Land Use Policy 26 (2009) 334–344

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

# Public preferences for landscape features: The case of agricultural landscape in mountainous Mediterranean areas

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ARTICLE INFO

*Article history:*
Received 8 November 2006
Received in revised form 27 February 2008
Accepted 17 April 2008

*Keywords:*
Aesthetic value
Rural landscape
Conjoint Analysis
Contingent Valuation
Sustainable rural development
South-eastern Spain

ABSTRACT

Provision of landscape amenities produced by farmers, in addition to their economic function of producing food and fibre, has contributed to a reassessment of the role of agriculture in society. In this paper, we examine whether agricultural landscape provision really responds to a social demand as is argued by those in favour of multifunctionality. Thus, the aim of the present work is two-fold. First, we evaluate rural landscape preferences of citizens from a range of choices in the mountain area of the Alpujarras (south-eastern Spain), and second, we estimate their willingness to pay (WTP) to enjoy each of the landscape characteristics existing in the area. For the empirical analysis, based on a survey of public preferences due to the good public characteristics of landscape amenities, we applied two stated preference methods: Conjoint Analysis (CA) and Contingent Valuation (CV). Three landscape attributes were considered for this analysis: type of vegetation layer, density of rural buildings, and level of slope. Several levels were also considered for each attribute: abandoned fields, dryland farming, irrigated farming, and natural lands were included for the vegetation layer; three levels (low, intermediate and intense) were considered for the level of slope and three levels (none, little and intense) for rural buildings.

The empirical findings from the CA and CV confirm that the agricultural-landscape component (first irrigated lands, followed by dryland farming, within the attribute "vegetation layer"), plays an important role in public preferences on the landscape and WTP. Maintaining local agricultural activities, preventing future migration from agricultural lands, recovering abandoned fields, and including elements of rural landscape observation and appreciation of existing recreational programmes for rural tourism in the area, were among the strategies to take full advantage of this aesthetic landscape potential, and to foster sustainable development of the region.



## Introduction

Society's recreational demands for landscapes in rural Mediterranean areas have been increasing heavily in recent years, since the aesthetic contribution provided by these areas clearly increases the welfare of the citizens (Dearden, 1980; DeLucio and Múgica, 1994; Santos, 1998; C. Hall et al., 2004). Society's demands for new functions in rural landscapes are also rapidly changing and diversifying (Sarapatka and Sterba, 1998; Vos and Meekes, 1999; Gary, 2001; Musacchio et al., 2005). At the same time, the supply of high-quality landscapes is steadily declining both quantitatively and qualitatively as a result of the degradation caused by activities of diverse nature and magnitude (Bush, 2006; Mottet et al., 2006; Rao and Rekha, 2001; Verburg et al., 2006; Tasser et al., 2007). Landscapes have dramatically changed in the countryside as a result of both public subsidies and technological changes in agriculture and forestry (intensification/extensification, agricultural practices, afforestation, nature conservation, etc.) (Bush, 2006; Van Meijl et al., 2006; Westhoek et al., 2006). These changes have brought about a decline in the more traditional roles of agriculture as well as an increasing interest in new functions (Sayadi and Calatrava, 2001; C. Hall et al., 2004; Yrjölä and Kola, 2004; De Groot, 2006).

In response to social environmental concern and demand, and as a result of the growing consideration of environmental objectives in the new paradigm of sustainable agriculture, evaluation of environmental externalities of agricultural systems has become increasingly important, particularly since the mid-eighties.

Among the externalities caused by agriculture, we should consider how this activity has shaped the landscape, analysing the aesthetic function of agro-ecosystems (Deffontaines, 1985, 1986; Thenail and Baudy, 1994). Different agro-ecosystems have different capabilities of shaping the landscape, and rural landscapes will

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doi:10.1016/j.landusepol.2008.04.003

display a different degree of the agricultural component, depending on the composition of the agricultural systems. To identify various types of environmental externalities linked to agricultural activities, Kline and Wichelns (1996), Sayadi (1998), Sayadi and Calatrava (2001) and Mottet et al. (2006) consider their role to be key in shaping the landscape. It is therefore crucial to recognize and appraise this contribution to the rural spaces and to determine whether landscape provision really responds to a social demand.

A comprehensive approach to the analysis and assessment of a certain agricultural landscape for rural development must take into account its aesthetic (Laurie, 1975; Hammitt et al., 1994; Hull and Revell, 1989; Arriaza et al., 2004); its ecological (Zonneveld and Forman, 1989) or geographical (Dunn, 1974; Blaschke, 2006), and its cultural (Vos and Meekes, 1999) aspects. This can be achieved only if we understand the concept of perception. According to González (1981), landscape is the "multi-sensory perception of a system of ecological and cultural relations". People thus shape the landscape, are part of it, and also form perceptions of it. As Laurie (1975) points out, landscape evaluation may be defined as "the comparative relationships between two or more landscapes in terms of assessment of visual quality".

For such an evaluation, we consider the rural landscape as the final product, in visual and aesthetic terms, of a series of interacting factors, including climate, relief, water, soil, natural flora and fauna, and human actions. The result of this interaction is a specific spatial layout of agro-ecosystems which is a characteristic of each territory, this being its most perceivable dimension.

