

## THE IMPORTANCE OF CONSERVATION OF BILBOR SWAMPS

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**ABSTRACT.** This paper is the result of the study of the conserving importance of Bilbor swamps, due to the existence in the territory of many high value glacial relicts. Glacial relicts, from eutrophic with oligotrophic intrusions swamps were taken into study as: *Ligularia sibirica* (L.) Cass., *Pedicularis sceptrum-carolinum* L., *Swertia perennis* L., *Carex diandra* Schrank, *Carex appropinquata* Schumach. and more. Vegetal species which build or are included in three associations that belong to the same class *Scheuchzerio-Caricetea nigrae* (Nordh. 1937) Tx. 1937 are: *Caricetum diandrae* Jon. 1932 em. Oberd. 1957 (Syn.: *Carici-Menyanthetum caricetosum diandrae* Rațiu 1972), *Carici flavae-Eriophoretum latifolii* Soó 1944 and *Carici flavae-Blysmetum compressi* Coldea 1997. By Habitats Directive these associations are classified into different types of priority habitats with high conservation value: Alkaline fens and Transition mires and quaking bogs.

**Key words:** Bilbor, eutrophic swamps, glacial relicts, habitat.

**REZUMAT. Importanța conservării mlaștinilor Bilborului.** Prezenta lucrare constituie rezultatul studiului privind importanța protejării Mlaștinilor Bilborului, datorită existenței în teritoriu a relictelor glaciare de o mare valoare. Au fost luate ca studiu relicele glaciare din mlaștinile eutrofe, precum: *Ligularia sibirica* (L.) Cass., *Pedicularis sceptrum-carolinum* L., *Swertia perennis* L., *Carex diandra* Schrank, *Carex appropinquata* Schumach. etc., specii vegetale ce edifică sau sunt incluse în trei asociații ce aparțin clasei *Scheuchzerio-Caricetea nigrae* (Nordh. 1937) Tx.1937: *Caricetum diandrae* Jon. 1932 em. Oberd. 1957 (Syn.: *Carici-Menyanthetum caricetosum diandrae* Rațiu 1972), *Carici flavae-Eriophoretum latifolii* Soó 1944 și asociația *Carici flavae-Blysmetum compressi* Coldea 1997. Prin Directiva Habitate, aceste asociații sunt încadrate în două tipuri de habitate prioritare cu o valoare conservativă mare, respectiv foarte mare: Mlaștinile turboase de tranziție și turbării mișcătoare și Mlaștini alcaline.

**Cuvinte cheie:** Bilbor, mlaștini eutrofe, relice glaciare, habitate.

## INTRODUCTION

Mountain valleys in Romania are great subject of study both past and present for biologists, geologists, economists and ethnographers. **Inter-Carpathian swamps, especially eutrophic ones are the richest conservative of glacial relicts** (Pop, 1858), as in this situation Bilbor swamps, requiring constant observation and conservation. Bilbor valley, located in Harghita County is part of

the Central Group of Eastern Carpathian mountains, situated in the region of meeting of crystalline-Mesozoic area of Bistricioara Mountains with Neocene eruptive of Calimani Mountains, representing one of the highest valleys of the Romanian Carpathians, 880-900 m. Bilbor belongs to the type of tectonic and volcanic valleys or volcanic dam, being drained by tributaries of the upper basin of Bistricioara river.

Bilbor swamps are part of the trigeminal eutrophic swamps Drăgoiasa-Bilbor-Borsec, have approximately 100 km<sup>2</sup> area, covered randomly by 8 main individualized swamps, which three are directly influenced by mineral springs.

### MATERIALS AND METHODS

To achieve the objective was necessary to describe researched area from **Ocotirea Naturii** (Pop, 1958) and PhD thesis **Componenta nordică a ulucului depresionar (Drăgoiasa-Glodu-Bilbor-Borsec-Corbu-Tulgheș)** (Tofan, 2012). The identification of relict species was made from: **Ocotirea Naturii** (Pop, 1958), **Vegetația României** (Doniță et al., 1992), **Carici remotae-Calthetum laethae Coldea (1972) 1978 ligularietosum sibiricae nova subass. in the Brusturet Gorges (Piatra Craiului)** (Alexiu & Stancu, 2003), **Flora și vegetația Văii Gurghiului** (Sămărghișan, 2001). Coenotic integration was made using **Les associations vegetales de Roumanie** (Coldea et al., 1997). For the study of the habitats and special areas for protection was used: **Arii speciale pentru protejarea și conservarea plantelor în România** (Sârbu, 2007), **Habitatete și situri de interes comunitar** (Drăgulescu & Schneider, 2005), **Habitatetele din România** (Doniță et al., 2005), **Manual de interpretare a habitatelor Natura 2000 din România** (Gafta & Mountford, 2008) and **Catalogul habitatelor, speciilor și siturilor Natura 2000 in România** (Bădărău et al., 2013).

