Forum geografic. Studii și cercetări de geografie și protecția mediului
*Volume **XVII**, Issue **1** (**June** 2017), pp. **59-69***
*http://dx.doi.org/**10.5775/fg.2017.132.i***

Conservation Status of Habitat Types of European Community Interest in the Alpine Biogeographic Region of Romania

Daniela STRAT[1,*], Simona MIHĂILESCU[2]

[1] University of Bucharest, Faculty of Geography, 1 Nicolae Bălcescu Blvd., Bucharest, Romania
[2] Institute of Biology, Romanian Academy, 296 Splaiul Independenței, Bucharest, Romania
* *Corresponding author*, danielastrat@gmail.com

Received on <10-04-2017>, reviewed on <11-05-2017>, accepted on <25-05-2017>

Abstract

The Habitat Directive (HD) is the main strategy for nature conservation in the European Union aimed at stopping biodiversity loss. In this paper, we present the conservation status of those habitat types designated at the European level that occur within the Alpine biogeographic region (ALP) of Romania. The conservation status (CS) of habitats was assessed using data that were acquired as a result of the first national monitoring of species and habitats. This monitoring was completed during the 2007-2012 period following the mandatory requirements that arise from Article 17 of the HD to report the results to the European Commission in 2013. The ALP, which is one of the five terrestrial biogeographic regions that were demarcated within Romania on European criteria, comprises the Carpathian Mountains and covers an area of 46,800 km^2. Following the official European methodology, all parameters were evaluated and combined to give the CS of each habitat type. The results show that, out of the 51 habitat types belonging to 6 classes that were identified of European Community importance within the Carpathian part of the ALP bio-region, only 17 habitat types occurred solely in the ALP bio-region. The conservation status of the habitat types was assessed as: "Favourable" (FV) for eleven types (1 freshwater, 3 temperate heath and scrub, 4 natural and semi-natural grassland formations, 1 rocky habitat, and 2 forest habitats), "Unfavourable inadequate" (U1) for four types (1 freshwater, 1 temperate heath and scrub, 1 *Sphagnum* acid bogs habitat, and 1 forest habitat), "Unfavourable bad" (U2) for one (*Sphagnum* acid bogs type), and "Unknown" (XX) for one (Calcareous fens habitat). These are results of the first national assessment in Romania of the CS of species and habitats protected by the HD and the first report to the European Commission.

Keywords: *biogeographic regions, the Carpathians Mountains, Habitats Directive, Natura 2000 network, national report*

Rezumat. Starea de conservare a habitatelor de interes comunitar din regiunea biogeografică Alpină din România

Directiva Habitate (DH) este cea mai importantă strategie de conservare a naturii în cadrul Uniunii Europene care are ca scop stoparea pierderii biodiversității. În această lucrare este prezentat statutul de conservare a tipurilor de habitate desemnate ca fiind importante la nivel european și care sunt prezente în cadrul regiunii biogeografice alpine (APL) din România. Starea de conservare (CS) a habitatelor a fost evaluată pe baza datelor colectate în urma primei monitorizări la nivel național a speciilor și habitatelor de interes european. Monitorizarea s-a realizat în perioada 2007-2012 în baza obligațiilor care decurg din articolul 17 al DH referitoare la raportarea în 2013 a rezultatelor către Comisia Europeană. În ALP, una din cele cinci regiuni demarcate pe teritoriul României după criteriile EU, este inclus lanțul carpatic și ocupă o suprafață de 46,800 km^2. Pentru identificarea stării de conservare a fiecărui tip de habitat au fost evaluați și combinați toți parametrii ceruți în conformitate cu metodologia de raportare stabilită de EU. Rezultatele obținute arată că în cadrul sectorului carpatic românesc al bioregiunii alpine, există 51 de habitate de importanță comunitară, grupate în 6 clase, dintre care doar 17 sunt exclusiv în ALP. În baza evaluării, starea de conservare este: "Favorabilă" (FV) pentru 11 tipuri (apă dulce - 1, tufișuri temperate – 3, formațiuni de pajiști naturale și seminaturale – 4, păduri – 2), "Nefavorabilă inadecvată" (U1) pentru patru tipuri (apă dulce – 1, tufărișuri temperate – 1, mlaștini acide cu *Sphagnum* – 1, Păduri -1), "Nefavorabilă rea" (U2) pentru un habitat (turbării acide cu *Sphagnum*) și "Necunoscută" (XX) pentru un habitat (Formațiuni pioniere alpine cu Caricion bicoloris-atrofuscae). Acestea sunt rezultate obținute urmare a primei evaluări naționale a speciilor și habitatelor protejate de DH pe baza cărora a fost întocmit primul raport național înaintat Comisiei Europene.

Cuvinte-cheie: *regiuni biogeografice, Munții Carpați, Directiva Habitate, rețeaua Natura 2000, raport național*

Introduction

The preservation of biodiversity has become an important concern at national, regional and global level policies. It is a key component of the United Nations 2030 agenda for sustainable development (UN, 2015) and it also is a global obligation under the Strategic Plan for Biodiversity 2020 (Pereira et al., 2005).

At the EU level, nature and biodiversity are protected by several laws, beginning with the adoption of the Birds Directive (79/409/EEC) in 1979, which provides comprehensive protection to wild bird species naturally occurring in the EU. An integrated approach is ensured by Council Directive 92/43/EEC, often known as the Habitat Directive (HD) (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31992L0043).

The Natura 2000 network now comprises more than 27,000 sites which cover around 18% of the terrestrial surface of the EU (European Commission, 2015) and it is the most important tool in halting biodiversity loss, or at least significantly reducing the rate of loss (Pullin et al., 2009; Fenu et al., 2016).

Natura 2000 is currently the largest network of protected areas in the world (Hochkirch et al., 2013). In Romania, the Natura 2000 network covers 22.55 % of the land area (European Commission, 2015), which means that the Aichi Target of protecting 17% of the terrestrial area (Balmford et al., 2005; Convention on Biological Diversity, 2010) has been attained.

Monitoring the conservation status of the habitats and species of Community Interest from each EU member state is an obligation arising from Article 11 of the HD. Moreover, to assess the effects of conservation policies and the progress made with implementation of the HD, the EU Commission requires assessment every 6 years of the CS of species and habitats at national and biogeographical levels (Evans & Arvela, 2011). According to the HD, conservation status assessment is based on the concept of "Favourable Conservation Status", and the degree of deviation from this status (European Commission, 2011). Such assessments differentiate between "Favourable" (FV), "Unfavourable-inadequate" (U1), "Unfavourable-bad" (U2) or "Unknown" (XX) (Evans & Arvela, 2011; Moser et al., 2016).

