

Note on the amphibians and reptiles of the “Nordul Gorjului de Est” site of community interest and adjacent areas (Southern Carpathians, Romania)

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Abstract. The results of studies on the amphibians and reptiles of the “Nordul Gorjului de Est” site of community interest on the south-facing slope of the Parâng massif and associated foothills (Gorj county, Romania), are presented. 11 amphibian and 8 reptile species were identified in the field. Their distribution within and around the site is discussed, together with ecological data, correlating these with the local climate influences. A new altitude record for Romania is given for *Hyla arborea*.

Key words: Natura 2000 site, mountains, southern slope, foothills, amphibians, reptiles, records, distribution.

Introduction

The Natura 2000 network is a system of protected areas (Natura 2000 sites) spread across all EU states, with the purpose of protecting biodiversity and ensuring sustainable development in the European space by protecting key elements, both natural habitats and plant and animal species (Natura 2000 habitats and species, respectively); the protection of Natura 2000 species and habitats constitutes a good “umbrella” for the conservation of other species (often in need of protection) coexisting with these. Its effectiveness is the subject of numerous studies, ecological (e.g. Klaučo et al. 2013, Votsi et al. 2012), socio-economical (e.g. Cruz et al. 2011), of integrative management (e.g. Walentowski et al. 2013), etc., underlining the importance of this network but also the problems it faces. While the Romanian Natura 2000 network is quite effective in covering the protected species as compared to the general European situation (Trochet & Schmeller 2013), mapping the distribution of protected species within and around sites remains of paramount importance in assessing them and increasing the effectiveness of the sites' protective function (see, e.g., Hartel & von Wehrden 2013). In this paper we address the issue of within-site and around-site distribution of amphibians and reptiles for the “Nordul Gorjului de Est” Natura 2000 site.

Materials and methods

Area description

The “Nordul Gorjului de Est” site (code: ROSCI0128) is a

Site of Community Interest (SCI) established in 2007 for the protection of 25 habitat types, 4 plant and 18 animal species – including two amphibians, *Triturus cristatus* and *Bombina variegata*. It covers an area of 49.160 ha along the southern cline of the Parâng Mountains and their foothills in the northern part of the Gorj county, with a small extension in the adjacent Vâlcea county in Romania. The site comprises altitudes between 340 m in the foothills and 2314 m a.s.l. in the high Parâng Mountains. These mountains are mainly magmatic and crystalline; in the south-east of the study area there are small areas of Jurassic limestone, with karst scenery (gorges on the Galbenu and Olteţ rivers, caves such as Polovragi and Peştera Muierii). The Parâng massif continues towards south in a series of sub-Carpathian hills, consisting of aluvial and clay deposits, sandstones etc., which grade into the Olteţ Piedmont to the south. This area is separated by several roughly north-south oriented river valleys originating in the Parâng chain: the Sadu, the Blahniţa, the Ciocadia, the Gilort, the Galbenu, the Olteţ and several smaller ones as well (Fig. 1). The vegetation of this area consists of deciduous forests, dominated by sessile oak (*Quercus petraea*), Turkey oak (*Q. cerris*) and hornbeam (*Carpinus betulus*) up to ca. 1000 m, further up by beech stands, then above 1400 m by beech-fir-spruce forest, and further on by pure spruce forests and Alpine grasslands and bushes (with *Pinus mugo* and *Rhododendron kotschyi*) on the mountain tops. Secondary grasslands are found in all of these zones, being created for the necessities of pasturing; the lower hills harbour villages with associated hay meadows, orchards and small-scale agriculture (Măciu et al., 1982; personal observations). The herpetofauna of this area is incompletely known: Fuhn (1960) records *Bombina variegata* from Cărbuneşti; Fuhn and Vancea (1961) record *Zootoca vivipara* from Piţic; Bazilescu et al. (1980) record *Triturus cristatus* from Baia de Fier, *Lissotriton vulgaris* from Budieni, *Bombina variegata* from Baia de Fier, *Bufo bufo* from Rânca, *Pelophylax kl. esculentus* from Bălăneşti, *Rana dalmatina* from Budieni, *Rana temporaria* from Rânca and Baia de Fier, *Podarcis muralis* from Baia de Fier and

