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**CONTRIBUTIONS TO THE KNOWLEDGE OF BIRD (AVES)
AND MAMMAL (MAMMALIA) FAUNA
FROM ZARAND MOUNTAINS (ROMANIA)**

DUMITRU MURARIU, ANGELA PETRESCU, NĂSTASE RĂDULEȚ,
GABRIEL CHIȘAMERA, CORNELIA CEIANU, RALUCA PÂNCULESCU

Abstract. In the Zarand Mountains there is an important specific structure of birds and mammals, unknown as yet. Along time (1845-2008), in the Zarand Mountains, 74 bird species of 12 orders and 30 families were reported. From their preferred habitat point of view, 35 species are characteristic to the deciduous forests, 8 species prefer mixed forests, 2 species the coniferous forests, and 10 species are synanthropic. From the total of 64 bird species observed in 2007 and 2008, 34 species are included in the annexes OU 57/2007 (Romanian Government Ordinance No. 57/2007, on the regime of the protected areas, conservation of the natural habitats, of wild flora and fauna) with different protection degrees. The 39 mammal species belong to 28 genera of 15 families, with representatives of 6 orders: Insectivora, Chiroptera, Lagomorpha, Rodentia, Carnivora and Artiodactyla. A number of 22 species are in decline, and other 29 are threatened. In this respect, it is necessary to make a scientific documentation for declaring protected areas – optimum shelters of the increasing anthropic pressure.

Résumé. Dans les Monts Zarand il existe une importante structure spécifique d'oiseaux et de mammifères, inconnue jusqu'à présent. Au cours de longues années (1845-2008) on y a observé 74 espèces d'oiseaux appartenant à 12 ordres et 30 familles. Du point de vue de l'habitat préféré 35 espèces d'oiseaux sont caractéristiques pour les forêts de feuillus, 8 espèces préfèrent les forêts mixtes, 2 espèces les forêts de conifères et 10 espèces sont synanthropes. Des 64 espèces d'oiseaux observés au cours des années 2007 et 2008, 34 sont comprises dans les annexes de l'Ordonnance du Gouvernement Roumain No 57/2007 concernant le régime des aires protégées, la conservation des habitats naturels, de la flore et de la faune sauvage, avec divers degrés de protection. Les 39 espèces de mammifères appartiennent à 28 genres de 15 familles, qui représentent 6 ordres: Insectivora, Chiroptera, Lagomorpha, Rodentia, Carnivora et Artiodactyla. Un nombre de 22 espèces enregistrent une tendance de déclin numérique de leurs populations, tandis que 30 espèces sont menacées de disparaître. C'est pourquoi une documentation scientifique est nécessaire pour la déclaration d'aires protégées – des refuges optimums contre la pression anthropique croissante.

Key words: habitats, ecosystems, Zarand Mountains, Romania, bird and mammal species, conservation, economic and cynegetic importance, epidemiology.

INTRODUCTION

The Zarand Mountains belong to the Western Carpathians and have a common border with Codru Moma Mountains and Bihor Mountains, to North, with the Metaliferi Mountains, to East. They are low mountains, with a height between 90-836 m, from which three peaks distinguish: Drocea (836 m), Highiș (799 m) and Husului (814 m). They are East-West directed, and their slopes display South-Northwardly. Southern slope is limited by the Mureș River, and the northern one by Crișul Alb River (Fig. 1), and it also represents the southern limit of the Țara Zarandului (Zarand Land) depression, much better studied from the avifaunal point of view.

English translation by Mihaela Barcan Achim.

From floristic perspective, the Zarand Mountains were well studied. The vegetation of these mountains was studied by Ghişa & Kovacs (1963), Ghişa, Tudoran & Coldea (1971), Pop (1978) and Ardelean (1980, 1994 a, b); there are studies on the acid rain effect and the air pollution consequences in the Zarand Mountains (Ardelean 1986, 1987), but also studies on the preservation and protection of the vegetation in the reservations from the Zarand Mountains (Ardelean, 1975; Ardelean & Maior, 2002). The area has podsolic soils and acid brown (classes spodosoil, respectively cambisol), and the vegetation is characterized by the presence of the coniferous forests, more spread on the summits (spruce fir, fir, pine, larch fir), coniferous and beech mixed forests, grasslands and hayfields, and to the feet, there are orchards and rare plots of land, cultivated with cereals. From faunal point of view, this area was less studied. There is a single recent study on the herpetofauna of the Mureş basin in Arad county, in which the valley of the Juliţa River is also included (Covaciu – Marcov & col., 2005).

In such a natural landscape, with different geological structures and karstic forms, there is an interesting bird and mammal fauna, unfortunately devoid of the specialists' attention.

Our study on birds and mammals of the Zarand Mountains, on the southern slope between localities Juliţa and Slatina de Mureş county (Fig. 1) was made within the project CEEEX 86/2006 "Multidisciplinary research on the circulation and emergence of the zoonotic viruses, agents of the bird flu, of some hemorrhagic fever and of some neuroinvasive infections; an innovating concept on the control at the level of some multiple interfaces: human health/animal health/wild fauna/environment", coordinated by „Ion Cantacuzino” Institute of Bucharest, in which “Grigore Antipa” National Museum of Natural History (Bucharest) was partner.