The results of assessments of the conservation status were summarized and analysed, and then reported to the EU Commission according to Article 17 of the HD. The year 2013 marked the third reporting date since the HD was first adopted, and the first time that Romania could report progress made with the implementation of the HD since it jointed the EU.

The accession of Romania and Bulgaria resulted in the addition of two terrestrial biogeographic regions (Steppic, which occurs exclusively in Romania and the Black Sea) and 13 new habitat types (Evans, 2010) to Annex I, including "91V0 Dacian Beech forests (*Symphyto-Fagion*)", which is endemic to the Southern Carpathians.

Of the nine biogeographic regions that have been described for the European mainland, five (Continental, Alpine, Pannonic, Steppic and Black Sea) occur in Romania. Romania is also at the junction of four European floristic regions i.e. Central European, Central Russian, Pontic and Mediterranean (Popova-Cucu, 1983; Doniță and Ivan, 1992). These circumstances, together with the great heterogeneity of landforms and landscape, are key factors that have led to a great diversity of wildlife and well-preserved natural habitats. Consequently, Romania holds a large number of taxa and habitat types of Community interest (Mihăilescu et al., 2015).

Among the nine terrestrial biogeographical regions, the Alpine biogeographic region (ALP) covers an area of 780,000 km^2, representing 7.7 % of the entire continent (Condé et al., 2002). This bio-region is not contiguous, comprising all European high mountain ranges irrespective of their orogeny. However, given that the boundaries for the biogeographical regions were drawn using the Map of the Natural Vegetation of Europe (Roekaerts, 2002), there is no exact correspondence between the mountain ranges and the extent of the ALP in term of landforms and geology.

Within the Carpathian Mountains, the ALP includes parts of Poland, Slovakia, Ukraine and Romania, but its extent in Romania is significantly greater than in the other Carpathian countries, representing 6% of the entire Alpine region of Europe (Condé et al., 2002).

Comprehensive studies on Romanian habitats started in 1993 as part of the CORINE Biotopes Project (Moss and Wyatt, 1994), leading to the identification of 783 habitat types in 261 areas distributed over the whole country (Doniță et al., 2005).

This paper reports the conservation status of habitats listed in Annex I of the HD and occurring in the Romanian Carpathians part of the ALP, i.e. results of the first national monitoring of all habitats and species of Community Interest, using the standard methodology. Since this was the first instance of such monitoring and reporting for Romania, the efforts required by the HD were particularly demanding. The main problems encountered with the reporting are a lack of available data, unclear definition of some habitats, and of the scientific reserves for some species, according to Biogeographical Seminars guided by the European Commission (ETC/DB, 2008, 2012).

The report to the European Commission, covering all of Romania and all species and habitats included in the HD, was achieved through collaboration between public institutions (Bucharest Institute of Biology of the Romanian Academy and the Ministry of Environment, Waters and Forests), researchers from universities and scientific societies, as well as independent experts.

Material and methods

Study area

The Carpathians are the second largest range system in Europe. They form an arc around 1600 km long in Central and Eastern Europe and, defined geologically and geographically, extend from the Danube Gap, North of Bratislava, to the Timok valley in Serbia (Mihăilescu, 1963) and cover an area of about 206,000 km^2.

The climate is moderately cool and humid, with both temperature and precipitation strongly correlated with elevation. The average annual air temperature is 8°C in the Carpathian foothills, while in the highest parts of Southern Carpathians it is

only -2.5°C (Săraru, 2008). The mean annual air temperature is 0°C above 1850m elevation in the Eastern Carpathians and above 2050m in Southern Carpathians (Săraru, 2008). Annual precipitation ranges from 600 mm in the Carpathians foothills to 1000-1200 mm at high elevations (Dragotă & Baciu, 2008). The greatest precipitation quantityyy (exceeding 1600 mm per year) is registered in the Apuseni Mountains, due to the influence of oceanic air masses. Except for the alpine zone, most precipitation falls as rain, peaking in June (Dragotă & Baciu, 2008). A dense network of rivers and streams originate in the Carpathians and many are still clean and untouched by human activities.

The vegetation displays a pronounced zonation that is mainly caused by altitude (Doniță, 1962). Around 65% of Romanian forests, which cover 6.48 million ha, are in the Carpathians (Stănicioiu et al., 2010). The mountain zone is dominated by forests with two major species: *Fagus silvatica* and *Picea abies*. Nearly pure beech forests dominate the lower part of the mountain zone. In Romania, Norway spruce forests form a distinct belt between 1300 m and 1850 m altitude (Doniță & Ivan, 1992). In some places, the mountain zone is dominated almost exclusively by conifers, usually a mixture of *Picea abies* and *Abies alba*, especially in the northern part of the Eastern Carpathians ("Carpații Orientali"). Significant areas of virgin forest still exist as patches in all the Romanian Carpathians (Borlea et al., 2006), including about 4.5 ha of virgin *Larix decidua* thickets (Fărcaș et al., 2013).

The climate-driven alpine tree line (Körner, 1998) is located at about 1650 m altitude in the Rodna and Călimani massifs (at the northern extremity of the Eastern Carpathians) and 1850 m in the rest of the Southern Carpathians. Excluding European Russia, the biggest reported populations of large carnivores in Europe occur in suitable forested habitats of the Romanian Carpathians i.e. *Ursus arctos*, *Canis lupus* (Zedrosser et al., 2001; Geacu, 2009; Mihai, 2014) and *Lynx lynx,* the latter being a very secretive, forest-dependent mammal, that prefers undisturbed habitat and has a large home range (Ionescu, 2004).

The subalpine zone, composed of scrubland meadows and defined by *Pinus mugo*, *Rhododendron myrtifolium*, *Bruckenthalia spiculifolia* and *Soldanella hungarica* ssp. *major,* occurs between 1650-2200 m altitudes (Doniță & Ivan, 1992). Above 2200 m, the alpine zone has very sparse vegetation.

Data gathering and data-base compilation

The first national monitoring project for Romania was implemented during 2011-2015. The aim of the project was to assess the conservation status of species and habitat types of Community Importance designated in the Annexes of the HD, including those of the ALP. Data were gathered and then compiled at the national level to facilitate reporting of the results in 2013 to the European Commission according to Article 17 of the HD. The assessment followed the stringent European Commission methodology, as set out in two official documents available at http://bd.eionet.europa.eu/activities/Reporting/Article_17/reference_portal.

Site selection and sampling for habitat assessment were performed both within Natura 2000 sites and on areas that had no such protection. For each habitat group, the project used the Romanian version of the Habitats Interpretation Manual (Gafta & Mountford, 2008), technical handbooks (Biriș et al., 2013; Trif et al., 2015) and agreed assessment matrices for the conservation status of each habitat at local or site level.

