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Preliminary text

Mountains and Ecological History

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Up to the altitudinal limit of continuous vegetation, and except in the most inaccessible places, mountains are cultural landscapes. Their vegetation and infrastructure are the product of thousands of years of interactions between human activities, the natural environment, and plants and animals, often extending back to the Bronze Age and sometimes to the Neolithic. Surprisingly remote places can have a history of pasturage, mining, transport, and even cultivation. Occupation of very extreme areas tends to be intermittent, related both to environmental changes such as the Little Ice Age and to demographic, economic, and political events elsewhere.

Mountains tend to be difficult places to investigate ecological history. They are often sparsely recorded in historical documents, and dense vegetation makes them difficult to survey archaeologically. But scarcity of evidence should not be taken as evidence of lack of human activity. Only in modern times, with mechanization and specialization of agriculture, have mountains become marginal land. It is a mistake to think of them as a 'primaeval' environment that somehow escaped the influence of humanity until the nineteenth century.

The cultural depth of mountain landscapes

It is often supposed that mountains represent approximately a primæval landscape, only recently and partially affected by human activity. There used to be a belief among conservationists that primæval landscapes are good and cultural landscapes are bad, and it is their duty to get rid of human influence, which is most easily done in mountains. (Is this why National Parks are strongly associated with mountains?)

There is also a belief that mountains are difficult and hostile terrain and settled only in times of great population pressure, especially the last two centuries. I have seen it claimed that agriculture has been abandoned in mountains because it leads to too much erosion and is inherently unsustainable.¹

In reality, mountains have been lived in since prehistory, sometimes at higher altitudes than in the recent past: examples are the Bronze Age field systems and associated settlements on the high plateau of Dartmoor, SW England, or the remains of settlements, cultivation, and industries in the mountains of Scotland. The more extreme altitudes were not always continuously inhabited: they might alternate between permanent settlement,

¹ JR McNeill 1992 *The Mountains of the Mediterranean World* Cambridge University Press.

summer settlement, and abandonment. Even these have cultural landscapes like anywhere else.

Mountains may not often have conspicuous ancient monuments, but they have as much archaeology as anywhere else. They are often more difficult to investigate, because of dense vegetation and unstable terrain. They are less well recorded in historical documents. But their cultural ecology is much deeper than a mere 200 years.

In west Crete the Samariá Gorge is a cultural landscape. As the Sphakiá Survey has shown, it is full of archaeological sites. It plays a very significant part in Cretan cultural history and is famous in legend and song. Even the mountain desert of the high White Mountains is partly a cultural landscape. Its archaeology goes back, not necessarily continuously, to the Final Neolithic.²

People's activities are limited in north Europe and the Alps by winter cold, and in southern Europe by the short growing season, between snow-melt and summer drought. This is part of the reason why altitudinal limits are not higher in southern Europe: in Crete the limit of year-round settlement is 700 m, much lower than in the Alps and little higher than in Norway.

The Omalós Plain in Crete is a flat-bottomed depression at an altitude of 1080 m. It is now about one-quarter cultivated. In the late 16th and early 17th centuries the Venetian authorities were complaining that it ought to be growing wheat but was not. (Probably there were then no crop varieties suitable to the altitude at this stage in the Little Ice Age.) However, at other times the whole plain has been cultivated: it is divided between two townships and has two very different field-systems. Cultivation, indeed, has not only occupied the entire plain but has been extended on terraces far up the surrounding mountains.³

Decline of mountain land-uses

Mountain settlements are sensitive to natural changes. They are sensitive to climate change, such as the Little Ice Age from the 14th to the 19th century. In Scotland and Ireland the vegetation changes with time owing to the natural growth of blanket peat, which in this very oceanic climate slowly extends to displace cultivation and forest.

In the time of animal power and unspecialized agriculture, mountains had no great disadvantage. Once cultivation terraces had been built life was not much more difficult than elsewhere. There were certain advantages such as remoteness from wars and remoteness from central government. There have been previous periods of abandonment and repopulation. In many places the present state of depopulation follows a period of abnormally high population in the nineteenth century.

