

CONSIDERATIONS REGARDING ALPINE RIVERS AND THEIR LIGNEOUS VEGETATION WITH *MYRICARIA GERMANICA* IN THE MARAMUREȘ MOUNTAINS NATURE PARK (ROMANIA)

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ABSTRACT

The habitat 3230 Mountain rivers and their ligneous vegetation with *Myricaria germanica* was not listed in the standard form based on which the Natura 2000 site ROSCI0124 Maramureș Mountains was declared. The aim of this study is to offer some new information regarding the structure, distribution and ecology of the Natura 2000 habitat 3230 Mountain rivers and their ligneous vegetation with *Myricaria germanica* in Maramureș Mountains Nature Park. The ecological importance of habitat 3230 results from the capacity of *Myricaria germanica* to colonize new deposits of gravels and set up new biocoenoses, this ability being possible only in the case of natural morphodynamics of the mountain streams, not influenced by human activities.

ZUSAMMENFASSUNG: Betrachtungen über die Gebirgsfließgewässer und ihre Gehölzvegetation mit *Myricaria germanica* im Naturpark Maramurescher Gebirge/Munții Maramureșului (Rumänien).

Der Habitattyp von gemeinschaftlichem Interesse 3230 Montane Flüsse und ihre Gehölzvegetation mit *Myricaria germanica* ist unter den Habitaten des Standarddatenbogens, der zur Ausweisung des Natura 2000 Gebietes Maramurescher Gebirge/Munții Maramureșului geführt hat nicht aufgelistet. Daher bestand die Notwendigkeit eine umfassende Untersuchung über die im Gebiet des Naturparks Maramurescher Gebirge vorkommenden natürlichen Lebensräume durchzuführen. Ziel der Untersuchung ist es, neue Informationen über Struktur, Verbreitung und Ökologie des Natura 2000 Habitattyps 3230 Montane Flüsse und ihre Gehölzvegetation mit *Myricaria germanica* auf dem Gebiet des Naturparks der Maramurescher Gebirge zu liefern. Die Bedeutung dieses Habitattyps besteht in seiner Fähigkeit Schotterpionierflächen zu besiedeln und neue Biozönosen aufzubauen. Seine Ansiedlung ist allein an natürlichen Gebirgsflüssen mit einer natürlichen Hydro-Morphodynamik gegeben.

REZUMAT: Considerații privind râurile alpine și vegetația lor lemnoasă cu *Myricaria germanica* în Parcul Natural Munții Maramureșului (România).

Habitatul de interes comunitar 3230 Râuri montane și vegetația lor lemnoasă cu *Myricaria germanica* nu face parte dintre habitatele listate în formularul standard pe baza căruia s-a declarat situl Natura 2000 Munții Maramureșului. Scopul acestui studiu este de a oferi noi informații referitoare la structura, distribuția și ecologia habitatului Natura 2000 3230 Râuri montane și vegetația lor lemnoasă cu *Myricaria germanica* în Parcul Natural Munții Maramureșului. Importanța ecologică deosebită a tipului de habitat 3230 se datorează capacității speciei *Myricaria germanica* de a coloniza noi depozite de aluviuni și de a pune bazele unor noi biocenozes, acest lucru fiind posibil doar în cazul morfodinamicii naturale a râurilor de munte, neinfluențată de activitatea antropică.

INTRODUCTION

European nature conservation policy is based especially on the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, known as Habitats Directive and on the Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds, known as Birds Directive (***, 1992, 1995, 2007; ***, 2009).

The Habitats Directive and Birds Directive consist of the two pillars around which the European ecological network Natura 2000 was designed. The establishment of this network of Natura 2000 sites also fulfils a Community obligation under the UN Convention on Biological Diversity (***, 1992).

The purpose of the Natura 2000 network is to assure the long-term survival in situ of Europe's most valuable species and habitats. It is comprised of Sites of Community Importance (SCI) adopted as Special Areas of Conservation (SAC) designated by Member States under the Habitats Directive, and also incorporates Special Protection Areas (SPAs) (***, 2014).

Natura 2000 network includes sites selected for conservation of species and natural habitat representative for the Europe's biogeographically regions: Atlantic, Continental, Alpine, Mediterranean, Boreal, Macaronesian, Pannonian, Steppic and the Black Sea region (***, 2014).

Starting from 2007, as part of the European Union, Romania assumed obligations in order to assure the conservation of natural habitats and species, by the process of declaring Natura 2000 Sites. By Governmental Decision 1284/2007 a total of 106 Special Protection Areas were declared in Romania. This Governmental Decision was updated by the Governmental Decision 971/2011 and the number of Special Protection Areas in Romania increased at 149 sites. Also in 2007, by the Order of Ministry of Environment and Sustainable Development a number of 273 Sites of Community Importance were declared. This order was updated in 2011 by the Order of Ministry of Environment and sustainable Development no. 2387 at 408 Sites of Community Importance.