All field data collected were processed and grouped within an information management system that was designed specifically for this purpose (*Sistemul Informatic pentru Monitorizarea Speciilor și Habitatelor de Interes Comunitar* – SIMSHAB, i.e. The Information System for Monitoring Species and Habitats of Community Interest) which can be accessed through the URL https://www.simshab.ro.

Because this paper focuses on the ALP, we are dealing with one biogeographic region within the national assessment of all regions/habitats, using the European guidelines (Evans & Arvela, 2011), four parameters (habitat range, area, specific structures and functions, and future prospects) were scored separately according to a "traffic-light scheme" as "Favourable" (green), "Unfavourable-inadequate" (amber), "Unfavourable-bad" (red) or "Unknown" (grey). These scores were combined to give an overall assessment for all habitat types including, for the present paper, those that occur exclusively in the ALP. In addition, a separate assessment was made of habitat types that, within the Carpathians, occur: a) both in the ALP and adjacent CON (Continental biogeographic region); and b) only in the Carpathian foothills outside the ALP.

To help evaluate the sites of the Natura 2000 network and the other protected area categories in the Carpathian natural region, we used GIS data which were downloaded from the Ministry of Environment, Waters and Forests website (see latest data GIS i.e. http://www.mmediu.ro/articol/date-gis/434).

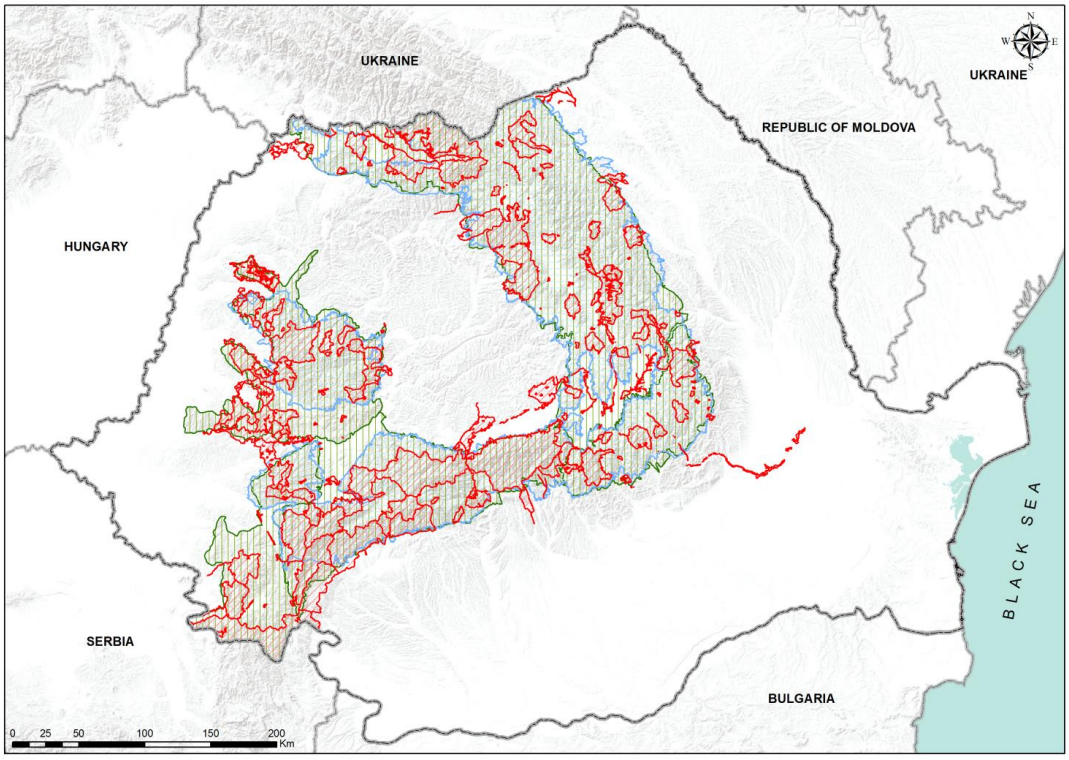

Fig. 1: The spatial distribution of Sites of the Community Importance - SCIs (red line contour) in the Romanian Carpathians (green line contour) using a 10 km x 10 km grid. The blue line delineates the Alpine biogeographical region (compiled after: Mihăilescu et al., 2015; https://bd.eionet.europa.eu/article17/reports2012/habitat/summary/?period=3&group=; http://www.mmediu.ro/app/webroot/uploads/files/2016_02_26_SDF_Natura_2000_SCI_022016.pdf)

Results

Protection and nature conservation in the Romanian Carpathians

Concern with nature protection in the Carpathians started in the second half of the 19th century and focused on preserving virgin forests that were perceived as a national heritage (Biriș et al., 2003). The first protected area was designated in 1904, a forestry reserve named "Codrul secular Slătioara" (Slătioara century-old forest) (Stoiculescu, 2004), which is located in the Rarău Mountains, at the north extremity of the Eastern Carpathians. In 1935, the Retezat Mountains National Park (Otiman et al., 2014), within the Southern Carpathians, was founded as the first national park in Romania. A century after the first protected area, the network now consists of scientific reserves, natural reserves, national reserves, natural parks, national parks, a geopark (Hațeg Country Dinosaurs Geopark), SCIs and SPAs, covering approximately 35% of the entire area of the Romanian Carpathians (Iojă et al., 2010). The enlargement of the protected areas network in the Carpathians, and that of Romania generally, came about soon after the dramatic change in political regime in 1989. Due to low human pressure and the large uninhabited wilderness areas, 12 national parks were designated. However, a massive expansion of the protected areas network followed the addition of 155 Natura 2000 sites, of which 123 are in the ALP, comprising1.76 million ha (Fig. 1).

There is at least one priority natural habitat type and/or species (defined by Article 1 of Directive 92/43/EEC; European Commission, 2016) within 109 of these SCIs. Different types of protected areas often overlap, especially between Natura 2000 sites. Over half of the Southern Carpathians are within protected areas i.e. twice the percentage in either the Western or Eastern Carpathians.

Habitat types and their conservation status

The ALP covers 23% of Romania (Doniță et al., 2005), comprising 80.4% of the Carpathians. The rest of the Romanian Carpathians (mainly the Banat Mountains and lower parts of the Apuseni Mountains) belong to the CON.

The terrestrial Alpine region of the EU encompasses 121 habitat types of Community Interest (see latest reference list for the HD i.e. http://bd.eionet.europa.eu/activities/Natura_2000). Within the area of the ALP in Romania, 51 habitat types listed in Annex I of the HD are present, belonging to six broad habitat groups. The largest

habitat group is forest, followed by grassland, bogs/mires/fens, screes and rocky habitats, freshwater habitats, temperate heath and scrub habitats (Fig. 2). Of these habitat types, 17 occur exclusively in the ALP bio-region, 23 types occur in both ALP and CON, and 9 types occur in ALP, CON and other bio-regions (Fig. 2).

