



Agricultural practices, ecosystem services and sustainability in High Nature Value farmland: Unraveling the perceptions of farmers and nonfarmers



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ARTICLE INFO

Article history:

Received 14 December 2015

Received in revised form 16 August 2016

Accepted 26 August 2016

Keywords:

Deliberative analysis

Socio-cultural values

Low-input agriculture

Agri-environmental policy

Euro-Mediterranean Basin

SUMMARY

Our aim was to examine the perceptions of farmers and nonfarmers regarding the relationships between agriculture and the environment in High Nature Value (HNV) farmland. We performed content analysis of information obtained from five focus groups to derive key items (recording units such as words, phrases and concepts) and classify the derived items into a set of themes: agricultural practices, ecosystem services, and economic and social sustainability. We established the relative importance of each item and the relationships among the items. The farmers were very knowledgeable of ecosystem services (particularly regulation), the interactions among them, and their relationships with agricultural practices, particularly grazing management. Nonfarmers were less knowledgeable of ecosystem services, particularly regulation, and identified fewer relationships with agricultural practices. However, nonfarmers were highly concerned about the provision of quality food products and several cultural ecosystem services, which were discussed in bundles. The provisioning of food with particular quality attributes was revealed to be important for participants and a distinctive feature of HNV farmland. Ecosystem services were frequently interwoven with broad issues of economic and social sustainability. Therefore, a systemic view should be considered when designing agri-environmental policies.

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1. Introduction

The concept of High Nature Value (HNV) farmland has been increasingly utilized in European agri-environmental policy in response to rapid declines in farm-related biodiversity and the delivery of other public goods from agriculture. Several features characterize HNV farmland: low-intensity land use, the presence of seminatural vegetation, the existence of a land-use mosaics, and the support of high species and habitat diversity or species of interest (Lomba et al., 2014). HNV farmland is based on a conservation concept that aims to link three separate domains: ecology, farming and public policy (IEEP, 2007). The literature has mainly focused on

the ecological domain, whereas the farming (e.g., the perceptions of farmers about their own activity and the environment) and policy (e.g., the views of citizens about agriculture-environment relationships and the agri-food system) domains are less understood. This situation has occurred although public participation is considered essential to the success of conservation policies (Fischer and Young, 2007).

HNV farmland accounts for approximately 30% of the total utilized agricultural area in Europe (mostly seminatural grasslands in the mountains, steppes, *dehesas* or *montados*, wetlands, and permanent and dryland crops) and are mainly located in the marginal areas in eastern, southern and north-western Europe. A variety of HNV farming systems are found in the EU, and grazing livestock systems, which are often located in mountainous areas, are the most common type of HNV farming system (Keenleyside et al., 2014). These systems are characterized by livestock (mostly ruminants) raised on natural and seminatural vegetation that is grazed, browsed, or cut for hay (Signal and McCracken, 2000). HNV livestock farming systems are multifunctional and deliver a wide

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range of private and public goods. Among these public goods, the conservation of agricultural landscapes, the conservation of farm biodiversity and the resilience of the land to forest fires are intrinsically linked to the existence of low-intensity grazing systems (Cooper et al., 2009). However, the intensification of land use in favorable areas and the abandonment of marginal areas are two primary causes of conflicts between agriculture and the conservation of biodiversity and agricultural landscapes in Europe (EEA, 2004; Henle et al., 2008), undermining the delivery of other ecosystem services (Rodríguez-Ortega et al., 2014).

Agri-environmental schemes that target HNV farmland intend to promote the adoption of environmentally friendly management strategies. These agri-environmental schemes provide payments to farmers who voluntarily subscribe to environmental commitments related to the delivery of public (nonmarket) functions, such as the preservation of biodiversity and the maintenance of the countryside. However, the value of nonmarket functions depends on societal perception and is contextual and diverse (Randall, 2002). In the European Union, agri-environmental schemes are part of the rural development policy known as the “second pillar” of the Common Agricultural Policy (CAP) and are organized around rural development programs that last six years. Specific agri-environmental measures are implemented at the farm level where farmers make decisions. Therefore, for agri-environmental schemes to be effective, it is important to analyze the experiences of farmers and how they understand their own activities and contexts (Boonstra et al., 2011). Thus, we must determine the perceptions of farmers regarding how their farming activities and agricultural practices affect the diverse provisioning and nonprovisioning ecosystem services they manage (Smith and Sullivan, 2014) and must identify the other dimensions of farming that are involved (the economic and social pillars of sustainability).