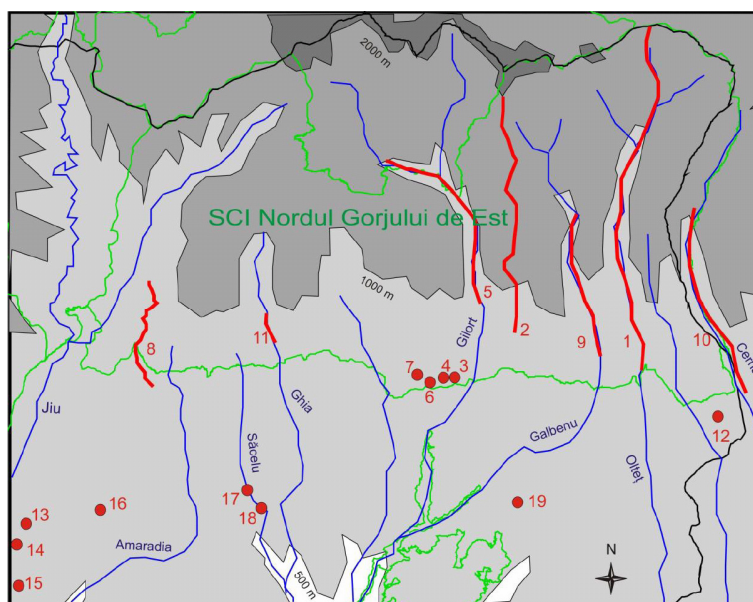


Figure 1. General map of the area. Transects are shown in red and numbered as in Table 1.

Zootoca vivipara from Râncea. Cogălniceanu, Aioanei & Matei (2000) add to the area records of *Pelobates fuscus*, Iftime & Iftime (2012) record *Triturus cristatus*, *Lissotriton vulgaris*, *Bufo bufo*, *Rana dalmatina* and *Pelophylax ridibundus* from Săcelu (in sulphurous waters) and Cogălniceanu et al. (2013) add a few records of *Salamandra salamandra*, *Bombina variegata*, *Bufo bufo*, *Rana temporaria*, *Rana dalmatina* and *Pelophylax kl. esculentus* or *P. ridibundus* (the authors combine the distribution of these taxons) in this area. Many of these records are outside or on the limits of the Natura 2000 site. It must be mentioned that there is better knowledge of the herpetofauna of the surrounding areas: the Jiu river gorges (Petrescu et al. 2004, Tudor et al. 2004, Covaciu-Marcov et al. 2009); the lower Gilort (Covaciu-Marcov et al. 2010); the northern Parâng slope (Iftime & Iftime 2010); the corresponding southern slope of the Vâlcan Mountains, West from the Jiu (Iftime & Iftime 2011).

Methodology

This paper is based upon field work performed in April 2011 and April-July 2013. The study was carried out following the active transects method (after Heyer et al. 1994, and McDiarmid 1992, in Cogălniceanu 1997). 11 stations (Olteț valley, road to Râncea, Novaci, Hirișești, Gilort valley, Aniniș valley, Radoși, Arșeni - Sadu valley, Galbenu valley, Cerna valley, Ghia valley) were checked, with transect length between 200 m and ca. 20 km, within the site or on its limits; an additional 7 stations outside the site (Sârbești, Curtișoara, Iezureni, Livada, Cânepești, Haiești, Mogoșani) are also presented, totalling 79 record points along transects on the whole (see Table 1). An older record (1996) of *Coronella austriaca* at Zorlești, also outside the site, belonging to dr. Mihai Șerban Procheș, is also given here. Amphibians were searched for both in

terrestrial habitats and aquatic basins. Photographs were taken whenever possible.