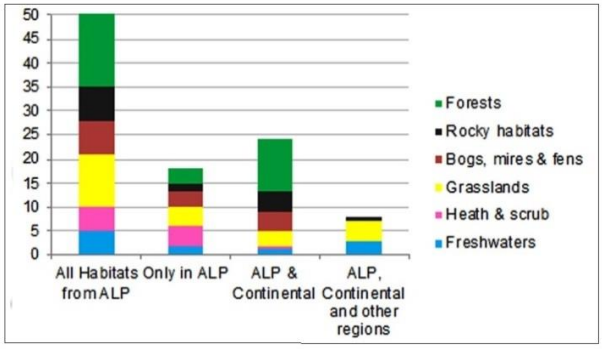

Fig. 2: Diversity of habitats of Community Interest in the Alpine biogeographical region by broad habitat groups

After data processing and classification by SIMSHAB, the results showed that 35 habitat types fall in the category of "Favourable" conservation status, 10 types "Unfavourable-inadequate", two "Unfavourable-bad" and the remaining two "Unknown". The conservation status of all alpine habitat types from each habitat group is shown in Fig. 3. Two forest types were reported as marginal to the ALP (91M0 Pannonian-Balkan turkey oak-sessile oak forests and 91 Y0 Dacian oak & hornbeam forests) and thus excluded from statistics. All grassland types were in "Favourable" condition whereas all bogs/mires/fens were "Unfavourable". The full name and conservation status of each habitat type that is confined to the ALP are given in Table 1.

Discussion

In the ALP of Romania, there is a high diversity of habitat types of Community Importance. Out of the five terrestrial bioregions in Romania, the ALP has the second highest number (after the CON) of habitat types, with 51 in total. Some of these are exclusively ALP in Romania (Table 1), whilst almost half (23 types) occur both in ALP and CON (Fig. 2). The remainder (e.g. some grassland and freshwater habitat types) are common to all five terrestrial biogeographic regions in Romania. Of the habitat types that exist both in the ALP and CON, most belong to the forest group (10 types), with the rocky and bogs/mires/fens groups also important (4 types each).

Table 1: Habitat types of Community Interest that are confined in Romania to the ALP together with their conservation status as recorded in the first national assessment following accession to the EU and submitted in 2013 under article 17 of the HD (*FV – "Favourable", U1 – "Unfavourable-inadequate", U2 – "Unfavourable bad", XX – "Unknown").

Natura 2000 code	Habitat type name	Conservation status*
3230	Alpine rivers and their ligneous vegetation with *Myricaria germanica*	FV
3240	Alpine rivers and their ligneous vegetation with *Salix elaeagnos*	U1
4030	European dry heaths	FV
4060	Alpine and Boreal heaths	FV
4070	Bushes with *Pinus mugo* and *Rhododendron hirsutum* (*Mugo-Rhododendretum hirsuti*)	FV
4080	Sub-Arctic *Salix* spp. scrub	U1
6150	Siliceous alpine and boreal grasslands	FV
6170	Alpine and subalpine calcareous grasslands	FV
6230*	Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and sub-montane areas in Continental Europe)	FV
6520	Mountain hay meadows	FV
7110*	Active raised bogs	U1
7120	Degraded raised bogs still capable of natural regeneration	U2
7240*	Alpine pioneer formations of the *Caricion bicoloris-atrofuscae*	XX
8110	Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)	FV
91Q0	Western Carpathian calcicolous *Pinus sylvestris* forests	FV
9410	Acidophilous *Picea* forests of the montane to alpine levels (*Vaccinio -Piceetea*)	U1
9420	Alpine *Larix decidua* and/or *Pinus cembra* forests	FV

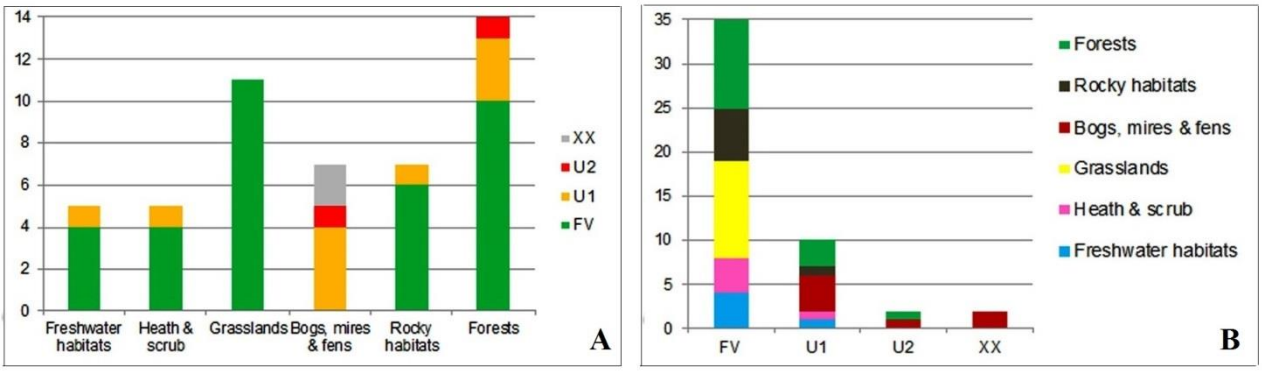

Fig. 3: Conservation status of habitat types from each habitat group in the ALP:
(A): *FV – "Favourable", U1 – "Unfavourable-inadequate", U2 – "Unfavourable bad", XX – "Unknown";
(B): A summary of the conservation status of each habitat type.

When the distribution and range maps of those habitat types that occur in both ALP and CON, together with information from the Natura 2000 Network are studied, it is found that these types occur mainly in mountain areas outside the ALP.

