

Landscapes for Learning – Rediscovering the Mediterranean Landscapes – & the Case of University of Crete’s woodland in Rethymnon.

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Abstract. *During the last decades, Mediterranean landscapes have been thoroughly transformed as a result of the changing socioeconomic and cultural conditions and policies. Nowadays, the design and planning of the use of land is often unsuccessful. Ecological knowledge is a prerequisite for the proper management of the landscape. Landscape Ecology education enables us to cultivate the awareness of nature and the appreciation of the landscape and encourages holistic thinking. Promoting holistic understanding and avoiding fragmentation of knowledge, Landscape Ecology can also provide a bridge between the Humanities and the Sciences.*

This paper reports an on-going research at the woodland of the University of Crete. It focuses on the restoration and management of a (previously rural) landscape, which resulted from the abandonment of the land about 40 years ago. Apart from the restoration of the landscape, the aim is to develop landscape education initiatives to promote the use of landscapes as an educational resource. In this way, young people will be helped to identify with their local environment and will be inspired to act for a sustainable future.

Keywords. Landscape, Landscape Ecology, education, Mediterranean, multifunctional landscapes, vegetation,

1. Introduction

The elaboration of a holistic view towards the environment requires our acquaintance not only with the natural but also with the historical and cultural environment as well. To develop a holistic perception, we need to make comparisons between the present and the past, but also to view the interrelations between elements of the present state.

People’s awareness of the state of their immediate environment allows them to develop

the ability to recognize changes and to assess their consequences. As a result, this perception leads to the development of interest and commitment for preservation and improvement of the local environment.

2. Mediterranean landscapes, Landscapes for Learning & Landscape Ecology

The shaping of land in the Mediterranean region is the outcome of the interaction of man with his surroundings. During the long human history in the Mediterranean, land was under continuous and constant pressure. Nevertheless, man’s understanding of his surrounding and of the scarcity and limitations of the environment’s natural resources, resulted in his using the land wisely. The high heterogeneity and complexity of the Mediterranean region allowed the development of different traditional uses of land in different places. Thus, dynamic processes shaped the different spaces, an outcome of the interactions between human, other biotic and also abiotic factors.

During the last decades, many traditional Mediterranean landscapes have been thoroughly transformed as a result of the changing socioeconomic and cultural conditions and policies of decision-makers.

Regarding the conception of planners that land is wasted if it is not converted into more profitable purposes’ Naveh states: ‘They ignore the fact that we live in the higher, super system of our total human ecosystem in which humans and all other living organisms are integrated with their total physical, natural and socio-economic and cultural environment’ [7].

Landscape has been seen as ‘the total character of a region’ [6] or as a ‘dynamic process developing on the visible earth surface, resulting from the interaction between abiotic, biotic and human factors which vary according to site and time’ [8]. Carl Troll introduced the synthesised term *landscape ecology* as ‘he was

aware that ecosystems are intangible, conceptual systems diffuse in space', so that 'they cannot be regarded as a key set for larger-scale landscapes'[6].

Naveh, too, proposed the broadening of conservation efforts from species and ecosystem levels to landscape levels and from biological diversity to ecological landscape heterogeneity and diversity [6].

'Landscape ecology is the study of spatial variation in landscapes at a variety of scales. It includes the biophysical and societal causes and consequences of landscape heterogeneity. Above all it is broadly interdisciplinary' [14]. Principles of Landscape ecology focus on: Distribution patterns of landscape elements or ecosystems, Landscape functioning and processes, Ecological changes in the landscape mosaic over time, Understanding the whole, Maintaining quality of landscapes [14].

Landscape ecology, is defined by Naveh and Lieberman, as 'an interdisciplinary science dealing with the interrelation between human society and its living space'. In order 'to account for the full value of our natural and semi-natural landscapes as life-supporting systems we have to include the following three major domains in all land-use decisions': the bio-ecological, the socio-cultural and the socio-economic domain [7].

The stimulus to conservation must come through education [10]; ecological knowledge and understanding is a prerequisite for proper management of the land. Landscapes can serve as excellent education environments (their structure and functions, especially those characters of the vegetation, which are adaptations, responsible for the resilience of the landscape).

As landscapes exist in space and time, they are also records of the past and of a cultural heritage. Moreover, as landscapes are tangible and not abstract, young people and people of all ages, can learn to observe and interpret them.

Vegetation is an important component of the landscapes and the "language" of vegetation can reveal the past landscape uses.

Today, older people recognize the value of their landscape, but not always pass the knowledge to the younger generation.

It is stressed that 'there is an urgent need to invest in ecological landscape research and education'.

Landscape ecology education enables us to cultivate awareness of nature and appreciation of

the landscape and encourages holistic thinking by emphasising the interrelatedness of all components (soil, hydrology, geology, climate, topography, flora, fauna) [6].