Results

19 species (eleven amphibians: *Salamandra salamandra*, *Lissotriton vulgaris*, *Ichthyosaura alpestris* (Fig. 2), *Bombina bombina*, *Bombina variegata*, *Bufo bufo*, *Hyla arborea* (Fig. 3), *Rana temporaria* (Fig. 4), *Rana dalmatina* (Fig. 5), *Pelophylax ridibundus*, *Pelophylax kl. esculentus*, and eight reptiles: *Lacerta agilis*, *Lacerta viridis*, *Podarcis muralis* (Fig. 6), *Zootoca vivipara*, *Anguis colchica* (Fig. 7), *Natrix natrix*, *Zamenis longissimus*, *Coronella austriaca*) were recorded by us (an asterisk marks a species recorded within the study area for the first time; see Table 2 for their occurrence in the checked transects).

The occurrence of amphibian and reptile species in different habitat types in the study area is given in Table 3.

The occurrence of reproducing amphibians in different types of water bodies in the study area is given in Table 4.

Discussion

The results are comparable to those obtained by other researchers in other areas of similar size and also located within the Carpathians (e.g. Bogdan et

Table 1. Transects with coordinates and description.

Transect with numbers as in Fig. 1	Coordinates	altitude	Description
1. Olteţ valley	From N45 14.184 E23 46.263 to N45 20.952 E23 47.131	713 m - 1615 m	Oak and hornbeam, then upwards beech and spruce forest with small openings
2. Road to Rânca	From N45 11.967 E23 41.470 to N45 19.190 E23 41.158	655 m - 1881 m	Oak and hornbeam forest with small openings, then upwards beech and spruce forest, then pure spruce forest with secondary pasture and then alpine vegetation
3. Novaci	N45 10.403 E23 39.318	465 m	Pond at edge of oak forest
4. Hirişeşti	N45 10.223 E23 38.559	462 m	Pond at edge of oak forest
5. Gilort valley	From N45 13.149 E23 40.084 to N45 17.109 E23 35.893	569 m - 1005 m	Oak and hornbeam, then upwards beech and spruce forest with small openings
6. Aniniş valley	N45 10.139 E23 37.592	426 m	Pond at edge of orchard
7. Radoşi	N45 10.766 E23 35.958	446 m	Pond at edge of orchard
8. Arşeni - Sadu valley	From N45 10.305 E23 26.445 to N45 12.117 E23 26.639	577 m - 724 m	Oak, then upwards beech forest with small openings
9. Galbenu valley	From N45 11.773 E23 45.365 to N45 15.071 E23 44.237	612 m - 817 m	Oak and hornbeam, then upwards beech and spruce forest with small openings
10. Cerna valley	From N45 11.502 E23 50.828 to N45 15.211 E23 49.249	556 m - 934 m	Oak and hornbeam, then upwards beech and spruce forest with small openings
11. Ghia valley	N45 11.653 E23 31.647 N45 12.122 E23 31.487	554 m - 590 m	Oak and hornbeam forest with small openings
12. Sârbeşti	N45 07.664 E23 49.824	459 m	Pond at edge of orchard
13. Curtişoara	N45 06.402 E23 21.186	250 m	Pond at edge of orchard
14. Iezureni	N45 05.076 E23 19.654	238 m	Ditches in pasture
15. Livada	From N45 03.756 E23 18.300 to N45 03.734 E23 18.341	222 m - 226 m	Ponds at edge of orchard
16. Cânepeşti	N45 06.621 E23 25.543	348 m	Pond at edge of orchard
17. Haieşti	N45 04.150 E23 33.178	319 m	Pond at edge of orchard
18. Mogoşani	N45 03.037 E23 33.650	297 m	Pond in pasture
19. Zorleşti	N45 12.172 E23 44.979	350 m	Orchard

al. 2011, Cogălniceanu et al. 2008, Covaciu-Marcov et al. 2007, 2008, Ghiurcă et al. 2005, Sos 2007, Strugariu et al. 2006 etc.) – with the expected differences due to location – and, as it happens in most Carpathian surveys, are dominated by species found usually in montane and submontane areas of central Europe. They include all species previously recorded in the study area, with the exception of *Triturus cristatus*; this species was, however, also found by us in the area (but not the Natura 2000 site) and published in a different context, that of its occurrence in sulphurous ponds (Iftime & Iftime 2012). As it is one of the species for which the “Nordul Gorjului de Est” site was declared, its absence should be cause for conservation concern, should it not be found by subsequent surveys also. However, we consider that the species is probably still present within the Natura 2000 site, given that a) it was found very close to the site limit, in the neighbouring site Defileul Jiului (Covaciu-Marcov et al. 2009), and the population is most likely spread, at least outside the breeding season, into both sites; and b) its other record, from Baia de Fier (Bazilescu et al. 1980)