The present abandonment is different from most of the earlier changes. It results from the specialization of agriculture and the appearance of alternative employment elsewhere. The disadvantages of mountains came in the 20th century with mechanization, plant and animal breeding, piped irrigation, and agricultural specialization. Technologists paid little attention to the needs of mountain farmers. Farm machines, especially recent ones, are not adapted to small fields or steep slopes. Modern varieties of crops and animals do not

² Work of the Sphakiá Archaeological Survey, directed by Jennifer Moody, Lucia Nixon, and Simon Price. Publication forthcoming.

³ O Rackham & J Moody 1996 *The Making of the Cretan Landscape* Manchester University Press.

perform well at high altitudes or on rough ground.⁴ People leave because there are many easier ways of making a living than by growing barley on terraces.

For example, in the English Lake District — a very high rainfall area — two centuries ago farms had cattle, sheep, and horses, grew wheat, barley, and oats, and were beginning to take in tourists. A hundred years ago (the time of Beatrix Potter, a Lake district farmer who wrote the famous children's books) the arable crops declined. Later the cattle disappeared, leaving only sheep and tourism. (As fate would have it, the fallout from the atomic disaster of Chernobyl hit the Lake District, and for some years the sheep were uneatable.)

In Mediterranean countries sheep and goat husbandry is usually the last to decline. This results in too much grazing in some areas and none at all in others. If mechanization is attempted, bulldozing and road-making do more damage to the landscape at high altitudes and on steep slopes.

Integration between cultural and ecological landscapes and biodiversity

One of the other speakers referred to the 'co-evolution' between cultural practices and plants and animals. I would prefer to use the term 'co-development', although I have little doubt that evolution plays a part, especially with animals and short-lived plants. Many of the characteristic mountain plants and animals are connected in some way to cultural ecosystems.

An example is furnished by the rare *Campanula lavrensis*, an endemic plant now largely confined to the monasteries of the Grand Lavra and other monasteries of Mount Athos. What was it doing before there were monasteries? It also grows on the very summit of Athos, which is high enough (2000 m) to have a small alpine zone. It is evidently an alpine endemic that has taken advantage of the artificial cliffs provided by large buildings.

A most important ecological feature of cultural landscapes is the savanna-like ecosystems where trees are not in forests but scattered in grassland or phrygana. The majority of rare and endemic plants are not forest species but occur in open habitats: grassland (alpine and at lower altitudes), savanna, phrygana, and cliffs. Many birds and invertebrate animals require both trees and grassland.⁵ Savannas are especially abundant in Portugal (*montados*), Spain (*dehesas*), Sardinia, the southern Alps (*Lärchenwiesen*, *Zirbenwiesen*), and Greece. There are many examples at low and high altitudes in Epirus. Like the savannas of North America, Africa, Asia, and Australia, they owe their existence to some combination of drought and grazing or mowing, which allows trees to exist but not forests.

Trees may be culturally altered in various ways. They may be *coppiced* (cut to the ground and allowed to sprout to yield successive crops of wood); *pollarded* (cut at 2–4 m above ground and allowed to sprout to yield successive crops of wood); *shredded* (the branches harvested for leaves on which to feed animals); incised to yield resin; (in Crete) rectangles of bark may be cut out to make roofs for beehives. Some of these practices prolong the life of a tree and turn it into an archaeological feature. Most of Europe's ancient trees, apart from coppice stools, are in savanna, not forest, and most owe their longevity to some cultural practice.

⁴ E O'Rourke, this conference.

⁵ C Stara & R Tsiakiris, this conference.

Ancient oaks, pines, ashes, maples, and other trees, which are thus a feature of savanna, are especially important as a habitat. Besides hole-nesting birds, many tree-living lichens, insects, arachnids, and fungi require very specific features — cavities of different sizes, heartwood rotted by a particular fungus, loose dry bark, dry overhangs — that occurs only in ancient trees, especially pollards. These have been studied mainly in Britain,⁶ but they undoubtedly apply to continental Europe as well.

Effects of abandonment

Abandoned cultural landscapes occur in most European countries and in other continents (e.g. in Japan). Abandonment does not necessarily result in a 'return to nature' — either to what was happening before people were there, or to what would have happened had humanity never existed.