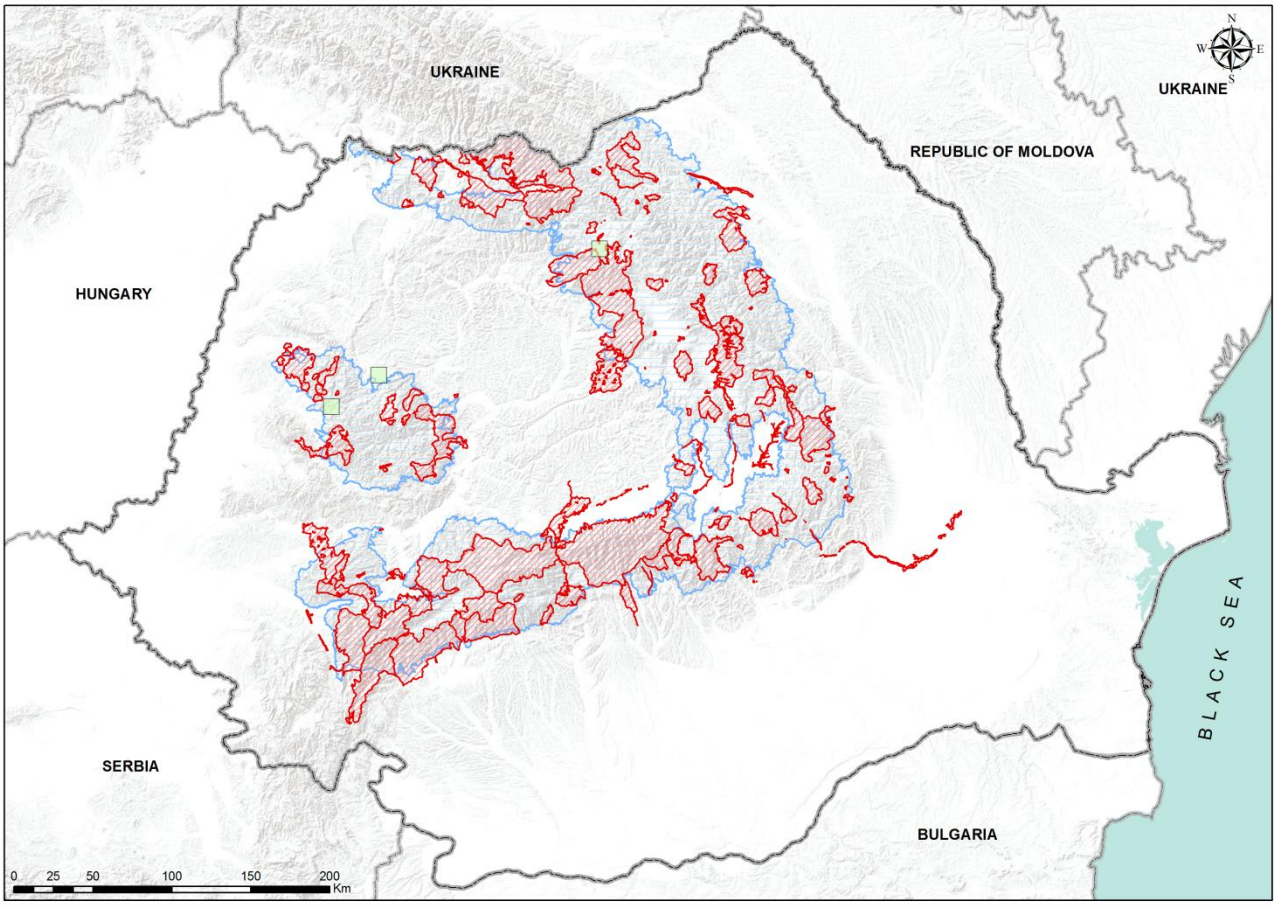

Fig. 4: Distribution map of the "7120 Degraded raised bogs still capable of natural regeneration" habitat type (with green cross-hatch) in Alpine biogeographical region of Romania, using a 10 km x 10 km grid. The spatial distribution of Sites of the Community Importance is in red line contour and the blue line delineates the ALP (compiled after: Mihăilescu et al., 2015; https://bd.eionet.europa.eu/article17/reports2012/habitat/summary/?period=3&group=; http://www.mmediu.ro/app/webroot/uploads/files/2016_02_26_SDF_Natura_2000_SCI_022016.pdf) .

The "9530 (Sub-) Mediterranean pine forests with endemic black pines" is a typical example. This habitat occurs only in south-western Romania, on both sides of the Cerna Valley which forms the border between the Southern Carpathians (in ALP) and the Banat Mountains (in CON). "91D0 Bog woodland" is another example and a priority habitat type that occurs within and outside of the Alpine region in the Apuseni Mountains. Other similar cases include rocky habitat types ("8160 Medio-European calcareous scree of hill and montane levels", "8210 Calcareous rocky slopes with chasmophytic vegetation", "8230 Siliceous rock with pioneer vegetation of the Sedo-Scleranthion or of the Sedoalbi-Veroniciondillenii") and forest habitat types ("9110 Luzulo-Fagetum beech forests", "9130 Asperulo-Fagetum beech forests", "9410 Acidophilous Picea forests of the montane to alpine levels - Vaccinio-Piceetea"). All the forest habitat types mentioned above (except "91D0 Bog woodland") occur not only in the low Carpathians, but also in the Sub-Carpathians, a hilly area peripheral to the Carpathians that belongs to the CON. The "91V0 Dacian Beech forests (Symphyto-Fagion)" is a rare habitat type that is absolutely confined to the Romanian Carpathians. The "9420 Alpine Larix decidua and/or Pinus cembra forests" is one of the two habitat types that occur exclusively in ALP in Europe and within Romania is confined to the Carpathians. Some habitat types are present in all five terrestrial biogeographical regions in Romania, including four grassland types and the freshwater habitat type "3260 Water courses of plain to montane levels with the Ranunculion *fluitantis* and *Callitricho-Batrachion* vegetation".