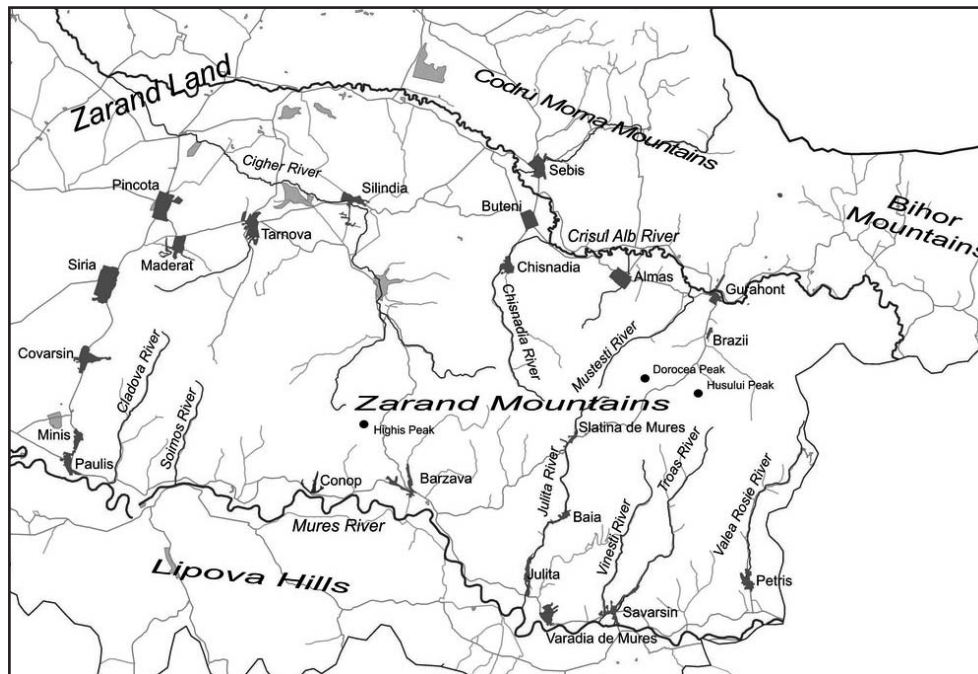


Fig. 1 – Map of the Zarand Mountains, Western Carpathians (Romania).

MATERIAL AND METHOD

Our studies took place between localities Bârzava and Văradia of Mureș county, from the feet of the Zarand Mountains, in the valley of the Julița River, between locality Julița, Baia and Slatina de Mureș, in two subsequent years and two field trips made within the period 20th – 22nd of September 2007 and 30th of June – 3rd of July 2008.

Bird species were observed with the field glasses. We identified laid egg nests, food remains, down and feather found during the habitat research, between localities Julița and Slatina de Mureș. Some of the birds were identified after their song, especially the small Passeriformes, difficult to be observed by the field glasses. We took pictures of the bird preferred habitats, different food remains or egg laid remains, laid eggs and even birds which were identified later.

Mammals were studied within the same periods: 20nd – 22nd of September 2007 and 30th of June – 3rd of July 2008, both in the Baia streamlet valley and along its tributaries, between the localities mentioned above (Fig. 1).

Considering the theme of the mentioned project, we focused on the rodents of the species: *Clethrionomys glareolus* (Schreber, 1780), *Microtus arvalis* (Pallas, 1778), *Apodemus sylvaticus* (Linnaeus, 1758), *Apodemus flavicollis* (Melchior, 1834), in the collecting of the small mammals, when we used different types of traps (mainly those which catch living animals, of Sherman type). For these species we studied mainly the biotopes with deciduous and mixed forests, grasslands, bush areas, most of them along the streamlets.

We established the rodent collecting stations in the characteristic biotopes of the above-mentioned species, as the deciduous and mixed forests, grasslands, bush areas, most of them riparian. They are: A - Belt of the deciduous forest, mixed with sting nettle (*Urtica dioica*), hazel (*Coryllus avellana*), alder (*Alnus glutinosa*) (1st of July 2008) (Fig. 2); B - The bush area at the spruce fir forest belt (*Picea* sp.) and sloping land with beech forest (*Fagus sylvatica*), cleared, now with twigs, bushes (2nd of July 2008); C - Riparian area of the Baia streamlet and of the little tributary with sting nettle (*Urtica dioica*), alder (*Alnus glutinosa*), hazel (*Coryllus avellana*), chamomile (*Matricaria chamomilla*), klammath weed (*Hypericum perforatum*), blackberry (*Rubus idaeus*), (3rd of July 2008) (Fig. 3, above).

Besides the collecting of the small mammals, we made studies on the tracks, paths, burrows, nests, galleries, excrements of any mammal species of the orders Insectivora, Chiroptera, Lagomorpha, Rodentia, Carnivora and Artiodactyla. For the representatives of the last two orders we also based on the rangers' confirmations as well as on the local people, which know very well the species, especially those of hunting interest.

