

BIODIVERSITY CONSERVATION IN BUDA AND RÂIOSU MOUNTAINS, FĂGĂRAȘ MASSIF

DANIELA ILEANA STANCU

Argeș County Museum, 44 Armand Călinescu Street, 110047, Pitești, Argeș County, Romania,
e-mail: stancuileana@yahoo.com

ABSTRACT. In the paper we presented plants and community interest habitats from Râiosu and Buda Mountains, Făgăraș Massif. The conservation of species, particularly those in danger of extinction, forms one of the basic elements of biodiversity conservation. Not surprisingly, the largest families contain the largest number of species. The rate of man-made extinction at planetary level is high enough to be called catastrophic. Every year, tens of thousands of species are disappearing from our planet and the intensity of the extinction process is much higher. It is essential to make the complete inventory of the component of the flora of any mountain for conservation and sustainable use. This fact requires an efficient management of the mountains where they vegetate.

Keywords: conservation, flora biodiversity, extinction, Râiosu and Buda Mountains.

REZUMAT. Conservarea biodiversității din munții Râiosu și Buda, Masivul Făgăraș. În lucrare sunt prezentate speciile de plante și habitatele de interes comunitar din munții Râiosu și Buda, Masivul Făgăraș. Deloc surprinzător, familiile cele mai mari conțin cel mai mare număr de specii de plante. Rata extincției provocate de om la nivel planetar este destul de mare astfel încât să o putem numi catastrofală. În fiecare an sute de mii de specii dispar de pe planetă și intensitatea procesului de extincție este mare. Este esențial să se realizeze inventarul complet al plantelor din fiecare munte pentru conservarea și folosirea lor pe termen lung. Acest fapt necesită un management eficient al munților unde acestea vegetează.

Cuvinte cheie: conservare, biodiversitatea florei, extincție, munții Râiosu și Buda.

INTRODUCTION

Carpathian's flora have been studied by generations of Austrian, Czech, Slovakian, Polish, Hungarian, Romanian, and Ukrainian botanists. These studies are summarized in a number of documents including Checklists and Keys, some of which are complete, and some of which are still in preparation.

It can now be asserted that the native flora of the Carpathians is among the richest on the European continent. Făgăraș massif is individualized in the Carpathian chain as an extended peak, which runs from east to west on a length of about 70 km, developing at a width of about 40 km. Făgăraș Mountains are

individualized by accentuated massiveness, typical alpine relief with peaks reaching the maximum altimetric elevations of Romania's relief: Moldoveanu 2,544 m and Negoiu 2,535 m.

MATERIALS AND METHODS

The conservation of species, particularly those in danger of extinction, forms one of the basic elements of biodiversity conservation. The lifespan of a species is not unlimited. Over a period of millions of years, species either become extinct in the ever - changing environment or develop into new distinctive forms. It is assumed that in natural conditions at least one species per year becomes extinct for purely natural reasons.

This situation has rapidly changed today, with people altering the biosphere and pushing an uncountable number of species to the verge of extinction. The rate of man-made extinctions is high enough to be called catastrophic. Every year, tens of thousands of species are disappearing from our planet and the intensity of the extinction process is much higher.

RESULTS AND DISCUSSIONS

Bearing in mind that we have so far described less than 2 million species globally - only a 10% to 15% fraction of total world species diversity - the majority of extinct forms are not known and never will be known to science.

Progress in ecology and related sciences, including conservation biology, has proven that mountain areas are of particular value for human beings. These ecosystems are key sources and reservoirs of freshwater. The specific micro- and meso-climates of mountain areas play an important role in diminishing the global greenhouse effect.

Vast complexes of mountain forests are vital for the timber production industry. Moreover, in the past several decades, mountains have become the main areas for the rapid development of tourism and recreation. First and foremost, however, mountains host a unique variety of species, many of which are rare, vulnerable or threatened. All over the world, mountains are the sites of continental or regional species diversity hot spots.

Făgăraș massive is the one that preserves the largest surface sculptured by glaciers in the Southern Carpathians. The alpine area was periodically located in Pleistocene above the limit of permanent snow and had sufficient rainfall to supply the glaciers. Structurally there are circulars and glacial valleys. The Nordic slopes with an accentuated gradient have limited the development of the glaciers in length, while the south and the long valleys have allowed the formation of valley glaciers over 7 km in length. Glacier circles differ in appearance and complexity.

