

INTERNATIONAL CONFERENCE



Făgăraș Mountains

An inventory towards
a new National Park

Book of abstracts

**10–11
December 2018**

"Ion Heliade Rădulescu"
Amphitheatre,
The Romanian Academy
125 Calea Victoriei Blvd.

ARS DOCENDI
BUCUREȘTI 2018

Conference organised by the
Institute of Biology Bucharest
(IBB)-Romanian Academy,
Foundation Conservation
Carpathia (FCC) and the Faculty of
Agricultural Sciences, Food Industry
and Environmental Protection,
"Lucian Blaga" University of Sibiu
(ULBS), in partnership with IUCN
WCPA (International Union for
Conservation of Nature and World
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Theme of the Conference

The Conference deals with topics related to the conservation of biodiversity in the Făgăraș Mountains, including issues concerning Red Lists, Important Species Areas, ecology, dispersal and habitats of threatened species, in situ and ex situ conservation efforts, and restoration.

The Conference included panel discussions on various aspects of the proposed Făgăraș Mountains National Park.

We invited scientists, researchers, conservationists, members of the national and local administrative bodies and other interested stakeholders to attend this event, and share their knowledge and experience for the conservation interest of the Făgăraș Mountains.

Purpose of the Conference

The main purpose of the Conference is to create a fair discussion framework for the present and future conservation and sustainable use of biodiversity in the Făgăraș Mountains. For this, we gathered together scientists, researchers, educators, conservationists, members of the national and local administrations, representatives of local communities as well as other interested parties to share their experience and visions on Făgăraș Mountains. We are aiming to exchange ideas and set a common vision related to our future in this area in harmony with nature.



A vision for the future of the Făgăraș Mountains National Park

In a fast-changing world, the biodiversity of both species and habitats is threatened now more than ever as the world population is projected to grow by a further 50% this century, reaching an estimated 11.2 billion by 2100 (United Nations, 2015, medium scenario). Humankind will find and exploit any resource for food or feed purposes and wild species and habitats already under threat will be more exposed than ever by 2040.

According to the last Report of the Millennium Ecosystem Assessment (2005), the current global rate of species extinction is up to 1000 times greater than the background rate that has been estimated from the fossil record. Moreover, throughout the world species-richness at the local scale has been estimated as declining by over 10% on average in the last 200 years (Newbold et al., 2015). Climate change is intensifying this decline! Our attempts to improve biodiversity are feeble when compared to this rate of decline. Biodiversity needs new shelters!

Therefore, a coordinated effort is needed for every single locality, region, country or group of countries to support biodiversity conservation as a whole and the Scenarios for the 2050 Vision for Biodiversity adopted under the COP 14 of the Convention on Biological Diversity.

The Făgăraș Mountains represent a treasury of species and habitat richness not only for Romania but also for the European Union and indeed the whole continent of Europe. Today these mountains are connected and grounded by archaeological discoveries to 7000 years of human civilisation. These mountains are also silent witnesses to the ups and downs of our national history.

The Făgăraș Mountains are examples of potentially resilient ecosystems and, since 2007, they have the status of a protected area under the ecological network Natura 2000. The mountains are covered by impressive forests habitats! Romania has over 6 million hectares of forests, of which a significant proportion is still virgin with tall canopies and unfragmented habitats with no permanent settlements except those at the foot of the mountains. These stunningly beautiful mountains are clothed in natural forests and cut by untamed rivers, whose dynamism continues to shape the valleys. Bears, wolves and lynx are all still commonly seen in their natural environment, and there are over 3,700 plant species, many of them endemic to the region. Internationally, numerous examples demonstrate how large protected areas have boosted the local economy through tourism, branded products or the development of local markets. In particular, the large, iconic National Parks attract an increasing number of visitors on a yearly basis and have a significant positive impact upon local communities. In Europe, there are over 300 National Parks, but none sticks out as the emblematic park!

The Făgăraș Mountains are also relevant to the communities of scientists and naturalists! From the 19th century onward, extensive researches have been conducted in this area.

The Făgăraș Mountains can become a flagship for biodiversity conservation and sustainable development! As wilderness and virgin areas disappear from Europe, the Făgăraș Mountains have the potential to become the wildest and largest forested National Park in Europe - a vital role! There is still a long way to go and many steps need to be properly planned, financed, and implemented by the Romanian managers. However, development of a National Park needs time, giving the human inhabitants of the National Park the opportunity to understand these new experiences and, where necessary, to change the economics of their communities.

The Făgăraș Mountains connect biodiversity with local people! Transhumance and temporary settlements have for centuries linked local communities from the foot of the mountains to their summits through their rich pastures, timber and wild fruit. Today's natural heritage owes a great deal to these local communities and their traditional ways of accessing the riches of the mountains.

The Făgăraș Mountains are ready for a public debate! A very broad range of stakeholders decided to launch this debate on the importance of the Făgăraș Mountains, including leaders of opinion, local communities' representatives and scientists under the patronage of the Romanian Academy, with experts from the Institute of Biology (Bucharest), the Faculty of Agricultural Sciences, Food Industry and Environmental Protection of "Lucian Blaga" University in Sibiu (ULBS) and the Foundation Conservation Carpathia. A summary of some of the research conducted by scientists and presented at the conference is available in this book of abstracts.

The Făgăraș Mountains are our insurance for future generations! Our sustainable development for tomorrow depends on our decisions today!



Photo: Dan Dinu

ORGANISING INSTITUTIONS – SHORT PRESENTATION

INSTITUTE OF BIOLOGY BUCHAREST OF THE ROMANIAN ACADEMY

The *Institute of Biology Bucharest* pioneered the biological research at national level as the first *Centre of Biological Research* in Romania, founded in 1957 and headed by Prof. W. Knechtel. Since 1949, when its first departments were established, and despite several reorganization and subsequent changes in denominations, the Institute was constantly dedicated to advanced biological research. Moreover, along its tumultuous history the Institute was the main source of emergence for other biological research units as *Institute for the Biology of Development*, *Research Centre for Ecological Technologies*, *Institute of Biochemistry* and *National Institute of Research and Development for Biological Sciences* or provided whole established departments for the *Institute of Agricultural Researches* and also for the *Academy of Agricultural and Forestry Sciences*. Since 1990, by government decision (HG 1220/1990) the institute was named *Institute of Biology Bucharest*, gained its approximative present structure and was included under the Romanian Academy. Based on Decision 9634/14.04.2008 issued by the *National Authority for Scientific Research*, the *Institute of Biology Bucharest* has been accredited as a research unit of national interest.

Following its ultimate mission to perform biological researches in order to gain knowledge towards the development of the Romanian society, currently a range of EU or nationally funded projects are conducted within the *Institute of Biology Bucharest*. These are dealing with the most recent worldwide research topics in biology, including: biodiversity assessment and conservation, bioremediation, developmental processes in *in vitro plant* systems, microorganisms with potential applications in environmental technologies, bio- and nanotechnologies.

In more than 60 years of taxonomical research in the *Institute of Biology Bucharest*, over 50 new reports for science (taxa, locations, etc.) were released. To date, under the affiliation of *Institute of Biology Bucharest* more than 400 scientific papers were published in ISI indexed journals and also more than one thousand in other prestigious journals.



Photo: Marian Constantin



Photo: Mădălin Enache

Besides the research laboratories, the *Institute of Biology Bucharest* also hosts a vascular plant and a mycological herbarium, registered in *Index Herbariorum* under the acronym BUCA and BUCM, respectively. BUCA is the second largest herbarium collection from Romania and it consists of more than 400.000 specimens (vascular plants and bryophytes). It is included in the international scientific circuit, its main use being scientific research. Most of the specimens are of unique value (endemic, rare species, herbarium sheets more than 100 years old, collections of illustrious botanists), and can be considered values of cultural patrimony.

Committed to nature conservation, the *Institute of Biology Bucharest* has been actively involved in providing scientific studies required for the designation of various protected areas. These studies constituted the scientific baseline for Law 5/2000 and also for H.G. 2151/2004, H.G. 1581/2005, H.G. 1143/2007 and H.G. 1284/2007. Accordingly, researchers from the *Institute of Biology Bucharest* contributed to the designation of many *protected areas* including: Danube Delta Biosphere Reserve, Retezat National Park, Piatra Craiului National Park, Măcin Mountains National Park, Domogled-Cernei Valley National Park, Semenic-Carașului Gorges National Park, Bicăzului Gorges-Hășmaș National Park, Bucegi Mountains Natural Park, Comana Natural Park, Balta Mică a Brăilei Natural Park, Apuseni Mountains Natural Park, Cozia National Park, Poștile de Fier Natural Park, Grădiștea Muncelului-Cioclovina Natural Park, Vânători Neamț Natural Park.

Recommended by a significant number of prizes granted by the Romanian Academy, prestigious international awards, patents for inventions, scientific papers published in journals with high visibility and the coordination of international projects, the *Institute of Biology Bucharest* is currently one of the most performant research units for biological sciences in Romania.

<http://www.ibiol.ro/en/index.html>

FOUNDATION CONSERVATION CARPATHIA

For the last ten years, Foundation Conservation Carpathia (FCC) has worked tirelessly to promote awareness of the importance of Europe's few remaining expanses of old growth forest. It has come to have a leading role in the campaign to encourage the protection of important wild spaces, higher standards of conservation, as well as sustainable farming and the well-being of local communities.

Since its inception, the project has purchased over 22,000 hectares of forests and alpine meadows in the south-eastern Carpathians. Obtaining the highest legal protection level for all acquired land is the core of this initiative – already now, over 8,000 hectares of forests have been declared as non-intervention zones in the Făgăraș Mountains Natura 2000 management plan or were included as core areas of the Piatra Craiului National Park. Almost 1,000 hectares of these forests are completely untouched and part of it has been already introduced into the National Catalogue of Virgin and quasi-virgin Forests, to protect these jewels in perpetuity.

The presence of FCC rangers, patrolling an area of over 50,000 hectares, has also led to a full stop on illegal logging in the neighbouring forests.

Beyond this protection, FCC has bought and restored more than 600 hectares of clear-cut, has planted over 1.6 million saplings, created 8 tree nurseries, and conducted erosion control works on over 24,000 m of former tractor tracks. All the works are involving FCC specialised personnel as well as an average of 200 seasonal workers hired from the local communities.

In order to effectively protect wildlife in the general area of land acquisitions, the project has leased the hunting rights for the core area of the project in the upper Dâmbovița Valley. Together with the adjacent Piatra Craiului National Park, this translates into an area of 36,000 hectares of



Photo: Dan Dinu

hunting free zone – an important refugium for predators and prey alike. To get a good and reliable estimate on the current population sizes of key species, we have started to use genetic analysis of scat and hair samples, and use of camera traps, together with traditional sign surveys (snow-tracking, den counts). FCC is also committed to bring back what has been lost: The European bison should soon be part of the native fauna of the Făgăraș Mountains again.

Local communities are the key to protected areas, and the Făgăraș Mountains are one of the few remaining large areas without human settlements on our continent. Yet, they are surrounded by 28 communes, who have an important connection to the mountains. A National Park would change the local economy and, in order to develop alternatives for the local communities, an intensive dialogue is necessary. Education, awareness programmes, development of conservation enterprises and the necessary funds to implement a new, green economy are the other key aspects of the FCC's activity.

"What we are doing to the forests of the world is but a mirror reflection of what we are doing to ourselves and to one another"

Mahatma Gandhi

<https://www.carpathia.org/en/>



Photo: Dan Dinu

FACULTY FOR AGRICULTURAL SCIENCES, FOOD INDUSTRY AND ENVIRONMENTAL PROTECTION – “LUCIAN BLAGA” UNIVERSITY OF SIBIU

The first school opened in the citadel of Sibiu as early as 1380 and it was a milestone in the history of education in the city on the banks of the Cibin River. In 1786, the Teacher Training School, one of the first pedagogical institutions in Transylvania started its activity. In 1850, the School changed its profile and became a Theological-Pedagogical Institute for Higher Education. During the 1940–1945 period, the Orthodox Theological Institute continued to function in Sibiu and later became the “Andrei Șaguna” Faculty of Theology. On May 12, 1995, on the 100th birth anniversary of poet and philosopher Lucian Blaga, the University of Sibiu received the official approval to change its name to “Lucian Blaga” University of Sibiu. Since 1945, the University has continuously developed and today it hosts aside the Faculty of Theology (Pastoral Theology, Teaching Theology, Social Theology) other eight faculties such as The Faculty of Law (Law, Public Administration), The Faculty of Letters and Arts (Romanian Language and Literature, Applied Modern Languages, Sciences of Communication, Theatre), The Faculty of Social and Human Sciences (International Relations, Political Science, Security Studies, History, Heritage, Protestant Theology, Journalism, Public Relations, Sociology, Psychology), The Faculty of Engineering (Industrial Engineering, Mechanical Engineering, Mines, Oil and Gases, Engineering and Management, Computers and Information Technology, Electronic Engineering, Environment Engineering, Transportation Engineering, Applied Science and Engineering, Systems Engineering, Electronic Engineering and Telecommunications), The Faculty of Sciences (Mathematics, Informatics, Ecology and Environment Protection, Biology, Physics, Physical Education and Sports), The Faculty of Medicine (Medicine, Dental Medicine, Health Care, Dental Technique, Dental Care), The Faculty of Agricultural Sciences, Food Industry and Environmental Protection (Food Engineering, Engineering and Management, Agriculture, Environmental Engineering) and The Faculty of Economics (Banking and Finance, Marketing, Management, Accounting and Management, Commerce, Tourism and Services).