Of the nine biogeographical regions in Europe, five occur in Romania: Alpine, Continental, Pannonian, Steppic (existing only in Romania at UE Level) and Black Sea, (***, 2014).

In Romania, the Habitats and Birds Directive are enforced by the Governmental Emergency Ordinance no. 57/2007 regarding the protected areas regime, conservation of natural habitats and wild flora and fauna, completed and modified by Law 49/2011 and by Governmental Emergency Ordinance no. 31/2014. According to these regulations, 98 habitats of community interest are protected in Romania by SCIs, as part of the Natura 2000 network.

The aim of our study is to offer some new information regarding the structure, distribution and ecology of the Natura 2000 habitat 3230 Mountain rivers and their ligneous vegetation with *Myricaria germanica* in Romania, and especially in the Maramureş Mountains Nature Park protected area (Curtean-Bănăduc et al., 2008). The Maramureş Mountains have been declared as a protected area since 2004, by the Governmental Decision 2151/2004 regarding the establishment of new protected areas in Romania. After Romania's attendance to the European Union, about 70% of the territory of the Maramureş Mountains Nature Park is part of the European ecological Network Natura 2000 as the Maramureş Mountains site ROSCI0124. The entire territory of the Natura 2000 site is inside the limits of the nature park and it is administrated by the National Forest Administration (ROMSILVA), the Maramureş Mountains Nature Park Administration, which is why we will consider the study area the territory of the nature park.

The habitat 3230 is one of the 19 Natura 2000 nature habitats that were identified in the area of the Maramureş Mountains Nature Park (Danci, 2011) and this habitat is not included in the standard form of the Natura 2000 site Maramureş Mountains. The diagnostic plant association for the habitat 3230 was cited by Beres M. in 2000 and Schneider E. made reference to this habitat for the territory of the Maramureş Mountains in 2005.

This habitat is a pioneer one and its presence and dynamics are related to the streams and rivers dynamics.

The habitat of mountain rivers and their ligneous vegetation with *Myricaria germanica* is under protection of the Natura 2000 Network and also of the Emerald Network.

In Europe, this habitat includes rivers in the Alps and other high mountains where the banks are dominated by herbaceous plants rather than trees or scrubs. Although typical for the Alpine biogeographical region it is also reported from the Boreal, Continental, Macaronesian and Mediterranean regions (***, 2012).

In Romania, the habitat of mountain rivers and their ligneous vegetation with *Myricaria germanica* is specific for alpine region, as it is defined in the biogeographical regions of Europe. It is important to mention that this habitat is not specific to the alpine storey of vegetation, as they are presented in Vegetation of Romania, but it is an intrazonal type of vegetation in mountain storey of vegetation.

This habitat establishes as a pioneer one, on gravels and sediments in the minor riverbed of the streams in mountain areas where floods are frequent. *Myricaria germanica*, the diagnostic species for the habitat 3230 is a pioneer shrub that requires natural river dynamics and, due to river corrections leading to the destruction of its habitat, the species is extinct in many rivers of Romania. The presence of this habitat may be an indicator of natural dynamics of water courses. Once established, this habitat sets up the proper conditions for the installation of some tree species that fix river banks, and so it creates the conditions for biocoenoses to establish and survive close to the rivers and also create ecological corridors.

German tamarisk or false tamarisk, *Myricaria germanica* L. (Desv.), a representative species of family Tamaricaceae in the Romanian flora (Sârbu, 2013), is known in vernacular Romanian as "cătină mică", "prundar", "răureancă", "zdrohiş" (Drăgulescu, 2013). It is distributed in Europe and South-West Asia.

Myricaria germanica is a deciduous shrub 0.6-2.5 m in height, sparsely distributed from the hills to the spruce forest zone, on river gravels and sandy alluvia. It presents twigs erect, brown reddish. The leaves are small, three to five mm, linear-lanceolate, grayish-green, obtuse, sessile and imbricate. The bracts are longer than flowers. The flowers are pink to white, grouped in terminal spikes; calyx and corolla five-lobed, anthers 10, the ovary with sessile stigmas (Clinovschi, 2005). The inflorescence is presented in figure 1. The fruit is a pyramidal capsule, as can be seen in figure 2. The seeds are small, with a pappus of hairs, as seen in figure 3. It flowers from June to August and disperses by the air-borne seeds.

Myricaria germanica (Fig. 4), is demanding of good conditions of both light and soil moisture (Sârbu, 2013). It is a native species and is cultivated in gardens too for ornament and also for medicinal purposes (Mahmoud, 2013). The dense root system of the shrubs firmly anchors them in the substrate and thus reduces soil erosion. Flexible branches exhibit only minimal resistance to floodwaters and thus prevent the plants from being dislodged. Since natural river dynamics continuously alter the sites the plants rarely reach more than 15-20 years of age. Damaged and buried plants show a high ability to regenerate, an important adaptation to repeatedly shifting gravel banks (Kudrnovsky, 2013).



Figure 1: Inflorescence of
Myricaria germanica
(photo Mancu C.).



