

# Exploring the use of landscape as the basis for the identification of High Nature Value farmland: a case-study in the Portuguese *montado*

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## **Abstract:**

*The High Nature Value (HNV) classification of farm systems, proposed by the European Environment Agency, emerges as more relevant today in the preparation of Rural Development Programme within the CAP post-2013. HNV classification is applicable across all Europe and seeks to define objective criteria for identifying farm systems that support high biodiversity values and landscape quality, which may also be linked to other ecosystem services. Considering that changes in rural space, taking place across all Europe, have been occurring at different levels, paces and intensities, the assessment of HNV farm systems also needs to consider this differentiation. Spatially based approaches at the regional level, linked to landscape based indicators, may be the way forward to reliable information, required for the contemporary rural policy making. This presentation is based on a case study in Alentejo region, in southern Portugal, dominated by traditionally managed agro-forestry systems which allow maintaining the specific character of these landscapes and have created conditions for establishing other functions (nature conservation, recreation, etc.). These traditional extensive practices have a great impact on vegetation composition, species distribution and landscape pattern and consequently they influence landscape quality and attractiveness for recreational activities. Therefore, this close relationship between farming practices and landscape patterns led us to seek what defines a HNV farming system in the Alentejo context and to identify its distribution considering landscape as the basis for a spatial approach. Recognizing the diversity of farm system types, and aiming to identify the associated landscape patterns and relate them with the HNV classification, the proposed presentation will focus on the methodological approach, grounded in preliminary field work, and the consequent development of the landscape based HNV indicators, applicable to Alentejo.*

## **Introduction**

### **The concept of HNV farmland**

The concept of High Nature Value Farmland (HNVF) has been evolving in the last two decades in Europe aiming to integrate biodiversity and environmental concerns in the agricultural sector. It is recognized that nature values and environmental qualities are closely linked or dependent on farming and that low intensity agricultural management can greatly improve the overall biological and landscape diversity of farmland (Halada *et al* 2011). The most common trends currently taking place in European farming areas, intensification and abandonment of unprofitable land, greatly influence those values and qualities of the countryside (EEA 2004), hence the maintenance of specific farming systems, especially where agriculture is less competitive, may have a positive impact on the preservation of biodiversity and wildlife value of farming areas.

High nature Value farmland can be defined as *those areas in Europe where agriculture is a major (usually the dominant) land use and where that agriculture supports or is associated with either a*

*high species and habitat diversity or the presence of species of European conservation concern or both (Andersen et al, 2003). There are three core characteristics (Andersen et al 2003; Beaufoy & Cooper 2008) associated with those areas:*

- *Low intensity farming characteristics - biodiversity is usually higher on farmland that is managed at a low intensity. The more intensive use of machinery, fertilizers and pesticides and/or the presence of high densities of grazing livestock, greatly reduces the number and abundance of species on cropped and grazed land;*
  
- *Presence of semi-natural vegetation - the biodiversity value of semi-natural vegetation, such as unimproved grazing land and traditional hay meadows, is significantly higher than intensively managed agricultural land. In addition, the presence of natural and semi-natural farmland features such as mature trees, shrubs, uncultivated patches, ponds and rocky outcrops, or linear habitats such as streams, banks, field margins and hedges, greatly increases the number of ecological niches in which wildlife can co-exist alongside farming activities;*
  
- *Diversity of land cover - biodiversity is significantly higher when there is a “mosaic” of land cover and land use, including low intensity cropland, fallow land, semi-natural vegetation and farmland features. Mosaic agricultural habitats are made up of different land uses, including parcels of farmland with different crops, patches of grassland, orchards, areas of woodland and scrub. This creates a wider variety of habitats and food sources for wildlife and therefore supports a much more complex ecology than the simplified landscapes associated with intensive agriculture.*

According to the key characteristics three broad types of HNMF were distinguished at the European level: (Type 1) Land with a high proportion of semi-natural vegetation; (Type 2) Land with a mosaic of low intensity agriculture and natural and structural elements, such as field margins, hedgerows, stonewalls, patches of woodland or scrub, and small rivers; and (Type 3) Land supporting rare species or a high proportion of European or world populations.

It is expected, in order to follow the Common Monitoring and Evaluation Framework for Rural Development Programme, all Member States to apply the HNMF concept, identifying and monitoring the HNMF at the national or regional level. For this purpose the European Environment Agency defined the methodological guidelines (Beaufoy & Cooper 2008), refined by joint work with the Institute for European Environmental Policy (Andersen et al 2003). These orientations aim to assist each Member State in order to first, clarify what Types of HNV farmland can be identified, second, to describe their key characteristics in terms of land cover, management practices and biodiversity values, third, to estimate their number and extent and finally to apply monitoring indicators allowing to estimate the changes on the extent and conditions of High Nature Value farmland.

