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Avoiding over-implementation of agri-environmental schemes for steppe bird conservation: A species-focused proposal based on expert criteria

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ABSTRACT

This study presents an assessment, resulting from consultation with experts in steppe-bird conservation (scientists, officers and conservationists) using the Delphi method, of a broad range of agri-environmental measures (AEMs) which have been applied in agricultural areas in Spain, with particular reference to four threatened steppe bird species. The measures which experts have valued most highly relate to the maintenance of fallow land, the prohibition of agrochemicals and the suspension of certain agricultural practices when the species are nesting. Other AEMs which have frequently been mentioned as beneficial for steppe birds, including the maintenance of straw-mulched fallows and the abandonment of farmland, were rejected by the experts. The assessment showed a high degree of consensus between experts, although differences between the four studied species were detected. Delphi assessment indicated that different birds need different AEMs. In addition, expert evaluation showed that different AEMs can cause the same effect on the target species, which could generate an over-implementation of measures. Finally, we evaluated the financial implementation of the AEMs selected by the Delphi using a Special Protection Area for birds (SPA) in the Madrid region as a case study. All the hypothetical scenarios used yielded assumable costs, oscillating between 1 and 2 times the current AEMs expenditure. In conclusion, in extensive agrarian systems with already high conservation merits, the implementation of AEMS could be improved using species-specific assessments, thus avoiding over-implementation and improving the fit between costs and benefits for conservation.

1. Introduction

The Common Agricultural Policy (CAP) was introduced with the objective of increasing agricultural production through maintaining prices and protecting against imports. In conjunction with modern technology this favoured intensification of agriculture on productive land and a parallel abandonment of unprofitable properties (extensive areas of low productivity) (Oñate, 2005). Although the CAP has achieved its objectives with respect to productivity, to date it has not contributed to stabilising the rural economy and it has had a pronounced environmental impact, causing a large decline in numerous taxa (see reviews in Robinson and Sutherland, 2002; Tscharntke et al., 2005). It has had a particularly marked effect on birds associated with agricultural areas, a group of species which is particularly threatened on a European scale (Donald et al., 2002; Sanderson et al., 2005), and especially for Mediterranean steppe birds (Suárez et al., 1997).

Successive reforms of the CAP have attempted to mitigate its negative effects (Oñate, 2005). Specifically, the agri-environmental measures (hereafter, AEMs) established under Regulation 2078/92 were conceived with the aim of compensating farmers for loss of income resulting from the use of environmentally friendly farming practices. Their principal objectives include a reduction in the use of pesticides and fertilisers, the protection of biodiversity, landscape restoration and prevention of rural abandonment. The European expenditure on AEMs amounts for 2007–2013 to nearly 20 billion EUR or 22% of the expenditure for rural development, including the co-financing by Member States (European Commission, 2006).

Despite this investment there is still little information regarding the effects of the AEMs on biodiversity. Some evaluations on the effectivity of AEMs have been carried out in different European countries, some of them showing positive effects (Marggraf, 2003; Primdahl et al., 2003; Berger et al., 2006; Marshall et al., 2006; Wrbka et al., 2008; Douglas et al., 2009), and some others

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indicating disparate ones (Kleijn and Sutherland, 2003; Báldi et al., 2005, Feehan et al., 2005; Kleijn et al., 2006; Wretenberg et al., 2007; Concepción et al., 2008) biodiversity. They agree that purpose-made investigations need to be carried out to permit an evaluation of the effectiveness of the measures in relation to the initial circumstances (see review in Kleijn and Sutherland, 2003). Moreover, there are few evaluations at the species-level (see e.g. Peach et al., 2001; Douglas et al., 2009) and incorporating these in the design might result in improvements in species conservation.

In recent years a number of evaluations of the effect of AEMs on the steppe avifauna have been carried out in some countries, including Spain, although these have been restricted to particular regions (Astraín and Zaragüeta, 2006; Kleijn et al., 2006; Concepción et al., 2008) and have given inconclusive results (see also Potts et al., 2006). In the particular case of Spain, the AEMs introduced to date are incomplete and of limited application (Llusía and Oñate, 2005).

On the other hand, although most authors agree on the types of measures needed to conserve steppe birds, they differ significantly regarding the design of some of these programmes, especially in relation to targets, timing, and to the extent of the areas involved. Studies assessing the effectiveness of AEMs yield negative results with respect to steppe and farmland bird conservation (Kleijn et al., 2001, 2006). The limited and often fragmented application of measures, in conjunction with very general design features which may introduce errors, may be reducing their effectiveness.

