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Biodiversity on the waves of history: Conservation in a changing social and institutional environment in Hungary, a post-soviet EU member state

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ABSTRACT

Changes of the social-political system in the last twenty-five years heavily affected biodiversity conservation in the post-soviet Central and Eastern European (CEE) countries. We used a framework to present the effect of the two fundamental social, political and economic changes on the biodiversity and ecosystems of Hungary from 1989 until recently. First, following the democratic transformation in 1989 social, political, economic and institutional drivers led to the increase in farmland biodiversity, improvement of water quality due to less chemical use and decrease of habitat loss within protected areas. At the same time, land privatisation and uncertain ownership led to habitat degradation, abandonment and fragmentation. These changes were coupled with the spread of alien species and re-ploughing. The second change was joining the European Union in 2004. This resulted in the establishment of the Natura 2000 network, the application of the relevant EU policies, and access to conservation related EU funds, which contributed to successful habitat restorations increasing of some charismatic species' populations. Meanwhile, however, disappearance of extensive farming practices, agricultural intensification and infrastructural developments driven by some increasing EU funds led to a net habitat loss, degradation and decline in biodiversity, with more than half of the species of European importance having unfavourable conservation status. Increased support for conservation institutions, adaptive and extended agri-environment schemes and further research and monitoring to establish, refine and supervise sustainable management practices, including water management, are needed to prevent further biodiversity loss in the coming years.

1. Introduction

Effective conservation of biological diversity can be achieved only if viewed in a coupled socio-ecological system (Berkes and Folke, 1998; Díaz et al., 2015). Understanding the links between society and nature, however, requires specific knowledge, gained particularly from regions where rapid social transformations have high stakes regarding biodiversity conservation. In Central and Eastern European (CEE) countries political, legal and regulatory systems changed dramatically in a relatively short period making a substantial impact on biodiversity conservation (Liira et al., 2008; Berkes, 2016). Despite of forced intensification trends (Peterson, 1993; Jepsen et al., 2015), extensive farming practices and extended semi-natural and natural habitats survived in Hungary during socialism (Báldi and Batáry, 2011), similarly to other CEE countries (Stoate et al., 2009; Tryjanowski et al., 2011). These habitats contributed substantially to the increase of biodiversity-rich areas of the European Union (EU) when these countries joined (Henle et al., 2008; Young et al., 2007; Stoate et al., 2009; Sutcliffe et al., 2015). The deconstruction of the socialist legislation, the establishment of new institutions, new progressive conservation laws and later the EU accession introduced new regulation and management tools for biodiversity conservation in the new member

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states, including the establishment of the Natura 2000 network and the related agricultural incentives (Hochkirch et al., 2013; Kati et al., 2014). The EU Common Agricultural Policy (CAP) has a much broader and debatable influence on the ecosystems: in addition to resource allocation to the conservation of high nature value areas (HNVA-s) and sustainable agriculture and forestry practices, CAP is driving agricultural intensification accelerating the decrease of farmland biodiversity (Tryjanowski et al., 2011; Pe'er et al., 2014). While impacts of socio-economic changes on species, habitats and land-use are thus manifold (e.g. Kuemmerle et al., 2008; Pullin et al., 2009), biodiversity governance and conservation institutions have also gone through substantial transformation in these countries (Kluvánková-Oravská et al., 2013), resulting in an ever-so changing socio-political landscape of conservation advocacy.

Particular case studies contributed to the overall picture of conservation in the CEE region on e.g. protected areas (Iojă et al., 2010; Knorn et al., 2012; Lepšová and Pouska, 2014), conservation policy (Ioras, 2003), and pollinators (Kovács-Hostyánszki et al., 2016) in Romania, farmland birds population trends in Poland and Hungary (Sanderson et al., 2009; Szép et al., 2012), wood pastures (Hartel et al., 2013; Varga et al., 2015) and steppe habitats (Wesche et al., 2016) in Eastern Europe. Information compiled from the EU Member States' reports and further assessments under the EU Directives provides a review on the status of habitats and species in the European Union (EEA, 2015). There is an increasing need, however, to understand the wider picture of this dynamic era (see e.g. Hanspach et al., 2014), but no report is available at the most important and operative administrative level, the state, to scrutinise the relationship between biodiversity, governance and legislation in a socio-economic context. Thus, information from the CEE region, that applies an integrative approach and provides the wider context are key for a better understanding and documentation of how substantial changes in socio-political context influence biodiversity conservation. Considering the recent rapid political changes, such case study will provide essential information. Hungary has been the subject of these radical changes while substantial knowledge has been also accumulated enabling us to assess the effects of changes on biodiversity. Exploring these changes and their impacts on biodiversity conservation is strongly needed, as it provides further basic insights into the links between society and nature. This is all the more needed, as biodiversity conservation faces particular challenges more than twenty-five years after the transition from communism to democracy and a decade after the EU accession (e.g. Knorn et al., 2012; Baumann et al., 2011; Báldi and Vackar, 2016).

