

# **Proposals for a New Policy of Environmental Protection, Sensitisation and Tourist Development of the Parnassus National park**

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## **Abstract**

The present study proposes the implementation of a new planning policy for the Parnassus National Park (NP), in Central Greece. National Parks constitute the most important category of protected areas in Greece, because they include mountainous forest areas, of great scientific and ecological interest. The mountainous area of Parnassus is of particular interest, while also featuring the greatest ski centre of the country and several bauxite mines, activities which undermine the natural environment and biodiversity. Our proposals for the management of the park challenge the dominant perception expressed in the national park management model. Compared to other national parks in Europe and North America, where economic activities and local society form part of the national park, in Greece the only goal of establishing a national park is to protect the natural environment. For this study, we mapped and recorded in detail the area's vegetation and land use, using GIS, while we located points of particular scientific and ecological interest with GPS. In order to achieve the objectives of: a) preservation of biodiversity and ecosystems, b) environmental education and sensitisation and c) sustainable utilisation of the area's natural and cultural wealth, this paper proposes to establish discreet management zones, recommending specific activities for each zone, compatible with environmental protection and sustainable development.

**Keywords:** National park, GIS, Zoning, Environmental protection, Sustainable development, Parnassus.

## **1. Introduction**

Greece is a mountainous Mediterranean country which presents wide inequalities between its centre (Athens) and the rest of the country, as well as between lowland and mountainous areas. Mountainous areas cover 42% of national territory, and account for 62% of forests and 50% of grazing land. About 10% of Greek population lives and works in these areas. The irrational and constantly increasing human intervention in nature, as well as the incessant and uncontrolled exploitation of natural resources, resulted in disrupting the ecological balance, with negative consequences both for the environment and for human life. One and a half century ago, increased damage to nature and landscape created the necessity for measures to conserve the planet's biodiversity. A first such systematic and coordinated effort was the decision of the US Congress in 1872, designating a large area of Yellowstone as a National Park for the conservation of natural wealth and the recreation of citizens.

National Parks (NPs) are the most important category of protected areas in Greece, including mostly forest areas of particular ecological and scientific interest. In Greece, the first protected area, designated by law 856/37, is the Olympus NP, while six more NPs had been established until 1966. Today, Greece has a total of ten NPs, covering a total area of 68,738.7 hectares, excluding the area of the regional zones of the first five NPs.

NPs are areas with special protection status. They are established so as to: a) protect and conserve biodiversity and ecosystems, b) protect, conserve and promote our cultural heritage, c) encourage and reinforce sustainable development with rational use of natural resources, traditional activities and projects, and mild forms of tourism, and d) provide environmental education and citizen sensitisation.

The management of the natural environment in general and NPs in particular falls under the jurisdiction of the Ministry of the Environment, Energy, and Climate Change. This management is governed by the principles determined by law 1650/86, according to which each NP consists of: a) a central zone (absolute protection zone, covering at least 1500 ha, and b) a regional zone, covering a surface at least as large as that of the central zone, where activities are organised in ways that comply with the aims of the NP and the protection of the environment.

The general principle applied in all developed countries is that national parks should not be viewed and managed as museums of nature. Each NP is a region distinguished by its natural beauty and rare natural wealth, and its management should comply with three main aims, determined by international standards: protecting the natural environment, accepting visitors (for recreational, educational or research purposes), and contributing to local development, by utilising natural and cultural wealth, in a framework of sustainability and respect for the environment (Kokkosis and Tsartas, 2001).

The development of mild, alternative forms of tourism in NPs and mountainous areas in general forms the basis of the pluriactivity model. Alternative mild tourism can enhance the quality of life of the local community, by improving its income. This relates directly to the social and cultural structure of society, which forms the criterion determining the feasibility of the model (Akbar Valadbigi, 2010).

The present paper focuses on a double need: tourist development on the one hand, and protection of the environment on the other. The protection of nature and ecosystems is the main aim of creating protected areas and national parks in Greece. We are interested in expanding this by adding nature tourism, mountain sports and, consequently, the economic revitalisation of the area. The sustainable development of the regional zones aims at protecting the environment, providing economic development and motivating the inhabitants to stay in the area. The national park can also become an area for scientific research, environmental programmes and environmental education and sensitisation for citizens and students. These new activities can create a fertile perspective of mild and balanced development (Sfakianakis, 2000).

The establishment of management zones and proposed management measures derive from the study and analysis of all parameters of the Parnassus area. Using satellite images, aerial photos, and forest maps at 1:20.000 scale provided by the Ministry of Rural Development and Food, we mapped the Parnassus mountainous area, using GIS to create vegetation, land use and touristic infrastructure maps. We recorded every point of ecological, scientific, or touristic interest, with GPS. We also conducted field work, held discussions with NP officers and local administration and officials, and used available research data on Parnassus visitor preferences (Martinis, 2005).