The Faculty of Agricultural Sciences, Food Industry and Environmental Protection was established in 1990, and the specialization Mountain Studies 28 years ago. For more than a quarter of a century, the specialization Mountain Studies has managed to define its role as trainer for professional elites. We have been continuously preoccupied for developing the professional skills and competences of our students, adapted to the demands of today's labour market and entrepreneurial society, constantly focusing on the modernization of teaching and research approaches, in order to provide the competences and to reach the performance standards for the future agriculture specialists, graduates of license and master programs. The academic staff was always preoccupied by the harmonization of the teaching process with the national and international trends, and this was possible by developing partnerships with similar universities, from Romania and Europe, by adapting our curricula and research areas to the national and international ones. The visibility of our specialization is granted by the professional prestige of the 26 members of our teaching staff, whose concern towards the quality of the teaching is harmoniously combined with the results from their scientific research activity, these enabling our Faculty to be an excellence pole within the University, and not only. The academic staff was involved during these 25 years in many research grants, and has published more than 800 papers in national and international prestigious journals. The Faculty is involved in many Sectoral



Operational Programme-Human Resources Development projects, by which we provide our students with practical training, entrepreneurial formation, etc. From our best graduates, ten have completed their professional training by doctoral studies, conducted in prestigious universities from Romania and abroad. Making a honest analysis of the achievements and flaws of all these years, we can state that we have sowed the "miraculous seed" of agricultural science and research in Sibiu, and we fully enjoy the results of our work.

The efforts and endeavours of the whole Mountain Studies staff during this quarter of a century enable us to look forward towards excellence, meeting the needs of a knowledge-based society, and contributing to the consolidation of the international prestige of the Faculty and of the "Lucian Blaga" University of Sibiu.

<https://www.ulbsibiu.ro/en/facultati/saiapm/>

Oral presentations

Plenary session 1

BIODIVERSITY CONSERVATION IN THE BUDA AND RÂIOSU MOUNTAINS, FĂGĂRAȘ MASSIF

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The two investigated mountains are situated at the northern tip of Argeș County and form a part of the southern slope of Făgăraș Massif.

Buda Mountain (2431 m), separates at the north Buda Lake at 2055 m altitude. The other is Râiosu Mountain (2395 m), a continuation of Buda Mountain, forming an almost continuing summit, separated by a small saddle, called Drumul lui Vodă (Vodă's Road). This mountain has the shape of a huge pyramid and presents all the characters of a limestone mountain with steep walls and beginning of scree.

The vegetation of the two investigated mountains is spread over three levels: mountain, subalpine and alpine. 27 alpine and subalpine habitats were described. 14 of these are habitats of community interest, with high conservation value. These habitats, which contain protected, relict, endemic and vulnerable species are threatened by numerous anthropogenic impacts.

The numerous endemics and relicts in the vegetal groups attest the great vegetation age of this limestone massif. They survived glaciations due to the thermal characteristic of the limestone substratum. In the glacial periods, the heights of the two mountains that exceed 2300-2400 m altitude, functioned as a true "nunatak" that was discovered by the glacier and was able to favor the preservation of this rich flora in endemics and relicts.

Knowledge regarding the different habitat types, their distribution and extent is very important to develop a management plan for the two studied mountains. Such a plan is necessary to improve the conservation status of habitats and species through a series of strategic actions including the development of an ecological database and educational programmes designed to address local communities.

AN ASSESSMENT OF RED LIST DATA OF VASCULAR PLANTS FROM THE SUBALPINE-ALPINE AREAS OF THE FĂGĂRAȘ MTS. (SOUTHERN CARPATHIANS)

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Făgăraș Mts. (Southern Carpathians) are the second highest massif in the Carpathians Mts., representing a massive continuous block of forested and alpine habitat with a very rich biodiversity.

This study presents a regional red list of vascular plant species, native in the subalpine-alpine areas of Făgăraș Mts. (Southern Carpathians), based on the IUCN Red List categories. The distribution and abundance data were obtained from the field floristic surveys carried out by the authors during the last 16 years (2002–2017) in high-mountain (subalpine and alpine) areas of the Făgăraș Mts. Moreover, floristic data provided before the 21st century from literature data were revised in the field.

The list comprises 70 species, including 24 Critically Endangered species, 13 Endangered species, 7 Vulnerable species and 26 species classed as Data Deficient (DD). In most of cases, DD category is triggered by insufficient information for the species which might be due to lack of recent field work or no monitoring data being available (e.g. *Primula baumgarteniana* Degen & Moesz, *Conioselinum tataricum* Hoffm., *Ranunculus thora* L.).

The main hazard for the threatened plant species is represented mainly by the intensive grazing activities, which have the worst impacts.

The results are compared to the Romanian national Red List of vascular plants and briefly discussed.

The resulted Red List makes it possible to identify trends in the occurrence of threatened and endangered taxa over time in the Făgăraș Mts., though these changes in the numbers in particular categories are sometimes difficult to interpret.

THE BIOGEOGRAPHIC AND CONSERVATION IMPORTANCE OF THE FĂGĂRAȘ MTS. FLORA: ENDEMISM, RANGE MARGIN AND RELICT POPULATIONS OF ALPINE PLANTS

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The Făgăraș Mountains (Southern Carpathians), the second highest range in the Carpathians, are characterised by extensive alpine habitats and a predominant acidic bedrock with insular occurrence of calcareous outcrops. Based on our personal data on species distribution collected in the past 15 years and a thorough peruse of the accessible literature and herbarium data, we present a biogeographical and ecological overview for more than 40 rare or endemic taxa in order to outline the biogeographic and nature conservation importance of the Făgăraș Mts. We highlight the biogeographic value and ecological preferences of these taxa and present their accurate distribution in the Făgăraș Mts., coupled with their general distribution in the Carpathians and Europe. Some of these taxa represent recently recorded novelties from this range (arctic-alpine *Carex rupestris* and pan-Carpathian endemic *Plantago atrata* subsp. *carpatica*), while others are reconfirmed after more than half a century since their last mention (Carpathian-Balkan *Draba compacta*, European alpine *Carex parviflora* and *Allium ericetorum*, together with the South-Eastern Carpathian endemics *Leontodon kulczynskii* and *Silene zawadzki*). Furthermore, other floristic elements of various origin from its high-mountain flora are presented: narrow endemics (*Silene dinarica*), Southern Carpathian endemics (e.g., *Aquilegia transsilvanica*, *Festuca bucegiensis*), South-Eastern Carpathian endemics (e.g., *Draba kotschy*, *Eritrichium nanum* subsp. *jankae*, *Phyteuma vagneri*), Pan-Carpathian endemics (e.g., *Arabidopsis neglecta*), Carpathian-Balkan elements (e.g., *Centaurea kotschyana*, *Saxifraga carpathica*), Alpine-Carpathian elements (e.g., *Saponaria pumila*, *Jacobaea incana* subsp. *carniolica*), European and Eurasian alpine elements (e.g., *Androsace obtusifolia*, *Astragalus australis*, *Callianthemum coriandrifolium*, *Gentiana frigida*, *Geum reptans*, *Persicaria alpina*, *Ranunculus alpestris*), and arctic-alpine elements (e.g., *Kobresia myosuroides*, *Ligusticum mutellinoides*, *Ranunculus glacialis*, *Salix hastata*, *Saxifraga hieraciifolia*).

All the taxa discussed here are included in the national Red Lists and Red Books of Poland, Ukraine and/or Romania, emphasising the high conservative value of the subalpine and alpine habitats from the Făgăraș Mts. Botanical evidence together with the existence of extensive and diverse natural alpine habitats that ensure a long-term shelter for natural populations provide a substantial support for the establishment of a high-rank law protection of the Făgăraș Mts. within the framework of a National Park.

THE IMPORTANCE OF THE LEPIDOPTERAN DIVERSITY OF THE FĂGĂRAȘ MOUNTAINS, WITH NOTES ON THE LEVEL OF ASSESSMENT OF THE ALPINE INVERTEBRATE FAUNA

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The Romanian Carpathians harbor only four massifs which due to their altitude, climate, vegetation and fauna are considered to have a typical alpine character: the Rodnei Mountains, the Bucegi Mountains, the Făgăraș and the Retezat Mountains. The sub-alpine and alpine regions, which occupy about 50% of their area, are best represented in the Făgăraș Mountains. While entomological studies, particularly those aimed at assessing the lepidopteran fauna, have begun as early as 1850, the Făgăraș Mountains remain the least well known among the Carpathian massifs.

About 600 lepidoptera species have been so far recorded from the Făgăraș Mountains, however estimates suggest that between 1200 and 1400 species could be found here. These estimates suggest that less than 50% of the diversity of this massif has so far been assessed.

From among the 16 lepidopteran taxa which are endemic to the Romanian Carpathians, not one is specific to the Făgăraș Mountains. This does not mean that there are no endemic taxa to the Făgăraș Mountains, instead it further underlines the lack of detailed studies in this region.

Detailed studies, carried out using specific methodological tools, are likely to reveal taxa new to science as well as species new to the Romanian fauna. This is particularly the case for the alpine microlepidoptera. We further consider that the alpine diversity of the terrestrial and aquatic fauna of the Făgăraș Mountains has overall not yet been sufficiently investigated. Only after conducting detailed research into the alpine biodiversity of the Făgăraș Mountains can we properly assess its value. Unfortunately, the difficult accessibility of the area and especially the lack of funding aimed at supporting research in the mountain-alpine regions of the Carpathians, currently limits our understanding of the area and our possibility to take informed decisions about its conservation.

At the same time, as in most of the Carpathians, the biodiversity of the Făgăraș Mountains is being threatened by human intervention. Disturbances are thereby not limited to a restricted area, but affect this region from the lowlands to the highest peak. Intensive grazing is not only affecting the insect fauna of these mountains, but also other invertebrates, terrestrial mollusks and reptiles. Uncontrolled deforestation, landslides, mass tourism, hydro-power plants, unauthorized constructions, climate change and its complex effects are expected to rapidly alter the known and unknown diversity of the Făgăraș Mountains. In order to be able to fight these changes and in order to maintain the rich biological heritage of the area, we need better knowledge and better information exchange and dialog with the public and the decision makers from both regional and national levels.

NATURA 2000 AND ENDEMIC INVERTEBRATE SPECIES IN THE FĂGĂRAȘ MOUNTAINS AREA

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Făgăraș Mountains are in many ways the most spectacular mountain massif in Romania. Constituting a group of specific habitats, characterized by a great diversity of flora and fauna, Făgăraș Mountains are home of a large number of European protected species, and among them a number of invertebrates, most of them included in orders Lepidoptera and Coleoptera. Natura 2000 standard forms include some of these species and others are mentioned in the area in the various studies. On the other side, in the Făgăraș Mountains we find a number of endemic species that increase the conservative value of the area. All these species ultimately depend on the state of conservation of natural habitats and reducing human pressure. Identification of species and habitats with high conservation value and their protection is a prerequisite for declaring the Făgăraș Mountains National Park.

THE AMPHIBIANS OF COMMUNITY INTEREST IN THE ROSCI0122 FĂGĂRAŞ MOUNTAINS

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The ROSCI0122 Munţii Făgăraş is one of Romania's most valuable Nature 2000 site. It was designated specifically to protect core areas for a number of 40 species and 28 habitats of community interest listed in the Habitats Directive, among which only three amphibian species were listed in the Nature 2000 standard form.

During May–September 2014, we conducted an inventory, mapping, and assessing the conservation status and impacts affecting the amphibians of Community interest in a selection of statistically computed cells of the ETRS89 5 km grid covering the Nature 2000 site.

We identified thirteen amphibian species, among which one true salamander, four newts, three toads and five frogs. We also found a new amphibian species of Community interest, *Triturus vulgaris ampelensis*, in addition to the three already known in the area. *Triturus (Lissotriton) montandoni* was found at the edge of its distribution range in the Iezer-Păpuşa massif, while *Triturus cristatus* is present mostly at lower altitudes at the site boundaries, whereas *Bombina variegata*, a species rather abundant at lower altitudes along the valleys, is rather scarce elsewhere. The breeding habitats preferred by all four amphibian species of Community interest are permanent aquatic habitats with natural vegetation but they may as well thrive in temporary manmade ponds, puddles or drainage ditches. Due to an intensification of human activities within the area, such as overgrazing, deforestation, road traffic or water pollution, the amphibians are negatively impacted, resulting in an unfavourable-inadequate conservation status for most of them.

SPECIES OF BIRDS OBSERVED IN THE FĂGĂRAȘ MOUNTAINS DURING THE LAST TEN YEARS

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Because of the diverse relief that created various habitats, over 120 species of birds were observed in the Făgăraș Mountains during the last ten years. A part of them are resident species, others are partial migrants, while others are predominantly or exclusively summer visitors, winter visitors or passage migrants. At least 27 protected species from the Annex I of the Birds Directive (*Ciconia ciconia*, *Ciconia nigra*, *Haliaeetus albicilla*, *Aquila chrysaetos*, *Aquila clanga*, *Aquila pomarina*, *Pernis apivorus*, *Milvus migrans*, *Circus aeruginosus*, *Circus cyaneus*, *Circus pygargus*, *Falco peregrinus*, *Falco vespertinus*, *Tetrao urogallus*, *Bonasa bonasia*, *Grus grus*, *Glaucidium passerinum*, *Strix uralensis*, *Alcedo atthis*, *Picus canus*, *Dendrocopos leucotos*, *Picoides tridactylus*, *Dryocopus martius*, *Lullula arborea*, *Lanius collurio*, *Ficedula albicollis* and *Ficedula parva*) live in the area during the year or transit it during their passage. To enrich this avifaunistical diversity, special measures of conservation must be taken by the area administrators. Considering the site ROSPA0098 "Piemontul Făgăraș" from the North, the list grows to more than 170 species. As a result, we consider the idea of enlargement of the Special Protection Area over the Făgăraș Mountains as most appropriate.

OBTAINING RELIABLE DENSITY ESTIMATES FOR LARGE CARNIVORES IN THE SOUTHERN CARPATHIANS, ROMANIA

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Reliable population size and density estimates are prerequisites in conservation strategies, particularly for species that interact with local communities in a conflictual manner, such as large carnivores. In Eastern Europe, decision-making regarding large carnivores still relies on biologically unrealistic data, putting pressure on the long-term viability of their populations. During the 2017–2018 period, we collected data through systematic genetic and camera trap surveys in a pilot area in the Southern Carpathians, Romania, aiming to obtain robust population estimates for brown bear, wolf, and Eurasian lynx. We collected hair, scat and urine samples during the intense-feeding season for bear (n=783), and during the winter for wolf (n=147) and lynx (n=24). To cope with low detectability for lynx, we combined genetic data with a camera trapping survey (48 traps recording over 60 nights). Preliminary genotyping results revealed a minimum number of 127 bears with a sex ratio biased towards males (68 ♂ and 59 ♀). Genotyping wolf samples identified 22 individuals (9 ♂ and 13 ♀). We identified 11 lynx based on their unique coat pattern and successfully genotyped 4 of them. For wolf, capture-recapture modelling (TRIM, Mh Chao) yielded an estimate of 33 individuals, while pedigree reconstruction assigned them to four different packs. To provide further reliable population estimates, we recommend covering the inventory gaps in the genetic surveys for bear and wolf, and to increase the monitoring effort in the camera trapping study for lynx, by means of increasing both the density of traps and monitoring time span.

