Chapter 12
Biodiversity Modelling Experiences in Ukraine

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ABSTRACT

Biodiversity modeling in Ukraine was recently developed in order to support policy making and for providing information to e.g. the reporting to the UN Convention of Biological Diversity. This is the first and highly ambitious study on biodiversity and its conditions in Ukraine and some surrounding countries. It includes four different methods to assess and project biodiversity changes: the indicative-index approach, the GLOBIO Mean Species Abundance (MSA) and two species based approaches, one using habitat changes as driving factor (EEBIO) and the other includes climate change (SDM_GLM). The indicative-index methodology dealt with 128 species and demonstrated low impact of climate change from 1950-2002, and is presented in a special Web-agro-biodiversity-searchable 'BINU' system for the users in Ukraine. It contains 96 agro-biodiversity indicators-indices. The EEBIO approach links species distribution maps, compiled from different sources to habitat change maps, resulting in a series of 800 GIS maps. The MSA-approach gives a general view of the intactness of biodiversity and shows a low impact of climate change by 2002 and a high impact due to habitat loss. A training package for educational purposes is derived from the analyses. The SDM-GLM-approach provided detailed species-based maps of the expected changes in habitats condition caused by land use change and climate change. Finally, the selected 54 indicator species (vascular plants, insects, amphibians, birds and mammals) demonstrated a surprising diversity of SDM-GLM-trends by 2030-2050. It proved that expected climate change, together with land-use change would provoke numerous expected and unexpected species-habitat alterations. If the final model is correct, then in the near future in Ukraine in particular, scientists and decision makers will by 2050 find about 4% of new species or will lose up to 13% of existing species.

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1. INTRODUCTION

In Ukraine until 2003, climate change, land use change and biodiversity were mainly discussed as philosophical issues in scientific publications and no attention was given to the evidences on changes in biodiversity resulting from pressures like climate change. In 2003-2005, the UNEP-GEF funded Biodiversity Indicators for National Use (BINU) project proposed the indicative-index approach and demonstrated possible impact of land use change (LUC) and climate change (CC) on agrobiodiversity of Ukraine (Sozinov *et al*., 2005a, 2005b). In 2007, the internationally oriented Ukrainian Land and Resources Management Centre (ULRMC) jointly with the Netherlands Environmental Assessment Agency (PBL) carried out an application of a pressure based biodiversity model at national and regional level. Based on that study a book, 'Landscape Ecology' was published for educational purposes (Prydatko *et al*., 2008a, 2008b). In June 2008, the partners completed the second project on biodiversity modelling, i.e. the 'Projection of Species- and Species-Climate Based Models' and scenario development using the GLOBIO approach for the Ukraine Region, which was mainly focused on Ukraine and neighboring countries like Belarus, and Moldova. At the same time, the methodology used required a much larger geographical space for better simulation. It also required a broader set of species including rare and 'red-data-book' species as well as alien species. In 2008, the geographical space for the species-based-models was extended to twelve Eastern European countries, which we called the EEBIO region. The final modelling has been applied for projections from 2000 towards 2030 and 2050. This paper summarizes and compares the different modeling approaches and discusses them at the conceptual level and in their possible applicability for the Ukraine region

2. REGIONAL BIODIVERSITY MODELLING HISTORY

The regional history of biodiversity modelling only started in 2005 with a serious attempt of digitizing biodiversity distribution maps. Unlike other European countries, Ukraine has demonstrated slow progress of biodiversity modelling (at least for applications at the level of decision makers) during 1990's and 2000's. This is in contrast to well known opinions about many successes in biodiversity conservation during 1992-1998. However these attempts were more virtual instead of evidence based studies of its natural analogy as stated by Prydatko (2000).

The first location-based evaluation of the performance of Ukraine's commitments under Convention on Biological Diversity (CBD) was done and summarized four years ago (Sozinov & Prydatko, 2006). It reported both satisfactory and unsatisfactory indexes of Ukraine's 14 years of membership to the Convention (since the Convention was signed). During this period, Ukraine was placed before Congo and after Togo on the basis of efforts devoted to preserve biological diversity (in percentage to the GDP). At the same time, over 200 legislative documents were issued (and approximately 13 normative documents developed per year), which directly or indirectly facilitated the preservation of biological diversity and the active development of cooperation in this subject. Regardless of 14 years of experience as a member to the Convention, only 8% of the documents issued ensured direct application of the articles and decisions of the Convention on Biological Diversity, which might be considered as the documents of practical CBD-directives. During 14 years the reporting of Ukraine remained unsatisfactory as only 15% of the obligatory reports were submitted. According to the selective data, the reporting activity placed Ukraine on the same level with Uganda and lower than Armenian and Uzbek.

This contributed to low assessment scores, given by the public during the All-Ukrainian sur-

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