### **Identifying HNV farmland**

The orientations established at the EU level (Beaufoy & Cooper 2008) include indicative methods for the identification of HNMF, though each Member State has the commitment of applying the concept and identifying HNV farmland, adapting the EU guidance to the specific conditions and contexts in the Member State, at the national or regional level.

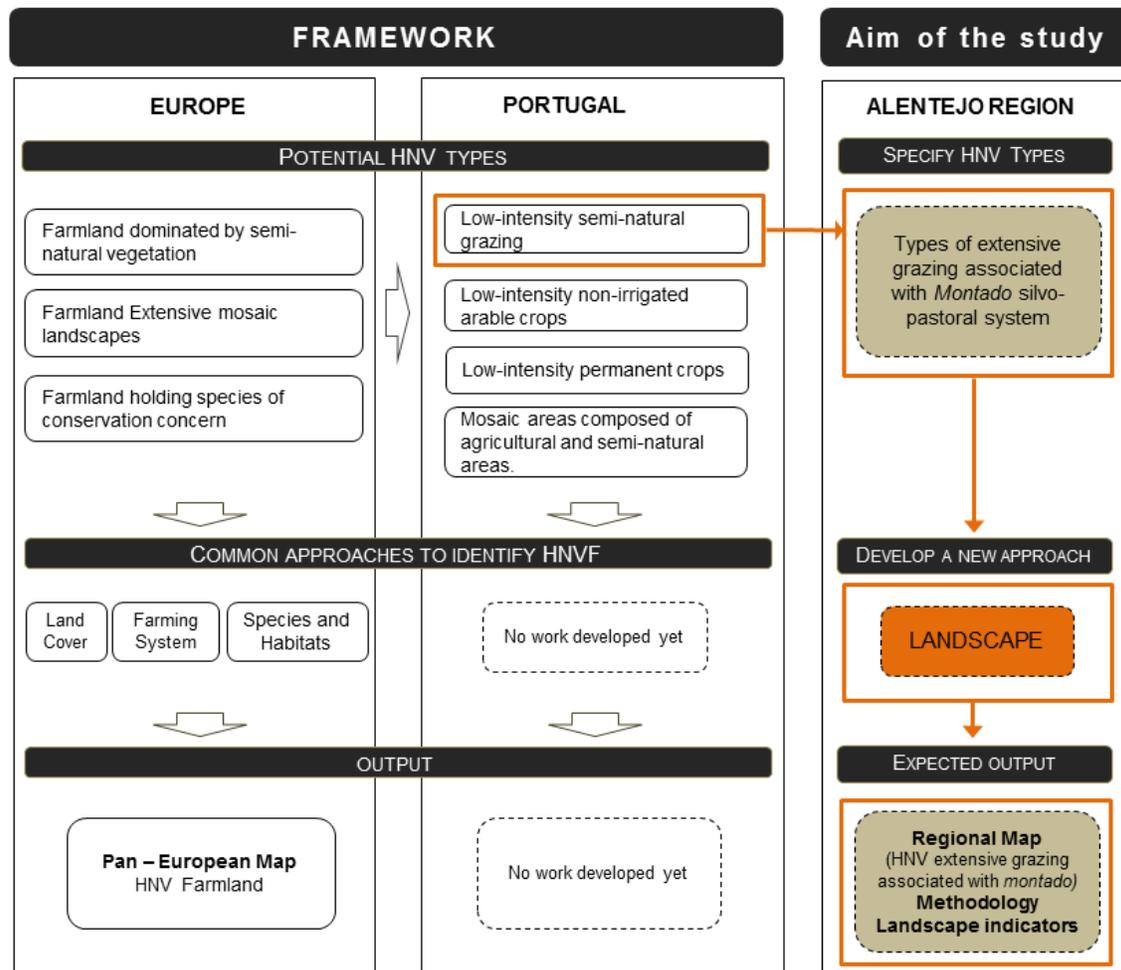
The identification of HNV farmland comprises two steps, first the definition of the potential HNV farming system types and second, the development of indicators for the characterization of those farming systems. Three different approaches have been considered in the HNVF identification process, the Land Cover approach, the Farming System approach and the Species and Habitat approach (Andersen *et al* 2003). The first one is based on data from CORINE Land Cover and allows, through the presence of land cover classes related to HNV farming (such as *Pastures*), to estimate the location of HNV areas, however this approach does not give information whether a specific area is managed under an extensive or intensive farming system. The second approach uses agronomic and economic data available from agricultural statistics, allowing the analysis of farming practices and giving indications on the pressure from different types of farming on HNV farmland. It gives indications on the presence and extent of HNV farming systems. The Species and Habitat approach focuses on the distribution of species known to occur in association with specific types of farmland. This approach can help identifying other types of farmland not achievable through the Land cover or the Farming system approaches.