THE EURASIAN OTTER (*LUTRA LUTRA*): A FLAGSHIP SPECIES OF THE FUTURE FĂGĂRAȘ MOUNTAINS NATIONAL PARK

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Otters serve as flagship species to raise awareness for the conservation of aquatic ecosystems in many areas in the world.

The Eurasian otter was also one of the top 10 species used in fundraising advertisements by the BBC Wildlife programmes and this example could be adopted by many protected natural area managers from Romania.

In 2013, the otter was the symbol of a conservation campaign initiated by WWF Romania in order to stop the construction of more than 500 micro hydropower plant (MHP) projects in the Carpathians, some of these were located in the Făgăraș Mountains. This campaign has been a premiere at the level of the Danube basin and using the otter as flagship species was a success. The Eurasian otter was chosen to be the image of this national campaign, taking into consideration two main factors: it is a charismatic mammal, but also a threatened species affected by MHP projects, that is under national and international legal protection.

The use of shortcuts is widespread in conservation practices to help to ensure biodiversity conservation with minimal expenditures, and otters are a perfect alternative for conserving the aquatic habitats from the Făgăraș Mountains. The otter is an umbrella species from Făgăraș Mountains whose conservation confers protection to a large number of naturally co-occurring species.

DENDROCHONOLOGICAL RESEARCH OF MOUNTAIN TEMPERATE PRIMARY FORESTS IN THE FĂGĂRAȘ MTS.: WILL A LONG-TERM RESEARCH BE POSSIBLE?

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The remaining primary forests of the Carpathians are substantial carbon reserves and the last refuge for numerous endemic European species. The REMOTE (REsearch of MOUNTain TEMperate) primary forests project (www.remoteforests.org) is a long-term international collaboration based on a network of permanent plots in spruce and beech dominated primary forests. The general objective of this project is to better understand the developmental dynamics, disturbance regime, forest structure and biomass pattern, and biodiversity in the remaining primary forest from the region. As part of this network, we established over 200 permanent study plots in the Făgăraș Mts. These ecosystems are characterized by a mixed severity of the disturbance regime with a high spatiotemporal variability in both in amplitude and frequency. However, periods of synchrony between disturbance activities were also found. Current stand size and age structure were strongly influenced by past disturbance activities. We suggest that natural disturbances should be recognized as a natural part of ecosystem dynamics in the Făgăraș Mts. and should not be a reason for salvage logging of rare habitats. Our data further show, that the Făgăraș Mts. can be considered as the mountain range with largest complexes of highest quality primary temperate forests within the EU. However, most of the primary forests in the Făgăraș Mts. are not strictly protected, and logging in these valuable ecosystems and in our permanent study plots continues rapidly. Conservation actions to halt the loss of primary forests in the Făgăraș Mts. are urgently needed.

FIRST DRAFT OF THE FUTURE FĂGĂRAȘ MOUNTAINS NATIONAL PARK – THE NORTHERN SIDE

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The northern side of the Făgăraș Mountains covers 79,737 ha and an altitude range over 2,050 m. Six of the nine bioclimatic layers of Romania can be found here, six of the 98 landscape types, 47 (22%) of the 212 forest site types, 16 (32%) of the 50 forest formations and 69 (23%) of the 306 forest types. The forests cover 61,204 ha. Of the ten currently existing reserves (8,792 ha), six (925 ha) are in the forest area and their main objective is to preserve rare plant and animal species. Twenty-four further scientific reserves are planned, included in as many natural reserves of virgin and quasi-virgin forests. The current ecological and genetic value of the forest area, which may vary from 1 – *exceptional* to 9 – *negligible*, is 3 – *very high* for the buffer area (30,849 ha), 2 – *extremely high* for the planned natural reserves (30,818 ha) and 1 – *exceptional* for the planned scientific reserves (13,818 ha). These data show the remarkable value of the local forest patrimony and call for the maintenance of the currently existing reserves, the conservation of the virgin and quasi-virgin forests through the legal enforcement of the planned reserves, as well as the conservation of the whole northern slope of the Făgăraș Mountains as a national park and as a biosphere reserve before the land becomes privatised.

VIRGIN AND OLD GROWTH FORESTS IN ROMANIA – SAFEGUARDING THE EUROPEAN BIODIVERSITY HERITAGE. A PROJECT BY THE UNIVERSITY OF ROTTENBURG AND THE GERMAN ENVIRONMENT FOUNDATION TO SUPPORT OLD GROWTH FOREST IDENTIFICATION AND PROTECTION ROMANIA

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The largest share of primary forest remains in the temperate zone within the EU is located in Romania. However, these forests are under threat from logging. In 2012, the Romanian Government established the “National Catalogue of Virgin Forests” which allows experts to identify and map forest stands and to submit respective studies to authorities in order to aid their protection. However, the pace to populate the Catalogue is slow, thus raising concerns by NGOs, scientists and even by the timber industry.

Given the size of the country, the number of unprotected and threatened primary forests and the pace of progressive logging there is an urgent need: (1) to speed up the identification and protection of high nature value forests (2) to highlight the importance of the last remaining virgin / old-growth European forest ecosystems (3) to safeguard the last intact European virgin forest areas for their scientific importance and (4) to develop strategies to inform and to raise awareness.

The University of Rottenburg (HFR) / Germany with financial support provided by the German Environment Foundation (DBU) initiated a scientific project aiming to support the Romanian state with the identification and protection of important virgin forests. The first phase of the project is scheduled from spring 2017 until early 2019. During this period several 1000s of hectares have been visited and expert studies have been submitted to governmental authorities. In the course of the project several obstacles occurred, such as questionable data in forest management plans; lack of co-operation with authorities and significant bureaucratic burdens in conjunction within the Ministerial approval process.

The Făgăraș Mountains Natura 2000 site is a major hot-spot of high nature value forests of international ecological and scientific significance. Pathless and untouched valleys – a unique feature in Europe still exist there. The conservation of these forests is of key importance for a future national park. Unfortunately, only a fraction of these forests is under sufficient protection today. Thus, the project operates in close partnership with the REMOTE-project helping to save those old growth forest areas inherent for long-term scientific research programs.

Plenary Session 2

CONTRIBUTIONS TO THE ESTABLISHMENT OF ALTITUDINAL, PRATICULTURAL, PASTORAL, AMBIENTAL AND ECONOMIC GRADIENTS IN THE FĂGĂRAȘ MOUNTAINS

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Based on data from the scientific literature and on our personal research findings, the main climatic altitudinal gradients directly affecting the vegetation layering of the Făgăraș Mountains can be depicted (air temperature and rainfall).

We conducted studies on increasing the productivity of permanent meadows with chemical fertilizers for livestock use, identifying gradients of productivity expressed in livestock weight gain. These gradients are used to extrapolate missing data for areas where no research has been conducted for various reasons. The altitude gradients of meadow productivity represent the scientific support for granting subsidies to livestock farmers in the mountain area.

At present, without the improvement of species composition of meadows at 600–800 m altitude, 165 kg/ha of livestock weight gain is obtained, which decreases to 80 kg/ha at 1,600–1,800 m. After a normal fertilization with 200 kg/ha nitrogen and balanced amounts of phosphorus and potassium, the yield of livestock weight gain in the young cattle reaches 500 kg/ha in the 600–800 m range and drops to 200 kg/ha at 1,600–1,800 m altitude in the Făgăraș Mountains.

At elevations up to 1,000–1,200 m the livestock weight gain decreases with a gradient of 20 kg/ha and between 1,600 and 1,800 m it decreases with a gradient of 40 kg/ha for each 100 m increase in altitude.

Through the fertilization of the permanent meadows in the Făgăraș Mountains and their rational use, the livestock weight gain can increase 3–6 times, like in the European alpine countries with developed animal husbandry.

GRASSLANDS FROM SOUTH-WEST FĂGĂRAȘ MASSIF USAGE VS. CONSERVATION

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Grasslands from alpine and subalpine S-W Făgăraș Massif belonging to private stakeholders from Căineni (Vâlcea County) were studied in respect with pastoral management. A brief screening highlighted the habitats of national and community conservation interest. In the present paper we describe the grasslands and the impact of grazing, mainly with sheep, we present the habitats with potential conservation interest and formulate recommendations regarding future research, conservation strategies and for the restoration of degraded habitats.

ASSESSMENT OF CLIMATIC AND HYDROLOGICAL RISK SITUATIONS IN THE MOUNTAIN AND SUB MONTANE AREA OF THE FĂGĂRAȘ MOUNTAINS IN THE CONTEXT OF BIODIVERSITY CONSERVATION

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The frequency and violence with which the climatic risk situations are manifested generating hydrological risks is increasing, which is why we consider that it is important to analyze the cases, especially the directions to be followed to limit the effects of such events.

In the context of the obvious climate change, the scale of climate risk has increased which affects the biodiversity of the mountainous and sub montane areas of the Făgăraș Mountains and the human community alike.

The monitoring of meteorological events generating climatic and hydrological risks is hampered by the very small number of mountain weather stations. Although in Romania the mountainous area occupies 33% of the country's territory, only 10% of the meteorological stations within the national monitoring network are located in the mountain area.

In order to assess the climatic risk situations we used data from four meteorological stations: Bâlea-Lac (2043 m altitude), Fundata (1360 m), Făgăraș (430 m), Brașov (625 m).

From the analysis of the meteorological data, both the frequency with which climatic risks are manifested and their violence is obvious. Liquid precipitation in particular favors floods in the sub-mountain area, while solid ones are the main avalanche factor.

The impacts of climate change on the biodiversity of the Făgăraș Mountains and sub-mountain areas require a throughout analysis of the impacts on the ecosystems found in the area, overlapped with the already existing pressures, like habitat destruction and environmental pollution.

Climate risk situations have a direct effect on the evolution of living beings, first on their ability to adapt and then on their survival capacity, and in extreme cases may constitute factors for the elimination of certain trophic species. This can have serious consequences for biodiversity at local level and with an overall impact. Activities such as deforestation and overexploitation can lead to the exacerbation of the effects of climate change.

LITHOLOGY, TOPOGRAPHY AND WEATHERING CONTROLS ON THE DISTRIBUTION AND MORPHOMETRY OF MOUNTAIN ROCKWALLS IN THE FĂGĂRAȘ MOUNTAINS

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Mountain rockwall dynamics is controlled by thermal weathering patterns and intensity, experiencing also strong structural and lithological control. This work presents the inventory and morphometry of rockwall surfaces mapped in the Făgăraș Mountains, focusing on their distribution (density, frequency, orientation) area, slope and relative height. Continuous rock surface thermal monitoring was used to estimate the freeze-thaw regime on the rockwalls in the 2000-2200 m altitude range. Rockwall surfaces were identified on Google Earth® and their morphometrical characteristics were derived from the 25 m resolution EU-DEM digital surface model. The altitudinal distribution (mean altitude) shows the high elevation of rockwalls accommodated on metamorphic schists (> 2150 m a.s.l.) which are generally associated with former Pleistocene glaciations and subsequent reworking (peaks, high crests, headwalls), compared to sedimentary rocks in other massifs (1600-1800 m a.s.l.) which reflect strong structural control. Metamorphic rockwalls show reduced individual mean height (45-50 m) and area (< 10×103 m²). Both frequency and mean covered area show that rockwalls are generally more developed on the north-facing slopes in the detriment of the southern ones (5:1 ratio). Frost weathering analysis also reveals important differences between the north and south-facing rockwalls, the first experiencing deep continuous freezing throughout most of the cold season whereas the latter is subject to high day-night thermal amplitudes. These findings can contribute to rockfall hazard and risk assessment on the main transportation route in the massif (the Transfăgărășan road) in order to establish the hot spots and develop early warning systems for such situations.

SNOW AVALANCHES AND RELATED HAZARDS, BASED ON HIGH-RESOLUTION SATELLITE DATA, IN THE FĂGĂRAȘ MOUNTAINS

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Snow avalanches represent important natural hazards with impact on hillslope modeling and generate every year injuries, fatalities and infrastructure damages in many mountainous areas around the world. This is also the case of the Făgăraș Mts., and although in Romania a permanent service for snow layer and snow related hazard monitoring exists since 2004, there are no consistent spatial databases with mapped avalanches for the Southern Carpathians. In this context several new data and results have been obtained in the frame of a Romania-Norway cooperation project (SnowBall) for the central part of Făgăraș Mts. The use of high-resolution satellite, drone images and derived products has the potential to overcome the lack of avalanche data and give a good overview of the spatial distribution of snow avalanches from one year to another. The results showed that the analyzed events are mainly loose snow avalanches, and in most cases are small and medium size related to the runout length, and only few were identified as slab avalanches developed in open slopes. In the same time, the high number of avalanches mapped based on satellite images (mainly the years 2012 and 2016) shows that the avalanche occurrence in Făgăraș Mts. is more extended than the past reported events and show a higher density on the southern slopes of the massif. The hazard areas generated for the central part of Făgăraș Mts., in the surroundings of the highway, show that for medium and large events, several parts of the highway, including forested areas for the southern slopes will be frequently affected.