Figure 2: Fruits of
Myricaria germanica
(photo Mancu C.).



Figure 3: *Myricaria germanica* seed dissemination (photo Mancu C.).



Figure 4: Aspect of the leaves of *Myricaria germanica* (photo Mancu C.).

MATERIAL AND METHODS

Due to the fact that the habitat 3230 Mountain rivers and its vegetation with *Myricaria germanica* was found on the study area and it is not found on the Natura 2000 standard data form of the Maramureş Mountains ROSCI0124, an analysis of the available data on this habitat within the study area and also at national level was required. Also a comparison between data at the Romanian national level from different sources was a necessity.

After the study area was defined at the limits of Maramureş Mountains Nature Park, all the permanent water courses in the area were covered in order to identify the presence of the habitat 3230 in the field. The main diagnostic species of the habitat is *Myricaria germanica*, so the identification of the habitat in the field was easy. All the fragments of the habitat were analyzed regarding structure and geographical position; coordinates were registered for all the sites. Collection of the data from the field was made in 2011. For the data collection we used data collection sheets and GPS receptor Garmin Dakota 10. Data interpretation was made in the office using Quantum GIS.

An assessment of the pressures and anthropic impact was made using the data collected on the field. Also a set of minimum management measures and recommendations was made.

The previous presented materials and methods facilitated us to reach the aim of this study, to offer new data regarding the chorology of habitat 3230 in Romania and especially in Maramureş Mountains Nature Park.

Maramureş Mountains represent the highest mountainous massif located on the Romanian national border, the convergence point of several ethnographic regions (Romanian Maramureş, Zăcarpatia, Southern and Northern Bucovina, Galiția). Maramureş Mountains are located in the Northern part of the Oriental Carpathians, and they border upon Țibău Mountains in the East, upon Rodnei Mountains and Maramureş Depression in the South, and upon Rahiv and Cernahora Mountains (Ukraine) in the North (***, 2008).

The entire surface of the massif (including the depression and marginal hills areas) is 1,500 km². The area subjected to this study is represented by the territory of the Maramureş Mountains Nature Park (MMNP; Fig. 5), with the limits stipulated by GD 2151/2004. These limits comprise a 133,354 ha surface.

The morphological fragmentation of the massif is a peculiarity of Maramureş Mountains, as the hydrographical network determines the separation and fragmentation of massif's high areas. There are two classes of fragmentation depth that prevail within Maramureş Mountains: 300-450 m and 150-300 m. The highest values are found in metamorphic rocks and in the Toroiaga Massif on volcanic rocks (Curtean-Bănăduc et al., 2008). Over 60% of the surface of Maramureş Mountains has fragmentation depth ranging between one and three km/km² (Mureşan, 2008).

The hydrographical network is highly developed, providing abundant, permanent water runoff during the entire year. The Maramureş Mountains include three drainage basins: Vişeu (Tisa), Bistrița (Siret) and Ceremuş (Prut). The surface of the region belonging to the Vişeu drainage basin is 1,023 km², that of the region drained by Bistrița tributaries is 168 km² and that of the Ceremuş drainage basin is 25 km². The average runoff value specific to Maramureş Mountains is 8.41 l/s/km², lower than in Oaş, Gutâi and Țibleş mountains, located to the West first in front of the oceanic air masses. (Mureşan, 2008)

The river dynamics have been influenced by the historical floods in the study area. According to the Administration of the Basin of the Someș-Tisa rivers, historical floods, with a probability of one to five percent, took place in 1970, 2001 and most recently in 2008. The floods affected mostly the basins of the Vișeu, Vaser, Ruscova and Repedea rivers (***, 2013). Certainly the floods mentioned by the Administration of water basin Someș-Tisa had a great negative impact on the distribution and structure of the habitat 3230 Mountain rivers and their vegetation with *Myricaria germanica* in Maramureș Mountains Nature Park, especially the floods along the Vaser River that destroyed the riverbanks and the narrow-gauge railway line along the river, except the places where the riverbanks were fixed by forest vegetation from the habitat type 91E0* Alluvial forest with *Alnus glutinosa* and *Fraxinus excelsior*. Once again it is proved that the best solution for riverbank stabilization is by using the vegetation instead of concrete.

The Maramureș Mountains are located in the continental moderate climate area, permanently subjected to the influence of Western oceanic air masses advection, whose characteristics reflect into the evolution of all climatic elements (Moldovan, 2000). The month with the lowest average temperatures is January, with values between -6°C and -10°C. July has average values between 8°C and 12°C. The presented values result in annual average amplitude of 22-24°C, the moderate value highlighting the continental moderate temperate climate nature with significant thermal extreme values between summer and winter (***, 2008).

Summer is the rainiest season, when 61% of total rainfall is registered. The poorest rainfall season is winter, with only 17% of the total rainfall. The annual number of rainfall days is 150-170. The snow layer occurs in September and the last snow may be recorded as the average data in the last decade of March. The snow layer is maintained between 120 and 200 days, and the layer thickness ranges from 75 to 150 cm (***, 2008).