In this context, the present study attempts to employ expert-assessed criteria (from scientists, officers and conservationists) to evaluate the adaptation of AEMs which have been taken to date in pseudosteppe agricultural regions in Spain for conserving four threatened bird species associated with this habitat. On the basis of this evaluation, species-specific proposals based on a scientific consensus are made, with the aim of improving the current situation of those species in a Special Protection Area for birds (SPA/ZEPA) in Madrid region, central Spain. A cost is assigned to these proposals and possible avenues of finance by the EAFRD of the European Union identified.

2. Materials and methods

2.1. Study species

Four steppe bird species, the Great Bustard (*Otis tarda*), Little Bustard (*Tetrax tetrax*), Lesser Kestrel (*Falco naumanni*) and Montagu's Harrier (*Circus pygargus*) were selected. These four depend on cereal farmland and the principal threats to their conservation relate to agricultural intensification and alteration of their feeding and nesting habitats (Santos and Suárez, 2005). Their selection was based on the following criteria: (i) the high amount of available information on their basic ecology, and (ii) the broad functional spectrum they cover (including herbivores, insectivores and carnivores, as well as species depending on crop fields for nesting and on fallows for nesting and/or feeding). Therefore, these four species can reasonably be considered as an umbrella group for farmland bird assemblage. They are regarded as vulnerable or of special interest on a national level, according to the National Index of Threatened Species and the Spanish Breeding Bird Red Book (Madroño et al., 2004).

2.2. Establishing the initial proposal for agri-environmental measures

An initial proposal of 24 agri-environmental measures for conserving these species was drawn up from a review of scientific and technical literature on measures which have been found to be beneficial to the conservation of steppe birds in the Iberian peninsula (Barreiro et al., 2004; Madroño et al., 2004; Llusía and Oñate, 2005; Astraín and Zaragüeta, 2006; De la Concha et al., 2006; Kleijn et al., 2006; Lima et al., 2006). All the measures included in the initial proposal are currently being applied or form part of some plan or study and the majority relate to non-irrigated, herbaceous crops.

2.3. Evaluation of agri-environmental measures: the Delphi analysis

The Delphi methodology, which allows a collective view to be obtained distinct from a simple aggregate of individual judgments, was followed to evaluate the original proposed measures (Murry and Hammons, 1995). The Delphi method is based on the interrogation to experts using consecutive questionnaires with the aim to highlight and identify opinion agreements and establish potential consensus on the questions asked. This method, although rarely used in environmental assessments (see, however, Marggraf, 2003 and references therein, and Astraín and Zaragüeta, 2006), allows for a group communication process when dealing with complex questions for which information is scarce, yielding a collective view different from simple aggregation of individual judgments (Murry and Hammons, 1995).

The Delphi analysis was carried out in two successive stages based on responses to a questionnaire which was drawn up according to an initial proposal of agri-environmental measures and submeasures (i.e. time ranges for a specific measure; different dimensions as width of strips, etc.). The questionnaire, with no special reference to a specific area or region, was sent to a total of 39 experts belonging to three different professional fields: researchers, conservationists and officers of Public Administration. Replies were received from 20 of them (51.3%), 12 belonging to science, 7 to office administration and 1 to conservationists. In the first instance the experts were required to respond to the initial questionnaire. In the second stage each expert received a new version of the questionnaire, with the same options as the original version but including his or her own initial responses and also the mean values obtained from the whole of the specialist group. All the experts required in this second stage answered the questionnaire. This now gave each person the option of reaffirming his or her original response or of modifying it in the light of the new information provided. This method provides informative feedback whose outcome is to achieve a consensus in the experts' evaluation of each measure (Murry and Hammons, 1995). For a similar methodological approach, see Marggraf (2003) and Astraín and Zaragüeta (2006).

The experts were required to rate the suitability of each agri-environmental measure for the conservation of each of the four species on a scale ranging from +5 (highly beneficial) to −5 (highly unsuitable), recording 0 if a measure was judged to be inconsequential or irrelevant to a species' conservation. A score of 2.5 (i.e. above the 75th percentile) was taken as the acceptance threshold for including a measure in the final proposal, rejecting those measures which gave a negative value for any of the four species. Where measures received different evaluations for recommended intensity of application, the highest mean value for the four species was chosen. The measures included in the final proposals were grouped into programmes according to criteria related to the type of terrain involved (fallow land, cultivation or pasture).

The four species have been grouped according to their similarity in the evaluation obtained for all the measures and submeasures by means of a hierarchical cluster analysis, with single linkage as the amalgamation rule and squared Euclidean distances as the similarity criterion among measures. In addition, in order to relate