RESULTS AND DISCUSSIONS

BIRDS (Class AVES)

In the old ornithological papers, of the 19th century, on the birds of Transylvania, there are a few data on the Arad area and any observation precisely localized in the Zarand Mountains. We found some citings from literature where it is used the general term of "Zarand county", and therefore, the oldest data on the Zarand avifauna are those of Stetter's (1845), who made the first avifaunal list of Transylvania and who specified some extinct or rare species for this county: *Gyps fulvus*, *Aegypius monachus*, *Aquila heliaca*. He also made a minute description of



Fig. 2 – Above, woodside of the deciduous forest, mixed with sting nettle (*Urtica dioica*), hazel (*Coryllus avellana*), alder (*Alnus glutinosa*) (1st of July 2008). Bottom, the bush area at the spruce fir forest woodside (*Picea* sp.) and sloping land with beech forest (*Fagus sylvatica*), cleared, now with twigs, bushes (2nd of July 2008).



Fig. 3 – Above, riparian area of the Baia streamlet and of the little tributary with sting nettle (*Urtica dioica*), alder (*Alnus glutinosa*), hazel (*Corylus avellana*), chamomile (*Matricaria chamomilla*), klammath weed (*Hypericum perforatum*), blackberry (*Rubus idaeus*). Bottom, lawn area with subarbooreal vegetation at the deciduous forest belt from the surroundings of Baia locality.

the species *Parus lugubris* which he reported from Zarand (after Poliș, 1974). Zeyk (1921) mentions two species, *Ciconia nigra* and *Aquila heliaca*, observed in Zarand county. These observations are from 1849 and published much later, in 1921, supervised by Johannes Csato in "Aquila" journal. Geographer Schmidl (1863), who travelled in Bihor Mountains between 1859 and 1861 made observations also on fauna. He mentioned only the woodcock group which appear after 3 – 4 years, during the spring passage around Sebiș, locality from the feet of the northern slope of Zarand. Simonkai (1888, 1893) is the first who studied the flora and fauna from Arad county. Kormos (1904) studied the fauna from the area between Miniș and Măderat, localities situated close to the eastern side of the Zarand Mountains and made a list with 105 species, after three months of observations. Mihai Băcescu (1961) studied the ornithological folklore from Brad, Gurahonț, Buteni, localities from the feet of the northern slope of the Zarand Mountains.

Table 1

List of the bird species observed in the Zarand Mountains, Arad.

Species	Locality	2007-2008	Prefered habitat	R.G.O. 57/2007
<i>Tachybaptus ruficollis</i> (Pallas, 1764)	Buteni	8. 06. 1968	A	4B
<i>Gavia arctica</i> (Linnaeus, 1758)	Buteni	10. 1964	A	3
<i>Ardea cinerea</i> (Linnaeus, 1758)	Julița	2007	A	
<i>Ciconia ciconia</i> (Linnaeus, 1758)	Bârzava	2007, 2008	A	RB; 3
<i>Ciconia nigra</i> (Linnaeus, 1758)	Zarand County	1845	A	RB; 3
<i>Anas platyrhynchos</i> Linnaeus, 1758	Julița	2007	A	5C
<i>Actitis hypoleucos</i> (Linnaeus, 1758)	Brazi	-	A	4B
<i>Larus fuscus</i> Linnaeus, 1758	Buteni	1967	A	
<i>Aquila chrysaetos</i> Linnaeus, 1758	Gurahonț, Hălmagiu	1968, 1969	FC	RB; 3
<i>Aquila heliaca</i> Linnaeus, 1758	Comitatul Zarand	1845	F	
<i>Circus cyaneus</i> (Linnaeus, 1758)	Zarand Mountains	12. 1969	F	3
<i>Accipiter gentilis</i> (Linnaeus, 1758)	Slatina de Mureș	2007	FC	
<i>Accipiter nisus</i> (Linnaeus, 1758)	Julița	2008	FC	
<i>Buteo buteo</i> (Linnaeus, 1758)	Valea Slatina	2007, 2008	F	
<i>Falco subbuteo</i> Linnaeus, 1758	Sebiș, Bârzava	25. 08. 1966, 2008	F	4B
<i>Falco tinnunculus</i> Linnaeus, 1758	Julița	2007, 2008	F	4B
<i>Columba oenas</i> Linnaeus, 1758	Baia, Valea Slatina	2008	F	5C
<i>Cuculus canorus</i> Linnaeus, 1758	Julița	2008	L, F	
<i>Bubo bubo</i> (Linnaeus, 1758)	Gurahonț	1964	F	RB; 3
<i>Tyto alba</i> (Scopoli, 1769)	Șiria	-	S	RB; 4B
<i>Athene noctua</i> Scopoli, 1769	Baia	2007	S	4B
<i>Asio otus</i> (Linnaeus, 1758)	Julița	2008	F	

Table 1 (continued)

