IDENTIFICATION OF LANDSCAPE PREFERENCES FOR INTEGRATION IN DECISION SUPPORT SYSTEM:

Contributions to the management of the Montado as a multifunctional system

Diana Surová
(maiden name: Diana Ježová)

Doctoral thesis, University of Évora, Portugal 2011
Supervisor / Orientador: Teresa Pinto-Correia

This study was financially supported by the Fundação para a Ciência e a Tecnologia in Portugal, as a part of doctoral fellowship.

UNIÃO EUROPEIA
FUNDOS ESTRUTURAIS
FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR Portugal

The real voyage of discovery consists not in seeking new landscapes but in having new eyes.

Marcel Proust

French novelist (1871 - 1922)

I ABSTRACT

The main purpose of this thesis is to contribute to scientific knowledge about the attraction of traditional land-use systems in the region of Alentejo, Montado, for the non-production functions demanded by today's society from rural landscapes. Corresponding to the aims of the study, the thesis comprises five scientific papers dealing with (1) development and application of a methodology suitable for evaluation of landscape preferences and expectations of diverse user groups in the Montado land- use system; (2) assessment of land users' preferences for the Montado amongst other land uses in the region of Alentejo; (3) assessment of the current situation of cultural and amenity functions in the Montado ,from land users' perspectives; (4) assessment of land users' preferences for cork oak Montado landscape patterns by different user groups; and (5) integration of land users' preferences in decision support systems for management of the cork oak Montado as a multifunctional system.

II RESUMO

O objetivo principal desta tese é contribuir para o conhecimento científico sobre a atractividade de sistema de uso de terra tradicional na região de Alentejo, o Montado, para funções de não-produção exigidas pela sociedade actual. Correspondente aos principais objectivos do estudo, a tese é construída por cinco artígos científicos que tratam (1) o desenvolvimento e aplicação de uma metodologia conveniente para a avaliação de preferências de paisagem e expectativas de differentes grupos de utilizadores do Montado; (2) a avaliação de preferências de utilizadores do Montado entre este e outras ocupaçãoes do solo características da região de Alentejo; (3) a avaliação de situação actual das funções culturais e amenidades no Montado de perspectivas de utilizadores; (4) a avaliação das preferências de diferentes utilizadores da paisagem por diferentes padrões da paisagem no Montado do Sobro; e (5) a integração de preferências de utilizadores de paisagem no sistema sistema do apoio à decisão do Montado do Sobro como um sistema multifuncional.

III ACKNOWLEDGEMENT

Particular thanks and appreciation go to:

- my supervisor, Teresa Pinto-Correia, for providing intellectual stimulation, professional opportunities, time and encouragement during my PhD work. Her advice, patience and support in the formulation and writing of the papers presented in this thesis, is acknowledged with gratitude
- Jorgen Primdahl for enthusiastic discussions during the PhD course in Faro 2005 about PhD work and methodology and also to Simon Bell and Wiliam Vos for fruitful methodology discussions
- Joachim Saborowski and Branislav Sloboda from Gottingen University in Germany, for their advice about the data analysis
- Nuno Ribeiro, for his ideas about my collaboration in the multidisciplinary project Agroreg, thus facilitating the survey realisation
- associations of hunters, beekeepers, landowners, tourism agencies and municipalities in the region of Alentejo, for collaboration during the interviews and especially to Mariana Ribeiro Telles and Miguel Telles Branco from APFC in Coruche
- all 232 interviewed people for their willingness to share their time, to respond to my questions and for their valuable participation in this study
- Fundação para a Ciencia e a Tecnologia for funding this doctoral thesis (Nº SFRH / BD / 18633 / 2004)
- my colleagues and friends scattered geographically over the years, my appreciation for their support during my studies and throughout this stage of my life: Milena Andrade Dneboská, Anne Van Dorn, Bas Breman and Rosário Oliveira
- my current colleagues from Dynamo discussion research group: Isabel Loupa Ramos, Filipe Barroso, Helena Menezes, Catarina Machado and Isabel Joaquina Ramos
- and to my family, especially my husband and my mother, for a great deal of social and emotional support and instilling confidence in me.

IV | **CONTENTS**

V RESUMO ALARGADO

As mudanças de estilo de vida ocorridas durante as últimas décadas reflectem-se, entre outros aspectos, no aumento do tempo de lazer e na mobilidade das pessoas, tendo vindo a aumentar o interesse por uma fruição adequada de bens públicos e serviços. Na Europa, nas últimas décadas, as expectativas sociais da área rural já não têm a ver simplesmente com a mera produção alimentar, mas tornaram-se mais complexas. Há uma consciência crescente de que as paisagens rurais cumprem outras funções sociais além da satisfação da exigência básica dos alimentos. As actividades relacionadas com caça, relaxamento, recreação, desenvolvimento cognitivo e reflexão espiritual são cada vez mais procuradas pela sociedade. Assim, o futuro planeamento paisagístico implica enfrentar essas novas expectativas sociais. Esta modificação do uso humano do espaço rural é designada pela comunidade científica como "transição multifuncional da área rural", que significa a mudança dos objectivos de produção anteriormente dominantes em direcção a uma simbiose dos objectivos da produção, consumo e protecção. O desafio da perspectiva multifuncional é aceite como um objectivo para a gestão de paisagem, tanto na comunidade científica como já também na definição de objectivos de política, como é o caso, por exemplo, do Segundo Pilar da Política Agrícola Comum, orientado em direcção ao desenvolvimento rural e que reconhece a variedade de funções económicas, sociais, culturais e ambientais da agricultura. Além disso, o contexto da multifuncionalidade em áreas rurais aparece em diferentes áreas científicas, como na ecologia de paisagem, sociologia rural, agronomia, silvicultura e economia.

O montado, sistema tradicional agro-silvo-pastoril dominante na região do Alentejo, pela sua especificidade, pelo padrão de paisagem a que corresponde, pela diversidade que suporta e pelas funções de recreio, identidade, conservação, caça, e qualidade ambiental que suporta, é reconhecido cada vez mais como um valor para a sociedade. Apesar disso, pouco se sabe sobre como os utilizadores de funções de não-produção avaliam este sistema e as suas diversas alternativas de gestão, que resultam em padrões de paisagem diferentes. O conhecimento sobre preferências e expectativas de utilizadores é essencial para melhor adaptar a gestão para o uso multifuncional do montado.

O estudo apresentado nesta tese enquadra-se na área de ecologia de paisagem e concentra-se nas funções culturais e nas "amenidades" no contexto da paisagem rural. O termo paisagem pode ter múltiplos significados, sendo neste trabalho definido, de acordo com a Convenção Europeia da Paisagem, como "uma área, como percebido pelas pessoas, cujo carácter é o resultado da acção e a interacção de factores naturais e/ou humanos".

Em consequência das novas tendências relacionadas com a paisagem rural, as inovadoras abordagens científicas sobre a capacidade de a paisagem fornecer funções, a procura social dessas funções e, em seguida, a sua integração com as actuais funções geridas nas áreas rurais, desempenham um papel crucial. Isto significa que o conhecimento sobre os valores das pessoas, as expectativas e as avaliações da paisagem tornam-se muito importantes, sendo esses aspectos reflectidos em preferências de paisagem.

Originalmente, a maior parte dos estudos sobre preferências de paisagem concentrou-se em procurar uma base empírica para o consenso público. Menos atenção foi dada ao efeito de tipos de paisagem diferentes e aos modos diferentes de a usar. Na literatura mais recente, a evidência é a de realçar as diferenças nas preferências, em vez de manter uma medida unitária nas preferências de paisagem.

O objectivo principal desta tese foi o de contribuir para o conhecimento científico sobre a atractividade do montado – sistema tradicional de uso de terra na região de Alentejo – para funções de não-produção exigidas pela sociedade actual. As questões principais de pesquisa foram: "Como é que os utilizadores de paisagem avaliam o montado para diferentes funções culturais e amenidades?" e "Como é que as suas preferências podem ser implementadas no sistema de apoio à decisão?"

Os objectivos da tese podem ser resumidos nos seguintes pontos:

1. desenvolver e aplicar a metodologia conveniente para a avaliação de preferências de paisagem e expectativas sobre o montado, por diversos grupos de utilizadores;
2. avaliar as preferências de paisagem de diversos grupos de utilizadores pelo montado, entre outros tipos de uso do solo na região;
3. avaliar as preferências de paisagem de diversos grupos de utilizadores pelos diferentes padrões do montado de sobro;
4. avaliar o uso actual das funções culturais e amenidades no montado, na perspectiva dos utilizadores;
5. integrar as preferências de utilizadores no apoio à decisão de orientar o montado do sobro para um sistema multifuncional, como contribuição para o projecto multidisciplinar AGROREG.

A metodologia aplicada neste estudo combina métodos científicos quantitativos e qualitativos. Os inquéritos realizaram-se individualmente, usando questões fechadas e abertas que foram acompanhadas por dois grupos de fotografias coloridas: o primeiro representava vários usos do solo existentes na região do Alentejo e o segundo mostrava os vários tipos de montado de sobro, representando os resultados de diferentes tipos e intensidades de gestão.

Para obter um conhecimento conveniente na indicação de instrumentos na gestão multifuncional do montado, a amostragem propositada ("purposeful sampling") foi usada para ilustrar os diferentes grupos de interesse que experienciam as funções culturais e as amenidades em áreas rurais. Os grupos seleccionados correspondem à variedade de actividades ligadas às funções culturais, amenidades e à gestão: proprietários, trabalhadores, habitantes rurais, habitantes novos rurais, urbanos de Lisboa, turistas estrangeiros, caçadores, apicultores e apanhadores de cogumelos.

O estudo refere-se à área onde o montado de sobro predomina em relação ao azinho, na parte do noroeste da região de Alentejo. Quatro cidades, dispersas nesta parte específica da região, foram seleccionadas como centros principais do processo de entrevista: Alcácer do Sal, Montemor-o-Novo, Évora e Coruche.

O desenho estatístico deste estudo aplicou a estatística descritiva e inferencial (Test de Pearson Qui-Quadrado). Para as respostas às perguntas abertas, usou-se a análise de conteúdo. Foram analisadas as tabelas de contingência entre as preferências e as variáveis socioeconómicas (género, idade, educação e rendimento familiar) e tabelas de contingência entre as preferências e as actividades principais praticadas no montado.

A última parte do estudo teve por objectivo experimentar a integração dos dados sobre as preferências na paisagem dos utilizadores no apoio à decisão para o montado de sobro. Os resultados dos inquéritos sobre as preferências por diferentes tipos de montado foram transformados em índices numéricos, simplificando-os para introdução no modelo.

Correspondendo aos principais objectivos do estudo, a tese é construída por cinco artigos científicos que tratam:

1-- o desenvolvimento e aplicação de uma metodologia conveniente para a avaliação de preferências de paisagem e expectativas de diferentes grupos de utilizadores sobre o montado (paper I: Ježová D. & Pinto-Correia T. (2006) Methodology for evaluation of landscape preferences and its application to montado of cork oak (Quercus suber) in southern Portugal (Alentejo). In: Bunce, R.G.H and Jongman, R.H.G. (Eds.), Landscape Ecology in the Mediterranean: inside and outside approaches, pp 85 – 94.);

2-- a avaliação de preferências de utilizadores do montado, entre outras ocupações do solo na região do Alentejo (paper II: Surová D. & Pinto-Correia T. (2008) Krajinné preferencie rôznych skupín užívateľov pre tradičnú kultúrnu krajinu v južnom Portugalsku - Montado. Landscape preferences of different user groups for traditional cultural landscape in southern Portugal – Montado. Acta Horticulturae et Regiotecturae, Special Issue, pp 64-68) ;

3-- a avaliação da situação atual das funções culturais e amenidades no montado, na perspetiva dos utilizadores (paper III: Surová D. & Pinto-Correia T. (2009) Use and assessment of the 'new' rural functions by land users and landowners of the Montado in southern Portugal. Outlook on AGRICULTURE, Vol 38, No 2, pp 189-194);

4-- a avaliação das preferências de diferentes utilizadores da paisagem por padrões da paisagem no montado do sobro (paper IV: 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 groups. Landscape Research, Vol. 33, No 3, pp 311 – 330);

5-- a integração de preferências de utilizadores de paisagem no sistema de apoio à decisão de encarar o montado do sobro como um sistema multifuncional (paper V: Surová D., Surový P., Ribeiro N.A. and Pinto-Correia T. Integrating differentiated landscape preferences in a decision support model for the multifunctional management of the Montado. Paper accepted for publication in Agroforestry Systems).

Os resultados principais deste estudo podem ser resumidos nos seguintes pontos:

- Em relação ao conjunto diverso de ocupações do solo presente na região, o montado é a ocupação do solo preferida no noroeste do Alentejo por caçadores, apanhadores de cogumelos, apicultores, proprietários, visitantes portugueses (representados neste estudo por trabalhadores do campo, habitantes rurais e visitantes urbanos de Lisboa) e visitantes estrangeiros da Europa do Norte (representada por novos habitantes rurais e turistas). Esses resultados mostram o potencial do montado para as funções culturais e amenidades, que não devem ser omissas na futura identificação de usos alternativos deste sistema.
- O montado tem capacidade para oferecer experiências de tradição e identidade; fruição estética; experiências reconfortantes como contacto com a natureza, tranquilidade, conforto e sombra refrescante; valores ecológicos e econômicos para os seus utilizadores.
- As características de paisagem não têm igual importância para todos os utentes, dependendo da actividade ou uso que eles lhe dão. Esses resultados mostram também a importância de considerar os diferentes usos em estudos de preferência de paisagem. Os

grupos de caçadores, apanhadores de cogumelos, apicultores, proprietários, visitantes portugueses e visitantes estrangeiros são significativamente diferentes em preferências quanto aos padrões de paisagem que resultam de opções de gestão existentes no montado. A consideração dessas diferenças e a sua influência na organização espacial do sistema de paisagem, que inclui funções de não-produção, pode contribuir para a satisfação de necessidades sociais modernas, procurando encontrar alternativas de gestão apropriadas para o suporte de novas funções e evitando conflitos potenciais dentro das atividades. Nem todas as funções podem ser totalmente acomodadas dentro do mesmo tipo do modelo montado -- por isso, as decisões devem ser tomadas quanto a prioridades e combinações possíveis de funções, bem como quanto às opções de gestão necessárias.

- A gestão actual das funções culturais e funções de amenidades no montado não satisfaz a maioria dos utentes de paisagem. Principalmente, uma definição compreensível dos direitos e das responsabilidades dos utilizadores de paisagem e dos proprietários acerca do uso de novas funções rurais no montado, tem falhado.
- A maior parte dos proprietários está principalmente envolvida em actividades de produção e a sua motivação dominante na implementação da nova função rural nas suas propriedades é económica, seguindo-se a motivação para satisfazer necessidades sociais. As atitudes dos proprietários em relação à implementação das novas funções rurais nas suas propriedades não são uniformes e devem ser consideradas em futuros processos de planeamento.

Com o conhecimento sobre os padrões de paisagem preferidos pelos grupos de utilizadores quanto às específicas funções culturais e as amenidades, será possível integrar um sistema de apoio à decisão baseado no modelo de crescimento de árvore individual. Isto parece ser um dos caminhos prometedores sobre como aproximar os resultados científicos das preferências de utentes aos gerentes da paisagem.

Os resultados obtidos por este estudo têm algumas implicações na futura gestão multifuncional da paisagem do montado. É de esperar que os decisores e os planeadores possam usar deste tipo da informação. Esses actores têm de ser melhor informados sobre as preferências de paisagem e as expectativas dos diferentes tipos de utilizadores. Os proprietários do montado, tentando ajustar as suas práticas às condições económicas incertas, podem achar tais resultados interessantes, como uma fonte de informação sobre o que é considerado como paisagem valorizada na região. Além disso, as agências de turismo locais podem usar este tipo da informação para propostas no mercado, isto é, considerando este tipo de paisagem como um destino atractivo para os diferentes tipos de utentes.

Este trabalho, inserido na linha mais integradora de questões sociais na ecologia de paisagem, vem reforçar um novo caminho de estudos sobre a paisagem tradicional, o montado e o seu potencial para as funções de não-produção exigidas pela sociedade actual. O montado e os seus diferentes padrões de paisagem foram avaliados por utilizadores das diversas funções culturais e das amenidades, tendo em conta a sua actividade principal na área rural. Neste tempo de mudanças rápidas nas condições de mercado, este tipo de estudos ajuda a encontrar usos alternativos de paisagens tradicionais, apontando simultaneamente para a sua manutenção e utilidade para a sociedade actual. Assim, o contributo de estudos sobre a introdução adequada das novas funções em planos de gestão da paisagem rural, torna-se essencial.

VI THESIS STRUCTURE

The following part of the thesis is structured in two sections:

The first section summarises, in general description, the research work of this dissertation. Part of the introduction refers to the new social demand related to rural landscapes, followed by the Montado as a traditional land use system. New societal demands are described and finally, the landscape preferences in multifunctional context are introduced. Next, the aims of the study are depicted. The following division explains the methods used in the work and shows the two types of interview guides and the photographs applied in the survey. Part of the first section is devoted to a general discussion of the results and subsequently, some conclusions are derived from the latter. The first section ends with a list of references.

The second section comprises five scientific papers corresponding to the principal aims of the study. Papers I, III, IV and V are published in English. Paper II is presented in two languages. Paper IIA is the published Slovak version and paper IIB is its English version.

1 GENERAL DESCRIPTION

1.1 INTRODUCTION

1.1.1 *New social demand for rural landscape*

Lifestyle changes which occurred during recent decades resulted in an increase of leisure time and mobility and enhanced the focus of interest towards an adequate provision of public goods and services. Nowadays, the societal expectations from the countryside are becoming more complex and not merely connected to "food" production. There is a growing awareness that rural areas fulfil other societal functions besides satisfying the basic demand for food. The new rural functions related to recreation activities, relaxation, cognitive development and spiritual reflection in landscapes, arise from societal demand. Therefore, future planning involves coping with these new social expectations in definition of what the function and purpose of rural areas might be. Holmes (2006) expresses this change of human use of rural space as the multifunctional rural transition, which means a shift from the formerly dominant production

goals towards a variable mix of production, consumption (market-driven amenity use) and protection (e.g. biodiversity preservation and landscape protection) goals. The concept of multifunctionality was applied by OECD and EU in the sectoral context of agriculture; however, it has considerable importance in sustainable land development regarded cross-sectorally in the general perspective of land use and landscape (Wiggering et al 2006). Furthermore, the challenge of multifunctional perspective is accepted as an aim for landscape management, both in the scientific community and also in the definition of policy objectives e.g. the Second Pillar of the Common Agricultural Policy (CAP) oriented towards rural development. This new perspective of CAP recognises the full range of economic, social, cultural and environmental functions of agriculture. Moreover, the concept of the multifunctionality in rural areas appears in different research areas, for example in landscape ecology, rural sociology, agronomy, forestry, economy and the need for multidisciplinary research with interdisciplinary communication, is accepted as an important challenge (Noe et al. 2008). A study focusing on cultural and amenity functions, not in the sectoral context of agriculture, forestry or economy, but in the context of the rural landscape, has been undertaken. The study has close connections with landscape ecology, which deals with analysis, planning and management of the landscapes of the world and include building theory and developing knowledge of landscape pattern and process, developing integrative tools and making them applicable to real landscape situations and applying them to solve problems. The conceptual and theoretical core of landscape ecology links natural sciences with related human disciplines.

The term, landscape, can have multiple meanings, though in this work it can be defined in accordance with the definition from the European Landscape Convention as "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors" (Council of Europe 2000). The European Landscape Convention (ELC) underlines the fact that landscape is for the common good, as well as a common responsibility. The capacity of a specific landscape to provide goods and services that satisfy human needs directly or indirectly and thus have a social value is defined as landscape function, by de Groot (2006).

The abovementioned new functions, demanded by society from rural areas are defined by de Groot and Hein (2005), in the typology of ecosystem functions, goods and services, as cultural and amenity functions. These relatively new functions, at least in the land use management objectives, have a social value and correspond thus to public services or goods. However, in economic terms, they have currently no market value or have markets that do not function adequately, for example, the users have not previously paid for such goods and they are therefore designated as 'non-commodity outputs' (OECD 2001). Nevertheless, the increasing demand for these functions may lead to a shift in status that

means that they earn a monetary value through new market conditions or public interventions (Wiggering et al. 2006). This may provide landowners with a new potential income that is indeed dependent upon societal demands and preferences.

A range of today's amenity functions in rural areas has always been part of the agriculture or forest outputs, for example mushroom picking and hunting. However, increasing societal demand puts them in new positions, where purely production-oriented management may not be adequate for today's social expectations.

In consequence, new research approaches concerning the capacity of the landscape to supply societal demand for these functions and their possible integration with currently managed functions, is crucial. Pertinent research can be useful in supporting innovative ways of management, where commodity and non-commodity functions are paired in suitable ways and at suitable levels.

1.1.2 *The Montado – traditional land use system responding to new societal demands*

The Montado is the agrosilvo-pastoral system dominant in the Alentejo, the southern region of Portugal. This system has existed for centuries in a more or less developed and intensively managed form (Fonseca 2004). The system is particularly flexible with numerous possible management options resulting in a variety of landscape patterns on a local scale, even if the common impression of this land use system is of open, savannah-type, evergreen oak woodland. Traditionally, this system is utilised for multiple land uses, combining tree cover, both cork and wood for charcoal and a rotation of grazing, cultivation and fallow areas (Pinto-Correia 1993). The principal products from the Montado are cork and meat from livestock breeding. Cereals used to be produced in the Montado until some decades ago, but this practice has been discontinued, due to changing trends (Pinto- Correia & Mascarenhas 1999). Where there is crop cultivation today, it is mainly to produce forage for cattle and so the system is now mainly silvo-pastoral. These production functions secure incomes for the landowners. Cork is a highly valued product in the market-place and cattle are subsidised by the CAP. Apart from production purposes, the Montado is also used by hunters, beekeepers and mushroom pickers. Historically, the functions related to these activities were important for the rural population to supplement food resources (Fonseca 2004). Today, hunting can be managed in two ways: through municipal management and hunting associations, with no payment to the landowner, or for tourist purposes where there is an obligation to submit a game management plan and where hunters pay for their activity. This second option provides an economic supplement for landowners. With regard to beekeeping, the

Mediterranean vegetation in the Montado is rich in aromatic plants that are responsible for the high quality of honey in this region. As for mushrooms, the semi-open forest and the low intensity of soil mobilisation create suitable conditions for a wide variety of mushrooms.

Nowadays, the growing demand for rural landscapes as a space for relaxation and recreation has increased the interest in the Montado, which is particularly attractive due to its combination of: a) open and tree-covered areas, b) clear and shrub-covered undergrowth, c) a human management regime that provides a semi-natural appearance, d) the presence of livestock in low numbers, and e) the presence of natural flora and fauna (Gomez-Limon & Fernandez 1999). There are also new rural settlers who appreciate this type of landscape and tourists who visit these areas for contemplation, walking, riding, bicycle tours, etc. The most numerous user-groups are probably composed of local people who visit the Montado occasionally for aesthetic, recreational or other experiences as an escape from daily routine. Urban visitors often use the areas for recreational purposes and some are also interested in the landscape system and acknowledge its value for multiple functions. The Montado is thus nowadays appreciated in various ways that entail several non-production functions. Yet present day management still concentrates on production objectives, even if landowners are aware of the potential interest of the Montado for many other uses and for satisfying varied human needs (Plieninger et al. 2004). Knowledge about preferences and expectations of land users in the Montado is essential to focus management on multifunctional use. Certainly, little is known about how users of non-production functions evaluate this land use system and its diverse management alternatives, resulting in different landscape patterns.

1.1.3 Landscape Preferences in the Context of (Multi) Functionality

There is a growing awareness of the need for feasible measures for landscape protection, management and planning, utilising public support. Illustrative of this concern, is the European Landscape Convention (Council of Europe 2000) which demands participation by the public in issues on landscape policy. It means that knowledge about peoples' values, expectations and appreciation of landscape has become very important. According to several researchers, for example Buijs et al. (2006), Egoz (2001) and Gómes-Limón and Fernández (1999), these expectations are reflected in landscape preferences.

Originally, most studies about landscape preferences have focused on securing an empirical basis for public consensus. Less attention has been paid to the effect of different landscape types and to different ways of using landscapes. In more recent literature, evidence is found for differences in preference, instead of a unitary measure of environmental preference.

In the studies of multifunctional land use, there is an increasing awareness that landscape preferences can be influenced by what the specific landscape can offer for specific activities (e.g. Van den Berg and Koole 2006, Buijs et al. 2006). This can be a very significant factor in landscape preference when it is understood who is looking at landscape and why (Bell 2001).

Several researchers have highlighted the need for considering group differences in studies regarding landscape preferences. There were differences found between expert judgements and the general public (Herzog et al 2000) and amongst farmers, landscape experts and rural dwellers. (Rogge et al. 2007 and van den Berg 1998) provide an aesthetic evaluation of nature development plans by farmers, visitors and residents. This revealed important differences between the user groups relating to landscape characteristics and perceived beauty. The survey by Ryan (2006) found significant differences between the values that rural inhabitants, planners and home-builders place on nature. Willis and Garrod (1992) reported similarities in preference between residents and visitors in their work relating to landscape evaluation in Britain. Whether a person grew up in a given landscape type proved to be insignificant in the work of Brush et al. (2000), but the interaction between landscape type and participant group (tourist, farmer, forester, etc.) was significant in relation to their enjoyment and the degree of appreciation of a landscape was reflected in landscape preference. Coeterier (1996) underscores this statement by saying that people generally agree on the quality of a landscape but disagree on the use they want to make of it. Thus, the question "Who demands what?" is an important one in light of the debate on multifunctional use of the landscape that is currently being considered.

The study about user preferences for existing management options of commodity outputs, deals with finding a high coherence between commodity and non-commodity outputs. Belletti et al. (2003) regard this coherence as the best approach to strengthen the multifunctional role of (agricultural) rural areas.

1.2 THE AIMS OF THE STUDY

The main purpose of this thesis is to contribute to scientific knowledge about the potential of the Montado landscape in the region of Alentejo for cultural and amenity functions demanded by today's society. The main scientific progress of this work is intended to be, in the study of landscape preferences, an explicit differentiated consideration of the various user groups using the rural landscape. The groups considered, and particularly relevant for the Montado, include rural inhabitants, urban dwellers, new rural inhabitants, tourists, hunters, mushroom gatherers, beekeepers, workers and landowners/managers. This consideration is believed to be important for grouping types of landscapes and types of use, in an attempt to help with appropriate management of multifunctional landscapes.
The main research questions can be formulated as follows:

"How different user groups assess the Montado landscape for cultural and amenity functions?"

and

"How the landscape preferences of different user groups can be implemented in a decision support system for the Montado management?"

A definition of the aims of the study takes into consideration, amongst other factors, the observation that in the Montado, different landscape patterns can be found and the knowledge about how they are evaluated, for specific non-production functions required by society, is omitted. In the region of Alentejo, the Montado land use system dominates. However, other land use types can be observed in the region as well. There is little known about how the Montado land uses are evaluated for cultural and amenity functions by land users. A monitoring system for the Montado non-production use does not exist. There is a dearth of surveys about landscape preferences and expectations of land users in the Montado and consequently, available methodology is lacking.

The aims of the study can be structured as follows:

a) Development and application of a methodology suitable for evaluation of landscape preferences for, and expectations of, the Montado by diverse user groups

b) Assessment of the landscape preferences of diverse user groups for the Montado amongst other types of land uses in the region

c) Assessment of the landscape preferences of diverse user groups for the cork oak Montado landscape patterns

d) Assessment of the current use of the cultural and amenity functions in the Montado from land users' perspectives

e) Integration of land users' preferences in a decision support system for the management of the cork oak Montado as a multifunctional system. Contribution to the multidisciplinary project AGROREG.

1.3 METHODS

1.3.1 *Research method*

The appropriate research method for the objectives of this study was defined following the review of existing literature (e.g. Plieninger et al. 2004; Silvennoinen 2001; Soini 2001; Bell 2001; Brush et al. 2000; Gómes-Limón and Fernández 1999; Hunziker 1995; Yu 1995; Zube et al. 1992) and discussions with experts in landscape preferences research. In order to assess landscape preferences and expectations of the Montado users, a combination of approaches from quantitative and qualitative research methods was selected. A part of the quantitative approach was used for identification of respondents' preferences for different landscape patterns. The other part, the qualitative approach, using open-ended questions (Kvale 1996; Patton 2002), was applied for understanding and capturing respondents' points of view, their experiences and expectations in landscape use. Both types of data were analysing using advanced statistical analysis.

1.3.2 *Data collection*

For data collection, individual personal interviews, using photographs as the visual stimuli, were utilised. Personal interviews allowed direct contact with respondents, permitting the capture of direct quotations about their perspectives and experiences and highlighting difficulties encountered in understanding questions and thus assisting respondents to answer the questions properly.

At the beginning of each interview, the respondent was given a brief introduction to the purpose of the study. The interviews were carried out in Portuguese. For foreign respondents with little knowledge of Portuguese, English was used for communication during the interviews.

1.3.3 *Visual stimuli*

Two groups of photographs, edited using computer technology, were used as the visual stimuli for interviews. It was borne in mind that photographs are static by nature and achieving realism in computer-generated images is difficult and requires experience in this field. Despite the omission of the third dimension and senses such as smelling, touching and hearing, meaningful similarity was found in the response to two-dimensional representations and the response to the real landscape (e.g. Lange 2001; Kaplan & Kaplan 1989). Moreover, in this study, there were several reasons for using this kind of visual stimuli, instead of field visits, during the interviews. The photographs allowed the showing of a larger number of alternative landscape patterns and simultaneously controlled the properties of the visual stimuli, for example the weather conditions.

Seven colour photographs of different land uses in the region of the Alentejo (Figures 1 - 7) and fourteen colour photographs corresponding to different landscape patterns of the cork oak Montado (Figures 8 - 21), resulting from different management options, were used. The dimension of the photographs was 10 x 15 cm.

In the case of the Montado landscape types, the number of representations had to be defined and simplified, due to the huge variation in the Montado management options. Thus, four main aspects, influenced by landowners' management, were considered: presence of shrubs, presence and type of livestock, density of trees and spatial

distribution of trees. These are the dimensions that mostly influence landscape patterns in the Montado system. In the representations of the Montado types, two varieties of livestock, cows and sheep, presenting the most frequent big and small grazing animals in the cork oak Montado, were used.

From the 500 photographs captured in the field, the ones best representing the different landscape patterns in the Montado were selected. At first, the photographs were divided into three groups with different levels of crown cover, in order to distinguish between the open, dense and highly dense areas. The aspect of different spatial organisation of trees was relevant only for dense areas, thus this photo set was divided into two groups: dense aligned and dense irregular. Subsequently, there was a selection of photographs captured in the field better representing the following different landscape patterns: open area, dense area with aligned configuration of trees, dense area with irregular configuration of trees with shrubs and dense area with irregular composition of trees without shrubs and finally, the highly dense area. These five photographs served as the base for representations of other existing Montado landscape patterns, obtained by photographic manipulation, using image-editing software. The aspects manipulated were related to the presence of shrubs and two types of pastured livestock – sheep and cattle. Some further modifications were performed by computer technology, in order to reduce differences in the sky colour on the photos and to manipulate the presence of livestock and the changing densities of shrub cover.

1.3.4 *Sampling*

In the context of multifunctional landscape management, a variety of utilitarian perspectives were considered to be important. Thus, in order to obtain knowledge suitable for the use of tools in aiming for multifunctional management of the Montado, utilitarian overlay on landscape preferences was applied. The purposeful sampling (Patton 2002) was used in order to illustrate different user groups experiencing cultural and amenity functions in rural areas. Nine groups of users were identified at the beginning of the study, based on previous observations about non-production use of the countryside in the region. Selected groups corresponded to management activities and to varieties of activities connected with cultural and amenity functions in rural areas: (1) landowners managing cork oak Montado on their properties; (2) field workers from the properties with the cork oak Montado; (3) hunters (4) mushroom pickers (5) beekeepers practising their activities in the region; (6) long-term residents

living in the region since childhood and practising leisure activities in the countryside; (7) new rural inhabitants coming from other regions or countries and living in the Alentejo region for less than fifteen years; (8) urban dwellers from metropolitan areas of Lisbon, visiting the region sporadically and (9) foreign tourists coming to the region and visiting the countryside.

Contacts with hunting, tourist, beekeeping and landowners' associations and municipalities were established in the study areas, in order to gain initial contact with potential respondents. Afterwards, to enhance the representative nature of groups' samples and to select people best suited to the needs of a survey, a snowball sampling was applied. The community's knowledge was used to find out about those residents who had the required experiences in the study area, and thus helped with locating information-rich key informants (Patton 2002). A few potential respondents were contacted in each centre of the interview process and asked whether they knew of anybody with the required knowledge and they in turn provided more names (Atkinson and Flint 2001). The personal interviews with those who had accepted were carried out. In all, 232 such interviews were completed. Each respondent was assigned to one category of users and was interviewed as such, even if he or she could be included in more than one group. For example, a hunter could also be a local inhabitant, but if he was interviewed as a hunter, this was clarified at the start of the interview and answers were accepted on this basis.