## **2. Area of Study**

The Parnassus Mountain, also known as the “God Apollo Mountain”, is in central Greece and forms part of the Pindos mountain range, which starts from the country’s northern borders and reaches the southern end of central Greece. The total surface of the mountain is about 48.000 ha (Martinis, 2001), with many peaks, the highest of which is Liakoura, at 2,457 meters.



Since 1938, the area features the Parnassus National Park, covering 3.630 ha (law 25/7/38 – GG 286), at the boundaries of three prefectures: Fthiotida, Viotia and Fokida. The responsibility for managing this NP, as well as all other protected areas, lies with the Ministry of the Environment, Energy, and Climate Change. Unfortunately, the area has so far been developed haphazardly, without any planning, nor respect for the environment. The existence of a snow sports centre and several bauxite mines in the area aggravates the problem. Only some road signs remind us that we are in a protected area.

Based on the existing economic development and inhabitant quality of life, the Parnassus area is divided into two separate zones. The developed southern zone features the Delphi archaeological area, the Arachova winter resort, the Livadi plateau, the Korykeion Andron cave, combining the wild beauty of the Delphi landscape with a healthy climate and great sea view. In contrast, the northern zone is no different than other Greek mountains, characterised by the lack of financial resources, low quality of life for the local society and the rural exodus which is still going on, with all the negative consequences it entails (Hellenic Statistical Authority, population census 1971, 1981, 1991, 2001).

The Parnassus mountainous area displays many problems, relating both to the NP organisation and management and to the haphazard development of the southern zone.

### **3. Instruments – Methodology**

In order to achieve the objectives of the present paper on the relief of the area, it was necessary to use specialised mapping information. We used forest vegetation maps at 1:20,000 scale, digitised and grouped using the Geographic Information System (GIS). The information was updated with satellite imagery (Landsat 7/2000), creating new maps (relief, land use, vegetation, cultural and archaeological interest points, tourist infrastructure), necessary to complete this proposal for the Parnassus management zones. Moreover, the Global Positioning System (GPS) is an important tool, with which we obtain digital coordinates and altitude information for any location on Earth, thanks to a 24 satellite system. The information and qualities of each location can be entered into a geographical information system, to record an area or zone, analyse it, and create and manage a database. In this application, the systematic data collection was conducted using GPS. The collected data was then corrected and transformed into ArcView.shp files, to be entered in the GIS.

Combined with relief modelling techniques, the GIS constitutes the best approach for analysing spatial data. We used the TNT mips software package to combine the application of GIS with GPS mapping, satellite image elaboration and analysis, visualisation of different data types and the application of a different type of analysing and elaborating spatial data.

### **3.1. Satellite Imagery Analysis**

The satellite imagery data used in this study refer to Landsat 7 satellite system images taken during the summer of 2000.

We have used image processing techniques to analyse the satellite images, conduct geometrical corrections, diminish the amount of information contained in the reflected area of the spectrum, and correlate images of different analysis. The combination with panchromatic data makes it easier to interpret the different image elements. There is marked improvement in terms of mapping scale and low cost, spatial analysis, and the information that can be directly utilised by GIS. Satellite images can be directly utilised by GIS. Satellite images offer great possibilities of:

1. Creating a supervision point for a location of interest.
2. Mapping the current situation in terms of vegetation / roads / road network / agglomerations.
3. Identifying geological / geomorphologic characteristics.
4. Combining them with the relief to create tri-dimensional images.

The study findings show that the remote sensing data we used can be used to complete or update maps at up to 1:50,000 scale.

With the new satellite systems, scale precision has improved, reaching up to 1:5.000 scale in applied research. The time required for delimiting an area's specific characteristics, locating positions, differentiations and changes (e.g. change in land cover), combining data and finally updating the maps is minimal, compared to the time required in classical analysis methods.