Species	Locality	2007-2008	Preferred habitat	R.G.O. 57/2007
<i>Strix aluco</i> Linnaeus, 1758	Valea Socilor	2008	F	
<i>Picus canus</i> Gmelin, 1788	Valea	2007	F	3
<i>Dendrocopos major</i> (Linnaeus, 1758)	Julița, Valea Crăciuneasa	2007, 2008	L, F	
<i>Dendrocopos medius</i> (Linnaeus, 1758)	Baia	2007, 2008	F	3
<i>Alcedo atthis</i> (Linnaeus, 1758)	Bârzava, Julița, Baia	2007, 2008	A	
<i>Upupa epops</i> Linnaeus, 1758	Julița, Baia	2008	L, F	RB; 4B
<i>Hirundo rustica</i> Linnaeus, 1758	Julița, Baia, Slatina de Mureș	2007, 2008	S	
<i>Delichon urbica</i> (Linnaeus, 1758)	Julița, Baia, Slatina de Mureș	2007, 2008	S	
<i>Motacilla alba</i> Linnaeus, 1758	Julița, Baia	2007, 2008	A	4B
<i>Motacilla cinerea</i> Tunstall, 1771	Baia, Slatina de Mureș, Valea Crăciuneasa	2007, 2008	A	4B
<i>Anthus trivialis</i> (Linnaeus, 1758)	Slatina de Mureș	2008	FC	
<i>Cinclus cinclus</i> (Linnaeus, 1758)	Valea Jidovița	2007, 2008	A	4B
<i>Troglodytes troglodytes</i> (Linnaeus, 1758)	Valea Crăciuneasa, Valea Socilor	2007, 2008	F	
<i>Prunella modularis</i> (Linnaeus, 1758)	Valea Crăciuneasa, Valea Socilor	2007	FC	4B
<i>Sylvia curruca</i> (Linnaeus, 1758)	Slatina de Mureș	2008	L, F	
<i>Sylvia communis</i> Latham, 1787	Julița	2008	F	
<i>Sylvia atricapilla</i> (Linnaeus, 1758)	Julița, Baia	2008	L, F	
<i>Phylloscopus collybita</i> (Vieillot, 1817)	Valea Slatina	2008	F	4B
<i>Phylloscopus sibilatrix</i> (Bechstein, 1793)	Valea Slatina	2008	F	4B
<i>Muscicapa striata</i> (Pallas, 1764)	Julița, Baia	2007, 2008	F	4B
<i>Phoenicurus phoenicurus</i> (Linnaeus, 1758)	Valea Slatina	2008	F	4B
<i>Phoenicurus ochruros</i> Gmelin, 1789	Julița, Baia, Slatina de Mureș	2007, 2008	S	4B
<i>Oenanthe oenanthe</i> (Linnaeus, 1758)	Julița	2008	F	
<i>Erithacus rubecula</i> (Linnaeus, 1758)	Baia, Valea Slatina	2007, 2008	L, F	
<i>Luscinia luscinia</i> (Linnaeus, 1758)	Julița	2008	L, F	
<i>Turdus viscivorus</i> Linnaeus, 1758	Valea Slatina, Slatina de Mureș	2008	FC	5C

Table 1 (continued)

Species	Locality	2007-2008	Preferred habitat	R.G.O. 57/2007
<i>Turdus merula</i> Linnaeus, 1758	Julița, Baia, Valea Slatina, Slatina de Mureș	2007, 2008	FC	
<i>Turdus philomelos</i> C. L. Brehm, 1831	Julița, Baia	2008	F, FC	5C
<i>Parus ater</i> (Linnaeus, 1758)	Valea Socilor	2007, 2008	F	
<i>Parus caeruleus</i> (Linnaeus, 1758)	Câmpul Măgura, Valea Slatina, Slatina de Mureș	2007, 2008	L, F	
<i>Parus major</i> Linnaeus, 1758	Julița, Baia, Slatina de Mureș	2007, 2008	L, F	
<i>Aegithalos caudatus</i> Linnaeus, 1758	Valea Crăciuneasa	2007, 2008	F	4B
<i>Lanius collurio</i> Linnaeus, 1758	Baia	2008		3
<i>Oriolus oriolus</i> (Linnaeus, 1758)	Julița, Baia	2008	F, L	4B
<i>Sturnus vulgaris</i> Linnaeus, 1758	Julița, Baia	2007, 2008	S	5C
<i>Passer domesticus</i> (Linnaeus, 1758)	Julița, Baia, Slatina de Mureș	2007, 2008	S	
<i>Passer montanus</i> (Linnaeus, 1758)	Julița, Baia, Slatina de Mureș	2007, 2008	S	
<i>Sitta europaea</i> Linnaeus, 1758	Julița, Valea Slatina	2007, 2008	L, FC	4B
<i>Certhia familiaris</i> (Linnaeus, 1758)	Valea Ungurului	2008	FC	
<i>Fringilla coelebs</i> Linnaeus, 1758	Câmpul Măgura, Valea Slatina, Slatina de Mureș, V. Crăciuneasca	2007, 2008	FC, L	
<i>Emberiza citrinella</i> Linnaeus, 1758	Slatina de Mureș	2007, 2008	L, F	
<i>Carduelis carduelis</i> (Linnaeus, 1758)	Julița, Bârzava, Baia	2007, 2008	L, F	4B
<i>Carduelis chloris</i> (Linnaeus, 1758)	Julița, Baia	2007, 2008		4B
<i>Coccothraustes coccothraustes</i> (Linnaeus, 1758)	Dealul Dobrețului, Baia	2008	L	4B
<i>Loxia curvirostra</i> Linnaeus, 1758	Slatina de Mureș	2008	C	
<i>Pyrrhula pyrrhula</i> (Linnaeus, 1758)	Valea Socilor	2008	C	
<i>Garrulus glandarius</i> (Linnaeus, 1758)	Baia, Slatina de Mureș	2007, 2008	FC	5C

