Software data news

A software tool for designing cost-effective compensation payments for conservation measures

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Abstract

Compensation payments to farmers who apply species-friendly farming activities are a common instrument to reconcile nature conservation with agriculture in Europe. In order to design cost-effective and ecologically effective compensation payments for conservation measures an ecological–economic modelling procedure has been developed using the example of protecting Large Blue butterflies. The modelling procedure forms the basis for the decision support tool EcoEcoMod. By comparing the effects of different mowing regimes on the butterfly populations for a given budget, the user can identify the cost-effective mowing regime and the corresponding compensation payments for that budget.

Keywords: Ecological–economic model; Decision support; Simulation model; Habitats; Directive; Online tool; Biodiversity conservation; Maculinea; Cost-effectiveness

Software availability

Software name: EcoEcoMod (Version 2.00)
Contact: karin.ulbrich@ufz.de
Year first available: 2006
Hardware required: IBM compatible PC
Software required: Windows 98/2000/XP, Internet Explorer 5 or higher, FlashPlayer Plug-in
Program languages: Delphi 5, Macromedia Flash Prof. 2004
Availability: Downloadable for free from: http://www.macman.ufz.de/tool

1. Introduction

Compensation payments for measures to protect endangered species have become a central instrument of European biodiversity conservation policy. However, there is little knowledge on how to consider and combine both ecological and economic aspects of conservation management. An ecological–economic modelling procedure has been developed which is able to determine cost-effective compensation payments as a function of the budget (Johst et al., 2002; Drechsler et al., 2005). Cost-effectiveness here means that the highest ecological output is achieved for a given budget (Wätzold and Schwerdtner, 2005). The procedure was tested using the example of two endangered Large Blue butterflies in the region of Landau, SW-Germany.

The two species Maculinea teleius and Maculinea nausithous are highly endangered in Europe and strictly protected by the EU Habitats’ Directive. They inhabit agriculturally used grasslands, and their survival depends on two resources: Great Burnet plants (Sanguisorba officinalis) for egg deposition and larvae foraging and meadow ants for pupation in ant nests (Thomas and Settele, 2004). Mowing influences the abundance of plants and ant nests on the meadows as well as egg and larval mortality on the plants (see Johst et al., 2006). The conventional mowing regime is often detrimental to the butterflies. Butterfly-friendly mowing regimes, however, lead to profit losses for which the farmers have to be compensated. The modelling procedure combines cost data for mowing regimes with results from ecological simulation models to
identify the cost-effective mowing regime for a given budget, the corresponding compensation payments and the effect of the payments on the butterfly populations (Fig. 1).

The ecological—economic modelling procedure was implemented in the software EcoEcoMod as a tool for decision support (cf. Znidarsic et al., 2006).

2. Software features

The software EcoEcoMod consists of a descriptive part which is written in Adobe Flash and of a simulation tool which is based on the ecological—economic modelling procedure and is written in the programming language Delphi. The main features of EcoEcoMod are as follows.

- The descriptive part provides information about the modelling procedure, the study region, and the management scenarios.
- The user input includes the choice of the mowing regime and the available budget for compensation payments on the regional scale.
- The model output comprises maps, diagrams, and tables which show how the survival of the butterfly species in a certain region depends on the choice of mowing regime and the available budget.

3. Concluding remarks

EcoEcoMod responds to the demands that decisions in conservation management should be founded on an understanding of both population dynamics and economic considerations. Comparison of the ecological outcomes of different mowing regimes for a given budget allows the identification of the cost-effective mowing regime and the corresponding compensation payments. The decision support tool EcoEcoMod allows the early and continuing involvement of stakeholders into resource management and increases the awareness among natural resource managers how this knowledge can be used to improve management. EcoEcoMod may also be used for educational purposes.

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References