### **3.2. Geographic Information System**

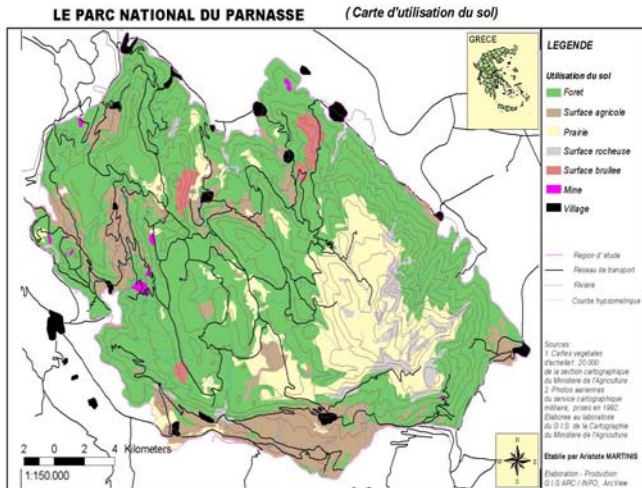
The key for the successful implementation of GIS and GPS mapping is the cartographic background. In this case, we used a cartographic background at a 1:50,000 scale, with detailed digitisation of different levels of information, including: contour lines per 20 meters, the water course network, the road network, the locations of agglomerations and residential areas, any marked changes in the relief, water access points (sources, wells), trigonometric points, municipal boundaries, etc. The data was elaborated according to the 1987 Greek geodesic reference system. The digitised contour data was used to create the digital relief on a 20 meter grid, and to calculate the levels of shadow and the gradients / slope orientations for the whole Parnassus mountain. The mapping of vegetation, species (map 1), land use (map 2) and cultural features and the creation of theme maps is particularly important. Before we can determine the zones, we should obtain detailed knowledge of the features of the area, the rarity and sensitivity of the species, the location of special geomorphologic and cultural characteristics. This information determines the management objectives, allowing us to define specific management zones.

The use of new spatial data maps allows for different applications, such as:

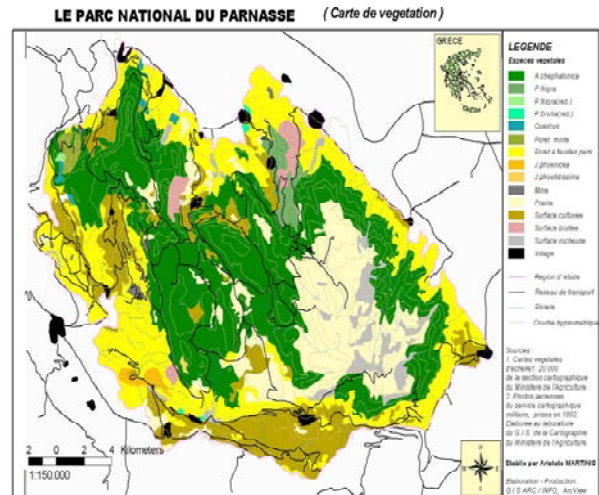
1. Finding the qualities of any mapped characteristics.
2. Choosing data according to its qualities.
3. Choosing characteristics based on their proximity to other characteristics.
4. Finding special characteristics of interest.
5. Creating and categorising statistical data from mapped characteristics.
6. Creating and printing maps/posters.

The following maps were created by the data elaboration:

**Map 1: Parnassus land use map (A. Martinis)**



**Map 2: Vegetation map (A. Martinis)**



It should be pointed out that in the future, the project will enrich the spatial information system with detailed spatial data of a larger scale in specific parts of the national park area, which are of special interest (i.e. in traditional settlements, this includes a detailed mapping of all buildings, or in the case of different vegetation types, this means the detailed mapping of these types and of the habitats).

#### 4. Defining Management Zones (Zoning)

All physical and cultural environment data seen above were used for defining the management zones of the Parnassus National Park.

Zoning is an important tool of NP management, crucial for achieving the NP objectives. The National Park is a single entity. The definition of zones, based on the particular characteristics of each area, aims at a holistic management approach, with different types of use. This is the only way to reconcile different and often conflicting NP objectives, such as environmental protection and local development.

The aim of zoning is to:

- Succeed in utilising the area in a rational way.
- Promote the different NP objectives, namely environmental protection, preservation of biodiversity and sustainable development.
- Implement a management approach that conforms to the NP objectives.

In the case of the Parnassus mountain, the determination of zones must manage harmonically and provide appropriate locations for various land uses, such as:

- Important habitats with indigenous species presence.
- Significant biodiversity at all levels.
- Solid fir forest (*Abies chefalonica*).
- Important archaeological sites (Delphi, Delphi landscape).
- Geological formation of particular interest for scientists, speleologists, or geotourists (Korykeion Andron, Katavothra sinkhole, karstic phenomena).
- Areas of intensive touristic exploitation (snow sport centre).
- Areas of intensive economic exploitation (bauxite mines).
- Extensive agglomerations around the snow centre facilities and the centre of the NP.

After analysing all mapping data, field data, research data on the preferences of Parnassus visitors, personal contact with NP officials, local society and representatives of the local administration, we propose to define management zones aiming at:

- Utilising the area in a more rational way, promoting its priorities, advantages, and disadvantages.
- Conducting the management in compliance with the NP objectives.
- Working towards achieving two different objectives: environmental protection and sustainable development.

