

CULTURE AND NATURE:
THE EUROPEAN HERITAGE OF
SHEEP FARMING AND PASTORAL LIFE



Culture Programme

RESEARCH THEME:

Landscape and sheep farming.

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1. INTRODUCTION

Sheep and goat farming is the main pastoral activity practiced in Greece since ancient times (Zygoiannis, 2006) and a short chronological description of this is presented elsewhere (Gidakou and Apostolopoulos, 1995; Hatziminaoglou and Boyazoglu, 2004). Nowadays, livestock husbandry is an important economic activity in all four countries (Greece, Italy, Portugal and Spain) with sheep numbers exceeding those of cattle and goats. Among these animals, a large proportion of sheep and goats and a smaller one of cattle (beef cattle) depend on permanent pastures for feeding. They constitute extensive production systems and are the ones that mostly affect Mediterranean ecosystems and landscapes. Sheep and goats are raised in pure or, traditionally, in mixed flocks with cattle in pure herds.

However, the uncontrolled (overgrazing, undergrazing) and without any strategy of grazing management of Greek pastoral landscapes has caused desertification of land, high erosion rates, disappearance of some plant species. Meanwhile, European Union policies which paid subsidies per animal capita to farmers in the 1980s and early 1990s had a direct impact on livestock husbandry and on grazing lands. In the Mediterranean countries, these policies resulted in farmers increasing livestock numbers, which in turn resulted in overgrazing and desertification in several regions, especially in the dry and semi-dry areas. In addition, subsidies for livestock production pushed farmers to replace many local animal breeds, which had been capable of using natural vegetation, with breeds that were more productive but less efficient in utilizing grazing lands thus resulting in their deterioration due to undergrazing.

The aim of the project is to study the history and characteristics of Greek landscapes formed and maintained by sheep farming and grazing and to promote sheep farming as a tool for landscape management and maintenance.

The specific objectives identified in the project brief are:

- To provide an assessment and description of the character, distinctiveness and qualities of the Greek pastoral landscapes, identifying their component landscape character types and character areas;
- To identify factors of change that have influenced the landscape in the past, factors currently at play, and those which will influence change in the future, including outside factors which impact locally;
- To promote awareness of the Greek pastoral landscape and its social significance, particularly the importance of conservation, enhancement and restoration

2. LITERATURE REVIEW – *General overview of landscape character types associated with and maintained by intensive an extensive sheep farming during the period (1900-2010)*

Pastures are extensive in Greece, with great ecological and economical importance for the production of low cost and good quality animal products. They represent marginal lands,

mainly used as grazing lands by *sheep*, *goats* and *cattle*. The majority of them are found in dry, semi-dry and sub-humid areas. They are subdivided into grasslands, shrublands and open forests, also known as silvopastoral systems.

1. Grasslands are dominated by herbaceous species, particularly annual grasses and legumes, while a great variety of other species is also found. They grow in dry (pelouses) or wet (meadows) sites. They are the main grazing lands for sheep and cattle, although goats can also use them.

2. Shrublands include dwarf shrublands, known as *phrygana* in Greece; open shrublands, known as *garrigues* or *garriga*, which are usually found on calcareous soils and dominated by evergreen or deciduous shrubs; and dense shrublands, also known as *maquis* or *matorral*, which are usually found on siliceous soils and dominated by evergreen shrubs. Shrublands are typical areas for goats but sheep and cattle may also graze them.

3. Open forests or silvopastoral systems are dominated by trees, coniferous or broadleaved (evergreen or deciduous), with a crown density less than 40%. There are several kinds of open forests based on the dominant species.

Pastures are found at a wide range of altitudes (fig.2) from lowlands to alpine zones: (a) low zone pastures (altitude 0-600 m), which covers 18% of the total pasture land (b) middle zone pastures (altitude 600-800 m), which covers 32% of the total pasture land and (c) upper zone pastures (altitude >800m) which covers 50% of the total area of pastures.

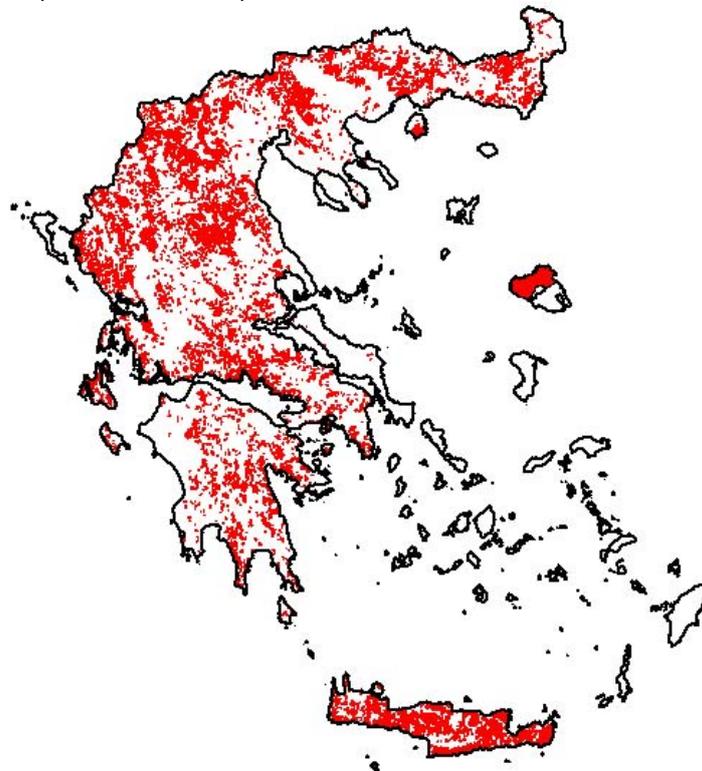


Figure 1. Geographical distribution of natural pastures according to the CORINE land cover map

A brief literature review about the evolution of landscape character types associated with farming and rural management is presented in the following table (table 1.)