likely pertains to ponds along the Galbenu valley, within the site, since we found no other suitable breeding habitat in the area, where a low-density population might have escaped detection by us; further investigation is necessary.

The other species for which the Natura 2000 site was declared is *Bombina variegata* which is present in all our longer transects along valleys within the site, from ca. 550 m a.s.l. to ca. 1500 m a.s.l. From our observations so far, the species appears to be reasonably abundant and the site appears to fulfil its protection purpose with respect to this species for now. The negative human impact within the site is not extensive: housing, touristic and road development, especially in Rânca and the road thereof, logging and traditional activities (small-scale woodcutting, grazing etc.). Grazing can even be beneficial for amphibians, as artificial waterholes created for cattle are good reproduction habitats for amphibians (Fig. 4), including *Bombina variegata*.

Numerous other amphibians benefit from the same habitat as these two Natura 2000 species within the site. *Salamandra salamandra*, *Ichthyosaura*

alpestris, *Lissotriton vulgaris*, *Bufo bufo*, *Hyla arborea*, *Rana temporaria*, *Rana dalmatina* and *Pelophylax ridibundus* share the habitat of *Bombina variegata* within the site (see Table 3). Of these, *Rana temporaria* is most frequently found; *Hyla arborea* is the rarest – and its occurrence at 1495 m a.s.l. (Fig. 3) is the highest-altitude record for this species in Romania for now (see Cogălniceanu et al. 2013).



Figure 2. *Ichthyosaura alpestris*, adult female, Olteț valley, photo Oana Iftime.

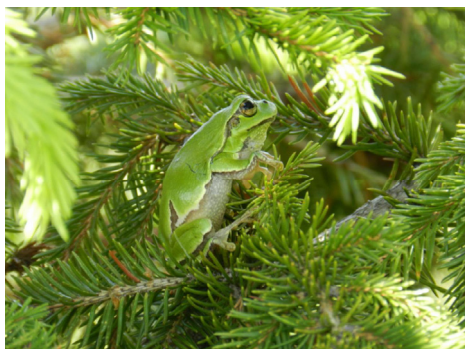


Figure 3. *Hyla arborea*, adult on spruce branches, near Râncea, photo Al. Iftime.

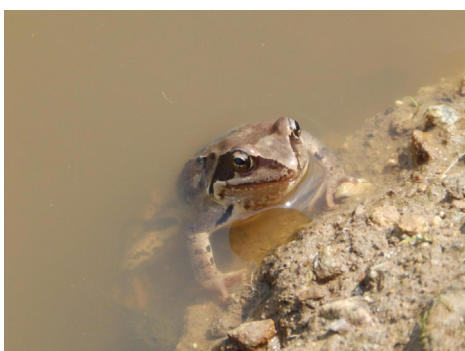


Figure 4. *Rana temporaria*, adult in cattle waterhole, near Râncea, photo Oana Iftime.



Figure 5. *Rana dalmatina*, adult, Iezureni, photo Al. Iftime.



Figure 6. *Lacerta viridis* and *Podarcis muralis* adults on concrete tube, Ghia valley, photo Oana Iftime.



Figure 7. *Anguis colchica*, young female, Gilort valley, photo Al. Iftime.

Table 2. Distribution of recorded species in transects.