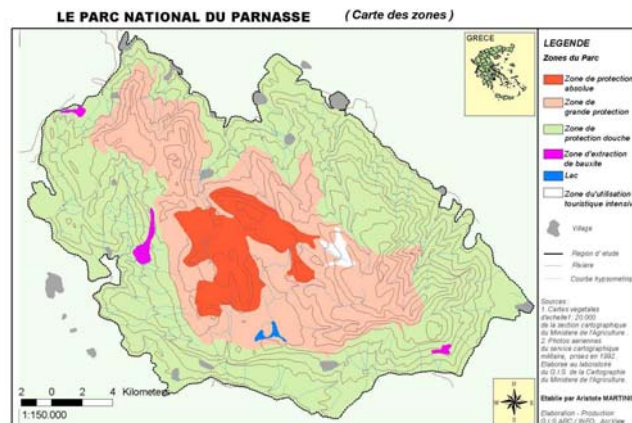
When categorising the sectors of a national park and designing its equipment and infrastructure, one should also consider the desired degree of protection, the existing capacity (social, economic, physical, psychological), the use and protection of natural resources, and other economic parameters of the area, that is information on the most important problems of NPs throughout the world today. According to time and space parameters, the wish to protect takes priority over the desire to exploit and vice versa.

Each NP can have up to 5 zones for different kinds of use by citizens: from the central or absolute protection zone, to the mild and controlled development zone, often with intermediate zones – wild scenery zone, natural environment zone, natural environment protection zone (*Revue de Géographie Alpine. 1985*).

Three zones are proposed for the mountainous area of Parnassus (map 3):

- **Absolute protection zone or central zone,**
- **Regional zone A: mild development and natural environment protection.**
- **Regional zone B: mild protection and general touristic development.**

Map 3: Zone map (A. Martinis)



These zones include several smaller ones, with special characteristics, which define a different use: intensive use zone, historical-political interest zone, special use zone, etc.



#### 4.1. Absolute Protection Zone or Central Zone

The main purpose of this zone is to preserve the natural resources and biodiversity. Permitted activities include scientific research, environmental education and sensitisation, mild recreational activities and protection projects conducted by the NP administration (Richez, 1992).

This zone includes wild natural areas or areas that are only slightly undermined by human activity, with sensitive and unique ecosystems, with rare or threatened species of flora and fauna, and with natural geomorphologic phenomena that need absolute protection (Kasioumis, 1991, 1994).

The flora of the Parnassus central zone is very important. The forests of Cephalonian fir (*Abies cephalonica*), protected since 1938, the habitats of *Paeonia Parnassica* and *Lilium chalconium*, part of a compact *Juniperus foeditissima* forest, and two individuals of the *Coryllus collurna* species, located at the “Eftastomon” rocky slopes, are of particular scientific interest (Brofas, 1995).

Moreover, the central zone geological formations, karstic phenomena, the Eftastomo gulch, the Korykeion Andron cave, the Megali Vrisi sinkhole, and the dolines and karstic formations can attract visitors and geotourists. The Eftastomo gulch is 117 meters deep and features eternal glaciers, but it still not open to visitors, except speleologists.

The central zone fauna is also important. The area features 77 bird species, protected by the European Union directive 409/79. The same zone offers nesting refuge for 65 bird species protected by the Bern Treaty, 14 mammal species and 10 amphibians (Brofas, 1995).

Inside the central zone there are private agricultural lands. These lands should be organically cultivated, with traditional means and methods, so as to avoid burdening the natural environment and to promote organic agricultural products.

Visitors are allowed in the central zone for educational purposes, while some mild recreational activities (walking, photography, observing nature, picnic), are also allowed.

#### 4.2. Regional Zone A: Mild Development and Natural Environment Protection

The regional zone proposed in the present paper protectively surrounds the central zone and includes special interest areas in terms of flora and fauna, rare species, endemic and threatened with extinction, with unique ecosystems, with animal species protected by international treaties, and geomorphologic phenomena of particular interest. This zone also includes part of the Parnassus alpine areas, which host the most important habitats of the area’s endemic species and great birds of prey.

The general purpose of the regional zone is to protect the natural environment and the features of the area, and to ensure the rational and sustainable development of natural resources. We also propose the creation of infrastructure necessary to provide access to visitors and tourists during both the winter and the summer period.

In this zone, we could create touristic infrastructures and promote mild activities that comply with the protection of nature and biodiversity.

The main principles should be:

- To promote activities that respect the environment and the landscape features of the Parnassus.
- To disseminate these activities over a wider area, so as to diminish the pressure of certain areas.
- To guide visitors and tourists according to the activity they wish to engage in, avoiding to undermine areas due to overcrowding.
- To utilise the natural and cultural wealth of the area in general.
- To promote the area’s particular environmental features through environmental education and sensitisation. With the right infrastructure, this zone could constitute an excellent laboratory for geotechnical and environmental sciences.

The specific characteristics of the regional zone are:

The “Kortinos”, “Fasoularchis”, and “Gerolekas” peaks, with minimal impact from human activities, without roads, mines or animal husbandry facilities.