### RESULTS AND DISCUSSIONS

Bilbor swamps are eutrophic with small oligotrophic areas, divided in two categories: the meadows swamps, uninfluenced or influenced by mineral waters (Pârâul Rușilor swamp, Lunca Bistricioarei, Tifreni and Bilborăș swamp) and swamps with mineral water (Sub Sasca, Pârâul Bilborului Mare and Pârâul Dobreanului). One particular thing that makes Bilbor swamps special is the presence of mineral springs that burst on many fracture lines, loaded with calcium carbonate which dissolves in contact with dolomitic layers, producing slag or massive slabs of travertine. Mineral waters soaked partially swamps territory, even if they were formed in conjunction with most common infiltration water.

Other factors such as climate, soils, also contributed to the preservation of glacial relicts up today. The cold climate of Bilbor valley is part of temperate-continental transition climate specific to intermountain areas; which is another cause of retrieval in this field of many vegetal glacial relicts. The temperature is constant in those springs without ponds, is between 9.5 to 9.75 °C and in those

springs which collect water in basins the temperature is between 11-15 °C. The springs which contain CO<sub>2</sub> are acidic with a pH value between 5.9 and 6.3 or slightly alkaline pH value ranging between 7.9 and 8.5, due to calcium carbonate is resulting formation of travertine deposits, depending of their distance to the springs, peat has variable pH value. Average annual rainfall is between 700 to 800 mm. The types of soil found in the eutrophic wetlands are hydrate-soils, litomorph, proti-soils and histic-soils, the rest of the Bilbor area is covered by district cambisole.

In Bilbor valley respectively Bilbor swamps there is a huge complex variety of plant species, glacial relicts are combined with today's climate appropriate plant species, grouped in several associations like *Scirpo-Phragmitetum*, *Caricetum (fuscae) nigrae*, *Carici-Menyanthetum* and *Deschampsietum caespitosae*, *Caricetum diandrae*, *Carici flavae-Eriophoretum* and association *Carici flavae-Blysmetum compressi*. It has been taken to study the last three associations that are part of *Scheuchzerio-Caricetea nigrae* (Nordh. 1937) Tx. 1937 class, these tree associations contain relict species with a significant conservation value: *Ligularia sibirica* (L.) Cass., *Pedicularis sceptrum-carolinum* L., *Swertia perennis* L., *Carex appropinquata* Schumach. etc.

Association *Caricetum diandrae* Jon. 1932 em. Oberd. 1957 (Syn.: *Carici-Menyanthetum caricetosum diandrae* Rațiu 1972) belongs to the order *Scheuchzerietalia palustris* Nordh. 1936 and to the *Caricion lasiocarpae* Vanden Bergh ap. Lebrun et al. 1949 alliance. This association is characteristic of a mesotrophic habitat with moderate content of organic substances and a fairly big presence of calcium ions, the peat layer reaction at surface is alkaline. *Carex diandra* Schrank is the characteristic species of the association along with other important species: *Carex nigra* (L.) Reichard, *Menyanthes trifoliata* L., *Eriophorum angustifolium* Honck., *Ligularia sibirica* (L.) Cass., *Pedicularis palustris* L., *Carex rostrata* Stokes, *Dactylorhiza incarnata* (L.) Soó, *Eriophorum latifolium* L., *Bryum pseudotriquetrum* (Hedw.) Gaertn., Mey. & Scherb., *Drepanocladus vernicosus* (Mitt.) Warnst., *Saxifraga hirculus* L., *Comarum palustre* L., *Sphagnum angustifolium* (C. Jens. ex Russ.) C. Jens., *Galium palustre* L., *Equisetum fluviatile* L., *Valeriana simplicifolia* Kab.

The association *Carici flavae-Eriophoretum latifolii* Soó 1944 belongs to the order *Tofieldietalia* Prsg. ap. Oberd. 1949 and to *Caricion davallianae* Klika 1934 alliance. The present association is also located in habitats of southeastern Carpathian eutrophic swamps, on soils rich in organic substances and calcium carbonate, with a less acidic or with a neutral reaction (pH 5.8-6.8). Floristic composition of the association contains two edifying species: *Carex flava* L. and *Eriophorum latifolium* Hoppe, with the characteristic species: *Eriophorum latifolium* Hoppe, *Schoenus nigricans* L., *Carex davalliana* Sm., *Blysmus compressus* (L.) Panz., associated with other important species: *Carex nigra* (L.) Reichard ssp. *nigra*, *Molinia caerulea* (L.) Moench, *Salix rosmarinifolia* L., *Carex gracilis* Curtis, *Carex appropinquata* Schumach., *Juncus compressus* Jacq., *Juncus inflexus* L., *Valeriana simplicifolia* Kab., *Carex panacea* L., *Pinguicula vulgaris*

L., *Parnassia palustris* L., *Epipactis palustris* (L.) Crantz, *Carex lepidocarpa* Tausch., *Swertia perennis* L., *Carex distans* L., *Dactylorhiza maculata* (L.) Soó, *Tofieldia calyculata* (L.) Wahlenb., *Dactylorhiza incarnata* (L.) Soó.

