

# Forest Landscapes and Global Change

New Frontiers  
in Management,  
Conservation  
and Restoration

Proceedings

Edited by  
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IUFRO Landscape Ecology Working Group  
International Conference

Bragança · Portugal  
September 21 to 27, 2010

## Connecting landscape conservation and management with traditional ecological knowledge: does it matter how people perceive landscape and nature?

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### Abstract

Ethnobotanical surveys conducted in Trás-os-Montes (Portugal) highlighted a renewed interest in cultural values of landscapes. Long term interactions between traditional ecological knowledge (TEK) and natural processes provided landscapes characterized by high diversity and relative stability. Rural contexts are facing social and economical constraints and landscapes are change accordingly.

On a basis of ethnographic methodologies (consented interviews and participant observation), recent landscape changes at a local level and people' perceptions are briefly described and discussed as important tools for landscape conservation and management.

Young and some middle aged people value some of these changes, which they consider less hard-working and a symbol of modernity. Others see actual transformations as a waste of resources and abandonment and thus landscape is perceived as unproductive, which is considered reprehensible. Most of the informants are aware of a dynamic process taking place and conscious that landscape, like themselves, must adapt to changing times.

*Keywords: TEK, Portuguese ethnobotany, cultural landscapes, rural landscapes dynamics*

### 1. Introduction: Cultural landscape and traditional ecological knowledge (TEK)

Traditional rural landscapes are culturally relevant and a consequence of an integration of natural and anthropogenic processes that resulted in a great diversity of sustainable landscapes (Council of Europe 2000; Antrop 2005).

Human influence, especially related to agriculture and land-use patterns, have determined greater impacts on rural landscape than the ecological features and processes over the last decades. In Europe, long and complex history of land uses have promoted a rich diversity of cultural landscapes that have been shaped by local practices, beliefs and specific purposes, and maintained in those areas where physical, socio-economic and political constraints have prevented modernization and changing in farming systems until recent times (Vos and Meeke 1999; Antrop 2005; Plieninger, Hocht and Spek 2006; Calvo-Iglesias, Fra-Palelo and Diaz-Varela 2009).

Ethnobotanical studies deal with local people knowledge and perceptions of nature and environment. Traditional ecological knowledge (TEK) has great cultural significance and refers to the use of many wild or domesticated resources and the management of natural habitats and

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agroecosystems. TEK refers, as well, to some other important rural activities and practices, such as cattle transhumance, agricultural techniques (e.g. crop rotation, irrigation methods, multi use parcels and partial harvest), land management (e.g. land holding fragmentation, terraces, natural or artificial boundaries), rituals and ceremonies, oral traditions and symbolism, communitarian features and settlement patterns (Martin 1995; Cunningham 2001).

Coherent relations between the physical environment, TEK and local adaptation result in well-established regionally differentiated patterns of settlements, land use systems and field structure that characterize European cultural landscapes (Vos and Meekes 1999). Local people knowledge and traditional rural landscapes are fundamental for the conservation of biodiversity and also a source of information on the past and present cultural landscapes, focusing on the land-use system, management techniques, cultural heritage, and farmers' perception of changes (Antrop 2005; Calvo-Iglesias, Fra-Paleo and Diaz-Varela 2009).

Cultural landscapes dynamics presupposes change according to changing TEK, values and policies. For many centuries these changes had local impact and thus cultural landscapes were perceived as rather stable (Vos and Meekes 1999; Antrop 2005; Calvo-Iglesias, Crecente-Maseda, Fra-Paleo, 2006; Carvalho 2010).

Nowadays, rural contexts face sudden and faster social and economical transformations and rural landscapes are rapidly changing and diversifying. The geographical and social conditions that led to the isolation of some European regions are no longer prevalent, and so changes in the cultural, economic and political contexts of plant use and landscape are coming faster and faster. The current reduction in the human population, due to out-migration and a general drop in the birth rate, and the abandonment of agriculture have been critical for rural areas and ways of life and have promoted the loss of cultural traditions. These changes are affecting the system of local knowledge of plant resources and the maintenance of traditional plant use practices (Carvalho and Morales 2010). Landscape changes observed and locally perceived are some of the topics addressed in this paper, based on research in such a region of northeastern Portugal.