In terms of vegetation, the presence of endemic species, the *Quercus ithaburensis ssp macrolepis* forest in Lilea, the *Pinus nigra* forest in Polydrossos, and the presence of the species *Juniperus foeditissima*, stress the importance of the area.

In terms of fauna, the birds of prey that inhabit the Parnassus peaks and the Phaedread rocky formations, near the Delphi archaeological site, are particularly interesting.

Moreover, the geomorphologic formations are of significant geological importance, and their promotion through geotouristic routes could contribute to local development. The area features karstic phenomena, caves, gulches, sinkholes etc, the most important of which are: the Lilea Sinkhole, the cave of the Nymphs, and a series of dolines in the Varyanni area.

The regional zone also includes private agricultural lands, which should be organically farmed (regulation EU 2078/92). The lands that are included in the fir vegetation areas could be encouraged to cultivate Christmas trees.

Animal grazing is permitted in the regional zone, but should be conducted under the control of the respective NP authority. In some areas, grazing is controlled (Pogonoi, Vlacholakkos, refuge area, Arnovrisi, etc.). In other parts of the regional zone, the problem is not as important, nor are the NP endemic species in danger.

Over the last years, we have observed increased building activity in the Park’s regional zone, without any planning nor common architectural guidelines, damaging the ecosystem and aesthetically undermining the natural environment. The lack of any regional planning for the touristic development of the Parnassus area creates serious problems regarding the architectural style and aesthetics of the national park. A study on the area’s architectural heritage, aiming at restoring the existing buildings would contribute to the effective protection of the Parnassus architectural style and the aesthetic upgrading of the area. Examples from other countries demonstrate that this proposal is feasible if supported by political will. Cultural buildings (churches, chapels, monuments, traditional buildings) of particular interest should be recorded, preserved and renovated. It is hoped that the state and the NP authority will contribute to preserving these architectural monuments for future generations.

### **4.3. Regional Zone B: Mild Protection and Broad Touristic Development**

This zone expands to the foot of the Parnassus, including forests, forest areas, rocky and alpine areas, agricultural lands, and agglomerations.

The main purpose of delimiting such a zone is to preserve the area’s architectural style and cultural heritage and to develop mountain, natural and ecological tourism.

The rocky formations north of Arachova, the rocky volume of the Phaedreads and the rocky formation of Tsouka south of Gravia, are habitats for the area’s great birds of prey.

In terms of vegetation, the beautiful fir forest of Roupakia and the *Juniperus foeditissima* forest at Profitis Ilias are of particular interest. Moreover, the aesthetically pleasing forest of Tithorea offers visitors the absolute satisfaction of natural beauty.

The “Karkaros of Lilea” cave (100 meters deep) attracts geologists and speleologists. This zone also includes the caves: “Varsamo” in Amfikleia, “Khali” in Ano Tithorea, and the historical Odysseas Androutsos cave. The byzantine monasteries of Panagia and Jerusalem attract both religious tourists and every tourist interested in the culture, history and tradition of the Parnassus area.

This zone includes the archaeological site of the ancient oracle of Delphi, renowned throughout the world.

The villages in the Parnassus area are of particular architectural interest, and many have been established as traditional protected villages.



#### **4.4. Other Secondary Zones**

Both the regional zone and the zone of mild protection and broad touristic development include sub-zones or different use areas, such as:

**a) Zones or areas of historical and cultural interest:** These zones include areas of historical, archaeological or cultural interest, which should be preserved, restored and delivered to the people. The main purpose is to protect the monuments and archaeological sites. Cultural heritage is interconnected with the area and should be linked to educational and recreational activities. In these zones, the only activities that are permitted relate to monument protection and preservation or to ensuring easy visitor access and excellent visitor service. It is often necessary to build a fence so as to keep animals out of these areas.

To the sites of archaeological and cultural interest, we could also add some areas of natural beauty, such as: Eftastomo, the Katavothra sinkhole, Karkaros, the Varyanni cave, Korykeion Andron, etc.

**b) Intensive exploitation zones:** These zones include locations of intensive use. They usually represent beautiful scenery, natural wealth which favours recreational activities and easy car access. These areas include winter resorts, ski centres, summer camps, etc. The NP authority should mainly aim at promoting the environmental awareness of the visitors of these areas, so as to minimize the damage invoked on the mountain's natural environment and habitat.

**c) Restoration zones:** They include areas where the vegetation has suffered extensive damage or a series of plants must be relocated, for ecological or scientific purposes. Permitted activities in these areas include: hiking, mountain climbing, photography and any other mild recreational activity which does not burden the natural environment.

