Ecosystem services and transhumance in mountain landscapes of Mediterranean Spain

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The Mediterranean eco-region is one of the world's most important biodiversity hotspots, where human civilization and wild nature have coevolved for centuries, producing a unique and characteristic cultural landscape (Cuttelod et al. 2008). In the Mediterranean Basin productivity is limited in both summer (water scarcity) and winter (low temperatures), being this climatic restrictions enhanced in mountainous areas. One consequence of this fluctuating environment is the existence of marked changes in pasture availability, which has historically encouraged transhumance, a customary practice consisting in the seasonal migration of livestock between summer pastures (highlands, northerly latitudes) and winter pastures (lowlands, more southerly latitudes). Matching grazing pressure with seasonal peaks in productivity allows an optimal exploitation of existing resources (Ruiz and Ruiz 1986).

Transhumance reached its peak during the Middle Ages (Castán and Serrano 2004) but after the industrial revolution this practice began a process of continuous decline, which has accelerated dramatically during the last decades as a consequence of several socio-cultural and economic factors (Ruiz and Valero 1990, Bacaicoa et al. 1993).

In a research project currently under way, we are using the Millennium Ecosystem Assessment framework (MA 2005) to study the major social-ecological drivers behind the abandonment of transhumance, to identify and value those ecosystem services linked to the practice of transhumance, and to explore the potential of payment for ecosystem services (PES) schemes.
The study is taking place along the Conquense Royal Drove (CRD), a 75-m wide set route still in use by sheep and cows in Spain. The main current path of the CRD extends over more than 410 km, from the Albarracín Mountain Range in north-central Spain (pinewood forests and pasturelands), to the mountains of Sierra Morena in the south (holm oak woodlands), crossing the characteristic agricultural landscapes of La Mancha region (vineyards and olive crops). Livestock usually stays in the fresh pasturelands of the Albarracín mountains from June to October, when climatic conditions enhance pasture productivity. In early November, when the snow begins to cover mountainous pasturelands, shepherds and herds start a 25-30 days journey towards the warmer mountains of Sierra Morena, where livestock stays for about six months, before returning to the north in late-May.

According to official livestock movement permits granted in 2009, only 34 shepherds with 22.498 sheep and 1.324 cows were transhumant in the study area, compared with 84 shepherds and 37.998 sheep recorded seventeen years ago (Bacaicoa et al. 1993). Most of the current transhumant shepherds use cattle trucks or trailers to move the cattle, with only 236 cows and 5.645 sheep walking the royal drove in 2009.

We hypothesize that one of the major factors behind this sharp decrease in the number of transhumant herds is probably the lack of an adequate assessment and recognition of the full range of ecosystem services provided by this practice, as well as the lack of knowledge about its importance for social-ecological resilience and sustainability in the face of global change.

A continuous decrease in profitability, together with social difficulties associated with the nomadic lifestyle, is always claimed by shepherds using the CRD as one of the major factors behind the abandonment of transhumance. We believe that a thorough economic valuation of

the ecosystem services generated and/or maintained by transhumant movements might provide the basis for implementing PES schemes or other incentives that could help avoid the disappearance of this traditional practice.

Semi-structured interviews and participatory workshops with transhumant shepherds, managers, and decision-makers were carried out, along with a thorough literature review, in order to identify and characterize ecosystem services and beneficiaries at different temporal and spatial scales.

Although the perceptions of stakeholders differed notably, our results reveal the importance of transhumance for maintaining several regulating services such as fire prevention (particularly in summer pastures), plant species regeneration (in wintering areas), seeds dispersal, habitat for plants and animals (along the drove), maintenance of biological and genetic diversity, ecological connectivity, and maintenance of natural productive soils. Some important cultural services were recognized, being traditional ecological knowledge, cultural identity and recreation, the most frequent. The better-known provisioning services, such as food or wool, were also highly valued, particularly the production of meat from transhumant livestock which was widely considered of a better quality and healthier than the usual meat from intensive livestock exploitations.

Our preliminary results show that the progressive abandonment of customary practices like transhumance is having dramatic negative effects on the generation and maintenance of some critical ecosystem services, essential for biodiversity conservation and human wellbeing. Social-ecological resilience is also being eroded with the loss of traditional ecological knowledge and important regulating services. This is of special concern in the arid and fragile mountainous landscapes of the Mediterranean ecoregion, taking into account their vulnerability to human-induced changes.

The significance and the future of transhumant movements in the face of global environmental change will be analyzed and discussed in future stages of the project, and insights will be provided in order to contribute to the ongoing policy debate on economic incentives for rural development and the reform of the Common Agricultural Policy of the European Union.

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