*Carici flavae-Blysmetum compressi* Coldea 1997 association belongs to the order *Tofieldietalia* Prsg. ap. Oberd. 1949 and to the *Caricion davallianae* Klika 1934 alliance. Is found on the surface of southeast Carpathians eutrophic swamps with an alkaline reaction pH value is 7.5. Floristic composition of this peat habitat edified by *Blysmus compressus* (L.) Panz. and *Carex flava* L., complemented by species: *Juncus compressus* Jacq., *Carex nigra* (L.) Reichard ssp. *nigra*, *Gymnadenia conopsea* (L.) R. Br., *Juncus effusus* L., *Juncus inflexus* L., *Valeriana simplicifolia* Kab., *Carex panacea* L., *Epipactis palustris* (L.) Crantz, *Swertia perennis* L., *Carex distans* L., *Dactylorhiza maculata* (L.) Soó, *Pinguicula vulgaris* L., *Eriophorum angustifolium* Honck., *Juncus articulatus* L., *Triglochin palustre* L., *Carex echinata* Murray, *Pedicularis sceptrum-carolinum* L., *Pedicularis palustris* L., *Ligularia sibirica* (L.) Cass., *Carex diandra* Schrank.

The importance of Bilbor swamps is the presence on the territory of many glacial relicts, those that survived glaciation, which sometimes are growing in huge densities on the eutrophic swamps: *Carex appropinquata* Schumach. - widespread in central and northern Europe, forming associations in the Bilbor swamps region, isolated descending to the Balkans and Caucasus; *Carex diandra* Schrank - can be seen in Pârâu Dobreanului and Sasca, being a boreal species that descends more and more to the south of the country; *Swertia perennis* L. - a glacial relict spread in Eurasian boreal zone, rarely in our country, reaching the southern limit on the Carpathians longitude; *Ligularia sibirica* (L.) Cass. - glacial relict, representing an subarctic Siberian element with the southern European limit at Brusturet Gorges in Piatra Craiului National Park; *Pedicularis sceptrum-carolinum* L. - an impressive glacial relict, with acanthine rosette of large leaves and his scepter shaped stern flourished, is one of the most attractive of the Bilbor swamps, is a north European-Siberian element that has its southern limit of its world area at Harman swamp.

The main activities in this region leading to the destruction of vegetation are overgrazing, drainage works and uncontrolled deforestation. To prevent the biodiversity damage through the anthropogenic activity and also climate changes, the Natura 2000 network through Habitats Directive requires specific standards of conservation for each type of habitat. According to the first Annex of the Habitats Directive, alpine bioregion from the studied area, have the next types of bogs and wetlands habitats: active raised bogs, alkaline fens and transition mires and quaking bogs. All three types of habitats have a high conservation value as priority habitats.

Transition mires and quaking bogs, is a habitat of high conservation that covers the flat lands in boreal floor, mainly covered with vegetation that is not set to the substrate. In Romania there are several types: middle European yellow sedge fens, alpine pioneer formations of *Caricion bicoloris-atrofuscae*, *Carex chordorrhiza* Ehrh. ex L. F., swards, *Carex lasiocarpa* Ehrh., swards, mud sedge (*Carex limosa* L.) swards and *Carex diandra* Schrank, quaking mires. A special

attention should be paid to the relict species on the surface of these habitats: *Drosera rotundifolia* L., *Betula nana* L., *Liparis* sp. and more. One characteristic associations of transition mires and quaking bogs in Bilbor valley is *Caricetum diandrae* Jon. 1932 em. Oberd. 1957 (Syn.: *Carici-Menyanthetum caricetosum diandrae* Rațiu 1972).

Alkaline fens have a high conservation value, because of *Ligularia sibirica* (L.) Cass. species. This habitat has low altitude peat lands, with neutral-slightly alkaline water. These preserved over time pollen and plant debris. Sedge short and brown moss communities almost covers totally the habitat area, with favorable ecological conditions and permanent saturated soils with water rich in limestone base, with ground water near or slightly above the ground. Those species that lives in this type of habitat have a restricted distribution, characteristic for alkaline fens, endangered in almost all regions when is formed the infra-aquatic peat. In Bilbor swamps, some of the association that corresponding to this type of habitat are *Carici flavae-Eriophoretum latifolii* Soó 1944 and association *Carici flavae-Blysmetum compressi* Coldea 1997.

## CONCLUSIONS

Bilbor swamps are part of the trigeminal swamps Drăgoiasa-Bilbor-Borsec. Those from Bilbor are different from other swamps from Romania by their reduced extend but with a long length, the rich vegetation developed in the presence of mineral waters, in an environment almost entirely eutrophic, with few oligotrophic intrusions.

Peat dates back to the finiglacial and preboreal period, preserving in time with mineral water, a huge number of glacial relicts (*Ligularia sibirica* (L.) Cass., *Swertia perennis* L., *Pedicularis sceptrum-carolinum* L. and more).

These habitat types require increased protection, therefore any human activity such as cutting bushes, overgrazing, draining land for exploitation, forest cutting are destroying the original vegetation of the area.

Of all the eight swamps from the Bilbor valley, just Pârâul Dobreanului swamp was declared in 1980 nature reserve of botanical interest.

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