Species	Distribution in investigated sites	Observations
<i>Salamandra salamandra</i>	1, 5, 9, 10, 11	-
<i>Lissotriton vulgaris</i>	4, 9, 16	-
<i>Ichthyosaura alpestris</i>	1, 2, 5, 10	-
<i>Bombina bombina</i>	14	-
<i>Bombina variegata</i>	1, 2, 5, 8, 9, 10, 11	-
<i>Bufo bufo</i>	1, 2, 9, 10	-
<i>Hyla arborea</i>	1, 2	-
<i>Rana dalmatina</i>	3, 4, 5, 6, 7, 8, 11, 12, 14, 15, 16, 17, 18	In lower hills and lowermost tracts of montane valleys
<i>Rana temporaria</i>	1, 2, 5, 8, 9, 10, 11	-
<i>Pelophylax ridibundus</i>	8, 13, 14, 16	-
<i>Pelophylax kl. esculentus</i>	16	-
<i>Lacerta agilis</i>	1, 2, 5, 8, 9, 10	-
<i>Lacerta viridis</i>	2, 8, 11	Western part of site and lower ridge towards Rânca
<i>Podarcis muralis</i>	5, 9, 10, 11	-
<i>Zootoca vivipara</i>	1, 5	-
<i>Anguis colchica</i>	5, 8, 9	-
<i>Zamenis longissimus</i>	8	Western part of site
<i>Coronella austriaca</i>	19	-
<i>Natrix natrix</i>	1, 9	-

Table 3. The occurrence of amphibian and reptile species in different habitat types in the study area.

Species	Mixed broadleaf forest	Beech forest	Beech-spruce forest	Spruce forest	Alpine and subalpine grassland	Secondary grassland or orchard with ponds and marshes
<i>Salamandra salamandra</i>	+	+	+	-	-	-
<i>Ichthyosaura alpestris</i>	-	+	+	+	+	-
<i>Lissotriton vulgaris</i>	+	+	-	-	-	+
<i>Bombina variegata</i>	+	+	+	+	+	+
<i>Bombina bombina</i>	-	-	-	-	-	+
<i>Bufo bufo</i>	+	+	+	+	+	-
<i>Hyla arborea</i>	+	-	-	-	+	-
<i>Rana temporaria</i>	+	+	+	+	+	-
<i>Rana dalmatina</i>	+	-	-	-	-	+
<i>Pelophylax ridibundus</i>	+	-	-	-	-	+
<i>Pelophylax kl. esculentus</i>	-	-	-	-	-	+
<i>Lacerta viridis</i>	+	+	-	-	-	-
<i>Lacerta agilis</i>	+	+	+	+	-	-
<i>Zootoca vivipara</i>	-	+	+	+	+	-
<i>Podarcis muralis</i>	+	+	+	+	-	-
<i>Anguis colchica</i>	+	+	+	-	-	-
<i>Coronella austriaca</i>	-	-	-	-	-	+
<i>Zamenis longissimus</i>	+	-	-	-	-	-
<i>Natrix natrix</i>	+	+	-	-	-	-

The reptiles we found all occur within the site or upon its limits, except for *Coronella austriaca* which is recorded at Zorlești – but we consider it not unlikely for it to also live within the site, for the conditions appear favourable.

We must, however, discern a pattern in the herpetofauna distribution in the study area. Most of the “Nordul Gorjului de Est” is inhabited by an assemblage of “montane”, cold-tolerant species (*Salamandra salamandra*, *Ichthyosaura alpestris*, *Lisso-*

triton vulgaris, *Bufo bufo*, *Rana temporaria*, *Lacerta agilis*, *Podarcis muralis*, *Zootoca vivipara*, *Anguis colchica*), while species less tolerant of cold conditions (*Rana dalmatina*, *Pelophylax ridibundus*, *Lacerta viridis*, *Zamenis longissimus*) penetrate but little within the site, at the lowermost of the valleys or on sunny ridges such as that leading to Rânca, or at the western edge of the site. This is in stark contrast with the hills beyond (and below) the site where *Rana dalmatina* is frequent and *R. temporaria*

Table 4. The occurrence of reproducing amphibians in different types of water bodies in the study area.

