with a lot of useful information such as:
   - Altitude indicator;
   - Destination time;
   - Hours of sunset and sunrise hours;
   - Direction and orientation of the plateau.

2. Photoshop since it is a very extensive software was designed with the best image processing, thus helping in all necessary design corrections.

3. The AutoCAD of the Autodesk Company is one of the best for forest engineering applications which are available on the market, the most widespread and is of general purpose, to wit, can be applied to architecture, statics, topography, hydraulics, road construction and generally to every forest engineering field.

The main materials of the construction are selected based on the climatic conditions of the area and taking into account the local character of the constructions so that it is consistent with the architecture and with the environment in general. The means of construction are stone, wood and reinforced concrete. Other basic materials [8]:

- Rockwool for better protection as non-flammable material;
- Gypsum board;
- Asphalt tiles (Roof chalet);
- Tar.

The question of building a forest village with basic raw material stone is a much more difficult case than a more conventional material. The peculiarities of the stone and the way of building are not easy and standardized. The type and quality of the materials has been chosen with the logic that in a stone forest “settlement”, it is important to have a consistent luxury.

3. Results

Two types of buildings were designed with a total of 23 buildings that bind to the surrounding area as materials from the wider region of the Peloponnese have been used. These settlements will be able to accommodate a large number of visitors, research groups, pupils during educational trips, etc. So the forest village is designed to accommodate up to 85-90 people along with staff who will be responsible for meeting the needs of the guests (Fig. 2).

A landmark at the entrance of the village is the first impression, its first image. It can attract a passerby or leave him indifferent, sometimes to repel him. The goal was not the creation of a loose construction. The place was again a source of inspiration. The aim was to synthesize primary local materials in a configuration of space, as if born of him. For the creation of an accessible natural sculpture it is needed experience. Moreover, it was the aim of the new shaped space-place to be neat, modest, simple and beautiful, as it is appropriate to the principles of traditionally built mountainous landscape.
Fig. 2  Picture from the Google Earth with the layout of the buildings.

Fig. 3  Facade of the united building.
3.1 Reception Building—Chalet

It is the main service and management building, measuring $15.55 \times 8.15$ meters, divided into 2 floors, providing all the facilities of staff and tourists while being divided into various areas. The main entrance leading to the reception from which all the instructions for stay will be provided through brochures informing about the proposed activities, hours of breakfast and evening and special reference to the treatment of emergency medical care needs. Therefore, in order to avoid unpleasant situations, the reception also has a special storage area for medicines [1].

- A large living room with a lounge and a bar that completes a large dining room for 12 people where lunch or drinks will be offered, respectively, with the local traditional music mix and the warm atmosphere that will give the traditional stone fireplace of the living room.
- The 2 large toilets are located a short distance from the dining room and designed to cater for the disabled.
- An important piece is the small but elegant office where it serves as a conference room, a study with a large projector.
- Finally, there is the central, large ground floor kitchen where cooks will take care of maximizing enjoyment by creating original flavors with a distinctly local character.
- Leaving the ground floor, follows the next floor with 2 indoor circular stairs facing each other, consisting of 2 bedrooms of 2 people each, exclusive staff area including 2 sitting rooms.

3.2 Wood Frame

The forest village will consist of 22 wooden residences with capacity of 4 individuals each. The residences have been designed based on the bioclimatic design, in order to exert the least effect on the natural environment and respond to the inhabitants' needs for a comfortable and relaxing living. The residences will be per two joined, so as with the opening of the interior door at the center of the residence, they increase their capacity from 4 to 8 individuals, satisfying the needs of more inhabitants (Fig. 3).

3.3 Costing

Estimate cost of forest village [1]:

(A) Wood frames:

(i) Ground floor:

\[ E_a = 6.35 \times 6.35 + 2.72 \times 3.2 = 49.03 \text{ m}^2 \]

(ii) Floor: \( E_b = 6.35 \times 6.35 = 40.32 \text{ m}^2 \)

(iii) Total area of a wood frame:

\[ E_1 = 49.03 + 40.32 = 89.35 \text{ m}^2 \]

(2) Total area of wood frames: \( 22 \times E_1 = 22 \times 89.35 = 1,965.7 \text{ m}^2 \)

(B) Chalet:

(i) Ground and 1st floor:

\[ E_a = 2 \times (15.54 \times 8.14 - 6.16 \times 3.6) = 208.64 \text{ m}^2 \]

(ii) 2nd floor: \( E_b = 2 \times 6.35 \times 4.69 = 57.69 \text{ m}^2 \)

(iii) Total Chalet Area = \( E_a + E_b = 208.64 + 57.69 = 266.33 \text{ m}^2 \)

(C) Total area of forest village = \( T_1 + T_2 = 1965.7 + 266.33 = 2232 \text{ m}^2 \)

(D) Total village cost:

(a) Estimated cost of 1 sqm = 500 $\text{€} / \text{sqm}$

(b) Total cost: \( K = 2232 \times 500 = 1,116,000 \text{ €} \)

Incidental expenses = 40,000 €

4. Analysis and Discussion

The mountainous areas and the forest villages of Greece have undergone the price of a developmental process without the design and effective protection of their built environment. Fatal many have lost the privilege of constant development and intense tourist activity, resulting in isolation and abandonment.

Survardo, on the contrary, has retained all those features in terms of the physiognomy of the
environment and traditional architecture, so that it is still an important attraction of tourist interest, highlighting its lively history, the authenticity and the unspoiled beauty of the natural landscape. The stages of development of the area, often in difficult economic conditions of the local population, did not alter the local characteristics of the structured area. It was therefore necessary to create a forest settlement to keep up with the successive alternations of the modern era, giving even more glamour to a place that combines culture with a modern way of life. Consequently, the highly aesthetic constructions that will gather positive criticism will provide solutions to the unstoppable needs of the local population that despite the difficulties was held in the place, struggled to survive in him and certainly did not have the means or the ability to create a high aesthetic built an environment that will greatly improve living conditions and create the desire to seek adventure, guided tours and reconciliation with nature and history. The construction of the Forest Village will contribute to the regeneration of the nature of the natural environment and any approach in this direction requires in-depth knowledge and study of the characteristics of the area such as soil, hydrological, climatic and property as well as the delicate handling of the construction of a traditional village combined with the latest amenities. In order to meet this expectation, it was somehow required that the cost of the investment be greater than expected, expecting the future benefits that will emerge. These responsible work aims to create a center of environmental, tourist and cultural interest, respecting the nature and tradition of the region.

5. Conclusion

It is out of the question the creating of a visitor guide with natural landscapes and archaeological sites. The mountainous mass of Helmos and the surrounding area over millions of years with the action of not only water but also other factors of nature (wind, temperature etc.) gave many characteristic forms, such as the imposing gorge of the Vouraikos River, the beautiful cave of the lakes, the cool springs of the Aroani River, the mythical waters of Stygos, the Tsivlos and the Daxas lakes and many more. The E4 European long distance path and a network of other paths link these interesting natural monuments to geological heritage and enable the visitor to combine recreation with adventure and initiation into nature, history and traditions.

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