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Weak agreement between the species conservation status assessments of the European Habitats Directive and Red Lists

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ABSTRACT

Public acceptance of conservation measures and measuring the effectiveness of conservation efforts essentially depends on the agreement among experts on the conservation status of species. Here we provide the first European Union-wide comparison of assessments of conservation status of species using two independent frameworks, reports under the European Habitats Directive (HD) and Red Lists. We compared the national and EU-wide conservation status of species assessed for the two last HD reports (2001–2006, 2007–12) with national (27 EU member states) and European Union Red Lists. Discrepancies in species' conservation status assessments of Red Lists and the HD were substantial: the average Spearman correlation coefficient was 0.49 for the first and 0.47 for the second HD report for countries and 0.39 for the first and 0.45 for the second HD report for the whole EU. In addition, correlations differed widely between different EU Member States, with the national assessments of several European countries showing no relationship at all. Surprisingly, many presumably well-known species were assessed very differently. Moreover, there was no evidence of any convergence between the Red Lists and HD reports over time. On average, Red Lists were more pessimistic about the conservation status of species than the HD reports. These low agreements between the two methods raise doubts about the reliability and validity of these assessments and certainly call for a careful revision of the many divergent assessments.

1. Introduction

The human domination of the Earth (Rockstrom et al., 2009; Steffen et al., 2011) has reduced many species ranges and populations to such low levels that their medium- to long-term survival is at risk (Butchart et al., 2004; Butchart et al., 2010). Accordingly, the most recent global Red List of Threatened Species shows that of the 77,340 plant and animal species evaluated, 22,783 (29%) are threatened, and an increasing number of species are facing immediate extinction (IUCN, 2015). The deficient conservation status of many biota has led to initiatives aiming to halt the loss of biodiversity (e.g. the United Nations Convention on Biological Diversity — CBD, the Convention on International Trade in Endangered Species of Wild Fauna and Flora — CITES). Since the early 1990s, the European Union (EU) has established the Natura 2000-network, the largest continent-wide network of protected areas worldwide (Hochkirch et al., 2013). Natura 2000 is based on the Habitats Directive (HD; Directive 92/43/EEC) and the Birds Directive (Directive 2009/147/EC) and includes more than 27,000 sites covering about 18% of the terrestrial surface of the EU and significant areas of Europe's seas (European Commission, 2015). Article 17 of the HD obliges the EU member states to report the conservation status of the habitats and species listed in annexes of that directive every six years following an agreed, standardized methodology. The HD assessments are not restricted to conservation areas such as Natura 2000, and are based on quantitative indicators such as size and trends in the area of occurrence, population size and trends (European Commission, 2011; Evans and Arvela, 2011), which correspond to similar threat indicators in the IUCN Red Lists (IUCN, 2012b). While Red Lists are the most important instrument for evaluating the extinction risk of species worldwide (Lamoreux et al., 2003; Rodrigues et al., 2006), conservation policies in the EU are largely focused on the HD. The first HD report (1994–2000) focused on implementation but the second (2001–2006) and third reports (2007–2012) included assessments of conservation status (EEA, 2015a, 2015b, 2015c). At the same time, Europe is the continent with by far the largest number of national Red Lists and there are also continent-wide Red Lists available for several species groups (Bilz et al., 2011; Cox and Temple, 2009; Temple and Cox, 2009; Temple and Terry, 2007). Thus, two different, but generally comparable schemes for classifying the threat to species and habitats exist in parallel. This parallelism provides a unique opportunity for a continent-wide

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comparison to explore the uncertainties involved in such assessments. The issue is not only of theoretical interest but also relevant for conservation policies. Setting priorities in species conservation, acceptance of conservation actions and measuring the effectiveness of conservation efforts depends in large parts on the agreement among experts on the conservation status of species (Helfman, 2013). In fact, it has already been claimed that conservation measures often do not sufficiently take into account scientific results (Winter et al., 2014) and several authors have claimed that the HD species list is unbalanced (Cardoso, 2012; Hochkirch et al., 2013; but see Maes et al., 2013). Such disagreement may delay or undermine conservation actions.

Here, we analyse the agreement between the conservation status assessments of species of the European HD and Red Lists for several taxonomic groups: (1) plants (i.e. vascular plants and bryophytes), (2) mammals, (3) amphibians and (4) reptiles. In particular, we ask the following questions: (1) Do HD conservation status assessments and Red Lists show a close correlation at the national and the European scale? (2) Do the correlations converge over time, i.e. does the correlation increase between the two reporting periods of the HD (2001–06, 2007–12)? (3) Do HD conservation status assessments and Red Lists agree in their overall conservation status assessments, i.e. the level of threat reported?