Table 1 (continued)

Species	Locality	2007-2008	Prefered habitat	R.G.O. 57/2007
<i>Pica pica</i> (Linnaeus, 1758)	Julița, Baia	2007, 2008	S, L	5C
<i>Corvus corax</i> Linnaeus, 1758	Julița, Baia	2007, 2008	F, L	RB; 4B
<i>Corvus corone</i> Linnaeus, 1758	Julița, Baia	2007, 2008	F	5C
<i>Corvus monedula</i> (Linnaeus, 1758)	Bârzava	2007, 2008	S	5C
<i>Nucifraga caryocatactes</i> (Linnaeus, 1758)	Slatina de Mureș	2007, 2008	FC	4B

A = aquatic species; Si = synanthropic; F = species of beech forests; FC = euristic species from mixed forests, deciduous and coniferous; L = orchards.

R.G.O. 57/2007 (with annexes) – Romanian Government Ordinance No. 57/2007, on the regime of the protected areas, conservation of the natural habitats, of wild flora and fauna; Annexa 3 = bird species whose conservation needs the establishing of some special avifaunal areas; 4B = species of national interest who need special protection; 5C = species of local interest whose hunting is allowed; 5D = species whose commercialization is allowed.

R.B.V.R./2005 = Red Book of Vertebrates from Romania/2005.

Poliș (1974) studied the avifauna of the Zarand Land, depression area placed to the North of the Zarand Mountains and crossed by Crișul Alb. The author studied the old papers which referred to the avifauna of this area, private collections from the area, to which her own observations are added. The list of the observed species in this area along time is of 124 species. From this list we selected eight species which were observed and collected from the localities from the feet of the Zarand Mountains, northern slope: *Tachybaptus ruficollis*, *Gavia arctica*, *Larus fuscus*, *Aquila chrysaetos*, *Circus cyaneus*, *Falco subbuteo*, *Bubo bubo*, *Tyto alba*. Collecting places and data of these species are presented in the table 1.

Tachybaptus ruficollis, *Gavia arctica*, *Larus fuscus* are aquatic birds and their association with a mountain area seems strange. We explain their collecting from this area by the fact that these aquatic birds have to cross the Zarand Mountains in their way from the floodplain of Mureș River to the wet areas between the Criș rivers, they being transversally laid in this migration way. Low heights of these mountains of maximum 836 m made them easily to be crossed by different bird species. We support this conclusion just by our observations from September 2007, when solitary specimens of *Ardea cinerea* crossed the mountain towards night, from Mureș floodplain to North. Also, flocks of 2-4 specimens of mallards, *Anas platyrhynchos*, crossed this mountain on the fly. At the beginning of September, in 2007, when we made those observations, the weather was fine, enough warm, and the aquatic birds made local migrations for food, between Mureș River and Criș rivers, crossing this mountains whose slopes were East-Westwardly directed, that means transversally with this local migration way.

From the “Catalogue of the ornithological collection of the Museum of Oradea” (Kovats, Poliș & Beczy, 1970) we found out that a juvenile female of *Aquila chrysaetos* was captured, on the 17th of June 1968, at Gurahonț, locality placed on the northern slope of the Zarand Mountains, over Drocea peak and at

some tens of kilometres far from Slatina de Mureş. This specimen lived in captivity, in the Zoo of Oradea, till in January 1969. *Aquila chrysaetos* is also reported by Korodi Gal (1976) as a species present in the Apuseni Mountains, probably as a nestling species. As we know, eagles have large territories, and the young birds of this species migrate searching for new feeding territories, after they leave the nest, and thus they can be occurred in the afforested mountains from the surrounding areas. Even the adult specimens go down to lower altitudes within unfavourable conditions (lack of food, heavy winters with abundant snow).

During the two years, 2007 and 2008, we observed 64 bird species to which ten species from literature were added, totally 74 species. It is the first list of the avifauna of the Zarand Mountains. In 2007, we made observations at the half of September and we made a list with 40 species. In 2008, we observed 57 species during the summer period, the beginning of July, which corresponds to the reproduction period of the birds and of chicken flight. The 74 species, observed along time in the Zarand Mountains, belong to 12 orders and 30 families. Passeriformes are prevalent, represented by 46 species of 14 families (Tab. 1).

Studied area has a large variety of habitats, where the arboreal vegetation is prevalent. Deciduous forests cover the two slopes of Juliţa Valley. In the upper side of the streamlet, beyond Slatina de Mureş, in Valea Crăciuneasca and Valea Ungurului, the slopes are covered with venerable beech forests associated with oak, and in Valea Socilor the slopes are covered with hornbeam forests associated with beech, the altitude being between 400-500 m.

