PERSPECTIVES OF SILVICULTURE AS DISCIPLINE IN GREECE

Zagas T., Tsitsoni T., Gkanatsas P.
Laboratory of Silviculture, School of Forestry & Natural Environment
Aristotle University of Thessaloniki
Tel.: +3031 998903, Fax: +3031 998881, e-mail: zagas@for.auth.gr
P.O.Box 262, 540 06 Thessaloniki - Greece

Abstract

Greek Forestry relies basically on the principle of sustainability. Recently, this term, eventhough it is very old, has acquired a special interest as it redefines the relation between man and nature. Greek silviculturalists adopted this principle many years ago, in the form of providing perpetually equal wood volumes, annually or periodically as well as other social benefits.

Keeping in mind that, the priorities and perspectives of silviculture as discipline in Greece are the following: The contribution to the protection of greek forests by applying the most appropriate silvicultural treatments as well as the rehabilitation of degraded forest ecosystems (conversion of coppices, cover of bare lands etc.). The maintenance of the existing mixed forests and the transformation of the pure conifer forests into mixed ones as well as the improvement of structure of the high forests. The use of natural regeneration in the future in same way it was used so far, the prohibition of clear-cuttings in all forests and the use of low impact management methods. The application of selective harvesting and the keeping of individual old trees until their biological death. The protection of rare species and the creation of a network of special protected areas.

1. Introduction

The globe goes through a critical period. For the confrontation of this crisis and the protection of the earth itself, altogether and everyone alone need to work on every possibility.

Over the last ten thousand years the earth's mantle of forests and woodlands has shrunk by a third, as trees were cleared to make way for agriculture and urban

areas (Postel and Ryan 1991 in Gosz 1992). Each year the earth's tree cover diminishes by some 17 million hectares, an area the size of Austria (Brown 1991 in Gosz 1992).

These simple statistics show the necessity of the protection, amelioration to the extend and the sustainable management of the existing forests (Zagas and Hatzistathis 1995). The term sustainability is well known in Forestry science, as it is applied in the forest practice from the middle of the 18th century (Hasel 1985).

Recently, the term sustainability has acquired a special interest as it re-defines the relations between man and nature. The general implication is a concept of preservation, nurture of a resource, process, or environmental attribute over time. Sustainable forestry is a complex phenomenon which is much more difficult than balancing the short-term factors of annual harvest and growth (Gosz 1992).

Forests are comprised of much more than wood and other products for human consumption. Their "public service" functions such as climatic regulation, water supply, pest control, gene banks, or recreational opportunities are valuable, but more valuable is their sustained existence (Noss, 1993).

Keeping in mind the above mentioned, we will present the priorities and perspectives of silviculture as discipline in Greece.

2. Ecological particularities of Greece and greek forests

Greece is a mountainous mediterranean country, characterized by a variety of climates, bedrocks, soil types, topography characteristics and microenvironments.

It belongs to the temperate zone, located in the eastern part of the northern hemisphere. According to Emberger's classification (1959), greek climate is ranging from semi-arid to humid. Generally, in the lower altitudes the climate is characterized by mild and humid winters, and warm and dry summers while in the higher altitudes the rainfall increase and temperatures decrease. The annual precipitation range from 350 - 400 mm in Attica and islands of Aegean Sea to more than 1500 mm on the mountains, particularly those of western, central and northern Greece and Crete. The dry period ranges from 2-3 months in the northern and more mountainous country, to 5-6 months in the eastern and southern parts of the lowland

country. An increase in rainfalls is also observed from eastwards to westwards and from southwards to northwards of the country (Flokas 1991).

The above mentioned climatic changes are reflected on the zonal appearance of vegetation (Dafis 1973, Athanasiadis 1986), which is also significantly depended on the geology and pedology of an area.

The different bedrock usually occupy small areas or zones and they form a mosaic on the geological map of the country. This phenomenon affects considerably the appearance and growth of the different forest species since, more or less, the type of forest soils and the moisture conditions depends on them. There are many characteristic examples in the greek region of the influence that bedrock have upon the composition of forest species (Mount Olympus, Mount Cholomon, etc.).