Species	Slow-flowing brooks	Small, temporary ponds	Large, permanent ponds	Man-made ditches
<i>Salamandra salamandra</i>	+	+	-	-
<i>Ichthyosaura alpestris</i>	+	+	+	+
<i>Lissotriton vulgaris</i>	-	+	+	+
<i>Bombina variegata</i>	+	+	+	+
<i>Bombina bombina</i>	-	-	-	+
<i>Bufo bufo</i>	+	+	+	+
<i>Hyla arborea</i>	-	-	+	-
<i>Rana temporaria</i>	+	+	+	+
<i>Rana dalmatina</i>	+	+	+	+
<i>Pelophylax ridibundus</i>	-	+	+	+
<i>Pelophylax</i> kl. <i>esculentus</i>	-	-	+	+

is altogether absent, *Bombina variegata* was not found and *B. bombina* appears at one station. This is also in contrast with the situation in the Jiu gorges and the corresponding Vâlcan mountains and hills west of the Jiu gorges where thermophilic elements (*Darevskia (praticola) pontica*, *Vipera amodytes*) are found, *Bombina bombina* comes close to the mountains and hybridizes with *B. variegata*, and cryophilic elements such as *Ichthyosaura alpestris* and *Zootoca vivipara* are confined to a few locations (Covaciu-Marcov et al. 2009, Iftime & Iftime 2011). This might be partly due to the microclimatic effect of the foehn winds that blow in spring down the slopes of the Vâlcan mountains (Măciu et al. 1982); this effect probably extends to the westernmost part of our study area (Sadu and Ghia valleys) but not further to the east where there is no foehn but, on the contrary, we observed that very cold katabatic winds occur sometimes in early spring.

On the whole, the „Nordul Gorjului de Est” has a relatively rich herpetofauna, distinct from that of closely situated Natura 2000 sites of comparable size, and the adequate protection of the species for which it is designated shall also benefit numerous other interesting species of amphibians and reptiles.

References

- Bazilescu, E., Sorescu, C., Cruce, M., Popescu, M. (1980): Catalogul sistematic al colectiilor de vertebrate din Muzeul Olteniei. Oltenia. Studii și Comunicări, Muzeul Olteniei, Craiova 1980: 311-401.
- Bogdan, H.V., Ilieș, D., Covaciu-Marcov, S.D., Cicort-Lucaciu A.Ș., Sas, I. (2011): Contributions to the study of the herpetofauna of the western region of the Poiana Ruscă Mountains and its surrounding areas. North-western Journal of Zoology 7(1): 125-131.
- Cogălniceanu, D., Aioanei, F., Matei, B. (2000): Amfibienii din România. Determinator. Editura Ars Docendi, Bucharest, 100 pp. [in Romanian]
- Cogălniceanu, D., Băncilă, R., Samoilă, C., Hartel, T. (2008): The current distribution of herpetofauna in the Maramureș County and the Maramureș Mountains Nature Park, (Maramureș, Romania). Transylvanian Review of Systematic and Ecological Research 5: 189-200.
- Cogălniceanu, D., Székely, P., Samoilă, C., Iosif, R., Tudor, M., Plăiașu, R., Stănescu, F., Rozyłowicz, L. (2013): Diversity and distribution of amphibians in Romania. ZooKeys 296: 35-57.
- Covaciu-Marcov, S.D., Cicort-Lucaciu, A.Ș., Ile, R.D., Pascondea, A., Vatamaniuc, R. (2007). Contribution to the study of the geographical distribution of the herpetofauna in the north-east area of Arad county in Romania. Herpetologica Romanica 1: 62-69.
- Covaciu-Marcov, S.D., Cicort-Lucaciu, A.Ș., Sas, I., Moșu, A.G., Toth, B. (2008): Contributions to the knowledge of the composition and geographical distribution of the Western Maramureș County herpetofauna. Herpetologica Romanica 2: 27-36.
- Covaciu-Marcov, S.D., Cicort-Lucaciu, A.Ș., Dobre, F., Ferenți, S., Birceanu, M., Mișuț, R., Strugariu, A. (2009): The herpetofauna of the Jiului Gorge National Park, Romania. North-Western Journal of Zoology 5(1): 501-578.
- Covaciu-Marcov, S.D. (2010): Data upon the presence of *Ablepharus kitaibelli* in the Getic Piedmont, Gorj County, Romania. North-Western Journal of Zoology 6(2): 316-318.
- Cruz, A., Benedicto, J., Gil, A. (2011): Socio-economic benefits of Natura 2000 in Azores Islands - a case study approach on the ecosystem services provided by a Special Protected Area. In: Proceedings of the 11th International Coastal Symposium, 1955-1959. Szczecin, Poland. Journal of Coastal Research, SI 64: 1955-1959.
- Fuhn, I. (1960): Amphibia. In: Fauna R.P.R., Vol.14, fasc.1. Editura Academiei R.S.R., Bucharest. [in Romanian]
- Fuhn, I., Vancea, St. (1961): Reptilia. In: Fauna R.P.R., Vol.14, fasc.2. Editura Academiei Române. Bucharest. [in Romanian]
- Ghiurcă, D., Roșu, S., Gherghel, I. (2005): Preliminary data concerning the herpetofauna in Neamț county (Romania). Analele Universitatii din Oradea, Fascicula Biologie 12: 53-62.
- Hartel, T., von Wehrden, H. (2013): Farmed Areas Predict the Distribution of Amphibian Ponds in a Traditional Rural Landscape. PLoS ONE 8(5): e63649.
- Iftime, A., Iftime, O. (2010): Contributions to the knowledge of the herpetofauna of the Eastern Jiu and Upper Lotru drainage basins (Southern Carpathians, Romania). Travaux du Museum National d'Histoire Naturelle „Grigore Antipa” 53: 273-286.
- Iftime, A., Iftime, O. (2011): Note on the herpetofauna of the Vâlcan mountains and their foothills (Southern Carpathians, Romania). Travaux du Museum National d'Histoire Naturelle „Grigore Antipa” 54(2): 513-521.