Downstream Slatina de Mureş and upstream Baia there are spruce fir islands and unexpectedly, upstream Juliţa, on the right slope of Juliţa Valley, there is a fir forest, at an altitude of 300 m. Also, around localities there are plum tree orchards and numerous clearings. In the deciduous woodside bush and shrub areas occur, with species of: *Sylvia curucca*, *S. communis*, *Turdus merula*, *Erithacus rubecula*, *Luscinia luscinia*. *Lanius collurio* prefers alder areas (*Alnus glutinosa*), hazel (*Corylus avellana*) and blackberry (*Rubus idaeus*) areas, upstream Baia (Fig. 3, bottom).

This unexpected vegetation mosaic shelters an important variety of birds. Some of them prefer deciduous forest, and they are the most numerous, over 35 species, others are characteristic to the mixed forests, deciduous and coniferous (8 species), and two species are specific to the coniferous forests; some of the species from the deciduous forests were observed also in orchards (17 sp.); 12 bird species prefer the aquatic habitats, and 10 species are synanthropic.

From the conservation point of view, from the 64 bird species observed in 2007 and 2008, 34 species are included in the annexes OU 57/2007 (Romanian Government Ordinance No. 57/2007, on the regime of the protected areas, conservation of the natural habitats, of wild flora and fauna) with different protection groups. Thus *Ciconia ciconia*, *Picus canus*, *Dendrocopos medius*, *Lanius collurio* are bird species whose conservation needs the establishing of special avifaunal areas (Annex 3). Other 21 species are included in the annex 4B within the species of national interest which need a special protection, 9 species are in the annex 5C within the species of local interest, whose hunting is allowed and a single species is included in the annex 5D, within the species whose commercialization is allowed. Also, *Ciconia ciconia*, *Upupa epops*, *Corvus corax* are included in the "Red Book of the Romanian Vertebrates".

MAMMALS (Class MAMMALIA)

Local people and the rangers from the area which we studied know especially the middle and large sized mammals (rabbits, wolves, foxes, badgers, martens, wild cats, wild boars, deers, stags). Their knowledge on micromammals (insectivores, chiropterans, rodents) is general, vague. For instance, insectivores and rodents are grouped in the same category, of *mice*, and chiropterans as *bats*, without distinguishing the species.

Taking into consideration the purpose of the mentioned project, and as it was underlined, the knowledge of the health state of the following rodent species was the prior element: *Clethrionomys glareolus* (Schreber, 1780) – Bank vole; *Microtus arvalis* (Pallas, 1778) – Common vole; *Apodemus sylvaticus* (Linnaeus, 1758) – Wood mouse and *Apodemus flavicollis* (Melchior, 1834) – Yellow-necked mouse. From them, no specimen of *Microtus arvalis* was collected, that means that this species is not present in the studied area. Body measurements (in mm) and weight (in g) for the 55 small mammal specimens, which were sampled according to the project, are presented in table 2.

Small mammals (insectivores and rodents), collected in 2007 and 2008 from the Zarand Mountains.

Table 2

MEASUREMENTS (mm)		SPECIES					
		<i>Sorex minutus</i> Linnaeus, 1766	<i>Myoxus glis</i> (Linnaeus, 1766)	<i>Clethrionomys glareolus</i> (Schreber, 1780)	<i>Apodemus agrarius</i> (Pallas, 1771)	<i>Apodemus sylvaticus</i> (Linnaeus, 1758)	<i>Apodemus flavicollis</i> (Melchior, 1834)
Length	Min.	54	130	78	64	80	78
	Max.	64		104	95	106	110
	Med.	57.08		92.2	74.57	88.3	94.04
Tail	Min.	37	115	35	55	81	74
	Max.	56		50	81	105	108
	Med.	42.6		41.4	64	83.66	95.21
Hind foot	Min.	8	27	14	13	17	22
	Max.	13		18	20	24	25
	Med.	9.3		16.4	17.57	21.7	23.72
Ear	Min.	5	17	10	10	11	12
	Max.	7		15	13	19	20
	Med.	6		12.2	10.71	16.1	16.09
Wieght	Min.	3	55	-	7	14.5	19
	Max.	7		-32	28	41	
	Med.	5		-	15.57	19.81	25.06
Sex	♂	1	1	6	4	1	14
	♀	4		4	3	9	8
No. of specimens		5	1	10	7	10	22
Total		55 (27 ♂ + 28 ♀)					

Because we also observed the presence of other mammal species besides those ones (of immediate interest, for contact), on the one hand, and on the other side we remarked that no kind of study was made on this group of vertebrates from the Zarand Mountains, we consider useful the following list:

Order INSECTIVORA Bowdich, 1821

Family Erinaceidae Bonaparte, 1838

Erinaceus concolor Martin, 1838 (European hedgehog)

Family Talpidae Gray, 1825

Talpa europaea Linnaeus, 1758 (European mole)

Family Soricidae (Gray, 1821)

Sorex araneus Linnaeus, 1758 (Common shrew)

Sorex minutus Linnaeus, 1766 (Pygmy shrew)

Neomys fodiens (Pennant, 1771) (Water shrew)

Neomys anomalus Cabrera, 1907 (Mediterranean water shrew)

Crociodura suaveolens (Pallas, 1811) (Lesser white-toothed shrew)