### **5. Discussion – Conclusions (on the Protection and Mild/Sustainable Development of the Parnassus area)**

#### **5.1. Implementing a System for Receiving, Informing and Training Visitors**

The opening of an NP visitors leads to a NP operation regulation, aiming at informing the visitors and protecting the NP. At the park entrances, visitors are informed of the necessity and importance of the regulation, so that they won't view this regulation as an obligatory burden, but as an expression of respect for environment and its natural wealth.

To inform the public we propose:

- **Creating information centres.**

The information centres should provide visitors with actual information on the NP, the activities they can participate in, the NP regulation, etc.

- **Preparing rich informative material.**

For visitors to be well informed, the NP administration should prepare printed material presenting the national park and posters with simple information and protection themes, available free of charge at the information centres.

- **Operating a natural environment museum.**

Natural environment museums can present and utilise the area's natural and cultural heritage. A proposed location for the museum is Agoriani.

- **Organising cultural events throughout the summer.**

Cultural events address the wider public and are recreational and educational. They offer visitors the opportunity for a first cultural and human contact with the area's inhabitants (Flogaiti, 2006).

- **Creating the “National Park House”.**

To create the “National Park House”, we need contemporary equipment, a conference hall, a hall for exhibitions, reading, and working, a library, a cafeteria, etc. It could host conferences, exhibitions, meetings, etc., at a mountain environment, with all necessary audiovisual equipment.

The “National Park House” could also play an important informative, educational, and pedagogical role for the public, particularly the young, because it can function as a natural environment school, a common NP practice in other European countries. The House would also engage in publishing books and articles on the Park, informational material, maps, etc. (Richez, 1992).

## **5.2. Organising a System of Promoting and Exploring the Park - Facilitating Mild Sports and Recreation in Natural Environments**

### **Improving the Walking and Riding Paths**

Mountain paths usually come from the historical transfer and transportation network of the area’s population. Today, with so many roads for automobile use, most paths are unknown to people who love walking in nature.

In the Parnassus area today there are paths of about 150 km, most of which are old mule paths, unpreserved and almost closed from vegetation (Martinis, 2001).

We also propose:

- **Bicycle routes**
- **Ski routes** (ski walking)

At Livadi, Kalania, Varko, Skamno, etc., we can create such routes. From Tithorea to the peaks, the winter route would offer an unforgettable experience to every hiker or skier, provided it could be crossed in absolute safety. These special routes, updated and properly equipped, could promote this sport in Greece and give a new perspective to mountain sports.

- **Creating composite educational paths.**

Composite paths are representative park routes of a particular interest. They play an important educational role and can “talk” to the visitor, who has the opportunity to perceive and meet the geomorphology, vegetation, rock formations, soils, soil erosion, bioclimatic zones, the relief, etc. For Parnassus, we propose to create such composite paths at the Agoriani and Gravia areas.

It is obvious that his way of exploring nature could be very educational for student visitors, who would attend environmental courses taught by NP staff (Lobry, 1985, Ouzounis & Kalaitzidis, 2000).

## **5.3. Utilising the Natural Hheritance**

- **Utilising the caves.**

In order to become accessible to tourists or other visitors, all caves must be the object of a detailed geological and geotectonic study, to ensure that the tectonics and mechanics of the rock formations are stable and that the visitors will be safe.

It is necessary to utilise the “Korykeion Andron” cave, which is linked to the history of Parnassus since antiquity. A series of works would turn the cave into an important archaeological site, attracting the interest of tourists.

- **Organising view spots.**

In a protected area, visitors can familiarise themselves with nature and the landscape, by walking the Park’s paths of crossing the mountains roads, with an automobile, a bicycle or a horse. In well chosen spots, there will be organised areas for admiring the area’s natural beauty, geological formations, green fields, rivulets, etc. These spots should be organised in such a way that visitors can rest while admiring the view.

For this purpose, the following areas are particularly appropriate: Kroki in Delphi, where visitors can contemplate the archaeological site and the Delphi landscape from afar, Pyrgaki in

Eptalofos, Marmara in Delphi, and the Liakoura peak, offering a spectacular view and a view of the sunrise that reminds us how beautiful life is.

- **Establishing outdoor air picnic spots.**

Tourists visit the Parnassus NP in order to enter a natural environment. After engaging in the various activities available at the mountain, they seek a place to rest, eat, read and relax (Barruet & Gerbaux, 1984).

At the Parnassus NP, such areas can be established at Agios Georgios of Mariolata, Petra at Eptalofos, Agios Athanasios of Varyanni, Pouri at Gravia, the Panassari monastery, Karkavelia at Polydrosso, and Arvanitovrisi at Arachova.

- **Creating a botanical garden**

A botanical garden should be established at the NP, namely at the Panassari location at Gravia. At that location we should create a garden with all plant species that are representative of Parnassus, to provide visitors with the complete picture of the national park. The garden will inform visitors of the NP's natural wealth and contribute to the education and environmental sensitisation of students.