1.3.5 *Study Area*

The study refers to the area where the cork oak Montado predominates in the north-western part of the region of Alentejo. Four towns, dispersed in this specific part of the region, were selected as main centres for the interview process: Alcácer de Sal, Montemor-o-Novo, Évora and Coruche. These settlements are surrounded by the cork oak Montado, which has socio-economic importance due to cork production, but which is also used in a multifunctional way by local inhabitants and urban dwellers from the metropolitan areas of Lisbon, as well as by foreign tourists. A more detailed description of the study area is presented in scientific papers I, II, III and IV.

1.3.6 *Interview guides*

For data collection, structured interviews consisting of a list of open and close-ended questions and photo representations of landscape types was used. The questions from the same themes were grouped together in order to make the questionnaire easier to answer. Filling in of names and contact details of the respondents was optional. The interview guide covered six distinct themes specified below:

I. Preferences for the Montado between other land use types in the region of the Alentejo. The photos representing different land use types in the region were used as the visual stimuli in this section of the interview.

II. Verbal expressions for the Montado identified by its users. This section of the questionnaire overlapped the aims of the thesis, so the results are not presented here.

III. Preferences for the Montado landscape patterns resulting from different management options. Different landscape patterns in the cork oak Montado were shown on the photos.

IV. Questions about use and assessment of the 'new' rural functions in the Montado by land users. This part of the questionnaire had different questions for the landowners. These did not apply to the other land user groups.

V. Economic assessment of the Montado. This is the second theme overlapping the aims of the thesis, thus the results from this theme are not presented in this thesis.

VI. Questions about the socio-economic variables of the respondents.

Two versions of the interview guide were arranged: for land users and for landowners/ managers. Questions in part IV for landowners/managers, about the use and assessment of the 'new' rural functions in the Montado by its users, were different from other land user groups in the management of their Montado areas. After testing of the interview guide, some further adjustments were made. Specifically, the number of Montado landscape patterns was reduced from seventeen to fourteen. Furthermore, a respondent's choice of preferred landscape type through various steps was reduced to a single choice from all photos, in order to simplify the question for respondents.

The English versions of interview guides for land users and for landowners/managers applied in the survey are demonstrated in Annex 1 and Annex 2. Some of the questions in the interview guide overlapped the aims of the presented thesis.

The questions taken into account in this thesis are the following numbers in the interview guides: 1- 3, 9 – 19 and 28 - 33.

Photographic Representations of Land Use Types applied in the Survey

In the survey, seven colour photo representations of the following land use types of the region were used: Intensive cultures, Vineyard, Olive grove, Montado, Eucalyptus grove, Stone pine grove and Maritime pine grove (see Annex 3).

Photo Representations of the Montado landscape patterns applied in the Survey

The Montado landscape patterns, resulting from variety management options in tree level and undercover level, were shown to respondents during the interviews, using fourteen colour photographs (see Annex 4). The latter were considered the most frequent combinations of four management aspects: Tree density defined as a percentage of the crown cover; tree composition; shrub presence and livestock presence and type.

The Montado types, with descriptions of the aspects considered in the photographic representations, are illustrated in Table 1.

Table 1. The Montado types with descriptions of the aspects considered in the survey.

Nº	Montado type	Livestock presence	Shrubs presence	Trees' composition	Crown cover %
1	Open	no livestock			
2	Open with cows	sheep	no shrubs	irregular	10 - 35
3	Open with sheep	cows			
4	Dense irregular	no livestock			
5	Dense irregular with sheep	sheep	no shrubs		
6	Dense irregular with cows	cows		irregular	
7	Dense irregular with shrubs	no livestock	with shrubs		
8	Dense irregular with shrubs and sheep	sheep			>=35 <=65
9	Dense aligned	no livestock			
10	Dense aligned with sheep	sheep	no shrubs		
11	Dense aligned with cows	cows		aligned	
12	Dense aligned with shrubs	no livestock	with shrubs		
13	Dense aligned with shrubs and sheep	sheep			
14	Highly dense irregular with shrubs	no livestock	with shrubs	irregular	> 65

1.3.7 *Data Analysis*

The statistical design in this study applied frequency statistics for the preferences of types of land use (see paper II - Surová and Pinto-Correia 2008a) and types of Montado patterns (see paper IV – Surová and Pinto-Correia 2008b). A Pearson's chi-square test (X2) was used to identify group differences between preferences. A significance level of 0.05 of p-value was used for all tests. To identify the most important reasons for the respondents' decisions concerning the preferred land use and Montado pattern and perceived limitations and improvements suggested by land users, as well as landowners' attitudes towards 'new' functions, a content analysis was applied to the open explanations of the respondents. Each description was broken down into a series of short phrases and the phrases were sorted into categories that expressed similar meanings. The content analysis was applied due to its common use for identification of concepts, key issues, themes and patterns in communicative texts, in order to arrive at interpretative and quantitative summaries of qualitative data (Patton 2002).

1.3.8 *Implementation of the landscape preferences in a Decision Support System for the Montado management*

The final aim of the study was to integrate the land users' preferences into the existing decision support system for cork oak Montado management. For this purpose, the results of land users' preferences for Montado landscape patterns were transformed to social indicators in ordinal, numerical outline and subsequently introduced into the software of the decision support system. The process of the integration of utilitarian landscape preferences with the software of the decision support system for management of the Montado, is in paper V (Surová et al. *Submitted manuscript)*.

1.4 DISCUSSION OF THE RESEARCH RESULTS

This chapter discusses the main results described in the five scientific papers presented in the second section of the thesis.

Paper I (Ježová and Pinto-Correia 2006) describes a development and application of a methodology suitable for evaluation of landscape preferences for, and expectations of, the Montado by diverse user groups. In this survey, the personal interviews were used for data collection regarding land users' preferences and expectations in the Montado land use system. The structured interviews allowed control over the flow of the dialogue. On the other hand, in the open-ended questions in this experimental study, there was freedom to respond to some questions and they were specifically helpful for a better understanding of the various points of view of users and for the identification of landscape characteristics, valuable to different user groups. This would not have been possible to obtain through close-ended questions about preferred landscape types. A combination of quantitative preference choice and qualitative responses was also applied by other researchers (e.g. Schroeder 1995) as they were considered to provide a more complete understanding of human responses to landscape, than could either approach, used alone.

The visualisation by photographs was a powerful tool in attracting interviewee interest in the survey, as well as showing possible variations in landscape patterns. As a term, landscape can have different meanings and the problem of misunderstanding of landscape in the questions, needed to be avoided. The photographs had the capacity to specify landscapes in the study and allowed for greater clarity about the stated preferences. However, photographic representations to evaluate different landscape types, without real field visits, would have made this kind of survey much more expensive. It also had clear limitations due to the static views of the landscape and the need for careful preparation of realistic photo representations.

An important aspect of the sample design in the survey was to interview members of different user groups, instead of considering the public in general. This type of sample design would have shown different results in gaining utilitarian perspectives on the landscape. Paper II and paper IV showed that the more appreciated landscape qualities between user-groups was not uniform in the same preferred land use type. Moreover, there were significant differences noted between preferences of user-groups to different landscape patterns in the Montado (paper IV). These results support the theory of the

necessity of considering perceptions of different user groups in the management of landscape functions.

In relation to the methodology used to identify users' expectations of specific landscape function, it was necessary to stress the importance of the respondents' awareness of the type of user group represented during the interview, especially when more than one target group could be represented The face-to-face interviews using open-ended questions for determining the reasons for preferences for particular patterns, allowed control of the abovementioned requirement "in situ".

Paper II (Surová and Pinto-Correia 2008a) showed the Montado as the most preferred landscape type from seven assessed land use types in the southern region of Portugal. The content analysis of open-ended questions revealed that land users appreciated a variety of aspects in the Montado. The most valued aspects were regional tradition, biodiversity, attractiveness of landscape scenery, adaptation to local conditions and experience of identity. However, the concepts articulated for preference explanations, were not uniform for all user groups. For Portuguese visitors, the Montado is the landscape of the regional tradition and identity, frequently named as the "familiar landscape". Foreign visitors appreciate mainly the aesthetic values of landscape type connected with its uniqueness, complexity and contrast of light and shadow. Mushroom pickers, beekeepers and hunters positively evaluated, above all, the biodiversity in the land use system, which increased the suitability of the Montado for their favourite activities in rural areas. Landowners principally valued the economic worth connected to cork production and multifunctional exploration, but also the adaptation of land use to specific ecological conditions and its regional tradition. In relation to other land use types in the region, the Montado offered the strongest experiences of tradition and identity, aesthetic and restorative experiences. It is noteworthy, that despite the multi- exploration of the system, the same system is able to offer the experience of nature, tranquillity, silence and well-being to its users. These results stress the importance of the Montado for diverse groups of land users and confirms its significant attraction for cultural and amenity functions.

Paper III (Surová and Pinto-Correia 2009) surveyed the use and assessment of 'new' rural functions in the Montado, both by land users and landowners. The study showed that the Montado was appreciated for different activities, but also for socially sensitive management that seemed to be required .Most notable was the abundance of visitors, representing generally tourists and new rural inhabitants, with higher education. The main activity practised in the Montado was walking, followed by sightseeing by car

and picnicking, mainly during the spring season. Most of the visitors practised more than one type of activity in the Montado. The typically dry and very hot weather conditions and elevated fire risk was probably the reason for a lesser tendency to visit the Montado during this season of the year. Preferred sightseeing by car across the Montado, is probably related to the scenic beauty of this type of landscape: an undulating terrain allowing different panoramic views across the open savannah-like landscape, with changing densities of trees and varying pasture composition. The majority of respondents experienced some difficulties in visiting the Montado areas. These concerns were mainly due to poor public access; lack of safety information; lack of orientation facilities and lack of clarity on the rights of visitors. The fencing of estates allowed for the control of livestock grazing areas, but could also have contributed to poor control of visitor access during the summer. Good control could be a solution to the fire risk and access fees could be charged for mushroom picking and hunting. The increased consideration of economic interests concerning these externalities leads to increasing pressure by landowners to privatise these goods (Merlo and Croitoru, 2005). Even this fencing trend could be perceived as a step forward in managing social functions through the control of visits, if it were to be followed by subsequent steps such as the improvements mentioned by land users in this study. The improvement of infrastructure such as footpaths and route indicators, signposting in the fields and the setting up of interpretation panels, could provide information for visitors, so they could discover more about the landscape they are enjoying. These improvements would additionally allow for a higher degree of independence for the occasional visitor, who would not need to be part of large guided groups of visitors. This could consequently increase the quality of the visitors' experience.

Most landowners are still mainly engaged in production activities, as these are their main source of income. Yet, probably due to its long tradition in rural areas, hunting is practised on most estates, bringing some economic input. With regard to landowners' attitudes about 'new' rural functions, better preparations are required to face the current social demands. The important role of 'communication' between stakeholders is stressed by various authors (e.g. Brunori and Rossi, 2007; Konijnendijk, 2000). More communication would most probably help people to understand the restrictions imposed, or desired, by landowners and on the other hand, it would enhance farmers' understanding about public expectations and demands from rural areas.

Economic incentives for landowners could also improve the current situation, for example, with support for the development of 'new' functions, such as payments and grants for the upkeep of paths and other facilities, or compensation for additional work undertaken to create conditions for public access. Still the economic incentives should be

accompanied by other tools, such as best practice guidelines produced as a result of cross-sector collaboration.

The part of the research described in **Paper IV** (Surová and Pinto-Correia 2008b) identifies the consensus and divergences within the user groups in relation to the preferences for different Montado types. Furthermore, it describes valuable landscape characteristics preferred by different user groups. The socio-economic variables of the land users do not show any decisiveness in their preferences for the Montado landscape patterns. Yet, a type of activity practised in the rural areas, influences the preferences for landscape patterns in the Montado significantly. Thus, according to the results in the study, hunters, mushroom pickers, beekeepers, landowners, Portuguese and foreign walkers should be considered in the Montado management, as user groups with different expectations relating to landscape patterns. It means that there is no unique Montado type, satisfying all interviewed user groups. Moreover, people from one user group, practising walking activities in the Montado, did not show particular preference for any specific pattern. This fact can be understood as the assumption that attractiveness depends on the variety of patterns that a visitor finds during a walk. For this reason the evaluation of patterns separately, by this group of users, can perhaps never be very accurate, due to its dependence on the patterns in their surroundings. Thus, to satisfy several user groups, requires the existence of a spatial landscape mosaic composed of different landscape patterns.

An open area of the Montado, without livestock, is the most valued by hunters, providing good visibility and a feeling of safety during hunting. The shrubby Montado is appreciated by beekeepers and mushroom pickers and most of the mushroom pickers prefer these patterns without livestock. Landowners, contrary to the majority of other user groups, value the aligned Montado, allowing easier access for mechanisation because of fewer shrubs. For landowners, aligned patterns are not associated with the experience of tradition, identity or memories of a place, contrary to patterns of irregular structure with livestock presence and clear undergrowth. A dichotomy can be traced in the preferences of landowners regarding current productive management options with aligned composition of trees and irregular composition, representing traditional management options. The group of Portuguese walkers was defined in the study on the base of the consensus of rural inhabitants, workers and urban dwellers in preferences for landscape patterns. The reason for this similarity can be found in a common characteristic of the aforementioned groups and this is familiarity with the Montado land use system. This is an important factor for the experience of landscape (e.g. Bourassa 1991; Kaplan & Herbert 1988; Hagerhall 2000) and it could also explain the differences in preferences between the Portuguese

walkers and the foreign walkers, represented by tourists and new rural inhabitants. These people are generally not as familiar with the Montado system as the previously mentioned groups. The Portuguese walkers prefer a variety of Montado patterns with one common characteristic: undergrowth without shrubs. This characteristic, together with livestock presence and irregular structure of trees, is frequently associated with the traditional appearance of the Montado. An experience of diversity, important for foreign walkers, is higher in dense shrub patterns. However, this experience could also be gained by walking through a variety of Montado types.

Responses to open-ended question about preferences for Montado landscape patterns revealed two types of concepts, helping to illustrate the perception of preferred patterns by respondents. These are the objective features and the subjective experiences. Both types of perceptions are influenced by one another, although the present survey revealed differences related to the type of activity practised in the landscape. Landowners, mushroom pickers and beekeepers were interested mainly in the objective features of landscapes, which probably allow them the most suitable conditions for their activity. About a third of the hunters mentioned visibility as an important aspect, so they preferred open areas. The walkers were more perceptive to subjective experiences in landscape, than to perceptions of objective features. The experience of tradition, identity and memories of the place, which were the most significant for Portuguese walkers, are connected with livestock presence, clean undergrowth and irregular structures of trees. One of the important aspects in the preferred landscape patterns, mentioned by respondents in this survey, is nature appreciation, frequently related to objective features such as the presence of shrubs, irregular structure of trees and dense crown cover. This is in accordance with earlier studies (e.g. Ulrich 1986; Schroeder 1995) where preferences are shown to be positively related to vegetation density and naturalness. This study concurs also with important components in landscape preferences, mystery and diversity, as listed by Kaplan (1979).

Paper V shows one of the possible ways of data adaptation for user preferences for integration with decision support systems for the Montado. Data about user preferences can be transformed to form social indicators in ordinal, numerical outlines and can be integrated with the single-tree model. However, an adaptation of the existing model is needed as well. The empirical single-tree models provide only outputs at the tree level and the stand characteristics have to be derived using simple calculation formulas (in the case of production per hectare) as well as complex geometrical calculations (in case of crown cover without overlapping). To extend this kind of model to landscape level, new formulas are necessary. In the case of the Corkfits, for purposes of landscape

patterns, models for under-grove evolution and models for pasture types have to be introduced.

This example of the landscape preference implementation into the DSS is particularly oriented to the Montado land use system, where a specific combination of production outputs exists and where different management options result in a variety of landscape patterns. The implementation of users' preferences for several landscape patterns in the Montado, related to existing management practices, was achieved in this work. However, the real range of landscape patterns in this land use system is much wider and sometimes difficult to assign to clearly defined patterns. Furthermore, the survey on users' preferences was limited to a study area and larger surveys would increase the reliability of the data. There are also more management options in the cork oak Montado as surveyed in this work, compared with, for example, the open Montado landscape patterns with shrubs, patterns with trees from different age classes, the cork oak stands mixed with other species, for example stone pine. Hence, the integrated model of user preferences should be tested and continuously improved. In the same way, it is important to stress that some of the powerful factors that contribute to landscape preferences are changing rapidly over time, (pasture presence, shrub presence) so it is important for the users of this decision support system to understand and take this into consideration during a decision making process.

As the main decisions about management of the Montado are largely in the hands of landowners, the development and permanent improvement of a decision support tool available for this group of managers, as the CORKFITS is, is essential. Nevertheless, landowners are not a unique group which may want to make use of this tool. The intention of the model is the training of non-professional private forest owners, forest managers and students, as well as to support public relations.

In this case, the integrated information about landscape preferences seeks to help in identifying the possible, and diverse, cultural and amenity values of the existing Montado patterns and to show by decision support tools, how the existing management practices have impacted on land users' preferences. It can help respond to questions about how the changes in management of production functions will influence the attractiveness of pattern for some of the non-production functions.

In assessment of livestock species, little significant difference was found in any user group. However, if pasture is present in the pattern it has not influenced the preferences of several user groups, such as hunters and mushroom pickers, who prefer the Montado without grazing livestock. The presence of shrubs is decisive for beekeepers, but for landowners and Portuguese visitors searching for tradition and identity values, shrubs are not preferred. Artificial regeneration with aligned compositions

of trees practical for landowners was not chosen as a favourite by other user groups, apart from hunters seeking the required visibility for finding game in this type of composition.

It needs to be stressed that the knowledge about users' preferences, integrated in this work, is not enough to measure the availability of given non-production functions in the Montado. The knowledge presented here can be defined, on the basis of the work of Groot and Hein (2005), as the state indicators clarifying the attractiveness of the Montado landscape patterns for users of different cultural and amenity functions. The other two types of indicators for functions, goods and services of the rural landscape, are mentioned by Groot and Hein as important for economic valuation. These are the performance and use indicators. The performance indicator would assess the maximum suitable use of the landscape features, attractive from the given point of view, and the use indicator, the actual use (e.g. number of visitors).

A decision support tool is recognised as a good mediator between private sectors and scientific investigators. The tool serves to visualise the impact of potential decisions and to identify trade-offs and compatibilities between environmental, economic, and social benefits of the Montado. Nevertheless, as the presented study shows, the scientific knowledge needs to be fundamentally simplified in order to be implemented in the support system in ways comprehensible to its users. Moreover, the integration process requires an interdisciplinary dialogue. These communication skills still need to be improved amongst the scientists themselves, but also amongst scientists, managers, planners, and public sector personnel and is essential for achieving the goals of multifunctional rural landscapes.

1.5 CONCLUSIONS

This survey, from the perspective of landscape ecology, is innovative in a new path of studies about traditional Montado landscapes and its potential for non-production functions demanded by today's society. In this work, the Montado land use system and its different landscape patterns were evaluated by users of diverse cultural and amenity functions, from the point of view of their main activity in the countryside. In the current era of quick changes in market conditions, this kind of study helps to find alternative uses for traditional landscapes regarding their maintenance and

usefulness for today's society. The non-production functions are considered to be one alternative or component of use and income in traditional landscapes in the future. Thus, the research helps with an adequate introduction of these cultural and amenity functions and shows that management planning for rural landscapes is essential.

The results obtained from this research have some implications for the future management of the Montado multifunctional landscape. It is believed decision-makers and planners can make good use of this type of information. These stakeholders need to be better informed about the landscape preferences and expectations of different types of user groups, seeking cultural and amenity functions. Landowners of the Montado, trying to adjust their practices to uncertain economic conditions, may find these results interesting and a source of information about what are considered valuable landscapes among the users of the regional countryside. Furthermore, the local tourism agencies can use this kind of information for marketing purposes, i.e. identifying pleasing landscape types for different types of users.

The main findings of this research work can be summarised as follows:

- The Montado is the most preferred land use among other land use types in the north-western part of the Alentejo region for hunters, mushroom pickers, beekeepers, landowners, Portuguese visitors (represented by field workers, rural inhabitants and urban visitors from Lisbon) and foreign visitors from northern Europe (represented by new rural inhabitants and tourists). These results underline the Montado potential for cultural and amenity functions, which should not be omitted in future identification of alternative uses of the traditional land use system in the region.

- The Montado offers experiences of tradition and identity, aesthetics, restorative experiences and has ecological and economic values for its users.

- The important landscape characteristics are not equal for all land users and are directly influenced by the activity or use they represent. These results show the importance of taking into account uses in landscape preference studies. Groups of hunters, mushroom pickers, beekeepers, landowners, Portuguese visitors and foreign visitors are significantly different in their preferences for landscape patterns resulting from existing management options in the Montado. The consideration of these differences and their influence on the spatial organisation of the landscape system, that includes non-production functions, can contribute to the fulfilment of modern social needs to find existing management options appropriate for the support of new functions and to avoid potential conflicts within these activities. Not all functions can be accommodated fully within the same type of Montado pattern, therefore decisions must be taken to prioritise and possibly devise combinations of functions and diversified management options are needed. Knowledge of the preferred landscape patterns of different user groups can help

managers to understand what kind of landscapes they should maintain in order to offer new functions, or vice versa. They can decide what new kinds of functions are suitable, using the existing landscape patterns on their properties.

- The current management of the cultural and amenity functions in the Montado does not satisfy the majority of the land users. A comprehensible definition of the rights and responsibilities of land users and landowners concerning the use of new rural functions in the Montado, is lacking.

- Most of the landowners are primarily engaged in production activities and the dominant motivation for integration of new rural functions on their property is economic, followed by the motivation to satisfy social needs. The attitudes of the landowners towards implementation of the new rural functions on their properties are not uniform and this should be considered in the planning and integration process of the new rural functions.

- In the Montado case, knowledge about preferred landscape patterns for user groups experiencing specific functions can be integrated with a single-tree model based decision support system. This seems to be one of the promising ways to make good use of research findings about land users' preferences, for managers of the Montado land use system.

The results of this thesis indicate some challenges for future research:

- *Survey about cultural differences in utilitarian landscape preferences*

This study shows (in paper IV) that the Portuguese and North European walkers have significantly different preferences for the cork oak Montado landscape patterns. Thus, the cultural differences in utilitarian landscape preferences should be investigated further, principally in relation to landscapes of multi-cultural interests.

- *Larger surveys about users' preferences in rural landscapes*

This survey was limited to a specific part of the region of Alentejo. Larger surveys about land users' preferences for landscape types extended to whole regions would increase the reliability of the data.

- *Survey about utilitarian preferences for further types of the Montado landscape patterns*

The survey was limited to considering the principal management aspects in the study area of the cork oak Montado, resulting in a variety of landscape patterns. However, the real range of landscape patterns in the Montado overlaps those studied in this survey. The others are, for example, the open landscape patterns with shrubs, patterns with trees of different age classes, the cork oak stands mixed with other species such as stone pine

and maritime pine. Future research studies, applied to larger areas, regarding utility preferences, should consider the other Montado landscape patterns as well.

- *Study about effect of noise, smell and touch on users' preferences for landscapes*

In general, most of the landscape preference studies focus on visual perceptions of the landscape. However, other senses are also engaged in perceptions of landscapes. Little is known, for example, about the effect of noise, smell or touch on users' preferences. Therefore, in studies about experiences and preferences in various landscapes, considerations other than visual stimuli, should also be included.

- *Implementation of regular surveys and monitoring dealing with landscapes*

Regular surveys and monitoring tools and instruments need to be developed for preferred landscape types, concerning types of activity, amount of use, group sizes and user satisfaction, in order to identify demand, changing preferences and pressures on the environment and to make multifunctionality of the landscape more feasible for managers.

- *Study about the economic valuation of landscape functions*

The present study did not attempt to examine the economic value of landscape functions. However, the efficient management of traditional land uses requires knowledge about the various values of these systems. Thus, a study considering the economic values of landscape functions in the Montado, is necessary.

- *Enhancement of science-based management and planning*

A challenge to pool research and practices in the context of landscape multifunctionality is growing. In this work, the landscape preferences of users for more varied landscape patterns were implemented in existing decision support systems. However, several improvements should be considered. For example, more detailed information about users' expectations would be helpful, but the guidelines should also be simplified to provide easier access for managers. One of the possible directions of future research should be a study of online guidelines, providing information to managers about multifunctional management skills, thus enabling them to understand the expectations of users of non-production functions.

1.6 REFERENCES

Atkinson R. and Flint J. (2001) Accessing Hidden and Hard-to-reach Populations: Snowball Research Strategies, *Social Research Update* , 33.

Bell S. (2001) Landscape pattern, perception and visualisation in the visual management of forests. *Landscape and Urban Planning*, 54: 201 – 211.

Belletti G., Brunori G., Marescotti A. and Rossi A. (2003) *Multifunctionality and rural development: a multilevel approach.* In: van Huylenbroeck G. and Durand G. (eds.), Multifunctional Agriculture. A new paradigm for European Agriculture and Rural Development. Ashgate, Aldershot: 55-80.

Bourassa S. C. (1991) *The Aesthetics of Landscape* (London: Belhaven Press).

Brunori, G., Rossi, A. (2007), 'Differentiating countryside: Social representations and governance patterns in rural areas with high social density: The case of Chianti, Italy', *Journal of Rural Studies*, Vol 23, No 2, pp 183–205.

Brush R., Chenoweth R.E., Barman T. (2000) Group differences in the joyability of driving through rural landscapes. *Landscape and Urban Planning*, 47: 39-45.

Buijs A.E., Elands B.H.M. and Langers F. (2006) No wilderness for immigrants: Cultural differences in images of nature and landscape preferences. *Landscape and Urban Planning*, 91: 113-123

Coeterier J.F. (1996) Dominant attributes in the perception and evaluation of the Dutch landscape. *Landscape and Urban Planning*, 34: 27–44.

Council of Europe (2000) ETS 176 - European Landscape Convention, 20.X. 2000, Council of Europe, Florence, 9p.

de Groot R.S. (2006) Function-analysis and valuation as a tool to assess land use conflicts in planning for sustainable, multi-functional landscapes. *Landscape and Urban Planning* 75: 175-186.

de GROOT R. and HEIN L. (2005) *Concept and valuation of landscape functions at different scales.* In: Mander U., Wiggering H., Helming K. (eds.), Multifunctional Land use. Meeting Future Demands for Landscape Goods and Services. Springer, pp 15-36.

Egoz S., Bowring J. Perkins, H. (2001) Tastes in tension: form, function, and meaning in New Zealand's farmed landscapes. *Landscape and Urban Planning* 57:177-196.

Fonseca A. (2004) O Montado no Alentejo (Se´ c. XV a XVIII) (Portugal: Edições Colibri).

Groot R. and Hein L. (2005) *Concept and valuation of landscape functions at different scales*. In: Mander U., Wiggering H., Helming K. (eds.), Multifunctional Land use. Meeting Future Demands for Landscape Goods and Services. Springer, 15-36.

Gómes-Limón J., Fernández J.V. de L. (1999) Changes in use and landscape preferences on the agricultural-livestock landscapes of the central Iberian Peninsula (Madrid, Spain). *Landscape and Urban Planning* 44: 165-175.

Hagerhall C. M. (2000) Clustering predictors of landscape preference in the traditional Swedish cultural landscape: prospect-refuge, mystery, age and management. *Journal of Environmental Psychology* 20: 83-90.

Herzog T.R., Herbert E.J., Kaplan R., Crooks C.L. (2000) Cultural and developmental comparison of landscape perceptions and preferences. *Environ. Behav.* 32 (3), 323–346.

Holmes J. (2006) Impulses towards a multifunctional transition in rural Australia: Gaps in the research agenda. *Journal of rural studies* Vol. 22, pp 142 – 160.

Hunziker M. (1995) The spontaneous reforestation in abandoned agricultural lands: perception and aesthetic assessment by locals and tourists. *Landscape and Urban Planning* 31: 399-410.

Ježová D. & Pinto-Correia T. (2006) Methodology for evaluation of landscape preferences and its application to montado of cork oak (Quercus suber) in southern Portugal (Alentejo). In: Bunce, R.G.H and Jongman, R.H.G. (Eds.), Landscape Ecology in the Mediterranean: inside and outside approaches, pp 85 – 94.

Kaplan S. (1979) *Perception and landscape: conceptions and misconceptions*, in: Proceedings of Our National Landscape Conference, pp. 241–248 (Berkeley, CA: Pacific Southwest Forest and Range Experiment Station).

Kaplan R. and Herbert E. J. (1988) Familiarity and preference: a cross-cultural analysis, in J. L. Nasar (Ed.) Environmental Aesthetics: Theory, Research, and Application, pp. 379–389 (Cambridge: Cambridge University Press).

Kaplan, R. and Kaplan, S. (1989) The Experience of Nature: A Psychological Perspective (New York: Cambridge University Press).

Konijnendijk C.C. (2000), 'Adapting forestry to urban demands — role of communication in urban forestry in Europe', *Landscape and Urban Planning*, 52: 89-100.

Kvale S., 1996. Interviews. An Introduction to Qualitative Research Interviewing. Sage Publications, London.

Lange E. (2001) The limits of realism: perceptions of virtual landscapes, *Landscape and Urban Planning*, 54: 163-182.

Merlo M. and Croitoru L. (eds.) (2005). Valuing Mediterranean forests: towards total economic value. Wallingford, Oxfordshire, UK. 406 p.

Noe E., Alrøe H.F., Langvad A.M. (2008): A polyocular framework for research on multifunctional farming and rural development. *Sociologia Ruralis*, 48 (1): 1–15.

OECD (2001) Multifunctionality: Applying the OECD Analytical Framework Guiding Policy Design. (Workshop 2–3 July 2001). OECD, Paris, http://www1.oecd.org/agr/mf/index.htm

Patton M. Q. (2002) Qualitative Research and Evaluation Methods, 3rd ed. (Thousand Oaks, CA: SAGE).

Pinto-Correia T., Mascarenhas J. (1999) Contribution to the extensification/intensificaion debate: new trends in the Portuguese Montado. *Landscape and Urban Planning*, 46: 125 – 131.

Pinto-Correia T. (1993) Threatened landscape in Alentejo, Portugal: the 'Montado' and other 'agro-silvopastoral' systems, *Landscape and Urban Planning*, 24: 43–48.

Plieninger T., Wilbrand C. (2001) Land use, biodiversity conservation and rural development in the dehesas of Cuatro Lugares, Spain. *Argoforestry Systems* 51: 23-34.

Plieninger T., Modolell y Mainou J. and Konold W. (2004) Land manager attitudes toward management, regeneration, and conservation of Spanish holms oak savannas (dehesas). *Landscape and Urban Planning* 66: 185-198.

Rogge E., Nevens A. and Gulinck H. (2007) Perception of rural landscapes in Flanders: Looking beyond aesthetics. *Landscape and Urban Planning*, 82: 159–174.

Ryan R. L. (2006) Comparing the attitudes of local residents, planners, and developers about preserving rural character in New England, *Landscape and Urban Planning*, 75: 5–22.

Schroeder H. W. (1995) *Preference and meaning of arboretum landscapes: combining quantitative and qualitative data*, in: A. Sinha (Ed.) Landscape Perception: Readings in Environmental Psychology, pp. 119–136 (London: Academic Press).

Silvennoinen H., Alho, J., Kolehmainen O., Pukkala T. (2001) Prediction models of landscape preferences at the forest stand level. *Landscape and Urban Planning* 56: 11-20.

Soini K. (2001) Exploring human dimensions of multifunctional landscapes through mapping and map-making. *Landscape and Urban Planning* 57: 225-239.

Surová D. and Pinto-Correia T. (2008a) Krajinné preferencie rôznych skupín užívateľov pre tradičnú kultúrnu krajinu v južnom Portugalsku - Montado. Landscape preferences of different user groups for traditional cultural landscape in southern Portugal – Montado. Acta Horticulturae et Regiotecturae, Special Issue, pp 64-68.

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 groups. Landscape Research, Vol. 33, No 3, pp 311 - 330.

Surová D. & Pinto-Correia T. (2009) Use and assessment of the 'new' rural functions by land users and landowners of the Montado in southern Portugal. Outlook on AGRICULTURE, Vol 38, No 2, pp 189-194.

Ulrich R. S. (1986) Human responses to vegetation and landscapes, *Landscape and Urban Planning*, 13: 29–44.

Van den Berg A. E. (1998) Group differences in the aesthetic evaluation of nature development plans: A multilevel approach. *Journal of Environmental Psychology* 18: 141-157.

Van den Berg A.E., Koole S.L. (2006) New wilderness in the Netherlands: An investigation of visual preferences for nature development landscapes. *Landscape and Urban Planning* 78: 362–372.

Wiggering H., Dalchow C., Glemnitz M., Helming K., Muller K., Schultz A., Stachow U. and Zander P. (2006) Indicators for multifunctional land use: linking socio-economic requirements with landscape potentials, *Ecological Indicators*, 6: 238–249.

Wilis K. G. and Garrod G. D. (1992) Assessing the value of future landscapes. *Landscape and Urban Planning* 23: 17-32.

Yu K. (1995) Cultural variations in landscape preference: comparisons among Chinese sub-groups and Western design experts. *Landscape and Urban Planning* 32:107-126.

Zube E.H., Sell J.L., Taylor J.G. (1982) Landscape perception: research, application and theory. *Landscape planning* 9: 1-33.

2 SCIENTIFIC PAPERS

The following section of the thesis consists of five scientific papers corresponding with the principal aims of the study.