From the large soil groups, significant surfaces are covered by districambosol, prepodzolic soils, litosols, humisols and alluvial soils. (Curtean-Bănăduc et al., 2008)

Two towns (Borșa and Vișeu de Sus) and eight communes (Moisei, Vișeu de Jos, Ruscova, Repedea, Poienile de Sub Munte, Leordina, Petrova and Bistra with their villages Valea Vișeului and Crasna Vișeului) are included within the MMNP. These have developed along the courses of the Vișeu, Repedea, Ruscova and Tisa rivers. (Curtean-Bănăduc et al., 2008)

The population of the 10 localities in the MMNP is approximately 90,000 inhabitants, of which 62,000 are Romanian, 25,000 Ukrainian and 1,774 German, as this is the location of the largest Ukrainian community in Romania and the largest settlement with a majority Ukrainian population, Poienile de Sub Munte (10,170 inhabitants) (***, 2008).

The evolution of the landscape is closely connected to the traditional occupations. Therefore, logging, cattle farming and mining have affected the landscape and implicitly the natural framework over time. The pre-Christian customs related to nature worship, old and new religious holy days, agricultural customs and traditions related to the human life cycle harmoniously combine in the communities of the MMNP (Danci, 2011).

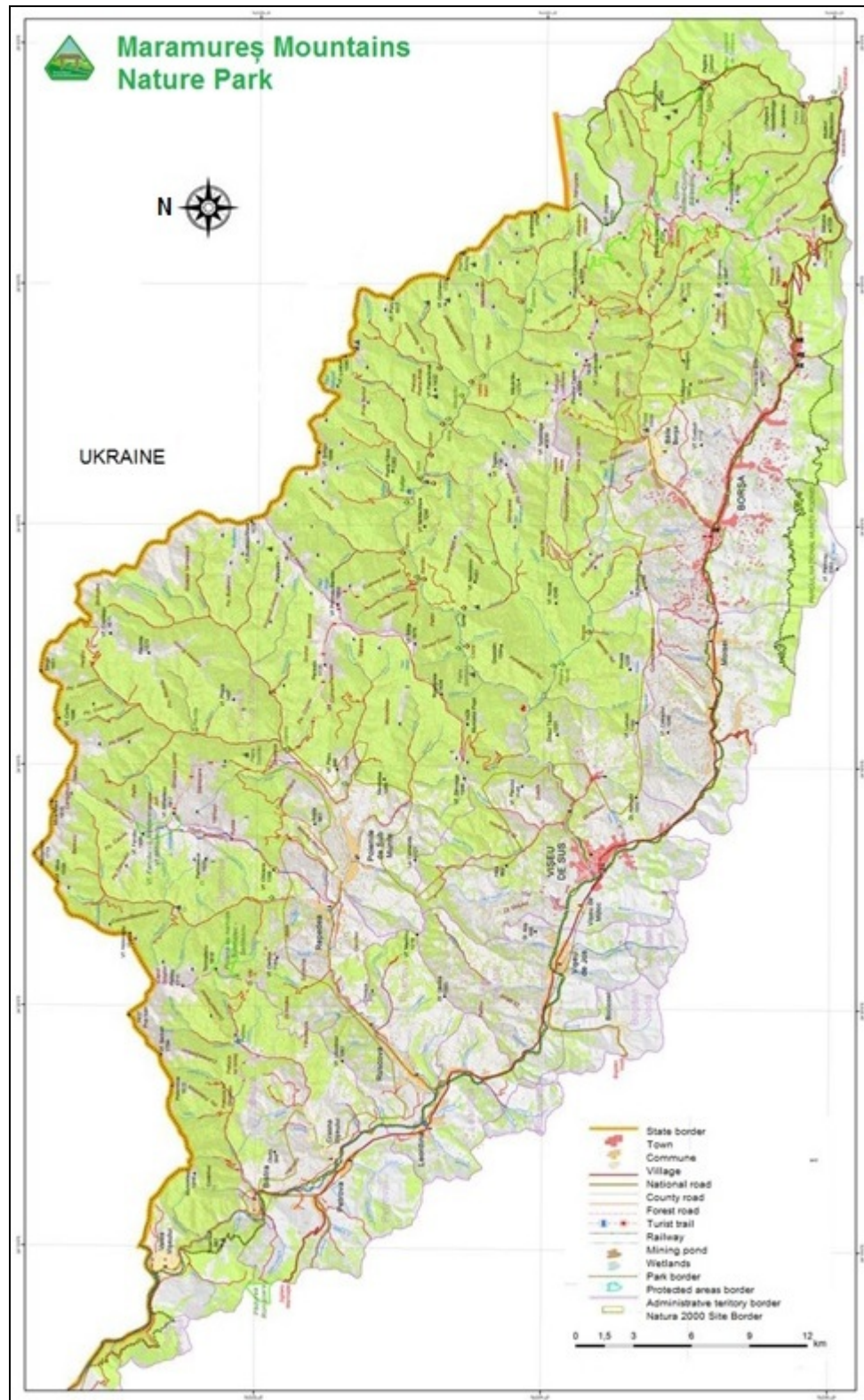


Figure 5: Study area - The Maramureş Mountains Nature Park.