PERMAFROST FROM FĂGĂRAȘ MOUNTAINS: FIELD RESEARCH AND MODELLING OF SPATIAL DISTRIBUTION

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Mountain permafrost is the frozen ground that remains below 0 °C for at least two consecutive years regardless of the nature of the material (soil or rock), ice presence or absence or ice content. It was a widespread environmental feature in Late Glacial in Făgăraș Massif and its downslope dynamics created the so-called rock glaciers. Most of them are now relict as a consequence of Holocene climate warming. Our field research from the last ten years using miniature temperature data loggers (iButtons) proved that in some areas, permafrost is still present today. This was confirmed also by applying bottom temperature of late winter snow cover (BTS) measurements in the upper part of Doamnei Valley. Thermal monitoring of rockwalls at different altitudes also indicated that perennially frozen rockwalls are possible above 2300 m asl even though the bouldery rock deposits (rock glaciers and lower talus slopes) are the most favorable locations for permafrost in general. GIS and remote sensing analysis revealed that Făgăraș massif presents 3 km² of rock glaciers vegetation free surface, 8 km² of talus slopes and 45 km² of rock walls. These surfaces are 2D so the real surfaces are higher. By incorporating the thermal measurements in GIS, we obtained that permafrost is possible on 1.8 km² (rock glaciers and talus slopes) and 0.7 km² (rockwalls). This reveals the sporadic nature of permafrost from the crystalline Făgăraș Massif which has a much lower share of the alpine area in comparison to the granitic massifs of Retezat and Parâng Mountains.

ENVIRONMENTAL MONITORING USING SUPERVISED CLASSIFICATION ON SENTINEL 2 IMAGERY IN THE FĂGĂRAȘ NATIONAL PARK

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The use of satellite imagery has intensified in the last decade, proving its usefulness in evaluating different types of hazards or changes in landscape, sometimes from one day to another. Applying the methodology used in evaluating and monitoring phenomena like deforestation, floods, vegetation burning etc. is useful also for the management of protected areas. For the future Făgăraș National Park a land cover was derived using free Sentinel 2 images, with a resolution up to 10 meters. The algorithm that was used allowed detailed mapping of the forest and of different tree species, grassland, water bodies, cliffs, tracks, roads, and constructions. The classification was validated using orthophotos, true ground points and mathematical algorithms. Land cover data is useful in analysis of habitats, natural potential or degradation thus being a valuable instrument in evaluating the environmental state and for quick decision making in conservation management.

THE ACCESS TO GENETIC RESOURCES

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By adopting the Nagoya Protocol, the international community is responding to the 3rd objective of the Convention on Biological Diversity (CBD) which refers to the fair and equitable sharing of benefits resulting from the use of biodiversity, the intention of the CBD parties being to create innovative financial mechanisms working for its conservation. For the regional level, the EU adopted the Regulation (CE) no. 511/2014 for providing the harmonizing framework in the implementation of the Protocol. For the year 2017, 15 Member States reported to the Secretariat of the CBD on the state of implementation of the Protocol on voluntary basis. The purpose of this paper is to discuss the evolution of certain terms such as genetic resource from the classical type to the virtual sequence of the DNA. Legislative aspects related to the Regulation 511/2014 are also addressed. Best practices in managing new topics for Romania in this field, such as synthetic biology, digital sequence information, biopiracy related to patenting, traditional knowledge and local communities will be presented. The national consultancy is of outmost importance for further developing the legislative framework in Romania by taking into account the financial costs of implying the full implementation of the Nagoya Protocol.

INTEGRATING HUMAN DIMENSIONS RESEARCH TO BUILD PUBLIC SUPPORT FOR NATIONAL PARK CONSERVATION

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Conservation is only achieved through understanding and working with people. Human dimensions (HD) research identifies attitudes, beliefs, and behavioural intention of individuals and key interest groups to aid in understanding the nature of conflicts in a conservation issue, document public support/opposition to various management issues, identify key beliefs that are directly linked to attitudes so to target educational messages, and generally understand public attitudes toward the species or issue. We offer an overview of human dimensions research that is being integrated to build public support for large carnivores, European bison reintroduction and the proposed national park. Specifically, we will present results mainly from quantitative data collected from 1) visitors (n=418) to the Făgăraș Mountains, documenting public support for the proposed national park and diverse views on appropriate activities within the park (e.g., sheep grazing, ski development, etc.), 2) hunters (n=512) attitudes toward large carnivores, 3) university student (n=350) attitudes and beliefs toward large carnivores, 4) residents (n=116), closest to the proposed European bison release site, attitudes and fears toward European bison and their management, and local community resident attitudes toward park establishment and forest issues focusing on residents north of the Făgăraș Mountains (n=323) and south of the mountains (n=321). In addition, our HD work has involved listening through more than 50 qualitative interviews with key interest groups and informants in the various communities around the Făgăraș Mountains. Potential for Conflict Index (PCI) is used to demonstrate the amount of consensus within groups across various management issues.

EFFECTIVE MEASURES TOWARDS THE CONSERVATION OF MLACA TĂTARILOR – A SITE OF COMMUNITY INTEREST FROM THE FĂGĂRAȘ MOUNTAINS

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Mlaca Tătarilor is a protected natural area from the southern part of Transylvania, located at a distance of about 3 kilometers from Arpașu de Sus village (Sibiu county). The site is included in the Piemontul Făgăraș Special Protection Area (ROSPA0098) and was designated as a Site of Community Interest (ROSCI0012) based on the documetation developed by the Institute of Biology Bucharest.

Mlaca Tătarilor is an active mesooligotrophic peatland with a rich peat deposit and characteristic fauna and vegetation including *Sphagnum* sp., *Drosera rotundifolia*, *Rhynchospora alba*, *Epipactis palustris*, *Carex lepidocarpa*, *C. diandra*, *Menyanthes trifoliata*, *Triturus cristatus* and *Emys orbicularis*.

Since 2001, the site was progressively colonized with species of Betulaceae – *Betula pubescens*, *B. pendula* and *Alnus glutinosa* – being completely overgrown by 2015. As a consequence, the entire ecosystem was functionally and structurally affected due to subsequent processes such as: (i) intensive water loss by evapotranspiration, (ii) progressively replacement of heliophyte species by the sciophyte ones and (iii) accelerated mineralization.

In order to reestablish the structure and function of the peatland, in 2016, under the EEA grant "Restoration strategies of the deteriorated peatland ecosystems from Romania (PeatRO)" some rehabilitation measures were undertaken. The measures were mainly to reestablish the water table and consisted in the removal of enclosing woody vegetation, blocking the water drainage channels and providing a supplementary water source from another spring.

Since 2016, in order to assess the efficiency of the applied measures, the site was under a monitoring program. Every three months measurements were taken, especially of the water level. The results showed that the restauration measures were successful and the water level raised with an average of 10 cm, being stabile.

Posters

THE LIVERWORTS OF FĂGĂRAŞ MOUNTAINS

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The first reports of bryophytes from Romania are from the Făgăraş Mountains, dating back to the early 19th century, when the Transylvanian Saxon botanists J.C.G. Baumgarten and L.R. von Heufler made the first botanical excursions in the Arpaş Valley.

Făgăraş Mountains are the richest liverwort area of Romania, with 143 species from a total of 229 species included in the national list. On the second place is Bucegi Masiff, with 126 species, on third place is Retezat Mountains, with 100 species, followed by Rodna Mountains with 88 species and Piatra Craiului with 73 species.

Făgăraş Mountains is the only place in Romania from where the following ten liverwort species were reported: *Anastrophyllum saxicola* (Schr.) R.M. Schust., *Fossombronia foveolata* Lindb., *Gymnomitrion alpinum* (Gottsche ex Husn.) Schiffn., *Marsupella aquatica* (Lindenb.) Schiffn., *M. boeckii* (Austin) Kaal., *M. condensata* (Ångstr. ex C. Hartm.) Kaal., *M. sparsifolia* (Lindb.) Dumort., *Pallavicinia lyellii* (Hook.) Carruth., *Scapania crassiretis* Bryhn and *Tritomaria polita* (Nees) Jörg.

Făgăraş Mountains is therefore the most important national area for liverwort conservation, with 31 threatened species (CR - critically endangered species: 14, EN - endangered species: 3, VU - vulnerable species: 14). This large number of threatened species calls for the protection of the area, which could be achieved by the designation of Făgăraş Mountains as a National Park.

***RHIZOMNIUM MAGNIFOLIUM* (MUSCI, MNIACEAE): THE FIRST RECORD FROM THE FĂGĂRAȘ MOUNTAINS (SOUTHERN CARPATHIANS, ROMANIA)**

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Rhizomnium magnifolium (Horik.) T. J. Kop. is a moss species, typical of wet, base poor, montane habitats, especially occurring around high mountain springs, streams and near areas with prolonged snow cover. This species has high moisture requirements and an ecological optimum in crenic habitats, being a crenophile.

R. magnifolium has a circumboreal distribution: Asia (China, Japan, Korea), North America (USA, Canada), Northern Europe (Russia, Finland, Norway, Iceland, Great Britain) and Central and Southeastern Europe (Slovakia, Romania, Serbia, Macedonia, Montenegro). In Romania, it has been reported from the following mountain units: Apuseni, Rodnei, Călimani, Tarcău, Ceahlău, Hășmaș, Harghita, Nemira, Bucegi, Retezat and from the surroundings of Bârnova locality (Iași county).

The aim of this study is to report for the first time the presence of *R. magnifolium* in the Făgăraș Mts. Specimens were collected from Doamnei Valley, in a crenic habitat situated above Doamnei Lake (1986 m altitude, on the northern slope, crystallized bedrock). Herbarium vouchers with the collected specimens are deposited in the Herbarium of Eszterházy Károly University, Eger (EGR) and Babeș-Bolyai University, Cluj-Napoca (CL). The presentation emphasizes the distinctive morphological characteristics of this species, its distribution in Romania and reveals the ecological preferences and habitat features of the species in the newly discovered site.

ALIEN PLANT SPECIES IN FĂGĂRAȘ MOUNTAINS. CASE STUDY - *IMPATIENS GLANDULIFERA* ROYLE

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Increasing anthropogenic pressure as a result of poorly managed economic activities generates a major impact on mountain areas. The establishment of invasive alien species into native communities represents a direct consequence of anthropogenic pressure. *Impatiens glandulifera* is a species of Asian origin, native to the Himalaya Mountains, which was introduced in Europe for ornamental purposes. High propagule pressure and tolerance to environmental conditions along with the ability to suppress native species contribute to the invasive nature of the species. *I. glandulifera* can induce changes in ecosystem structure and functioning, preventing the regeneration of forests in invaded habitats. In May-August 2017 and 2018 we inventoried the presence of *I. glandulifera* along the altitudinal gradient on both southern and northern slopes of Făgăraș Mountains. Using Maxent algorithm we generated the potential distribution model of the target species, highlighting the areas prone to be invaded by this species. The results underline the importance of early detection and implementing management measures to control and limit the impacts of alien species naturalization in mountain areas.

SPARSELY VEGETATED HABITATS ACCORDING TO THE EUROPEAN RED LIST OF HABITATS IN THE FĂGĂRAȘ MOUNTAINS

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In the Făgăraș Mountains we found nine sparsely vegetated (scree) habitats included in the European Red List of Habitats. We searched for *Androsacion alpinae* Br.-Bl. in Br.-Bl. et Jenny 1926, *Papavero-Thymion pulcherrimi* Pop 1968, *Stipion calamagrostis* Jenny-Lips ex Br.-Bl. 1948, *Arabidion alpinae* Beguin 1972, *Gypsophilion petraeae* Borhidi et Pócs in Borhidi 1957, *Potentillion caulescentis* Br.-Bl. In Br.-Bl. et Jenny 1926, *Gypsophilion petraeae* Borhidi et Pócs in Borhidi 1957 alliances.

The current state of the habitats is presented, together with a qualitative estimation of the extent, severity and type of degradation. Quality indicators and quantitative data regarding the past and present extent and trends in habitat quantity are provided, underlying the pressures and threats for individual habitats.

Moreover, the habitats are presented in accordance with the European Red List of Habitats, referring to conservation and management needs.

Finally, a question for the future of habitats arises: when severely damaged, does the habitat retain the capacity to recover its typical character and functionality?

NATURAL HABITATS OF COMMUNITY INTEREST IN THE RÂIOSU AND BUDA MOUNTAINS, FĂGĂRAȘ MASSIF, WHOSE CONSERVATION REQUIRES THE DESIGNATION OF SPECIAL AREAS OF CONSERVATION

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22 natural habitats of community interest are presented from the Râiosu and Buda Mountains, Făgăraș Massif. The two investigated mountains are situated at the northern tip of Argeș County and form a part of the southern slope of Făgăraș Massif. 13 of these are habitats of high conservation value, such as: South-Eastern Carpathian dwarf azalea heaths (*Loiseleuria procumbens*), South-Eastern Carpathians alpenrose scrubs (*Rhododendron myrtifolium*) with bilberry (*Vaccinium myrtillus*), South-Eastern Carpathians juniper scrubs (*Pinus mugo*) with alpenrose (*Rhododendron myrtifolium*), South-East Carpathian communities of mobile or semi-fixed siliceous screes with *Oxyria dygina*, *Sesleria*-evergreen sedge grasslands (*Carex sempervirens*) and *Sesleria*-evergreen sedge grasslands (*Sesleria bielzii*), South-Eastern Carpathian meadows *Dryas* mats dwarf shrubs (*Dryas octopetala*), South-Eastern Carpathian springs & rivulets communities with *Doronicum carpaticum*, *Saxifraga aizoides*, *Chrysosplenium alpinum* and *Achillea schurii*, South-Eastern Carpathian communities Siliceous screes of the montane to snow level with *Saxifraga bryoides*, *Silene acaulis* and *Veronica baumgartenii*, South-Eastern Carpathian communities Calcareous and calchist screes with *Papaver corona-sancti-stephani*, *Cerastium lerchenfeldianum* and *Cerastium transsilvanicum*, South-Eastern Carpathian communities Calcareous and calchist screes with *Acinos alpinus* and *Galium anisophyllum*, South-Eastern Carpathians forests of alder (*Alnus incana*) with *Telekia speciosa*, South-Eastern Carpathians beech forests *Fagus sylvatica* with *Symphytum cordatum*.

These habitats which contain protected species, relict species, endemic species are threatened by numerous negative anthropogenic impacts. Knowledge regarding the different habitat types, their distribution and extent is very important in developing a management plan for the two studied mountains. Such a plan is necessary to improve the conservation status of habitats and species through a series of strategic actions following the increasing ecological database.

