when applied to the high resolution land-cover data. Inadequacies could be shown in the classification of narrow elongated anthropogenic landscape elements (e.g. roads, narrow fields, field banks), which are frequent in agricultural landscapes. To overcome these shortcomings, a new index for shape and boundary complexity is presented which characterises two dimensional geometric shapes by the number of shape characteristic points along a polygon's boundary. Landscape boundary complexity expressed by this new measure showed a high positive correlation to species richness of vascular plants and bryophytes (correlation coefficient: 0.85 for vascular plants, 0.74 for bryophytes) and confirmed the assumed relationship.

The Issue of Effort versus Benefit in Biodiversity Prediction

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Abstract

The question as to whom we are developing predictive instruments for, the so-called „end-users", is rarely addressed, the assumption being that it is largely restricted to ecologists and computer modellers. However, most management decisions in agricultural environments that affect species richness (*one* measure of biodiversity and hence conservation value) occur at the landscape-scale (e.g. individual farm size) and are made by farmers, often in consultation with agricultural advisors. So it is these end-users that we also need to encourage to make use of predictive instruments. The probability that a predictive instrument will be widely used in these circumstances is a question of effort or level of expertise required, and benefit, measured in terms of predictive power. It is therefore of high priority that we develop simple, user-friendly predictors for management at the landscape-level. Habitat diversity (number of different vegetation types) as a predictor of species richness is examined based on three different methods of assessing habitat diversity: (1) A possible total of 13 habitat types within study quadrants (= low effort/ low level of expertise required). (2) A possible total of 41 habitat types (= high effort / high botanical expertise required). (3) Satellite imagery based on CORINE land cover types (= high effort / high computer modelling expertise required).

The predictive power of habitat diversity ranges from a low 37% (41 habitat types) to a high of 69% (13 habitat types). Thus, the simplest habitat diversity measure predicts the highest percentage of total species richness (pooled richness of birds, vascular plants, bryophytes, carabid beetles, spiders, gastropods, ants and orthopterans).

Highest benefits in terms of predictive power are achieved by individual taxa, especially vascular plants, but this would pay a high price in terms of cost of time and level of expertise required. Low predictive powers are provided by the analysis of satellite imagery data. The predictor variable requiring the lowest effort and lowest level of expertise (13 habitat types) predicts almost 70% of total species richness at the landscape-scale and would appear to be the most sensible

predictor variable to use if on-site (in the field) prediction of species richness, as one measure of conservation value, is the chosen option of assessment.

Pressure Indicators for Biodiversity Loss

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Abstract

Whereas reliable, scientifically valid pressure indicators have been developed for many important environmental problems – e.g., ozone depletion, global warming, acidification, etc. –, such indicators are lacking for biodiversity loss. Pressure indicators – i.e., indicators for socio-economic activities that cause environmental problems – should be related to the environmental problem to which they refer in a simple, in the best case linear, way. They should measure socio-economic activities, not processes within ecosystems, and it should be possible to unambiguously relate them to different socio-economic actors. To derive pressure indicators for biodiversity loss we propose a research strategy that is based on measures such as the "human appropriation of net primary production" (HANPP). The results we report show that HANPP meets the requirements outlined above for a transect in Eastern Austria. However, because of restrictions in the coverage of available data we conclude that further research is needed to validate HANPP as a pressure indicator for biodiversity loss.

Keywords: Species diversity, biodiversity, pressure indicators, human appropriation of net primary production (HANPP), NPP.

Introduction

Policies towards sustainable development should be based on comprehensive sets of indicators that cover, at least, (1) socio-economic driving forces of environmental change, (2) socio-economic pressures on the environment, (3) the state of the environment and (4) feedback of environmental change on society (EEA, 1999, Haberl and Schandl, 1999, Haberl et al., 2001a). This paper focuses on the second type of indicators, that is, on pressure indicators.

Because pressure indicators analyse which socio-economic activity contributes how much to a particular environmental problem at hand – e.g., to biodiversity loss –, they are a prerequisite for the formulation of cause-related, precautionary policies aimed at the reduction of environmental pressures. To be useful for the formulation of precautionary, cause-related environmental polices,