2. Methods

2.1. Habitats Directive conservation assessment data

Assessments under the HD are based on the definition of 'Favourable Conservation Status' given in the directive and differentiate between 'Favourable' (FV), 'Unfavourable-inadequate' (U1), 'Unfavourable-bad' (U2) or 'Unknown' (European Commission, 2011; Evans and Arvela, 2011; see Fig. A.6). 'Favourable Conservation Status' describes the situation where the habitat or species can be expected to prosper without any change to existing management or policies. 'Unfavourable-Inadequate' characterizes situations where a change in management or policy is required to restore a favourable status, but there is no danger of extinction of the species or habitat type in the region of assessment in the foreseeable future. 'Unfavourable-Bad' flags habitats or species in serious danger of becoming extinct (Evans and Arvela, 2011). For species, the assessments are based on size and trends in range and population, size and quality of habitats and expected future prospects. In the course of the assessment, species ranges and population size are compared to "favourable reference" ranges and populations, respectively. These "favourable reference" values describe the thresholds for the 'Favourable Conservation Status' of a species, very similar to the concept of the minimum viable population (Lehmkuhl, 1984; Traill et al., 2007). Ranges with more than 10% and populations with more than 25% below the favourable reference values result in a U2 status assessment. Similarly, the HD guidelines are very rigorous with trends; declines in range or population beyond 1% per year already qualify for a U2 status.

Assessments by EU Member States are reported separately for each of nine terrestrial biogeographical and five marine European regions (EEA, 2015b, 2015c) in which the species occur. Thus in cases where a species occurs in different biogeographical regions within one country there is more than one national conservation status assessment per species (e.g. *Lutra lutra* which occurs in five different biogeographical regions in Romania). However, more than 60% of the species occur in only one region per country.

EU-wide assessments for each biogeographical or marine region were produced based on the EU Member State assessments (EEA, 2015c; Evans and Romão, 2014) by the European Topic Centre on Biological Diversity. Data on the HD assessment for both reporting periods (2001–06, 2007–12) are available from http://bd.eionet.europa.eu/activities/Reporting/Article_17.

2.2. Red List data

We extracted the Red List status of species listed in annexes II, IV and V of the HD for plants (i.e. vascular plants and bryophytes), mammals, amphibians and reptiles (excluding marine species) from the most recent national Red Lists of all Member States (Table A.1, Fig. A.5) and from the latest European Red Lists (i.e. the EU assessment; Bilz et al., 2011; Cox and Temple, 2009; Temple and Cox, 2009; Temple and Terry, 2007). We excluded invertebrates as Red Lists are not available or are incomplete for many countries. Not all national Red Lists strictly applied the IUCN criteria (Table A.1) and in a few cases, the categories applied in national Red Lists were not fully congruent with the categories as proposed by the International Union for Conservation of Nature (IUCN, 2012b; see Fig. A.6). In these cases, we converted the national assessment to the categories: Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), and Extinct (EX). However, for some Red List assessments, e.g. the category "rare" in the Belgian, Lithuanian and Latvian Red Lists, no conversion could be established and species were treated as unknown in the analyses. As expected, not all annex species had been assessed in Red Lists, even for the selected taxonomic groups. In some cases (Latvia, Lithuania, Luxemburg, Portugal, Romania, Cyprus and the United Kingdom), less than 40% of the annex species were included in national Red Lists (Table A.2). Red lists for United Kingdom are actually Great Britain (UK without Northern Ireland) and Red Lists for Ireland cover the Republic of Ireland plus Northern Ireland. This means that they do not completely match the HD political units adding more uncertainty.

For comparison on the EU level, we used the latest European Red Lists (Bilz et al., 2011; Cox and Temple, 2009; Temple and Cox, 2009; Temple and Terry, 2007) and the conservation status assessment for the EU 27 biogeographical regions (EEA, 2015a, 2015b).

2.3. Statistical analyses

Since the HD conservation status for annex species has been assessed for biogeographical regions, species which occur in several regions per country have several national conservation status values. By contrast, the Red Lists we used are assessments for whole countries (or the whole EU) and each species is hence assigned a unique national threat status. To establish a one to one link for subsequent correlation analysis, we aggregated multiple national conservation status values using two different methods: (a) best match: selection of the HD conservation status value that is most similar to the Red List status (irrespective of the proportional area the biogeographical regions occupy within the country). We matched FV with LC, U1 with NT and VU and finally U2 to EN, CR and EX. This approach maximizes the correlation among the two classification schemes; and (b) best conservation status: selection of the most favourable status in any of the biogeographical regions of a country. Here we assume that if a species is in a favourable conservation status in one biogeographical region it, logically, cannot be threatened in the whole area. In other words, if a species is not threatened in one biogeographical region, this should apply for the whole country. Thus, we assume this approach is the most realistic for comparison of HD conservation status and Red List status.

To estimate the correlation between HD conservation status and Red List status we performed a Spearman's rank correlation for ordinally scaled variables. The HD conservation status was translated to FV = 1, U1 = 2 and U2 = 3, the Red List status were translated to LC = 1, NT = 2, VU = 3, EN = 4, CR = 5 and EX = 6. Only species where both HD conservation and Red List status were available were analysed and the correlations were only calculated for countries with at least 15 species of known status. To test if the correlations were biased by the publication date of the Red Lists, we calculated correlations between the above correlation (between HD and Red Lists) and the publication date of the national Red Lists.