THE VEGETATION COMMUNITIES OF ALPINE AND BOREAL SHRUBS OF THE IEZER-PĂPUȘA MOUNTAINS

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The vegetation communities of alpine and boreal shrubs 4060 Alpine and boreal heaths (Annex I of Habitat Directive 92/43/CEE) were studied. These are found in the southern and northern slopes of the Iezer-Păpușa Mountains, on acid soil, mainly on siliceous substrate, belonging to the following phytosociological associations: *Cetrario-Loiseleurietum procumbentis* Br.-Bl. et al. 1939; *Rhododendro myrtifolii-Vaccinietum* Borza (1955) 1959 em. Boșcaiu 1971; *Campanulo abietinae-Juniperetum nanae* Simon 1966; *Junipero-Bruckenthalietum spiculifoliae* Horv. 1936. The main characteristics of the habitat: acidophilous, temperate Central European climate with mountain climate features, moderate to very humid, low-temperature and wind action. Persistent snow over winter also favors the growth of characteristic lichens and bryophytes. Drastic seasonal conditions are tolerated only by the species that are very resistant, mainly perennials and lichens. The study area is characterized from a floral point of view, highlighting the protected species for each association, taking into account the presence of Carpathian and Carpathian-Balkan endemic species. Finally, on the basis of the obtained data, the conservation status of this habitat of community interest is assessed, with the aim to establish management proposals for its conservation.

THE RIVER BASIN OF VÂLSAN – COMPONENT GEOGRAPHIC SPACE OF THE FĂGĂRAȘ MOUNTAINS WITH A LARGE BIODIVERSITY

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The Vâlsan River and its basin represent a component of the Făgăraș Mountains. This area of approximately 358 km² displays a geomorphological fragmentation, a mountain landscape, on the upper and middle course, continuing with the Sub-Carpathians, alongside the lower course. These features represent the premises for the development of a valuable botanical and faunistic diversity. The human intervention in this area (deforestation, hydrotechnical activities, rock extraction from the riverbed, mining explorations, grazing, tourism) has led to the transformation of the geographic landscape and implicitly of the natural landscape. Though, for some of the zoocoenoses components, such as some bird species, the creation of artificial lakes represents an ecologic opportunity, while for many other species of flora and fauna human intervention is not benefic. The area is marked by a large biodiversity: 130 species of bryophytes (16 species in the Hepaticatae Class and another 114 in the Bryatae Class) and about 550 species of cormophytes, of which 30 are pteridophytes (42.85% of the total fern species in Romania) etc. Endemic, rare and endangered species: *Dicranella crispa*, *Hymenostylium recurvirostrum*, *Plagiothecium neckeroideum*, *Grimmia trichophylla*, *Plagiobryum zieri*, *Hygrohypnum duriusculum*, *Botrychium multifidum*, *Cirsium furiens*, *Dianthus tenuifolius*, *Hepatica transsilvanica*, *Peucedanum rochelium*, *Silene dubia*, *Thymus comosus*, *Ranunculus stevenii*, *Anagalis minima*, *Typha shuttleworthii*, *Eleocharis carniolica*, *Luzula forsteri*, etc.

As for the ichthyofauna, we notice the *Romanichthys valsanicola* endemism, included in the IUCN Red List as critically endangered, being the most endangered European fish species.

We consider that the already existing strictly protected areas in Vâlsan Basin (Zoruleasa Natural Reserve, the sulphited natural springs) represent the start of protecting the natural environment in this area. An integrated protection of biodiversity can be carried out, on long term, only by declaring the entire are of the Făgăraș Mountains as a Natural Park.

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DIVERSITY OF CHRYSOMELIDAE AND CERAMBYCIDAE (COLEOPTERA: CHRYSOMELOIDEA) IN THE FĂGĂRAȘ MOUNTAINS AREA

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The paper presents data on the diversity of Chrysomelidae and Cerambycidae (Coleoptera: Chrysomeloidea) in the Făgăraș Mountains and its surroundings, based on the study of material preserved in the collections of the "Grigore Antipa" National Museum of Natural History (Bucharest), the Institute of Biology Bucharest of the Romanian Academy, and on published data. The greatest part of the Cerambycidae material belongs to the Dr. Nicolae Săvulescu Collection, which includes material collected in: Poiana Neamțului, Cârțișoara, Vama Cucului, Turnu Roșu, the Capra Peak, the Otic Peak, the Buda Peak etc. The Chrysomelidae species are recorded mainly from the "Vâlsan Valley" ROSCI0268 Site of Community Importance.

A total of 189 species are listed, according to the nomenclature and systematical order from the Catalogue of Palaearctic Coleoptera (Löbl & Smetana, 2010).

Among the valuable species recorded in this area, *Cornumutila quadrivittata* (Gebler), *Xylosteus spinolae* Frivaldszky (endemic to Southeastern Europe), *Chrysomela collaris* Linnaeus, *Chrysolina weisei* Frivaldszky (endemic to Southern Carpathians), *Chrysolina carpathica* (Fuss) and *Prasocuris phellandrii* Linnaeus should be mentioned.

From the conservation point of view, *Rosalia alpina* (Linnaeus) and *Morimus asper funereus* Mulsant are species of community interest, included in Annex II of the Habitats Directive.

THE FĂGĂRAŞ MOUNTAINS BUTTERFLY SPECIES FROM THE "LUCIAN BLAGA" UNIVERSITY OF SIBIU COLLECTION

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The Carpathians represent around two-thirds of the area of Romania, being relatively well known and explored in terms of biodiversity of species of plants, insects and vertebrates. Due to the collectings conducted up to the present, with synthetically data, the fauna of Lepidoptera in the Romanian Carpathians is quite well known. In the present paper the species of Lepidoptera, collected from the Făgăraş Mountains (Bâlea Lake, 2,200 m) are mentioned, namely *Aplocera simplicata* Treitschke 1835 (1♂, July 27, 1994, Lacul Bâlea, Făgăraş Mountains, 2.100m), *Erebia gorge* Hübner, 1804 (1♂, July 29, 1994, Lacul Bâlea, Făgăraş Mountains, 2.200 m). These were collected by lepidopterologist Levente Székely, the specimens being included in the collection of the "Lucian Blaga" University of Sibiu.

PRELIMINARY RELATIONSHIPS BETWEEN ABIOTIC SOIL PROPERTIES AND SOIL BIOTA ACROSS DIFFERENT LAND-USE TYPES IN THE FĂGĂRAȘ MOUNTAINS (ROMANIA)

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Soil biota plays an important role in many ecosystems by ensuring a number of functions such as decomposition and nutrient mineralization. As these ecosystem services are threatened by land-use changes, an improved knowledge about the relationship between soil properties and soil biota over relevant spatial scales and in different land-use types is needed to predict consequences of future changes. The services of the soil fauna provided for the functioning of ecosystems are diverse, but the interactions and regulatory forces in decomposer systems are poorly understood. Changes in land use and its intensity are major factors that affect biodiversity and may also alter interaction patterns between species, thereby changing their role for associated ecosystem functions.

To contribute to such an improved understanding, we performed our sampling campaigns in ten differently managed forest and grassland plots in Făgăraș Mountains. Soil fauna (Acari, Collembola, Protura and Chilopoda) were sampled using a 10×10 cm quadrat up to 10 cm depth. The animals were extracted by the Berlese–Tullgren method. All soil fauna abundances were expressed as individuals per m². More than 45 species of soil fauna were identified: 4 species of Protura, 8 species of Chilopoda, 12 species of mites and 21 species of Collembola.

Our work has increased the number of species of soil invertebrate known to be present in the Făgăraș Mountains. We argue that more general relationships between soil properties and soil biota can only be derived from future studies that consider larger spatial scales and different land-use types.

CONSERVATION ASPECTS FOR INVERTEBRATES OF COMMUNITY INTEREST FROM THE ROSCI0381 RÂUL TÂRGULUI - ARGEȘEL - RÂUȘOR PROTECTED AREA, ROMANIA

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An inventory study, mapping and identification of threats and pressures of three invertebrate species of community interest were conducted in the Râul Târgului – Argeșel – Râușor ROSCI0381 protected area, in 2018. In the same time, management measures were provided, in order to evaluate the conservation status and to foster the achievement of a favourable protection status for these invertebrates. According to the Council Directive 92/43/EEC of 21 May 1992 and to the O.U.G. 57/2007, three protected species were identified: *Carabus variolosus* Fabricius, 1787; *Rosalia alpina* (Linnaeus, 1758), from the Coleoptera order and *Parnassius mnemosyne* (Linnaeus, 1758), from the Lepidoptera order.

Carabus (Hydrocarabus) variolosus Fabricius, 1787 was inventoried in 20 habitats (with 200 pitfall traps), being reported from only 17 observation points (with 78 individuals). Six types of pressures and three types of threats were reported, which were correlated with seven specific management measures.

Rosalia alpina (Linnaeus, 1758) was inventoried on 25 transects, being signaled only in two observation points (with 2 individuals). Two types of pressures and two types of threats were reported, which were correlated with three conservation measures.

Parnassius mnemosyne (Linnaeus, 1758) was identified in two observation points, with seven individuals. Three types of pressures and four types of threats were signaled. These were correlated with three conservation measures, specific for this species.

Evaluating their conservation status, according to SINCRO nomenclature (according to the Romanian Ministry of Environment, Water and Forests), we found that from the population, habitat, species perspective and global conservation status points of view, all three species were included in the U1 unfavorable-inappropriate category.

Applying conservation measures correlated with the reduction / disappearance of pressures and threats will determine an improvement of the conservation status of these invertebrate species of community interest. The positive effects of management measures will be visible after a longer period of time (at least five years).

The field work was financed by the project "Elaboration of the management plan of protected area ROSCI0381 Râul Târgului - Argeșel - Râușor", SMIS-CSNR102086 and by the project no. RO1567-IBB01/2018.

FRAGMENTATION AND FLOW DIMINUTION: THE TWO MAJOR IMPACTS AFFECTING THE ICHTHYOFAUNA OF THE FĂGĂRAȘ AREA

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In the last centuries the human intervention drastically changed the face of the rivers on Earth. In the second part of the 20th century in the Făgăraș area many rivers were affected by fragmentation and flow diminution. The aim of this study is to highlight the negative effects of the fragmentation and flow diminution on *Cottus gobio* in the Făgăraș area and to make some recommendation for resolving this problem. Data collection was made in 2014 and 2017, in 121 sampling stations.

We found 6 big dams, 32 water intakes, 21 micro hydro power plants and 129 migration barriers. *Cottus gobio* was present in 41,32% of the sampling stations (in ROSCI0122 Făgăraș in 31,57%, in ROSCI0194 Piatra Craiului in 40% and in the ROSCI0381 Râul Târgului-Argeșel-Râușor it was present in all sampling stations).

The low presence of the *Cottus gobio* proves that the water network of the study area is highly fragmented.

In order to ensure the ecological restoration of this area it is necessary to facilitate the elimination of the barriers, by simplifying the bureaucratic procedures.

In order to protect the fish fauna, it is necessary to prohibit the installation of new migration barriers (dam, threshold, water intake) and all new water extraction/flow diminution activities must be banned.

AQUATIC BIODIVERSITY OF THE FĂGĂRAȘ MOUNTAINS. FUTURE PERSPECTIVES?

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The aquatic ecosystems in Făgăraș Mountains are highly impacted mainly by micro-hydro-energetic power plants, drought, forestry and the local pollution. These factors highly reduce the biodiversity of the streams, the water hydrodynamics and the connectivity of the rivers. Aquatic environmental modification threatens several protected species, which need urgent protection to avoid severe loss of biodiversity.

THE AMPHIBIANS OF ROSCI0381 RÂUL TÂRGULUI - ARGEȘEL - RÂUȘOR

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We studied the distribution and breeding habitat preferences of amphibians in the ROSCI0381 Râul Târgului–Argeșel–Râușor site. The protected area covers 131.76 km², ranging in elevation between cca. 800 m and 2319 m a.s.l. We began an inventory of amphibian species and aquatic habitats in 2018. We found seven species of the 19 species of amphibians inhabiting in Romania. Species rather abundant at low elevation (e.g. *Bombina variegata*) became rare at high altitude and their distribution offers a view of altitudinal boundaries of some species. Man-made ponds, puddle and drainage ditches represent important habitats for pond breeding amphibians. As most of the existing ponds were temporary, they selectively favored those species that had short larval period and high potential for phenotypic plasticity (e.g. *B. variegata*). Even if man-made water bodies had lower species diversity, they often represent the only available aquatic habitats within ROSCI0381, providing vital reproductive habitats and stepping-stones for dispersal and connectivity, thus supporting widespread amphibian communities.

CONSERVATION MANAGEMENT OF BIRD SPECIES OF COMMUNITY INTEREST IN ROSPA0098 PIEMONTUL FĂGĂRAȘ

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During 2014 and 2015, in frame of the project “Servicii de elaborare studii aferente habitatelor și speciilor de interes comunitar din perimetrul siturilor Natura 2000 Munții Făgăraș și Piemontul Făgăraș, Lot nr. 4 Servicii de elaborare studii aferente păsărilor de interes comunitar”, the Romanian Ornithological Society (SOR/BirdLife Romania) was subcontracted by Munții Făgăraș Association to evaluate the populations of the bird species of conservation importance present in the Natura 2000 site ROSPA0098 Piemontul Făgăraș, to determine their conservation status and to develop management measures to be included in the broader management plan.

Sampling methods were developed by taking into account the habitat needs and periods of presence in the site for each bird species, resulting in nine different sampling methods/protocols: passerine (CBM) and Syrian Woodpecker, woodpeckers, nocturnal birds of prey, diurnal birds of prey and Black Stork, Corncrake, White Stork, Hazel Grouse, Capercaillie, wintering and staging species. Data were collected from randomly preset points and transects by visual observations. Based on the gathered data and the habitat characteristics, distribution maps were developed for each species representing the feeding and breeding areas and the location of the observations. Population size was established by calculating the minimum and the maximum number of pairs or individuals present in the study area, and conservation status was determined for each species. Based on the analysis of the results, management measures were developed for key species and species groups and their habitats.