The concepts of multifunctionality and, more recently, ecosystem services, are human-centered because both human benefits and societal demands are at the core of their definitions (Millennium Ecosystem Assessment, 2005). The ecosystem services framework has helped to systematically classify the different services or functions provided by HNV farmland (Rodríguez-Ortega et al., 2014). However, the embedment of the ecosystem service framework into the wider concept of sustainability is problematic. Norgaard (2010) affirms that the predominance of the ecosystem services framework, which considers nature as a provider of flows of services, is blinding us from the complexity of the challenges (ecological, economic and political) we actually face. Abson et al. (2014) conclude that, despite its increasing acceptance among the scientific community, the ecosystem service framework involves critical challenges (greater focus on normative and transformative knowledge) for use as a management tool. Interdisciplinary knowledge integration and shared vocabularies are necessary for addressing these challenges.

The integration of biological and social knowledge often follows top-down “expert” approaches. However, the economic or socio-cultural benefit (welfare gain) of a particular ecosystem service depends on how different actors in society perceive or attach value to the ecosystem service; thus, these perceptions of value can eventually effect changes in policies (van Oudenhoven et al., 2012). Therefore, if we want public policies to be socially acceptable and transformative, the importance of understanding the different perceptions of society, which ultimately fund these policies, is implicit. To address these demands, social research methods are used to analyze the heterogeneity of the actors, their particular circumstances and their sometimes competing values (Martín-López et al., 2012). In these bottom-up studies, discourse-based deliberative approaches assume that individuals take the role of citizens and act according to social rationality instead of solely as consumers,

which involves ethical considerations, social norms and collective utility (Kelemen et al., 2013; Vatn, 2009).

The body of literature available regarding the perceptions of different beneficiaries, particularly farmers and nonfarmers, on biodiversity and sustainability is increasing, but few studies considering ecosystem services have been conducted (Kelemen et al., 2013; Lamarque et al., 2011; Oteros-Rozas et al., 2013; Smith and Sullivan, 2014). Moreover, little research has been directed toward understanding the relevant agricultural practices that mediate between agroecosystems and the delivery of ecosystem services, and few studies have focused on how the perceptions of ecosystem services and environmental attitudes affect farmer behavior (e.g., Reimer et al. (2012), Lamarque et al. (2014)). To the best of our knowledge, studies of the effects of specific agricultural practices and management regimes on ecosystem services and related sustainability issues, as perceived by stakeholders, have not been conducted.

Our objective was to analyze, in depth, the perceptions, understandings and reasoning of farming and nonfarming groups (hereafter, farmers and nonfarmers, respectively) regarding the relationships between animal agriculture in HNV farmland (using the Mediterranean mountains as a case study) and the environment. For this purpose, we focused our analysis on agricultural practices and their mediating effects between agroecosystems and 1. the ecosystem services that they provide, 2. the economic and social issues of sustainability relevant to farmers and nonfarmers, and 3. the relationships among ecosystem services and issues of sustainability.

2. Methodology

2.1. Characteristics of the study area

We circumscribed the study to the Mediterranean mountains in Northeast Spain (the Central Pyrenean and pre-Pyrenean mountain ranges). A large proportion of the Natura 2000 sites are concentrated within this area, covering approximately 30% of the total area in the region. Natura 2000 is the centerpiece of the EU Nature and Biodiversity Policy that established an EU-wide network of protected natural areas in 1992 (Habitats Directive). Habitats such as 6170 (alpine and subalpine calcareous grasslands), 6210 (semi-natural dry grasslands *Festuco-Brometalia*) and 6230 (species-rich *Nardus* grasslands) are dependent on grazing by livestock and mowing by farmers to maintain their HNV status. In the study area, grazing livestock systems (meat sheep and beef cattle) and mixed arable-pastoral (cereals and permanent crops such as almond and olive trees) systems are the most prevalent agricultural systems. These systems are generically considered HNV farming systems despite their very diverse land use, intensity and management regimes (García-Martínez et al., 2009; Riedel et al., 2007).

These HNV livestock systems have the greatest potential to deliver public goods through specific management practices. Some of these public goods, such as the prevention of forest fires, the preservation of biodiversity and the conservation of cultural landscapes, are inherently linked to these types of low-input farming systems (Cooper et al., 2009). However, these areas have experienced profound changes in their demographic and socio-economic characteristics that have threatened the sustainability of these farming systems (Bernués et al., 2011). These changes resulted in a two-fold process: the intensification of farming in the most favorable and easy-to-work areas and the abandonment of the marginal areas, which has led to important transformations of agricultural landscapes characterized by the encroachment of shrub and forest vegetation and the loss of diversified mosaics (Bernués et al., 2005; Lasanta-Martínez et al., 2005; Riedel et al., 2013). Other

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