It is also believed that Landscape Ecology education will allow a bridging of the Humanities and Science, promoting holistic understanding and avoiding fragmentation of knowledge. It can also introduce the concept of sustainable development in an understandable way [6]

Landscape Education initiatives should be developed to promote the use of landscapes as an educational resource and to develop links with schools. In this way, young people identify with their local environment, and are thus inspired to act for a sustainable future. This is especially significant in view of the accelerated urbanisation and the minimisation of contact with the natural and traditional rural Mediterranean landscape.

Landscapes provide a meaningful context for learning: In order to investigate the ecological history of Mediterranean Europe, and more specifically to give some answers to the question of desertification, Grove and Rackham adopt a holistic approach which includes all the different factors: climate, weather, geology, geomorphology, aspects of human history, vegetation, traditional multifunctional landscapes, erosion [3]. Rackham & Moody dedicate their book 'The Making of the Cretan Landscape: 'To the tectonic forces that shaped the topography; The Pleistocene fauna that shaped the vegetation; the Cretan people who shaped the landscape. Each without the others would have resulted in a dramatically different Crete'[10].

Nevertheless, there are questions to be answered about viewing Landscape ecology as a unifying discipline: 'how – going beyond general statements – can it be realized; how to implement the specialists' knowledge into holistic approaches and how to introduce this in practical land management / landscape planning?'[1].

Moreover, 'all relevant information, even if not expressible in marketable commodity values or dollars in cost-benefit analyses, must be presented in a clear and illustrative way that can be comprehended by the public ...' [7].

Jala Makhzoumi and Gloria Pungetti, in their book 'Ecological Landscape Design and Planning - The Mediterranean Context' offer a holistic methodological approach to landscape design and planning. The principles of their approach

can be used in practice, for creative ecological design and sustainable planning in the Mediterranean[6].

3. From the regional to the local landscape: University of Crete's woodland on Rethymnon an on-going research

The University of Crete's (UOC) campus in Rethymnon is located within a woodland, which is the result of the abandonment of fields about 40 years ago, when the local people sold their properties to the University. After the construction of the UOC campus, the remaining vegetated land is about 1600 stremata (160 hectares).

3.1. About the history of the present landscape

The present landscape witnesses a variety of land forming processes and past human activities, which help consider what happens to areas of abandoned cultivation.

Local people had created a beautiful and harmonious landscape. People were using the different trees, in combination with grazing and the use of coppice for fuel they also were cultivating wheat and barley in the more open and free of stone places, among the trees. Lime – kilns were near the sources of fuel.

Fields were enclosed by thick dry stone walls. Making stone piles was a practice for using up stones to free their fields. Shaping of paths between two drystone - walls allowed the movements of man and animals

Dry stone building, required huge labor and persistence. The space which has been shaped and formed by dry stone walls, becomes a place inside of which special relations develop between the communities and the natural environment. The coexistence of the drystone building with the vegetation, created a complicated space formed by man [15].

Controlled grazing of domestic sheep and goats assured the existence of a low grass cover with many flowering geophytes. Cultivation of oaks was very profitable as farmers sold not only the acorn cups (to the dying leather industry) but also the acorns (to be used as forage). Most species of vegetation were used; and were used wisely. Aware of the high flammability of *Calycotome villosa*, the hot fire that produces when burned, local people used these bushes as a fuel for their oven or lime kilns. Nevertheless, they did not cut down the *Calycotome* near the base of the stem,

as they knew that it would not manage to resprout, something which *Pistacia lentiscus* and *Quercus coccifera* manage to do very well. Prickly oak, before abandonment, was a major source of fire wood, and food for goats. *Sarcopoterium* was also widely used as fuel for ovens and lime kilns. Carob trees, wild or cultivated, were used for feeding the animals.

In its early stages, the complete abandonment and cessation of cultivation, woodcutting, and grazing should have led to a recovery in height and density of the herbaceous and woody plant cover. The vigorous vegetative regeneration of sclerophylls from stunted shoots and almost imperceptible rootstocks followed. Thus, gradual enclosure of the canopy should have suppressed the herbaceous understory vegetation almost totally.

‘After the initial high photosynthetic rates of the regenerating shrubs has slowed down, the dense 3-6m high shrub thicket gradually becomes stagnant and even senescent and very fire prone, because of the accumulation of dry and dead branches and undecomposed litter’[7].

Thus, in the last 50 years, the abandonment of land, was followed by the reencroachment maquis vegetation which persisted and regenerated considerably. Today, large quantities of dry and dead wood are accumulated without barriers to the spread of fires.

The present situation of the landscape, is an example - in small scale - of a traditional multifunctional Mediterranean landscape with the typical complexes of agro-, silvo- and pastoral components that has changed thoroughly.

3.2. The present landscape

This is a landscape in the Mediterranean vegetation zone, near the northern coast of Rethymnon town. The elevation slightly increases as we follow the low hills southwards.

Different plant species, vegetation types and land-use forms, give rise to complex mosaics of patches.