## 2. Methodology

The landscape topic emerged from several ethnobotanical surveys carried out in Trás-os-Montes (a Portuguese region) for almost nine years (2000-2009) within the scope of three different research projects that aimed to record and document traditional knowledge on plant resources use, related technologies and management (Ramos, 2008; Frazão-Moreira, Carvalho and Martins 2009; Carvalho 2010).

The study area is located in the most northeastern part of the Trás-os-Montes region and included in two important natural protected areas (the Natural Park of Montesinho and the Natural Park of Douro Internacional) corresponding to Vinhais, Bragança and Miranda do Douro municipalities. Mostly a mountainous and very isolated rural area, with small villages (many of them less than 100 inhabitants) scattered all over the landscape. The local economy was/is based on small farming systems, with an important crop production diversity, a high level of subsistence strategies avoiding productive risks, and mostly affected by agriculture abandonment and both population ageing and erosion, due to several migratory flows.

Traditional landscapes are characterized by a mosaic composed of different patches finely linked to each other, particularly highlighted by the seasonal contrasts of the vegetation and agricultural activities (e.g. fallows, manure, hay or grazed meadows, orchards, gardens).

Within the research projects, we used a random stratified sampling of approximately 40% of the villages in the study area which had a history of agropastoral activities and homegardens until very recently (at least 2005). In every case study, consented semi-structured interviews as well as participant observation were conducted during all seasons of the year. Informants (a total of 165) were selected using random sample and snow-ball methods (Martin 1995; Alexiades 1996). In-depth interviews have been held with 30 local experts or key informants (informants with profound knowledge of a particular aspect of local culture, e.g. shepherds, smugglers, hunters,

healers), a sub-group selected from those informants considered knowledgeable by their neighbors (Martin 1995; Carvalho 2010).

For the purpose of this paper we have only considered the information provided by key informants (18 women and 12 men, nearly all over 60 years old) that have lived most of their lives in the selected villages, were acquainted with forestry, animal husbandry, agricultural practices and local farming systems and culture, and that were able to remember or have participated in different management scenarios of natural and traditional landscape (e.g. plows, clearings, common lands, forestation, road system, irrigation canals and mining, for instance). As a photographic collection and an ethnobotanical database were created, it was possible to compare structural components of traditional landscapes and some elements such as land cover, building and infrastructural construction for a time period of almost a decade.

### 3. Results

A descriptive and qualitative analysis of the reported data show that landscape changing in structure and land use has been locally detected in the last two decades in all the studied areas. Key informants considered that the main signs of landscape structural changing are:

- The emergence of a road system since the 1990s allowing a better physical communication between some villages and nearest towns, as it was very inefficient or nonexistent in many of cases;
- The village planning since 1975. For instance, sewage system, water distribution network, paving, small medical centers, rebuilding and scattered secondary housing, formal meeting places;
- Rebuilding and preservation of collective facilities (e.g. water mill, forge, press, communitarian stable) with no current use or considered obsolete;
- Stagnation, abandonment and aging, more relevant after 2005. Building increased but houses are closed. Small medical centers and schools, local and regional services for farmers were disabled and relative recent infrastructures are closed and abandoned. A great majority of the inhabitants is older than 60 and there is serious lack of children and young.

Informants have also reported noticeable changes in land use and cover such as no cattle grazing, quite abandoned meadows and arable lands, the absence of once usual crops, for instance, flax and hops, the afforestation of individual fields, more diverse homegardens adjacent to houses, the presence of many cultivated and exotic ornamentals, and fenced fields and plots.

Some of these topics that were also identified and perceived as probable causes of landscape changing are detailed and summarized as follows.