Several Member States have already started to apply the HNV concept and identifying HNV farmland (e. g. Pointereau *et al* 2007; Trisorio *et al* 2010) however, in Portugal little work has been developed in this sense. Few steps were taken by the Portuguese Office of Planning and Policy in order to define the possible HNV Farming Systems at the national level, according to the guidelines of the European Commission (Beaufoy & Cooper 2008). As a result four types of HNV Farming systems were defined as the most common and significant in Portugal: *Low-intensity semi-natural grazing (includes Montado)*; *Low-intensity non-irrigated arable crops*; *Low-intensity permanent crops*; and *Mosaic areas composed of agricultural and semi-natural areas*.

### **Aim of the paper**

The study presented in this paper aims to develop a methodology for a systematic approach able to facilitate the identification of HNV farmland. This work will focus on producing and testing indicators having the landscape as the basis of a spatial approach. This approach will merge the three approaches commonly used in other Member States for the identification of HNV farmland and will explore the diversity of farming systems and its relationship with the landscape patterns resulting from the combination of management practices, biodiversity and land cover. The landscape indicators expected to emerge from this study should increase the possibility of identifying HNV areas through sensitive analysis of aerial photographs and thus with no or reduced need for field data collection.

As a first step and within an exploratory approach we focus on the extensive grazing on Southern Portugal, often associated with a low density of tree cover, in the silvo-pastoral system called *Montado*. The framework for this approach is shown in Figure 1. As shown, the aim is to develop a straightforward approach that can be applied for the identification of HNVF with no need for extensive field work but following the existing guidelines at the European level and learning from methods developed in other European regions and concerning other systems. The exploratory development will be based on a case-study area located in the region of Alentejo, the municipality of Montemor-o-Novo. Later, application to other areas is also foreseen, so that the methodological achievements can be generalized. Since little work have been developed so far in the application of the HNVF concept in Portugal this study will also contribute with new data and knowledge towards the identification and monitoring of HNV farmland. In this paper the overall methodology of the study will be presented with focus on the methods used for the characterization of HNV farming systems.



**Figure 1.** Framework and aim of the study

### 1. Case-study: Extensive grazing in the Portuguese *Montado*

The four types of HNV farming Systems defined by the Portuguese Office of Planning and Policy can all be identified in Alentejo region. Therefore, and taking into account that the aim of this study follows an exploratory approach, one will focus on *Low-intensity semi-natural grazing* in order to grasp the methods that best adjust to our purpose, and subsequently adapting these methods to other HNV farming systems.

According to the 2009 Agricultural Survey of the National Statistics Institute (INE 2010), extensive grazing represents one of the most significant farming systems occurring in Alentejo Region, approximately 57% of the Utilized Agricultural Area in this region. Extensive grazing can occur in open permanent grasslands (37%) but mainly associated with *Montado* areas, corresponding to 62% of the total area of grazing land in Alentejo.

In the Alentejo region *Montado* areas represent the dominant landscape. *Montados* are complex agro-forestry systems, similar to the Spanish *Dehesas*, with its complexity increasing according to the conjunction of the tree cover (in changing densities of cork and holm oak maintained through natural regeneration), combined with the agricultural and grazing components in the ground layer, and with the variability of soil, climate and topography conditions (Pinto-Correia *et al* 2011). This complexity results in a specific landscape that is currently valorized for its multiple functions.

Besides the productive function, *Montado* is also recognized for its value as a particular landscape, its aesthetic and identity values and its attractiveness for recreation (Surova & Pinto-Correia, 2008) and for its rich biodiversity, hosting valued habitats and species.

*Montado* is a system fully dependent on agricultural management (Halada *et al* 2011), thus its natural value and environmental qualities are closely related, not only to the high variability of the system components, but mainly to the pressure of different farming practices. The *montado* system has been in the last decades subject to different pressures which have resulted in multiple trends, intensification through increased livestock density and increase mechanization and extensification through lower grazing density and lower shrub control, both simplification of the land use generally. This means mainly that the *montado* is not a stable system, but a system where a balance between the various components is always challenged by human practices. Being aware of this interrelation a question needs to be raised: *May all montado areas be recognized as High Nature Value farmland?* Having this question as our starting point, this study will allow us to i) identify different degrees of suitability of the *montado* to a HNV classification and ii) grasp the hypothesis that HNV farmland can be identified through landscape indicators with support on land cover maps and aerial photos.