Table 1. Rough historic outline of Greek rural landscape history. *Source: Kizos A., 2008.*

TABLE 1: ROUGH HISTORIC OUTLINE OF GREEK RURAL LANDSCAPE HISTORY

Period	Political situation	Land uses and practices	Landscape elements	Localities with special interest
9,000 years ago,	-	-	Consolidation of coastline.	Coastal caves, inland plains
Mesolithic to early Neolithic (up to 7,000 BC)	Settlements	Mixed cereal and pulses cultivation system; Sheep and goat; Practices closer to horticulture (lack of ploughs); Typical settlements of 50 to 300 people	Forests and forest areas; cleared land close to settlements	- Fertile plains of eastern central Greece - On islands, at end of Neolithic (4,000 BC) - In uplands 2,000 BC
Beginning of 2nd Millennium BC - Classical times	City States (Poleis); many small free farmers	Ploughs with animal traction key development. Three systems: (a) cereal cultivation - fallow; (b) olive trees and vineyards; (c) animal husbandry with periodic transhumance	From 1,500 BC onwards a human landscape: terraces, irrigation networks, small fields, managed forests and small rural settlements alongside growing cities Not linear: Periods of cultivation growth and abatement	Coastal cities and plains; gradually everywhere
Roman era (2nd century BC - 4th AC)	Roman empire; big landlords and small free framers	Same systems; more intensification and more "commercial" crops for the growing cities; new tools, plants and practices	Open landscapes of cereals, big farms, terraces expansion, water management	Population growth and cultivated area increase
Byzantine era (7th - 13th AC)	Byzantine empire; big landlords, church lands increase, small free framers disappear gradually	Decline of population and cultivated land, especially "commercial" (olives, vines), systems unchanged	Less cultivated land, large estates	-
Byzantine, Frankish and Ottoman period (14th - 15th AC)	Byzantine small kingdoms, Frankish and Italian areas, Ottoman empire expanding	Decline of population and cultivated land, in some Frankish and Italian lands "commercial" cultivations	Less cultivated land, large estates	Frankish lands on islands and South Greece; Italian lands on islands and ports; Byzantine lands in the Peloponnesus and Konstantinopolis
Ottoman Empire (15th - 19th century)	Ottoman Empire; Small free farmers; only later big farmers; large expanses of land with administrative liberties (mountains and islands)	Management systems: (a) integration of agriculture and animal husbandry; (b) combination of intensive and extensive practices (fallow, mixed cultivation); (c) transhumance; (d) common management (forest and grazing lands); (e) orientation towards selfsufficiency.	See Figures 2, 3, 4	-
Greek State (1927 - today)	After agrarian reform (1932) small family farming; central administration and mountains and islands lost community control over their resources	Change constant, important after 1930s and especially 1950s with intensification of agriculture and animal husbandry (i.e. mechanisation, irrigation, chemical fertilizers and plant production products; more livestock and imported feeding stuff for animals).	See Figures 2, 3, 4	Mountains and islands considered as less favoured compared to plains and fertile areas and gradually abandoned; rise of the cities and especially Athens

According to Papanstassis (2009), **pastoral landscapes** are heterogeneous lands composed of a variety of plant communities all or most of them accessed and grazed by livestock. This is why, they include more than one type of grazing lands interspersed in a particular area and used by one or more livestock species. In addition to animals, pastoral

landscapes also include the infrastructure associated with animal activities such as watering points, sheds, corrals, access roads and trails. Therefore, three most distinctive landscape types are recognised: the free roaming, the shepherded or the transhumance landscapes. The impact of grazing animals is different in these three types of landscape.

1. In free **roaming** pastoral landscapes grazing animals move freely around without being shepherded. They are found in confined grazing lands and result in the development of fenced landscapes, which are common in areas with privately owned pastures. Free roaming pastoral landscapes are also created by non shepherded production systems in communal lands (fig. 2).



Figure 2. Free roaming pastoral landscape in Kea-Greece. *Source Gkoltsiou A.*

2. In **shepherded** pastoral landscapes livestock graze, guided by a shepherd who takes them on certain but different routes every day (fig.3). They are found in unfenced grazing lands including the communally grazed rangelands.



Figure 3. Shepherded pastoral landscape in Karpenissi-Greece. *Source Gkoltsiou A.*

3. In **transhumance** pastoral landscapes are created by livestock displacement from lowlands to highlands and vice versa. They are normally elongated grazing corridors with a

width of up to 70 m and created along drove roads that animal flocks follow as they move from the winter to summer pastures in late spring and back again in the autumn.

Therefore, in order to conclude to a more precise typology of pastoral landscapes, we present a classification of landscape types (fig. 4) in Greece based on topography, soil type and climate.

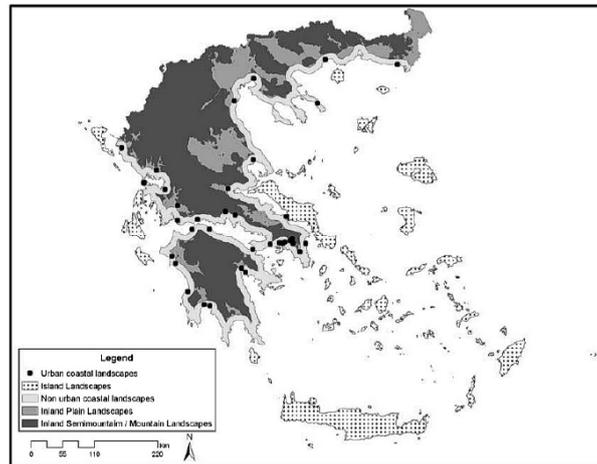


Figure 4. Landscape types of Greece. *Source Kizos A.*

Pastures are found in the following areas of Greece:

- The mountainous, alpine climate zone. This includes the Pindos mountain chain which, running in a NNW-SSE direction, separates the country into two parts with different climatic characteristics, especially regarding rainfall.
- The continental zone of north Greece including the mainland of Epirus, Macedonia, Thrace, and a large part of Thessaly, which has a climate changing gradually from characteristic Mediterranean to the colder climate of central Europe.
- The marine Mediterranean Ionian zone including the coastal regions of western Greece and the Ionian islands.
- The Mediterranean mainland zone including the southeastern part of Greece (Aegean) up to Thessaly and the Aegean islands. The climate of this region is similar to the marine Mediterranean but with lower winter temperatures and longer summer droughts.

Pastures also exist on a wide variety of soils, usually too poor to support adequate biomass production. Soils on the lowlands are usually deep (depth >150 cm), well drained, medium to fine-textured, free or rich of carbonates, with low organic matter content (usually lower than 2.8% in the surface horizon), formed mainly on alluvial deposits, and classified as Fluvisols, Cambisols and Luvisols. Soils in sloping areas are usually shallow (depth 10-50 cm), well drained, medium to fine-textured, low or rich in carbonates (depending on parent material), low in organic matter content (lower than 1.8%), formed mainly on marl, shale, conglomerates, limestone, flysch, and classified as Cambisols, Regosols, and Luvisols. Limestone is one of the main parent materials on which pastures exist with a high degree of soil degradation.



Concerning topography, pastures are found in a variety of physiographic conditions. In most cases they are located on moderately sloping (6-12%), strongly sloping (12-18%), steep (18-35%) and on very steeply sloping (>35%) areas. Slopes are usually greater in the upper zone (altitude >800 m) in which pastures are found.