The main groups of bedrock, the weathering of which provides the same "type" of soil, are the following:

- Hard limestone which provide clay soils or clay-loamy soils and comprise the 32% Greece's surface; very important for pastures and forests.
- Metamorphic or crystalline schists which provide loamy to sandy soils of acid reaction and comprise the 16% of the total area. They are the most productive soils for forestry.
- Tertiary depositions which provide soils of various texture and comprise the 21% of Greece. They are important for forestry and agriculture.
- Flysh which provide clay-loamy to loamy soils of acid reaction. They are most useful for forestry and comprise the 9% of Greece.
- Acid volcanic (granites, diorites etc.), which provide loamy to sandy soils of acid reaction. They comprise the 3% of Greece; valuable for forestry.
- Alluvial depositions which provide alluvial soils, suitable for agricultural use. They comprise the 17% of Greece (Min. of Agriculture 1992, Papamichos 1996).

The appearance and growth form of the vegetation is greatly influenced by the topography of the area. The slope and the aspect play a decisive role on site quality along with the historic and the prevailing demographic and economic conditions of the area (Dafis 1967).

The above mentioned features play an important role on the appearance of a variety of microenvironments and, consequently, on a great number of natural forest types.

These forests present in general a natural irregularity and often mixtures of different species, conifers and broadleaves as well. The vegetation zones become frequently vague, whereas the inversion of the vegetation zones is not an unusual phenomenon, as it is clearly expressed by the "ecological counterbalance law".

Conifers extend in almost all altitudes; from sea level up to the timberline. The evergreen broad-leaved brushlands and forests occupy the lower areas, while the forests consisting of deciduous broad-leaved species along with a variety of mixed forests, cover the slopes of the mountains in a considerable part of the country.

3. Sustainability and the greek Forestry

The first steps towards applying a systematic forestry have taken place in Greece in the middle of the 19th century. However, a century almost went by, before greek forests were placed under regular management. The first Greek foresters studied in the Forestry Schools of Central Europe, as well as the first professors who taught in the only Department of Forestry in Greece, the current Department of Forestry and Natural Environment, in the Aristotle University of Thessaloniki.

The scientific knowledge has been promptly adapted into the greek conditions and particularities, which have already been stated. The basic principle upon which the management of the greek forests relies on, is the principle of sustainability, in the form of providing perpetually equal volumes, annually or periodically. However, before this principle became valid, two other principles must be applied: a) the principle of preservation of the forest as an ecosystem, and, b) the principle of conservation and improvement of soil productivity (Dafis 1989, Hatzistathis and Dafis 1989, Zagas and Hatzistathis 1995, Hatzistathis and Zagas 1996).

Greek forests today suffer from wildfires and, sometimes, from overgrazing, despite being protected by many laws and the Greek Constitution.

Nevertheless, many forests in Greece, even coppice ones, seem to have been improved, especially in areas where overgrazing and other irrational human activities have ceased over the last years.

4. Contribution of Silviculture in the application of the sustainability principle

Silviculture in Greece was based on the triptych of the following:

- sustainability (outputs and functions)
- conservation of forest ecosystems, and,
- improvement of site productivity (Dafis 1986, Zagas and Hatzistathis 1995).

The greek forests, as already pointed out, are characterized from an irregularity, as a result of the site variability in small areas and their inappropriate use in the past. This irregularity, which is usually accompanied by a poor quality composition, creates many silvicultural and management problems. In these cases, of course, instead of trying to find solutions to all problems, it is rather useful to transform some of them into advantages, and use them for achieving long-term goals. A good example is the use of the existing irregularity of forests for providing their desirable stability. To achieve an ideal structure, it is not usually the main target. It is sufficient in many cases, enough for us, the existing stand structure and productivity or the stand function to be in accordance with the site productivity and the management goal as well.

Mixed stands are of special ecological and aesthetic value and, especially, the uneven-aged stands composed of broadleaves and conifers. The natural mixed forests are an important capital for the greek forestry. Greek silviculturalists many years ago have recognized the ecological, economical and social role (multiple role) of these forests and by applying the appropriate treatments, they aim at maintaining them into their original composition (Dafis 1989, Zagas 1994, Tsitsoni and Zagas 1994). In the mixed forests, the role of silviculturists is versatile and requires the good knowledge of the existing ecological conditions.