## 2. Methods

The overall methodology we expect to develop in the study is composed of three stages (Figure 2):

(1) Characterization of HNV Farming Systems - Identification of farming systems recognized for its High Nature Value (taking into account the key characteristics defined by the EC methodology); Identification of indicators and related criteria that enable recognizing the identified systems; Validation of types and criteria through a case-study carried out in the municipality of Montemor-o-Novo, in Alentejo region;

(2) Identification of HNV Farming Systems - Application of the criteria to identify the spatial distribution of HNV and Non-HNV areas in the municipality (at the plot level) and assess what *Montado* types better support the nature and environmental services defended by a HNV classification.

(3) Definition of landscape indicators – Application of an integrated spatial and statistical analysis that best evaluate the relationship between *Montado* composite spatial metrics, management variables and biodiversity values in order to define landscape indicators enabling the identification of HNV and Non-HNV areas through aerial photographs analysis; Validation of the defined landscape indicators in a different municipality in Alentejo region.

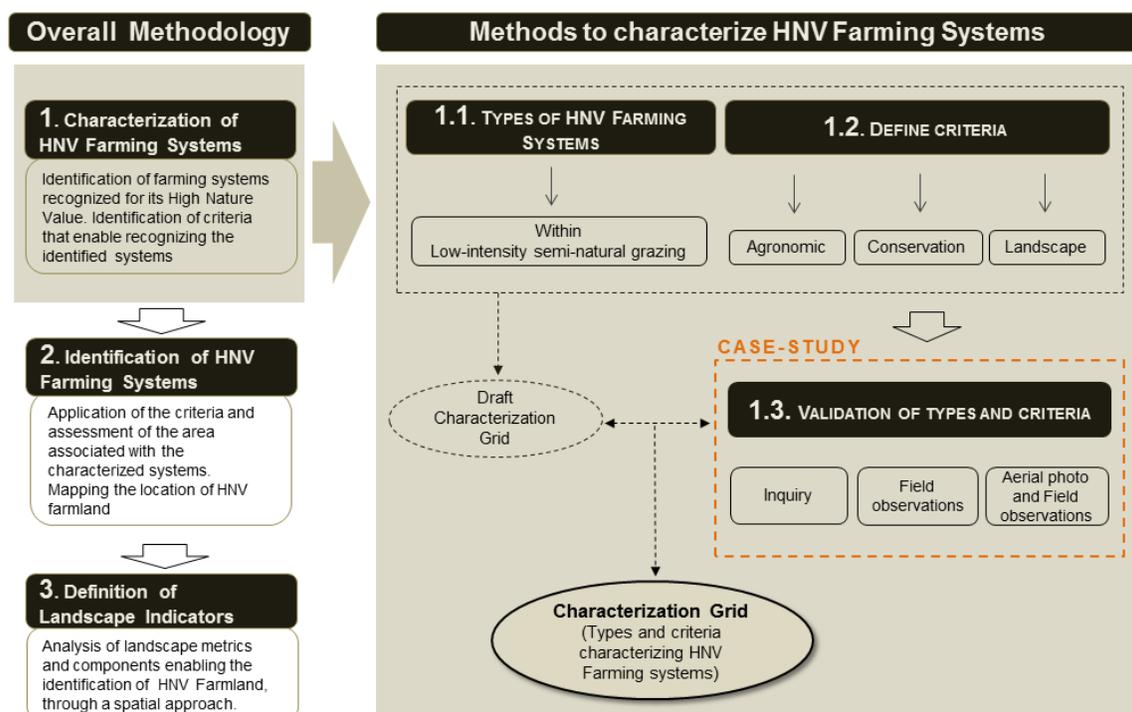
At the present, only the first stage of the study (*1.Characterization of HNV farming systems*) is being developed according to the working process schematized in Figure 2. Data on the characteristics of HNV farming systems would allow one to assess the location of HNV farmland and subsequently to produce and test a set of landscape indicators to Identify HNV Farmland.

The characterization of HNV farming systems involves three steps, which will be the object of this paper:

(1.1.) Definition of a typology of HNV farming systems: the purpose is to specify the different types of extensive grazing in *montado* areas, since it is possible to differentiate subtypes of grazing land occurring in different conditions, representing different farming systems (e.g. Grazing land in open areas; Grazing land within open tree cover; Grazing land within dense tree cover).