**PRELIMINARY STUDY ABOUT THE DISTRIBUTION OF
GLAUCIDIUM PASSERINUM (LINNAEUS, 1758) IN THE
UPPER HYDROGRAPHICAL BASINS OF ARGEȘ AND DÂMBOVIȚA RIVERS
(ARGEȘ COUNTY, ROMANIA)**

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A preliminary research study about the distribution of *Glaucidium passerinum* (Linnaeus, 1758) in the upper hydrographical basins of Argeș and Dâmbovița rivers (Argeș County, Romania) was conducted between 2015 and 2018. The point count method and a play-back device were used. 25 individuals were recorded: 22 in the upper basin of the Argeș River and 3 in the upper basin of the Dâmbovița River. 17 individuals were observed in the Făgăraș Mountains, 5 in Iezer-Păpușa Mountains and 3 in the Leaota Mountains. The majority of the individuals were registered between 1,500 and 1,599 m a.s.l. in the mature spruce forest. Other considerations on the species habitats and the weather conditions at the moment of the observations are made in the paper.

MONITORING OF INDICATOR SPECIES (WHITE-BACKED WOODPECKER, THREE-TOED WOODPECKER AND RED-BREASTED FLYCATCHER) AND OTHER FOREST BIRDS AS PART OF THE CONTINUOUS MONITORING PROGRAMME OF HABITAT RESTORATION MEASURES IN THE UPPER DÂMBOVIȚA VALLEY

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Natural forests, managed forests and clear-felled areas were purchased by the Conservation Carpathia Foundation for conservation purpose. One of the aims of the project was to manage forests in a way in which a more natural, more diverse tree composition can be achieved, that holds a higher diversity of species typical for these habitats. The Milvus Group Association was appointed to set up a long-term scheme in these forests aiming the monitoring of management actions through the monitoring of three indicator bird species – White-backed Woodpecker (*Dendrocopos leucotos*), Three-toed Woodpecker (*Picoides tridactylus*) and Red-breasted Flycatcher (*Ficedula parva*) – and other forest birds. Point counts were completed on 148 observation points annually for four years (2014-2017) between 16-26 May. A total of 85 species were observed. Three-toed Woodpeckers were observed regularly in spruce forests at higher altitudes, showing preference to non-managed natural forests and other forest patches with dead wood. The number of observations was significantly higher in the first year, numbers showing steep decline during the next three years. White-backed Woodpeckers were rarer, but regularly observed in beech or mixed beech-spruce forests. The Red-breasted Flycatcher was almost absent from the study area. To compensate for the absence this latter indicator, the Collared Flycatcher was proposed as an alternative, because it has similar habitat requirements and was more abundant than the Red-breasted Flycatcher. Beside the Three-toed Woodpecker another nine forest species showed significant population trends during the four years, but most of these are probably caused by natural fluctuations.

FAUNISTIC AND BIOGEOGRAPHIC STUDY OF BATS FROM THE FĂGĂRAȘ MOUNTAINS

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Before this study, very few bat inventories were made in the Făgăraș Mountains. Therefore, during 2011-2015, we have tried to cover some gaps concerning the ecology and distribution of bats in the Făgăraș Mountains by recording bats in five habitats types at altitudes between 360 m and 2310 m: 1). subalpine and alpine habitats: 10 recording points between 1440-2310 m; 2) forest habitats (13 survey transects in deciduous, mixed and coniferous; 3) wetlands (dams, small lakes and ponds, slow-flowing rivers and streams); 4) open habitats; 5) human settlements (a case study: Racoviță and surroundings). Through the acoustic method, 23 Chiroptera species were identified in the ROSCI Făgăraș Mountains site of community importance; five passage corridors and 14 feeding areas were located. The most strenuous feeding activity in alpine habitats was observed at an altitude of 2310 m, at the base of Moldoveanu Peak. The dominant species recorded here were *P. pygmaeus* and *E. nilssonii*. Eight bat species were found feeding over the glacial lakes, the most abundant was *M. daubentonii*, *E. nilssonii* being the sub-dominant species. The bat fauna of the coniferous forest is comparable to that characteristic for deciduous and mixed forests, but in quantitative terms the number of passes is considerably reduced. In open habitats eight species were identified. We detected nine bat species feeding in and found only three birth colonies in buildings, whose populational actives are down now because of the human influence.

BAT COMMUNITIES (MAMMALIA: CHIROPTERA) IN UNDERGROUND GALLERIES OF THE FĂGĂRAŞ MOUNTAINS

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Făgăraş Mountains are formed of crystalline schists and it's known caves are located at altitudes over 2000 m, they are cold and do not meet the required microclimate for bats. For this reason, we tried to locate the gallery mines which represent shelters for bats. During 2009-2018, we conducted 54 field surveys in the Făgăraş Mountains and the Făgăraş Piedmont in order to locate the underground shelters that roost or could shelter bats. Thus, 17 mine galleries were located, totalising more than 10 km length of verified galleries. During the hibernation period, the mine Sumerna¹ roosts 10 bat species; in transit periods (spring and autumn) it hosts between 400-720 *M. schreibersii*. The second most important shelter were the mines Piscu Negru which roosts about 300 bats mainly belonging to four bat species. This shelter could no longer be monitored because of the obstruction of the entrance. The Riuşor Gallery represents the most important hibernation shelter known for *B. barbastellus*. The Lake gallery of Vâlsan Valley is an important shelter during the hibernation period for *R. ferrumequinum*, with 84% of the observed specimens. The Turnu Roşu mine gallery is the only known shelter that was permanently occupied by *R. hipposideros*. Although located at long distances from settlements, human influence is present in the form of the waste thrown in. Since most of the Făgăraş Mountains caves are not suitable as hibernation or maternity roosts, the mine galleries represent the most important shelters for 15 bat species.

NON-INVASIVE DNA MONITORING OF LARGE CARNIVORES: SAMPLE COLLECTION STRATEGY

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In 2017 we started a project to estimate the current population size of large carnivores in the Southern Carpathians, Romania. The study area overlaps eight game management units and four natural protected areas, totalizing an area of about 100,000 ha. To provide robust statistical estimates, based on capture–mark–recapture method, we collected non-invasive DNA samples such as scat, hair, urine but also blood or tissue from dead or injured animals. For brown bear we collected 783 samples in the autumn period (67% scat, 32% hair, and 1% tissue), for wolf 147 samples (65% scat, 24% urine, 8% hair, and 3% blood and tissue samples), and for lynx 24 samples (45% hair, 32% scat and 23% urine) in the winter time. Continuous sampling was done to include feeding areas, rubbing trees, fences, orchards, marking places, forestry roads or animal paths, until covering the entire study area. Our results showed that samples are spatially clustered for all species (Nearest Neighbor Ratio is 0.28 for bears, 0.38 for wolf, and 0.69 for lynx, at $p < 0.01$). For brown bear, the high number of samples also allowed us to derive hot- and cold-spots of sampling effort. These spatial metrics will prioritize DNA monitoring in the following seasons to obtain a balanced spatial coverage in the context of capture–mark–recapture modeling.

NON-INVASIVE DNA MONITORING OF LARGE CARNIVORES: LABORATORY METHODS AND GENETIC ANALYSES

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Solving the human-wildlife conflict without affecting species conservation status requires reliable data and statistical modelling to assist decisions, however management of large carnivores in the Romanian Carpathians is severely lacking robust population estimates. To monitor large carnivore populations in the Southern Carpathians, we collected between August and May 2017/18 non-invasive samples from a ~1500 km² pilot area. The target species were: *Ursus arctos*, *Canis lupus*, and *Lynx lynx*. A number of 794 bear, 162 wolf and 35 lynx samples, including scat (67%), hair (26%), tissue (0,6%) and urine (5%) were collected based on well-established field protocols in the context of capture recapture modelling, labelled and processed in the laboratory prior to DNA extraction (DNAext). We used DET's buffer and ethanol for preservation, STAR buffer (bear scat) for automatized DNAext, and Qiagen kit for manual DNAext. Samples were amplified in duplicate using multiplex PCR (14 markers) and species-specific microsatellite loci were analysed on an automatic sequencer. After purifying and sequencing (using Illumina Platform), we pooled the amplicons in a library and reached a success rate of over 80%. We used bioinformatics for further identification of individual alleles and compared them to the pattern of the Slovenian population database. Our results show that, at least for wolf samples, it is very likely to have new loci specific to the Romanian population. The advantage of this non-invasive method is that it allows us to obtain individual identification (ID assignment), sex genotyping, family trees, and to do capture-recapture modelling and range pattern analysis, which delivers more comprehensive information for large carnivore management than traditional methods.

SNOW MEASUREMENTS AND AVALANCHE RISK ESTIMATION IN FĂGĂRAȘ MOUNTAINS

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The study presents a statistics and evolution of snow studies and avalanche risk estimation in Făgăraș Mountains over the years. Though the greatest avalanche in Romania happened on April 17, 1977 at Bâlea Lake, with 23 victims, the meteorological station began its monitoring activity only in January 1979, but with no specific snow studies. These started in March 2004, when the National Meteorological Administration program for snow and avalanches was launched. Daily risk bulletins started to be released one year later, in January 2005.

Avalanches in Făgăraș Mountains are quite impressive, especially those on the southern part, causing almost every year major forest damages and victims among wildlife and even human deaths. Avalanche studies and prevention are therefore important for skiers, resort development, as well as for preserving the forest and wildlife.

With only one observational station in the whole massif, avalanche risk estimation was quite a challenge. New techniques and materials have been very helpful along these years, while risk estimation skills were improved. Education of the public and increasing popularity of avalanche risk bulletins has led to good results.

AVALANCHES IN THE PODRAGU VALLEY (FĂGĂRAȘ MOUNTAINS)

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The avalanches in the Făgăraș Mountains represent some of the most important natural phenomena that occur in the winter season. The effects on the components of the environment, tourism infrastructure and human society are complex. This paper presents the areas affected by the avalanches in the Podragu Valley basin, situated in the central part of the northern slope of Făgăraș Mountains, and their influence on a series of tourist routes, which connect the chalets located here. This example is an eloquent one for the northern slope and can be used with success for the whole massif.

THE INDIVIDUALITY OF THE GLACIAR RELIEF IN THE FĂGĂRAȘ MOUNTAINS

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The sharp-edged interfluvials and the massive peaks, the steep slopes, the cirques impressive by their size and surface, the slightly wide but deep glacial valleys are the immediately visible characteristics of the Făgăraș Mountains.

Among the geographers who studied glacial geomorphology, the first to distinguish differences in the glacial morphography in the Carpathians was the French geographer Emmanuel de Martonne (1907), who named them "Fagaras type" and "Borascu type".

The of the density of the glaciated surfaces on the two macroversants is asymmetric: the northern one, with almost no surface that has not been glaciated and the southern one, with large surfaces, whose sliver plans generally lean against the slope surface and have not been glaciated (the southern slope of the Scara Mountain, the south-eastern slope of Buduri Mountain, the southern slope of Bandea Mountain, the southern slope of Lăitel Peak, the south-eastern slope of Mircea Mountain).

The glacial valleys in the Făgăraș Mountains represent another aspect of the asymmetry characteristic of the Fagaras type, both in terms of their length, slope and density differentiated on the two macroversants, as well as in shape. It is well known that the southern valleys are longer (4-8 km, Posea, Popescu, Ielenicz, 1974, even 5-9 km, Urdea, 2004), in comparison with the northern glacial valleys (2-4 km).

SPRUCE MONOCULTURES ALDER GALLERIES IN SUD EASTERN SIDE OF THE FĂGĂRAȘ MOUNTAINS, FACTS, EXPERIMENT AND FOLLOW UP IN MANAGEMENT PLANNING FOR NATURA 2000 SITES

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The expansion of spruce to the altitudes normally occupied by deciduous and mixed forests in the Romanian Carpathians, as an outcome of forest management, has led to changes in the natural structure of these forests. Over time, spruce forests have become vulnerable to destabilizing factors. To reduce the risks generated by these environmental factors, urgent measures to improve biodiversity, increase stability, and reconstruct the natural composition of these monocultures are necessary.

Within the Life Natura LIFE11/NAT/RO/823 project a reconstruction experiment of natural forests was conducted, based on a scientific study elaborated by the Forestry Faculty of Transylvania University. The forest types were remapped, management measures were elaborated, and practical reconstruction measures were applied on 400 hectares of monocultures and 550 hectares of clear cuts.

The Elaboration of the Management Plan for the Natura 2000 site Râul Târgului Argeșel Râușor project is based on the mapping of the forest Natura2000 habitats. The results of habitat mapping and measures proposed for monocultures and degraded Alder habitats are also presented.

ECOLOGICAL RESTORATION OF FOREST HABITATS IN THE DÂMBOVIȚA VALLEY

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The project "Restoration of forest habitats on Dâmbovița Valley in severe erosion areas caused by inadequate logging" is an integrated approach of preparatory studies, technical projects and implementation of relevant activities. The project focused on restoring the forest bed and replanting tree samplings on illegally clear-felled areas, that otherwise would have recovered in a long time. The forest plots were purchased by FCC and used the scientific knowledge obtained through a Life+ project. Fieldwork was conducted in three areas along the Dâmbovița Valley (Richita, Baltatu and Berevoiu).

The forest plots were considered to be part of 9110 Luzulo – Fagetum beech forests habitat with the Romanian classification R4102 *Picea abies* South-Eastern forests.

Therefore, the planting structure included tree species according to the forest management plans. We also studied old forest management plans from the '60s, to see how forest structure has changed during communist times and revive the old forests with deciduous species targeting a rich biodiversity.

MOUNTAIN ECONOMY OR ENVIRONMENTAL PROTECTION? ASSESSMENT, PRIORITY AND NECESSITY. CASE STUDIES: BÂLEA AND CAPRA GLACIAL VALLEYS

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The Bâlea and Capra glacial valleys are two of the most spectacular and important areas from the scientific, tourist and economic point of view of the Făgăraș Massif. Due to the existence of the Transfăgărășan highway, these valleys are visited each year by a large number of tourists, especially during the summer season.

The Bâlea glacial lake and the surrounding alpine area has become a protected area since 1932, constituted by J.C.M. 1149. It is now known as the Bâlea Valley or the Bâlea Lake and the Bâlea alpine area and is classified as IUCN category IV mixed nature reserve (180 ha according to the Law no. 5/2000). It was adopted by the Romanian Nature Monuments Commission and is fully included in the Natura 2000 ROSCI0112 Făgăraș Mountains. However, the anthropic influence through its various economic activities (grazing, uncontrolled tourism, summer transport, temporary and itinerant trade) has a strong impact in both glacial areas, through the degradation of relief, soil and floral alpine structures.