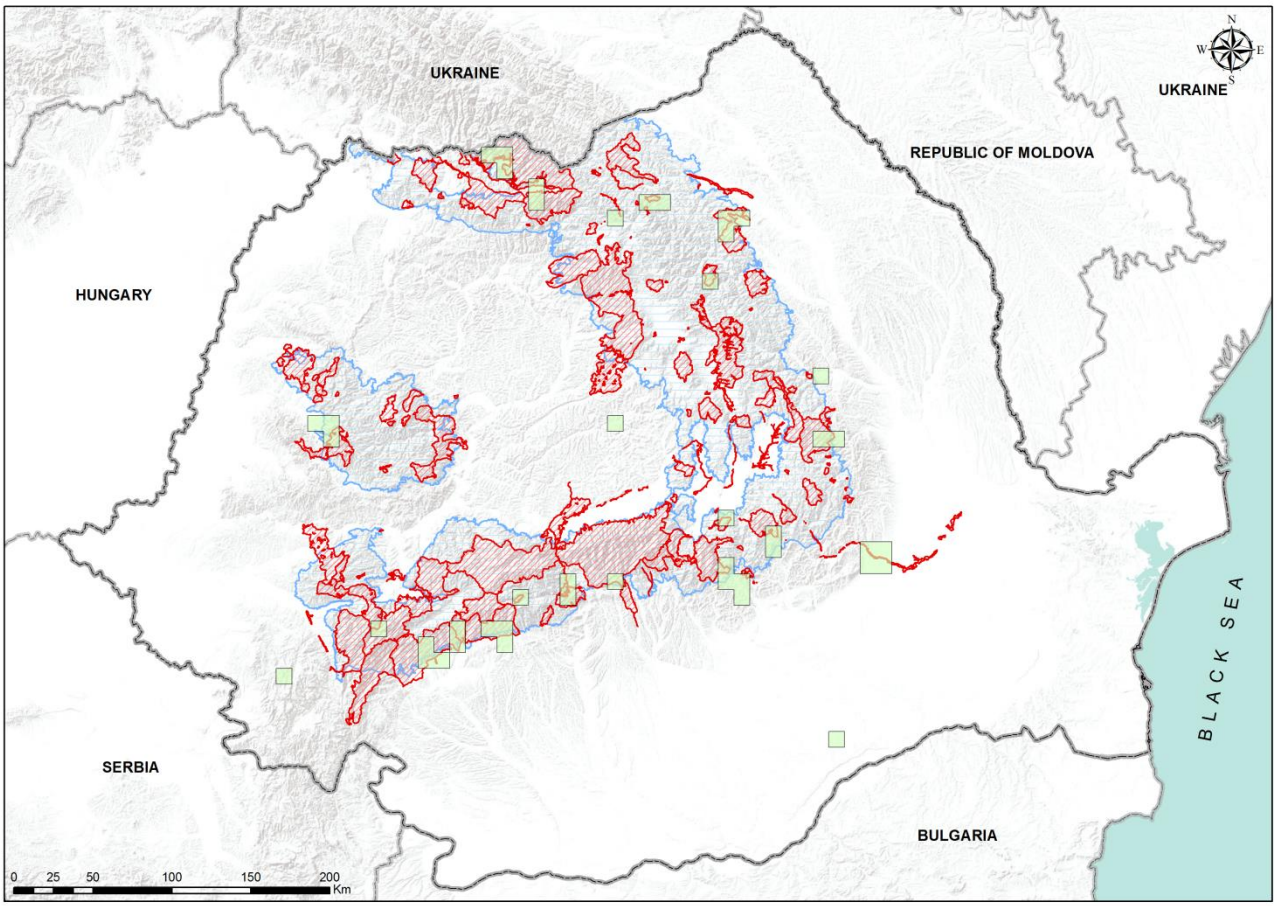

Fig. 5: Distribution map of "3240 Alpine rivers and their ligneous vegetation with Salix elaeagnos" habitat (with green cross-hatch) in Romania using a 10 km x 10 km grid. The spatial distribution of Sites of the Community Importance is in red line contour and the blue line delineates the ALP (compiled after: Mihăilescu et al., 2015; https://bd.eionet.europa.eu/article17/reports2012/habitat/summary/?period=3&group=; http://www.mmediu.ro/app/webroot/uploads/files/2016_02_26_SDF_Natura_2000_SCI_022016.pdf)

All types of bog, mire and fen habitat are threatened in Romania, with the conservation status "Unfavourable-inadequate" for four, "Unfavourable-bad" for one and "Unknown" for another two. "7120 Degraded raised bogs still capable of natural regeneration" represents a special case, occurring only in the ALP and covering around 2.4% of the area (Fig. 4). Its conservation status was assessed as "Unfavourable-bad" (Table 1).

At the European level, the "7120" habitat type is also highly degraded, although widely distributed. Except in the Macaronesian region, where its conservation status for the reporting period 2007-2012 was reported as "Favourable", in three other regions (Boreal, Atlantic and Continental) the status is "Unfavourable-bad" and in the ALP region its overall status is unknown (EEA, 2007-2012).

The habitat type is vulnerable to important threats and pressures such as changes in the condition of water bodies and vegetation succession. For management measures to improve the conservation status of this type to be effective, one must bear in mind that the "7120" habitat is a degraded form of the "7110 Active raised bogs" habitat and that key natural conditions must be maintained for preservation of its characteristic features. There are clear difficulties in distinguishing and assessing these bog habitats, since they usually occur in mosaics which may include other habitats (e.g. "3160 Natural dystrophic lakes and ponds", "7150 Depressions on peat substrates of the *Rhynchosporion*" and/or "91D0* Bog woodland") (Evans, 2006).

The running freshwater habitat "3240 Alpine rivers and their ligneous vegetation with *Salix elaeagnos*" also had "Unfavourable" conservation status for the reporting period 2007-2012, both in Romania and at the European level. Although this habitat is termed "Alpine", which actually refers broadly to European mountain ranges rather than specifically to the ALP, and this type is known to occur in four biogeographic regions. Initial listings for Romania cited the "3240" habitat in both ALP and CON. However, during the Natura 2000 Biogeographical Seminars organized by the National Environmental Protection Agency in October 2012, the habitat "3240" was excluded from the CON (http://ibis.anpm.ro/Modules/Admin/HabitatsOfComunityInterestReferenceList.aspx?moduleName=Article17Lotnr1). Therefore, although assessments of this habitat were made for both regions and its distribution and range were mapped in the CON (Fig. 5), assessment of the conservation status of habitat "3420" in the CON was omitted from the national report under Article 17 of the HD submitted to the European Commission.

Conclusions

The Alpine biogeographical region in Romania has a great diversity of habitats of Community Interest. After the first national assessment and report under Article 17 of the Habitats Directive (period 2007-2012) since the accession of Romania to the EU, the conservation status of habitat types was assessed as "Favourable" for 35 types of 49 (71.42%). Of the 17 habitat types that occur exclusively in the ALP, the conservation status was "Favourable" for 12 (70.58%). Assessments were performed mainly within the protected areas network. The most degraded, threatened and vulnerable habitat types were those of bogs, mires and fens.

Since this is the first national assessment in Romania of the CS of species and habitats protected by the HD and the first report to the European Commission since accession to the European Union, the results are benchmarks for future reporting and for action taken in order to reach the HD goals.

There remain significant gaps in knowledge of the habitats of Community Interest in Romania, including those of the ALP. Appropriate management practices must be applied to maintain the "Favourable conservation status" of all habitat types and to improve the conservation status of all those that are in bad condition and threatened. It should be borne in mind, however, that there are many more types of vegetation and habitats in Romania than those listed in the Annexes of the HD 92/43/EEC.

Acknowledgements

This study was partially funded by the Institute of Biology Bucharest of the Romanian Academy (Project no. RO1567-IBB04/2016), and by the Ministry of European Funds, Sectorial Operational Programme Environment (SMIS 17655). The authors would like to thank all experts for their effort, useful comments and suggestions in preparing the national report under article 17 of the HD that was submitted to the European Commission in 2013. Special thanks go to Tiberiu Sahlean for his help in the design of maps, also to Owen Mountford for the English review, text stylization, and helpful suggestions. The contents and views contained in the article are those of the authors and do not necessarily represent those of the Ministry of Environment or the Institute of Biology Bucharest of Romanian Academy.