RESULTS AND DISCUSSION

Doniță et al. (2005) present the habitat 3230 Mountain rivers and their specific ligneous vegetation with *Myricaria germanica* without offering details: Eastern and Western Carpathians, Moldavian Subcarpathians, in the distribution area of durmast oak and beech. We can observe that the study area is included in the very generally distributions details provided.

Gafta and Mountford (2008), give the information that the habitat 3230 exists in 18 Natura 2000 sites, without providing a list of them.

Starting from 2011, the number of Natura 2000 sites in Romania increased at 408 sites. We analyzed the standard forms of these sites in order to identify the presence of the habitat 3230, the surface and the conservation status. The results of the analysis we made are presented in table 1 and are based on the Order of Ministry of Environment and Sustainable Development no. 2387/2011.

Table 1: List of SCIs in Romanian territory that include in the standard form the specific habitat 3230 Mountain rivers and their ligneous vegetation with *Myricaria germanica*.

No. crt.	Name of Natura 2000 Site	Code	Surface (ha)	% of the habitat	Surface of the habitat	Conservation status
1.	Apuseni	ROSCI0002	75943	0.01	7.5943	B
2.	Bucegi	ROSCI0013	38787	0.1	38.787	D
3.	Cheile Bicazului - Hășmaș	ROSCI0027	7642	0.5	38.21	B
4.	Ciucaș	ROSCI0038	21864	1	218.64	A
5.	Cozia	ROSCI0046	16760	1	167.6	B
6.	Creasta Nemirei	ROSCI0047	3509	1	35.09	B
7.	Defileul Jiului	ROSCI0063	10946	1	109.46	A
8.	Munții Făgăraș	ROSCI0122	198618	1	1986.18	B
9.	Munții Rodnei	ROSCI0125	48062	1	480.62	C
10.	Nordul Gorjului de Est	ROSCI0128	49160	1	491.6	B
11.	Nordul Gorjului de Vest	ROSCI0129	86958	0.5	434.79	B
12.	Parâng	ROSCI0188	30434	1	304.34	B
13.	Penteleu	ROSCI0190	11268	0.003	0.33804	D
14.	Piatra Craiului	ROSCI0194	15867	1	158.67	B
15.	Putna - Vrancea	ROSCI0208	38213	3	1146.39	B
16.	Retezat	ROSCI0217	43561	1	435.61	B
17.	Siriu	ROSCI0229	6230	0.01	0.623	D
18.	Slănic	ROSCI0230	1408	1	14.08	B
19.	Valea Iadei	ROSCI0262	2946	0.1	2.946	B
20.	Vânători Neamț	ROSCI0270	30206	0.01	3.0206	D
21.	Munții Ciucului	ROSCI0323	59641	0.1	59.641	B
22.	Râul Suceava	ROSCI0379	881	1	8.81	C

According to this analysis, the number of sites of community importance containing the habitat 3230 in Romania increased from 18 in 2007 to 22 in 2008, but Maramureş Mountains ROSCI0124 is still not included in the reviewed standard forms. Table 1 also presents the surface of the identified sites and the percentage assumed to be covered by the habitat 3230 inside them. The total surface, resulted by this method, covered by the habitat of mountain rivers and their vegetation with *Myricaria germanica* in Romania is 6,143 ha. All the sites identified are situated in the alpine or in both alpine and continental biogeographical regions of Europe. Their distribution at national level is especially in the Carpathian Mountains arch and it is presented in figure 6.

Assessments on the conservation status of the habitat types and species of Community interest have been carried out in EU 25 for the period 2001-2006 and in EU 27 for the period 2007-2012, compiled as part of the Habitats Directive - Article 17 reporting process. The data summary sheet for species conservation status provides an overview on biogeographical region. This information presented in the data sheet of the habitats is provided for each country by the authority responsible for nature conservation and environment. For Romania, the reports were made by the Ministry of Environment. The surface reported for the habitat 3,230 is 5,600 ha (2007-2012) and the surface range to 13,900 ha, for the period 2001-2012 and the method used for providing this surfaces is based on partial data with some extrapolation and/or modeling. According to this report the global conservation status is favorable. This conservation status and also the surface range are not the same presented in the standard form based on which the Natura 2000 sites were designated in Romania. The trend regarding the evolution of the surface in the short term is assessed to be stable.

All these differences regarding surface range, different global conservation status, lack of some habitats from the Natura 2000 standard forms are problems that should be solved as soon as possible as far as the standard forms represent the only legal documents regarding the Natura 2000 sites, until the approval of their management plans.