The first paper (I) describes the interviewing method and interview guide design, used in this survey, for identification of land users' preferences and expectations of the Montado landscape. Results from a test of the interview guides with a pilot group of the respondents, are discussed. The second paper (II) deals with the assessment of the landscape preferences of the Montado among others land uses in the region of Alentejo, by different user groups, of cultural and amenity functions. This paper is presented in two versions. Paper IIA presents the published Slovak version and paper IIB is the English version of this paper. In the available Slovak version of the paper an error was introduced during the publishing process in table 1. The correction will be published in Errata of the journal Acta Horticulturae et Regiotecturae. The third paper (III) in this thesis is about how the Montado supports and can better support, cultural and amenity functions from land users' perspectives. Results regarding visitor profiles, current activities in the Montado, perceived limitations and improvements suggested by land users, as well as landowners' attitudes towards 'new' functions, are presented and discussed in this paper. The purpose of the next paper (IV) is to present and discuss the results of consensus and divergence within user groups, in relation to their preferred Montado types and the way they use, or relate to, this type of landscape. The methodological issues are also discussed, as this approach has not been applied in its current form in this type of landscape system, connected with extensive cattle production and dispersed tree cover. The last paper (V) describes an integration of the results regarding users' preferences for the Montado landscape patterns in an existing decision support system, with the aim of managing the cork oak Montado as a multifunctional system.

Papers:

I. Ježová D. & Pinto-Correia T. (2006) Methodology for evaluation of landscape preferences and its application to montado of cork oak (Quercus suber) in southern Portugal (Alentejo). In: Bunce, R.G.H and Jongman, R.H.G. (Eds.), Landscape Ecology in the Mediterranean: inside and outside approaches, pp 85 – 94.

II. Surová D. & Pinto-Correia T. (2008) Krajinné preferencie rôznych skupín užívateľov pre tradičnú kultúrnu krajinu v južnom Portugalsku - Montado. Landscape preferences of different user groups for traditional cultural landscape in southern Portugal – Montado. Acta Horticulturae et Regiotecturae, Special Issue, pp 64-68.

IIA Published version in Slovak language

IIB English translation of the paper

III. Surová D. & Pinto-Correia T. (2009) Use and assessment of the 'new' rural functions by land users and landowners of the Montado in southern Portugal. Outlook on AGRICULTURE, Vol 38, No 2, pp 189-194.

IV. 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 groups. Landscape Research, Vol. 33, No 3, pp 311 - 330.

V. Surová D., Surový P., Ribeiro N.A. and Pinto-Correia T. Integrating Differentiated Landscape Preferences in a Decision Support Model for the multifunctional management of the Montado. *Agroforestry Systems,* Published online DOI 10.1007/S10457-011-9373-8.

Paper I

Surová D. and Pinto-Correia T. (2006) Methodology for evaluation of landscape preferences and its application to montado of cork oak (Quercus suber) in southern Portugal (Alentejo). In: Bunce, R.G.H and Jongman, R.H.G. (Eds.), Landscape Ecology in the Mediterranean: inside and outside approaches, pp 85 – 94.

Methodology for evaluation of landscape preferences and its application to montado of cork oak (*Quercus suber*) in southern Portugal (Alentejo)

D. Ježová and M.T. Pinto-Correia

Department of Biophysical and Landscape Planning
Colégio Luis Verney, University of Évora, Portugal

Corresponding author e-mail: dj@uevora.pt

Abstract

This paper is based on a study aiming at the construction and the application of a methodology for identification of landscape preferences among different groups of people, who manage and use the landscape of the montado in different ways. This evaluation is required to obtain knowledge about people's relation to landscapes, to be integrated in future planning and in management options. The landscape type studied is the montado, the agro-silvo-pastoral system dominant in the southern region of Portugal, Alentejo. The present methodology is based on face-to-face interviews using photographs as visual stimuli. Close-ended questions were accompanied by open-ended questions. The focus groups are landowners, different groups of actual land-users and urban people as potential future users. The topics under investigation are the preferences of different types of values attributed to the montado by various groups of actors. This paper describes construction of the questionnaire to explore landscape preferences and a discussion of the results from tests of the questionnaire. The preference of montado landscapes to other types of rural areas in the southern part of Portugal was significant in all involved groups. The results show the advantage in combination of close-ended with open-ended questions in finding out values attributed to preferred landscape. The montado and its different types are valued in various ways. Preferences of tested groups varied in economic, traditional, ecological, aesthetic, recreational and utilization values.

Keywords

multifunctionality of rural landscape, landscape preferences, landscape values, photographs

Ježová & Pinto-Correia.

Introduction

This paper makes part of interdisciplinary project Agroreg created as a response to problem of landowners with sustainable management of montado of cork oak (*Quercus suber*). The main objective of the project was to create a Decision Support System (DSS) for landowners for evaluation of economic, social and environmental influence of actual management practices. It is expected to solve the problem with regeneration failure of cork oak stands and to help make better decisions of landowners towards sustainability of montado. In this holistic approach are involved several academic disciplines e.g. forestry, biology, botany, economy, geography and landscape architecture. The project acted as a bridge between scientists and different public actors and engaged several associations of landowners. The challenge of multifunctionality in the rural landscape is accepted as an aim for landscape management, both in the scientific community and also already in the definition of policy objectives e.g. the Second Pillar of the Common Agricultural Policy. Even though montado is a multifunctional system, in Portugal there is a lack of studies about its different non-productive functions and their integration in management of montado. In order to fill this gap, it was planned to explore these functions by landscape preferences of different users. Increasing demand for active public involvement conducted to consider not only values of landowners as managers of landscape but also landscape preferences of land-users as an important contribution of DSS for sustainable management of montado. People are an important component of traditional landscapes and its continuity directly depends on their actions (Plieninger *et al.* 2004). For multifunctionality of the rural landscape, especially of agro-silvo-pastoral systems in Alentejo, it is needed a new methodology approach, to study different landscape functions and their integration in landscape management.

Montado is appreciated in various ways, but it is unclear the type of montado that is preferred. This problem makes difficulties for landscape planners and decision makers to integrate different activities in management. To make clear these doubts, it is necessary to explore landscape preferences of different groups of people who manage and use montado in different ways. The integration of human preferences, needs and activities in the management plans safeguard their continuation and success (Pavlikakis *et al.* 2005). Landowners with their activities and management choices are influencing development of landscape changes. Knowledge about the role of their preferences and motivations in management is important, and can be integrated with many other types of information in an applied DSS. Furthermore, various groups of land-users, including inhabitants and urban people, consider the landscape in different ways, according to the functions expected by them. Thus, the knowledge about their preferences in relation to pattern and in relation to the function has to be integrated in the future planning of the landscape. The work aim is to explore the value of different montado types to landowners and to different land-users. If we want to maintain the montado as a multifunctional system, we need to answer to social demand of non-productive functions. For this is essential to know, how people value montado and its different types, what is attractive for them and what their expectations are.

Montado and its various functions

The montado is the agro-silvo-pastoral system dominant in the southern part of Portugal already existing for many centuries, in more or less developed and intensive management forms. Commonly open evergreen oak woodlands form it. The dominant species of trees are cork oak (*Quercus suber, L.*) or holm oak (*Quercus ilex, spp. Rotundifolia, L.*). Traditionally this system is exploited by multiple land uses, combining the exploitation of tree cover, and a rotation of grazing, cultivation and fellow in the under cover. The principal product of montado of cork oak is cork, livestock breeding and cereals. This last one has been decreasing radically in the last decades, being now mainly a silvo-pastoral system. These multiple productive functions, managed by landowners, provide the main income from this system. These functions still provide some social conditions giving income necessary for subsistence of workers living in rural landscape. Apart from these main productive functions, montado include social functions as it is used by hunters, honey producers, collection of aromatic plants and mushrooms pickers. Historically, these functions were important for the rural population in supplementing its food (Fonseca, 2004). Today, hunting continues as a linked activity and tourist hunt and offer economic additions to landowners. Mediterranean vegetation of montado is rich in aromatic plants, which is responsible for high honey quality of this region. The second apiculture product until the eighteenth century was wax used for lighting (Fonseca, 2004). Nowadays, the increasing demands of national and foreign tourists ask to develop conditions for rural tourism. As elsewhere in Europe, also here it can be seen impact of socio-economic changes and the migration of young people from countryside to urban areas and ageing of population. Simultaneously there is an increasing demand of landscape as a space for recreation. There are also some new rural habitants that came, usually from big cities, to live in countryside and temporary habitants that came to spend weekends to the countryside in their second houses. Maybe the most numerous user-groups are local people that visit the landscape only sometimes to satisfying aesthetic, recreational or other experiences as an escape from daily routine (Kaur, 2004). Some of the urban people are actual users but also some of them can be potential future users of montados. It is important to know how they value the montado landscapes and what their expected requirements are. In this work it is intended to explore landscape preferences of all the groups mentioned above. Actual demands of society in landscape can be seen as a challenge to find solution to maintain people in these traditional landscapes.

Research Questions

According to what has been said above, and aiming to contribute to a more integrated montado management, the research questions of this part of the project are 'What kind of montado do landowners and land-users prefer?' and 'How multifunctional is montado today and which expectations have people for future?'.

Ježová & Pinto-Correia.

Landscape Preferences and Values

Human landscape perception recognition, and values directly affect the landscape and landscape preferences clearly depend from these processes (Nassaurer, 1995). What one can see in landscape and how we appreciate them is often a reflection of its values through landscape preferences (Egoz, 2001). Values are important life goals or standards and are generally viewed as influencing attitudes and behaviour (Bell, 2001).

Many of the traditional landscapes in Europe and other parts of the world combine high natural values with high cultural values and may also be considered as aesthetically pleasing (Hagerhall, 1999). The traditional landscape represents a balance between nature and human influence, a balance suggested desire by humans and reflecting in preference (Hartig, 1993). One of the key positions of landscape evaluation is landscape function. It is assessment of landscape functions in the sense of their direct relation to human society (Bastian, 2002). People do not perceive their environment naturally, but view it in terms of what it offer them (Van den Berg *et al.* 1998). This is a very significant factor when we consider who is looking at landscape – farmer, workers, mushroom picker, beekeeper, tourist, hunter, or inhabitant – and why. To consider this scientific knowledge in integration of various functions in landscape management it is necessary to explore landscape preferences of different groups of users rather than a random sample of population. Most studies of landscape preference to date have sought to find some level of agreement regarding landscape preferences. Few studies have examined differences between participant groups. For example, Brush *et al.* (2000) found significant differences of enjoyability between groups and landscape types. Van den Berg *et al.* (1998) found statistically reliable differences in beauty ratings between user-groups.

Groot and van den Born (2003) divide landscape preferences research in three scales:

1. Preferences for landscape types in general and verbal terms

2. Preferences for landscape elicited as in most landscape preferences studies, i.e. visualized and depicting more concrete landscapes, and

3. Preferences for landscapes as expressed in concrete behaviours of daily life, such as picnic, play, recreation from daily stress. The present research is relevant to this scale of research.

To answer the questions about the experience, meanings and values of people in relation to landscape, a more open-ended, qualitative approach to studying landscape preferences is required (Schroeder, 1995).

The Use of Photographs as Visual Stimuli

People are generally receptive to photographs and like to see them. A page of text is rarely met with the same enthusiasm. Humans are visual animals (Kaplan, 1979). The aim of using the photographs in this research is to facilitate communication with people about their preferences. Photographs are quite realistic representations, and permit a

better control by the researcher of the conditions under which the landscapes will be perceived (atmospheric and light conditions, number and type of elements present, etc.). Another advantage is that it is also possible for a given subject to simultaneously compare several photographs (Real, 2000).

The following sections of this paper consist of two main parts. The first explains the methodology of the research. The second presents some results from test of questionnaire and discussion.

Methodology

The methodology proposed is based on interviews to different groups of users and mangers of the montado. The interviews are mainly based on photographs as representations of montado types, and on questions about practices and uses of the montado. Each interviewee gets asked the same questions – the same stimuli – in the same way and the same order (Patton, 2003). Interviews are carried out individually with each respondent. All respondents participate voluntarily.

Study Area

The study areas of landscape preferences were classified by project Agroreg. There are four districts in southern Portugal with cork oak montado inside: Alcácer de Sal, Chamusca, Coruche and Mora. Agencies from these districts make contacts with managers and different users of montado landscapes.

Photographs

About 500 colour slides were taken from July to September 2004 in study areas of project Agroreg using a Minolta DiMAGE digital camera. The aim was to capture the different types of rural landscapes and different types of montado of cork oak, on clear days, in areas with almost flat horizon, without presence of man-made elements (roads, electric power lines, farm buildings, etc.) and with absence of water components. Finally, the photographs were selected or manipulated with computer technology. The simulation was used to eliminate differences in sky colour, to manipulate presence of animals on the picture and presence of shrubs. In this case, the objective was to compare different types of montado, corresponding to more or less intensive management and higher or lower density of trees. These combinations result in different types of landscapes. A simplification had to be admitted, because not all possible variations of the montado could be considered. This is an extremely flexible system, with many variants of management options and densities, resulting in a high variation in types. Therefore, only the most significant aspects for the project Agroreg were selected. These are related not so much with the bio-physical characteristics, but more with the management of the montado by land owners: land cover, composition of trees, density of shrub and livestock density. Land cover (<10%, 30-60%, >80%) is the result of different intensity of management. The open landscape with land cover less than 10% present intensification of agricultural production. The landscapes with land cover more than 80% present extensification of traditional grazing practices. Trees composition, aligned or irregular, depends on type of regeneration of trees. Irregular composition of trees is usually resulting from natural regeneration. The new plantations are planted in lines to simplify

access for mechanisms. Different frequencies of shrub cleaning affect the undergrowth structure in presence or absence of shrubs. The most frequent livestock in montado of cork oak are cows and sheep. The combinations of these landscape elements are presented on the photos. It was obtained seven pictures of rural landscapes and seventeen pictures of montado of cork oak.

Table 1. Aspects related with different management visualized in seventeen photos of montado of cork oak types. The combination of four elements, land cover, composition of trees, presence of shrubs and presence of animals, results in seventeen slides. The first slide represents a new plantation of cork oak, always without pasture. The last one represents the system with abundant undergrowth without grazing.

Land Cover	Composition of trees	Shrubs presence	Livestock presence	Photo
	aligned		without animals	1
>10%		without	without animals	2
	irregular	shrubs	with sheep	3
			with cows	4
		without	without animals	5
		shrubs	with sheep	6
	irregular		with cows	7
			without animals	8
		with shrubs	with sheep	9
30-60%			with cows	10
		without	without animals	11
		shrubs	with sheep	12
	aligned		with cows	13
			without animals	14
		with shrubs	with sheep	15
			with cows	16
>80%	irregular	with shrubs	without animals	17

Purposeful Sampling

As a design strategy is used a purposeful sampling (Patton, 2002). The phenomenons in this case are different social functions in montado and as a sampling of each function are users. The work has many different kinds of participants as it is intended to obtain information from each homogeneous group at their main use of montado. Landowners are important group that influence directly by their activities landscape changes. It is essential to understand their preferences and motivations in relation to management of montado. Land-users are actual groups of people who use montado in different ways. Groups of land-users considered in this research are workers, hunters, beekeepers,

aromatic plants pickers, mushroom pickers, tourists, new rural habitants, habitants and urban people.

Questionnaire

At the beginning of the interview, the respondent receives a short introduction to the purpose about project goals from the interviewer. All questions are read aloud by the interviewer. Responses to open-ended questions are fully described. Configuration of photographs on the table is changed randomly for each respondent in order to eliminate the effect of presentation order. The questionnaire comprises three parts.

Figure 1. Photos from seven different landscape types of districts under study. Intensive cultures (a); Vineyard (b); Olive grove (c); Montado (d); Eucalyptal grove (e); *Pinus pinea* grove (f) and *Pinus pinaster* grove (g).

Ježová & Pinto-Correia.

The first part consists of closed question about preference of rural landscape type in southern Portugal. Seven rural landscapes are presented on the photos. Respondents are asked to indicate the more preferred landscape type. Subsequently, they are request by open-ended question to try explaining its preference. The second part of the questionnaire consists of questions about montado type preference. Using various steps to choice from seventeen photos help maintain enable the participants to concentrate on the interviewing process. The first choice is from all photos without animals. The respondent choice the most preferred landscape type and he try to explain his preference.

1

4

5

12

17

Figure 2. Examples of photos used in research present different types of montado of cork oak. The numbers of photographs are relevant with Table 1.

Explication of preference by respondent is fully described. The more preferred photo from the first choice and the next two photos of the same landscape type with presence of cows and sheep is base for the second choice (for example, if the first choice was photo n.5, the second set of photos will be photos n. 5, 6 and 7).

The third choice follows if the second choice is different from the first one (for example, if the respondent from photos n.5, 6 and 7 choice the photo n.5). In this step respondents have five photos with landscape types with animals that they preferred in the second choice (for example, in the third step respondent choice from all the photos with sheep). The fourth choice is the comparison of the first and the last choice.

In the third part of the questionnaire respondents are asked about:

- Their opinion about the importance of maintenance of montado for the future generations
- Their actual type and frequency of activities in montado, their limitations and expectations in using montado
- Land owners are asked to explain the property characteristics in order to obtain the data about actual multifunctionality of montado
- In the last part of the interview are questions about the socio-economic background variables characterizing the respondent and his household, as age, gender, education, profession, number of family members and family income

Discussion

The questionnaire was tested with the pilot group of 20 people, consisted on 17 land-users and 3 landowners. There were 11 women and 9 men. Respondents were contacted by agencies of landowners by telephone or contacted personally. The objective was to test the questionnaire with landowners and different types of land-users. The average time for completing the interview was 20 minutes. The test showed that respondents successfully comprehended the questions used in the questionnaire. Using the photographs as visual stimuli helped focus the talk to landscape types. In this kind of study when it was intended to evaluate the preferences of focus groups, it is important to identify group of respondent before the interviewing. Associations of landowners in study areas contacted participants by their main activity in landscape. It was obviously important to verify the user group of each respondent, because some of them can represent more than one focus group. For example, worker can be also hunter. In these cases, the respondent choice the group that he wants to present and respond to questions with this consciousness. The face-to-face interview is time-requiring method, but on the other hand permits to better understand the preferences of people. This method permits ask the people about their choice immediately after choosing the preferred photo. For analyze of fully described responses to open-ended questions was used method from Schroeder (1995). Response was simplified into a series of short phrases, and the phrases were sorted into categories that expressed the similar concepts. The responses to open-ended questions provide the useful information about the preference reason which is not

obtained through closed-ended questions about preferred landscape type. It is also important to be sure that the people understand the questions and to help them through the questionnaire because they are of very different education levels and not all would be able to reply without help. Analyses of responses of tested group to open-ended questions show that their preferences are affecting by economic, traditional, ecological aesthetic, recreation values and the way they used the montado. All respondents preferred montado to other types of rural landscape in the southern part of Portugal. All of them suppose that it is important to maintain montado for future generations. The main reason for it is tradition and the economic value of cork.

Further research can be improved by asking the respondents to rate the photographs in order to obtain more data about preferences. The preference rating provides information not only about the participant's likes and dislikes, but also about their patterns of perceiving the environment (Kaplan, 1979). The purpose of this research does not concern the economic evaluation of montado and its different types of users so, it will not obtain knowledge about how much people are willing to pay for using their preferred landscape, for example.

The research of Ulrich (1986) confirmed that landscape evaluation has a close link to emotionally related responses. One of the important directions for future research concerns also the valuation of the psychological benefits of the montado.

Montado by its flexibility can satisfy needs and expectations of various groups of people. It is necessary to find out which montado type is valued for which user group. When this information has been obtained, it can be guaranteed a significant part of sustainable management of this traditional landscape and satisfy some needs of modern society. Finally, it is important to emphasize that preference survey should only be a part of the decision basis (Jensen, 1993).

References

Bastian, O. (2001). Landscape Ecology – towards a unified disciplines? *Landscape Ecology* **16**: 757-766.

Bell, P.A., Greene, T.C., Fisher, J.D. & Baum, A. (2001). *Environmental Psychology*. Harcourt College Publishers, USA.

Brush, R., Chenoweth, R.E. & Barman, T. (2000). Group differences in the enjoyability of driving through rural landscapes. *Landscape and Urban Planning* **47**: 39-45.

Egoz, S., Bowring, J. & Perkins, H.C. (2001). Tastes in tension: form, function, and meaning in New Zealand's farmed landscapes. *Landscape and Urban Planning* **10**: 177-196.

Fonseca, A. (2004). *O Montado no Alentejo (Séc. XV a XVIII).* Edições Colibri. Portugal.

Groot, W.T. & Van den Born, R.H.G. (2003). Visions of nature and landscape type preferences: an exploration in The Netherlands. *Landscape and Urban Planning* **63**: 127-138.

Hagerhall, C. (1999). The Experience of Pastoral Landscapes. Acta Universitatis Agriculturae Sueciae. Doctoral thesis. Alnarp.

Hartig, T. (1993). Nature experience in transactional perspective. *Landscape and Urban Planning* **25**: 17-36.

Jensen, F.S. (1993). Landscape managers' and politicians' perception of the forest and landscape preferences of the population. *Forest and Landscape Research* **1**: 79-93.

Kaplan, R. (1979). Visual Resources and the Public: An Empirical Approach. *Proceedings of Our National Landscape.* A Conference on Applied Techniques for Analysis and Management of the Visual Resource. Nevada. 209-215.

Kaur, E., Palang, H. & Soovali, H. (2004). Landscapes in change – opposing attitudes in Saaremaa, Estonia. *Landscape and Urban Planning* **67**: 109-120.

Nassauer, J. I. (1995). Culture and changing landscape structure. *Landscape Ecology* **10**: 229-237.

Patton, M.Q. (2002). *Qualitative Research and Evaluation Methods (3rd ed.).* Thousand Oaks, CA: Sage Publication. Inc.

Pavlikakis, G.E. & Tsihrintzis, V.A. (2005). Perceptions and preferences of the local population of Eastern Macedonia and Thrace National Park in Greece. *Landscape and Urban Planning*, Article in press.

Plieninger, T., Modolell y Mainou, J. & Konold, W. (2004). Land manager attitudes toward management, regeneration, and conservation of Spanish holm oak savannas (*dehesas*). *Landscape and Urban Planning* **66**: 185-198.

Real, E., Arce, C. & Sabucedo, J.M. (2000). Classification of landscape using quantitative and categorical data and prediction of their scenic beauty in North-Western Spain. *Journal of Environmental Psychology* **20**: 355-373.

Schroeder, H.W. (1995). Preference and meaning of arboretum landscapes: Combining quantitative and qualitative data. In: *Landscape Perception Readings in environmental psychology*. Sinha, A. Ed. Academic Press. pp. 119-136.

Ježová & Pinto-Correia.

Ulrich, R.S. (1986). Human responses to vegetation and landscapes. *Landscape and Urban Planning* **13**: 29-44.

Van den Berg, A.E., Viek, C.A.J. & Coeterier, J.F. (1998). Group differences in the aesthetic evaluation of nature development plans: A multilevel approach. *Journal of Environmental Psychology* **18**: 141-157.

Paper IIA

Ježová D. and Pinto-Correia T. (2008) Krajinné preferencie rôznych skupín užívateľov pre tradičnú kultúrnu krajinu v južnom Portugalsku - Montado. Landscape preferences of different user groups for traditional cultural landscape in southern Portugal – the Montado. Acta Horticulturae et Regiotecturae, Special Issue, pp 64-68.

- Published version in Slovak language

Acta horticulturae at regiotecturae – mimoriadne číslo
Nitra, Slovaca Universitas Agriculturae Nitriae, 2008, s. 64–68

KRAJINNÉ PREFERENCIE RÔZNYCH SKUPÍN UŽÍVATEĽOV PRE TRADIČNÚ KULTÚRNU KRAJINU V JUŽNOM PORTUGALSKU – *MONTADO*

LANDSCAPE PREFERENCES OF DIFFERENT USER GROUPS FOR TRADITIONAL CULTURAL LANDSCAPE IN SOUTHERN PORTUGAL – *MONTADO*

Diana SUROVÁ, Teresa PINTO-CORREIA

Group on Mediterranean Ecosystems and Landscapes/ICAM, University of Évora, Portugal

The aim of the present work is to contribute to the knowledge about potentials of traditional cultural landscape in Southern Portugal, *Montado*, for the new functions in rural landscape demanded by society. Study of this issue is important in order to find the alternative utilization of traditional cultural landscapes aiming in their maintenance. A qualitative research method based on the 232 individual face-to-face interviews with different user groups of rural landscape was used. As the visual stimuli, seven color photos of landscape types in Southern Portugal with different vegetation cover were used. The identification of land users' preferences was carried out by quantitative analysis, and the values of surveyed landscape type perceived by respondents were subsequently detected by content analysis. From seven landscape types, the *Montado* was the most preferred one for 61 % of respondents. The content analysis of responses revealed several categories of values assigned to the studied system. These were related with tradition and identity, restorative experience, and with ecological, aesthetic and economic values of the system. The results of the work emphasize the importance of traditional system – *Montado* – not only due to its cultural values but also for its significant potential for functions demanded by modern society from rural landscape.

Key words: traditional cultural landscape, *Montado*, landscape preferences, landscape type potential, functions of rural landscape

Problematika miznúcich tradičných kultúrnych krajín a potreba nových krajinných funkcií sa stáva častou témou medzinárodných konferencií a vedeckých publikácií. Kultúrna krajina neustále podlieha zmenám, nakoľko je výsledkom postupných pozemkových úprav s cieľom lepšie prispôsobiť jej využitie a priestorovú štruktúru požiadavkám spoločnosti (Antrop 2005). Tradičné kultúrne krajiny v Európe, vytvárané stovky rokov, tvoria dnes kultúrne dedičstvo a potrebujú byť zachované a chránené. Snaží sa o to aj Európsky dohovor o krajine (European Landscape Convention, 2000), otázkou však zostáva ako reálne zlúčiť existujúce hodnoty krajiny s aktuálnymi požiadavkami a potrebami spoločnosti? Súčasný životný štýl, ovplyvnený socio-ekonomickými zmenami, sa stáva stále viac urbánny a mobilnejší, na druhej strane požaduje od vidieckej krajiny aby bola "miestom na život, nie na prežitie", miestom pre trávenie voľného času, rekreácie a turistického vyžitia. Vznikajú tak nové funkcie väčšinou ešte nezačlenené alebo začlenené neadekvátne do hospodárenia vidieckej krajiny.

Problémom tradičnej kultúrnej krajiny v južnom Portugalsku, *Montado*, sú dva typy degradácie spôsobené intenzifikáciou a zánikom hospodárenia (Pinto-Correia, 1993). Oba typy znamenajú opustenie tradičného spôsobu hospodárenia, najčastejšie v dôsledku nepostačujúcich výnosov pre farmárov. Preto sa hľadajú nové alternatívy využitia, rešpektujúce tradičné krajinné charakteristiky, zároveň vyhovujúce potrebám spoločnosti a v neposlednom rade aj ekonomickej prosperite farmárov. *Montado*, v Španielsku známe pod názvom Dehesa, je agro-silvo pastorálny systém prevládajúci v južnom regióne Portugalska, Alentejo. Táto kultúrna krajina, pripomínajúca africkú savanu, existuje už niekoľko storočí. Je prispôsobená špecifickým ekologickým podmienkam prostredia a zároveň sa vyznačuje vysokou biologickou biodiverzitou. Základ stromových druhov tvoria dub korkový (*Quercus suber*, L.) a dub cezmínolistý (*Quercus ilex*, ssp. *Rotundifolia*, L.). Tradičným ho tvorí mnohonásobné využívanie, zlučujúce zúžitkovanie stromového pokryvu pre korok a drevné uhlie; a podrastu, kde sa strieda pastva, sejba a úhor (Pinto-Correia, 1993). Hlavnými produktami tohto systému je korok a mäso z pasúceho sa dobytka. Obilniny boli v minulosti ďalším produktom v *Montado*, avšak v posledných desaťročiach vymizli v dôsledku trendov menej intenzívneho hospodárenia (Pinto-Correia a Mascarenhas, 1999). Sejba sa v dnešnej dobe využíva hlavne na produkciu krmiva pre dobytok a *Montado* v súčasnosti predstavuje prevažne silvo pastorálny systém. Zisk farmárom zabezpečuje korok, ktorý je zatiaľ vysoko cenený na trhu, a dobytok dotovaný Európskou úniou. Okrem týchto hlavných produkčných funkcií, *Montado* umožňuje vhodné podmienky pre aktivity poľovníkov, včelárov a hubárov. V minulosti boli tieto ďalšie funkcie dôležité z hľadiska doplnku stravy vidieckej populácie (Fonseca, 2004). V súčasnosti sa však tieto funkcie, spolu s ostatnými rekreačnými a turistickými aktivitami, dostávajú do inej dimenzie. Z ekonomického hľadiska nemajú trhovú hodnotu alebo obchodovanie s nimi nefunguje adekvátne. To znamená že ich užívatelia za ne neplatia. Rastúce požiadavky pre tieto funkcie v krajine ich však môžu v nových trhových podmienkach presunúť do pozície umožňujúcej zisk (Wiggering a i., 2006). To by znamenalo nový výnos pre farmárov, ktorý závisí od požiadaviek spoločnosti a jej preferencií.

Integrácia nových krajinných funkcií do súkromného hospodárenia ale aj politickej stratégie nie je jednoduchý proces a vyžaduje si nové poznatky týkajúce sa identifikácie spoločenských požiadaviek na jednej a potenciálu krajinného typu uspokojiť tieto požiadavky na druhej strane. V tejto súvislosti štúdium potenciálov krajiny a krajinných preferencií rôznych skupín užívateľov dostáva dôležitý význam, nakoľko začlenenie týchto preferencií do hospodárskych plánov ovlyvňuje ich úspech (de Groot, 2006; Pavlikakis, 2006).

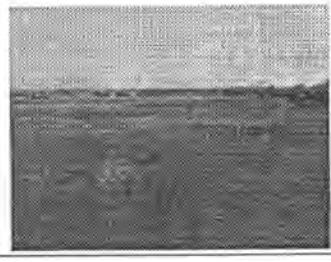


Foto 1 Obilniny
Photo 1 Intensive cultures

Foto 2 Vinica
Photo 2 Vineyard

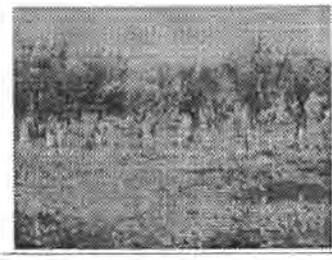


Foto 3 Olivový sad
Photo 3 Olive orchard

Foto 4 *Montado*
Photo 4 *Montado*

Obrázok 1 Fotografie krajinných typov použité ako vizuálne podnety v prezentovanej práci
Figure 1 The photos of the landscape types used in presented study as visual impulses

Problematikou krajinných preferencií rôznych skupín užívateľov sa zaoberalo viacero štúdií (napr. van den Berg, 1998; Willis a Garrod, 1992; Brush a i., 2000; Ryan, 2006). Cieľom prác spomínaných autorov bolo objasniť rozdiely a konvergencie v krajinných preferenciách. Väčšina prác zaoberajúcich sa touto problematikou odhalila rozdiely v krajinných preferenciách medzi rôznymi skupinami užívateľov. Štúdium van den Berg (1998) o estetickom hodnotení plánov vývoja

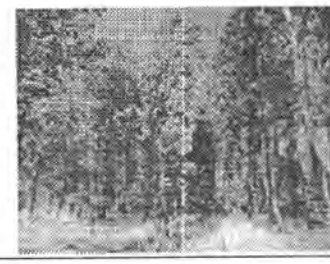


Foto 5 Eukalyptový porast
Photo 5 Eucalyptus stand

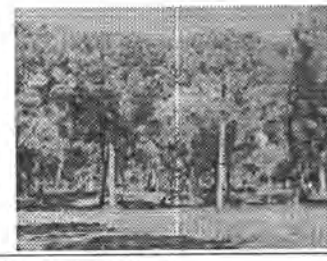


Foto 6 Porast borovice piniovej
Photo 6 Stone pine stand

Foto 7 Porast borovice prímorskej
Photo 7 Maritime pine stand

prírody v Holandsku farmármi, návštevníkmi a obyvateľmi odhalilo významné rozdiely medzi spomínanými skupinami v spájaní krajinných charakteristík s vnímanou krásou. Ďalej prieskum vypracovaný Ryanom (2006) objavil signifikantné rozdiely medzi hodnotami priraďovanými prírode obyvateľmi, plánovačmi a stavbármi. Willis a Garrod (1992) zaznamenali podobnosti v preferenciách obyvateľov a návštevníkov hodnotiacich krajinu v Británii. Taktiež faktor indikujúci či osoba vyrastala v danom krajinnom type alebo nie sa preukázal nepodstatný v práci Brusha a i. (2000), avšak vzťah medzi krajinným typom a zainteresovanou skupinou (turista, farmár, lesník atď.) bol signifikantný v prežívaní pôžitku z krajiny. Súhrnne by sa dalo povedať, že faktor zainteresovanosti v krajine signifikantne ovplyvňuje jej vnímanie a krajinné preferencie. V dôsledku toho, pre úspešné hospodárenie v krajine, je potrebné poznať krajinné preferencie rôznych zainteresovaných skupín užívateľov.