The present paper proposes to synthetically present on the basis of case studies (Bâlea Cascadă and Bâlea glacial lake on the northern slope and Piscul Negru and Capra chalet on the southern slope) the results of the assessment of the current state of the geographic environment by means of modern evaluation methods: the Rapid Impact Assessment Matrix (RIAM), the near and buffer functions of the ArcMap program and the SWOT analysis.

WAYS FOR SUSTAINABLE DEVELOPMENT IN THE AVRIG VALLEY

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The natural component has always required a customization of the Avrig Valley geographic area, which benefits from a diversified natural base. Completed with the anthropic potential, the Avrig Valley enables various forms of tourism: leisure and recreation tourism, agritourism, rural tourism, ecotourism and cycling, scientific tourism, cultural and gastronomic tourism, and silvotourism. For the sustainable development of this area, it is necessary to identify ways to include also the locals: exploiting vital resources for them, carrying out traditional activities of using natural resources by and for the benefit of communities in the area, optimizing the use of human and institutional resources to achieve the objectives of the protected area management plan.

Situated right in the heart of the country, Avrig Valley enjoys a privileged position that could attract a number of advantages. The interest of tourists for outdoor leisure activities, especially when combined with sightseeing (cultural, natural), has led to the adoption of an international concept with a real attraction force. "Greenways" - thematic circuits that involve traveling by non-motorized means - are gradually gaining success in Romania and the organization of such routes in the Avrig Valley is extremely opportune.

HONEY RESOURCES AND ECONOMIC RELEVANCE OF AVRIG CITY (SIBIU COUNTY)

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The work is part of a broader research project on floral honey in Sibiu county. The current study aims at identifying bee plants from Avrig city and its environs. The research was based on both literature and field studies. Direct observations were conducted in the field and plant material was collected. Additionally, a photo database of honeys from the investigated area was compiled and used. 45 species of bee plants were identified, the majority from the spontaneous flora, but also some cultivated species.

The results revealed the flowering heat index (TOC), and average flowering time for each identified species, honey production (kg/ha) and the share of agriculture. The flowering period of these species spans from March to August. In terms of share of honey bee base the identified plant species were divided into four groups. The Avrigului beekeeping area has a favourable climate and diversity of bee plants, thus provides a valuable occupation resource for the locals.

ANALYSIS OF THE HONEY QUALITY OBTAINED FROM A FĂGĂRAȘ MOUNTAINS FARM

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The research preceding this work was carried out within an apiary from Ucea de Jos locality in Brașov county and targeted the description and analysis of the main product, honey. The apiary consists of 220 bee families maintained both in a horizontal apiary system (80 families) and in a vertical apiary system (140 families). The form is pastoral, in the active collection season the daily activities of bees are influenced by the frequently changing environmental conditions. In this paper we aim to highlight the natural qualities of one of the bee products, namely of five honey assortments that have been subjected to laboratory analyzes. As a result of physical and chemical analyzes, it was found that all assortments have normal parameters, none of them being influenced by additives or incentives in the bees' feeding during their harvesting activity.

THE LANDRACE ONION “ROȘIE DE FĂGĂRAȘ”

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“Roșie de Făgăraș” is a red onion landrace originating from the Făgăraș Country historical region, situated in Southeastern Transylvania. It was included in the National Official Catalogue for cultivars and hybrids in 1952, for almost 50 years, and erased before 2004 without applying in situ conservation measures. However, food security depends on the appropriate management of all genetic resources for food and agriculture (PGRFA). Thus, these have to be conserved and sustainably used and efforts must be done for the recognition of this particular landrace as a PGRFA including its inclusion as “under conservation” in the Official Catalogue. The study focused on analysing data from three localities recognized for cultivating “Roșie de Făgăraș” in order to evaluate morphometric characteristics of mature onion bulbs according to the UPOV Standard TG/46/7, productivity, land cultivation and socio-economic vulnerabilities. The results of the morphometric measurements and analysis show that “Roșie de Făgăraș” is a medium size red onion that may have the chance to enter the market, at least at the local scale, according to the current regulatory framework of the European Union regarding the conservation of landraces provided by Directive 2008/62/EC, Directive 2009/145/EC and Directive 2010/60/EU. The analysis of productivity, and land cultivation revealed dramatic land use changes associated with the decline of its cultivation area as following: 76.27% in Mândra, 50% in Recea and 33.34% in Beclean. With an increasing ageing population, lack of political support for entering the market place, decrease of landowners cultivating this genetic resource is threatened with erosion.

FROM NORTH TO SOUTH: COMMUNITY SUPPORT FOR THE PROPOSED NATIONAL PARK

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Establishing a new national park is never a controversy-free endeavour. A first step towards mitigating potential conflicts is understanding the local community members who are affected by the initiative. This research explores the human dimensions of the proposed Făgăraş Mountains National Park (FMNP) from a local community perspective. A questionnaire was distributed using the Drop-Off-Pick-Up method to members of the local communities in and surrounding the current Făgăraş Mountains Natura 2000 areas (SCI Muntii Făgăraş and SPA Piemontul Făgăraş) in five municipalities in the south (n = 321; response rate = 31%) and north (n= 323; response rate = 27%) respectively, between August – November 2018. The questionnaire focused on knowledge regarding conservation in the Făgăraş Mountains; support/opposition for the FMNP; perception of impacts of the FMNP; and acceptability of activity restrictions following the designation of the FMNP.

The questionnaire focused on various aspects related to the proposed FMNP. In this research, acceptability levels of various restrictions (not being able to cut wood; collect berries and mushrooms; herd livestock; fishing; and hunting) are explored between the northern and southern cluster.

LIVELIHOODS AND CONSERVATION: LOCAL COMMUNITY PERSPECTIVES ON FOREST, FIREWOOD AND DEFORESTATION

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Meeting local livelihood needs while achieving conservation objectives is a delicate balance. The communities adjacent to the Făgăraş Mountains are depending on firewood to meet their basic livelihoods; yet conservation objectives focus on protecting the vast amounts of virgin and quasi-virgin forest found in the Făgăraş Mountains. From a local community perspective, two primary issues occur related to the forest in the Făgăraş Mountains. One is related to deforestation, another is regarding the provision of firewood to meet basic livelihood needs. This research draws on results from a mixed-methods study of the communities around the Făgăraş Mountains conducted between September 2017 and November 2018. Fifty qualitative interviews were conducted with various stakeholders and a quantitative questionnaire was distributed using the Drop-Off-Pick-Up method to members of the local communities (n = 644; response rate = 29%) in the study area. We found that the conservation agenda's hope to combat deforestation is in agreement with local community members' perspective. However, firewood makes up a crucial livelihood resource, especially in local communities where there is no access to gas. The conservation value of deadwood is not perceived as important; rather, deadwood is considered to have a high utility for people.

VISITOR ATTITUDES TOWARD NATURE AND NATIONAL PARK ESTABLISHMENT

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National parks exist throughout the world as mechanisms to achieve wildlife conservation, visitor satisfaction and sustainable livelihoods for communities in and near their boundaries. For success, a national park must have the support of residents, key interest groups and the visitors to the area. This human dimension research study explores attitudes and beliefs toward nature and the proposed establishment of a Făgăraș Mountains National Park (FMNP) from a visitor's perspective.

A self-administered questionnaire printed in Romanian, German and English languages, consisting of mainly closed-ended items, was administered in August 2018 to adult visitors (n=418) through an intercept survey at Bâlea Lake, a popular destination while travelling the Transfăgărașan mountain road. The questionnaire consisted of 145 items divided into seven sections. Visitors were asked their attitudes toward what activities would be acceptable in a national park (e.g., sheep grazing, ski development, forestry, camping, etc.), attitudes toward the nature of facilities and infrastructure (e.g., accommodation, restaurants, stores, etc.) appropriate inside the protected area, interest in wildlife viewing and whether the Făgăraș Mountains should become a national park. While most visitors were Romanian (72%), there were more than 22 countries represented in our sample. Approximately 93% of visitors in our study expressed support for the establishment of a national park in the Făgăraș Mountains. Diverse opinions exist however regarding appropriate activities within a protected area. Approximately 70% of visitors support ski development within the Făgăraș Mountains and 60% sheep grazing and more services in the park, thus suggesting potential for conflict lies ahead.

RESIDENT ATTITUDES TOWARD BISON AND BISON MANAGEMENT IN THE FĂGĂRAȘ MOUNTAINS

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European Bison narrowly escaped extinction after more than 200 years of overhunting, habitat loss, degradation, and fragmentation being the primary drivers of the bison decline. Only through systematic breeding programs and increased public support to share space with Europe's largest herbivore has the species recovered to more than 3000 animals creating an exciting opportunity to reintroduce small herds back to the European landscape. A proposed reintroduction of European bison to the Făgăraș Mountains in Romania has created the need to listen and understand resident's views toward the large mammal.

This human dimension study listens to the attitudes and beliefs of those residents (n=116) from Rucăr, Lerești and Sătic, communities closest to the proposed release site. A self-administered quantitative questionnaire consisting of 136 items was designed addressing wildlife attitude values scale (WAVs), perception of risk, wildlife acceptance capacity (WAC) and attitudes toward various management options regarding bison. In addition, the questionnaire documented resident fear of bison and level of tolerance to damage caused by bison.

More than 70% of residents believe that European Bisons have the right to exist in the Făgăraș Mountains. Most residents also expressed a great deal of tolerance of European bison damage before suggesting the animal should be killed. There remains limited knowledge about bison and their possible impacts suggesting the need for targeted educational messages focused on how to keep safe around bison and how to minimize damage to livestock from bison. Interestingly, residents are cautiously supportive of environmental organizations managing the released European Bison.

ARE CARNIVORES CONSIDERED EQUAL AMONG ROMANIAN HUNTERS?

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A ban on trophy hunting of large carnivores in Romania since 2016 has caused emotions and attitudes to run high amongst the Romanian hunter population. Romanian hunters have prided themselves on sustaining a resource whereas in many parts of Europe large carnivore numbers were severely reduced. This Human Dimension study offers hunters a voice in this debate by documenting the attitudes of those hunters in and around the Făgăraş Mountains toward large carnivores, their beliefs about population trends, and their attitudes toward management options regarding large carnivores.

A mixed-methods approach was used to collect data from hunters. Firstly, a self-administered questionnaire was distributed to the various hunting associations to distribute to their members (n=512). The quantitative research instrument consisted of 186 items exploring wildlife value orientations, perceptions of impacts, attitudes, and beliefs toward brown bears, lynx, wolves and the wild cat. This quantitative research offered guidance in the development of the qualitative portion of the research project, where semi-structured interviews were conducted with presidents of the various hunting associations to explore key themes, concerns and explanation of the quantitative results. Potential for Conflict Index₂ (PCI) was used to explore the differences in hunter views across the four species regarding attitudes and management actions. Hunters' attitudes toward the four carnivores do differ; brown bears and wolves are not perceived as positively as wild cat and lynx. Negative attitudes toward bears appear to be the strongest due to the increased damage caused by bears and the inability to control numbers through hunting.

FUTURE WILDLIFE MANAGERS AND FUTURE COMMUNICATION DIRECTORS HOLD DIFFERENT VIEWS ABOUT LARGE CARNIVORES IN ROMANIA

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In Europe, the Romanian Carpathian Mountains have long been synonymous with large carnivores but a ban on trophy hunting of these species has created controversy in Transylvania. We focus on understanding how the attitudes, beliefs and behavioral intentions vary between future communicators (sociology and communication students), and future hunters, foresters and wildlife managers (silviculture students) at the Transilvania University of Brașov toward brown bears, lynx, wolves and the wild cat.

Quantitative data were collected using a self-administered questionnaire consisting of 186 items exploring wildlife value orientations, emotions, beliefs, attitudes, and behavioral intentions toward large carnivores. Questionnaires were administered in university classrooms ensuring 100% response rate from participants. The total respondents (n=350) reflected future communicators (n=180) and future wildlife managers (n=170). Potential for Conflict Index (PCI) was used to display the amount of consensus within the student groups.

T-tests revealed significant differences between the two university groups across existence items, attitudes, lethal management issues, beliefs about numbers and impacts on livestock and trophy hunting issues, but surprisingly no significant differences were found in emotions. Wildlife and forestry students held stronger existence values toward bears, stronger negative perceptions of bear impacts on livestock and crops than sociology and communication students. When it came to trophy hunting issues, silviculture students tended to agree while sociology and communication students disagreed with brown bear trophy hunting. Results suggest the potential for conflict between future professionals in wildlife management regarding large carnivores.

THE CURRENT USAGE OF THE PERMANENT GRASSLANDS ON THE WESTERN PART OF THE LOTRULUI MOUNTAINS

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The grasslands from the alpine and sub-alpine regions of the Lotrului Mountains represent areas of high diversity, being maintained by traditional practices for centuries. Due to their large extent, the economic importance of these grasslands is high. Focusing on grasslands situated in the Western part of Lotrului Mountains, the presentation aims to highlight the current situation and the good use practices of all 632 hectares belonging to Balota, Sărăcinești and Câinenii Mari Communities.

ECONOMIC VALUES OF PROTECTED AREAS. A FRAMEWORK FOR ECONOMIC VALUING

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The natural features of protected areas represent attraction points in many countries due to the various opportunities which they provide (tourism, recreation, agricultural products etc.). However, promoting economic services is not the primary role of most protected areas. Their primary role is the conservation of biodiversity and providing the natural resources which permit communities to meet their various needs. However, the market alone does not support a protected areas framework – therefore society, through its various stakeholders must provide environmental protection as a public service. Breakdown to provide these public services impoverishes the quality of life for individuals and indeed for entire nations.

Identifying the actions which people hold for a protected area may be an important scientific exercise, but in the lack of a framework which embeds the values in a broader context the process remains just an exercise. A structured assessment process gives purpose and direction to a valuation study and for a process that identifies what the values will be used for, which values are important to measure, and which techniques of valuation are most appropriate.