#### 3.1 Cultural heritage and aesthetical values

For a long time, villages' subsistence was based mainly on forestry, pastoralism (cattle, sheep and goats) and sustainable farming systems with specific gardening techniques. People's food and medical needs relied on materials found in the natural surroundings, on small-scale animal breeding, on fishing and hunting and on self-sufficient and subsistence oriented agriculture. Wild-gathered species were an important supplement and alternative to the regular diet and often used to prepare homemade remedies for primary healthcare and treatment of human and animal diseases. Arable crops, scrubland and woods provided food and supplied other basic needs, such as fuel, domestic tools, textiles and building raw materials. At times, surpluses of grains, chestnuts, potatoes, livestock, textiles, handicrafts, charcoal and wood were traded or sold, to generate extra income. Mining, smuggling and other men activities complemented the household income.

According to informants' testimony, those were days of great activity in the villages; women and children were active plant gatherers and foragers, while most of the men cultivated field

crops, worked in the woods or had jobs outside the community in farming, mining, road works and reforestation programs. Over time, this close relationship between people and their natural and agricultural environment has led to the development of a rich knowledge base on plants, plant uses and related practices (Carvalho and Moraes 2010).

Key informants have emphasized that over the recent two to five decades people's adaptive management of natural resources has built a multifunctional, productive and diverse landscape. Land-use system respected a circular configuration with settlements in the middle; surrounding the houses, homegardens, arable lands, scrubland, woods and crop rotation (rye - more or less long fallow) following a decreasing gradient of soil fertility but increasingly slope and distance to center; meadows were and still are transversal to these aureoles (Aguar et al. 2009).

This traditional landscape is considered part of their cultural heritage and has embedded intangible values such as dwelling and aesthetical values, local tradition, neighborly and inter-generational relations.

### **3.2 Disabling traditional agricultural activities**

Cereal production, crop rotation and animal husbandry are locally considered as linked practices and skills that may not last alone because they are meaningless without each other. As they explained growing wheat or rye usually provided three sub-products: straw for litter and basket weaving, grain for selling in the market and to keep at home, stubbles and fallows for feeding sheep in late summer and after the first autumn rains.

People were able to remember the enlargement of the areas assigned to rye, wheat and fodder production during the 1950s, as well as, the satisfactory performances of local varieties well adapted and the consequent increase of cattle and sheep, which in turn, also concerned the management of the scrublands, meadows and pastures, fallows and stubbles. Cycles of slash-and-burn, cultivation, and scrub were still common in the 1970s. Species from the scrubland were used as fertilizer, litter, pasture, firewood, and some to make charcoal.

Considering the informants reports, there is a general idea that traditional agricultural farming systems have been affected by a succession of CAP (Common Agricultural Policy) reforms and 'flanking' measures, beginning in 1992 and continuing for twelve years, that cancelled or reduced some crop subsidies, introduced new varieties and imposed strict production conditions. These measures disappointed many local farmers and caused the abandonment of several crops (such as cereal grain, potatoes, fodder, fibers and hop). Breeders experienced some difficulties to meet municipal ordinances and innovative requirements concerning animal welfare and veterinary care, which require continued technical assistance. New policies constrained the ability of small farmers to diversify and reduced the mosaic of farming activity. Agriculture was suddenly viewed as an impossible task without competitive advantages because of rising production costs versus low profits and uncertain wages.

Perceived main indicators of landscaping changing due to non prevailing agricultural practices are abandoned arable lands and meadows that progressively exhibit a different floristic composition and scrubland represented by a tallest stratum with increased risk of wildfires.

As meadows are not cut for hay or grazed the early colonizers will be shaded out when woody plants become well-established. Several medicinal plants often gathered in these fields are no more available.

### **3.3 Perennial rather than seasonal crops**

In general, afforestation of farmland is regard as a good alternative to seasonal crops and abandonment because it allows absenteeism, provides income and represents a patrimony for future generations.