Cieľom predloženej práce bolo prispieť k poznatkom o potenciáloch tradičnej kultúrnej krajiny v južnom Portugalsku, *Montado*, pre nové funkcie dané spoločenskými požiadavkami. Výsledky sú dosiahnuté na základe porovnania preferencií rôznych skupín krajinných užívateľov pre *Montado* s preferenciami pre iné krajinné typy v južnom Portugalsku. Následne sú identifikované hodnoty študovaného krajinného typu na základe odpovedí respondentov.

Materiál a metódy

Kvalitatívna metóda s dotazníkmi na báze fotografií

V práci bola použitá kvalitatívna vedecká metóda podľa Pattona (2002) nakoľko cieľom nebolo iba identifikovať krajinné preferencie, ale aj získať nové, detailné poznatky o hodnotení krajiny jej užívateľmi. Dotazník obsahoval kombináciu zatvorených a otvorených otázok, pričom otvorené otázky neobsahujú preddefinované odpovede narozdiel od zatvorených. Využitie fotografií vo výskume vnímania krajiny a krajinných preferencií je pomerne častým materiálom slúžiacim ako vizuálny podnet pre respondentov (napr. van den Berg, 1998; Gomez-Limon a Fernandez, 1999; Hagerhall, 2000). Fotografie sú pomerne verné prezentácie reality a zároveň dovoľujú kontrolu podmienok vplývajúcich na vnímanie krajiny (napríklad počasie, svetelné podmienky, počet a typ prezentovaných prvkov, atď). Ďalšou výhodou je možnosť súbežného porovnania niekoľkých fotografií, to znamená niekoľkých krajinných typov (Real, 2000). V prezentovanej práci bolo použitých sedem farebných fotografií s rozmermi 10 x 15 cm ako vizuálne podnety pre identifikovanie krajinných preferencií respondentov. Fotografie boli nasnímané pomocou digitálnej kamery Minolta DiMAGE. Cieľom bolo zachytiť rôzne krajinné typy v južnom regióne Portugalska s rozdielnym vegetačným pokryvom, počas slnečného dňa, bez vodných komponentov a bez prítomnosti artefaktov ako cesty, elektrické vedenia a budovy. Účelom bolo zobraziť nasledovné typy krajiny: obilniny, vinica, olivový sad, *Montado*, eukalyptový porast (*Eucalyptus globulus*, L), porast borovice piniovej (*Pinus pinea*, L.) a porast borovice prímorskej (*Pinus pinaster*, L.). Použité fotografie sú v zmenšenom formáte znázornené na obrázkoch 1–7.

Rozhovory boli realizované s každým respondentom individuálne, na základe dotazníka. Úvodom každého rozhovoru bolo vysvetlenie cieľa práce, postupu rozhovoru a zaradenie respondenta do konkrétnej skupiny užívateľov. Dotazník obsahoval viacero častí týkajúcich sa štúdia vnímania krajiny a krajinných preferencií. V tomto článku sú prezentované výsledky z prvej časti dotazníka, v súvislosti s tým sa aj opis metódy sústreďuje výhradne na túto časť práce. Respondenti boli požiadaní vybrať si zo siedmych fotografií ich najpreferovanejší typ krajiny z hľadiska ich dominantnej aktivity vo vidieckej krajine. Následne, bez preddefinovaných odpovedí, boli požiadaní o vlastné vysvetlenie ich preferencií. Tento druhý komponent rozhovoru bol dôležitý z hľadiska identifikácie hodnôt preferovanej krajiny a zážitkov, ktoré daná krajina ponúka jej užívateľom. Vysvetlenia respondentov týkajúce sa ich preferencií boli v plnom znení písomne zaregistrované počas rozhovorov.

Výber respondentov

V práci bol použitý cielený výber respondentov, t.j. "purposeful sampling" (Patton, 2002), ktorý je zameraný na výber ponúkajúci bohatosť informácií. Podmienkou výberu bolo, aby každý respondent mal predchádzajúce skúsenosti s využívaním vidieckej krajiny v regióne a celkovo aby cielený výber charakterizoval rozsiahlu škálu záujmov, požiadaviek a aktivít v krajine. Boli selektované štyri malé mestá v južnom regióne Portugalska, Alentejo, ako hlavné centrá pre rozhovory. Kontakty s potenciálnymi respondentami boli realizované telefonicky, v spolupráci s cestovnými kanceláriami, s asociáciami farmárov, poľovníkov a včelárov sídliacich v hlavných centrách pre rozhovory. Spomínaná spolupráca s asociáciami bola nevyhnutná z hľadiska identifikácie ľudí a ich záujmov v krajine. Pri prvom kontakte s potenciálnym respondentom bola vysvetlená forma a cieľ vedeckej práce. Po následnej dohode o stretnutí boli s dobrovoľníkmi individuálne realizované osobné rozhovory. Každý respondent bol zaradený výhradne do jednej skupiny užívateľov krajiny, napriek tomu, že prakticky mohol reprezentovať viac ako jednu skupinu. Napríklad poľovník mohol byť zároveň aj obyvateľom vidieka. V takýchto prípadoch si sám respondent vybral skupinu, ktorú chce prezentovať a hodnotil krajinné typy z vybraného uhla pohľadu. Celkovo, počas siedmych mesiacov vyhradených na kolekciu dát, 232 ľudí súhlasilo so spoluprácou na štúdii, z toho 26 poľovníkov, 29 včelárov, 12 hubárov, 82 domácich návštevníkov (obyvatelia vidieka a mesta), 55 zahraničných návštevníkov a 28 farmárov.

Analýza dát

Pre dáta o preferenciách krajinného typu bola použitá quantitatívna frekvenčná metóda využívaná v deskriptívnej štatistike. Pre kvalitatívne výsledky z vlastných vysvetlení respondentov o ich preferenciách bola použitá analýza obsahu podľa Bardina (1977), zameraná na konceptuálnu dimenziu. Každá odpoveď bola zjednodušená na sadu jednoduchých viet, ktoré boli následne rozdelené do kategórií pojmov s podobným významom.

Tabuľka 1 Výsledky quantitatívnej analýzy krajinných preferencií

Krajinné typy (1)	Všetci respondenti v %(2)	Skupiny respondentov v %(3)					
		D	Z	H	V	P	F
Obilniny (4)	5	7	0		0	8	0
Vinica (5)	4	9	0		0	4	0
Olivový sad (6)	9	9	8		3	15	3
Montado (7)	61	50	92		52	69	93
Eukalyptový porast (8)	6	2	0		38	0	0
Porast borovice piniovej (9)	14	20	0		7	4	4
Porast borovice prímorskej (10)	2	4	0		0	0	0
Súčet (11)	100	100	100	100	100	100	100

Skupiny respondentov: D – domáci návštevníci (obyvatelia vidieka a mesta), Z – zahraniční návštevníci, H – hubári, V – včelári, P – poľovníci, F – farmári
Groups of respondents: D – national visitors (rural and urban dwellers), Z – foreign visitors, H – mushroom pickers, V – beekeepers, P – hunters, F – farmers

Table 1 Results of landscape preferences obtained by quantitative analysis
(1) landscape types, (2) all respondents in %, (3) groups of respondents in %, (4) intensive cultures, (5) vineyard, (6) olive orchard, (7) *Montado*, (8) eucalyptus stand, (9) stone pine stand, (10) maritime pine stand, (11) sum

Tabuľka 2 Výsledky kvantitatívnej analýzy krajinných preferencií

Kategórie pojmov použité respondentmi pri vysvetľovaní preferencií pre *Montado* (1)		Všetci respondenti v %(2)	Skupiny respondentov v %(3)					
			D	Z	H	V	P	F
Tradícia a identita (4)	⇨ regionálna tradícia (9)	17	27	20	8	7	0	11
	⇨ identita (10)	10	18	5	25	3	0	4
Estetické hodnoty (5)	⇨ atraktivita krajinného obrazu (11)	12	12	27	0	0	8	0
	⇨ komplexnosť, rozmanitosť (12)	6	0	20	0	0	8	0
	⇨ morfológia stromov (13)	6	5	13	0	0	0	11
	⇨ kontrast svetla a tieňa (14)	6	5	20	0	0	0	0
Zotavujúce zážitky (6)	⇨ kontakt s prírodou (15)	8	9	20	0	3	0	0
	⇨ ticho, pokoj, pohoda (16)	6	9	13	0	0	4	0
	⇨ osviežujúci tieň (17)	7	12	7	17	0	0	0
Ekologické hodnoty (7)	⇨ adaptácia daným podmienkam (18)	11	6	7	0	28	4	25
	⇨ biodiverzita (19)	16	1	5	50	34	62	0
Ekonomické hodnoty (8)	⇨ produkcia korku (20)	8	9	0	8	0	4	32
	⇨ multifunkčné využitie (21)	7	4	0	0	0	0	50

Skupiny respondentov: D – domáci návštevníci (obyvatelia vidieka a mesta), Z – zahraniční návštevníci, H – hubári, V – včelári, P – poľovníci, F – farmári
Groups of respondents: D – national visitors (rural and urban dwellers), Z– foreign visitors, H – mushroom pickers, V – beekeepers, P – hunters, F – farmers

Table 2 Results of content analysis of respondents' answers
(1) the categories of the concepts used by respondets in explanations of their preferences for the *Montado*, (2) all respondents in %, (3) groups of respondents in %, (4) tradition and identity, (5) aesthetic values, (6) restorative experiences, (7) ecological values, (8) economic values, (9) regional tradition, (10) identity, (11) attractiveness of landscape scene, (12) complexity, diversity, (13) trees' morphology, (14) contrast of the light and the shadow, (15) contact with nature, (16) calm, comfort, (17) refreshing shadow, (18) adaptation to specific conditions, (19) biodiversity, (20) cork production, (21) multifunctional exploitation

Výsledky a diskusia

Výsledky kvantitatívnej analýzy preferencií

Ako naznačuje prvý stĺpec výsledkov v tabuľke 1, *Montado* bolo najpreferovanejší typ krajiny zo siedmych krajinných typov v južnom regióne Portugalska odlišujúcich sa vegetačným pokryvom. Druhý najpreferovanejší typ bol porast borovice pínioveJ, po ktorom nasledoval olivový sad ako tretí najpreferovanejší krajinný typ. Keďže záujmom štúdie bolo porovnať potenciál krajinného typu Montado pre rôzne funkcie, výsledky preferencií boli rozdelené podľa skupín s totožnou hlavnou aktivitou vo vidieckej krajine. Aj v tomto prípade bolo Montado najpreferovanejšie v každej skupine respondentov.

Výsledky analýzy obsahu odpovedí respondentov

Viacero respondentov použilo nie jednu, ale niekoľko odlišných kategórií pojmov na vysvetlenie svojich preferencií. Vo vysvetleniach preferencií pre *Montado* sa najčastejšie vyskytovali pojmy spojené s regionálnou tradíciou, ďalej biodivezitou a atraktivitou krajinného obrazu (tabuľka 2). Rozdelenie výsledkov podľa skupín respondentov odhaľuje divergencie medzi skupinami v závislosti od pojmov použitých v odpovediach. Pre domácich návštevníkov bola na krajinnom type *Montado* najsignifikantnejšia regionálna tradícia a identita spojená s "dôverne známou krajinou". Zahraniční návštevníci vnímali a oceňovali hlavne estetické hodnoty krajinného typu ako atraktivitu krajinného obrazu spojenú s originalitou, komplexnosť a kontrast svetla a tieňa. Podobne hodnotené boli aj zážitky z kontaktu s prírodou a regionálna tradícia systému. Hubári, včelári a poľovníci pozitívne hodnotili prevažne biodiverzitu krajinného typu dôležitú pre ich aktivity praktizované vo vidieckej krajine. Ekonomické hodnoty produkcie korku a multifunkčného využitia systému oceňovali hlavne farmári. V neposlednom rade však vnímali a pozitívne hodnotili aj adaptáciu systému daným ekologickým podmienkam a regionálnu tradíciu.

Výsledky práce zdôrazňujú dôležitosť tohto systému pre rôzne skupiny krajinných užívateľov v južnom Portugalsku a potvrdzujú jeho markantný potenciál pre rekreačné a turistické využitie. V porovnaní s ostatnými krajinnými typmi v regióne, s odlišným vegetačným pokryvom, *Montado* ponúka najsilnejšie zážitky týkajúce sa tradície a identity, estetických a zotavujúcich zážitkov. Je pozoruhodné, že napriek viacnásobnému produkčnému využitiu systému dokáže tento typ krajiny poskytnúť aj zážitky z kontaktu s prírodou, ticho, pokoj a pohodu jeho užívateľom.

Práca otvorila novú trasu štúdií o tradičnej kultúrnej krajine *Montado*, týkajúcej sa poznatkov o jej potenciáloch pre rôznorodé funkcie požadované súčasnou spoločnosťou. Jej zachovanie totiž, v neistých odbytových podmienkach jej produkcie, stále viac závisí od iných, nie produkčných funkcií. Výzvou pre budúci výskum stále zostáva adekvátna integrácia spomínaných nových krajinných funkcií do jej hospodárenia v súlade s trvalou udržateľnosťou.

Súhrn

Cieľom predloženej práce je prispieť k poznatkom o potenciáloch tradičnej kultúrnej krajiny v južnom Portugalsku, *Montado*, pre nové funkcie požadované spoločnosťou od vidieckej krajiny. Štúdium tejto problematiky je dôležité z hľadiska potreby alternatívnych využití tradičných kultúrnych krajín s cieľom ich zachovania. V práci bola použitá kvalitatívna vedecká metóda založená na 232 individuálnych osobných rozhovoroch s rôznymi skupinami užívateľov vidieckej krajiny v južnom Portugalsku. Pre vizuálne podnety počas rozhovorov bolo použitých sedem farebných fotografií, ktoré zobrazovali krajinné typy v južnom Portugalsku s odlišným vegetačným pokryvom. Kvantitatívnou analýzou boli identifikované krajinné preferencie užívateľov a obsahovou analýzou boli odhalené hodnoty študovaného krajinného typu vnímané respondentami. Zo siedmych krajinných typov, *Montado* bolo najpreferovanejšie pre

61% respondentov. Obsahová analýza odpovedí respondentov odhalila niekoľko kategórií hodnôt priraďovaných študovanému systému, ktoré boli spojené s tradíciou a identitou; so zotavujúcimi zážitkami a s ekologickými, estetickými a ekonomickými hodnotami systému. Výsledky práce zdôrazňujú dôležitosť tradičného systému – *Montado* – nielen z hľadiska jej kultúrnych hodnôt ale aj z hľadiska jej významného potenciálu pre funkcie požadované súčasnou spoločnosťou od vidieckej krajiny.

Kľúčové slová: tradičná kultúrna krajina, *Montado*, krajinné preferencie, potenciál krajinného typu, funkcie vidieckej krajiny

Literatúra

ANTROP, M. 2005. Why landscapes of the past are important for the future. In: Landscape and Urban Planning, 70/2005, p. 21–34.

BARDIN, L. 1977. L'analyse de contenu. In: Presses Universitaires de France, 1977, 291 p. ISBN 21-3051-659-9

BRUSH, R. et al. 2000. Group differences in the enjoyability of driving through rural landscapes. In: Landscape and Urban Planning, 47/2000, p. 39–45.

DE GROOT, R. S. 2006. Function-analysis and valuation as a tool to assess land use conflicts in planning for sustainable, multi-functional landscapes. In: Landscape and Urban Planning, 75/2006, p. 175–186.

COUNCIL OF EUROPE. 2000. European Landscape Covention, Florence, 2000. [online] Publikované 20. 10. 2000 (citované 20. 8. 2007) dostupné z <www.coe.int.europeanlandscapeconvention/>

FONSECA, A. 2004. O *Montado* no Alentejo (Séc. XV a XVIII). Portugal : Edições Colibri, 2004, 158 p. ISBN 97-2772-505-8

GOMEZ-LIMON, J. – LÚCIO FERNANDEZ, J. V. 1999. Changes in use and landscape preferences on the agricultural-livestock landscapes of the central Iberian peninsula (Madrid, Spain). In: Landscape and Urban Planning, 44/1999, p. 165–175.

HAGERHALL, C. M. 2000. Clustering predictors of landscape preference in the traditional Swedish cultural landscape: prospect-refuge, mystery, age and management. In: Journal of Environmental Psychology, 20/2000, p. 83–90.

PATTON, M. Q. 2002. Qualitative Research and Evaluation Methods. Thousand Oaks, CA: Sage Publication, Inc. 2002, 598 p. ISBN 07-6191-971-6

PAVLIKAKIS, G. E. – TSIHRINTZIS, V. A. 2006. Perceptions and preferences of the local population in Eastern Macedonia and Thrace National Park in Greece. In: Landscape and Urban Planning, 77/2006, p. 1–16.

PINTO-CORREIA, T. 1993. Threatened Landscape in Alentejo, Portugal: the „*Montado*" and other „Agro-Silvo-Pastoral" Systems. In: Landscape and Urban Planning, 24/1993, p. 43–48.

PINTO-CORREIA, T. – Mascarenhas, J. 1999. Contribution for the extensification/intensification debate: what is happening to the Portuguese *Montado*? In: Landscape and Urban Planning, 46/1999, p. 125–131.

REAL, E. et al. 2000. Classification of landscapes using quantitative and categorical data, and prediction of their scenic beauty in North-Western Spain. In: Journal of Environmental Psychology, 26/2000, p. 355–373.

RYAN, R. L. 2006. Comparing the attitudes of local residents, planners, and developers about preserving rural character in New England. In: Landscape and Urban Planning, 75/2006, p. 5–22.

VAN DEN BERG, A. E. 1998. Group differences in the aesthetic evaluation of nature development plans: A multilevel approach. In: Journal of Environmental Psychology, 18/1998, p. 141–157.

WILLIS, K. G. – GARROD, G. D. 1992. Assessing the value of future landscapes. In: Landscape and Urban Planning, 23/1992, p. 17–32.

WIGGERING, H. et al. 2006. Indicators for multifunctional land use – Linking socio-economic requirements with landscape potentials. Ecological Indicators, 6/2006, p. 238–249.

Kontaktná adresa:
Ing. Diana Surová, Group on Mediterranean Ecosystems and Landscapes/ICAM, University of Évora, Núcleo da Mitra, 7 000, Évora, Portugal, tel.: 00351 967292217, e-mail: dj@uevora.pt

Paper IIB

Ježová D. and Pinto-Correia T. (2008) Krajinné preferencie rôznych skupín užívateľov pre tradičnú kultúrnu krajinu v južnom Portugalsku - Montado. Landscape preferences of different user groups for traditional cultural landscape in southern Portugal – Montado. *Acta Horticulturae et Regiotecturae*, Special Issue, pp 64-68.

- English translation of the paper

Landscape Preferences of Different User Groups for Traditional Land Use System in Southern Portugal – *the Montado*

Diana Surová and Teresa Pinto-Correia
Group of Mediterranean Ecosystems and Landscapes/ICAM, University of Évora, Portugal

ABSTRACT

The aim of the presented work is to contribute to scientific knowledge about the potential of traditional cultural landscape in Southern Portugal, the *Montado*, in order to provide new functions in rural areas, which are currently demanded by society. A study of this issue is needed to find alternative uses for traditional cultural landscapes, with the aim of preserving these landscapes. A qualitative research method, based on 232 individual face-to-face interviews with persons from different types of rural land user groups, was used. As visual stimuli, colour photographs representing seven landscape types in Southern Portugal with diverse vegetation cover, were used. The identification of land users' preferences was carried out by quantitative analysis and the categories of concepts related to the Montado, as the preferred landscape, were detected by content analysis of responses to open-ended questions. Of the seven landscape types presented to the interviewees, the *Montado* was the one most preferred by 61% of the respondents. The content analysis of the responses revealed several categories of concepts assigned to the studied system. These were related to tradition and identity, restorative experiences and to the ecological, aesthetic and economic values of the system. The results of the work emphasise the importance of the traditional system – *Montado* – not only for cultural values, but also for functions of rural landscapes, demanded by modern society.

KEYWORDS: traditional landscape, the *Montado*, landscape preferences, landscape potential, functions of rural landscape

INTRODUCTION

The issue of the disappearance of traditional landscapes and the need for new landscape functions, satisfying today's needs, is becoming a frequent topic of discussion at international conferences and in research papers. Traditional landscapes are the result of consecutive reorganisation of the land in order to better adapt its use and spatial structure to changing societal demands (Antrop, 2005). Traditional European landscapes, developed over hundreds of years have nowadays a significant value and they need to be protected. This aim is also stressed in the European Landscape Convention (2000). However, several questions related to their maintenance have arisen. For example, how can the existing landscape characteristics of traditional landscapes be integrated with current social needs? Current lifestyles, influenced by notable socio-economic changes in past decades, have become more urban and dynamic. Rural areas might become a place "to live, not merely to survive", as there is a social demand to spend leisure time there, contemplate and practise recreational and tourist activities. Thus, there is a growing need for new rural functions, which have not yet been incorporated into the management of the rural areas, or have been incorporated inadequately.

Problems of traditional cultural landscape in Southern Portugal, Montado, are created by two types of changes, influenced by intensification and extensification (Pinto-Correia 1993). Both types result in the abandonment of traditional management practices, mainly due to the low income generated for farmers. Hence, there is a challenge to find alternative uses for these areas, which would respect traditional landscape characteristics and at the same time consider social needs and economic benefits for farmers. The Montado, in Spain known as a *Dehesa*, is an agro-silvo pastoral system dominant in the southern region of Portugal, Alentejo. The landscape of this specific kind of land use has a savannah-like appearance, which has been developing for many centuries. It is adapted to the specific ecological conditions of the region and is characterised by high biological diversity. Basic tree species are Cork Oak (*Quercus suber, L.*) and Holm Oak (*Quercus ilex, ssp. Rotundifolia, L.*). Traditionally, the Montado is a mixture of multiple uses, combining the exploitation of tree level for cork and charcoal and the undercover level, where the rotation of grazing, cultivation and fallow lands occur (Pinto-Correia 1993). The principal products of this system of land use are cork and meat from livestock breeding. Cereals used to be an important product of the Montado as well. However, this production has diminished lately, due to extensification trends (Pinto-Correia a Mascarenhas 1999). Cultivation is nowadays used mainly for the growing of forage and the Montado is becoming principally a silvo-pastoral system. Income for farmers is secured by cork, which is currently highly valued on the markets and by cattle, subsidised by the European

Union. Apart from these main production functions, the Montado offers conditions for hunting, beekeeping and mushroom picking. Historically, these functions were important for the rural population, since they supplemented food resources (Fonseca, 2004). Nowadays, these practices, together with other recreation and tourist activities, are becoming more important. From an economic point of view, they have currently no market value or their market does not function adequately. Visitors, for example, do not pay for using these functions. However, the increasing social demand for these functions can propel them into a new market position, with monetary value attached (Wiggering at al. 2006). This could mean a new income source for farmers, who are dependent, amongst other factors, upon social demand and preferences.

Integration of new landscape functions to private management and also to policy making, is not a simple process. It requires new knowledge about identification of social demand on one hand and about the potential of the landscape type to satisfy these needs on the other. Thus the study of landscape potential and the landscape preferences of different user groups are becoming more important, since their implementation in management plans can influence their success (de Groot 2006, Pavlikakis 2006).

There are several studies stressing the importance of considering landscape preferences from different points of view amongst the user groups (e.g. van den Berg 1998; Willis a Garrod 1992, Brush a kol. 2000, Ryan 2006). The aim of the aforementioned works was to clarify divergences and convergences in landscape preferences among different groups of people. The majority of the studies have discovered differences in landscape preferences between user groups. The study of van den Berg (1998) about aesthetic evaluation of nature development plans by farmers, visitors and residents in Netherlands, revealed significant differences in how these groups connect landscape characteristics with perceived beauty. The survey elaborated by Ryan (2006) has shown significant differences between values attributed to nature by residents, planners and constructors. On the other hand, Willis and Garrod (1992) observed similarities in preferences of residents and visitors evaluating landscape in Great Britain. The study of Brush et al. (2000) revealed, that it is insignificant whether a person did or did not grow up in the given landscape type. Yet, the relationship between landscape type and the interest group - tourist, farmer or forester - was significant in landscape experience. In general, it can be concluded, that the interest factor of user groups influences the experience created by landscape. Thus, the knowledge about preferences of different interest groups could increase the success of landscape management.

The aim of the presented study was to contribute to knowledge about the potential of traditional landscape in Southern Portugal, Montado, for non-production functions demanded by today's society. The results of the study were obtained by assessment of

land users' preferences for different land use types in the region. The concepts attributed to the study of land users' needs, were identified by content analysis of responses to an open-ended question.

METHODS

Qualitative research method with photo questionnaire

The study used principles of the qualitative research method by Patton (2002). The use of this method provided an opportunity to not only identify the landscape preferences of the respondents, but also to gain new, detailed knowledge about the Montado landscape evaluation from the users' point of view. The interview guide applied in this study used a combination of closed and open-ended questions. The open-ended questions did not contain pre-defined answers. Studies about landscape preferences frequently used photographs as a tool, which provided visual stimuli for respondents (e.g. van den Berg 1998, Gomez-Limon a Fernandez 1999, Hagerhall 2000). Photographs provide relatively reliable presentations of reality and at the same time, they provide the possibility of controlling the conditions which influence the landscape perception, for example, the weather, light and number and types of the presented features. An additional advantage of the use of photographs is the possibility of comparing several landscape types simultaneously (Real 2000). Seven colour photographs with dimensions 10 x 15 cm, representing different types of land uses in the region were used in the presented study, as visual stimuli. The photographs were taken with a digital camera Minolta DiMAGE. The aim was to capture different types of land uses in Southern Portugal, with different vegetation cover, during a sunny day, without water components and without artefacts such as roads, electricity lines or buildings. The following landscape types were distinguished on the photographs: intensive culture, vineyard, olive orchard, the *Montado*, eucalyptus stand (*Eucalyptus globulus*, L), stone pine stand (*Pinus pinea*, L.) and maritime pine stand (*Pinus pinaster*, L.). The photographs are shown in Figure 1, in reduced scale.

The personal interviews were carried out individually. At the beginning of the study, each respondent received a short introduction regarding the aim of the study. Subsequently, the user group representation was agreed upon with each respondent, based on the main activity that he/she practised in the rural landscape. The questionnaire comprised several sections dealing with landscape preferences. This paper presents the results obtained in the first part of the questionnaire and the method description refers to

this first part only. The respondents were asked to choose their preferred landscape type from seven photo representations, from the perspective of the user group, which had been agreed upon at the beginning of the interview. Afterwards, they were asked to explain their preferences in an open-ended question, without pre-defined responses. The second part of the interview was important to identify attributed values and experiences in preferred landscape type. Responses were fully recorded in writing during the interviews.

Sample design

In order to obtain a great variety of viewpoints of the *Montado* as a landscape for different amenity functions, the "purposeful sampling"(Patton 2002) of respondents was used in this survey. Each respondent had had some previous experience with use of the rural landscape in the region. Four towns in the Alentejo were selected as the main centres for interviews. Contacts with potential respondents were established by collaboration with tourist centres and associations of farmers, hunters and beekeepers. This collaboration with the associations was necessary to identify potential respondents with different interests in the landscape. During the first contact with a respondent by phone, he/she received a short explanation of the aim of the work and of the method used in the study. Afterwards, if the contacted person agreed to respond during an interview, a personal meeting was arranged. Each respondent was assigned exclusively to one user group and was interviewed as a representative of that particular user group only, even though in reality he/she practised varied activities in the rural areas. For example, a hunter could be a rural inhabitant as well. In such a case, the respondent chose the user group he wanted to represent and responded to the photo questionnaire from that particular viewpoint. The personal interviews were carried out with those who had agreed to participate. In total, 232 interviews with volunteers were carried out during a period of seven months: workers (N=26), hunters (N=26), beekeepers (N=29), mushroom pickers (N=12), foreign tourists (N=24), new rural inhabitants (N=31), rural inhabitants (N=28), urban dwellers from Lisbon (N=28) and cork oak landowners of the Montado (N=28).

Data analysis

To obtain quantitative data about preferences for landscape type, the frequency method from descriptive statistics was used. The qualitative data, gained from explanations of respondents about their preferences for specific land use types, were processed by content analysis (Bardin 1977). The aim of the content analysis was to identify the landscape characteristics in the Montado which are valued by land users. Each response to the open-ended question was simplified into a set of short sentences. Subsequently, the sentences were divided into categories with similar meanings.

RESULTS AND DISCUSSION

Results from the quantitative analysis of the data regarding landscape preferences

As the first column of the results in Table 1 indicates, the Montado was the most preferred landscape type out of seven assessed landscape types in the Southern region of Portugal. The second most preferred landscape type was the stand with Stone pine, followed by the olive orchard. As the aim of the study was also to compare the potential of the Montado landscape type for different non-production functions, the results of the preferences were compared between different user groups. Even in this division, the Montado was the most preferred for each user group.

Table 1 Results from the quantitative analysis of the data about landscape preferences

Landscape types	All respondents in %	Groups of respondents in %					
		D	Z	H	V	P	F
Intensive cultures	5	7	7	0	0	8	0
Vineyard	4	9	4	0	0	4	0
Olive orchard	9	9	11	8	3	15	3
Montado	61	50	55	92	52	69	93
Eucalyptus stand	6	2	0	0	38	0	0
Stone pine stand	14	20	22	0	7	4	4
Maritime pine stand	2	4	2	0	0	0	0
Sum	100	100	100	100	100	100	100

Groups of respondents: D – Portuguese visitors (rural and urban dwellers and field workers); Z – Foreign visitors (tourists and new rural inhabitants); H – Mushroom pickers; V – Beekeepers; P – Hunters; F – Farmers (landowners).

Results from the content analysis of responses to the open-ended question

Several respondents used not just one, but several categories of concepts to explain their preferences. In the preference explanations for the Montado, the most frequently mentioned expressions were connected to regional tradition, biodiversity and attractiveness of landscape scenery (Table 2). The assessment of the user groups in the concepts used for preference explanations, revealed divergences between the groups. For Portuguese visitors the regional tradition and identity, often associated with the term "familiar landscape", was notably connected to the *Montado*. Foreign visitors perceived and appreciated mainly the aesthetic values of the landscape type, connected to the uniqueness, complexity and contrast of light and shadow. The nature contact experiences

Figure 1 The photographs of the landscape types used in the presented study as the visual stimuli

Photo 1 Intensive cultures

Photo 2 Vineyards

Photo 3 Olive orchard

Photo 4 the *Montado*

Photo 5 Eucalyptus stand

Photo 6 Stone pine stand

Photo 7 Maritime pine stand

and regional tradition maintained in the system were similarly evaluated. Mushroom pickers, beekeepers and hunters positively evaluated especially biodiversity, which increased the suitability of the *Montado* for their favourite activities in rural areas. Economic values connected to cork production and multi-exploration, were valued principally by the landowners. However, they also perceived and positively evaluated the adaptation of the system to specific ecological conditions and regional tradition.

Table 2 Results from the qualitative analysis of land users' preferences – The categories of the concepts used by respondents in explanations of their preferences for the Montado.

The categories of the concepts used by respondents in explanations of their preferences for the Montado		All respondents in %	Groups of respondents in %					
			D	Z	H	V	P	F
Tradition and identity	regional tradition	17	27	20	8	7	0	11
	identity	10	18	5	25	3	0	4
Aesthetic values	attractiveness of landscape scene	12	12	27	0	0	8	0
	complexity	6	0	20	0	0	8	0
	tree morphology	6	5	13	0	0	0	11
	contrast of light and shadow	6	5	20	0	0	0	0
Restorative experiences	contact with nature	8	9	20	0	3	0	0
	calm, comfort	6	9	13	0	0	4	0
	refreshing shadow	7	12	7	17	0	0	0
Ecological values	adaptation to specific conditions	11	6	7	0	28	4	25
	biodiversity	16	1	5	50	34	62	0
Economic values	cork production	8	9	0	8	0	4	32
	multifunctional exploitation	7	4	0	0	0	0	50

DISCUSSION

The results of the study stress the importance of the *Montado* land use system for diverse groups of land users in Southern Portugal and confirm its significant appeal for recreational and tourist use. In relation to other land use types studied in the survey, the *Montado* offers the strongest experiences of tradition and identity, as well as aesthetic and restorative experiences. It is noteworthy, that despite the multi-exploration of the *Montado* system for different products, it is able to offer nature experiences, tranquillity, silence and well-being to its users.

This survey initiated a new path of studies about traditional landscape *Montado*, dealing with knowledge about its potential for a variety of functions required by today's society from rural landscapes. It was shown in this survey that the *Montado* is the

preferred land use type for users of non-production functions. This could encourage the future consideration of these non-production functions in the *Montado* management and thus contribute to the preservation of this valuable land use system. Hence, future research about adequate introduction of these new landscape functions in management tools is needed.

REFERENCES

ANTROP, M.: Why landscapes of the past are important for the future. In: *Landscape and Urban Planning*, 70/2005, s. 21 – 34.

BARDIN, L.: *L'analyse de contenu*. Presses Universitaires de France, 1977. 291s. ISBN 21-3051-659-9

BRUSH, R.; CHENOWETH, R.E.; BARMAN, T. 2000. Group differences in the joyability of driving through rural landscapes. *Landscape and Urban Planning*, 47/2000, pp. 39 – 45.

DE GROOT, R.S.: Function-analysis and valuation as a tool to assess land use conflicts in planning for sustainable, multi-functional landscapes. *Landscape and Urban Planning*, 75/2006, s. 175-186.