The priorities of silviculture in Greece are set as follows:

a) The maintenance of the existing high forests in the most appropriate species composition and stand structure.

b) The rehabilitation of the degraded high and coppice forests with special care in the conversion of the coppice forests (Dafis 1989, Zagas 1994, 1995, Zagas and Hatzistathis 1995). The methods used must be “close to nature” methods, which will respect the existing vegetation, since its

species will consist the major planting material (restricted use of exotic species is recommended).

c) The establishment of new forests in the appropriate mountainous areas, by using the ecologically suitable forest species and reforestation methods. Depending on the goal of reforestation a detailed planning should take place first, for a better ecological and economic result (Hatzistathis and Dafis 1989, Zagas 1995).

d) The maintenance and enrichment of biodiversity, preserving the habitats of all species. The tools for this could be the irregular structure of forests, the preservation of old-growth trees until their biological death, the protection of rare species, etc. (Keuffel and Krott 1997).

e) The improvement of the qualitative composition of forests, by using low-cost and "close to nature" methods. Tools in this effort must be the appropriate sivicultural treatments in all developmental stages (Dafis 1989).

f) Reduction, to the extend possible, of cut to growth ratio, aiming at a better ecological and economic result. The best economic result will come out from the future higher prices of wood products, while the ecological one from the deposition of large amounts of carbon dioxide (CO_2) and the achievement of a better bioecological balance. (Dafis 1986, Zagas and Hatzistathis 1995).

g) The prohibition of clear-cuttings in coppice forests. Clear-cuttings are prohibited in high forests in Greece but not in coppice ones. However, an effort of converting oak and beech coppices into high forests has begun many years ago. The first results are very optimistic and the application of the acquired knowledge and experience towards a better result is a political choice. The oak and beech coppices are more than one third of the greek forests. This fact shows the importance of the conversion of coppice forests into high ones. The method which provides the best results is the immediate one by the tending in the good site qualities (I, II, III) and by changing the forest species in the worse site qualities (IV and V) (Dafis 1966, Hatzistathis et al 1996). The combination of the above silvicultural treatments must be applied in relatively small areas for a better economic

and ecological result (Dafis 1966, 1989, Hatzistathis and Dafis 1989, Zagas 1995).

h) The use of natural regeneration. The greek forests are naturally regenerated. This happens relatively easily and is accompanied by a number of advantages: the maintenance of the existing indigenous forest species and provenance, the formation of stands with a desirable composition and structure (which ensures ecological balance and stability), and a network of habitats which is very important for maintaining the biodiversity.

i) The conservation of characteristic natural forests of special interest. Some forests in Greece are under protection with special laws while others are about to be placed within the frame of the "Natura 2000" network. These forests are expected to play a multi-functional role in accordance to the modern ideas of the forestry science and the future social demands as well. The implementation of this objective could not be possible if the silvicultural measures taken in the past had altered the physiognomy of the forest ecosystems.

5. Discussion - Conclusions

The term "sustainability" is very old in its origin, and constitutes a "one- way road" towards long-term, viable development.

All scientific disciplines in charge of the natural resource management today are making efforts to apply in real terms the principle of sustainability. Furthermore, the concept of inter-generation equity (equity among different generations) contained into it, contributed to the fact that sustainability is on the focus of many scientific disciplines. As a consequence, the forestry based on the principle of sustainability is a modern forestry which provides for the needs of the present and future generations.

The problems which must draw our attention in the future, are the following:

- Contribution to the protection of greek forests, by applying the most appropriate silvicultural treatments (Hatzistathis et al 1996, Zagas et al 1998).

- Rehabilitation of degraded forest ecosystems (conversion of coppices, coverage of bare lands etc.)
- Maintenance of the existing mixed forests and transformation of the pure conifer forests into mixed ones.
- Use of natural regeneration in the future, in same way that it was used so far.
- Improvement of structure of the high forests.
- Prohibition of clear-cuttings in coppice forests and application of a conversion program.
- Allow trees to grow old and make selective harvesting.
- Keep individual old trees until their biological death.
- Protection of rare species.
- Creation of a network of special protected areas.
- Development of the special functions of the forests, whenever is necessary (water supply, protection against erosion, improvement of climate, maintenance of biodiversity etc.).
- Use of low-impact management methods (appropriate equipment, low road-density, use of animals, e.g. mules and horses).

In conclusion it can be stated that the applied silviculture in Greece is a "close to nature" silviculture, combining all forest functions and successfully contributing towards sustainable forestry. All greek foresters are taught the above viewpoints. However, before they apply them in practice, the cooperation of all parties involved is required. Moreover, the understanding of the above stated viewpoints is necessary from the competent politicians who should either train themselves on this topic (sustainable Forestry) or at least choose the right consultants.

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