(1.2.) Definition of criteria; the aim is to identify indicators and related criteria to be used to identify HNV farmland, providing a good differentiation of agricultural land with high nature value (HNV) and agricultural land with low nature value (Non-HNV). On the basis of the literature review and expert knowledge a set of indicators (Agronomic, Conservation and Landscape) and related criteria would be selected (e.g. livestock intensity, amount of tillage or mowing, species richness, diversity of patches, tree cover density, etc). Within each criterion there should be provided clear thresholds allowing a good differentiation between HNV and Non-HNV. The selected criteria will result in a *draft Characterization Grid* that would be validated in the next step of the work.

(1.3.) Validation in the field (Case-study): The third step consists in applying the selected criteria in a sample municipality in order to validate and adjust the two previous steps (types and criteria). The field work would be carried out at the plot scale in a sample of 100 plots in the case study area – the municipality of Montemor-o-Novo. The agronomic criteria will be validated through inquiries to the farm managers while the conservation and landscape criteria will be validated through field observations. The field work would allow possible adjustments of types and criteria resulting in the final *Characterization Grid*.



**Figure 2.** Structure of the work process for the characterization of HNV farmland

### 3. Concluding: expected results

In the paper presentation we expect to provide further detail on the methods, preliminary results of the case study and also some generalization hypothesis on spatial indicators. It is expected that the presented methodology, still in progress, will lead us to a new approach for identifying HNV farmland based on landscape criteria, applicable at first in Alentejo Region and

subsequently in other regions and considering other farming systems. The use of the territorial dimension that is expressed in the landscape pattern will be a step further in creating place based and at the same time reproducible indicators and is therefore seen as a potential for a more straightforward identification of these systems. This identification is needed for a better targeting of future policy application.

## References

- Andersen, E., Baldock, D., Bennet, H., Beaufoy, G., Bignal, E., Brower, F., Elbersen, B., Eiden, G., Godeschalk, F., Jones, G., McCracken, D.I., Nieuwenhuizen, W., van Eupen, M., Hennekes, S., and Zervas, G. (2003), Developing a high nature value indicator. Report for the European Environment Agency, Report for the European Environment Agency, Copenhagen. Available at [http://www.ieep.eu/assets/646/Developing\\_HNV\\_indicator.pdf](http://www.ieep.eu/assets/646/Developing_HNV_indicator.pdf)
- Beaufoy G. and Cooper T. (2008). Guidance Document to the Member States on the Application of the HNV Impact Indicator, European Evaluation Network for Rural Development, Bruxelles. Available at [http://ec.europa.eu/agriculture/rurdev/eval/hnv/guidance\\_en.pdf](http://ec.europa.eu/agriculture/rurdev/eval/hnv/guidance_en.pdf)
- EEA/UNEP, (2004). High Nature Value farmland: Characteristics, trends and policy challenges. EEA Report No.1/2004. EEA, Copenhagen. Available at [http://www.eea.europa.eu/publications/report\\_2004\\_1](http://www.eea.europa.eu/publications/report_2004_1)
- Halada, L., Evans, D., Romão, C., Petersen, J.E. (2011). Which habitats of European importance depend on agricultural practices? *Biodiversity and Conservation* 20 (11): 2365-2378.
- INE, (2010), Recenseamento Agrícola 2009 - Dados Preliminares. Available at [www.ine.pt](http://www.ine.pt)
- Pinto-Correia T., Ribeiro N. and Sá-Sousa P., (2011). Introducing the montado, the cork and holm oak agroforestry system of Southern Portugal. *Agroforestry Systems* 82 (2): 99-104.
- Pointereau, P., Paracchini, M.L., Terres, J.M., Jiguet, F., Bas, Y. and Biala K. (2007), Identification of High Nature Value farmland in France through statistical information and farm practices surveys, JRC report EUR 22786 EN. Available at [http://agrienv.jrc.ec.europa.eu/publications/pdfs/JRC\\_HNV\\_France.pdf](http://agrienv.jrc.ec.europa.eu/publications/pdfs/JRC_HNV_France.pdf)
- Surová, D., Pinto-Correia, T. (2008). Landscape preferences in the cork oak Montado region of Alentejo, southern Portugal: searching for valuable landscape characteristics for different user group. *Landscape Research* 33(3):311–330.
- Trisorio, A., Povellato, A., Borlizzi, A. (2010). High Nature Value Farming Systems in Italy: a Policy Perspective. National Institute of Agricultural Economics (INEA), Rome, Italy. Available at <http://www.oecd.org/dataoecd/9/4/45447828.pdf>