3. UNDERSTANDING LANDSCAPE CHARACTER OF GREEK PASTURES

3.1. Distribution of landscape types along the country in relation to the type of sheep farming

So far, there is not any official typology of Greek landscapes accomplished and accepted by any official public authority. Many attempts were organised by institutions, mainly focused on biophysical characteristics of the Greek landscape. The classification of pastoral landscapes will be based on five aspects: Vegetation land cover, Landform, Climatic zones, Types of pastoral landscapes. The types occurred, are given below:

1. **Mountainous:** 1.1. Mountainous Grasslands, Mountainous Shrublands, Mountainous Open forests,
 - 1.1.1. Mountainous Grasslands Free roaming, Mountainous Shrublands Free roaming, Mountainous Open forests Free roaming,
 - 1.1.2. Mountainous Grasslands Shepherded, Mountainous Shrublands Shepherded, Mountainous Open forests Shepherded,
 - 1.1.3. Mountainous Grasslands Transhumance, Mountainous Shrublands Transhumance, Mountainous Open forests Transhumance.

2. **Continental zone of north Greece:** 2.1. Continental zone of North Greece Grasslands, Continental zone of North Greece Shrublands, Continental zone of North Greece Open forests.
 - 2.1.1. Continental zone of North Greece Grasslands Free roaming, Continental zone of North Greece Shrublands Free roaming, Continental zone of North Greece Open forests Free roaming.
 - 2.1.2. Continental zone of North Greece Grasslands Shepherded, Continental zone of North Greece Shrublands Shepherded, Continental zone of North Greece Open forests Shepherded.
 - 2.1.3. Continental zone of North Greece Grasslands Transhumance, Continental zone of North Greece Shrublands Transhumance, Continental zone of North Greece Open forests Transhumance.

3. **Marine Mediterranean Ionian zone:** 3.1. Marine Mediterranean Ionian zone Grasslands, Marine Mediterranean Ionian zone Shrublands, Marine Mediterranean Ionian zone Open forests.
 - 3.1.1. Marine Mediterranean Ionian zone Grasslands Free roaming, Marine Mediterranean Ionian zone Shrublands Free roaming, Marine Mediterranean Ionian zone Open forests Free roaming.



3.1.2. Marine Mediterranean Ionian zone Grasslands Shepherded, Marine Mediterranean Ionian zone Shrublands Shepherded, Marine Mediterranean Ionian zone Open forests Shepherded.

3.1.3. Marine Mediterranean Ionian zone Grasslands Transhumance, Marine Mediterranean Ionian zone Shrublands Transhumance, Marine Mediterranean Ionian zone Open forests Transhumance.

4. **Mediterranean mainland zone of south Greece:** 4.1. Mediterranean mainland zone of south Greece, Mediterranean mainland zone of south Greece Shrublands, Mediterranean mainland zone of south Greece Open forests.

4.1.1. Mediterranean mainland zone of south Greece Grasslands Free roaming, Mediterranean mainland zone of south Greece Shrublands Free roaming, Mediterranean mainland zone of south Greece Open forests Free roaming.

4.1.2. Mediterranean mainland zone of south Greece Grasslands Shepherded, Mediterranean mainland zone of south Greece Shrublands Shepherded, Mediterranean mainland zone of south Greece Open forests Shepherded.

4.1.3. Mediterranean mainland zone of south Greece Grasslands Transhumance, Mediterranean mainland zone of south Greece Shrublands Transhumance, Mediterranean mainland zone of south Greece Open forests Transhumance.

Then, for the purpose of this project, we concluded to the presentation of the most representative landscape character areas as these occurred in relation to their natural and cultural environment.

3.2. The mountainous zone- Pindos.

In Pindos, animal husbandry and timber trade were the main occupations of the people. Transhumant landscapes were the most common ones. The animals kept were mainly sheep and goats (used for cheeses, meat and wool) with different transhumance practices. Some tribes were permanently located in their settlements or worked as shepherds for big transhumant herdsmen, others moved only their herds (and not their households and families) seasonally to the plains in the winter and returned in the fall and others moved their households and families along with the herds seasonally to summer seasonal settlements.

Cobbled paths and arched bridges are remaining distinctive traces of landscape from the past. The most prominent ones are noticed at the areas of Epirus and today they serve for ecotourism activities (fig. 5)



Figure 5. Skala Vradetou. Zagorohoria, Epirus. *Source: Gkoltsiou.*

Also, animal husbandry infrastructures, such as the one of nomadic Sarakatsan shepherds are reviving till today and reconstructed only for tourist and educational purposes in the area of Giftokambos (fig.6).



Figure 6. Sarakatsani stani Kaimaktsalan. *Source:* http://sarakatsianoι.blogspot.com/2009/10/blog-post_10.html

Today, the former farming landscape is now replaced by forests, which are more desirable by urban populations. This development is not negative in environmental terms, but important local knowledge in managing these fragile ecosystems in a more or less environmentally friendly way is lost.

3.3. The continental zone of north Greece- Epirus, Macedonia, Thrace &Thessaly.

The continental zone of north Greece presents a variety of pastoral landscapes. The most dominant types of pastoral landscapes recognised are Free roaming Grasslands, Shepherded Grasslands, Shepherded Open forests and Transhumance Open forests. This zone of Greece is characterized by big plains, where cereal cultivation has a long history, as well as broadleaves and coniferous forests. In the area of Macedonia and Thrace, the vegetation is particularly variable and

fertile. We recognise cultivations of cereals and fruit trees in the plains and coastal areas, shrublands and conifers in the lowlands (600-700m), Broadleaf oak forests in the midlands (1000-1200m) and in the highlands there are conifer trees such as *Pinus nigra*, *Abies borisiiregis*, *Pinus sylvestris*, etc. In Thessaly during Ottoman times, the development of mountain animal husbandry was closely linked with cereal cultivation on the plains. Herds grazed fallow lands of the big *ciflic* estates, created after the 16th century from former *timars* (Islamoglou-Inan, 1994). These large estates coexisted with small Muslim and Christian farmers who were either landless (therefore employed by the big estates), or with small farms and had to work for big landowners as well.

In the following decades, the new management systems were highly intensive and modernized and emphasis was gradually given to industrial plants in the place of cereals (tomatoes, sugar-beets and eventually cotton). Today, the above pastoral landscapes are characterised by big farm units, very modernised in order to adjust to recent needs of the European market As in most Western countries (Pratt and Funell, 1997), this intensification caused a number of problems in productive (overproduction), social (despite subsidies, people still migrated from rural areas) and environmental (pollution of underground aquifers, overuse of resources especially water, biodiversity loss due to monocultures, erosion) terms.

Today, older productions and management systems are re-evaluated and a growing number of farmers seek to diversify once again their land uses to reduce risks and use less inputs to reduce costs and increase revenues by focusing on quality rather than quantity. However, we also recognise many small temporal constructions made by tin or any other material looking completely strange to the surrounding landscape (fig.9). This is another proof of our era, that everything has to be done fast, cheap without any respect to the landscape.