Up to the forest limit it results in an increase of forest. This is very obvious in Epirus, where pastures and savannas are being overrun by trees and shrubs on a huge scale. Across the lake from Ioánnina itself, Mount Mitsikéli is gradually being covered by the dwarf, drought-bitten forest that develops where tree growth is limited by moisture. (Despite the high rainfall, either the limestone rocks do not retain moisture or tree-roots cannot penetrate them to get at the moisture.)

Increase of forest may not be good for biodiversity. Mountain grassland has far more specialized plants than forest, and they do not survive the change. These new forests lose their grassland and savanna values but only slowly (if at all) gain forest values. They also lose their cultural values, and are resented by local people because they erode a settlement's distinctiveness and local identity.⁷

Above the forest limit, abandoned meadows and pastures get coarse and tussocky; this promotes a few very competitive plants at the expense of the others.

Increase of forest is not necessarily good even for the forest. It can result in catastrophes. In southern Europe it usually results in an increase of forest fires, because abandoned lands get covered in the sort of trees that will burn — especially pines, for which fire is an integral part of their ecology. A landscape dominated by grazing turns into one dominated by fire: the plant material that used to be consumed by goats and sheep now accumulates and is consumed by fire instead.⁸ In some countries, notably Spain and Portugal, the risk of fire is increased by foresters who plant flammable pines and eucalyptuses.

In the National Park in the Tatra mountains in Slovakia, in November 2004, a great storm blew down about 100 sq.km of forest. In part this was a consequence of abandonment of the historic land-uses, which had produced a mosaic of grassland and trees. Replacing this from the 1920s onwards with a dense crowded spruce forest set up the conditions for a catastrophic blowdown. (The storm had comparatively little effect on buildings or isolated

⁶ O Rackham 1989 *The Last Forest: the story of Hatfield Forest*. Dent, London. Chapter 11: Pollards and ancient trees.

H Read 2000 *Veteran Trees: a guide to good management* English Nature.

H Scarborough & T Smith 2001 *Biodiversity . . . Action Plan for wood-pasture and parkland with the requirements of priority and other species*. English Nature Research Report **432**.

www.woodland-trust.org.uk/ancient-tree-forum/

⁷ C Stara & R Tsiakiris, this conference.

⁸ AT Grove & O Rackham 2001 *The Nature of Mediterranean Europe: an ecological history*. Yale University Press. Chapter 13.

trees.) Anyone who disapproves of blowdowns must ask, Ought that forest to have been there?

Increasing forest often eliminates the ancient trees, which get overtopped, shaded, and killed.⁹ Fires in infilled savanna destroy ancient trees and the wildlife that goes with them.

Conclusions

In most mountain landscapes, abandonment has happened before, but not usually over so wide an area simultaneously as now. It should not be thought of as a return to nature.

Abandonment is bad for many aspects of biodiversity, especially for poorly competitive endemic plants, creatures that require short grass, creatures that require both grass and trees, and ancient trees and the plants and animals that live on them.

When the Samariá Gorge was made a National Park it was depopulated and the cultural link was broken. Millions of visitors have passed through it without appreciating what a special place it is in Cretan history and culture. Pines have increased, creating the risk of a catastrophic fire that will destroy the famous cypress trees and other parts of the historic infrastructure. That was 40 years ago, and I hope such a mistake would not be made now. It should be the function of National Parks to uphold old-fashioned land-uses and to present cultural landscapes to the public.

Conservation has many aspects, from the conservation of the Amazon rain-forest to the conservation of the manuscripts of Benjamin Britten, the 20th-century composer. All too often different kinds of conservationists work in ignorance of each other and even at cross purposes. Archaeological and biological conservation ought to work together.

Comments on the conference

Some of the speakers did not explain their terms. I did not understand what 'stakeholder' meant until someone inadvertently revealed it on the third day.¹⁰ The speaker on the 'post-Fordist transition' assumed that everyone would know who Ford was and what he contributed to economic scholarship.

I detect some confusion between land-use and landscape, which are not the same thing: fields can change from arable to pasture and back without much change on the infrastructure of hedges and roads.