Author contribution

Both authors, Daniela Strat and Simona Mihăilescu, contributed equaly to this work.

References

Balmford, A., Bennun, L., Brink, B., Cooper, D., Cote, I. M., Crane, P. Walther, B. A. (2005, January 14). The Convention on Biological Diversity's 2010 Target. *Science, 307*(5707), 212-213. doi:10.1126/science.1106281

Biris, I. A., Doniță, N., Stoiculescu, C. D., & Seghedin, G. (2003). Contribution of the foresters to biodiversity conservation in Romania. În *Bioplatform European Platform for Biodiversity* (pg. 59-71). București: Editura Vergiliu.

Biriș, I.-A. et al., 2013. *Ghid sintetic de monitorizare pentru habitatele de interes comunitar: tufărișuri, turbării și mlaștini, stâncării, păduri*. Editura Universitas, Petroșani.

Borlea, G. F., Radu, S., & Stana, D. (2006). Forest biodiversity preservation in Romania. *Notulae Botanicae Horti Agrobotanici Cluj-Napoca, 34*, 21-28.https://dlc.dlib.indiana.edu/dlc/bitstream/handle/10535/7028/PB.pdf?sequence=1. (accesed 18.12.2016).

Condé, S., Richard, D., Liamine, N., Leclere, A.-S., Sotolargo, B., & Pinborg, U. (2002). Biogeographical regions in Europe. The Alpine region - Mountains of Europe*. European Environment Agency.* http://www.eea.europa.eu/publications/report_2002_0524_154909/biogeographical-regions-in-europe/alpine.pdf. (accesed 18.12.2016).

Convention on Biological Diversity. (2010). *Strategic Plan for Biodiversity 2011-2020, including Aichi Biodiversity Targets.* https://www.cbd.int/sp/. (accesed 18.12.2016).

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. *Official Journal L* 206, 22/07/1992, P. 0007 – 0050**.** Document *3*1992L0043. http://eur-lex.europa.eu/legal content/EN/TXT/?uri=CELEX:31992L0043. (Accessed 10.09.2016).

Council of Europe. (2001, August 28). Group of Experts for the setting upof the Emerald Network of Areas of Special Conservation Interest.Emerald Network Pilot Project in Romania. *T-PVS/Emerald, 14*, 1-22. https://wcd.coe.int/ViewDoc.jsp?p=&id=1501477&Site=&direct=true. (Accesed 18.12.2016).

Devilleres, P., & Devillers-Terschuren, J. (1996). A classification of Palaearctic habitats. *Nature and environment, 78*, 1-156.

Doniță, N. (1962). Elemente pentru interpretarea zonalității vegetației din RPR. *Acta Horti Botanici Bucurestiensis, 4*, 919-935.

Doniță, N., & Ivan, D. (1992). Marile unități de vegetație. În D. Ivan (Ed.), *Vegetația României* (pg. 32-46). București: Editura Tehnică Agricolă.

Doniță, N., Popescu, A., Paucă-Comănescu, M., Mihăilescu, S., & Biriș, I.-A. (2005). *Habitatele din România.* București: Editura Tehnică Silvică.

Dragotă, C., & Baciu, M. (2008). Precipitațiile atmosferice și evapotranspirația potențială. Cantitățile medii lunare și anuale de precipitații. În I. Sandu, V. Pescaru, I. Poiană, I. Cândea, & D. Țâștea (Ed.), *Clima României* (pg. 245-264). Bucuresti, România: Editura Academiei Române.

EEA, 2007-2012, Report under the Article 17 of the Habitats Directive Period 2007-2012. 7120 Degraded raised bogs still capable of natural regeneration. http://art17.eionet.europa.eu/article17/reports2012/static/factsheets/bogs-mires-fens/7120-degraded-raised-bogs-still-capable-of-natural-regeneration.pdf (accessed 05.07.2016).

ETC/BD, June 2008, Alpine Biogeographical Seminar: Sibiu, 9-12 June 2008, Conclusions. http://www.mmediu.ro/articol/natura-2000/435 (accessed 12.09.2016).

ETC/BD, October 2012, Draft detailed conclusions of the representatively of habitats and species in the pSCI's Romania. http://www.mmediu.ro/articol/natura-2000/435 (accessed 12.09.2016).

European Comission. (2015, December 23). Commission Implementing Decision (EU) 2015/2370 of 26 November 2015 adopting a ninth update of the list of sites of Community importance for the Alpine biogeographical region (notified under document C(2015) 8206). *Official Journal of the European Union, L*, 338-432. http://data.europa.eu/eli/dec_impl/2015/2370/oj. (accesed 18.12.2016).

European Comission. (2016, December 23). Commission implementing decision (EU) 2016/2332 of 9 December 2016 adopting a 10th update of the list of sites of Community importance for the Alpine biogeographical region (notified under document C(2016) 8185). *Official Journal of the European Union, L 353/256*, 256-301. Preluat pe December 27, 2016, de pe http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32016D2332&from=EN

European Commission. (2011). *Assessment and Reporting Under Article 17 Reporting Formatsfor the Period 2007–2012 of the Habitats Directive.* Brussels: European Commission. http://bd.eionet.europa.eu/activities/Reporting/Article_17/reference_portal (accesed 18.12.2016).

Evans, D. (2010, December). Interpreting the habitas of Annex I: past, present and future. *Acta botanica Gallica: bulletin de la Société botanique de France , 157*(4), 677-686. doi:10.1080/12538078.2010.10516241

Evans, D. (2006). The habitats of the European Union Habitats Directive. *Proceedings of Royal Irish Academy. Biology and the Environment, 106*(B(3)), 167-173.

Evans, D., & Arvela, M. (2011). *Assessment and Reporting Under Article 17 of the Habitats Directive. - Explanatory Notes & Guidlines for the Period 2007-2012.* Paris: European Topic Centre on Biological Diversity. http://bd.eionet.europa.eu/activities/Reporting/Article_17/reference_portal (accesed 18.12.2016).

Evans, D., Demeter, A., Gajdos, P., & Halada, L. (2013). Adapting environmental conservation legislation for an enlarged European Union: experience from Habitats Directive. *Environmental conservation*, 1-13. doi:10.1017/S0376892912000422

Fărcaș, S., Tanțău, I., & Turtureanu, P. D. (2013). Larix decidua mill. in Romania: current and past distribution, coenotic preferences, and conservation status. *Contribuții Botanice, XLVIII*, 39-50.