Figure 7. Huts in a mountainous open forest in Zagorohoria, Epirus. Source: F. Papageorgiou

3.4. Ionian islands

The pastoral landscapes of the Ionian Islands bare many similar landscape features distinctive of the south-eastern part of Greece. Because of the high amount of rainfall they receive, the vegetation is lasher than on the other islands. The pastoral landscapes are

mainly; Free roaming Grasslands (Fig. 8) or shrublands and Shepherded shrublands. However, due to tourism growth, animal husbandry and pastoralism are not the first economic priority of the islands.



Figure 8. Pastoral installations in Ithaka. *Source: A. Gkoltsiou.*

3.5. The south-eastern part of Greece- Sterea, Evia, Peloponnesus,

The south-eastern part of Greece- Sterea, Evia, Peloponnesus, presents also a remarkable pastoral activity. We basically recognise types associated with the free roaming and shepherded landscapes. Due to their altitude variety, there is vegetation diversity (from broadleaves to olive groves and shrublands). Most of these pastoral landscapes are found in confined grazing lands or orchards. There is also a variety of installations (from cheap tin constructions to well organised small dairy units) (fig.9, fig. 10, fig.11, fig.12).



Figure 9. Huts as part a family farm settlement, in Karpenissi, Sterea Ellada. *Source: A. Gkoltsiou.*



Figure 10. Modern installations of sheep farming in Astros- Peloponnesus. *Source: A.Gkoltsiou*



Figure 11. Overgrazing landscape in Peloponnesus. Hut from cheap material badly fitted to the landscape *Source:A.Gkoltsiou*



Figure 12. Overgrazing landscape in Sterea Ellada. *Source:A.Gkoltsiou*

3.6. The Aegean islands

The Aegean islands despite their diversity, however, their particular geographical features, climatic conditions and their socio-economic structure, are characterised by certain disadvantages regarding the agricultural activity and production, particularly in livestock.

Given that their agricultural land is found on semi- or marginal areas, the islands have experienced a gradual abandonment of land and, therefore, a declination of local societies. Indeed, depending on the typology of each island, the most important characteristics are:

- Dry and steeply mountainous areas
- Scarcity and exhaustive use of natural resources
- Water shortage and as a result, there is an acutely unbalanced land and water uses between farming and tourism. Land prices increased, while there is a loss of productive agricultural land and land of natural heritage
- In certain areas, landscape degradation and pollution has been noticed
- Isolation from the mainland and remoteness:
- Gradual but steady shift of the employment of the remaining farmers from farming to tourism continues. Farming becomes progressively only a small part of a multi-activity model of production and income.

Finally, the islands consist of an ecologically very fragile environment. Environmental damages caused by climate factors (forest fires, strong winds, very low rainfalls per year) are increasing frequent and intense, sharpening soil erosion, impoverishing the land further and making farming more vulnerable. All the factors, that I have mentioned before, have led the small islands to be highly dependent on a certain level of self sufficiency in agricultural production, particularly of livestock.

However, their pastoral landscape may belong to one of the following types such as Free roaming Grasslands (Fig. 13,14), Free roaming Shrublands (Fig. 15), Shepherded, Grasslands, and Shepherded, Shrublands. Due to overgrazing conditions, desert like appearance is inevitable.



Figure 13. Free roaming grassland landscape in Kea. *Source:A.Gkoltsiou*



Figure 14. Free roaming grassland landscape in Kos. *Source:A.Gkoltsiou*



Figure 15. Free roaming shrubland landscape in Lesvos. *Source:A.Gkoltsiou*

In Crete, for example, Psilorites mountain is a typical case of desertification (fig. 16). Since 1980, sheep and goats have increased three times, mainly due to European Union subsidies. As a result, sparse shrublands, which is the last degradation stage for the mountain, were increased by 85% between 1961 and 1989 at the expense of denser shrublands and forests.



Figure 16. Pastoral landscape in the municipality of Rethymno. Krete. *Source: A. Goltziou*

3.7. Significant landscape elements associated with sheep husbandry

Agriculture and animal husbandry infrastructure, which includes many different elements such as storehouses, animal yards, dwellings, constructions for harvesting, irrigating, watering animals or processing products (threshingflors, wine presses, windmills, water mills, wells, tanks, etc.), are part of the local architectural and craftsmanship stone building tradition (Figure 19). The decline of traditional management systems, new and cheaper building materials and the scarcity of craftsmen, have led to the degradation of their quality or replacement of stone with modern materials (concrete, metal, etc.)



Figure 17. Pastoral installations in Volaks, Tinos. *Source: A. Gkoltsiou*

Fences, which are of two types: hedgerows and dry stonewalls. Hedgerows are very rare on Aegean islands, but stonewalls are very common as protection from grazing or for marking rangeland - fields limits (figure 18). When they separate grazing lands they are vertical to the contours and rectangular when they separate fields (Figure 19). When they are in straight line or along contours, are forming terraces in order to increase cultivated land and preserve natural resources (soil and water) (Figure 20). Past installations, demonstrate the harmonious combinations of dry stone walls with the hut (figure 21). These are the most distinctive elements of the pastoral of the Aegean Islands. Modern fences are made of wire and often replace fallen stonewalls.



Figure 18. Stonewalls in Kithnos. *Source: F.Papageorgiou.*



Figure 19. Stonewalls separate properties in Kea. *Source: A.Gkoltsiou*



Figure 20. Stonewalls and Terraces in Andros and Kea. *Source: A.Gkoltsiou*



Figure 21. Harmonious combinations of dry stone walls and huts. Kea and Tinos. *Source: A.Gkoltsiou*

Footpaths that range from simple passages through fields to paved and broad paths (figure 22) are the strongest marks of the previous pastoral life, where transhumance activities were alive.

Today, they are either replaced by dirt or asphalt roads or abandoned and covered by vegetation. However, many of them are restored and serve for ecotourism activities.



Figure 22. Harmonious combinations of dry stone walls and huts. *Source: A.Gkoltsiou*

4. SHEEP FARMING AND MANAGEMENT

4.1. Sheep farming associated specific landscapes

In relation to the three main types of pastoral landscapes (free roaming, shepherded, transhumance), management practices are or can be adjusted adequately. For example, in a free roaming pastoral landscape, the farmer restore the desertified grazing lands and landscapes by making vegetation improvements (fertilization, introduction of new plant species by seeding or planting and weed control), increasing vegetative cover and forage supply to the animals. In a shepherded landscape, animal grazing during the summer months when pasture growth is limited or dried up, can be used to control vegetation overgrowth thus increasing the efficiency of the lanes against wildfires. However, today there is an uncontrolled grazing sheep and goat grazing, with overgrazing negative impacts in rejuvenated forests.

