
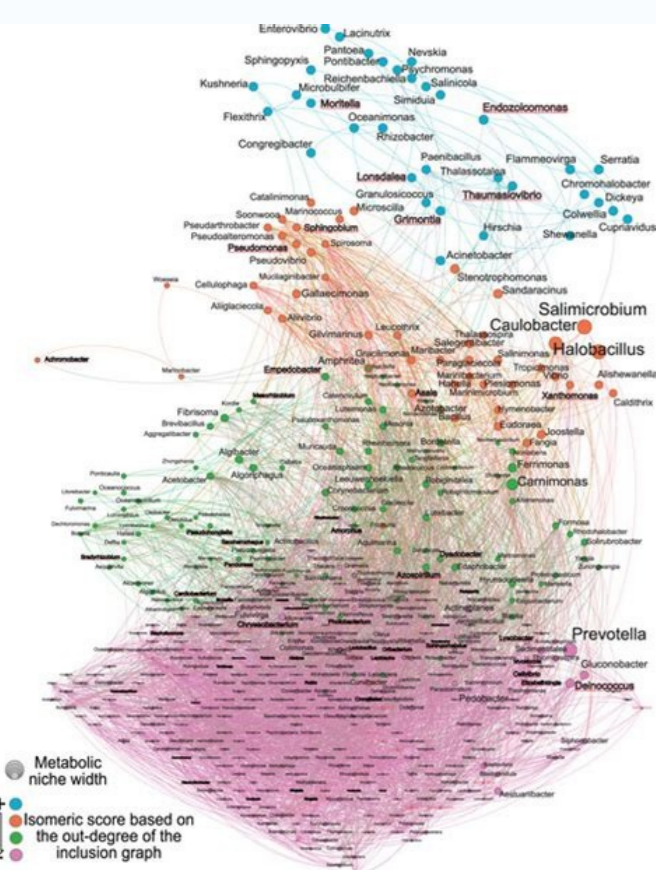


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Ecological Modelling 169 (2003) 1–15

ECOLOGICAL
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A GIS-based multi-scale approach to habitat suitability modeling

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Received 18 March 2002; received in revised form 22 April 2003; accepted 12 May 2003

Abstract

The aim of this study is to develop a method by means of which it is possible to produce georeferenced ecological information about the habitat requirements of different species. The integrated habitat suitability index approach includes the steps of constructing habitat suitability models, producing data needed in models, evaluating of target areas based on habitat factors, and combining various suitability indices. The method relies on the combined use of empirical evaluation models and models based on expertise in geographical information system (GIS) environment. GIS was used to produce the data needed in the models, and as a platform to execute the models and to present the results of the analysis. Furthermore, multi-criteria evaluation methods (MCEs) provide the technical tools for modeling the expertise and for connecting (standardizing, weighting, and combining) the habitat needs of different species. The main advantages of the method were connected to possibilities to consider the habitat factors on different scales, to combine habitat suitability evaluations for several species and to weight different species in different ways, and to integrate empirical models and expert knowledge. The method is illustrated by a case study in which an integrated habitat suitability map is produced for a group of old-forest species.
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Keywords: GIS; Habitat suitability evaluation; Multi-scale; Cartographic modeling

1. Introduction

Ecological research currently produces plenty of knowledge about the habitat requirements of the various species. Abundance and habitat suitability models, for instance, have been produced for many species (e.g. Özsesmi and Mitsch, 1997; Elmberg and Edenius, 1999; Radeloff et al., 1999; Whigham, 2000). For this

knowledge to be efficiently utilized, one needs methods and channels capable of bringing the knowledge into the field of practical forestry and nature conservation. Ecological knowledge is needed especially to evaluate different forest management alternatives according to their consequences to biodiversity conservation and to evaluate the importance of alternative locations to be set aside from wood production. In Finland, a high proportion of commercial forests is within the sphere of woodlot-specific forest planning, which enables the use of forest planning as a link between ecological knowledge and practical forestry.

One way of protecting threatened forest species that are difficult to locate and identify is to protect their

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