Fenu, G., Bacchetta, G., Giacanelli, V., Gargano, D., Montagnani, C., Orsenigo, S., Ercole, S. (2016, October 31). Conserving plant diversity in Europe: outcomes, criticisms and perspectives of the Habitats Directive application in Italy. *Biodiversity Conservation, Online first*, 1-20. doi:10.1007/s10531-016-1244-1

Gafta, D. & Mountford, O. (2008). Manual de interpretare a habitatelor Natura 2000 din România. Editura RISOPRINT Cluj Napoca.

Geacu, S. (2009). The wolf populations (Canis lupus L., mammalia, carnivora) in Romania and the human impact over the last two centuries. *Revue Roummain de Géographie/Romanian Journalof Geographie, 53*(2), 219-231.

Hochkirch, A., Schmitt, T., Beninde, J., Hiery, M., Kinitz, T., Kirschey, J., Proelss, A. (2013, November 6). Europe needs a new vision for Natura 2020 network. *Conservat ion Letters, 6*, 462-467. doi:10.1111/conl.12006

Iojă, C. I., Pătroescu, M., Rozylowicz, L., Popescu, V. D., Vergheleț, M., Zotta, M. I., & Felciuc, M. (2010). The efficacy of Romania's protected areas network in conserving biodiversity. *Biological Conservation*, 43(11), 2468-2476. doi:10.1016/j.biocon.2010.06.013

Ionescu, O. (2004). Romania. În M. von Arx, C. Breitenmoser-Wursten, F. Zimmermann, & U. Breitenmoser (Ed.), *Status and conservation of the Eurasian lynx (Lynx lynx) in Europe in 2001* (pg. 161-167). KORA Bericht No. 19.

Mihai, D. (2014). The Forest Management aspects in Natura 2000 sites. In *Natura 2000 Management Workshop. Alpine Biogeographical Seminar Follow-up.* Budapest. http://ec.europa.eu/environment/nature/natura2000/platform/documents/ceeweb_for_biodiversity_natura_2000_management_workshop_report_en.pdf (accessed 18.12.2016).

Mihăilescu, S., & Sanda, V. (2004). Characterization of priotity natural habitats in the Romanian Carpathians. *Proceedingsof the Institute of Biology, V*, 81-86.

Mihăilescu, S., & Ștefănuț, S. (2004). Peatlands - Romania's priority habitats. *Proceedings of the Institute of Biology, V*, 87-91.

Mihăilescu, S, Strat, D., Cristea, I., Honciuc, V. (2015). Raportul sintetic privind starea de conservare a speciilor și habitatelor de interes comunitar din România. Constanța: Editura Dobrogea,

Mihăilescu, V. (1963). *Carpații Sud-Estici de pe teritoriul R.P. Române. Studiu de geografie fizică cu privire specială la relief.* București: Editura Științifică.

Moser, D., Ellmauer, T., Evans, D., & Franz, E. (2016). Weak agreement between the species conservation status assessments of the European Habitats Directive and Red Lists. *Biological Conservation, 198*, 1-8. doi:http://dx.doi.org/10.1016/j.biocon.2016.03.024

Moss, D., & Wyatt, B. K. (1994). The CORINE biotopes project: a database for conservation of nature and wildlife in the European community. *Applied Geograpgy, 14*(4), 327-349. doi:10.1016/0143-6228(94)90026-4

Otiman, P.I., Dutu, M., Ionescu, C., Vlaic, I., 2014. Parcul Național Retezat – o problemă juridică nerezolvată. Academica, 3, 1-16.

O'Brien , P. J. (2001). Subduction followed by collision: Alpine and Himalayan examples. *Physics of the Earth and Planetary Interiors, 127*(1-4), 277-291. http://www.sciencedirect.com/science/article/pii/S0031920101002321 (accesed 19.11.2016)

Pereira, H. M., Ferrier, S., Walters, M., Geller, G. N., Jongman, R. H., Coops, N. C., Wegmann, M. (2013, January 18). Essential Biodiversity Variables. *Science, 339*(6117), 277-278. doi:10.1126/science.1229931

Popova-Cucu, A. (1983). Cunoașterea și cercetarea florei și vegetației. În L. Badea, P. Gâștescu, & V. Velcea (Ed.), *Geografia României* (Vol. I Geografia Fizică, pg. 388-395). București: Editura Academiei Republicii Socialiste România.

Pullin, A. S., Baldi, A., Can, O. E., Dieterich, M., Kati, V., Livoreil, B., Sousa-Pinto, I. (2009). Conservation focus on Europe: major conservation policy issues that need to be informed by conservation science. *Conservation Biology, 23*, 818-824. doi:10.1111/j.1523-1739.2009.01283.x

Roekaerts, M. (2002). *The Biogeographical Regions Map of Europe. Basic principles of its creation and overview of its dvelopment.* European Environment Agency. http://www.eea.europa.eu/data-and-maps/data/biogeographical-regions-europe-2001/methodology-basic-principles-of-the-biogeographical-regions-map-creation-and-overview-of-its-development/methodology-basic-principles-of-the-biogeographical-regions-map-creati(accesed 4.12.2016)

Săraru, L. (2008). Temperatura aerului. Temperaturile medii lunare, anotimpuale, semestriale si anuale. În I. Sandu, V. Pescaru, I. Poiană, I. Cândea, & D. Țâștea (Ed.), *Clima României* (7.1, pg. 130-147). București: Editura Academiei Române.

Stancioiu, P. T., Abrudan, I. V., & Dutca, I. (2010, March). The Natura 2000 Ecological Network and Forests in Romania: Implications on Management and Administration. *International Forestry Review, 12*(1), 106-113. doi:10.1505/ifor.12.1.106

Stoiculescu, C. D. (2004). Rarău – Giumalău, primul parc naţional potenţial al Bucovinei. *Analele Universitatii "Ștefan cel Mare" Suceava. Secțiunea Silvicultură, Serie nouă*(2), 49-66.

Trif, C. A., Făgăraș, M.M., Hîrjeu, N.-C., Niculescu, M., 2015. Ghid sintetic de monitorizare pentru habitatele de interes comunitar (sărături, dune continentale, pajiști, apă dulce din România). Constanța: Editura Boldaș,

UN (United Nations), 2015. Transforming our world: the 2030 Agenda for Sustainable Development. A/RES/70/1. http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E (accessed 05.07.2016).

Zedrosser, A., Dahle, B., Swenson, J. E., & Gerstl, N. (2001). Status and management of the brown bear in Europe. *Ursus, 12*, 9-20. http://www2.nina.no/lcie_new/pdf/634991427086642093_Zedroser%20URSUS%20Europe%20bear%20status.pdf (accessed 20.12.2016).