Chestnut, walnut tree, cherry tree and red oak are the most mentioned species for afforestation. Arable lands, dry prairies and common lands have been afforested for both timber and fruit

production. In wet meadows, fast-growing hybrid poplars are grown on plantations and sold for pulpwood and as inexpensive hardwood timber, used for pallets and cheap plywood.

Although it seems a good alternative, several informants commented that there is a risk of plant diseases, especially ink-disease in chestnut. Moreover, seasonal labor for fruit recollection and species management is considered expensive, scarce and difficult to hire.

Afforestation changes the traditional landscape mosaic, as there are scattered afforested patches, combined with annual crops, meadows and scrubland.

### **3.4 New food plants and new herbaceous and woody ornamentals**

Floral composition of homegardens and new green spaces inside the settlements are also signals of transformation in land use and traditional landscape. According to female informants, the number of cultivated species has increased with the introduction of a wide range of greens and ornamental species in the last three decades. These plants or propagation materials have been brought from remote areas, exchanged between relatives and neighbours or bought from retailers at the local markets. For instance, the gathering and consumption of wild edible plants is in steady decline throughout the area; therefore women have brought some of the most popular plants used as food additives and beverages from the wild to grow in their homegardens, in order to make them easily available.

Both a decline of agriculture and recent demographic trends have generated new approaches to homegardens. In former times they were less diverse because other agricultural activities such as forestry, grain production and animal husbandry were considered much more important for the household economy. Food production in homegardens was very limited and they were mainly used to grow fodder and flax to make linen.

In order to replicate urban lifestyles, villages' authorities created new areas and gardens where they have introduced exotic herbaceous and woody ornamentals which are, whenever possible, quickly propagated and used in homegardens. These ornamentals are also used in rituals and ceremonies and have taken the place of wild species previously harvested from the forest by women and children.

More diverse homegardens and new ornamental gardens are also perceived as new structural components of landscapes

## **4. Discussion**

Along the interviews, new farming practices, abandonment of farming and husbandry activities, a better mobility and a new concept of residential housing were the most mentioned causes for landscape changing. Key informants perceive that young and some middle aged people value some of these changes, which they consider less hard-working and a symbol of modernity allowing a more like urban lifestyle (e.g. weekends and holidays). Others regret actual landscape transformations which they view as a signal of abandonment, waste of resources, reprehensibly unproductive. Nevertheless, most of the informants are aware of a dynamic process that is taking place and conscious that landscape, like themselves, must adapt to changing times.

Beginning as children, some people have learned how to discover and understand the signs of nature and to observe changes in the landscape. However, they have also shaped landscape according to their own beliefs and material needs. This adaptive knowledge is often a practical one, based on empirical observation and long experience, and transmitted through oral traditions. Such knowledge is not merely of academic or historical interest but is fundamental to maintaining cultural continuity and identity and, possibly, could play a role in achieving sustainable use of plant resources in the future. It is also useful for providing more realistic evaluations of environment, natural resources and production systems. TEK may improve success by involving local people in the planning processes. Therefore TEK and local conceptions can be considered important tools for landscape conservation and management.

By interviewing specifically on folk nomenclature and identification of useful plants we observed that the loss of TEK and loss of vocabulary begin with people aged less than 50 years. The loss of traditional knowledge and local categorization and naming are not completely coupled: a few interviewees of the middle generation seem to be often able to remember the names of plants, but not to identify them or to explain their traditional use or to find the sites where these plants were usually gathered.

It became clear that in the past thirty years, homegardens have become areas of *in situ* and *ex situ* conservation for both nostalgic and pragmatic reasons. Some crops and landraces are no longer cultivated in arable fields and wild species are threatened by new access roads, wild fires, and reforestation activities.

Although some of the components may stay unchanged, much of aesthetic, historical or cultural value of rural landscapes remains to be inventoried and recorded which is urgent before it disappears.

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