Today the land is covered by impenetrable high evergreen sclerophyllous shrubs (maquis) and even woodland, with low phrygana on shallow soils and in exposed sites. Maquis and phrygana are intermingled in mosaics together with big deciduous oak trees, while here and there carob trees are seen, as well as the native Cypress (*Cupressus sempervirens*). Cultivations of olive trees which covered whole tracts of land are now impermeable by the growth of the

understory vegetation. Wild olives are also seen here and there. Climbers embrace shrub and tall trees creating a jungle-like landscape.

Much of the character of the local landscape is identified with large deciduous oaks with the big acorns and acorn cups (their understory being also impermeable). Oaks reproduce very well, as there were observed many seedlings of different ages in the more open places, where light can reach.

Vine cultivations were noticed within dry-stone enclosure walls which are in their turn, found within larger fields of oaks, carob trees, almonds, olives, also enclosed by dry-stone walls.

The evergreen oak, *Quercus coccifera*, has assumed a treelike habit. Many shoots arise from just one stump as they have regenerated vigorously from root suckers and shoots. Young sprouts and leaves of this dominant component of the maquis vegetation are noticed near the edges of newly opened path by heavy machinery, and they are devoured by goats which sometimes trespass. *Pistacia lentiscus* is the most abundant evergreen sclerophyll shrub and has attained its full size. *Sarcopoterium* can be observed now to dominate in many sites. Even today, cyclamens carpet under the oaks. Some annual herbaceous plants are found in the more open places.

We were surprised to find the wonderful blue spikes of the endemic *Petromarula pinnata*, which come out in May, in three different locations of the landscape: *Petromarula* being very palatable is known to be 'adapted to an inaccessible life on cliffs of the reach of goats' [10]. This finding brings to mind the similar behaviour of the endemic *Ebenus cretica* described by Rackham in areas of Eastern Crete, where grazing pressures diminished [10].

The immediate dangers to the landscape are:

a) fuel accumulation: large quantities of dry and dead wood are accumulated without barriers to the spread of fires.

b) uncontrolled circulation of sheep and goats which sometimes seem to trespass; in the past, people used to tie the sheep's feet to control their movement. Now, this constitutes a danger to the dry-stone structures. In addition to that, the palatable *Petromarula* will disappear again, along with the few remaining flowering herbaceous plants.

c) a number of exotic pines and eucalyptus species, were planted densely in the area; not only are they not suited to the landscape, but,

most important, but they also represent a potential fire hazard.

3.3. Management

The management of the above described area which is a property of the University of Crete, is a huge task and one that requires sound scientific involvement.

Absolute priority should be given to the development of a master plan to determine the protection and preservation of ecological values and processes. This has to focus on the attributes of the area that should be protected from the impacts of modern technological society. This is not an easy task, given that the area is not sufficiently large and remote enough, to make the long term protection of its biodiversity and natural systems practical.

The policy developed should concern all relevant issues as restoration, fire management, access, transport. We would like to stress that the use of heavy machinery in management operations can be very detrimental to soil stability and to wildlife.

Fire Management should be given a priority as the University campus is surrounded by masses of fuel. This is a difficult task and short term solutions should be avoided. Fire hazards should be reduced by management regulation functions (i.e., through and fuel and vegetation management). Fire hazards will also be increased if recreational uses are introduced.

Generally, management should focus on the manipulation and controlled utilization of the existing plant cover, such as cutting, thinning, pruning, chopping, copping. Grazing, if allowed as a management practice, should be controlled, should follow a special grazing system, and should not be given priority before the manipulation of vegetation described above.

3.4. Paying back the effort - Soft values

Because the area of about 150 hectares is neither large enough nor remote enough from the campus it cannot be preserved from external disturbance without real commitment.

The efforts should be oriented to the 'optimization of natural landscape values which may be of a purely bioecological nature, or they may constitute a complex and closely interwoven mixture of bioecological, geomorphological, and human-perceptual processes of scenic diversity,

attractiveness, and accessibility, which can be enhanced by ecological management' [7].

About the human-perceptual processes of scenic diversity, attractiveness, 'these functions cannot be fully expressed in monetary terms, although they can prevent severe longer – term financial losses and repercussions' [7]. This can be only achieved 'if ... the more farsighted and broad-minded elements in professional leadership struggle courageously and tenaciously' [7].

3.5. Education

After the proper management practises are realized, this landscape will become stimulating one which could help us guide young people through the complexities of Cretan vegetation and landscape.

Educational practises should be permitted within the area only providing they are consistent with the maintenance of the qualities of the area and operate according to the institution's policy. Thus, it could serve as an important outdoor classroom and living laboratory for ecological education, as it provides interesting information.

Education Programs could be developed with schools. Young people and people of all ages will thus be encouraged for a proper land use planning in their local community

School visits are considered an appropriate method of environmental education, when they take place in landscapes which are in the transition process from the rural to the urban phase and when they involve children's active investigation of issues like what the remaining trees witness for the possible past land uses, what kinds of plants were there initially and which are now [12].

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