Lastly, the transhumance (nomadic farming of sheep) landscape involves the transfer of the sheep in the highlands around St. George Day in April, where they spend the rest of spring and summer, and their return to the warmer lowlands near St. Demetrious Day in October to spend the winter. This type of pastoralism was one of the friendliest ways of management. During the summer time, grazing of the forest avoided the wildfires and the farming of lowlands during winter time, gave opportunities to the local population to exploit the land. However, the gathering of Sarakatsan once a year in the area of Pindos, is an attempt of cultural traditional revival. The nomadic pastoralism associated strongly with the transhumance landscape, points to the fact that this is the only way of forest management. Apart from that this type of farming offers excellent quality of dairy products.



Today, there is a tendency of a mix system of nomadic pastoralism and private owned pastures, where we will succeed to have a natural balance, good quality of products, preservation of indigenous species, and to be in accordance with the appropriate sanitary measures.

4.2. Terminology of sheep management in local languages and dialects

The following terminology is about some of the words that are used in pastoral Greek life:

Sheep= provato (*πρόβατο*), which means the animal that advances.

Milovotos (*μηλόβοτος*) = pasture

Pimenas (*ποιμένας*) = shepherd

Stavlos (*στάβλος*) = stable sheepfold

Stalos (*σταλός*), or stani (*σάνη*) = station

Mandri (*μαντρί*) = sheepcote

Strouga (*στρούγκα*) = pen for milking the sheep

Tyrias (*τυριάς*) = caves in the highlands in order to maintain the cheese cool during summer time

Xeimadio (*χειμαδιό*) = area in the lowlands for the wintering of flocks.

Galaropoti (*Γαλαροπότι*) = area of keeping the sheep nursing or the ones for intensive milking. This area was chosen in order to protect the pasture from trampling.

Gennolivado (*Γενολίβαδο*) = area of keeping the sheep which is ready to give birth.

Arnolivado (*αρνολίβαδο*) = area of keeping the sheep which is for reproduction.

5. PRESENT SITUATION OF SHEEP FARMING AND MANAGEMENT

5.1. Changes in landscape character types related to sheep farming and grazing

Sheep farming and grazing has caused many impacts on the Greek landscape. The most serious ones are described below.

1. **Overgrazing** which removes the vegetative cover and exposes the soil to erosion, resulting in desertification and completely denuded grasslands. As animals graze, they remove parts or whole plants from a particular grazing land. In the meantime, as animals move around they trample the soil with their hooves exerting a high pressure. This pressure results in soil compaction and, as a result, in the reduction of its infiltration capacity. Consequently, the rainwater runs off instead of percolating into the soil profile. In steep areas, which are common in the Mediterranean pastoral landscapes, the water runoff leads to soil erosion, first sheet but later rill and finally gully erosion. Eventually, the parent rock is exposed and desert-like conditions are created.

Overgrazing is very common, resulting in high erosion rates and disappearance of some plant species and expansion of other species unpalatable to animals. Furthermore, pastures in the upper zone can receive large numbers of animals during the summer period, or alternatively these pastures are undergrazed due to lack of infrastructure (roads and drinking water for the animals). Nowadays, however, goats are considered important animals not only for utilizing poor quality vegetation but also for controlling the woody understorey of Mediterranean forests and reducing the fire hazard.

As a result many young or valuable ecosystems disappear and turn to dry shrublands (Figure 26). Similarly, lot of Shrublands with a variety of species, turn to decertified lands (example the Aegean islands)



Figure 23 Over grazing in the Oak forest of Ikaria (Randi) creates a serious obstacle of regeneration.

2. **Undergrazing** can also cause desertification, because the plant material not removed by the animals becomes a very flammable fuel to be burned by wildfires, which in turn often lead to soil erosion. If not burned, undergrazed lands will be invaded by woody species, thus resulting in a loss of biodiversity, which is also a form of desertification.

3. **Interaction with wildfires.** Fire is a powerful means to control vegetation unpalatable to animals and Mediterranean pastoralists have known this since the ancient times. Pastoral wildfires therefore are an established tradition in several parts of the Mediterranean (e.g. Crete, Sardinia and Corsica). In Greece, for example, a large proportion (25%) of the fires every year is caused by pastoralists. Wildfires are set during summer, when temperatures are high and vegetation dry. With the advent of the first autumn rains, regeneration of the vegetation occurs in the burned areas through stump sprouting or prolific seed germination. To make use of this fresh feed, pastoralists put high numbers of animals into recently burned areas, thereby overgrazing the palatable in favour of the unpalatable species. Without competition from the palatable species, the unpalatable grow fast and come to dominate the burned area, thus forcing pastoralists to set another wildfire in order to control them. This is a vicious cycle that leads to denuded landscapes.

4. **Social impact.** Social factors related to social devaluation of the pastoral profession and high opportunity cost of labour, will certainly limit farming activities in the future.

5.2 Typical and special or unique examples and long-lasting and sustainable models of management that remain viable and survive today

The sustainable development of rangelands needs to take into account local or regional conditions, rather than applying general models or recommendations (Flamant et al., 1999). Mitigation measures concerning regulation of grazing management and implementation of

the necessary vegetation and soil improvements proved successful to restore productivity. Therefore, it will be necessary to adjust local, regional or national policies as well to solve any administrative or land tenure problems that might prevent grazing regulation. It is well known, that from the antiquity, we had a kind of symbiosis among forest and sheep. When the number of herbivores increased exaggeratedly, then the carnivores restored the balance of the ecosystem. Nowadays, man has to play this role. In some forest/national parks of Attica, sheeps are used to reduce the understorey vegetation (grass or shrubs) (figure 24).

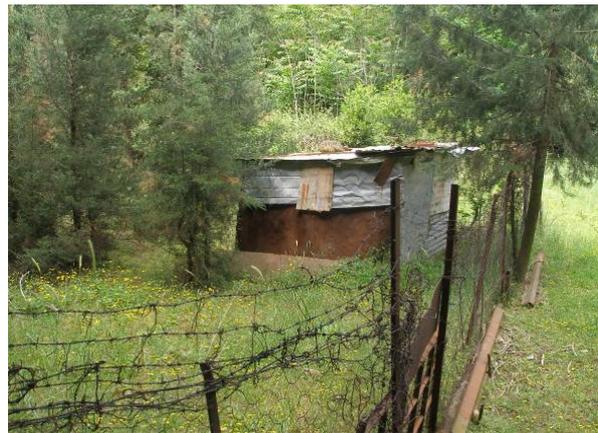


Figure 24. Sheep farming in the Royal Park of Tatoi, Athens. *Source: Aikaterini Gkoltsiou*

Traditional systems, which are more concerned with the relatively long term preservation of a level of soil fertility and resources availability, seem more viable and sustainable models. The fact though that no external inputs were available for their traditional systems forced them to utilise practices that preserved resources, making a virtue out of necessity. Again, this must not be taken to imply that all traditional systems are more sustainable than modern ones. Surely, environmental problems and degradation of resources were problems for traditional systems as well and the need to migrate to provide food or money or simply the level of population density in some areas indicates overexploitation of resources. Finally, such systems are not directly applicable but some of their features and practices could be used today in sustainable rural landscape management.