#### 5.4. Sports Activities

The NP features the appropriate facilities for visitors to be able to practice the following sports activities:

- **Climbing**

Climbing can be practiced both on steep rocky slopes and on ice, which offers a different sensation because of the climate and increased thrill because of the greater athletic risk.

The most well-known and interesting, though not properly organised, climbing routes at Parnassus are at: Liakoura peak, Tsarko location, Kouvelo, Zemeno and Gerontovracho.

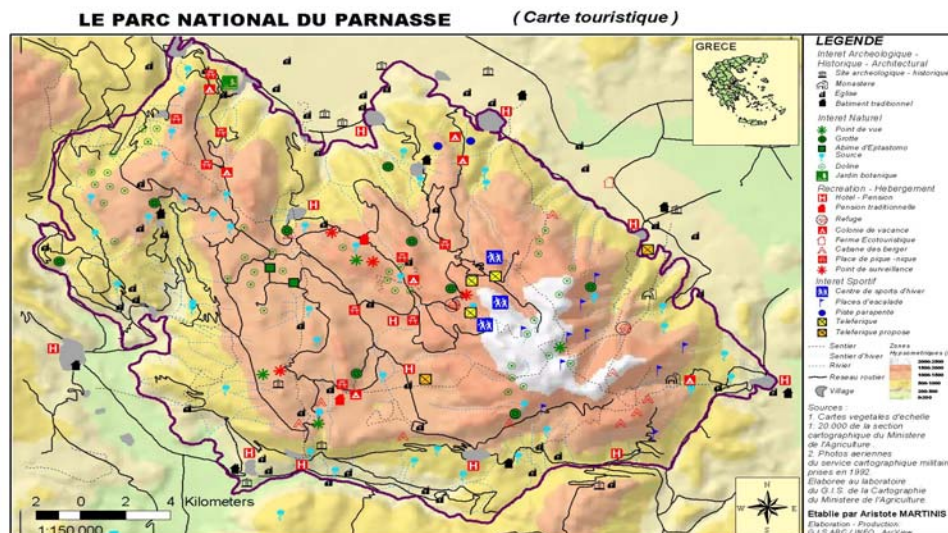
- **Parachuting and speed flying**

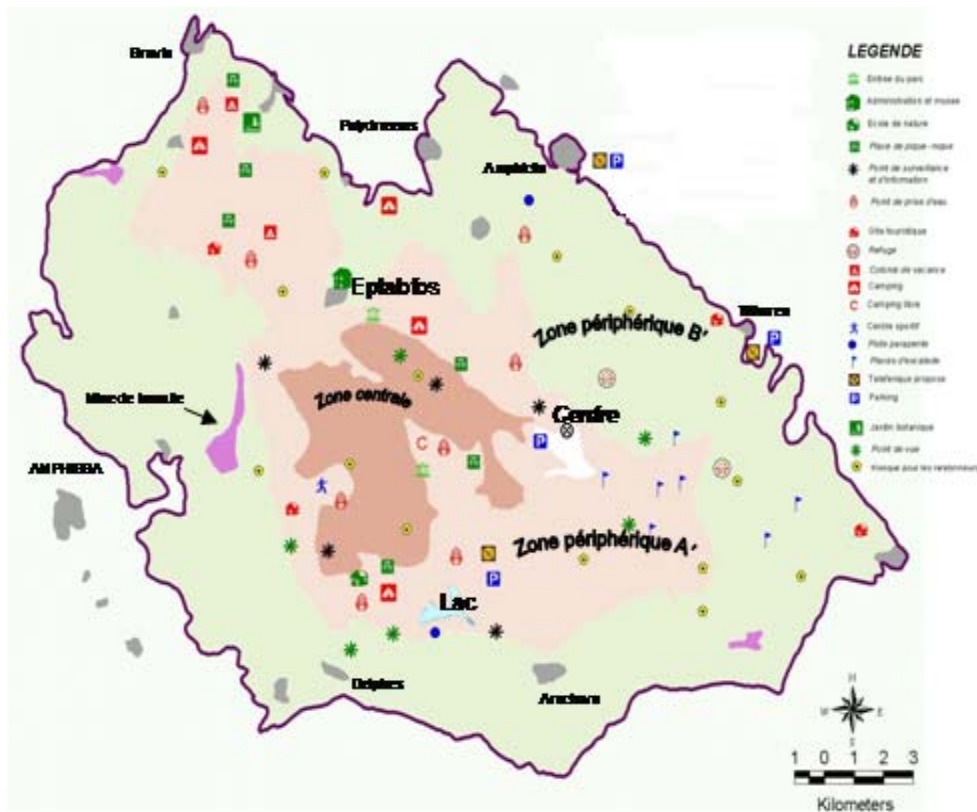
These are difficult and dangerous mountain sports which require a fundamental infrastructure to be safely practiced. Today there are three slopes, barely equipped, for parachuting at Parnassus: two at Amfikleia and one near Arachova. It is necessary to enhance the existing infrastructure if we wish to favour the development of mountain tourism, not only at Parnassus but at all mountain areas (Beteiller, 1996).