A conceptual framework is needed for this exploration as it can provide a simple view of the key components and relationships in a complex socio-ecological system. Such a framework is particularly useful for interdisciplinary approaches, namely to highlight relationships across disciplines, science and policy (Ostrom, 2009; Díaz et al., 2015). For this paper, we use a conceptual framework (CF) based on the IPBES (Intergovernment Science-Policy Platform on Biodiversity and Ecosystem Services) framework (Díaz et al., 2015). The central tenet of the concept is that society makes an impact on the ecosystems through indirect and direct drivers. These drivers affect nature, biodiversity and ecosystems and lead to different impacts in terms of ecosystem services and human well-being. These impacts lead to various actions in society (e.g. institutional re-structuring) initiating changes in indirect and direct drivers. The IPBES CF furthermore incorporates “anthropogenic assets” in the framework as the accumulation of physical, intellectual or cultural achievements (Díaz et al., 2015).

Our framework follows the above approach in a simplified way by exploring the basic elements of IPBES CFs: *Indirect drivers*, *Direct drivers*, and *Biodiversity and ecosystems* (Fig. 1) from 1989 up until recently. Under *Indirect drivers* (Section 3) we discuss the country-scale institutional, legal and financial changes affecting nature in Hungary in this period. While a comprehensive review of all indirect drivers (e.g. economic, technological and cultural, Díaz et al., 2015) would be much beyond the scope of this paper, we include some substantial aspect of cultural and economic changes in the discussion which we see as fundamental, including ‘anthropogenic assets’ such as knowledge accumulation. *Direct drivers* (Section 4) cover those anthropogenic factors influenced by the indirect drivers, that induce changes in ecosystems directly, including habitat conversions, shifts in land-use, deforestation and afforestations, habitat restoration, exploitation, species introduction and pollution (Díaz et al., 2015). The consequences of these direct effects on the species and habitats in Hungary are reviewed under *Biodiversity and ecosystems* (Section 5).

By applying this framework, we aim to show the biodiversity gains due to the strengthening conservation instruments after the transition and the EU accession, and to highlight the threat of biodiversity losses imposed by recent institutional changes, development and agricultural pressures following the EU enlargement. Finally we discuss a number of responses that are most needed to address these threats in order to maintain biodiversity in Hungary in the longer term.

2. Study area: Hungary in the centre of the Pannonian Biogeographical Region

Hungary is situated in the Carpathian basin, Central Europe, a topographically discrete unit of the European landscape in the temperate zone. Despite the country's relatively small area (93,030 km^2) and low altitudes (highest point is 1015 m) its classified moderately humid continental climate is rather erratic as it is substantially influenced by the Atlantic and the sub-Mediterranean climatic regimes, with alpine influences (Loczy, 2015; Fekete et al., 2014). The diversity of flora and fauna is especially high due to the multiple biogeographic effects and the species dispersal during and after the glacial period (Varga, 1995; Fekete et al., 2014). The uniqueness of the Hungarian flora and fauna contributed to the formation of a particular biogeographical unit within Europe named as the Pannonian Biogeographical Region (or Pannonicum), covering whole of Hungary, and small areas from the neighbouring countries and the Czech Republic (Fekete et al., 2014; Fekete et al., 2016). Unique endemic communities include the Pannonian forest–steppe forest on loess with *Acer tataricum*; oak scrub forests with *Quercus pubescens* and *Fraxinus ornus*; forest–steppe forests and tall-herb meadow steppes on saline soil; forest–steppe forests on sand; vegetation mosaic of dry perennial *Festuca vaginata* grasslands with juniper–poplar forests on sand; fine-scale mosaic of *Artemisia*- and *Achillea* steppes with *Puccinellia* and *Camphorosma* swards and salt lakes; open dolomite grasslands and dolomite rocky beech forests (Fekete et al., 2014).

Concerning the fauna, there are some widely distributed, pan-European or Eurasian species of priority importance within the EU that are present in remarkable population sizes in Hungary (i.e. the Imperial eagle (*Aquila heliaca*), Saker falcon (*Falco cherrug)*, Eurasian otter (*Lutra lutra*)). However, the speciality of the Carpathian Basin is that it is the most Western and unique outpost of the palaearctic steppe zone (Wesche et al., 2016) and holds a diverse mixture of fauna elements from a large number of geographical regions. Originating from the Siberian, the Mediterranean, the Balkan, the Alpine or Atlantic regions, several fauna elements are now the endemics of the Pannonian Biogeographical Region and as such are unique natural assets of Hungarian nature conservation. The proportion of endemisms is high in the following taxa: molluscs, diplopods, orthopterans and trichopterans (Varga and Kordos, 2003). Of the vertebrate species, the Biharian barbel (*Barbus biharicus*), the Hungarian meadow viper (*Vipera ursinii rakosiensis*), the Pannonian birch mouse (*Sicista trizona*) and four Blind mole-rat species (belonging to the genera *Nannospalax* and *Spalax*) can only be found within the Carpathian Basin. Conservation regulations under the EU legislation are putting therefore most of the responsibility to conserve biodiversity in the Pannonian region on Hungary.