6. SOCIO-POLITICAL MEASURES TO SUPPORT SHEEP FARMING AND GRAZING

The **Common Agricultural Policy (CAP)** acknowledge the contribution of farming over the centuries to create and maintain a unique countryside, therefore one of the main axes is to preserve 'natural' farming and forestry systems, and traditional agricultural landscapes. This is why, CAP ensures that its rules are compatible with environmental requirements and that CAP measures promote the development of agricultural practices preserving the environment and safeguarding the countryside. Farmers are encouraged to continue playing a positive role in the maintenance of the countryside and the environment.



This is achieved by:

- targeting aid at rural development measures promoting environmentally sustainable farming practices, like agri-environment schemes;
- enhancing compliance with environmental laws by sanctioning the non-respect for these laws by farmers through a reduction in support payments from the CAP.

The rural development policy for Greece is implemented through the Rural Development Programme 2007-2013 (RDP) focusing on the following Axes :

AXIS 1 : Improvement of the Competitiveness of the Agricultural and Forestry Sector

AXIS 2 : Improvement of the Environment and the Countryside

AXIS 3 : Quality of Life in Rural Areas and Diversification of the Rural Economy

AXIS 4 : Implementation of LEADER Approach

Therefore the Greek government supports an extensification system of farming according to the Measure 214, action plan 1.3.

The socio-political measures which may be taken in order to support sheep farming and grazing are the following:

1. *Resolving management problems for communally grazed lands.* This can be done by developing grazing management plans and encouraging farmers to follow them so that overuse is avoided.

2. *Institutionalizing the use of livestock as management factors in protected areas.* Livestock grazing in protected areas is instrumental in preserving high biodiversity. Currently it is not practiced because of several obstacles including the negative attitude of conservationists towards livestock.

3. *Supporting the use of local breeds.* Local breeds use native vegetation more efficiently than others. Support could be financial (e.g. subsidies or prices of the products) or institutional (e.g. only local breeds to be used in certain areas).

4. *Promoting the development of quality animal products.* This will encourage farmers to reduce the high number of animals that cause desertification and concentrate on fewer but more productive ones.

5. *Diversifying the farmer income.* Farmers can diversify their income from grazing lands by promoting other activities such as honey production, wild plants collection and agro-tourism.

6. *Institutionalizing the use of prescribed fire to improve grazing lands.* In rangelands where farmers are using wildfires to improve rangelands, the legitimate use of prescribed fire can alleviate the problems because it will be used judiciously without causing desertification.

7. *Economic support of farmers.* Such support is needed when farmers have to comply with a specific plan to combat desertification in their grazing land (e.g. reduction of the excess animals). It could be direct (subsidies) or indirect (prices of products).

8 *Farmer education.* None of the mitigation strategies will completely succeed unless farmers are properly informed and convinced of the need for combating desertification. This means that they should be educated accordingly about the negative impacts of desertification. Such education can be organized through field days in each desertified



landscape, demonstrating what measures to take in order to improve the situation without jeopardizing the farmers' economic prospects.

9. *Land tenure*. Sometimes, desertification of grazing lands and landscapes could be caused by land tenure conflicts. Such conflicts may include ownership / use problems (communal lands). These ought to be resolved before undertaking any other measures to mitigate desertification.

10. *Administrative conflicts*. Several administrative agencies are usually involved in livestock husbandry, especially where grazing land does not belong to farmers but to the state or community. In this case conflicts arise between these agencies on how to prioritize the use of the land and for what group, for example for protection and reforestation or for grazing; or, alternatively, for livestock or arable farmers.

7. ENVIRONMENTAL DIMENSIONS

7.1. Ecological values of landscapes associated with and created or maintained by sheep grazing

Since the extensive systems primarily depend on pastoral resources, the grazing livestock exert a significant impact on the vegetation (Perevolotsky and Etienne, 1999; Kramer et al., 2003), not only in quantitative and qualitative terms, but also upon vegetation dynamics (Rook and Tallowin, 2003), species and community diversity (Collins et al., 1998; Sternberg et al., 2000; Hadjigeorgiou and Karalazos, 2005) as well as landscape (Hartnett et al., 1996; Adler et al., 2001), where the heterogeneous vegetation creates a particularly rich mosaic (Balent and Gibon, 1996; Perevolotsky, 2005). Overall, grazing activity is now accepted of significantly contributing to the creation and preservation of all dimensions of biodiversity (Clergue et al., 2005).

According to the E.U. agricultural land management has been a positive force for the development of the rich variety of landscapes and habitats, including a mosaic of woodlands, wetlands, and extensive tracts of an open countryside. The ecological integrity and the scenic value of landscapes make rural areas attractive for the establishment of enterprises, for places to live, and for the tourist and recreation businesses. Many valuable habitats in Europe are maintained by extensive farming, and a wide range of wild species rely on this for their survival. But inappropriate agricultural practices and land use can also have an adverse impact on natural resources, like pollution of soil, water and air, fragmentation of habitats and loss of wildlife.

Desertification of grazing lands and pastoral landscapes can be mitigated if the degradation process is reversible. This is the case when the vegetation has not been totally removed and soil erosion has not become accelerated. Fortunately, degradation in the majority of grazing lands of Southern Europe is reversible. This is because Mediterranean ecosystems are very well adapted to livestock activities. Even if aboveground vegetation is removed, there are always underground organs (e.g. rhizomes, stolons and bulbs) or rich soil seed banks by which most species can recover if grazing pressure is removed. Some



species can be suppressed by grazing for years but still recover if grazing is suspended. Also, rangeland soils can recover from trampling if animals are removed for some time.

Finally, animals can be used to control vegetation overgrowth thus increasing the efficiency of the lanes against wildfires and help thinning the forest. This is why forests adjacent to grazing lands can be used for animal grazing during the summer months when pasture growth is limited or dried up. Such forests can be properly treated so that livestock use them without damage to the forest growth.