- **Landscape photography**

With its natural beauty, infinite and breath-taking view, peaks covered with snow, fog, or clouds, the national park of Parnassus offers itself for photography throughout the year.

**Map 4:** Proposed activities and infrastructure for sustainable development at the Parnassus NP. XX





## 6. General Conclusion

Parnassus is a very important ecological laboratory. For this reason, every touristic intervention should be thoroughly studied and the natural environment should be protected effectively. The protection of the national park is necessary for the future of the local population. The local society is interconnected with the economic activities of Parnassus, dominated by winter tourism.

Neither the natural and cultural wealth nor the climate conditions of Parnassus (an advantage for both the winter and the summer season) have been utilised yet. This is why the mountain is almost empty during the summer (Martinis, 2001).

The area is governed by haphazard development, without any vision or planning. If this situation continues, the environmental degradation will soon be irreversible.

The guidelines for the development of the area should aim at better utilising the natural, cultural and socioeconomic situation, for the benefit of society at local, regional and national level.

Like most Greek mountains, the Parnassus requires neither heavy investment nor excessive infrastructure. Mountainous areas need small investments, controlled by local society. There should be loans to help the locals buy the necessary equipment to revitalise their activities. Local society can and should take control of tourism and take advantage of development. Mild sustainable development must be conducted through local society, for local society (Kokkosis and Tsartas, 2001).

The recommended type of development is mild alternative tourism, so as to protect the environment and be affordable to locals, as any external financing is bound to take part of the profit out of the area. It would give a boost to local economy, enhancing the quality of life of the population of the mountain.

It should be noted that there is no established model of land planning and development. Instead, the development is determined by the need to protect the natural and cultural wealth, and the characteristics of local society, visitors and tourists.

**We propose:**

**In terms of tourism:**

- To create an information centre at Arachova or Livadi and another at Amfikleia or Agoriani, that is at towns of the NP regional zone.
- To create a network that transports visitors from the northern, southern or western part of Parnassus to the ski centre.
- To turn the NP into an environmental education school, with the right infrastructure.
- To activate the concept of agro-tourism, particularly at towns with favourable conditions, like Agoriani, Polydrosso or Amfikleia. For farmers, their embracing tourism represents the last chance to stay professionally active in the area.
- To implement an action plan for improving the grasslands and alpine areas. This would also help tourism, by creating the right conditions for hiking and horse-riding.
- Agricultural products could be directed to tourist consumers or new customers (cheese, Parnassus feta, Formaella, yoghurt, etc.). Moreover, new cultivations and agricultural products could enter the scene: small-sized fruit, medicinal plants, greenhouse vegetables, organic products (Martins, 1991).
- To create and mark several routes that reveal the area's rare natural and cultural wealth.
- To establish wild life and nature observatories, for the elderly and very young tourists.
- To have local organisations organise traditional cultural events so as to keep cultural tradition alive and recreate both tourists and the local population (Ministry of Rural Development and Food, 1995).

**Winter Activities: the Key to the Problems of Parnassus**

Downhill skiing is the main reason for visiting the Parnassus during the winter season. Other types of skiing should be promoted, including cross-country skiing, ski-touring and backcountry skiing, so as to expand the visitor potential and offer more people the opportunity to enjoy these sports.

**Regarding the National Park**, the determination of zones and the creation of infrastructure with respect to the principles of sustainability and to local society can contribute to the gradual upgrading of the area. The image of the “NP as an obstacle” can be replaced by the image of the “NP as a means for sustainable development”. In this way, we can expect to revitalise traditional economic activities and mild alternative tourism, thus preserving and increasing the area's demographic potential (Komilis, 2001).

Improving the regional zone infrastructure could attract part of the beach tourists to the mountain. The distance between the Parnassus plateaus and peaks and the beach is less than 50 km.

Solving the problems of the Parnassus National Park requires the Greek state to demonstrate political will. The political intervention is crucial to revitalise the mountain community and put an end to haphazard development.

**The local Population should Feel Informed and Empowered**

The dialogue between NP administration and the people who wish to keep living and working in the area should be constant, informational and supportive, so that the local population is fully informed of all existing problems and future objectives. Local population is a friend of the national park, not an enemy to be removed.

The local population forms the main axis of protection and development of the mountain, and should be familiar with the following principles:

- The multifunctionality of the rural sphere and the pluriactivity of the mountain inhabitants will contribute to the sustainable development of these areas. They constitute a “necessary evil” for the mountain population.
- We should not disparage small scale activities.
- We should not focus exclusively on direct investment returns.

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