The report also identifies the following pressures and threats: E03.01 - disposal of household/recreational facility waste, K01.01 - Erosion, C01.01.01 - sand and gravel quarries.

For the Maramureş Mountains, the situation is presented in the standard form different from the reality. The list of identified habitats in the field (Danci, 2011) is presented (Tab. 2).

There are major differences between the standard form and the data in the field. The most important habitats, considering conservative value and surface, are listed below. Priority habitats: 91D0* Wooded peateries, 91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) and 9180* Slope, detritus or ravines forests composed of Tilio-Acerion are missing from the standard form.

The habitat 9410 Forests with *Picea* from the alpine - mountain regions is also missing from the data form. This habitat is one of the most representative habitats in Maramureş Mountains Nature Park and it covers 30,442 ha, 30% of the surface of the Natura 2000 site Maramureş Mountains. The life of the communities in the park area is directly related to this habitat and to the culture of wood which defines the land of Maramureş and the traditional landscape. Due to the problems mentioned, the necessity of appropriate field studies becomes more obvious. The aim of this study is to clarify for the surface of the Maramureş Mountains Nature Park the distribution and structure of this very sensitive habitat 3230 Mountain rivers and their ligneous vegetation with *Myricaria germanica*. This need became important because of the ecological role of the habitat as a pioneer in sands and gravel colonization, in order to assure proper conditions for settlement of new biocenoses.

Table 2: List of identified habitats (Danci, 2011).

No.	Natura 2000 code	Type of Natura 2000 habitat
1.	3230	Mountain rivers and their wood vegetation with <i>Myricaria germanica</i>
2.	4060	Alpine and boreal pastures
3.	4070*	Shrubs with <i>Pinus mugo</i> and <i>Rhododendron hirsutum</i> (Mugo-Rhododendretum hirsuti) in the Carpathians <i>Rhododendron hirsutum</i> being replaced by <i>Rhododendron myrtifolium</i>
4.	6230*	<i>Nardus</i> rich grasslands in terms of species, on the siliceous substrata of mountainous areas
5.	6430	Woodside associations with tall hygrophyle grass from the level of plains to the mountainous and alpine level
6.	6520	Mountain grasslands
7.	7140	Transition peat swamps and moving peatlands (not fixed in the substrata)
8.	7220*	Petrifying springs with travertine formation (Cratoneurion)
9.	8210	Rocky slopes with chasmophytic vegetation
10.	9110	Luzulo-Fagetum type forests
11.	9130	Asperulo-Fagetum type forests
12.	9150	Cephalanthero-Fagion type medio-European forests
13.	9170	Oak forest with Galio-Carpinetum
14.	9180*	Slope, detritus or ravines forests composed of Tilio-Acerion
15.	91D0*	Wooded peatlands
16.	91E0*	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae and Salicion albae)
17.	91V0	Dacic beech (Symphyto-Fagion) forests
18.	91Y0	Dacic oak and hornbeam forests
19.	9410	Forests with <i>Picea</i> from the alpine - mountainous region