- Iftime, A., Iftime, O. (2012): A case of amphibians breeding in sulfurous water in Romania. *Herpetozoa* 25(1/2): 81-83.
- Klaučo, M., Gregorová, B., Stankov, U., Marković, V., Lemenkova, P. (2013): Determination of ecological significance based on geostatistical assessment: a case study from the Slovak Natura 2000 protected area. *Central European Journal of Geosciences* 5(1): 28-42.
- Măciu, M., Chioreanu, A., Văcaru, V. (eds) (1982): *Enciclopedia geografică a României*. Ed. Științifică și Enciclopedică, Bucharest, 847 pp. [in Romanian]
- Petrescu, A., Petrescu, I., Răduleț, N., Iftime, A., Ban, C. (2004): Date faunistice preliminare din zona viitorului Parc Național Defileul Jiului. *Oltenia, Studii și Comunicări, Științele Naturii* 21: 229-240. [in Romanian]
- Sos, T. (2007): Notes on distribution and current status of herpetofauna in the northern area of Brașov county (Romania). *North-Western Journal of Zoology* 3(1): 34-52.
- Strugariu, A., Sahlean, C.T., Huțuleac-Volosciuc, M.V., Pușcașu, M.C. (2006): Preliminary data regarding the distribution of reptilian fauna in Suceava County (Romania). *North-Western Journal of Zoology* 2(1): 39-45.
- Tudor, M., Crăciun, N., Burlacu, L. (2004): Preliminary report on herpetofauna of the becoming National Park "Jiului Gorge". *Oltenia, Studii și Comunicări, Științele Naturii* 21: 269-272.
- Votsi, N.E., Mazaris, A.D., Kallimanis, A.S., Zomeni, M.S., Vogiatzakis, I.N., Sgardelis, S.P., Pantis, J.D. (2012): Road effects on habitat richness of the Greek Natura 2000 network. *Nature Conservation* 1: 53-71.
- Walentowski, H., Schulze, E.D., Teodosiu, M., Bouriaud, O., von Heßberg, A., Bußler, H., Baldauf, L., Schulze, I., Wäldchen, J., Böcker, R., Herzog, S., Schulze, W. (2013): Sustainable forest management of Natura 2000 sites: a case study from a private forest in the Romanian Southern Carpathians. *Annals of Forest Research* 56(1): 217-245.
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