The use of invertebrate surveys as guidelines for management of wetlands in southern Belgium

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Introduction

Management of the remaining semi-natural sites like wetlands is needed, to safeguard adequate habitats for many threatened animal and vegetal species. Management guidelines are usually derived from ecological requirements of culturally well-known and attractive organisms, like birds. The time and space scales of such management plans is often too large for other organisms like invertebrates.

In this study, we have tried to design a methodology to assess priorities of guidelines management for invertebrates in five nature reserves in the Belgian Ardennes. The five reserves are wetlands : one is a lake and the other are mosaïcs of peat bogs, wet grasslands, moors and birchwoods. Some of them are crucial for the conservation of certain animal and plant species in Belgium.

Invertebrates selection

As it is impossible to deal with all invertebrates, three groups have been selected, because (1) they are complementary in habitat selection and space requirements, (2) their ecology is fairly well known, and (3) they are culturally attractive. These three groups are butterflies, dragonflies and carabid beetles.

Methodology

Several vulnerability indices have been used to compare the interest of the five reserves. These indices are either unidimensional indices, like for instance the number of UTM squares occupied by each species on a reference grid, either multidimensional indices, like a combination of species scarcity, species evenness of distribution, species abundance and species trends in population dynamics.

Two procedures of sites evaluation have been tested : (1) a synthetic approach based on the sum of the indices of the species recorded in the site and (2) a more specific approach based on the vulnerability of the different species in each site.

The conclusion is that the evaluation of the interest of a site computed by summing up the indices of the species recorded in the site must be rejected. Such indices strongly depend on the reliability of the surveys of each groups in each site. The use of such procedure in the present case would be irrelevant : careful censuses of each site were prohibited by budgetary constraints, only existing data with different sampling efforts can be used. Therefore, the basic data were very different between groups and between sites. This situation leads to an unsatisfactory ranking of the sites.

The method we develop is founded on another approach : we attach more importance to the vulnerability of the species present in each site. The indices listed above are good species vulnerability index, as well as those based on national or regional redlists. With the help of such indices, it is possible to identify vulnerable or endangered species, and to propose guidelines of management especially adapted to such species.

Priorities of management are easily detected by such a specific approach, as opposed to a global, synthetic one : the urgency of interventions required for maintaining viable populations of vulnerable or endangered species become the ultimate criterion. Moreover, with this method, biogeographical parameters like connectivity between sites or size of the sites are taken into account, because they are related to the viability of the populations of the target species.

Management guidelines derived from this method are different from one group to another, and to a lesser extent from one site to another. Nevertheless, the comparison of the measures proposed for the different groups in each of the sites show complementarities and convergences, allowing the realization of coherent global management procedures.

Evaluation of the management effects

As stressed by the Ecological Society of America in the Sustainable Biosphere Initiative (Ecology, 72: 371-412), "every management intervention is a learning opportunity if adequate baseline and follow-up are collected".

Using guidelines based on ecological requirements of vulnerable and endangered species, it is easily possible to assess the effect of management. This control is provided by monitoring the abundance of only a few target species.

Conclusions

We have to design at lower cost management guidelines of nature reserves for invertebrates. The method used is found on two main options : (1) the selection of groups of indicator species complementary in habitat selection and space requirements and (2) the proposition of concrete measures of management based on the ecological requirements of threatened species.

This method, which is certainly not the best one, is a trade-off taking into account financial constraints and the need of management guidelines adapted to both a time- and a space-scale specific to invertebrates, that is different from guidelines based on birds or vegetal species.

We hope the use of this conservation process will be useful to maintain the biodiversity of the wetlands and other semi-natural habitats.

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