COUNCIL OF EUROPE: *European Landscape Covention, Florence, 2000*. [online] Published 20.10.2000. [quoted 20.8.2007]. Accessible on <www.coe.int/europeanlandscapeconvention/>.

FONSECA, A.: *O Montado no Alentejo (Séc. XV a XVIII)*. Portugal, Edições Colibri, 2004. 158 s. ISBN 97-2772-505-8

GOMEZ-LIMON, J. a LÚCIO FERNANDEZ, J.V.: Changes in use and landscape preferences on the agricultural-livestock landscapes of the central Iberian peninsula (Madrid, Spain). *Landscape and Urban Planning*, 44/1999, s. 165-175.

HAGERHALL, C. M.: Clustering predictors of landscape preference in the traditional Swedish cultural landscape: prospect-refuge, mystery, age and management. *Journal of Environmental Psychology*, 20/2000, s. 83-90.

PATTON, M.Q.: *Qualitative Research and Evaluation Methods (3rd ed.)*. Thousand Oaks, CA: Sage Publication, Inc. 2002, 598 s. ISBN 07-6191-971-6

PAVLIKAKIS, G.E. a TSIHRINTZIS, V.A.: Perceptions and preferences of the local population in Eastern Macedonia and Thrace National Park in Greece. *Landscape and Urban Planning*, 77/2006, s. 1–16.

PINTO-CORREIA, T.: Threatened Landscape in Alentejo, Portugal: the "Montado" and ot-

her "Agro-Silvo-Pastoral" Systems. In: *Landscape and Urban Planning*, 24/1993, s. 43-48.

PINTO-CORREIA, T. a Mascarenhas, J.: Contribution to the extensification/intensification debate: what is happening to the Portuguese Montado? *Landscape and Urban Planning*, 46/1999, s. 125-131.

REAL, E. et al..: Classification of landscapes using quantitative and categorical data, and prediction of their scenic beauty in North-Western Spain. *Journal of Environmental Psychology*, 26/2000, s. 355-373.

RYAN, R. L.: Comparing the attitudes of local residents, planners, and developers about preserving rural character in New England. *Landscape and Urban Planning*, 75/2006, s. 5-22.

VAN DEN BERG, A. E.: Group differences in the aesthetic evaluation of nature development plans: A multilevel approach. *Journal of Environmental Psychology*, 18/1998, s. 141-157.

WILLIS, K. G. a GARROD, G. D.: Assessing the value of future landscapes. *Landscape and Urban Planning*, 23/1992, pp. 17-32.

WIGGERING, H. et al.: Indicators for multifunctional land use—Linking socio-economic requirements with landscape potentials. *Ecological Indicators,* 6/2006, s. 238–249.

Paper III

Surová D. and Pinto-Correia T. (2009) Use and assessment of the 'new' rural functions by land users and landowners of the Montado in southern Portugal. *Outlook on AGRICULTURE*, Vol 38, No 2, pp 189-194.

Use and assessment of the 'new' rural functions by land users and landowners of the Montado in southern Portugal

Diana Surová and Teresa Pinto-Correia

Abstract: The objective of the study discussed in this paper was to produce knowledge about how the Montado, an agrosilvopastoral system dominant in southern Portugal, supports and can better support 'new' rural functions associated with leisure and recreation. The Montado is recognized as a multifunctional landscape, although future management conditions are still to be defined. A qualitative survey was carried out through personal interviews with land users and landowners of this specific system. Results regarding visitor profiles, current activities in the Montado, perceived limitations and improvements suggested by land users, as well as landowners' attitudes towards 'new' functions, are presented and discussed.

Keywords: multifunctional land use; land users; landowners; property rights; Montado

Diana Surová is a PhD student and member of the Research Group on Mediterranean Ecosystems and Landscapes/ICAAM, University of Évora, Núcleo da Mitra, Apartado 94, 7002-554 Évora, Portugal. E-mail: dj@uevora.pt. Teresa Pinto-Correia is leader of the Research Group on Mediterranean Ecosystems and Landscapes/ICAAM and Associate Professor in the Department of Landscape, Environment and Planning, University of Évora, Portugal.

The increasing demand for the rural landscape as a space for leisure and recreation has raised interest in the Montado, the silvopastoral system characteristic of the Alentejo region. The landscape associated with this land use system is particularly attractive due to its combination of: (a) open and tree-covered areas, (b) cleared and shrub-covered understorey, (c) human management that maintains a semi-natural aspect, (d) the presence of livestock in low densities, and (e) the presence of wild flora and fauna, etc (Gomez-Limon and Fernandez, 1999). There are also new rural inhabitants who have recently settled in the countryside and seek out this type of landscape, and tourists who visit this specific type of area for the purpose of contemplation, walking, riding, cycling, etc. The most numerous amongst the user groups are possibly local people who occasionally visit the Montado for aesthetic satisfaction, recreational activities or other experiences that provide an escape from the daily routine.

With regard to urban dwellers, we find both actual users and those who are interested in the system for its own sake, who acknowledge its value for many purposes, and who may be potential users of the Montado in the future. The Montado is thus nowadays appreciated in various ways that entail several non-productive functions. Nevertheless, present-day management is still focused on production, even if landowners are aware of the potential interest of the Montado for many other uses and for satisfying diverse human needs (Plieninger *et al*, 2004).

Due to its various types of uses, the Montado is recognized as a multifunctional landscape (Pinto-Correia and Vos, 2004). However, future management conditions are still to be defined, due to changes in social demand and to the threat of decreases in incomes generated by its

production functions. Research can help in describing the current state of these functions and in identifying existing or potential conflicts.

Since public involvement is considered as one of the instruments that help increase the successful management of rural areas (for example, Konijnendijk, 2000), information on public demand and preferences is needed. This paper presents the results of a survey undertaken in the Alentejo region, in the area where the cork-oak Montado is dominant, concerning the use and assessment of 'new' rural functions in the Montado by its land users and landowners, in order to obtain knowledge on how this system is valued from different points of view. The aim is to contribute to the future management of 'new' rural functions, or non-commodity functions, in the Montado by providing information about the present situation. Results regarding visitor profiles, current activities practised in the Montado, perceived limitations and improvements suggested by land users, as well as landowners' attitudes towards these functions, are presented and discussed.

The Montado – a multifunctional system awaiting multifunctional management

The idea of the multifunctionality of rural landscapes is widely connected with providing social functions. These functions are not totally new; they have always been part of rural life, and include, for example, picnicking or hunting. It seems, however, that the more urbanized lifestyle of contemporary societies requires these functions to be in an innovative form. Besides recognizing the importance of the multifunctionality of the landscape, both in the scientific community and in the definition of policy objectives (for example, the Second Pillar of the Common Agricultural Policy), a more concrete definition of steps towards achieving multifunctionality is needed.

In the Alentejo, the southern region of Portugal, large private farm units prevail. A dominant land use in this region is the agrosilvopastoral system known as Montado, which has existed for centuries in more or less developed and intensive management forms (Fonseca, 2004). Its appearance is that of a generally open, savanna-type, evergreen oak woodland. The dominant tree species are cork oak (*Quercus suber* L.) or holm oak (*Quercus ilex*, spp. *rotundilfolia* L.). Traditionally, this system has been exploited by multiple land users, combining the exploitation of the tree cover, both for cork and for charcoal, and a rotation of grazing, cultivation and fallow in the undergrowth (Pinto-Correia, 1993). The main products of the cork-oak part of the Montado are cork and meat from livestock breeding. Cereals used to be produced in the Montado until some decades ago, but have been disappearing, due to extensification trends (Pinto-Correia and Mascarenhas, 1999). Where crops are grown today, their purpose is to produce forage for cattle. Nowadays, the system is therefore mainly a silvopastoral system. These production functions, maintained with no need for considerable investments, ensure an income for the landowners, as cork is highly valued in the market and cattle highly supported by the CAP.

Apart from these main productive functions, the Montado secures social functions for the local populations and for visitors, as it is used directly, for instance, by hunters, bee-keepers and mushroom pickers, as well as by those who like walking in the countryside. Historically, the first group of functions was important for the rural population in supplementing food resources (Fonseca, 2004). Today, hunting can be managed in two ways: through the municipal domain and hunting associations; or on a touristic basis, in which estates are closed to other types of hunting and have an obligation to fulfil a game management plan, and in which hunters from outside the area pay for this activity. This last modality can offer an economic supplement to landowners. With regard to bee-keeping, the Mediterranean vegetation communities in the Montado are rich in various aromatic plants, responsible for the high quality of honey in this region. As for mushrooms, the semi-open forest and the low intensity of soil mobilization create the right conditions for a valuable development of mushrooms. Certainly, their richness also depends on the quality of the soils.

The main issue in this situation is that all these functions are appreciated by society, but do not contribute to the maintenance of the system – only livestock production and cork harvesting represent an income for landowners. If public policies targeting the possible maintenance of the Montado are to be defined, or improved, there is a need for more knowledge on the specificity of the social demand for this particular area.

Study area and method

Study area

Four small towns in the north-western part of the region of Alentejo were selected as the main centres for the interviewing process: Alcácer de Sal, Montemor-o-Novo, Évora and Coruche (Figure 1). These towns are situated in surroundings where the cork-oak Montado dominates and already has a multifunctional usage, which benefits local inhabitants and urban dwellers from the metropolitan area of Lisbon, as well as foreign tourists. Furthermore, non-profit organizations in these towns provide information and contacts with land users and landowners.

The climate in the studied area has Mediterranean and continental characteristics, with a long dry season during very hot summers, fresh winters and high amplitude of daily temperatures. The study area features a rippled plain, associated with extensive use and dominance of large estates (over 200 ha) that combine cereal production (nowadays mainly for forage) and livestock grazing in open pastures or under the Montado tree cover, cork and wood production in the Montado, forest plantations of *Eucalyptus globulus* Labill. and *Pinus pinea* L., and more recently, vines. In the municipalities of Alcácer de Sal and Coruche, there are also rice plantations. The average annual temperature is 16.5°C and average annual precipitation is 600–700 mm.

Population density is low: in Alcácer de Sal, 10/km^2; Montemor-o-Novo, 15/km^2; Coruche, 19/km^2; and Évora, 43.2/km^2. The population is concentrated in towns or large villages, in a characteristic contrast between towns and the countryside. The total population has been decreasing steadily in the last decades, mostly in the

Figure 1. The main distribution of cork oak (*Quercus suber* L.) and holm oak (*Quercus ilex*, spp. *rotundifolia* L.) in Portugal. *Note:* The numbered points indicate the areas where the survey was carried out: the small towns of Coruche, Montemor-o-Novo, Alcácer de Sal and Évora. Lisbon is also indicated, as the survey targeting urban dwellers was carried out there as well.

dispersed farmsteads and smaller villages. As the region does not offer many alternative job opportunities, younger people tend to leave when the extensive farming systems employ increasingly fewer people. Improving the multiple uses of the landscape, particularly in the specific Montado system, could be a way towards a more diversified economy and a higher social value for the region's rural attributes.

Method

An approach based on a qualitative research method using interviews was applied, in order to gain detailed information about use and evaluation of the Montado. The purposeful sampling (Patton, 2002) employed in this study was focused on current activities in rural areas. The following groups of current users were identified in the Montado area: landowners, workers, hunters, bee-keepers, mushroom pickers, inhabitants, new rural inhabitants, urban visitors and foreigners (Surová and Pinto-Correia, 2008). To take various standpoints into account, several members of each user group were interviewed. The requirement for the selection of respondents was their previous use of the Montado, and they were asked to answer according to the point of view of their main activity in the rural area. Collaborations with hunters, tourists, bee-keepers and landowner associations were established in the selected towns. Potential respondents were randomly selected from existing contacts in associations, and contacted personally or by telephone. Interviews with those who accepted were carried out individually. In all, 232 face-to-face interviews were carried out: workers (N = 26), hunters (N = 26), bee-keepers (N = 29), mushroom pickers (N = 12), foreign tourists (N = 24), new rural inhabitants (N = 31), rural inhabitants (N = 28), urban dwellers from Lisbon (N = 28) and landowners of the cork-oak Montado (N = 28).

At the beginning of the interview, the respondent was given a short introduction on the purpose of the study. In order to gain information about the social characteristics of Montado users, socioeconomic variables such as gender, age, education, number of family members and income were recorded during the interview. The users interviewed responded to several questions about activities practised in the Montado, namely: 'What activities have you already practised in the Montado?' 'When have you practised these activities in the Montado (during the week, weekend or holidays)?' 'In which season?' With regard to existing difficulties and possible improvements related to their activities: 'Do you feel any difficulties about visiting the Montado?' 'What are the difficulties?' 'Do you think that there are any improvements to be made with regard to the activities you practise in the Montado?' 'Which improvements do you mean?' The landowners were asked to describe the current implementation of 'new' functions in the management of their farms: 'What activities are currently performed on your estate?' and motivations for them: 'Choose the main motivation for each activity to be performed on your estate from the following list: economy, tradition, social right and ecology'. 'In the future, do you want to change the current situation with regard to the activities performed on your estate?' If the response was yes, the following question was asked: 'What kind of change do you mean?'

Answers were subsequently analysed through descriptive statistics or, if related to open-ended questions, through content analysis. Answers to open-ended questions were broken down into a series of short phrases, and the phrases were sorted into categories that expressed similar meanings. The content analysis is adequate to identify concepts, key issues, themes and patterns in communicative texts in order to arrive at interpretative and quantitative summaries of qualitative data (Patton, 2002).

Results

Table 1 shows the socioeconomic characteristics of respondents in this study. Most of the respondents were male. The main male activities practised in the Montado were hunting, bee-keeping and managing the Montado system. The number of respondents with graduate education, mainly in groups of tourists and new rural inhabitants, is significant.

Most respondents practised more than one type of activity in the Montado. The main activity of respondents was walking, followed by sightseeing by car and picnicking (Table 2). The favourite season for these activities is spring, apart from hunting and mushroom picking, which are carried out predominantly during autumn and winter. By contrast, the Montado was less visited by respondents in summer. Weekends were preferred as the best time to practise most activities.

Table 1. Socioeconomic variables (categories) of respondents and their representation in percentages.

Socioeconomic variables	Categories	All (n = 232)	W (n = 26)	H (n = 26)	B (n = 29)	M (n = 12)	F (n = 24)	N (n = 31)	R (n = 28)	U (n = 28)	L (n = 28)
Gender	Males	66	62	92	100	83	42	32	46	50	96
	Females	34	38	8	0	17	58	68	54	50	4
Age	18–30 years	18	12	12	3	25	8	29	32	36	4
	31–45 years	33	38	31	28	33	33	35	29	29	39
	46–60 years	32	38	54	34	25	46	23	29	14	25
	>60 years	18	12	4	34	17	13	13	11	21	32
Education	Primary school	15	35	12	41	25	0	0	11	14	0
	Secondary school	29	42	35	38	42	4	6	43	32	29
	High school	11	4	12	3	0	17	10	18	11	18
	Graduate	45	19	42	17	33	79	84	29	43	54
Family	1–2 persons	46	50	31	41	50	63	48	46	57	32
	3–4 persons	47	50	65	59	25	33	45	43	36	50
	>4 persons	7	0	4	0	25	4	7	11	7	18
Family income	<1,000 euros	24	35	4	48	58	4	23	32	21	4
	1,000–2,000 euros	38	46	50	31	33	38	29	43	39	36
	2,000–5,000 euros	31	19	38	17	8	42	39	21	32	54
	>5,000 euros	6	0	8	3	0	17	10	4	7	7

Note: W – workers; H – hunters; B – bee-keepers; M – mushroom pickers; F – tourists; N – new rural inhabitants; R – rural inhabitants; U – urban dwellers; L – landowners.

Table 2. Activities practised in the Montado by respondents (numbers are percentages of all land users interviewed).

	Activities practised in the Montado by respondents										
	Walking	*Biking*	*Jogging*	*Hunting*	*Taking pictures*	*Picnicking*	*Sightseeing by car*	*Aromatic plant picking*	*Mushroom picking*	*Horse riding*	*Bee-keeping*
	80	28	5	24	36	29	72	21	19	5	19
Autumn	43	14	3	19	16	6	35	5	12	1	6
Winter	33	10	2	20	13	11	32	2	10	0	4
Spring	55	16	4	0	23	21	39	15	6	2	11
Summer	24	12	2	5	12	5	37	5	0	0	8
Week	17	7	2	3	7	7	25	5	4	0	10
Weekend	50	20	3	20	22	18	33	15	15	4	9
Holidays	13	2	0	0	7	4	13	1	0	0	0

Table 3. Implementation of activities in the management of interviewed landowners' estates and the main motivation for each function.

Activities implemented	Properties (%)	Main motivation			
		Economic	*Tradition*	*Social*	*Ecological*
Hunting	89	61	11	0	18
Mushroom picking	54	4	7	39	0
Bee-keeping	46	0	11	32	4
Rural tourism (accommodation)	29	18	0	7	4
Voluntary free access for public	18	0	4	14	0
Pedagogic activities	14	11	4	0	0

The majority of land users interviewed (53%) had experienced some difficulties with visiting the Montado. From this group, approximately 74% of respondents complained about hindrances to access, specifically fences and closed gates, or respect for private property. In this last case, the respondents referred to lack of information about the possibilities regarding access to the area. Twenty per cent of the respondents mentioned problems with transport to get to a Montado area, due to not having their own car or because too much time was needed. Concerns about safety due to a lack of information about wild cattle, hunting zones or fire risk were mentioned by 13%. Seven per cent referred to a lack of orientation facilities, such as, for instance, signposting of footpaths and tourist information. About 7% of the group highlighted restrictions on mushroom and asparagus picking as being problematic.

With regard to possible improvements, 89% of the land users interviewed agreed that they were needed. These were related to the identification of footpaths, tourist and education information in the fields and access possibilities (36% of respondents). Other topics mentioned were the distribution of maps of footpaths, tourist guidebooks, information on the Internet promoting the Montado landscape (28% of respondents); improvement of public access to areas of interest that are privately owned (28%); organizing guided visits with explanations of diverse topics, cork debarking demonstrations, environmental education of the public about preservation of the Montado (16%); development of infrastructures, bed & breakfast accommodation in rural areas (7%); authorization of activities such as picking mushrooms and asparagus (7%); provision of amenities such as picnic tables, litter bins and rest areas (6%) and construction of more dams in order to diversify the Montado landscape (4% of respondents). The majority of the bee-keepers interviewed suggested improvements of conditions for their activities, in particular identification of appropriate zones with shrub maintenance and free access for bee-keepers to these zones (66% of bee-keepers).

Types of 'new' activities incorporated into the estate management of interviewed landowners are presented in Table 3. Hunting was widely included, due to its economic benefit for landowners. Activities such as mushroom picking and bee-keeping were included on about half of the estates, due predominantly to social (but partly traditional) reasons. Rural tourism and educational activities were also available on a few properties on account of the economic profit involved. Few of the landowners interviewed mentioned voluntary authorization of free access for the public. The results obtained by qualitative analysis of landowners' answers with regard to management changes in the future highlighted three types of attitudes to 'new' rural functions. About half of the landowners had put into practice some of the 'new' rural functions, or intended to include them in their estate's management. Some of the landowners interviewed (18%) had traditionally allowed free access to their properties and did not intend to make any changes in this state of affairs or include other 'new' functions in their management. Others (32%) did not currently authorize free access to the public, and had no intention of changing this situation in the future. Few landowners perceived the 'new' activities as a further complication for the purely productive management of their estates.

Discussion and concluding remarks

This paper aimed to survey the use and assessment of 'new' rural functions in the Montado, both by its land users and landowners. After an examination of visitor profiles, the results show that a diversity of people use the Montado areas for leisure. The abundance of visitors with higher education is noteworthy. The fact of fewer visits during the summer season can be ascribed to the climatic conditions, with dry and very hot summers, and to the increased fire risk during this season. Walking was the main activity practised by respondents, followed by sightseeing by car, which is probably related to the high scenic attractiveness of this type of landscape: an undulating terrain allowing different panoramic views across the open savanna-like landscape, with changing densities of trees and varying pasture composition.

The Montado is appreciated for different activities, and there is increasing pressure from today's society for more socially sensitive management. The majority of respondents expressed some difficulties encountered in visiting the Montado areas, mainly due to access limitations. This problem has been notable in the past decade, when large open areas that existed in the past, perceived as being open to the public, are now changing into fenced areas, with access restrictions or without information on access possibilities. The fencing of estates allows for the control of livestock grazing areas, but could also contribute to the control of visitor access during the summer. This control could be a solution to the fire risk and the application of property rights for externalities such as mushroom picking and hunting, which could then be paid for by users. The increased consideration of economic interests concerning these externalities leads to increasing pressure by landowners to privatize these goods (Merlo and Croitoru, 2005). Even this fencing trend could be perceived as a step forward in managing social functions through the control of visits, if it were to be followed by subsequent steps such as the improvements mentioned by land users in this study. The improvement of infrastructure such as footpaths and route indicators, signposting in the fields, and the setting up of interpretation panels, could provide information for visitors so they could discover more about the landscape they were enjoying. These improvements would additionally allow for a higher degree of independence for the occasional visitor, who would not need to be part of large guided groups of visitors. This could consequently increase the quality of the experience by visitors.

Most landowners are still mainly engaged in productive activities, as these are their main source of income. Yet, probably due to its long tradition in rural areas, hunting is practised on most estates, bringing some economic input. With regard to landowners' attitudes about 'new' rural functions, better preparations are required to face the current social demands. The important role of 'communication' between stakeholders

is stressed by various authors (for example, Brunori and Rossi, 2007; Konijnendijk, 2000). More communication would most probably help people to understand the restrictions imposed, or desired, by landowners, and on the other hand, it would enhance farmers' understanding about what the public expects and demands from rural areas.

Economic incentives for landowners could also improve the current situation, for example, with support for the development of 'new' functions, such as payments and grants for the upkeep of paths and other facilities; or compensation for additional work undertaken to create conditions for public access. But still the economic incentives should be accompanied by other tools, such as best practice guidelines produced as a result of cross-sector collaboration.

This study contributes to a reflection about the current situation of 'new' rural functions in the Montado in southern Portugal, and brings to light several aspects that are important for the successful inclusion of these functions into the management of private estates within the Montado system. Besides the economic benefits for landowners that accrue from 'new' rural functions, another support measure would consist in providing help for landowners in the implementation process. Furthermore, a clear definition of the rights and responsibilities of land users and landowners concerning the functions mentioned is essential. Somehow, the need for these various measures to improve the multifunctional use of the Montado emerges from the evidence, since the most important potential is there: the attractiveness of the Montado, and the possible and already existing links between commodity and non-commodity functions.

References

Brunori, G., and Rossi, A. (2007), 'Differentiating countryside: social representations and governance patterns in rural areas with high social density: the case of Chianti, Italy', *Journal of Rural Studies*, Vol 23, No 2, pp 183–205.

European Landscape Convention (2000), Florence.

Fonseca, A. (2004), *O Montado no Alentejo (Séc. XV a XVIII)*, Edições Colibri, Portugal.

Gomez-Limon, J. and Fernandez, L. J. V. (1999), 'Changes in use and landscape preferences on the agricultural–livestock landscapes of the central Iberian peninsula (Madrid, Spain)', *Landscape and Urban Planning*, Vol 44, No 4, pp 165–175.

Konijnendijk, C. C. (2000), 'Adapting forestry to urban demands – role of communication in urban forestry in Europe', *Landscape and Urban Planning*, Vol 52, No 2–3, pp 89–100.

Merlo, M., and Croitoru, L., eds (2005), *Valuing Mediterranean Forests, Towards Total Economic Value*, CAB International, Wallingford.

Patton, M. Q. (2002), *Qualitative Research and Evaluation Methods*, 3 ed, Sage Publications, Thousand Oaks, CA.

Pinto-Correia, T. (1993), 'Threatened landscape in Alentejo, Portugal: the "Montado" and other "agro-silvo-pastoral" systems', *Landscape and Urban Planning*, Vol 24, No 1–4, pp 43–48.

Pinto-Correia, T., and Mascarenhas, J. (1999), 'Contribution for the extensification/intensification debate: what is happening to the Portuguese Montado?' *Landscape and Urban Planning*, Vol 46, No 1–3, pp 125–131.

Pinto-Correia, T., and Vos, W. (2004), 'Multifunctionality in Mediterranean landscapes – past and future', in Jongman, R. H. G., ed, *The New Dimensions of the European Landscape*, Wageningen UR Frontis Series, Springer, Dordrecht, pp 135–164.

Plieninger, T., Modolell y Mainou, J., and Konold, W. (2004), 'Land manager attitude toward management, regeneration and conservation of Spanish holm oak savannas (dehesas)', *Landscape and Urban Planning*, Vol 66, No 3, pp 185–198.

Surová, D., and Pinto-Correia, T. (2008), 'Landscape preferences in the cork oak Montado in the region of Alentejo, southern Portugal: searching for valuable landscape characteristics for different user groups', *Landscape Research*, Vol 33, No 3, pp 311–330.

Paper IV

Surová D. and Pinto-Correia T. (2008) Landscape preferences in the cork oak Montado region of Alentejo, southern Portugal: Searching for valuable landscape characteristics for different user groups. *Landscape Research*, Vol. 33, No 3, pp 311 - 330.

Landscape Research,
Vol. 33, No. 3, 311–330, June 2008

Routledge
Taylor & Francis Group

Landscape Preferences in the Cork Oak Montado Region of Alentejo, Southern Portugal: Searching for Valuable Landscape Characteristics for Different User Groups

DIANA SUROVÁ & TERESA PINTO-CORREIA
Group on Mediterranean Ecosystems and Landscapes/ICAM, University of Évora, Portugal

ABSTRACT *The Montado is the open savannah-like landscape predominant in southern Portugal. This landscape results from an extensively managed agro-silvo-pastoral system and has for a long time been appreciated for a variety of other uses. Research is needed in relation to the links between the various intensities of use, the resulting landscape patterns and new societal functions. In this study the preferences of user groups representing these functions are surveyed in relation to these diverse landscape patterns. Interviews with land users and also landowners were carried out using photograph preference techniques relating to the management options of the cork oak Montado. The results showed divergences among hunters, mushroom pickers, beekeepers, landowners, Portuguese walkers and foreign walkers. The content analysis of qualitative data revealed preferences relating to landscape characteristics. In particular, walkers were receptive not only to objective features, but particularly perceived the importance of subjective experiences in landscape.*

KEY WORDS: Montado, management, landscape preferences, multifunctionality

Introduction

New Perspectives to Look at the Rural Landscape

The European Landscape Convention (2000) states that landscape is an important contributor to the quality of life of people everywhere. Throughout Europe, the demand for new uses of landscape such as hunting, leisure, recreation, appreciation of traditional landscapes and activities that lead to quality of life, is increasing. To understand the landscape management requirements of such new uses, more knowledge about the landscape preferences of users is needed in order to ensure that the management responds to the changing demands on the landscape and the needs

Correspondence Address: Diana Surová, Group on Mediterranean Ecosystems and Landscapes/ICAM, University of Évora, Núcleo da Mitra, Apartado 94, 7002-554, Évora, Portugal. Email: dj@uevora.pt

ISSN 0142-6397 Print/1469-9710 Online/08/030311-20 © 2008 Landscape Research Group Ltd
DOI: 10.1080/01426390802045962

of modern society. These functions have a social value and correspond thus to public services or goods. However, in economic terms they have currently no market value or have markets that do not function adequately, for example, the users have not been used to pay for such goods in the past, and they are therefore designated as 'non-commodity outputs' (OECD, 2001). However, the increasing demand for these functions may lead to a shift in status that means that they earn a monetary value through new market conditions or public interventions (Wiggering *et al.*, 2006). This may provide a new income potential for landowners that is dependent upon societal demand and preferences.

As values such as diversity, coherence and identity of traditional land use systems in Europe are recognised, it is more likely that improved maintenance systems will be developed and new rural functions identified (Antrop, 2005). This may contribute to the management of landscapes as multifunctional relating to both the private and public policy sectors (de Groot, 2006). However, before this can be achieved more research concerning the preferences of different user groups is needed.

The Montado: Traditional Land Use System Faced with New Societal Demands

The Montado is the agro-silvo-pastoral system dominant in the Alentejo in the southern region of Portugal. This system has existed for centuries in a more or less developed and intensively managed form (Fonseca, 2004). The landscape appearance is commonly of open, savannah-type, evergreen oak woodland. The dominant species of trees are cork oak (*Quercus suber, L.*) and holm oak (*Quercus ilex, spp. Rotundilfolia, L.*). Traditionally this system is exploited by multiple land uses, combining the exploitation of tree cover, both cork and wood for charcoal, and a rotation of grazing, cultivation and fallow in the under cover (Pinto-Correia, 1993). The principal products from the Montado are therefore cork and meat from livestock breeding. Cereals used to be produced in the Montado until some decades ago, but have been disappearing, due to extensification trends (Pinto-Correia & Mascarenhas, 1999). Where there is crop cultivation today it is to produce forage for the cattle, and so the system is now mainly a silvo-pastoral system. These production functions, maintained with no need for much financial investment, secure an income for the landowners; cork is a highly valued good in the market and cattle are well subsidised by the Common Agricultural Policy (CAP).

Apart from these main productive functions, the Montado secures social functions for the local population as it is used by hunters, beekeepers and mushroom pickers. Historically, these functions were important for the rural population to supplement food resources (Fonseca, 2004). Today, hunting can be managed in two ways: through the municipal domain and hunting associations, with no payment to the landowner; or run for tourist purposes where there is an obligation to fulfill a game management plan, and where the tourist hunters pay for their activity. This second option can offer an economic supplement for landowners. Concerning beekeeping, the Mediterranean vegetation in the Montado is rich in aromatic plants that are responsible for the high quality of honey in this region. As for mushrooms, the semi-open forest and the low intensity of soil mobilisation create the conditions for a wide variety of mushrooms.

Nowadays, the growing demand for rural landscape as a space for relaxation and recreation has increased the interest in the Montado which is particularly attractive due to its combination of: a) open and tree covered areas, b) clear and shrub covered understorey, c) a human management regime that provides a semi-natural appearance, d) the presence of livestock in low densities, and e) the presence of wild flora and fauna (Gomez-Limon & Lúcio Fernandez, 1999). There are also new rural settlers who prefer this type of landscape, and tourists who visit these areas specifically for contemplation, walking, riding, bicycle tours, etc. However, the most numerous user-groups are composed of local people who visit the Montado occasionally for aesthetic, recreational or other experiences as an escape from daily routine. Urban visitors also use the areas for recreational purposes but some are also interested in the landscape system and acknowledge its value for multiple functions. The Montado is thus nowadays appreciated in various ways that entail several non-production functions. Yet the present day management is still concentrated on production objectives, even if landowners are aware of the potential interest of the Montado for many other uses and for satisfying diverse human needs (Plieninger *et al.*, 2004). Appropriate recognition of such needs is required in the management of this system, but first a greater understanding is needed concerning landscape pattern preferences of the various users.

Landscape Preferences and Different Perspectives of User Groups

Several studies stress the importance of investigating the landscape preferences of different user groups in order to find out where the preferences differ and converge (e.g. van den Berg, 1998; Willis & Garrod, 1992; Brush *et al.*, 2000). For example, van den Berg (1998) provides an aesthetic evaluation of nature development plans by farmers, visitors, and residents. This revealed important differences between the user groups relating to landscape characteristics and perceived beauty. The survey by Ryan (2006) found some significant differences between the values that rural inhabitants, planners, and homebuilders place on nature. Willis and Garrod (1992) reported similarities in preference between residents and visitors in their work relating to landscape evaluation in Britain. Whether a person grew up in a given landscape type proved to be insignificant in the work of Brush *et al.* (2000), but the interaction between landscape type and participant group (tourist, farmer, forester, etc.) was significant in relation to their enjoyment and the degree of appreciation of a landscape was reflected in landscape preference.

The evaluation of preferences related to different functions is needed to support the development and definition of management objectives. This is particularly important when choosing between different options where the integration of non-commodity functions is considered in parallel to production. An objective may be to achieve maximum satisfaction of some user groups, or to provide some measure of satisfaction for all users.

Aim of the Paper

The present paper forms part of a wider study aimed at developing a decision support system for landowners of the cork oak Montado in southern Portugal. Even

if it is recognised that this system has a high potential for multifunctionality within the increasing social demand for rural landscapes, data on the level and distribution of preferences by different users do not exist to support the required planning of an appropriate management regime. The main goal of the paper is to present and discuss the results of an empirical survey undertaken concerning consensus and divergence within user groups in relation to their preferred Montado type, and the way they use or relate to this type of landscape. Second, methodological issues are also discussed, as this approach has not been applied in its current form in this type of landscape system connected with extensive cattle production and dispersed tree cover.

Method

Study Area

The study refers to the area where the cork oak Montado predominates in the north-western part of the region of Alentejo. Four small towns were selected as main centres for the interview process: Alcácer de Sal, Montemor-o-Novo, Évora and Coruche (Figure 1). The settlements are surrounded by the Montado, which is already used in a multifunctional way by local inhabitants and urban dwellers from the metropolitan area of Lisbon, as well as by foreign tourists. The local landowners' associations in these towns also help to publicize the area through contact with land users and landowners.