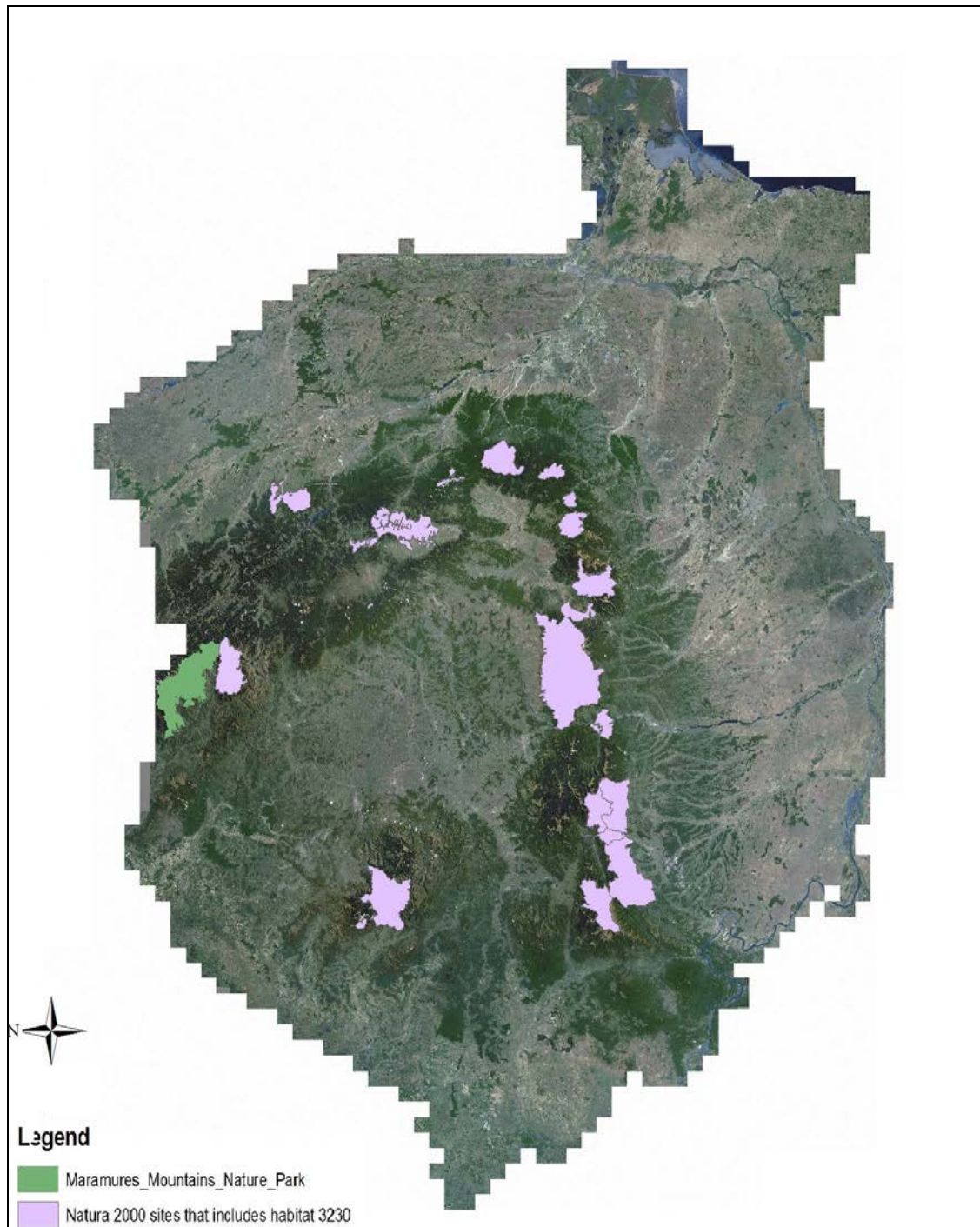


Figure 6: Distribution map of Natura 2000 sites that includes Habitat 3230 in Romania.

In order to realize the chorology of the habitat 3230 in Maramureş Mountains Nature Park and Natura 2000 site, all the permanent water courses were covered. The habitat of mountain rivers with *Myricaria germanica* was identified in the study area in the major streambed of the confluents of the Ruscova River, Rica River, Socolău River and Repedea River. The habitat is more often found on the Socolău and Repedea rivers than on the Rica River. Along the alluviums in the riverbed of Rica River more frequent is the habitat 91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*, type R4401 *Alnus glutinosa* and *Telekia speciosa*. The essential difference between the two tributaries of Ruscova, Rica and Socolău rivers, is the different anthropic impact generated by the constructions aimed to reduce the frequency and the impact of floods. These constructions modified the water regime and also the succession of the phytocenoses in the streambed. While the Rica River is more natural, the Socolău River has been affected by concrete riverbanks consolidations.

The distribution area of the habitat 3230 Mountain rivers and their vegetation with *Myricaria germanica* was also disturbed by the floods in 2001 and in 2008.

The distribution map of the habitat is presented in figure number 8. The surface identified in the field in 2011 is about 10 ha. In order to make it visible on the map, figure 8 presents only the North East part of the study area. The aspects of the habitat in the study are presented in figures number 7, 9 and 10.



Figure 7: *Myricaria germanica* in the Maramureş Mountains Natura 2000 site.



Figure 9: *Myricaria germanica* mature habitat on the Socolău River.



Figure 10: *Myricaria germanica* after floods in 2008.

Description of the habitat

NATURA 2000: 3230 Alpine rivers and their ligneous vegetation with *Myricaria germanica*
Romanian habitats: R4415 Dacic shrubs of tamarisk (*Myricaria germanica*).

EMERALD: !44. Riparian willow formations.

CORINE: 44.111 Willow-tamarisk bush.

PAL.HAB 1999: 44.111 Pre-Alpine willow tamarisk scrub.

EUNIS: F9.111 Pre-Alpine willow-tamarisk scrub.

Chorology in MMNP: Socolău, Rica and Repedea rivers.

Surface: 10 hectares.

Plant associations: *Salici purpureae-Myricarietum* Moor 1958 (Syn.: *Myricario-Epilobietum* Ardelean 1981 non Aichinger).

Structure: A pioneer plant association, identified by mezotherm, mezo-hygrophyllic and hydrophilic species. The herbs may also have eutrophic preferences after the floods. The shrub layer is dominated by *Myricaria germanica*, in different proportions together with *Salix purpurea*, *Alnus incana*, *Fagus sylvatica*. The coverage of this layer is 40-70%, the height is between 0.5 m and 2.5 m. The herb layer has very active dynamics, and is frequently damaged by floods. The coverage is 20-50%, depending on the time since the last water flows. *Agrostis stolonifera*, *Festuca pratensis* and *Dactylis glomerata* are the most frequent gramineous species. The height of the gramineous layer is about 0.5 m. Other frequent species are *Trifolium pratense*, *Lysimachia nummularia*, *Lycopus europaeus*, *Tussilago farfara*, *Aegopodium podagraria*, *Glechoma hederacea* and *Ranunculus repens* (Doniță et al., 2005, 2006).