8. CONCLUSIONS

8.1. Breeds most suitable for landscape management of extensive areas or specific locations

Some of the most suitable breeds for landscape management of extensive areas or specific locations, which is are promoted by the Greek Government are: Sarakatsan, Drama native breed, Florina, Karagouniko, Skopelos (or Glossa), Levkimmi, Sfakia, Psiloris, Sitia, Chalkidiki, Chios or Sakiz, Argos. Their preservation becomes of utmost importance, not only for fauna reasons but also because they are fully adapted to the dry climate and, generally, the environmental fragility of the islands.

8.2. Sheep farming as a tool for cultural and ecological landscape management-importance in the country, future trends

The environmental effects of sheep farming are also worth noting. Sheep and goat breeding plays a role of key importance in environmental protection, which includes natural maintenance of less fertile areas, bio-diversity, preservation of sensible ecosystems and of water quality, furthermore, it helps prevent soil erosion, floods, avalanches and fires.

For a biotope network with nutrient-poor and dry sites, sheep grazing plays a key role. Due to their lack of economic viability using conventional cultivation methods, there is often a risk that these valuable biotopes will cease to be managed and maintained. Furthermore, these areas are in many cases being drastically reduced, with remaining oligotrophic grasslands often becoming isolated. Site gradients are being lost, successional processes terminate at stages of maturity, and there is a lack of new pioneer sites. Traditional grazing using sheep can ensure the sustainable management of these sites. To this end, testing and development of practicable area management methods are required in cooperation with sheep farmers and landowners.

Also, flocks of sheep can promote the dispersion of species between individual areas by transporting diaspores and, in rarer cases, even small animals. This can be very important for the exchange of genes and species between isolated areas.

The current trend of "Organic farming" may offer a viable solution to the continuity of these farms (Nardone et al., 2004). Pastoral farmers can easily adopt this type of livestock farming since little management changes are needed, whereas the premium of this change is considerable and there appears to be no risk to the preservation of biodiversity (Hole et al., 2005). Moreover, due to the diverse interests of different stakeholders (farmers, representatives of other economic sectors, conservationists, etc.), a process of multilateral



negotiation and cooperation is strongly advisable when designing and implementing any agro- environmental or conservation policy.

8.3. Contribution to contemporary culture

Till the years of 60s the islands were practically working under conditions of closed economy. This has led in the production of plenty of local products address in niche markets which have become famous for their quality and closely linked to the traditions and customs of the islands. These local products are considered today to be part of our national heritage. For instance, 5 out of the 20 Greek cheeses which have been recognised as products of Protected Geographical Nominations are produced in the islands of the Aegean Sea.

8.4. Suggestions/proposals for future preservation/ revival of theme

In concluding, some suggestions for future preservation/ revival of theme are to create favourable conditions to the remaining farmers to have access to additional sources of income, because returns from agriculture alone are much lower than returns from other activities on the islands (tourism). Also, promoting further the quality component through the integrated management of the remaining production and the certification of traditional products on the basis of recognised standards for organic livestock production, special poultry breeds, and products of appellation of origin. The production of goods that can be certified is considered to be of a great benefit to the small islands, because there is a rich experience and tradition in the production of local products, the breeding ways could be environmentally friendly, preserve and enrich local bio-diversity and natural and productive resources.

Where necessary, programmes of extensification of production can be expanded, in particular of sheep and goat headage. Finally, rural development programmes should be implemented, aiming at:

- Decreasing the transport cost of the “imported” inputs, in particular fodder, and generally, facilitating exchanges of products between the islands and the mainland.
- Advertisement and marketing of islands’ products
- Preservation and protection of the scarce animal races.
- Encouragement of ecological and agro-tourism.
- Utilisation of the sea wealth for tourist purposes.
- Encouragement of a rational fisheries activity.

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ANNEX 1. STATISTICS

YEAR	NUMBER OF SHEEP	NUMBER OF GOATS	TOTAL NUMBER
1911	3.565.442	2.618.043	6.183.485
1929	5.805.646	4.179.214	9.984.860
1950	5.911.947	3.161.034	9.072.981
1961	8.191.836	4.331.627	12.523.463
1971	7.482.660	4.243.780	11.726.440
1983	6.681.980	3.632.300	10.314.280
1991	8.692.286	5.336.443	14.028.729
1999	8.752.668	5.327.201	14.079.869
2002	9.058.117	5.669.198	14.727.315
2007	10.079.903	4.987.092	15.066.995

Table 1. Distribution of sheep and goat population in Greece (1911-2007).

Source: National Statistical Service of Greece (NSSG)

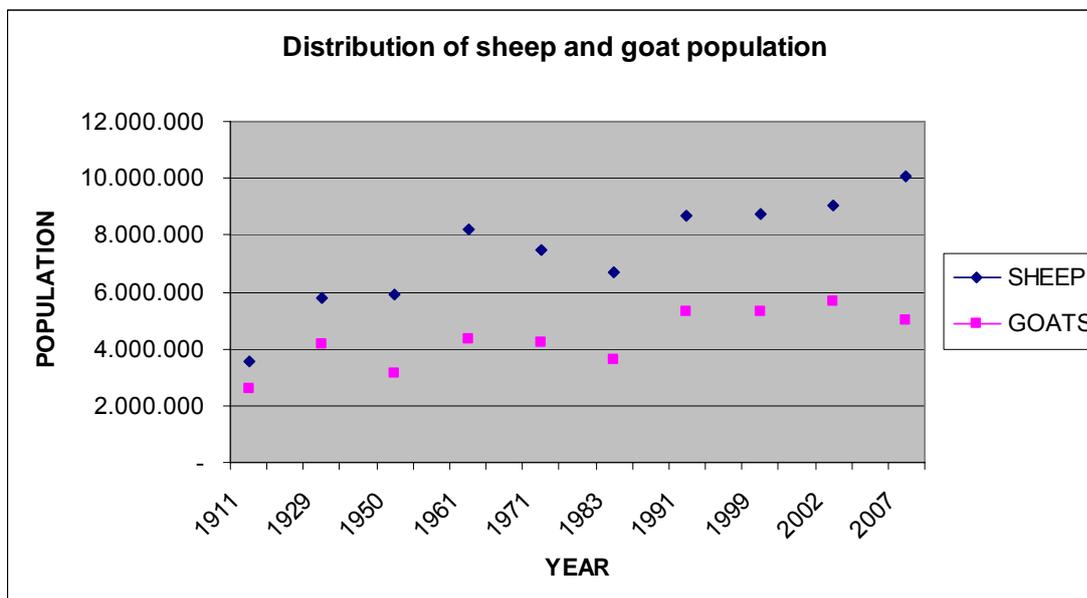


Figure 1. Distribution of sheep and goat population in Greece (1911-2007).