Order CHIROPTERA Blumenbach, 1779

Family Rhinolophidae Bell, 1836

Rhinolophus ferrumequinum (Schreber, 1774) (Great horseshoe bat)

Rhinolophus hipposideros (Bechstein, 1800) (Lesser horseshoe bat)

Family Vespertilionidae (Gray, 1821)

Myotis myotis (Borkhausen, 1779) (Great mouse-eared bat)

Myotis blythii (Tomes, 1857) (Lesser mouse-eared bat)

Myotis brandti (Eversmann, 1845) (Brandt's bat)

Myotis emarginatus (E. Geoffroy, 1806) (Geoffroy's bat)

Plecotus auritus (Linnaeus, 1758) (Brown long-eared bat)

Eptesicus serotinus Schreber, 1774 (Serotine bat)

Miniopterus schreibersii (Kuhl, 1819) (Schreibers's long-fingered bat)

Pipistrellus nathusii (Keyserling and Blasius, 1839) (Nathusius's pipistrelle)

Pipistrellus pipistrellus (Schreber, 1774) (Common pipistrelle)

Nyctalus noctula (Schreber, 1774) (Common noctule)

Order LAGOMORPHA Brandt, 1855

Family Leporidae Gray, 1821

Lepus europaeus Pallas, 1778 (Brown hare)

Order RODENTIA Bowdich, 1821

Family Sciuridae Gray, 1821

Sciurus vulgaris (Linnaeus, 1758) (Red squirrel)

Family Myoxidae Gray, 1821

Dryomys nitedula (Pallas, 1779) (Tree dormouse)

Family Arvicolidae Gray, 1821

Arvicola terrestris (Linnaeus, 1758) (European water vole)

1836) *Microtus* (= *Pitymys* Mc Murtrie, 1831) *subterraneus* (de Séllys-Longschamps, 1836) (European pine vole)

Microtus arvalis (Pallas, 1779) (Common vole)

Ondatra zibethicus (Linnaeus, 1766) (Muskrat)

Family Muridae Gray, 1821

Apodemus sylvaticus (Linnaeus, 1758) (Wood mouse)

Apodemus flavicollis (Melchior, 1834) (Yellow-necked mouse)

Apodemus agrarius (Pallas, 1771) (Striped field mouse)

Rattus norvegicus (Berkenhout, 1769) (Brown rat)

Mus musculus Linnaeus, 1766 (House mouse)

Order CARNIVORA Bowdich, 1821

Family Canidae Gray, 1821

Vulpes vulpes (Linnaeus, 1758) (Fox)

Family Mustelidae Swainson, 1835

Meles meles (Linnaeus, 1758) (Badger)

Martes martes (Erxleben, 1777) (Pine marten)

Mustela putorius (Linnaeus, 1758) (European polecat)

Mustela nivalis Linnaeus, 1766 (Least weasel)

Family Felidae Gray, 1821

Felis silvestris Schreber, 1777 (Wild cat)

Order ARTIODACTYLA Owen, 1848

Family Suidae Gray, 1821

Sus scrofa Linnaeus, 1758 (Wild boar)

Family Cervidae Gray, 1821

Capreolus capreolus (Linnaeus, 1758) (Roe deer)

This list is not complete, the study on mammals of the Zarand Mountains identifying other species in the future, as: *Talpa caeca* and *Crocidura leucodon* (from insectivores), *Myotis daubentonii*, *M. alcathoe*, *Plecotus austriacus*, *Pipistrellus pygmaeus*, *P. kuhlii*, *Hypsugo savii* (from chiropterans), *Muscardinus avellanarius*, *Eliomys quercinus*, *Microtus agrestis*, *Micromys minutus*, *Apodemus uralensis* and *Rattus rattus* (from rodents), *Canis lupus*, *Lutra lutra* (from carnivores), *Cervus elaphus* (from artiodactyls).

Considering the tendencies in population evolution, the 39 mammal species are included in IUCN statute of conservation and in the national and international laws on the regime of the protected areas, conservation of the natural habitats, of wild flora and fauna (Tab. 3).

Table 3

List of mammal species from Zarand Mountains. Trend of their populations' evolution, IUCN status and existing national and international conservation measures (according to field observations and Romanian literature).