The climate in the study area has Mediterranean and continental characteristics with a long dry season during very hot summers, fresh winters and high amplitude of daily temperature. The average annual temperature is 16.5°C and average annual precipitation 600 – 700 mm. In the study area a rippled plain is prevailing and is associated with extensively cultivated areas and the dominance of large properties (more than 200 ha). These combine the production of cereals (nowadays mainly for forage) with livestock grazing in open pastures or under the Montado trees, cork and wood production, the forest plantations of *Eucaliptus globulus* and of *Pinus pinea*, and more recently vine cultivation. In the municipalities of Alcácer de Sal and Coruche there are also rice plantations.

The population density is low and concentrated in cities or large villages: in Alcácer de Sal 10 hab/km^2; Montemor-o-Novo 15 hab/km^2; Coruche 19 hab/km^2 and Évora 43.2 hab/km^2. The total population has been decreasing steadily in recent decades, mostly in the dispersed farmsteads and smaller villages. As the region does not present many alternative job facilities and as farming systems employ fewer and fewer people, younger people tend to leave. Improving the multiple uses of the landscape, particularly in the specific Montado system, could be a way to achieve a more diversified economy and a higher social value for the region.

Visual Stimuli

Photographs, edited by computer technology, were used as visual stimuli in the research. However there are problems in using photographs in this way as a surrogate for field experience, for example, the difficulty in achieving realism in

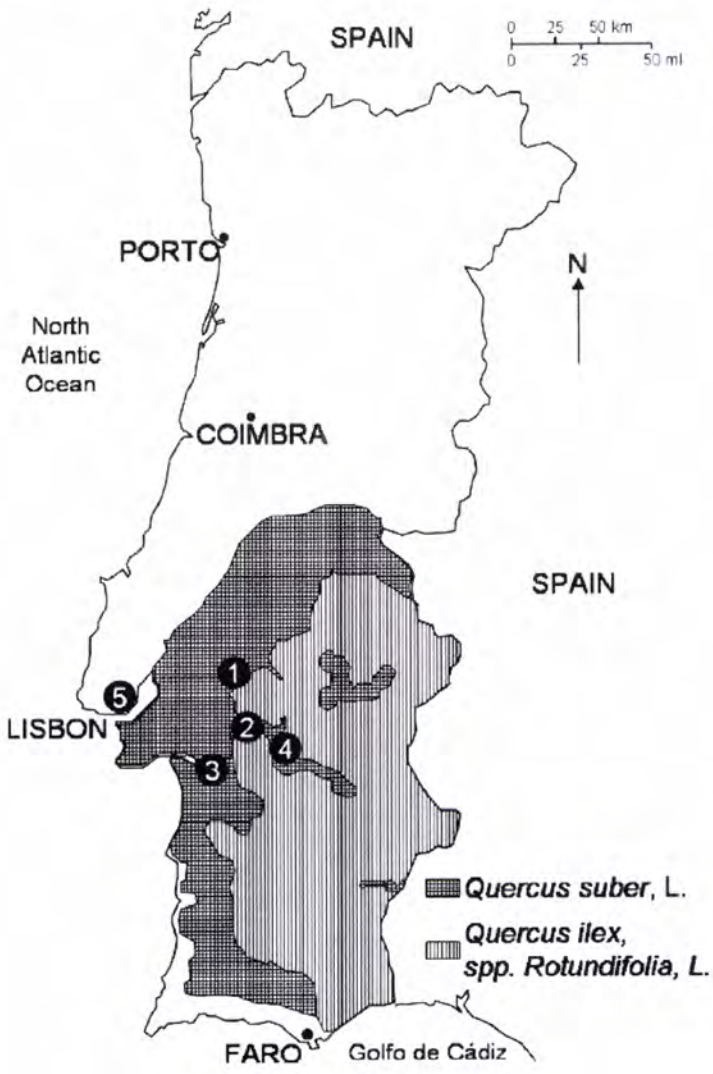


Figure 1. The main distribution of cork oak (*Quercus suber*, L.) and holm oak (*Quercus ilex*, spp. *Rotundifolia*, L.) in Portugal. The numbers indicate the five towns where the survey was applied: Coruche (1), Montemor-o-Novo (2), Alcácer de Sal (3), Évora (4), and Lisbon (5)—where the survey to urban dwellers was applied. (Base source: Carta de Ocupação do Solo—COS' 90, IGP).

computer-generated images and the static nature of the view and the weather, etc. There are also advantages: by using photographs it is possible to show a larger number of alternative landscape patterns, and also to control the properties of the visual stimuli. Despite the omission of the third dimension (sensations like smelling, touching and hearing), great similarity was found in the response to two dimensional representations and the response to the real landscape (e.g. Kaplan & Kaplan, 1989). Fourteen 10 × 15 cm colour photographs, corresponding to different management options for trees, grass, shrubs and livestock were used (Figure 2). In this case, the objective was to compare different types of Montado, corresponding to more or less intensive management and higher or lower density of trees. These combinations result in different types of landscapes. Representations were simplified because not all possible variations of the Montado could be considered. The Montado is an extremely flexible system, with many possible management options and vegetation

A: Open Montado

E: Dense aligned Montado with cows

H: Dense irregular Montado with cows

M: Dense irregular Montado with shrubs

N: Highly dense irregular Montado with shrubs

Figure 2. Examples of photographs used during the interviews, representing landscape patterns in Montado resulting from different management options. All Montado types studied in the present work are mentioned in Table 1.

densities, resulting in a wide variation in landscape types. Four main aspects influenced by landowners' management were considered: presence and density of shrubs, presence of livestock, density of trees, and distribution of trees. These are the dimensions that mostly influence landscape pattern. About 500 colour photographs

were taken from July to September 2004 in the study areas using a Minolta DiMAGE digital camera. The aim was to capture different patterns of cork oak Montado, on clear days, in areas with an almost flat horizon, with no people or man-made elements (roads, electric power lines, farm buildings, etc.) and with an absence of water features. Finally, the photographs were selected and edited by computer technology to eliminate differences in sky colour, and to manipulate the presence of livestock and the changing densities of shrub cover.

Survey Design

An approach based on qualitative research methods, through purposeful sampling (Patton, 2002) was used to interview and obtain data from a variety of user groups of the Montado. Nine groups of users were chosen corresponding to different activities: managing, working, hunting, beekeeping, mushroom picking, long-term inhabitants, recent inhabitants, visiting from urban area and foreign tourists. Collaboration with hunting, tourist, beekeeping and landowners' associations was established in the selected towns. Respondents were randomly selected from existing contacts in occupational associations. Personal interviews with those who accepted were carried out. In all, 232 such interviews were carried out: workers ($N=26$), hunters ($N=26$), beekeepers ($N=29$), mushroom pickers ($N=12$), foreign tourists ($N=24$), new rural inhabitants ($N=31$), rural inhabitants ($N=28$), urban dwellers from Lisbon ($N=28$) and landowners of the Montado of cork oak ($N=28$). Each respondent was assigned to one category of users and was interviewed as such, even if he or she could be included in more than one group. For example, a hunter can also be a local inhabitant, but if he was interviewed as a hunter, this was clarified at the start of the interview and answers were taken on this basis.

At the beginning of the interview, the respondent was given a short introduction as to the purpose of the study. The respondents were asked to choose three preferred photographs from the point of view of their main activity in the Montado and to explain their choice through an open explanation. The closed-ended questions about landscape preferences for different landscape types were complemented by open-ended questions in order to gain more complete information about the landscape characteristics which were considered to be particularly valuable by each respondent. This qualitative context was assumed to be important for the understanding of how different landscapes are experienced (Patton, 2002).

Data Analysis

The statistical design used, applied the frequency statistics for the preferences for type of Montado, and the Pearson's chi-square test (χ^2) using the following variables: gender, age, family income, number of family members, education level and user group. A significance level of p-value 0.05 was used for all tests.

To identify the most important reasons for the respondents' decisions concerning the preferred Montado type, a content analysis was applied to the open explanations of the respondents. Each description was broken down into a series of short phrases, and the phrases were sorted into categories that expressed similar meanings. Content analysis is commonly used to identify concepts, key issues, themes and patterns in

communicative texts, in order to arrive at interpretative and quantitative summaries of qualitative data (Patton, 2002).

Results

Analysis of Quantitative Preference Data

The first step in analysing the quantitative preference data was a frequency analysis, in order to reveal the photos preferred by all respondents together (Table 1). The most frequently chosen by 38% of respondents (each in a set of three preferred photos) was the photo representing highly dense, irregular Montado, with shrubs. The next most preferred photo, by 32% of respondents, represents dense irregular Montado without livestock and shrubs. The third most preferred are two photos, both preferred by 27% of respondents, one showing a dense irregular Montado with shrubs and the other, an open Montado. The least preferred (10% of respondents) was a photo presenting an open Montado, with sheep.

The next step was to look for variables having significant effect on the preferences expressed. The influence of the socio-economic variables and user group was analysed using the cross-tabulations and looking at the significant level of Pearson's chi-square tests. As shown in Table 2, two variables had p-values < 0.05: gender and user group. The user groups of hunters, beekeepers and landowners were represented in 98% by men. Owing to this, the significance of the effect of gender on preferences was examined in the other respondent groups. The p-value of the Pearson chi-square test was 0.700 (Table 2). Consequently, it is not possible to consider gender as a significant variable in these landscape preferences. The variables of age, number of family members, family income and education level proved to be insignificant, as they had p-values > 0.05. This finding indicates that preferences for different Montado types do not depend on socio-economic variables of its land users.

In order to assess if all user groups, defined at the beginning of the study, are significantly different or not, in relation to their preferences for Montado types, the next step of cross-tabulations was executed. Again, the significance level of p-value 0.05 was used. To obtain significantly different user groups, reorganisation of the initial groups was needed as a way to merge similar groups according to their preferences. The corresponding p-values are shown in Table 3. A p-value < 0.05 means that the two considered groups have a significantly different set of preferences. In this case, groups of tourists, new rural inhabitants, urban dwellers, rural inhabitants and workers are not significantly different in their preferences. However, their origin was not equal. The interviewed tourists and new rural inhabitants come from Northern Europe. They came to visit, or live in the region of Alentejo, and their main activities in the Montado are walking and observing. Their contact with the Montado system is quite recent in comparison with the Portuguese respondents. The same main activities are practised by the groups of urban dwellers, rural inhabitants and workers, though they are all Portuguese, who have been familiar with the Montado landscape system from childhood. A difference test of previously mentioned Portuguese walkers and foreign walkers by cross-tabulation of their preferences revealed some significance (p-value 0.029). Hence, in order to simplify the analysis, in the following text, the group called 'foreign walkers' gathers together

Table 1. Preferences expressed for Cork Oak Montado types by choosing three preferred photos from the point of view of the main activity in the Montado, undertaken by each interviewee

	Montado types by ascending aspect of wilderness	All respondents ($n=232$)		User groups											
				H ($n=26$)		L ($n=28$)		MP ($n=12$)		B ($n=29$)		PW ($n=82$)		FW ($n=55$)	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
A	Open	63	27	19	73	1	4	0	0	2	7	27	33	14	25
B	Open with cows	48	21	3	12	2	7	0	0	2	7	27	33	14	25
C	Open with sheep	24	10	2	8	0	0	0	0	2	7	13	16	7	13
D	Dense aligned	61	27	11	42	15	54	2	18	1	3	24	29	8	15
E	Dense aligned with cows	30	13	0	0	9	32	0	0	0	0	18	22	3	5
F	Dense area aligned with sheep	34	14	1	4	14	50	0	0	0	0	14	17	5	9
G	Dense irregular	74	32	12	46	11	39	6	50	2	7	22	27	21	38
H	Dense irregular with cows	49	21	0	0	9	32	3	25	0	0	23	28	14	25
I	Dense irregular with sheep	45	19	0	0	8	29	1	8	0	0	19	23	17	31
J	Dense aligned with sheep and shrubs	27	12	1	4	4	14	0	0	9	31	7	9	6	11
K	Dense aligned with shrubs	55	24	12	46	4	14	7	58	18	62	9	11	5	9
L	Dense irregular with sheep and shrubs	36	16	1	4	1	4	3	25	9	31	13	16	9	16
M	Dense irregular with shrubs	63	27	6	23	4	14	7	58	19	66	11	13	16	29
N	Highly dense irregular with shrubs	87	38	10	38	2	7	7	58	23	79	19	23	26	47

The first two columns refer to the preferences of all respondents together; the next part of the table shows distribution of preferences of significantly different user groups. Legend: H: hunters; L: landowners; MP: mushroom pickers; B: beekeepers; PW: Portuguese walkers (rural inhabitants, workers in rural areas, urban dwellers); FW: Foreign walkers (tourists and new rural inhabitants).

Table 2. Chi-square tests (χ^2) relating preferences for a Montado type with socio-economic variables and user group

	Pearson χ^2			Likelihood Ratio			Linear-by-Linear Association		
χ^2 Tests	value	df	*p*-value*	value	df	*p*-value*	value	df	*p*-value*
Gender	29.789	13	0.005	30.651	13	0.004	5.638	1	0.018
Gender[a]	9.926	13	0.700	10.085	13	0.687	0.013	1	0.910
Age classes	45.478	39	0.220	47.151	39	0.174	35.350	1	0.060
Number of fam. members	14.380	26	0.968	14.801	26	0.961	0.114	1	0.736
Family Income classes	50.735	39	0.099	50.717	39	0.099	5.605	1	0.018
Education level	44.746	39	0.243	46.867	39	0.181	1.541	1	0.214
User group	338.064	104	0.000	367.667	104	0.000	1.488	1	0.223

*asymptotic significance (2-sided).
[a]respondents without hunters, beekeepers and landowners.

Table 3. The *p*-values obtained by Pearson's chi-square test (χ^2) from cross-tabulation of preferences for Montado patterns with user groups defined at the beginning of the study

	User groups							
	W	H	B	MP	T	NRI	RI	UD
W								
H	0.000							
B	0.000	0.000						
MP	0.000	0.001	0.002					
T	0.242	0.000	0.000	0.016				
NRI	0.227	0.000	0.000	0.003	0.418			
RI	0.400	0.000	0.000	0.000	0.347	0.101		
UD	0.287	0.000	0.000	0.000	0.040	0.007	0.559	
L	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Legend: H: hunters; L: landowners; MP: mushroom pickers; B: beekeepers; RI: rural inhabitants; W: workers in rural area; U: urban dwellers; T: tourists; NRI: new rural inhabitants.

tourists and new rural inhabitants, and the group of urban dwellers, rural inhabitants and workers is combined to form 'Portuguese walkers'. The remaining user groups, hunters, landowners, mushroom pickers and beekeepers, were shown to be significantly different, with no need for re-grouping. Summing-up, six groups of users with five different activities were recognised as significantly different in their preferences for the Montado types (Table 1).

Most of the hunters (73%) preferred the photo showing open Montado. In second place of preferred Montado patterns by hunters (46%) were the photos with dense irregular Montado and dense aligned Montado with shrubs. The common aspect of the favourite patterns by this user group was the absence of livestock. The majority of the landowners (54%) chose the densely aligned Montado, and thereafter (50%) selected the same pattern with sheep. Mushroom pickers and beekeepers generally valued the patterns with shrubs in the understorey most highly, specifically the highly dense irregular pattern with shrubs (79% of beekeepers and 58% of mushroom pickers). The most preferred photographs for the Portuguese walkers were open Montado without livestock (33%) and with cows (33%). The foreign walkers preferred mostly (47%) highly dense irregular pattern with shrubs. The diversity of the Montado patterns chosen by both groups of walkers can be observed in the results in Table 1.

Analysis of Responses for Open-ended Question

The objective of this analysis was to explore the landscape characteristics that are important for the preferences of the different user groups identified in the quantitative analysis of preference data (Table 1). The responses of the interviewees to the open-ended question were analysed to obtain categories of similar meanings. Most people used several concepts to explain their preferences. The outline consists of two major sections. One that includes the concepts of objective features in the landscape pattern, and one that includes concepts of subjective experiences associated with these patterns. The objective features refer to livestock, trees,

understorey, structure, vegetation density, shadow, light and human exploration. These general features are further specified in Table 4. The term 'morphology' refers here to the shape and surface of the stem and branches of trees. The concept of 'human exploration' corresponds to the control and cleaning of shrub and/or to the use of the pasture in the undercover. For a Montado pattern with shrubs and/or without pasture, the respondents used the expression 'without human exploration'.

The most frequently mentioned categories connected with preferred landscape patterns were those with livestock presence or absence, succeeded by categories of shrub presence in the understorey. The next step was to consider the results of the content analysis, relating to the different user groups. The most frequently mentioned objective features on preferred photos, by hunters, were absence of livestock and open space. Landowners generally preferred a pattern with aligned structure of trees. The presence of shrubs in the understorey was important for mushroom pickers and beekeepers. And the presence of livestock was important for both groups of walkers.

Eleven concepts of subjective experiences connected with landscape patterns were identified (Table 4), resulting from the aggregation of similar meanings in the responses to open-ended questions. The term 'attraction' represents in this case the meanings connected with the wish to move into the scene and stay there; 'pleasure' is connected with pleasure to see something or pleasure to know that something is in a state that is appreciated. The rest of the terms in Table 4 were present in responses in different grammatical forms; for example the concept 'nature appreciation' was expressed in various forms, as nature, natural, wild, and wilderness. Some user groups were more reactive to the subjective experiences than others. A dichotomy can be observed between walkers, which made frequent mention of the variety of subjective experiences, and other user groups, which mentioned only a few subjective experiences less frequently. Hunters can be placed in an intermediate group, due to the fact that half of them identified the particular importance of visibility, and in a number of cases safety, tradition, identity and memories of the place. The Portuguese walkers generally preferred the experience of tradition, identity and memories of the place, and the foreign walkers mentioned mostly the experience of diversity and nature appreciation.

Relation between objective features in landscape and subjective experiences

As the previous results show, some respondents were apparently perceptive to subjective experiences in the landscape. This reveals an important question in landscape evaluation: "How do objective features in the landscape relate to the subjective experiences of the users?" The qualitative data in this study offer some light on this question. Each concept from the list of subjective experiences identified in the content analysis was related to the objective features mentioned by the respondents (Table 5). If the subjective experience was connected to some objective feature, this combination was given the value 1. The frequencies of all pair combinations mentioned were then identified for all respondents and then, for each user group, separately. Owing to too many existing combinations in responses (131), Table 5 shows only the most frequently mentioned pair combinations of subjective

Table 4. The objective features of landscape and subjective experiences mentioned by respondents for the preferred Montado types in responses to open-ended questions

		All respondents ($n=232$)		User groups											
				H ($n=26$)		L ($n=28$)		MP ($n=12$)		B ($n=29$)		PW ($n=82$)		FW ($n=55$)	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
Objective features in landscape															
Livestock	With livestock	87	38	0	0	15	54	1	8	6	21	42	51	23	39
	Without livestock	52	22	15	58	6	21	6	50	8	28	6	7	11	19
Trees	Solitary	18	8	1	4	1	4	0	0	0	0	7	9	9	15
	Large	10	4	1	4	0	0	0	0	0	0	7	9	2	3
	Aggregate	30	13	0	0	5	18	1	8	1	3	15	18	8	14
	Morphology	12	5	0	0	0	0	0	0	0	0	4	5	8	14
Understorey	Shrubs	52	22	7	27	3	11	11	92	25	86	4	5	2	3
	Clean	44	19	6	23	10	36	0	0	0	0	19	23	9	15
Structure	Irregular	43	19	2	8	6	21	1	8	5	17	13	16	16	27
	Aligned	34	15	5	19	16	57	1	8	2	7	8	10	2	3
Density	Open space	37	16	15	58	0	0	0	0	2	7	9	11	11	19
	Dense area	31	13	12	46	1	4	0	0	4	14	8	10	6	10
Shadow		23	10	1	4	1	4	1	8	1	3	13	16	6	10
Light		16	7	0	0	0	0	2	17	2	7	6	7	6	10
Human exploration		49	21	1	4	8	18	0	0	5	17	25	30	10	17
Without human exploration		19	8	0	0	0	0	4	33	6	21	2	2	7	12

(*continued*)

Table 4. (*Continued*)

	All respondents ($n=232$)		User groups											
			H ($n=26$)		L ($n=28$)		MP ($n=12$)		B ($n=29$)		PW ($n=82$)		FW ($n=55$)	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Subjective experiences														
Nature appreciation	39	17	1	4	0	0	0	0	4	14	17	21	17	32
Diversity	33	14	0	0	0	0	1	8	0	0	12	15	20	36
Mystery	18	8	0	0	0	0	0	0	0	0	9	11	9	19
Visibility	18	8	13	50	0	0	0	0	0	0	9	11	5	8
Safety	10	4	6	23	0	0	0	0	0	0	2	2	2	3
Attraction	33	14	0	0	0	0	0	0	0	0	20	24	13	22
Pleasure	25	11	0	0	0	0	0	0	0	0	12	15	13	25
Interest	20	9	0	0	0	0	0	0	0	0	10	12	10	20
Beauty	42	18	2	8	1	4	0	0	2	7	21	26	16	27
Tranquility	29	13	1	4	1	4	0	0	0	0	18	24	9	18
Experience of tradition, identity and memories of place	29	13	4	15	10	36	1	8	3	10	0	48	11	19

n – number of answers.
Abbreviations are defined in legend of Table 1.

Table 5. Pair combinations of the objective features and the subjective experiences most frequently mentioned by respondents

Objective features in landscape	Subjective experiences	All respondents ($n=232$)		H ($n=26$)		L ($n=28$)		MP ($n=12$)		B ($n=29$)		PW ($n=82$)		FW ($n=55$)	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
With livestock	Experience T,I and MP	31	13	0	0	6	21	0	0	0	0	20	24	5	9
	Pleasure	18	8	0	0	0	0	0	0	0	0	8	10	10	18
	Diversity	13	6	0	0	0	0	0	0	0	0	7	9	6	11
	Attraction	11	5	0	0	0	0	0	0	0	0	8	10	3	5
	Beauty	10	4	0	0	0	0	0	0	0	0	5	6	5	9
Open area	Visibility	22	9	10	38	0	0	0	0	0	0	8	10	4	7
	Beauty	15	6	2	8	0	0	0	0	0	0	3	4	10	18
	Experience T,I and MP	12	5	0	0	0	0	0	0	0	0	7	9	5	9
Understorey – clean	Experience T,I and MP	18	8	2	8	6	21	0	0	0	0	10	12	0	0
	Attraction	13	6	0	0	0	0	0	0	0	0	6	7	7	13
Solitary trees	Beauty	15	6	0	0	0	0	0	0	0	0	6	7	9	16
	Experience T,I and MP	10	4	0	0	0	0	0	0	0	0	3	1	7	13
Aggregate trees	Attraction	15	6	0	0	0	0	0	0	0	0	7	9	8	15
Shadow	Attraction	15	6	0	0	0	0	0	0	0	0	9	11	6	11
Tree's morphology	Interest	14	6	0	0	0	0	0	0	0	0	3	4	11	20
Structure irregular	Nature appreciation	14	6	0	0	0	0	0	0	1	3	9	11	4	7
	Experience T,I and MP	12	5	0	0	5	18	0	0	1	3	3	4	3	5
Understorey – shrubs	Nature appreciation	13	6	0	0	0	0	0	0	1	3	7	9	5	9
Dense area	Nature appreciation	13	6	0	0	0	0	0	0	1	3	6	7	6	11
	Diversity	10	4	0	0	0	0	0	0	0	0	4	5	6	11

Experience T,I and MP = Experience of tradition, identity and memories of place.
n – number of answers.
Abbreviations are defined in legend of Table 1.

experiences with objective features. The main management aspects, initially defined in the study (presence of shrubs and livestock, density and structure of trees) were shown to be important in the preferences of different user groups. The clear understorey emphasised the experience of tradition, identity and memories of the place, by Portuguese walkers and landowners; and the experience of attraction in both groups of walkers. On the other hand, the presence of shrubs supports nature appreciation by walkers. The most frequently mentioned subjective experiences of respondents were connected to the presence of livestock. The livestock in the Montado enhance the experience of tradition, identity and memories of the place, pleasure, experience of diversity, attraction, and experience of beauty. The presence of an open area was connected predominately with visibility; considered as an important characteristic for hunters, and equally with solitary trees, enhancing the experience of beauty and tradition. The irregular structure of trees contributes to nature appreciation and to the experience of tradition, identity and memories of the place. For many of the foreign walkers there was an interest in the morphology of the trees.

Discussion

In this work, the consensus and divergences within user groups in relation to the preferences for different Montado types were identified, and several preferences for valuable landscape characteristics for different user groups were found. The socio-economic variables—gender, age, number of family members, family income and education level of landscape users—were shown to be insignificant in the preferences for Montado types.

The preferences concerning the studied landscape patterns were shown to be significantly different for hunters, mushroom pickers, beekeepers, landowners, Portuguese walkers and foreign walkers. The open area of Montado, without livestock, was the most valued by hunters, providing good visibility and the feeling of safety during hunting. The landscape patterns with shrubs in the understorey were appreciated by beekeepers and mushroom pickers, and most of the mushroom pickers preferred these patterns without livestock. Landowners, in opposition to the majority of other user groups, valorised mainly the aligned Montado patterns, preferably without shrubs, allowing an easier access for mechanisation. For landowners, the aligned patterns are not associated with the experience of tradition, identity or memories of the place, contrary to patterns of irregular structure with livestock presence and clean understorey. A dichotomy can be traced in the perception of landowners regarding current productive management options, and irregular, traditional management options.

The group of Portuguese walkers was defined based on the identified consensus in preferences of rural inhabitants, workers and urban dwellers. The reason for this similarity can be found in the common characteristic of the mentioned groups and this is the familiarity with the Montado land use system. This is an important factor for the experience of landscape (e.g. Bourassa, 1991; Kaplan & Herbert, 1988; Hagerhall, 2000) and it could also explain the differences in preferences between the Portuguese walkers and the foreign walkers, represented by tourists and new rural inhabitants. These people are generally not as familiar with the Montado system as

the previously mentioned groups. The Portuguese walkers preferred a variety of Montado patterns with one common characteristic: the understorey without shrubs. This characteristic, together with livestock presence and irregular structure of trees, was frequently associated with traditional management. An experience of diversity, important for foreign walkers, was better in the dense patterns of Montado with shrubs. However, this experience could also be gained through walking in a variety of Montado types.

The two types of concepts revealed in responses to open-ended question, that is, the objective features and the subjective experiences, concurred with the work of Schroeder (1995). This concerns preferences and meanings of arboretum landscapes for visitors and illustrates the perception of preferred patterns by respondents. Both types of perceptions are influenced by each other, although the present survey revealed differences related to the type of activity practised in the landscape. Landowners, mushroom pickers and beekeepers were interested mainly in the objective features of landscape, which probably allow them the most suitable conditions for their activity. About a third of the hunters mentioned visibility as important, and therefore preferred open areas. The two groups of walkers were more perceptive to the subjective experiences of landscape. As such, the experience of tradition, identity and memories of the place, which are the most significant for Portuguese walkers, was connected with livestock presence, clean understorey and irregular structure of trees. One of the important aspects in the preferred landscape patterns, mentioned by respondents in this survey, was appearance of nature. Moreover earlier studies show (e.g. Ulrich, 1986; Schroeder, 1995) preferences relating to vegetation density and naturalness. The preference of respondents in this study was often in relation to objective features: presence of shrubs, irregular structure of trees, and dense vegetation. This study concurs with important components in landscape preferences, mystery and diversity, as listed by Kaplan (1979).

In relation to the methodological approach in this survey, several comments are pertinent. The use of photographs as visual stimuli, verified the interest of the interviewee in the project and stimulated curiosity. This facilitated the start of the communication process, and consequently helped to focus the information exchange on the different landscape patterns. Studies concerning specific landscapes require suitable stimuli so that interviewees can relate their comments clearly to specific landscape issues. The recognition of different landscape patterns on the photographs, and their association with favourite activities, was relatively easy for respondents. Also helpful was the focus of the study on the four management aspects and their combinations, the effects of which were easily recognised as different on the photos.

Another noticeable advantage was the possibility for respondents to simultaneously compare several photographs and several landscape patterns. Visiting different Montado types in reality during the interviews would be too expensive and time consuming. And also, during real visits of the same area, the perception of the landscape can be influenced by different atmospheric and light conditions. As such, the photographs permitted a better control of the conditions under which the landscape was perceived (Real, 2000), and allowed for greater clarity about the stated preferences to be revealed.

The use of personal interviews is a time consuming method, but it was important to be sure that the interviewee understood the questions and were helped through the questionnaire, since respondents were of different educational abilities and were not all able to respond without the support of the interviewer. The qualitative method using open-ended questions, in this kind of experimental study, was particularly helpful for a better understanding of the various points of view of users, and subsequently, for the identification of landscape characteristics valuable to different user groups. Such information could not be obtained through the quantitative identification of preferences.

Conclusion

Landscapes are dynamic and change is one of their properties (Antrop, 2005), nevertheless, in order to guide future management and foresee the effect of change, the identification of existing valuable characteristics relating to new landscape functions needs to be studied. The importance of identifying the abovementioned characteristics is crucial for traditional land use systems that combine high natural values with high cultural values. This is true for the Montado in the southern region of Portugal, since production alone would probably not be able to support the future maintenance of such a landscape system. The intention to maintain such systems as multifunctional landscapes requires knowledge about users' preferences and perceptions in order to define management options, based on the integrated management of productive and non-productive functions. The connection of the landscape preferences of new users with existing management options seems to be a straightforward way to implement needs and expectations of the new users in the real patterns of the landscape. It can help landowners to understand what kind of landscape patterns they should supply to offer new functions, or vice versa; for what kind of new functions is the existing landscape pattern on their property suitable? According to the results of this study, the important landscape characteristics are not the same for all new user groups, and are directly influenced by the activity or use they represent. The consideration of these differences and their influence on the spatial organisation of the landscape system that includes non-production functions can contribute to the fulfilment of modern social needs to find existing management options appropriate for the support of new functions and to avoid potential conflicts within the activities. Not all functions can be accommodated fully within the same type of Montado pattern, therefore decisions must be taken as to priorities and possible combinations, and diversified management options are needed. This is required at the level of public policies and regulations, as well as at the level of everyday decisions on the farm unit.

Acknowledgements

The authors of this study are grateful to the project AGROREG (AGRO 768), financed by the Portuguese funds for research in agriculture, which made it possible to collect the data presented in the paper. Through the project AGROREG, the

results of the present study are intended to be used to create indicators, to be introduced, together with many other types of information, into a decision support system for the landowners of Montado, which builds up scenarios and allows for choices between existing management options.

References

Antrop, M. (2005) Why landscapes of the past are important for the future, *Landscape and Urban Planning*, 70, pp. 21–34.

Bourassa, S. C. (1991) *The Aesthetics of Landscape* (London: Belhaven Press).

Brush, R., Chenoweth, R. E. & Barman, T. (2000) Group differences in the enjoyability of driving through rural landscapes, *Landscape and Urban Planning*, 47, pp. 39–45.

de Groot, R. S. (2006) Function-analysis and valuation as a tool to assess land use conflicts in planning for sustainable, multi-functional landscapes, *Landscape and Urban Planning*, 75, pp. 175–186.

European Landscape Convention (2000) (Florence: ELC).

Fonseca, A. (2004) *O Montado no Alentejo* (Séc. XV a XVIII) (Portugal: Edições Colibri).

Gomez-Limon, J. & Lúcio Fernandez, J. V. (1999) Changes in use and landscape preferences on the agricultural-livestock landscapes of the central Iberian peninsula (Madrid, Spain), *Landscape and Urban Planning*, 44, pp. 165–175.

Hagerhall, C. M. (2000) Clustering predictors of landscape preference in the traditional Swedish cultural landscape: prospect-refuge, mystery, age and management, *Journal of Environmental Psychology*, 20, pp. 83–90.

Kaplan, R. & Herbert, E. J. (1988) Familiarity and preference: a cross-cultural analysis, in J. L. Nasar (Ed.) *Environmental Aesthetics: Theory, Research, and Application*, pp. 379–389 (Cambridge: Cambridge University Press).

Kaplan, R. & Kaplan, S. (1989) *The Experience of Nature: A Psychological Perspective* (New York: Cambridge University Press).

Kaplan, S. (1979) Perception and landscape: conceptions and misconceptions, in: *Proceedings of Our National Landscape Conference*, pp. 241–248 (Berkeley, CA: Pacific Southwest Forest and Range Experiment Station).

OECD (2001) Multifunctionality: Applying the OECD Analytical Framework Guiding Policy Design, Workshop 2–3, OECD, Paris, available online at: [http://www1.oecd.org/agr/mf/index.htm], last accessed 12 March 2006.

Patton, M. Q. (2002) *Qualitative Research and Evaluation Methods*, 3rd edn. (Thousand Oaks, CA: SAGE).

Pinto-Correia, T. (1993) Threatened landscape in Alentejo, Portugal: the 'Montado' and other 'agro-silvo-pastoral' systems, *Landscape and Urban Planning*, 24, pp. 43–48.

Pinto-Correia, T. & Mascarenhas, J. (1999) Contribution for the extensification/intensification debate: what is happening to the Portuguese Montado?, *Landscape and Urban Planning*, 46, pp. 125–131.

Plieninger, T., Modolell y Mainou, J. & Konold, W. (2004) Land manager attitude toward management, regeneration and conservation of Spanish holm oak savannas (*dehesas*), *Landscape and Urban Planning*, 3, pp. 185–198.