Conservative value: high, habitat protected by Emerald network.

Plant composition

Edifying species: *Myricaria germanica*.

Characteristic species: *Salix purpurea*, *Myricaria germanica*, *Salix fragilis*, *Cirsium oleraceum*.

Other important species: *Lysimachia nummularia*, *Mentha longifolia*, *Calamagrostis pseudophragmites*, *Humulus lupulus*, *Saponaria officinalis*, *Salix elaeagnos*, *Calystegia sepium*, *Alnus incana*, *Fagus sylvatica*, *Agrostis stolonifera*, *Festuca pratensis*, *Dactylis glomerata*, *Trifolium pratense*, *Lycopus europaeus*, *Tussilago farfara*, *Aegopodium podagraria*, *Glechoma hederacea*, and *Ranunculus repens*.

Fauna: The structure of the gravel banks and the colonizing pioneer species *Myricaria germanica*, *Salix purpurea* and *Epilobium dodonaei* constitutes the typical habitat for two bird species *Actitis hypoleucos*/Common Sandpiper and *Charadrius dubius*/Little Ringed Plover. Also *Myricaria germanica* is the food plant for the phytophagous and oligophagous insects *Coniatus splendidus* (Curculionidae) and *Tuponia prasina* (Myridae/Heteroptera). In the distribution area of *Myricaria germanica* these are monophagous, living only on this species. If *Myricaria germanica* disappears in the Carpathian area, the above-mentioned insect species will disappear as well (***, 2013).

Human impact:

C01.01. sand and gravel extraction;

D01.01. paths, tracks, cycling tracks, includes non-paved forest roads;

I01 invasive non-native species;

J02.05.02 modifying structures of inland water courses;

J02.06.06 surface water abstractions by hydro-energy;

K01.01 erosion;

L08 inundation (natural processes);

River bank consolidation and loss of hydro-morphodynamics.

Management measures

The habitat 3230 Mountain rivers and their ligneous vegetation with *Myricaria germanica* is not listed in the standard form of the site ROSCI0124 Maramureş Mountains and the first measure necessary for the appropriate management of the habitat is to review the standard form of the site.

Due to the high sensitivity of this habitat to the dynamics of the water course, it is important to keep the river dynamics close to the natural state. Activities such as construction of hydro power plants, sand and gravel extraction, construction of concrete dams and gabion wall, and modernization of forest roads are recommended to be avoided.

Another important measure is related to the forest management. All the bare surfaces that in the past were covered by forest should be re-afforested in order to limit and prevent the inundation process that is frequent in the area and it has a big impact on the habitat 3230 structure and surface.

Invasive non-native species are present in the Maramureş Mountains Nature Park in aquatic or riparian ecosystems (Dumitraşcu et al., 2014). *Impatiens glandulifera* and *Fallopia japonica* (*Polygonum cuspidatum*) are also species that may occupy the same habitat as *Myricaria germanica*, sandy soils and alluvium. For this reason it is very important to limit the spread of those species upstream on the Rica, Socolău and Repedea rivers, from the riverbanks of the Ruscova and Vişeu riverbanks. Mostly these invasive species are on finer-sized sediments and only accidentally present in a habitat such as that of *Myricaria germanica*.

Long term information and education of local communities related to the importance of the habitat 3230 in riverbanks stabilization, regarding the ecological role in some insect life and regarding natural succession of vegetation related to dynamics of the rivers is needed.

This habitat has a rapid evolution related to the water course dynamics, so periodic monitoring of the evolution of this habitat should be one of the priorities for the Maramureş Mountains Nature Park Administration.

CONCLUSIONS

This paper analyzes the European and national context of nature conservation of habitats listed in the Habitats Directive for which Natura 2000 sites of community interest were declared, focused on the habitat 3230.

The habitat 3230 Mountain rivers and their ligneous vegetation with *Myricaria germanica* was found to be present in Romania in 22 sites of community importance situated in the alpine and both alpine and continental biogeographical regions of Europe, according to analyze of Natura 2000 standard data forms.

Supplementary from the 22 sites, the habitat was identified in the site of community importance ROSCI0124 Maramureş Mountains. The distribution map of the habitat 3230, the description of its structure and the human impact for this habitat were presented.

In order to assure the appropriate management of the habitat, a set of management measures was elaborated. These measures refer to economical activities, invasive non-native species limitation, monitoring of the habitat and public awareness.

The evolution of the habitat is rapid and dependent on the water dynamics, and the researches in the field should keep in line with it.

Collaboration between all stakeholders in area is the key of successful management of valuable biocenoses for the protection of which the Maramureş Mountains Nature Park, ROSCI0124 Maramureş Mountains and ROSPA0131 Maramureş Mountains were stated.

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