Despite the many studies on alternatives for evaluating externalities (Daniel and Vining, 1983; Amir and Gidalizon, 1990; Adamowicz et al., 1994, 1997; Boxall et al., 1996; Blamey et al., 1998; Hanley et al., 1998a,b, 2001; Santos, 1998; Wherrett, 2000; Bennet and Blamey, 2001; Hernández et al., 2004; Käyhkö and Skanes, 2006; among others), submitted to monetary evaluation methods (Contingent Valuation, Hedonic Price, Travel Cost method, etc.) to estimate the value of open spaces (DeLucio and Múgica, 1994; Hammitt et al., 1994; Tyrvänen and Hannu, 1998; Scarpa et al., 1999; Wang et al., 2006; among others), studies of primarily agricultural landscapes are scarce (Dunn, 1974; Price, 1978, 1990; Drake, 1987, 1992; Lee, 1990; Willis and Garrod, 1993; Pruckner, 1995; Brunstad et al., 1999; Arriaza et al., 2004).

An aesthetic valuation of agriculture is complex, and may be expressed directly in monetary values only in the extreme cases of homogeneous, specific landscapes, spatially localized and in a situation of evident aesthetic contrast. In Spain, the only study available (Calatrava, 1996) applies the Contingent Valuation Method to assess such landscapes, in the context of the sugarcane landscape in the Motril-Salobreña valley (Granada, south-eastern Spain). Another work compares and debates the results found using two commonly used preference techniques: ranking and rating in the application of Conjoint Analysis method for assessment of agricultural landscape preferences (Sayadi et al., 2005).

The present paper adds to this literature by appraising the value of agricultural landscape amenities and by comparing estimates of this value obtained using Conjoint Analysis (CA), which is a non-monetary approach, and Contingent Valuation (CV), a monetary approach. Estimating the values for different attributes of rural landscape and the willingness to pay (WTP) using the latter technique is also a novelty with respect to earlier studies. This is particularly valuable in helping policy makers redesign sustainable rural-development programmes in order to take fuller advantage of the aesthetic potential and to increase social welfare.

In this paper, we attempt, on one hand, to evaluate the agricultural attribute in the public enjoyment of the landscape, and, secondly, to quantify the monetary value of the different aspects of these landscapes. We provide a short overview in section 'The study area: landscape change in the Alpujarran mountain of south-eastern Spain' of the landscape evolution and changes in the mountain areas of south-eastern Spain. Section 'Methodological framework' explains the methodology in the empirical study of the contribution of agricultural landscape to public aesthetic preferences and willingness to pay. Two experiments using both the CA and CV methods were designed for comparative valuation of rural landscapes. The CA and CV methods were based on surveys performed to citizens from the provinces of Almeria and Granada (south-eastern Spain), near the study area and regions of potential visitors. This provides useful information on the importance of agriculture for public preferences and allows valuations of the aesthetic rural landscape. Section 'Results' presents the results of the empirical analysis and section 'Discussion' discusses the findings. The main conclusions and recommendations are offered in section 'Conclusions'.

## The study area: landscape change in the Alpujarran mountain of south-eastern Spain

Since the 1950s, as a consequence of the rural exodus, many rural Spanish regions have undergone changes in their landscape structure due to the abandonment of agricultural activities and, in some cases to the proliferation of other economic activities, such as tourism.

The Alpujarras of Granada (see Fig. 1), situated in the south of the massif of Sierra Nevada (south-eastern Spain), exemplifies this transformation, being typical of the Mediterranean high-mountain regions of Europe. The Alpujarras district, with a series of mountain valleys and gorges, has abrupt altitude gradients (almost sea level to 3500 m), and steep inclines impeding traditional farming systems. Irrigation systems, many dating from the 15th Century or earlier, are fed by streams and snowmelt from the Sierra Nevada summits and have permitted an intricate system of terraced agricultural land, which typifies the landscape around the mountain villages from 800 m a.s.l. to 1800 m a.s.l. This traditional agricultural landscape is at risk from agricultural abandonment. The irrigated terraces are labour-intensive and thus support a multi-cropping system which includes field crops, vegetables, trees, and, at lower elevations, vines and olives.

In this study, agricultural landscapes are analysed, these being below 2000 m and having undergone steady anthropic activity over history. The landscapes in the zone have been described in detail by Calatrava and Molero (1983), Sayadi and Calatrava (2001) and among others.

Local farming has been gradually abandoned since the beginning of the rural exodus in the fifties, and demographic changes in the second half of this century were dramatic. Most of the Alpujarran villages recorded population highs in 1950 and an exodus since then. The population declined by some 50% since 1950, with rates approaching 4% per year between 1960 and 1975, migrating towards other parts of Spain (especially Barcelona and Madrid) seeking employment in industry, in coastal tourism (e.g. Costa del Sol, Malaga), and also in intensive agriculture (particularly that of greenhouse horticulture along the Spanish Mediterranean coast). This migration, as in other European mountain areas, had a measurable environmental impact. Calatrava and Sayadi (1997, 1999) reported that small-irrigated multi-crop farms are particularly threatened. According to a more recent work by Calatrava and Sayadi (2003), farm abandonment has slightly decelerated as a consequence of the current European Rural-Development policies favouring non-farm activities (particularly rural tourism), non-agricultural activities, and, in some cases, the development of part-time farming. Nevertheless, small-irrigated farms are still