Real, E., Arce, C. & Sabucedo, J. M. (2000) Classification of landscape using quantitative and categorical data and prediction of their scenic beauty in north-western Spain, *Journal of Environmental Psychology*, 20, pp. 355–373.

Ryan, R. L. (2006) Comparing the attitudes of local residents, planners, and developers about preserving rural character in New England, *Landscape and Urban Planning*, 75, pp. 5–22.

Schroeder, H. W. (1995) Preference and meaning of arboretum landscapes: combining quantitative and qualitative data, in: A. Sinha (Ed.) *Landscape Perception:Readings in Environmental Psychology*, pp. 119–136 (London: Academic Press).

Ulrich, R. S. (1986) Human responses to vegetation and landscapes, *Landscape and Urban Planning*, 13, pp. 29–44.

Van den Berg, A. E. (1998) Group differences in the aesthetic evaluation of nature development plans: a multilevel approach, *Journal of Environmental Psychology*, 18, pp. 141–157.

Wiggering, H., Dalchow, C., Glemnitz, M., Helming, K., Muller, K., Schultz, A., Stachow, U. & Zander, P. (2006) Indicators for multifunctional land use: linking socio-economic requirements with landscape potentials, *Ecological Indicators*, 6, pp. 238–249.

Willis, K. G. & Garrod, G. D. (1992) Assessing the value of future landscapes, *Landscape and Urban Planning*, 23, pp. 17–32.

Paper V

Surová D., Surový P., Ribeiro N.A. and Pinto-Correia T. Integrating differentiated landscape preferences in a decision support model for the multifunctional management of the Montado. *Agroforestry Systems*, published online DOI 10.1007/s10457-011-9373-8

Integrating differentiated landscape preferences in a decision support model for the multifunctional management of the Montado

Surová D., Surový P., Ribeiro N.A. and Pinto-Correia T.
Research Group on Mediterranean Ecosystems and Landscapes/ICAAM,
University of Évora, Portugal

Abstract

A great part of the Alentejo region in Southern Portugal is covered by an agro-silvo pastoral system, the Montado. This traditional land-use system is specific, inter alia, in its ability to join production with favorable conditions for non-production functions. At the present time, as society positively evaluates and even demands cultural and amenity functions from the countryside, the Montado management faces the challenge of integrating production with non-production functions in a way which will result in suitable multifunctionality, and a more sound viability of the whole system.

The Decision Support Tool (DST) for the cork oak Montado management, the CORKFITS, based on the single-tree growth model and working at the stand level, is oriented primarily to the management of the production functions, but it is able to integrate also other data that can contribute for a more multifunctionality oriented management. In this exploratory study, the integration in the DST, of the preference distribution, as expressed by landscape users is investigated. The aim was to test a more comprehensive functioning of this tool, where non-production functions are also integrated. The described integration intended to communicate to decision-makers how the change in management practices at tree and under cover level, might alter the satisfaction of expectations of different user groups, as such changes affect the composition of the Montado, at both levels. The users considered are those practicing non-production functions in the Montado. Preferences were assessed through a questionnaire survey applied in the region of Alentejo, in the area of dominance of the cork oak, in the Montado system. The non-production functions are, in this context, related particularly to hunting, aesthetic appreciation related to walking and other leisure activities, to life quality, and to tradition and identity, as well as bee-keeping and mushroom picking. This paper focuses on the description of the specific methodological steps applied for the successful integration of the landscape preferences of different user groups into the DST for the cork oak Montado. Integration has proved to be possible, even if some methodological challenges still need to be faced for a more consistent use of the proposed tool.

Keywords: cork oak Montado; landscape preferences; landscape user groups; multifunctional management; single tree grow model; CORKFITS

1. INTRODUCTION

1.1 Challenges for the Management of the cork oak Montado regarding Cultural and Amenity functions

The traditional Portuguese agroforestry system known as the Montado (dehesa in Spain) refers to open savannah-like oak woodlands, comprising cork oak (*Quercus suber* L.) and/or holm oak (*Quercus ilex rotundifolia* Lam., syn. *Q. rotundifolia*, *Q. ballota*). Portugal has approximately 33% of the world's total area covered by cork oak, around 23% of the country's forested land, corresponding to an area of approximately 730,000 hectares, mainly in Southern Portugal. About half of the Portuguese forests are included in agricultural holdings and about 70% of this in-farm forest area is occupied by the Montado (Coelho 2003). In this agroforestry system, open tree cover, in various densities, is combined with the use of undercover, in a rotation of cultivation, grazing and fallow land. The main product is cork, largely driving its industry with bottle stoppers. The Montado land-use system can vary from thick forest to more open grassland and scrub vegetation areas, interspersed with trees. The system is characterised by a multiple-resource production, low-input agriculture with a high variety of products harvested and a high level of self-sufficiency, well adapted to the Mediterranean climate and the poor soil conditions (Joffre at al. 1999). However, in the last decades, as in many traditional European land-use systems, there has been a putative shift from moderate human disturbance towards bipolar changes, such as intensification or extensification. These changes may cause instability of the Montado system and can thus also result in the rapid vanishing of its valuable landscape (Pinto-Correia 1993). From the point of view of biodiversity, socio-economic value and cultural heritage conservation, the system is regarded as highly valuable, which emphasises the importance of its maintenance (Pinto-Correia and Mascarenhas 1999). At present, the role of the Montado is gradually changing, with increasing attention being directed to its ecological and amenity functions and an important challenge is to find solutions for safeguarding its economic viability and maintaining the human land-use there. The open savannah-like appearance makes the Montado landscape highly attractive for recreation, hunting, aesthetic appreciation, supporting identity values, supplying diverse ecological services, regional diversity, coherence and identity, and is considered as traditional land-use in the region of Alentejo (Pinto-Correia and Vos 2004). Moreover, results of different management options in this land-use system results in a variety of landscape patterns.

In general, human use of the rural space is changing from formerly dominant production goals towards a variable mix of production, consumption (market-driven amenity use) and protection (e.g. biodiversity preservation and landscape protection) goals (Holmes 2006). Some authors call these processes a transition from a mainly productivist into a post-productivist paradigm (Wilson 2007; Robinson 2008). The newly-demanded rural functions relate to recreation activities, relaxation, cognitive development and spiritual reflection in landscapes. These new rural functions were defined by de Groot and Hein (2005), in the typology of ecosystem functions, goods and services, and as cultural and amenity functions. They have a social value and correspond thus to public services or goods. A range of today's amenity functions in rural areas has always been part of the agriculture or forest outputs, for example mushroom picking and hunting. Nevertheless, they are still lacking in most policy support tools (Pinto-Correia et al. 2006; Verje et al. 2007). The concept of multifunctionality was applied by OECD and EU in the sectoral context of agriculture; however, it has considerable importance in sustainable land development regarded cross-sectorally in the general perspective of land use and landscape (Wiggering et al. 2006). Recent perspective of the Common Agricultural Policy recognises the full range of economic, social, cultural and environmental functions of agriculture. As Belletti et al. (2003) aver, all farms have some degree of multifunctionality, but few have embodied multifunctionality as a structuring principle. For some landscape types, depending on whether they are under-utilised as highly productive land-use systems, the value of the non-production functions may even be the future support needed for maintaining an integrated land-management system – as actual production-oriented systems may be severely threatened by globalisation processes, especially once specific protection measures may no longer be in place. As a consequence, new research approaches concerning the capacity of the landscape to supply societal demand for these functions and their possible integration with currently managed functions, is crucial. Pertinent research can be useful in supporting innovative ways of management, where commodity and non-commodity functions are paired in suitable ways and at suitable levels.

In the Montado case, the contemporary task of adapting management so that it incorporates multifunctional objectives, requires using recent knowledge and insight regarding social values and uses demanded in this specific land-use system, so that these new functions can be integrated more closely with production functions. In this context, more information, available to local managers, regarding social demand and what is valued by the various types of users, is essential. Not all users request the same appearance and structure of the Montado. Different management outcomes result in different patterns and internal structures of the Montado land cover, and can therefore

ideally provide different functions. There is thus a need to produce knowledge on users' preferences, by function type, so that the related data can be incorporated into the knowledge support for informed decision-making. The local level approach is needed here as, despite the role of global drivers, market and policy impacts, management is also driven by local level conditions and variations within the farm unit, and its everyday decisions are locally shaped.

1.2 Landscape Preferences in Multifunctional Management

After the Millennium Ecosystem Assessment (MEA 2005), landscape functions have become an important concept in policy-making. In this context, an increased research effort is expected regarding knowledge concerning the capacity of various land-use types and associated management options, to provide a range of landscape functions, and subsequently to introduce this information into the decision support systems. This practical application of the concept of landscape functions in planning, management and decision-making is still lacking (de Groot et al. 2009). The new multifunctional perspectives of agriculture have important implications for the scientific information that is required to efficiently integrate farm production management with information about management of cultural and amenity landscape functions. A variety of information is needed for successful management of non-production functions (de Groot and Hein 2005). Knowledge of peoples' values, expectations and appreciation of landscape has become very important for feasible measures of landscape protection, management and planning (e.g. Swanwick 2009). As these expectations are reflected in landscape preferences (Buijs et al. 2006; Egoz 2001), relevant studies are pertinent. In order to suitably satisfy the variety of social expectations, the landscape preferences of different user groups should not be omitted in the management of related landscape functions. However, as far as the social value of the landscapes is concerned, there is still a clear lack of usable indicators, which really do express a demand, since this implies assessing this demand and cannot be extracted from current statistics. However, even when surveys are undertaken, as in the present research, the main challenge still lies in the production of relevant and adequate indicators, so that the distinctive characteristics of the landscapes that drive peoples' preferences are adequately considered.

Farm managers comprise a relatively small portion of the population that own or actively manage land. Thus, it is essential to allow them access to information about how their production management practices influence satisfaction of landscape users, and how to combine production with other functions in the same area. In this context, research can assess data about the up-to-date preferences of different user groups and subsequently communicate this knowledge to land managers by integration into Decision Support Tools.

1.3 Decision Support Tools for Agroforestry Systems

In agroforestry systems are being developed and used various Decision Support Tools with the aim of integrating information to facilitate the decision-making process that directs development, acceptance and management aspects. A detailed overview of existing computer-based tools for decision support, applied in agroforestry, was elaborated on by Ellis (2004). These Decision Support Tools form part of adaptive management, which is considered the most effective approach to agroforestry (McNeely 2004). It involves available information, its implementation, associated research, systematic monitoring of results, and feeding the results of the monitoring back, to provide improved management of the system. This should not replace decision-making by the landowner or manager, but should facilitate decision-making by making the management process more informed and more objective (Grabum and Meyer 1998). The major challenge in the development of effective Decision Support Tools for agroforestry is dealing with its complex nature. In addition to the production functions, agroforestry systems provide different functions to society and should thus be managed for multiple objectives, and multiple social interests and preferences. Moreover, there is also an important need for compatibility of databases introduced in specific models, with geographical regions and with users' needs and resources considered. Despite the social interest in agroforestry systems, a clear lack in integration of landscape preference data in Decision Support Tools can be observed.

1.4 Aims of the Study

The central aim of this study is to describe and apply the methodological steps needed for the integration of landscape preferences in the existing Decision Support Tool (DST) for cork oak Montado management in Southern Portugal. The exploratory research design was applied for integration of preference distribution expressed by landscape users in the CORKFITS model system. Currently, this Decision Support Tool, based on the single-tree growth model and working at stand level, is up to date and oriented primarily toward the management of production functions. Integration of data regarding the landscape preferences of different user groups for landscape patterns resulting from different management options, intends to communicate to decision-makers how change of management practices at tree and understorey level might alter the satisfaction expectations of different user groups, practising non-production functions in the Montado, and thereby help the management process of non-production functions to become more informed and objective. The non-production functions are, in this context, related particularly to hunting, aesthetic appreciation related to new uses and life quality,

aesthetic appreciation related to tradition and identity, bee-keeping and mushroom picking. The paper focuses on the description and results of specific methodological steps applied for successful integration of the two components: landscape preferences of different user groups and DST, in the specific land-use system, cork oak Montado context, rather than to the development of a generally acceptable method regarding the integration of landscape preferences in decision support systems.

2. Methodological Steps allowing Integration of Landscape Preferences with Decision Support Tool for the cork oak Montado

The methodology applied in the study was adapted to exploratory investigation regarding possible integration of two principal components: landscape preferences and Decision Support Tool for cork oak Montado, based on the single-tree growth model. Based on the relevant existing literature and expert knowledge, the following methodological steps were applied in order to integrate the two principal components in the context of cork oak Montado in Southern Portugal.

2.1 Study area

The study focuses on the specific Montado type, where the principal tree species is the cork oak (*Quercus suber* L.). This Montado type predominates in the north-western part of the region of Alentejo. Here, the cork oak Montado has socio-economic importance due to cork production, but is also used in a multifunctional way by local inhabitants and urban dwellers from the metropolitan areas of Lisbon, as well as by foreign tourists. Private properties with dimensions greater than 100ha prevail in this region. Usually, the farm manager is the primary decision-maker with regard to the management of an individual farm business, technical operations and in-farm innovation. The management decisions are usually based on commodity products, such as meat from livestock, cork or charcoal. The associations of farmers and forest producers, existing in each region of Portugal, tend to share the objectives of adequately evaluating the existing forest products, helping with more efficient management of the holdings and sharing general information about marketing, policy, economy and technology.

For data collection with regard to landscape preference, four towns, situated in this specific part of the region, were selected as main centres for the interview process: Alcácer de Sal, Montemor-o-Novo, Évora and Coruche. Furthermore, the interviews with urban dwellers were conducted in the metropolitan area of Lisbon.

2.2 Preparation of Landscape Preference Database

2.2.1 Survey of landscape preferences of different user groups

Several studies investigated what type of landscape people prefer (e.g. Fanariotu and Skuras 2004; Hagerhall 2001; Kaplan 1995), specifically in the Mediterranean context (Arriaza et al. 2004; de la Fuente de Val 2006), or relating scenic beauty to forest stand characteristics (e.g. Blasco et al. 2009; Pukkala 1988). Their focus is however, on securing an empirical basis for public consensus. Less attention has been paid in the landscape preference models to the effect of different landscape types and to different ways of using landscapes. Yet, in more recent literature, evidence is found for differences in preference, instead of a unitary measure of landscape preference (e.g. Tveit, 2009; Dramstad et al. 2006; Brush 2000). This overview of the available literature revealed a lack of previous studies with regard to the preferences of different landscape user groups for landscape patterns that could be applied in tools supporting the management of cultural and amenity functions in the cork oak Montado. Due to this, the survey assessing landscape preferences of different user groups was undertaken. The results, expressing the preferences of different landscape user groups in relation to the cork oak Montado, were deemed fit for inclusion in a database for the CORKFITS model.

Instead of an overall model for mean public preferences (e.g. Canas et al. 2009; Sayadi et al. 2009), the preferences of different landscape user groups, corresponding to selected functions for a variety of management options, was surveyed. The differentiation of expectations of landscape user groups is believed to be important for the management of the specific landscape functions. This would apply to large-scale management, but also to the very local level, farm-unit scale. Preferences had to be surveyed at the very local scale, and therefore a locally implemented survey was the required data-gathering approach.

In order to obtain data on the landscape preferences of the Montado users, a combination of approaches from quantitative and qualitative research methods was selected. To obtain knowledge suitable for the use of tools in aiming for multifunctional management of the Montado, utilitarian overlay on landscape preferences was applied, considering explicit differentiation of the landscape user groups. For this, purposeful sampling (Patton 2002) was used in order to illustrate different user groups experiencing cultural and amenity functions in the countryside. For data collection, individual personal interviews, using photographs as the visual stimuli, were utilised. Personal interviews were chosen in order to have direct contact with respondents and to capture exact quotations about their

perspectives and experiences, and highlight difficulties encountered in understanding questions, and thus assist respondents to answer the questions properly.

The photographs represented Montado landscape types. The main aspects influenced by landowners' management, which mostly influence landscape patterns in the Montado system, were illustrated in the photos. These included presence of shrubs, presence and type of livestock, density of trees and spatial distribution of trees. For tree cover, the survey considered three levels of density, two types of spatial tree composition – aligned and irregular, landscape patterns with and without shrubs and sheep, cows or non-livestock presence. Only the stands with adult trees were assessed. Quantitative data from the interviews were analysed quantitatively, using frequency and chi-square statistics. Results from the landscape preference survey are described in a previous paper (Surová and Pinto-Correia 2008).

2.2.2 Identification of Landscape Indicators

Information integrated in a decision support system needs to be easily understandable for the system users. Thus, the message needs to be simple, although retaining the essential meaning for the questions asked to this data. For the comprehensive description of the interaction between landscape users' preferences and management alternatives of production in a decision support system, defining a set of indicators was chosen as a suitable solution (e.g. OECD 2003). In spite of the enormous simplification of the reality, the indicators are still considered a suitable way to obtain valuable support for multiple-use management (Fry et al. 2009). An indicator quantifies and simplifies phenomena and aids the understanding of complex realities. In the world of social indicators, the most-advised approach is a combination of expert knowledge with surveys in case studies (Cloquell-Ballester et al. 2006; Ekos Research Associates 1998; Schäfer et al. 2004). In this case, following the landscape preference survey, the quantitative data on landscape preferences were simplified in landscape indicators. The chi-square test calculation was applied, using the SPSS software. A hypothesis tested by the chi-square test assumes that all studied Montado landscape patterns (stands) are equally preferred by a particular user group (e.g. hunters). The expected (theoretical) value of the preferences for a specific landscape pattern was assigned as the average value of the preference choices in a specific landscape user group. The observed value for this calculation was the sum of respondents from the particular user group choosing the specific Montado pattern as the preferred one. The p-value obtained from the test was used as a division criterion for the numerical indicators. In statistical hypothesis testing, the p-value is the probability of obtaining a test statistic at least as extreme as the one that was actually observed, assuming that the tested hypothesis is true. The smaller the p-

value, the more strongly the test rejects a tested hypothesis. It can mean that the landscape preferences of a particular user group are significantly high or significantly low for specific Montado type.

2.3 Decision Support Tool for *Montado* Management

For the Decision Support Tool to be integrated with landscape preference data, the CORKFITS model system was used. This decision support tool is currently available for associations of forest producers and managers of the cork oak Montado in Southern Portugal. This administration assistance facilitates consultation regarding possible alternatives for the management options in cork oak stands. It is a software system for a single-tree spatial growth simulation model and was developed as an application of the SILVA model, available for use in operational or strategic forest planning in German conditions (Pretzch et al. 2002), as well as for cork oak stands in Southern Portugal (Ribeiro et al. 2006). The empirical models for tree height, diameter, crown volume and surface, total cork weight and cork thickness are currently incorporated in the model system. It uses the potential growth of trees derived from stand conditions and adjusts it to match the current competition status for each tree. Currently, the model displays the stand status in individual years as a result of a chosen management option (e.g. no management interventions, artificial regeneration). The management alternatives can be changed at any stage of the simulation, with the option of saving previous management results. Apart from the management alternatives at the tree level, other options can be set before or during the simulation as well. These are related to economics, as in number of cattle per hectare, subsidy income for one cattle unit, cork price, labour productivity and costs, type and frequency of shrub management with related costs and finally, costs related to new tree planting. Empirical single-tree models provide outputs at the tree level. Stand characteristics can be derived using calculations from simple sum formulas, (in cases of production per hectare) to complex geometrical calculations (in cases of crown cover without overlapping). Outputs related to land-cover cork properties, production and economic results are illustrated through the use of charts and also saved in a database format. CORKFITS permits visualisation and comparison of different scenarios and management options in order to maximise stated objectives. The model system allows repeated use that includes accessible user interfaces for non-technical people to preview results of their decision-making. One of the new challenges for this system is to attempt to integrate components of production with non-production functions.

In the framework of preparation of Decision Support Tool for landscape preference data integration, a compatibility of parameters, describing stands in the single-tree growth model with landscape patterns, needs to be verified. For distinction of different landscape

patterns in the CORKFITS, the specific combination of stand parameters needs to be attributed to each pattern.

2.4 Programming Steps and Visualisation of Landscape Preferences in the Montado Decision Support Tool

In order to connect the two components, landscape preferences and Decision Support Tool, the programming step was needed. In the programming step a Delphi 5 Enterprise programme was used.

The visualisation took into consideration the format for other results in the existing CORKFITS model. Thus, it was decided to illustrate the landscape preferences by the use of charts.

3. RESULTS

3.1 Landscape Preference Indicators

According to congruence and dissimilarity in landscape preferences for Montado landscape patterns, six distinct user groups were revealed: hunters, Portuguese visitors looking for aesthetic functions connected with tradition and identity, foreign visitors looking for aesthetic functions connected with new uses and life quality, mushroom pickers, bee-keepers and landowners. These groups showed statistically significant differences with regard to preferences for the considered Montado types.

In the next step, in order to reduce the complexity of data available on landscape user preferences from previous study, the empirical data were simplified into the form of numerical indicators. In this study, derived indicators express the level of attractiveness of the specific cork oak Montado landscape pattern (stand) for a particular landscape user group. In this way, the quantitative preference data were divided into five categories assigned with ordinal numeric indicators and the Utilitarian Landscape Preference Model was constructed (Table 1). In the model, each studied Montado landscape pattern is cross-tabulated with the landscape function and labelled with one of the five numeric indicators, depending on the particular user group preferences for a given landscape pattern. Landscape patterns, significantly more frequently preferred than expected with p-value 0.000 obtained from the Chi-square test, were assigned as "very often preferred" by the particular landscape user group and labelled with indicator "5". The patterns significantly more frequently preferred than expected, with P value < 0.05 >0.000, were assigned as "often preferred" by the specific user group and were labelled with indicator "4". The landscape patterns having p-value =>0.05 were labelled with indicator "3" and

called "sometimes preferred". The "rarely preferred" Montado patterns were those significantly less preferred than expected by user group, with P value < 0.05, and received the indicator "2". Finally, the landscape patterns "never chosen as preferred" by respondents from the particular user group were labelled with the indicator "1".

Table 1 **The Utilitarian Landscape Preference Model with Indicators expressing a Level of Attractiveness** For each of the fourteen Montado landscape patterns one indicator of landscape users' preferences was assigned. There were five numeric indicators: "5"- very often preferred; "4" – often preferred; "3" – sometimes preferred; "2" – rarely preferred and "1" – never preferred pattern by respondents from the particular landscape user group.

Montado patterns	type n°	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
	livestock	no	cows	sheep	no	cows	sheep	no	cows	sheep	sheep	no	sheep	no	no
	trees' composition	irregular			regular			irregular			regular		irregular		
	trees' density	open			dense										highly dense
	shrubs	without shrubs									with shrubs				
Functions represented by the respondents	Hunting	5	3	3	4	1	2	4	1	1	2	4	2	3	3
	Production	2	3	1	5	3	4	4	3	3	3	3	2	3	3
	Aesthetic - Tradition and Identity	4	4	3	3	3	3	3	3	3	2	2	3	3	3
	Aesthetic - New uses and Life Quality	3	3	3	3	2	2	4	3	3	3	2	3	3	5
	Mushroom picking	1	1	1	3	1	1	4	3	3	1	4	3	4	4
	Beekeeping	3	3	3	2	1	1	3	1	1	3	5	3	5	5

3.2 CORKFITS performance

The original descriptors of the stand characteristics in the single-tree growth model, CORKFITS, included a set of parameters, including the number of trees per hectare, the stand diameter distribution representing the age structure, the spatial-structure type distinguishing random, regular, clusters or stripes structure, the livestock density, the frequency of shrub clearing, and the type of shrub clearing differing between ploughing and shrub cutting. The model automatically calculates several specific stand characteristics from the input parameters, for example the crown cover. However, the combination of the existing and calculated parameters originally used in the model, did not distinguish between all the Montado landscape patterns considered in the preference study. Thus, some new parameters needed to be adjusted to the original set, in order to suitably describe the existing Montado landscape patterns, and to subsequently connect these patterns with the indicators of attractiveness for different user groups.

One of the short-term management alternatives influencing landscape user preferences is the shrub height in the landscape pattern (stand). The shrubby Montado was defined by shrubs higher than 50cm. The shrub height in the Montado areas usually

depends on the clearing frequency. Nevertheless, its development speed can also be influenced by specific local conditions, for example, by the soil properties. Thus, information capturing these specific local differences was needed. As the farm managers knew the shrub growth speed in their managed locality, the added parameter was adapted to this fact. Therefore, the values used in the model correspond to (a) number of years needed till the shrubs attain about 50cm in height in the specific area after shrub clearing and (b) a time period between the shrub clearings. Nine-year periods correspond to the time between the two debarkings of cork oaks in the specific stand. This time period is used in the CORKFITS model as a representation of one time period for management interventions. Based on theses values, the model calculates time period with shrubs higher than 50cm in the area. The Montado pattern with shrubs was defined as a stand having mostly shrubs higher than 50cm in the understorey; otherwise it is defined as a clear Montado type, without major shrubs. Scheme 1 shows the calculation inserted into the CORKFITS model, estimating a time period in years of shrubs higher than 50cm in a particular stand. If the time period when the shrubs are higher than 50cm is equal to, or longer than, 5 years, the specific Montado stand is considered as the landscape pattern with shrubs. Otherwise, the stand is considered as landscape pattern without shrubs. The second new parameter added to the model was the livestock species definition. As the original model considered only cows as a livestock type, the parameter added to the model distinguished between sheep and cows.

Scheme 1: **The calculation scheme constructed and introduced into the CORKFITS model for estimating a time period in years of shrubs higher than 50cm in a particular stand**, where **a** is the number of years needed till the shrubs attain 50cm in height in the specific area, **b** is the time period between two shrub clearings in years, and **s** is time in years with shrubs in the assigned area, during the nine-year period.

$$(9/b) * (b-a) = s$$

Each Montado landscape pattern studied was described as one explicit combination of measurable components of management practices at the tree and the understorey level. A validated description of the fourteen Montado landscape patterns in the Corkfits model by measurable parameters is shown in Table 2.

3.2.1 Results of programming steps and the visualisation of landscape preferences in DST

For the integration of the Utilitarian Preference Model with the single-tree growth model in CORKFITS, a Delphi 5 Enterprise programme was used. In Delphi code the "if

then" statement was applied. The rule comprises "if" criteria and "then" the rule can be applied. The "if" statement is used to test for a condition and then execute sections of code based on whether that condition is True or False. In this integration the Montado types represented the conditions for preference outputs. The "if" criteria are the parameters of the Montado types landscape described in Table 2. Like the other models in the CORKFITS model system, the implemented utilitarian preference matrix can be revised or replaced as necessary. Figure 1 demonstrates the flow chart for data processing algorithm in the simulator with regard to preferences of different landscape user groups. After the introduction of the initial stand data there is a management option for a management, or no management scenario. The simulator updates the initial data, and variables necessary for the evaluation of preferences are obtained (stand cover, stand regularity, horizontal structure). These variables together with variables coming directly from management decisions (e.g. pasture type and shrubs treatment) create the base for determination of preferences. At the end of each loop the stand status is subsequently updated and/or the management decision can be changed.

For users of the CORKFITS decision support system, the results regarding preferences of different landscape user groups for specific stand types are represented by the charts. The landscape users' preference chart can be visualised for stands with parameters corresponding to one of the studied Montado landscape patterns (Table 2). For other stands, no chart is presented. Figure 2 shows an example of the simulated stand of cork oak trees and respective preferences of landscape users for related functions. This stand is characterised by irregular spatial composition of the adult trees and no livestock presence. In this simulated stand, time needed for shrub renewal with height 50cm corresponds to two years, and the shrub clearing is executed every three years. Chart 1 shows the corresponding landscape users' preferences for this simulated stand. Charts 2 and 3 show the landscape preferences of different user groups when certain changes occur in the management options of original simulated stands. In the case of the introduction of cattle pasture in the area, the landscape user preferences will correspond with Chart 2. Thus, the preferences of most of the landscape user groups will be different in relation to the original stand. In the case of the extensification of the management interventions in the original stand by shrub clearance, executed regularly every four years, the landscape user preferences will correspond with Chart 3.

Table 2 **Classification of the Montado landscape patterns, using the measurable stand parameters in the CORKFITS model** Montado types correspond to the description in Table 1. I - open Montado without livestock; II - open Montado with cows; III - open Montado with sheep; IV - dense Montado aligned without livestock; V - dense Montado aligned with cows; VI - dense Montado aligned with sheep; VII - dense irregular Montado without livestock; VIII - dense irregular Montado with cows; IX - dense irregular Montado with sheep; X - dense Montado aligned with sheep and shrubs; XI - dense Montado aligned with shrubs; XII - dense irregular Montado with sheep and shrubs; XIII - dense irregular Montado with shrubs; XIV - highly dense irregular Montado with shrubs. *The crown cover is expressed as a percentage and is calculated by the original CORKFITS model using several stand parameters: "a" crown cover >=10 <35; "b" crown cover >=35 <=65; "c" crown cover >65. The trees diameter"d" in all patterns corresponded to dimensions between 70 and 160 cm. The spatial organisation of trees recognised two types: "e" - random and "f" - in lines. The pasture type corresponded to 1- cows; 2 - sheep; and 3 - no livestock presence.

Montado Type	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**	**XIII**	**XIV**
Crown Cover*	a	a	a	b	b	b	b	b	b	b	b	b	b	c
Range of Tees' Diameters	d	d	d	d	d	d	d	d	d	d	d	d	d	d
Trees' Structure Type	e	e	e	f	f	f	e	e	e	f	f	e	e	e
Pasture Type	3	1	2	3	1	2	3	1	2	2	3	2	3	3
N° of years with shrubs´height >50cm in 9 year period	<5	<5	<5	<5	<5	<5	<5	<5	<5	>=5	>=5	>=5	>=5	>=5

4. DISCUSSION

This study demonstrates one possible way to integrate the preferences of landscape users with the single-tree growth Decision Support Tool. The CORKFITS, Decision Support Tool for the cork oak Montado management, based on several models, originally dealt with the production aspect of the land-use system, yet showed its flexibility in integrating landscape preferences, which is information important for the management of non-production functions.

A relatively simple way of integration of landscape preferences into the DST was demonstrated. A landscape preference database, transformed in the indicators, reflected the attractiveness of landscape patterns resulting from different management options in the Montado. This direct connection between preferences and management options is considered to be important for facilitating the integration process. Nevertheless, the integrated model of landscape users' preferences should be tested and continuously improved. The survey on users' preferences was limited to a specific study area and larger surveys would increase the reliability of the database. Furthermore, the real range of landscape patterns in the studied land-use system is much wider.