The southern slopes offer numerous examples of hanging cirques, the most spectacular being on the western side of the Arpașu Mic - Buda - Râiosu -

Mușeteica summit, connected with the steep corridor of the Capra Valley, previously occupied by the glacier tongues.

With all the floristic importance of the southern sector of the Făgăraș Mountains revealed by the research conducted by Al. Buia and I. Todor in 1947 the floral investigation of the Râiosu and Buda Mountains was delayed and the phytosociological studies were completely absent.

To a large extent, the geobotanic researches in the limestone sector of the Făgăraș massif have encountered both access and cantonment difficulties. These have also been added to the avalanche difficulties that blocked the various ways of access, even during the summer.

The purpose of the researches carried out during the period 1996-2005 in the Râiosu and Buda Mountains, the Făgăraș Mountains, was the inventory of the flora in this region, together with the ecological, cariological, cenological characterization and the statistical study of the bioforms and geoelements as well as the identification and characterization of the plant associations.

An attempt was made to present a complete picture of the flora and vegetation of this territory, to provide a comparative basis for future similar research and to broaden the knowledge horizon of the vegetal carpet in our country.

The glacial valleys in the south have a length of 6 to 7 km, a sinuous tract with branches that flow from the tributary valleys. The most extensive are Capra and Buda valleys, formed in glacial valley complexes.

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 with 2,431 m altitude separates at the north Buda Lake at 2,055 m altitude. The lake occupies an area of 0.86 ha; it has a triangular shape, the maximum depth being 2.2 m. The Buda Valley, originated in the Buda Heathrow, flows south, digging into the limestone a key called the Gegiu Key with hardly accessible walls. At the foot of the Buda Mountain, the valley of the same name goes through 18 km until it flows into the Vidraru reservoir. Alongside it there are various tributaries including the Râiosu stream.

The other one is Râiosu Mountain, 2,395 m altitude, which is 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.

Lake Râiosu occupies an area of 0.15 ha and is maintained only during rainy periods. It is situated in the southern part of the massif, in the eastern part of the Arpașul Mic - Buda - Mușeteica ridge, at 2,180 m altitude, in the glacier circle dominated to the west by Mușeteica Peak and to the east by Râiosu peak.

This is probably the area with the most spectacular scenery in the Făgăraș Mountains. The lake is in an advanced state of clogging due to rock disaggregation processes and its transport to the snow and ice masses. In summer, it is very often covered by frozen snow. Access to this lake is very difficult, with no marked trail. The limestone from the Râiosu and Buda Mountains are home for a series of

calciphile vegetal associations that, despite their location in these mountains, remain representative for the Romanian Carpathians.

The numerous endemites and relicts of these vegetal groups, attest to the great vegetation of this limestone mass, surviving the catatherm extremes of the glaciations due to the thermal characteristics of the limestone substrate. 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 2,300-2,400 m altitude, functioned as a true "nunatak" that was discovered by the glacier and was able to facilitate the preservation of this rich flora in endemics and relicts.

The flora of these two mountains includes a wide variety of phytogeographical elements, caused by the altitude variations between 600 and 2,431 m. On the background of the Eurasian elements (which predominantly prevail in the studied territory), European, Circumboreal, Central European, there are the Carpathian endemites, the Carpatho - Balcanic elements and Alpic - Carpathian, representing 18% of the flora of these mountains.

In the Râiosu and Buda Mountains there were identified 135 rare, vulnerable or endangered taxa.

There are: 11 Endangered taxa (*Achillea oxyloba* (DC.) SCHULTZ-BIP. ssp. *schurii* (SCHULTZ-BIP.) HEIMERL), *Alopecurus laguriformis* SCHUR, *Armeria maritima* WILLD. ssp. *alpina* (WILLD.) P. SILVA, *Centaurea kotschyana* HEUFF., *Centaurea pinnatifida* SCHUR, *Gentiana lutea* L., *Iris aphylla* L., *Kobresia myosuroides* (WILL.) FIORI, *Leontopodium alpinum* CASS., *Nigritella nigra* (L.) REICHENB.); 1 Critically Endangered taxa (*Salix alpina* SCOP.); 4 Vulnerable or rare Taxa (*Campanula transsilvanica* SCHUR, *Erigeron nanus* SCHUR, *Galium lucidum* ALL., *Rhododendron myrtifolium* SCHOTT & KOTSCY); 6 Vulnerable taxa (*Angelica archangelica* L., *Aquilegia nigricans* BAUMG., *Daphne cneorum* L., *Juniperus sabina* L., *Nigritella rubra* (WETTST.) K. RICHTER, *Oxytropis carpatica* UECHTR.) and 113 Rare taxa.