There was an emphasis on continuous processes rather than intermittent or catastrophic influences. (For example, flood protection keeps out ordinary floods but guarantees disaster when an exceptional flood occurs, as New Orleans has just discovered.) Catastrophic influences are likely to increase in the future, especially with the globalization of plant diseases: past examples are the vine diseases imported in the 19th century and chestnut blight in the 20th.

Many speakers regarded increasing forest as a threat to biodiversity. I agree, but was surprised at so large a majority taking this view.

⁹ In the Sierra de Grazalema, SW Spain, is one of the world's few stands of the rare conifer *Abies pinsapo*. This increased in the 20th century, and is spreading into an adjacent savanna of ancient moss- and lichen-covered pollard deciduous oaks. Within the *Abies* forest are declining or dead ancient oaks, and further inside are declining or dead ancient *Abies* trees, which were themselves savanna pollards. One conservation problem has disappeared at the expense of aggravating another.

¹⁰ On a fencing crew the stakeholder is the man whose knuckles get hit when the sledgehammer-man misses the top of the stake.

I was surprised to see no reference to JR McNeill, *The Mountains of the Mediterranean World*, especially as one of his study areas included Zagóri, which was one of the BioScene study areas and the locus of the excursion. He collected a vast amount of data in archives and in the field. In my view his arguments are flawed and he draws the wrong conclusions. I disagree with the following claims:

1. Soils were much more extensive and better developed in Mediterranean countries a few centuries ago than now.
2. Erosion is the same as soil erosion.
3. Soil erosion has been a major factor in both land abandonment and the decline of forest.
4. Loss of forest is largely irreversible (many speakers at this conference demonstrated the contrary).
5. Mountains are difficult terrain on which life is hard and poverty-stricken (the Zagóri excursion demonstrated the contrary).
6. Mediterranean mountain settlements can suffer from underpopulation (what he calls 'undershoot', supposedly destroying the soil and infrastructure) as well as overpopulation.

Nevertheless McNeill's arguments are not negligible and might have had a hearing.

Most speakers talked of forest and grassland but failed to mention the intermediate categories of savanna (scattered trees) and maquis (trees reduced to the stature of shrubs). This is a serious omission because savanna and maquis are at least as important as forest in terms of biodiversity. The omission also complicates arguments about the extent of changes in vegetation. How big and how close together do the trees have to be to count as forest? When comparing states at different times, how much of the change is due to a real change in the vegetation and how much to a change of definition?

The excursion

The excursion was most instructive, but might have been more closely associated with the subject of the conference. I would point out the following:

1. The strong altitudinal zonation typical of the Balkans: evergreen trees at low altitudes, mixed evergreens and deciduous (*shibljak*) above, then deciduous, then mountain conifers.
2. On flysch the zones are at lower altitudes than on limestone, and the deciduous zone more strongly dominated by oaks.
3. The density of the vegetation is much determined by the geology: sparse on hard limestones with horizontal beds or few fissures, denser on limestones with better root penetration, denser still on flysch which retains more moisture.
4. The dormant badlands (landscapes dominated by erosion gullies) prevalent on flysch. There are spectacular active badlands to the east and north, especially on ophiolites, but in this region the badlands are overgrown with vegetation and the ridges worn down.
5. The great extent of recent forest and maquis, and the prospect of future changes. The mountain conifers appear to be extending downwards as fir (*Abies cephalonica*), which is tolerant of shade and sensitive to fire, invades the deciduous oakwoods.
6. The many cliffs, which are an important feature in biodiversity, both as nesting sites for rare birds (especially birds of prey) and as one of the chief habitats of endemic plants. In several places we saw horsechestnut as a wild tree: this favourite urban tree originated as an Albano-Epirote cliff endemic. Cliff endemics are the least threatened group of rare plants.

7. The contrast between the obviously well-to-do villages and the present lack of cultivation and even pasturage.
8. The great importance attached to communications. Epirus has no history of vehicles but had many thousands of mules, and a remarkable network of paved *kalderími* mule-paths and magnificent bridges.
9. Pollards, oak coppice-stools, and other cultural trees, now embedded in recent maquis and forest.
10. The churches are a feature of Zagóri which would be much appreciated by visitors (who are not all infidels) and should be more widely known. Some way should be found to overcome the problems of theft and vandalism — which are evidently not new: some of the graffiti are 19th-century.