Figure 1 **Flow chart demonstrating the algorithm for data processing of the input stand**

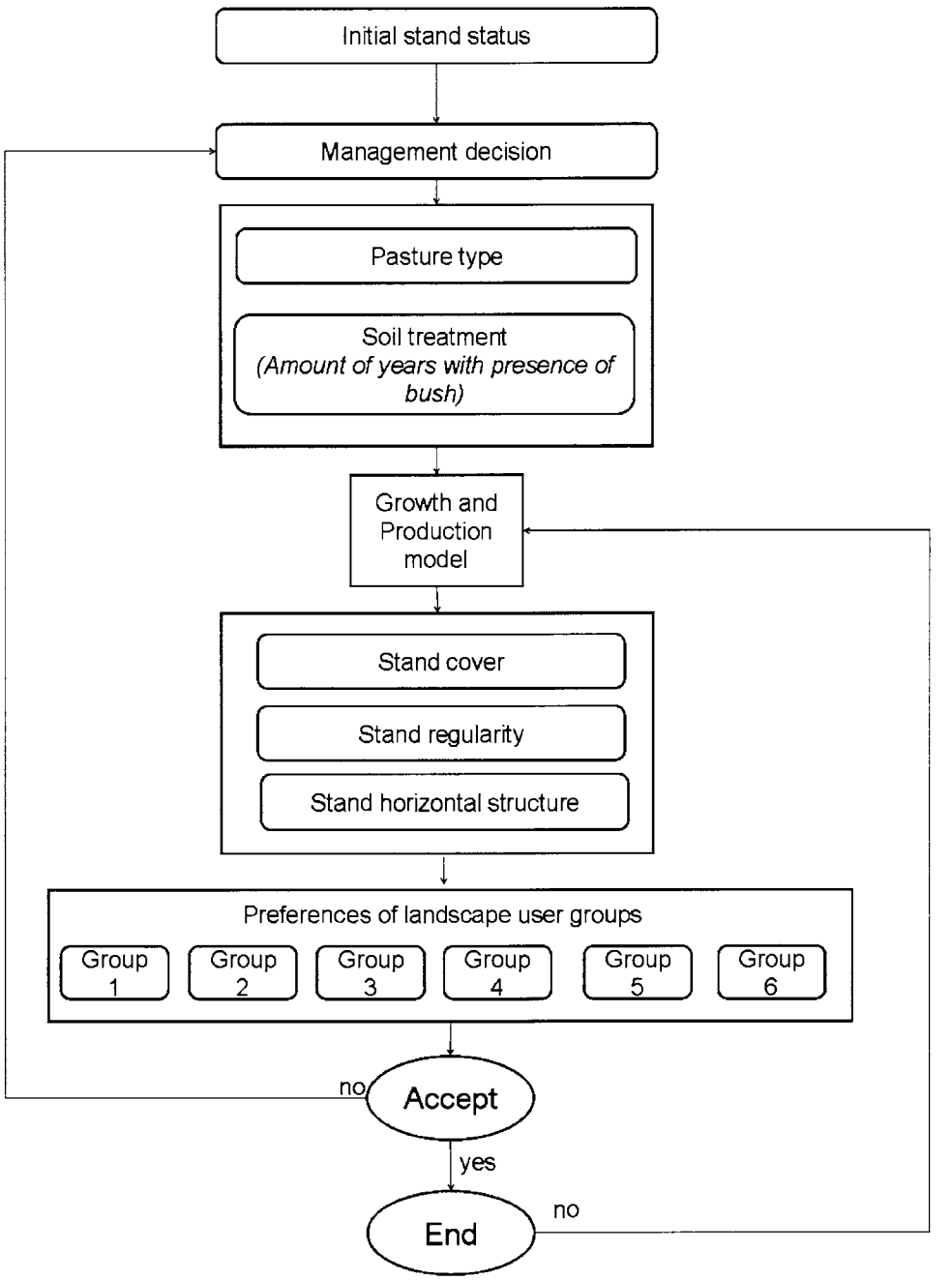
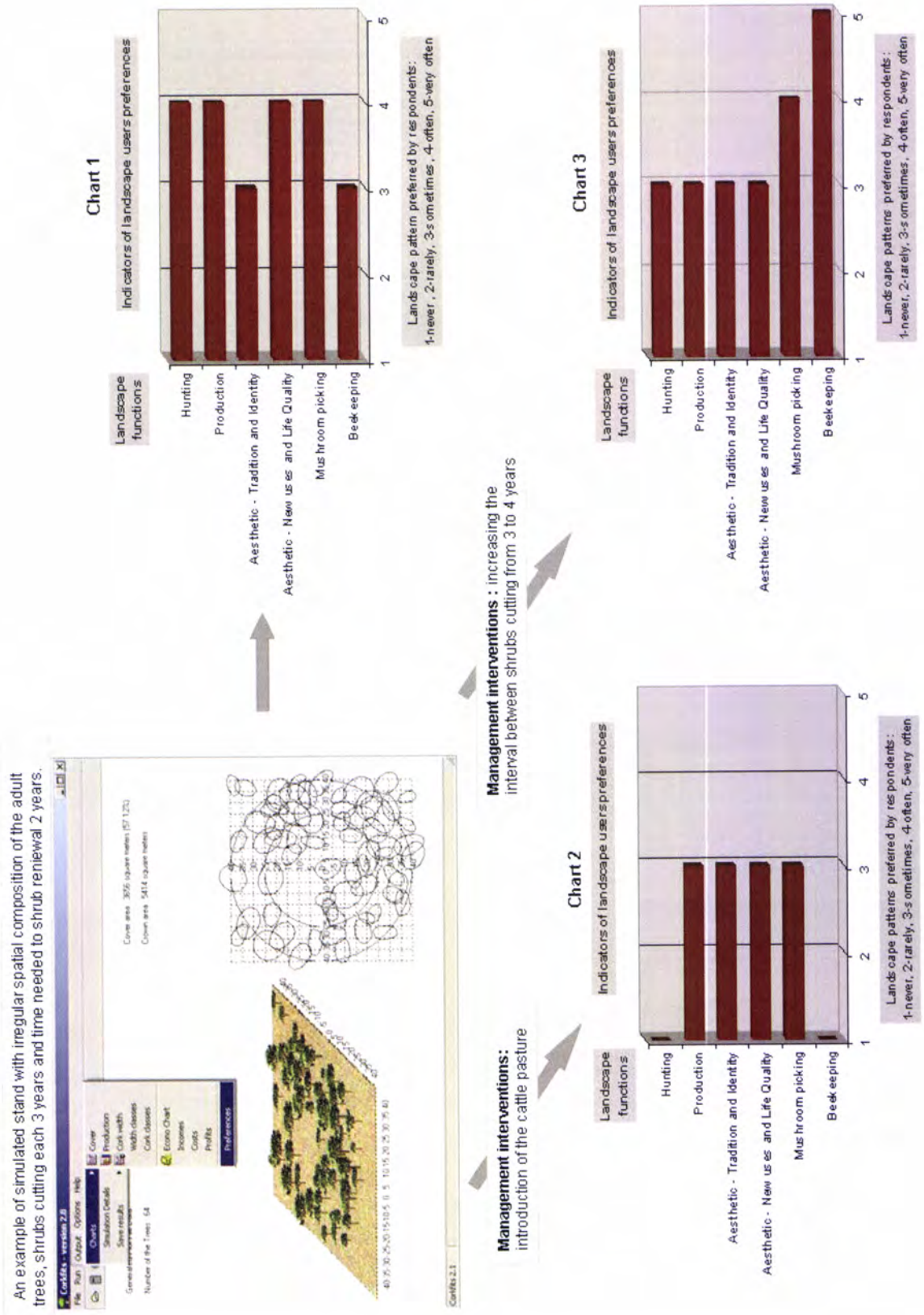


Figure 2 **Visualisation of the preferences of different landscape user groups in the CORKFITS Decision Support Tool** In the upper left part is shown an example of the simulated cork oak stand. Chart1 shows the preferences of different landscape user groups for this simulated stand, Chart 2 shows the landscape users preferences after the introduction of cattle pasture in the original stand, and Chart 3 shows the landscape users' preferences after increasing the interval between shrubs cutting from 3 to 4 years.



There are more management options in the cork oak Montado than were surveyed in a previous study, for example open Montado landscape patterns with shrubs, patterns with trees from different age groups and cork oak stands mixed with other species, for example the stone pine (*Pinus pinea* L.). In addition, more precise distinctions among many varieties of the undercover structure would be useful in the future for studies regarding landscape preferences for results of management options. Henkin et al. (2007) consider a variety of types of grazing management and their visual results in Mediterranean landscapes that are related to recreational and aesthetic human use. Undercover structure represents powerful characteristics influencing landscape preferences and can be changed rapidly with time in the Montado land-use system, such as pasture and shrub presence. It is therefore important for decision-makers to understand and take this fact into consideration during a decision-making process.

Similar to this study, some other studies deal with modelling landscape preferences at the forest stand level. The study of Silvennoinen et al. (2001) deals with the prediction models of landscape preferences at the forest stand level, adapted to Finnish forest conditions. By comparison with the Utilitarian Landscape Preference indicators applied in this study, the model of Silvennoinen et al. (2001) is focused on the scenic beauty of the stand, representing the public in general. However, his modelling technique should be tested in future in the Montado utilitarian context as well. Pukkala et al. (1995) proposed to integrate amenities into numerical forest planning by computing the amenity value of forest area by scenic and recreation value. Such a method is useful for identification of an amenity index suitable for numerical optimisation. In the multifunctional context of the Montado, this study could be important for computation of the amenity index of the cork oak stands considering, amongst others, different recreational activities.

In this study, the landscape indicators express the level of attractiveness of the specific cork oak Montado landscape pattern (stand) for the particular landscape user group. In terms of the non-production use of the landscape, these kinds of indicators can be defined as state indicators (de Groot and Hein 2005). These authors suggest two other indicators as important for measuring the availability of specific functions in the area. The performance indicator would assess the maximum suitable use of the landscape feature, attractive from a given point of view and the use indicator, the actual use (e.g. number of visitors). To date, these types of data are not available for most of the non-production functions in the Portuguese Montado.

To extend the CORKFITS model system to preferences for landscape patterns, it became necessary to incorporate new formulas for stand characteristics. The models for under-grove evolution and models for pasture type had to be introduced. After the integration of landscape preference data, the current version of the DST for the cork oak

Montado allows for the assessing of user preferences for a variety of combinations of stand variables. The information available can be used particularly to predict the landscape user group preferences for the current management options for production functions of the stands, or future stands, after implementing alternative management plans. Further evaluation of the implemented landscape preference model is important for an assessment of the strengths, weaknesses, and utility of a model for a stated purpose. The CORKFITS model is targeted in specific stand scale, where the focus of management alternatives is at the level of individual stands, and the context in which stands are located is not considered in estimation of landscape user preferences. The existing landscape decision models, for example LANDIS (Shifley et al. 2000), HARVEST (e.g. Gustafson et al. 2007), LANDSUM (e.g. Keane et al. 2006), and SIMPPLLE (e.g. Chew et al. 2004) are suitable for planning over large geographic areas as they are related to large-scale issues and explore the long-term management alternatives. The study presented should be viewed in an adaptive management framework, where the independent data at the necessary temporal and spatial scales reduce uncertainty and facilitates resource management (Shifley et al. 2000). At the landscape level, the main challenge is how to decide on the optimal allocation and management of the many different land-use options. This study deals specifically with the landscape user preferences at the stand level and can be used for answering questions such as how to combine management alternatives for production outputs in cork oak Montado in accordance with the landscape user expectations, rather than to solve tasks about optimal allocation of the non-production functions at the landscape scale.

A Decision Support Tool is considered to be a good mediator between private sectors and scientific investigators. Nevertheless, as this work shows, the scientific knowledge needs practical simplification in order to be integrated into the support system, in ways comprehensible to its users. Integrating information from different research disciplines in this work required an interdisciplinary dialogue amongst foresters, programmers and landscape researchers. These communication skills still need to be improved amongst the scientists themselves and also amongst scientists and managers, planners and public sectors, in order to help with achieving the goals of multifunctionality in rural landscapes.

5. CONCLUSIONS

The Montado land-use system, with its uniqueness and combination of several layers of vegetation in changing densities, offers a landscape rich in biodiversity and amenity

values. The aim of the study was to enrich the existing, primarily production-oriented, decision support system CORKFITS for management of the cork oak Montado in Southern Portugal, by providing information about the landscape preferences of different user groups of non-production functions. Integrated knowledge communicates to decision-makers about how change of management practices at tree and understorey level might alter the satisfaction expectations of different user groups, practising non-production functions in the Montado. This study has reacted to increasing social demand for cultural and amenity functions in rural areas, and to the idea that these functions can represent the enrichment or alternative use of traditional land-use systems in the future, and thus contribute to their maintenance. Indeed, not all farms need to be multifunctional, although the farm managers wanting to combine production with other activities need to be supported by available information regarding possible non-production use of their farms. The local studies about connecting production with non-production landscape functions can help managers to practise adaptive management in specific local contexts, and moreover enhance their capacity to simultaneously achieve agroforestry production goals and social non-production needs.

Acknowledgments

This study was elaborated in the framework of the AGROREG project (AGRO768) and doctoral thesis (SFRH / BD / 18633 / 2004) of the first author financed by Fundaçao Para a Ciencia e a Tecnologia in Portugal.

6. References

Arriaza, M., Cañas-Ortega, J., Cañas-Madueño, J., Ruiz-Aviles, P. (2004) Assessing the visual quality of rural landscapes. Landscape and Urban Planning 69: 115–125

Belletti G., Brunori G., Marescotti A. and Rossi A. (2003) Multifunctionality and rural development: a multilevel approach. In: VAN HUYLENBROECK G. & DURAND G. (eds.), Multifunctional Agriculture. A new paradigm for European Agriculture and Rural Development. Ashgate, Aldershot: pp 55-80

Blasco E., González-Olabarria J.R., Rodriguéz-Veiga P., Pukkala T., Kolehmainen O., Palahí M. (2009) Predicting scenic beauty of forest stands in Catalonia (North-east Spain). Journal of Forestry Research 20(1):73−78

Brush R., Chenoweth R.E., Barman T. (2000) Group differences in the joyability of driving through rural landscapes. Landscape and Urban Planning, 47: 39-45

Buijs A.E., Elands B.H.M. and Langers F. (2006) No wilderness for immigrants: Cultural differences in images of nature and landscape preferences. Landscape and Urban Planning 91: 113-123

Canas I., Ayuga E., Ayuga F. (2009.) A contribution to the assessment of scenic quality of landscapes based on preferences expressed by the public. Land Use Policy 26: 1173–1181

Chew J.D., Stalling C. and Moeller K. (2004) Integrating knowledge for simulating vegetation change at landscape scales, Western Journal of Applied Forestry. 19 (2): 102–108

Cloquell-Ballester V.A., Monterde-Diaz R. and Santamarina-Siurana M.C. (2006) Indicators validation for the improvement of environmental and social quantitative assessment. Environmental Impact Assessment Review 26: 79-105

Coelho I.S. (2003) Propriedade da Terra e Política Florestal em Portugal. Silva Lus. 11(2): 185–199

de la Fuente de Val, G., Atauri, J. & de Lucio., J., 2006. Relationship between landscape visual attributes and spatial pattern indices: A test study in Mediterranean-climate landscapes. Landscape and Urban Planning, 77: 393–407

Dramstad, W., Sundli Tveit, M., Fjellstad, W. & Fry, G. (2006) Relationships between visual landscape preferences and map-based indicators of landscape structure. Landscape and Urban Planning, 78: 465–474

Egoz S., Bowring J. Perkins, H. (2001) Tastes in tension: form, function, and meaning in New Zealand's farmed landscapes. Landscape and Urban Planning 57:177-196

Ekos Research Associates (1998) The Use of Social Indicators as Evaluation Instruments. Final Report. Canada

Ellis E.A., Bentrup G. and Schoeneberger M. M. (2004) Computer-based tools for decision support in agroforestry: Current state and future needs. Agroforestry Systems 61: 401–421

Fanariotu, I., Skuras, D. (2004) The contribution of scenic beauty indicators in estimating environmental welfare measures: a case study. Social Indicators Research 65: 145–165

Fry G., Tveit M.S., Ode A. and Velarde M.D. (2009) The ecology of visual landscapes: Exploring the conceptual common ground of visual and ecological landscape indicators. Ecological Indicators 9(5): 933-947

Grabaum R. and Meyer B. (1998) Multicriteria optimization of landscapes using GIS-based functional assessments. Landscape Urban Plan 43: 21–34

de Groot R.S. and Hein L. (2005) Concept and valuation of landscape functions at different scales. In: Mander U., Wiggering H., Helming K. (eds.), Multifunctional Land use. Meeting Future Demands for Landscape Goods and Services. Springer, pp 15-36

de Groot R.S., Alkemade R., Braat L., Hein L. and Willemen, L. (2009) Challenges in integrating the concept of ecosystem services and values in landscape planning, management and decision making. Ecological Complexity,Article in press

Gustafson E.J., Lytle D.E., Swaty R., Loehle C. (2007) Simulating the cumulative effects of multiple forest management strategies on landscape measures of forest sustainability. Landscape Ecol 22:141–156

Hagerhall, C.M. (2001) Consensus in landscape preference judgements, Journal of Environmental Psychology 21: 83–92

Henkin Z., Hadar L. and Noy-MeirHenkin I. (2007) Human-scale structural heterogeneity induced by grazing in a Mediterranean woodland landscape. Landscape Ecology 22:577–587

Holmes J. (2006) Impulses towards a multifunctional transition in rural Australia: Gaps in the research agenda. Journal of Rural Studies 22: 142-160

Joffre R., Rambal S., and Ratte J. P. (1999) The dehesa system of southern Spain and Portugal as a natural ecosystem mimic. Agroforestry Systems 45: 57–79

Kaplan S. (1995) The restorative benefits of nature: toward an integrative framework. Journal of Environmental Psychology 15: 169–182

Keane R.E., Holsinger L.M., Pratt S.D. (2006) Simulating historical landscape dynamics using the landscape fire succession model LANDSUM version 4.0. Gen. Tech. Rep. RMRS-GTR-171CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 73 p

McNeely J.A. (2004) Nature vs. nurture: managing relationships between forests, agroforestry and wild biodiversity. Agroforestry Systems 61: 155–165

Millennium Ecosystem Assessment (MEA) (2005) Ecosystems and Human Well-being: Health Synthesis. Washington, DC: Island Press

OECD (2003). Quality framework and guidelines for OECD statistical activities, OECD Paris

Patton M. Q. (2002) Qualitative Research and Evaluation Methods, 3rd ed. (Thousand Oaks, CA: SAGE)

Pinto-Correia T. (1993) Threatened landscape in Alentejo, Portugal: the 'Montado' and other 'agro-silvopastoral' systems, Landscape and Urban Planning, 24: 43–48.

Pinto-Correia T., Gustavsson R. and Pirnat J. (2006) Bridging the gap between centrally defined policies and local decisions. Towards more sensitive and creative rural landscape management. Landscape Ecology 21: 333-346

Pinto-Correia T. and Mascarenhas J. (1999) Contribution to the extensification/intensificaion debate: new trends in the Portuguese Montado. Landscape and Urban Planning, 46: 125 – 131

Pinto-Correia T. and Vos W. (2004) Multifunctionality in Mediterranean Landscapes – past and future. In: Jongman R. (Ed.), The new Dimension of the European Landscapes, Wageningen FRONTIS Series, Springer, pp: 135-164

Pretzsch H., Biber P., Dursky J. (2002) The single tree-based stand simulator SILVA: construction, application and evaluation. Forest Ecology and Management 162 (1): 3-21

Pukkala T, Kellomäki S, Mustonen E. (1988) Prediction of the amenity of a tree stand. Scandinavian Journal of Forest Research, 3: 533–544

Pukkala T., Nuutinen T. and Kangas J. (1995) Integrating scenic and recreational amenities into numerical forest planning, Landscape and Urban Planning 32: 185 – 195

Ribeiro N.A., Surový P., Oliveira A.C. (2006) Modelling Cork Oak Production in Portugal. In: Sustainable Forest management Growth Models for Europe, Hubert Hasenauer (Ed.) Springer-Verlag Berlin Heidelberg, pp. 285-313

Robinson G.M. (2008) Sustainable Rural Systems. Sustainable Agriculture and Rural Communities. Ashgate Publishing, Ltd., 210 p.

Sayadi S., González-Roa M.C., Calatrava-Requena J. (2009) Public preferences for landscape features: The case of agricultural landscape in mountainous Mediterranean areas. Land Use Policy 26: 334–344

Schafer D., Seibel S., Radermacher W. (2004) Umweltindikatoren und Umweltziele. Anforderungen aus statistischer Sicht. In: Wiggering H., Müller F. (ed.): Umweltziele und Umweltindikatoren. Geowissenschaften + Umwelt, Springerverlag Berlin Heidelberg, pp. 163-182

Shifley S.R., Thompson F.R., Larsen D.R., Dijak W.D. (2000) Modeling forest landscape change in the Missouri Ozarks under alternative management practices. Computers and Electronics in Agriculture 27: 7–24

Silvennoinen H, Alho J, Kolehmainen O, Pukkala T. 2001. Prediction models of landscape preferences at the forest stand level. Landscape and Urban Planning, 56(1): 11–20

Surová D. and 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

Tveit M.S. (2009) Indicators of visual scale as predictors of landscape preference; a comparison between groups. Journal of Environmental Management 90: 2882–2888

Swanwick C. (2009) Society's attitudes to and preferences for land and landscape. Land Use Policy 26S: S62–S75

Verje H., Abildtrup J., Andersen E., Andersen P., Brandt J., Busck A., Dalgaard T., Hasler B., Huusom H., Kristensen L., Kristensen S., Praestholm S. (2007) Multifunctional agriculture and multifunctional landscapes – land use as an interface. In: Mander U., Wiggering H. (eds.) Multifunctional Land Use: Meeting Future Demands for Landscape Goods and Services. Springer, Heidelberg, Berlin, pp.93-104

Wiggering H., Dalchow C., Glemnitz M., Helming K., Muller K., Schultz A., Stachow U. and Zander P. (2006) Indicators for multifunctional land use: linking socioeconomic requirements with landscape potentials, Ecological Indicators, 6: 238– 249

Wilson G.A. (2007) 'Post-productivism' or 'non-productivism'? In: Wilson G.A. (eds.), Multifunctional Agriculture: A Transition Theory Perspective. Wallingford: CAB International, pp 113-177

Annex 1

Interview Guide for Land Users applied in the Survey

Interview Guide for Land Users

1 - Workers 2 - Hunters 3 - Beekeepers 4 - Mushroom pickers
5 - Foreign tourists 6 - New rural residents 7 - Residents 8 - Urban residents

Date of the interview: _____ Land-user group _____
Interviewer: _____ Childhood Residence Place: _____
Starting time: _____ Current Residence Place: _____

I - PREFERENCES FOR LAND USE TYPES

From the perspective of the 1-8:
1. Choose three preferred land use types represented on these photos.
2. Which one is your favourite landscape type?

	Nº	III	I
Intensive cultures	1	___	___
Vineyard	2	___	___
Olive grove	3	___	___
Montado of Cork Oak	4	___	___
Eucalyptus forest	5	___	___
Pinus pinea forest	6	___	___
Pinus pinaster forest	7	___	___

3. Try to explain your preferences
a) for three land use types you have chosen:

_____

_____

b) for your favourite land use type:

_____

_____

4. Do you have a preference for a particular place in the countryside? Yes ___ No ___

If yes **5. Please describe this place?**

_____

II - VERBAL EXPRESSIONS FOR THE MONTADO

6. Please suggest some words you associate with the Montado.

_____

_____

7. Please suggest some feelings you associate with the Montado.

_____

_____

8. From the following list, choose those you associate with the Montado.

___ **joy** (alegria)
___ **sadness** (tristéza)
___ **fatigue** (cansaço)
___ **interest** (interesso)
___ **relaxation** (relaxamento)
___ **pleasure** (prazer)
___ **solitude** (solidão)
___ **discomfort** (desconforto)
___ **tranquillity** (tranquilidade)
___ **laziness** (preguiça)
___ **anxiety** (preocupação)
___ **energy, power** (força)

___ **poor**
does not give income
___ **mysterious**
it gives curiosity sensation
___ **beautiful**
pleasant to the sight
___ **quiet**
without noise
___ **coherente**
the elements fit together well
___ **abandoned**
uncultivated land
___ **legible**
not confused in orientation
___ **coloring**
has bright colours
___ **safe investment**
confident investment
___ **panoramic**
open observation
of landscape possible

___ **diversified**
complex
___ **aromatic**
nice-smelling
___ **heritage**
___ **fragile**
unresistant
___ **familiar**
usual, common
___ **vast**
very extensive
___ **shady**
gives shade
___ **refuge/ shelter**
___ **unique**
particular character
___ **abundant**
production

III. PREFERENCES FOR THE CORK OAK MONTADO LANDSCAPE PATTERNS

From the perspective of the 1-8:

9. Choose three preferred Montado types represented on these photos.

10. Which one is for your favourite Montado type?

Crown cover '	Trees' composition	Shrubs presence	Livestock presence	N°	III	I
10 - 35	irregular	without shrubs	without livestock	1		
			with sheep	2		
			with cows	3		
>=35 <=65	irregular	without shrubs	without livestock	4		
			with sheep	5		
			with cows	6		
		with shrubs	without livestock	7		
			with sheep	8		
	in line	without shrubs	without livestock	9		
			with sheep	10		
			with cows	11		
		with shrubs	without livestock	12		
			with sheep	13		
> 65	irregular	with shrubs	without livestock	14		

11. Try to explain your preferences

a) for three preferred Montado types you have chosen:

_____

_____

b) for your favourite Montado type you have chosen:

_____

IV. CURRENT USE AND ASSESSMENT OF THE SOCIAL FUNCTIONS IN THE MONTADO

12. Do you ever visit the Montado? Yes ____ No ____

If yes,

13a. What activities have you already practised in the Montado?

13b. When?

fr/m=frequency per month

13.c In which season?

	week	fr/m weeken	fr/m holidays	season
walking				
biking				
running				
hunting				
photography				
pic-nic				
car travel (sightseeing)				
aromatic-plant picking				
others:				

14. Would you like to visit the Montado more often than you do now? Yes ____ No ____

If yes, **15. Which activities would you practise more?**

_____

16. Do you encounter any problems when visiting the Montado? Yes ____ No ____

If yes, **17. Which problems do you experience?**

- **it is too far** ____
- **dont have enough time** ____
- **it is expensive** ____
- **difficult accessibility (fences)** ____
- **lack of signalization** ____
- **lack of marked paths** ____
- **others** _____

18. Do you think there are any improvements that can be made, regarding the activities you practise in the Montado? Yes ____ No ____

If yes

19. Which improvements can you suggest?

_____

20a. How far do you usually go? **how many km** ____

20b. With how many people? **how many people** ____

other costs ____

21. Which area of the Montado in the region do you prefere?

22. Why? _____

23. Do you think it is important to maintain the Montado landscape for future generations? Yes ____ No ____

24. Why? _____

25. Do you think

26. Do you think
to help maintain

If yes, **27. How**

28.Gender:

29. Year of birth:
30. Education

31. Work area
a) Professional ç

b) Student
c) Without job
32. Family:

33. Family incor

Name and contac
Name:
Contact (tel.):

V. ECONOMIC ASSESSMENT OF THE MONTADO

25. Do you think a view of the Montado would increase the value of a house?
Yes ___ No ___

26. Do you think it is reasonable to create a specific tax applied to the whole population, to help maintain the Montado landscape?
Yes ___ No ___

If yes, **27. How much are you willing to pay for this tax?**
5 Euros
20 Euros ___
50 Euros
other amount _____

VI. SOCIO-ECONOMIC VARIABLES

28.Gender:
M ___
F

29. Year of birth: _____

30. Education
dont have any, dont know how to read or write ___
dont have any, but know how to read and write
Primary scool ___
Secondary school (12°)
Middle course ___
Professional course ___
Academic degree

31. Work area
a) Professional group:
1. Leaders staff, High-level management
2. Academic and scientific profesions ___
3. Middle management
4. Administration ___
5. Service industry ___
6. Agriculture and Fishing
7. Workers in industrial prod. and in handicraft ___
8. Workers of industrial instalations
9. Workers without qualification ___
10. Army ___

b) Student ___
c) Without job

32. Family:
1-2 People
3 – 4 People ___
> 4 People ___

33. Family income euro/month:
< 1000 ___
1000 – 2000
2000 – 5000 ___
more ___

Name and contact of the respondent (optional):
Name:
Contact (tel.): _____

Interview duration: __ ___

Thank you for your collaboration!

Annex 2

Interview Guide for Landowners – Managers applied in the Survey

Interview Guide for Landowners

Date of the interview: _____ Property location: _____
Interviewer: _____ Childhood Residence Place: _____
Starting time: _____ Current Residence Place: _____

I - PREFERENCES FOR LAND USE TYPES

From the perspective of the manager of your property
1. Choose three preferred land use types represented on these photos
2. Which one is your favourite land use type?

	Nº	III	I
Intensive cultures	1	___	___
Vineyard	2	___	___
Olive grove	3		
Montado	4	___	___
Eucalyptus forest	5	___	___
Pinus pinea forest	6	___	___
Pinus pinaster forest	7	___	___

3. Try to explain your preferences
a) for three land use types you have chosen:

_____

b) for your favourite land use type:

_____

4. Do you have a preference for a particular place in the countryside? Yes No ___

If yes **5. Please describe this place?**

_____

II - VERBAL EXPRESSIONS FOR THE MONTADO

6. Please suggest some words you associate with the Montado.

_____

7. Please suggest some feelings you associate with the Montado.

_____

8. From the following list, choose those you associate with the Montado.

___ **joy** (alegria)
___ **sadness** (tristéza)
___ **fatigue** (cansaço)
___ **interest** (interesso)
___ **relaxation** (relaxamento)
___ **pleasure** (prazer)
___ **solitude** (solidão)
___ **discomfort** (desconforto)
___ **tranquillity** (tranquilidade)
___ **laziness** (preguiça)
___ **anxiety** (preocupação)
___ **energy, power** (força)

___ **poor**
does not give income
___ **mysterious**
it gives curiosity sensation
___ **beautiful**
pleasant to the sight
___ **quiet**
without noise
___ **coherente**
the elements fit together well
___ **abandoned**
uncultivated land
___ **legible**
not confused in orientation
___ **coloring**
has bright colours
___ **safe investment**
confident investment
___ **panoramic**
open observation
of landscape possible

___ **diversified**
complex
___ **aromatic**
nice-smelling
___ **heritage**

___ **fragile**
unresistant
___ **familiar**
usual, common
___ **vast**
very extensive
___ **shady**
gives shade
___ **refuge/ shelter**

___ **unique**
particular character
___ **abundant**
production

III. PREFERENCES FOR THE CORK OAK MONTADO LANDSCAPE PATTERNS

From the perspective of the manager of your property

9. Choose three preferred Montado types represented on these photos

10. Which one is your favourite Montado type?

Crown cover	Trees' composition	Shrubs presence	Livestock presence	Nº	III	I
10 - 35	irregular	without shrubs	without livestock	1		
			with sheep	2		
			with cows	3		
>=35 <=65	irregular	without shrubs	without livestock	4		
			with sheep	5		
			with cows	6		
		with shrubs	without livestock	7		
			with sheep	8		
	in line	without shrubs	without livestock	9		
			with sheep	10		
			with cows	11		
		with shrubs	without livestock	12		
			with sheep	13		
> 65	irregular	with shrubs	without livestock	14		

11. Try to explain your preferences

a) for three preferred Montado types you have chosen:

b) for your favourite Montado type you have chosen:

IV. CURRENT USE AND ASSESSMENT OF THE SOCIAL FUNCTIONS IN THE MONTADO

12. If you had the ability to decide, would you maintain the Montado on your property? Yes ___ No ___

13. Why?

14. What activities are currently performed in the Montado on your property?

15. Who practises these activities in the Montado on your property?

Are they Private and/or public users?

16. What is your motivation for allowing these activities on your property?

(arrange in order from 1 up to 4)

	Use		Motivations			
yes	private	public	economic	tradition	social	ecologic
cork production						
cattle breeding						
hunting						
tourism						
beekeeping						
mushroom picking						
aromatic plants picking						
walking						
education / science						
residence						
other						

17. What is the main product of your Montado area?

18. What is the second main product of your Montado area?

19a. In future, would you want to change something on your property? Yes ___ No ___

19b. If yes: **What changes do you envisage?**

20. What is the main problem in managing the Montado on your property?

economy ___ trees mortality ___

technicians support ___ products robbery ___

labour ___ others ___

21. Which area of the Montado in the region do you prefere?

22. Why?

23. Do you think it is important to maintain the Montado landscape for future generations? Yes ___ No ___

24. Why?

PROPERTY PERFIL

All Property

1. Total area of property (ha):
2. Total area of exporation (ha): _____
3. Which is the 1° product of exploration? _____
4. Which is the 2° product of exploration? _____

Montado

5. Area of Montado (ha):
6. Area of Plough on Montado (ha): _____
7. Area of Cutting-shrubs on Montado (ha): _____
8. What is the frequency of cutting?
9. How long have you been using the shrub-cutting? _____
9a. Why? _____
10. What are sowing cultures in the under cover?
11. What is the frequency to sow? _____

Livestock

12. How many animals do you have on your exploration?
Cows _____
Sheep
Others

Pasture

13. Area of pasture:
in the Montado _____
in open land

Montado

	Feb-June	July-Oct	Nov-Jan

Subsidies

14. What is the % of the subsidies in your income from exploration?

	<30	30 - 50	50 - 70	> 70	%
in 2004					
in 2005					

V. ECONOMIC ASSESSMENT OF THE MONTADO

25. Do you think a view of the Montado would increase the value of a house?
Yes No

26. Do you think it is reasonable to create a specific tax applied to the whole population, to help maintain the Montado landscape?
Yes ____ No ____

If yes, **27. How much are you willing to pay for this tax?**
5 Euros
20 Euros
50 Euros ____
other amount _____

VI. SOCIO-ECONOMIC VARIABLES

28.Gender:
M ____
F ____

29. Year of birth: _____

30. Education
dont have any, dont know how to read or write
dont have any, but know how to read and write ____
Primary scool ____
Secondary school (12°) ____
Middle course
Professional course ____
Academic degree ____

31. Work area
a) Professional group:
1. Leaders staff, High-level management
2. Academic and scientific profesions ____
3. Middle management ____
4. Administration ____
5. Service industry
6. Agriculture and Fishing ____
7. Workers in industrial prod. and in handicraft ____
8. Workers of industrial instalations ____
9. Workers without qualification
10. Army

b) Student ____
c) Without job ____

32. Family:
1-2 People
3 – 4 People
> 4 People ____

33. Family income euro/month:
< 1000
1000 – 2000
2000 – 5000 ____
more ____

Name and contact of the respondent (optional):
Name:
Contact (tel.): _____

Interview duration: ____

Thank you for your collaboration!

Annex 3

Photographic Representations of Land Use Types applied in the Survey

Figure 1 - Intensive cultures

Figure 2 – Vineyard

Figure 3 – Olive grove

Figure 4 – The Montado

Figure 5 – Eucalyptus grove

Figure 6 – Stone pine grove

Figure 7 – Maritime pine grove

Annex 4

Photographic Representations of the Montado landscape patterns applied in the Survey

Figure 8 - Open cork oak Montado

Figure 9 - Open cork oak Montado with cows

Figure 10 - Open cork oak Montado with sheep

Figure 11 - Dense cork oak Montado

Figure 12 - Dense cork oak Montado with sheep

Figure 13 - Dense cork oak Montado with cows

Figure 14 - Dense cork oak Montado with shrubs

Figure 15 - Dense cork oak Montado with shrubs and sheep

Figure 16 - Dense aligned cork oak Montado

Figure 17 - Dense aligned cork oak Montado with sheep

Figure 18 - Dense aligned cork oak Montado with cows

Figure 19 - Dense aligned cork oak Montado with shrubs

Figure 20 - Dense aligned cork oak Montado with shrubs and sheep

Figure 21 - Highly dense cork oak Montado with shrubs