YEAR	REGION	NUMBER OF SHEEP	NUMBER OF GOATS	TOTAL NUMBER
1911	Thessaly&Arta	886.175	415.779	1.301.954
	Ionian islands	109.169	84.040	193.209
	Cyclades	63.118	62.093	125.211
	Peloponnese	1.389.990	1.017.113	2.407.103
	Central Greece & Evia	1.116.990	1.039.018	2.156.008
	GREECE	3.565.442	2.618.043	6.183.485
1929	Crete	239.682	166.773	406.455
	Ionian islands	83.828	67.907	151.735
	Epirus	727.370	459.262	1.186.632
	Macedonia	1.329.196	880.964	2.210.160
	Cyclades	54.168	60.220	114.388
	Thrace	317.692	217.119	534.811
	Thessaly	1.078.245	502.994	1.581.239
	Aegean Islands	114.038	71.508	185.546
	Peloponnese	943.772	798.041	1.741.813
	Central Greece & Evia	917.655	954.426	1.872.081
	GREECE	5.805.646	4.179.214	9.984.860
1950	Central Greece & Evia	925.584	699.883	1.625.467
	Peloponnese	960.097	726.346	1.686.443
	Ionian Islands	104.310	88.397	192.707
	Thessaly	982.206	309.637	1.291.843
	Macedonia	1.343.971	517.563	1.861.534
	Epirus	675.799	320.813	996.612
	Crete	277.995	199.290	477.285
	Aegean Islands	261.108	215.539	476.647
	Thrace	380.877	83.566	464.443
	GREECE	5.911.947	3.161.034	9.072.981
1961	Macedonia	1.905.582	984.394	2.889.976
	Thessaly	1.601.582	468.808	2.070.390
	Thrace	495.675	267.233	762.908
	Ionian islands	117.368	88.419	205.787
	Epirus	809.998	390.653	1.200.651



	Central Greece & Evia	1.359.195	893.428	2.252.623
	Peloponnese	1.194.388	745.848	1.940.236
	Aegean Islands	314.255	241.093	555.348
	Crete	393.793	251.751	645.544
	GREECE	8.191.836	4.331.627	12.523.463
1971	Greater Athens	23.420	6.460	29.880
	Central Greece & Evia	1.341.720	925.780	2.267.500
	Peloponnese	1.140.860	775.560	1.916.420
	Ionian Islands	104.900	65.420	170.320
	Epirus	782.460	350.520	1.132.980
	Thessaly	1.288.200	475.820	1.764.020
	Macedonia	1.435.780	876.900	2.312.680
	Thrace	457.560	217.620	675.180
	Aegean Islands	371.500	244.320	615.820
	Crete	536.260	305.380	841.640
	GREECE	7.482.660	4.243.780	11.726.440
1983	Central Greece & Evia	1.119.680	793.360	1.913.040
	Peloponnese	769.640	594.820	1.364.460
	Ionian Islands	60.300	68.360	128.660
	Epirus	980.900	282.400	1.263.300
	Thessaly	854.240	472.100	1.326.340
	Macedonia	1.191.000	617.420	1.808.420
	Thrace	255.640	162.580	418.220
	Aegean Islands	616.100	310.020	926.120
	Crete	834.480	331.240	1.165.720
	GREECE	6.681.980	3.632.300	10.314.280
1991	Attica	8.880	3.554	12.434
	Central Greece & Evia	1.639.769	1.118.094	2.757.863
	Peloponnese	1.299.058	941.627	2.240.685
	Ionian Islands	121.570	132.190	253.760
	Epirus	957.696	368.956	1.326.652
	Thessaly	1.229.132	530.069	1.759.201
	Macedonia	1.275.436	1.036.092	2.311.528
	Thrace	428.875	310.712	739.587



	Aegean Islands	618.435	437.208	1.055.643
	Crete	1.113.435	457.941	1.571.376
	GREECE	8.692.286	5.336.443	14.028.729
1999	Eastern Macedonia and Thrace	557.344	587.733	1.145.077
	Central Macedonia	807.096	745.683	1.552.779
	Western Macedonia	366.116	207.285	573.401
	Thessaly	1.140.063	530.232	1.670.295
	Epirus	946.563	329.957	1.276.520
	Ionian Islands	134.870	148.119	282.989
	Western Greece	1.362.839	548.437	1.911.276
	Central Greece	659.065	538.636	1.197.701
	Peloponnese	557.992	596.437	1.154.429
	Attica	114.282	59.713	173.995
	North Aegean	388.648	113.950	502.598
	South Aegean	219.413	293.761	513.174
	Crete	1.498.377	627.258	2.125.635
	GREECE	8.752.668	5.327.201	14.079.869
2002	Attica	174.792	85.604	260.396
	Central Greece and Evia	1.449.254	943.527	2.392.781
	Peloponnese	1.428.388	984.059	2.412.447
	Ionian Islands	137.875	146.796	284.671
	Epirus	909.813	319.632	1.229.445
	Thessaly	1.196.550	550.168	1.746.718
	Macedonia	1.444.381	1.197.472	2.641.853
	Thrace	371.637	333.549	705.186
	Aegean Islands	647.940	508.529	1.156.469
	Crete	1.297.487	599.862	1.897.349
	GREECE	9.058.117	5.669.198	14.727.315
2007	Eastern Macedonia and Thrace	643.690	558.328	1.202.018
	Central Macedonia	1.042.084	593.326	1.635.410



Western Macedonia	407.907	187.256	595.163
Thessaly	1.417.855	597.679	2.015.534
Epirus	866.164	257.910	1.124.074
Ionian Islands	131.380	149.292	280.672
Western Greece	1.684.159	580.193	2.264.352
Central Greece	669.625	460.009	1.129.634
Peloponnese	562.788	517.663	1.080.451
Attica	82.867	49.224	132.091
North Aegean	491.821	144.218	636.039
South Aegean	200.682	237.084	437.766
Crete	1.878.881	654.909	2.533.790
GREECE	10.079.903	4.987.092	15.066.995

Table 2- Distribution of sheep and goat population by region. *Source: NSSG.*

YEAR	CATEGORIES			
1991	TOTAL NUMBER	DOMESTIC	IN FLOCK	NOMADIC
SHEEP	8.692.286	778.973	7.234.243	679.070
GOATS	5.336.443	866.789	4.219.893	249.761
2002				
SHEEP	9.058.117	719.619	7.681.528	656.970
GOATS	5.669.198	735.760	4.655.951	277.487
2007				
SHEEP	8.831.042	640.645	7.641.703	548.694
GOATS	5.401.865	633.652	4.510.887	257.326

Table 3- Distribution of sheep and goat population by category. *Source: NSSG.*

Permanent Pastures		
Country	Area (1000 Ha)	Percent of the total country
Greece	4,600	35
Italy	4,377	15
Portugal	1,437	16
Spain	11,470	23

Table 4- Statistics of permanent pastures land cover in 2007. *Source: FAOSTAT*