There are also 20 restricted range endemic species (*Achillea oxyloba* (DC.) SCHULTZ-BIP. ssp. *schurii* (SCHULTZ-BIP.) HEIMERL), *Aconitum moldavicum* HACQ. ex REICHENB., *Centaurea pinnatifida* SCHUR, *Cerastium transsilvanicum* SCHUR, *Dianthus spiculifolius* SCHUR, *Onobrychis montana* DC. ssp. *transsilvanica* (SIMK.) JAV., *Ranunculus carpaticus* HERB., *Festuca bucegiensis* MARKGRAF-DANNENBERG), 8 Carpathian endemic species (*Campanula carpatica* JACQ., *Dianthus henteri* HEUFF. ex GRISEB. et SCHENK, *Leucanthemum waldsteinii* (SCHULTZ-BIP.) POUZAR, *Silene nutans* L. ssp. *dubia* (HERB.) ZAPAL., *Veronica baumgartenii* R. & S.) and 7 Carpatho - Balkan endemic species (*Carduus kernerii* SIMONKAI ssp. *KERNERI*, *Centaurea kotschyana* HEUFF., *Doronicum carpaticum* (GRISEB. & SCHENK) NYM., *Gypsophilla petraea* (BAUMG.) REICHENB., *Sesleria bielzii* SCHUR, *Thlaspi dacicum* HEUFF., *Viola dacica* BORB.).

The following families have the highest percentage in threatened taxa: Asteraceae (15%), Orchidaceae (12%), Caryophyllaceae (12%), Poaceae (10%),

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Ranunculaceae (6%), Brassicaceae (6%), Fabaceae (5%), Primulaceae (5%), Scrophulariaceae (5%), Campanulaceae (5%).

This list of threatened vascular plants in the Râiosu and Buda mountains is the first attempt to assess the conservation status of the flora of this natural geographic unit.

Also, we described 21 community interest natural habitats in the Râiosu and Buda mountains, Făgăraș Massif. 13 of these are habitats with high conservation value as follow: Southern Carpathian dwarf azalea heaths (*Loiseleuria procumbens* (L.) Desv., South-Eastern Carpathian heaths with *Rhododendron myrtifolium* SCHOTT & KOTSCY and *Vaccinium myrtillus* L., South-East Carpathian bushes with pine scrub (*Pinus mugo* Turra) and alpenrose (*Rhododendron myrtifolium* SCHOTT & KOTSCY), *Dryas octopetala* L. dwarf heaths, South Carpathian grasslands with *Sesleria rigida* Heuffelssp. *haynaldiana* (Schur) Beldie and *Carex sempervirens* Vill., South Carpathian grasslands with *Carex sempervirens* Vill. and *Sesleria bielzii* Schur, Springs and streams South-East Carpathian communities with *Doronicum carpaticum* (Griseb. et Schenk) Nyman, *Saxifraga aizoides* L., *Chrysosplenium alpinum* Schur and *Achillea oxyloba* (DC) SCHULTZ-BIP ssp. *schurii* (SCHULTZ-BIP) HEIMERL), South-East Carpathian communities of mobile or semi-fixed siliceous scree with *Oxyria dygina* (L.) Hill, South-East Carpathian communities of semi-fixed siliceous scree with *Saxifraga bryoides* L., *Silene acaulis* (L.) Jacq. and *Veronica baumgartenii* R. & S., South-East Carpathian communities of mobile or semi-mobile calcareous scree with *Papaver alpinum* L. ssp. *corona sancti-stephani* (Zapal) Borza, *Cersatiumarvense* L. ssp. *lerchenfeldianum* (Scur) Ascherson et Graebner and *Cerastium transsilvanicum* SCHUR.

CONCLUSIONS

Mountains host a unique variety of species, many of which are rare, vulnerable or threatened. All over the world, mountains are the sites of continental or regional species diversity hot spots.

Râiosu and Buda Mountains from Făgăraș Massif are home to many rare, vulnerable or threatened plants. There can be no doubt that further field investigations on the populations of threatened plants would provide new data on which to base a more specific estimation of the conservation status of threatened plant species. Their eventual extinction in the Făgăraș Massif would be a great loss not only to regional Carpathian flora but also to world flora.

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