SUSTAINABLE DEVELOPMENT FOR LOCAL AND REGIONAL AUTHORITIES - IN DUMBRAVA NARCISELOR - FĂGĂRAȘ AREA

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The world population has increased, which represents a management challenge for the local communities and authorities to find solutions for implementing the 17 UN objectives, set for the year 2030 and 2050.

Sustainable development is the concept selected by the United Nations as a response to the challenges of the 21st century reflecting their concern regarding the negative outcomes of human/nature interactions. In 1992, the First UN World Congress around this topic took place in Rio de Janeiro. The Local Agenda 21, is the EU's summarized version that introduces the conclusions of the Congress. This management tool was suggested to local communities.

Our organization has been involved since 2003 in various projects in which the UN 2030 Agenda and its 17 Goals of Sustainable Development Goals (ODD) are analysed and implemented. The specific project objectives are found in Goal 8, Goal 11, Goal 13, Goal 16 and Goal 17.

The only solution is developing a scientific system based on the implementation of IMS (Integrated Management System) and the Sustainability Concept. The current administrative culture in the Făgăraș Area makes necessary the implementation of such a system, resulting in scientific - methodological "local strategies", based on sociological investigations, deep, constructive analyses created by the various participants under the coordination of scientists of our institution. The goal is developing a pattern that may be followed by Romanian local authorities. Our activities are conducted in collaboration with the National Institute of Economic Research "Costin C. Kirițescu" and the "Lucian Blaga" University of Sibiu.

USING INFORMATION TECHNOLOGY TOOLS IN SUPPORTING NATURAL PROTECTED AREAS

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The use of mobile phones in collecting and editing field data is beneficial both in terms of decreasing the time spent in the field and ease of data input and manipulation. In the area between Făgăraș, Iezer-Păpușa and Piatra Craiului in an area of approximately 200,000 ha we proposed the use of a mobile application to cover the field activities on Accidental Observation, taking Biological Samples and Monitoring large carnivores (bears, wolves and lynx) and other mammalian species of interest using cameras. In the first year of the project, approximately 1500 records were gathered and stored in the Biological Samples category, approximately 1 000 in the Accidental Observations category, and about 100 sites were monitored using Photo/Video cameras in the Monitoring category. The data entered in the phone automatically synchronizes with a database that can be easily accessed, viewed and edited through a webgis portal using an internet browser. Using smartphone applications in field data collection has plenty of benefits including:

- Ease of data entry and revealing input errors by using drop-down lists, predictive writing, scanning of certain codes to avoid mistakes, automatic insertion of location coordinates.
- It does not require complex data download operations, just press the synchronization button and the data is saved on the server.
- Easily navigate by loading maps that can be used offline as well, allowing the use of various data layers of interest in accordance with the aim of the study.

SOME REFERENCES ABOUT THE EXPLORATION OF THE FĂGĂRAȘ MOUNTAINS

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This paper highlights important moments in the exploration of the "Transylvanian Alps" that created the premises for the development of mountain tourism and the declaration of the first protected areas in Romania.

After 1690 when Transylvania became a province under Habsburg rule, the naturalist movement started to develop, promoted by young Transylvanian Saxons who studied at German universities and scholars from the Empire who were invited to work for the Transylvanian administration. From the end of the 18th century, Sibiu, the administrative center of Transylvania, has played an important role in promoting this movement, especially through the collections, library, financial support and spiritual protection of governor Samuel von Brukenthal (1721–1803).

From mid-19th century the first naturalist societies emerge at Sibiu: Naturwissenschaftlicher Leserverein (Societatea de lectură naturalistă) that became Siebenburgischer Verein für Naturwissenschaften zu Hermannstadt (Societatea transilvăneană pentru științele naturale din Sibiu). The new society printed a periodical (Verhandlungen und Mitteilungen) where several research results from the Făgăraș Mountains were published (ex. the findings of Ferdinand Schur).

In 1881 Siebenburgische Karpaten Verein (Societatea Carpatină Ardeleană) opens the first touristic cabin in the Transylvanian Alps at Negoiu Peak. S.K.V. makes a lot of efforts to promote mountain tourism by building huts, opening new trails, training local guides, organizing mountain rescue teams (Alpine Rettungstelle). In the S.K.V. Jahrbuch some of the members (ex: Julius Romer, E.A. Bielz etc) publish scientific articles about the Făgăraș Mountains.

At 8 April 1938 Bâlea Valley became a nature reserve, under the supervision of Central Commission of Nature Monuments represented by S.K.V. Sibiu.

FARMERS' MARKET AND FARM VISITS – PARTS OF SUSTAINABLE LOCAL DEVELOPMENT. CASE STUDY - SIBIU AND BRAȘOV COUNTIES

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This work presents the events meant to promote Sibiu as a European Gastronomic Region. The collection of data from local public authorities, local farmers and operators from traditional local gastronomy was carried out. The participation in different gastronomic events organized in the countryside allowed us to observe the number of local farmers involved in these events. Also, the paper presents as study case three open farms which produce local or traditional food. Local gastronomy products have also been identified, both at different gastronomic events or in open farms.

The potential to contribute to rural development and sustainable livelihoods, support for the agricultural and artisan food sectors and reduced economic leakage in the tourism sector are just a few of the positive outcomes. Tourists also benefit through the opportunity to experience authentic local culture and heritage and engage in a meaningful way with local producers and suppliers. Agritourism differs from food tourism in that agritourism is inherently rural, while food tourism is predominantly urban, but can be rural as well. The paper shows the role of farmers' markets and farm visits like parts of sustainable tourism.

ASPECTS REGARDING THE EXPLOITATION OF THE ROMANIAN BĂLȚATA BREED IN THE CENTER REGION

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The paper presents the evolution of cattle herds in the counties of the center region of Romania, namely as following: Alba, Brașov, Covasna, Harghita, Mureș and Sibiu. An insight into the history of the Romanian Bălțată cattle breeding is presented underlining their use either for milk or for meat lines. The "demanded type" of the Romanian Bălțată cows is presented, as well as the main objectives aimed at improving the breed. A numerical evolution of the breed in the last five years is presented in terms of official recognition for the farmers, registering into the genealogic register of the breed as well as the official controls dedicated for productions and the evolution of exploitations under monitoring. The poster is also discussing the breeding objectives as well as tendencies related to its integration in the current breeding programmes. The maintenance of this autochthonous race is depending a lot on the commitment of the farmers as well as on the open opportunities to become part of national or regional breeding programmes. Moreover, these endeavours should be included into an official monitoring programme together with the results in order to further support its conservation and sustainable use.

ECOLOGICAL, PHYTOSOCIOLOGICAL AND BIOTECHNOLOGICAL STUDY OF THE RELICT SPECIES *LIGULARIA SIBIRICA* (L.) CASS

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Day by day many plant species tend to adapt or migrate for optimal ecological conditions that can determine the population's survival. The successive climatic oscillations led to the migration of a large number of species during the glacial periods. Among these species we can find the relict species of community importance *Ligularia sibirica* (L.) Cass.

The main objective of this paper is to present the conservation importance of *Ligularia sibirica* (L.) Cass., from ecological, phytosociological and biotechnological point of view. In order to achieve the main objective, it was necessary to gather information related to the geographical and ecological distribution of the studied species. The obtained data was completed by the study of the qualitative and quantitative structure of the integrative phytocoenoses, combined with the analysis of the environmental factors which can influence the conservation of these relict species, combined with the identification of the biological compounds with medicinal properties obtained from *Ligularia sibirica* (L.) Cass. extracts. This study led to the determination of the protective conditions necessary for the species conservation in the studied habitats. At the same time this study has led to the identification of the tolerance parameters for the drought and salinity conditions necessary for a possible introduction into culture of *Ligularia sibirica* (L.) Cass., justified by the presence of the chemical compounds with applicability in the medical field.

PRIORITY NATURAL HABITATS OF COMMUNITY INTEREST OF LEAOTA MOUNTAINS, ROMANIA

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In 2016 an inventory of the natural habitats from Leaota Mountains was conducted. The itinerary research method was used, establishing certain routes to cover different types of ecosystems characterized by various vegetation formations and different relief forms.

23 types of Natura 2000 habitats and 4 natural habitats according to the Romanian classification system were identified in the Leaota Mountains area. Six of these are priority natural habitats of community importance: 4070* Bushes with *Pinus mugo* and *Rhododendron hirsutum* (Mugo-Rhododendretum hirsuti), 6230* Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and sub-mountain areas, in Continental Europe, 7220* Petrifying springs with tufa formation (Cratoneurion), 8160* Medio-European calcareous scree of hill and montane levels, 91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae), 9180* Tilio-Acerion forests of slopes, screes and ravines.

The field work was financed by Foundation Conservation Carpathia.

HABITAT IDENTIFICATION AND MAPPING IN THE LEAOTA AREA

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The Leaota region shelters a very high number of species and habitats on a surveyed area of over 25,000 ha. The region holds many important Natura 2000 elements worth protecting, according to the Romanian and the European laws.

The habitats were inventoried and evaluated along transects that crossed the main habitat types and sectors of the researched area. The vegetation composition was analysed in standard sample plots along the selected transects.

We identified a total of 24 habitat types (forests, meadows, shrubs, rivers, wetlands) included in Annex 1 of the EU Habitats Directive. These protected habitats cover over 70% of the Leaota area, a very high percentage compared to the surrounding national and natural parks. We mapped the spatial distribution of the habitats using the most current aerial imagery and conducted basic spatial analyses in an ArcGIS environment. The largest area is covered by the habitat 91V0 (12,460 ha) and 9410 (8306 ha). The smallest cover is represented by the scattered habitats along the rivers or over the alpine area.

At this moment, only a small part of the Leaota region is legally protected - 6,512 ha - according to the Romanian/European laws. The remaining 18,905 ha have no special protection status. The presence of large areas of Natura 2000 habitats, based on the results of this field survey and recent scientific literature, justify the designation of this area as a new Natura 2000 site, in order to achieve a better legal protection status for the entire region.

THE CONSERVATIVE VALUE OF ECOSYSTEMS FROM THE LEAOTA MOUNTAINS, ROMANIA, USING AN INVENTORY STUDY OF SOME INVERTEBRATE GROUPS

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In 2016, in Leaota Mountains, an inventory of the invertebrate fauna was conducted. 92 transects and 18 pitfall traps were investigated. The transects were established in various types of ecosystems and habitats: natural forest with *Picea abies*; planted forest with *Picea abies*; deciduous forest (*Picea abies*, *Fagus sylvatica*); deciduous forest (*Picea abies*, *Fagus sylvatica*, *Abies alba*, *Populus sp.*, *Betula sp.*); edge of forest with *Picea abies*; forest with *Fagus sylvatica*; riparian area; forest edge; riparian area; mountain meadows; forest in natural regeneration (*Betula sp.*, *Fagus sylvatica*); scree/edge of deciduous forest; boreal-alpine pasture with bushes and cut forest with *Picea abies*. 408 invertebrates were identified: 26 gastropods (Gastropoda), 9 millipedes (Miriapoda), 78 spiders (Aranea), 52 mites (Acari-Mesostigmata), 29 orthopterans (Orthoptera), 170 beetles (Coleoptera) and 44 butterflies (Lepidoptera). According to Council Directive 92/43/EEC of 21 May 1992, seven are species protected at European level, as following: *Carabus variolosus* Fabricius, 1787; *Lucanus cervus* (Linnaeus, 1758); *Morimus funereus* Mulsant, 1863; *Rosalia alpina* (Linnaeus, 1758); *Pholidoptera transsylvanica* (Fischer von Waldheim, 1853); *Euplagia (Callimorpha) quadripunctaria* (Poda, 1761) and *Lycaena dispar* (Haworth, 1803). According to IUCN criteria and to species vulnerability on national level, the 408 identified invertebrate species were classified as follows: 55,12% not threatened species (NoT); 42,26% species with data deficient (WD); 1,96% vulnerable species (VU); 0,24% critically endangered (CR), 1,71% near threatened species (NT); 0,49% endemic species for Romania and 0,98% rare species. The high conservative value of the investigated ecosystems is due to the presence of Community interest species (7), endemic (4), rare (3), indicator (14), relict species (2) and national protected ones (7).

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BIRD SPECIES OF THE LEAOTA MOUNTAINS, ROMANIA

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An inventory of the bird species from Leaota Mountains was conducted between the May 1 and September 31, 2016, through a project supported by Foundation Conservation Carpathia. 86 species were observed in the area, with the exception of low-level orchards, meadows and human settlements, out of which 17 species (*Aquila chrysaetos*, *Pernis apivorus*, *Milvus migrans*, *Circus aeruginosus*, *Falco peregrinus*, *Tetrao urogallus*, *Bonasa bonasia*, *Crex crex*, *Strix uralensis*, *Picus canus*, *Dendrocopos leucotos*, *Picoides tridactylus*, *Dryocopus martius*, *Lullula arborea*, *Lanius collurio*, *Ficedula albicollis* and *Ficedula parva*) are protected, being included in the Annex I of the Birds Directive. 81 species were identified in the breeding season. Some considerations regarding the distribution of the identified species depending on the main types of ecosystems, the dynamics, the role of the birds as bioindicators, etc. are also made.

IDENTIFICATION, CHARACTERIZATION AND CLASSIFICATION OF LANDSCAPES IN PUTNA-VRANCEA NATURAL PARK

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Understanding the environment, especially within a natural park, requires a thorough knowledge of its components. Starting from this premise, the present paper proposes a quantitative and qualitative analysis of the defining constituent elements of the geographic landscape, which are prioritized according to their patrimonial value, taking into account their direct contribution to the structure and functionality of the landscape. The choice of methods of analysis was made taking into account the specific characteristics of Putna Vrancea Natural Park. Recent studies integrate all elements of the geographic framework into a distribution, based on the ABC (abiotic-biotic-cultural) model. The purpose of the paper is to apply the ABC model and exemplify it in through the study of the Putna-Vrancea Natural Park. The working methodology was based on the collection of data from vectorized themed maps. Thus, a cartographic database has been created, the processing of which is characteristic of the landscape information systems. The qualitative assessment of the landscape is based on the visual evaluation sheet proposed for Romania. From the ABC model perspective, additional information on geology, climate, soil, hydrography and vegetation provides further details regarding these classes of landscape functionality by subdividing them into sub-types. The models obtained were validated on the basis of field observations.