Species	Trend of population	IUCN status	Conservation measures	
			International	National
<i>Erinaceus concolor</i>	D	E	none	none
<i>Talpa europaea</i>	PS	dd	none	none
<i>Sorex araneus</i>	D	V	A III, BC/79	none
<i>Sorex minutus</i>	D	dd	A III, BC/79	none
<i>Neomys fodiens</i>	Dd	E	A III, BC/79	RBVR/05
<i>Neomys anomalus</i>	Dd	E	A III, BC/79	A 4, RGO 57/07; RBVR/05
<i>Crocidura suaveolens</i>	D	NT	A III, BC/79	RBVR/05
<i>Rhinolophus ferrumequinum</i>	Dd	E	A II, BC/79; A II, BNC/82; A II and A IV, EUHSD/92	L 90/00; A 4A, RGO 57/07; RBVR/05
<i>Rhinolophus hipposideros</i>	D	NT	A II, BC/79; A II, BNC/82; A II and A IV, EUHSD/92	L 90/00; A 4A, RGO 57/07; RBVR/05
<i>Myotis myotis</i>	PS	NT	A II, BC/79; A II, BNC/82; A II and A IV, EUHSD/92	L 90/00; A 4A, RGO 57/07; RBVR/05
<i>Myotis blythii</i>	Dd	E	A II, BC/79; A II, BNC/82; A II and A III, EUHSD/92	L 90/00; A 3 and A 4A, RGO 57/07; RBVR/05
<i>Myotis brandti</i>	Dd	E	A II, BC/79; A II, BNC/82; A IV, EUHSD/92	L 90/00; A 4A, RGO 57/07; RBVR/05
<i>Myotis emarginatus</i>	Dd	E	A II, BC/79; A II, BNC/82; A IV, EUHSD/92	L 90/00; A 4A, RGO 57/07; RBVR/05
<i>Plecotus auritus</i>	Dd	E	A II, BC/79; A II, BNC/82; A IV, EUHSD/92	L 90/00; A 4A, RGO 57/07; RBVR/05
<i>Eptesicus serotinus</i>	Dd	E	A II, BC/79; A II, BNC/82; A II and A IV, EUHSD/92	L 90/00; A 3 and A 4A, RGO 57/07; RBVR/05
<i>Miniopterus schreibersii</i>	Dd	E	A II, BC/79; A II, BNC/82; A II and A IV, EUHSD/92	L 90/00; A 3 and A 4A, RGO/ 57/07; RBVR/05
<i>Pipistrellus nathusii</i>	Dd	E	A II, BC/79; A II, BNC/82; A IV, EUHSD/92	L 90/00; A 4A, RGO 57/07; RBVR/05
<i>Pipistrellus pipistrellus</i>	PS	LC	A II, BC/79; A II, BNC/82; A IV, EUHSD/92	L 90/00; A 4A, RGO 57/07
<i>Nyctalus noctula</i>	PS	LC	A II, BC/79; A II, BNC/82; A IV, EUHSD/92	L 90/00; A 4A, RGO 57/07
<i>Lepus europaeus</i>	PS	LC	A III, BC/79 included in <i>L. capensis</i>	A 1, L 103/96; A 5B, RGO 57/07

Table 3 (continued)

Species	Trend of population	IUCN status	Conservation measures	
			International	National
<i>Sciurus vulgaris</i>	PS	NT	A III, BC/79	A 1, L 103/96; A 5B, RGO 57/07
<i>Dryomys nitedula</i>	Dd	E	A III, BC/79; A IV, EUHSD/92	A 4A, RGO 57/07; RBVR/05
<i>Arvicola terrestris</i>	Dd	V	none	RBVR/05
<i>Microtus subterraneus</i>	Dd	NT	none	none
<i>Microtus arvalis</i>	PS	LC	none	none
<i>Ondatra zibethicus</i>	PI	LC	none	A 1, L 103/96; A 5B, RGO 57/07
<i>Apodemus sylvaticus</i>	PS	LC	none	none
<i>Apodemus flavicollis</i>	D	LC	none	none
<i>Apodemus agrarius</i>	D	LC	none	none
<i>Rattus norvegicus</i>	PI	LC	none	none
<i>Mus musculus</i>	PI	LC	none	none
<i>Vulpes vulpes</i>	D	LC	none	A 1, L103/96; A 5B, RGO 57/07; RBVR/05
<i>Meles meles</i>	Dd	V	A III, BC/79	A 1, L103/96; A 5B, RGO 57/07
<i>Martes martes</i>	PS	LC	A III, BC/79; A V, EUHSD/92	A 1, L103/96; RBVR/05
<i>Mustela putorius</i>	PS	LC	A III, BC/79; A V, EUHSD/92	A 1, L103/96; A 5B, RGO 57/07
<i>Mustela nivalis</i>	PS	NT	A III, BC/79	A 1, L103/96; A 5B, RGO 57/07
<i>Felis silvestris</i>	PS	NT	A II, BC/79; A IV, EUHSD/92; A II, CITES	A 2, L 103/96; A 4A, RGO 57/07; RBVR/05
<i>Sus scrofa</i>	PI	LC	A III, BC/79 for <i>S. s. meridionalis</i>	A 1, L 103/96; A 5B, RGO 57/07
<i>Capreolus capreolus</i>	PS	LC	A III, BC/79	A 1, L 103/96; A 5B, RGO 57/07; RBVR/05

Abbreviations:

NT = near threatened; E= endangered; dd= data deficient; V= vulnerable; LC=least concern.

D = in decline; Dd= in drastic decline; PS= population stable; PI=population increase.

A = Annexes (I, II... or 1, 2 ...).

BC = Bern Convention (with annexes), 1979.

EU = Habitats Directive (with annexes), 92/43/EEC with animal and plant species which need specific measures for habitat conservation.

BNC = Bonn Convention/1982 (with annexes).

L 103/96= Law 103/1996 (with annexes) of hunting fund and game species protection: Annex No. 1 – Wild fauna of hunting interest, with hunting permission. Periods of hunting and the amount of identification in case of illegal actions; Annex No. 2 – Hunting mammal and bird species with prohibited hunting as well as the amount of identification in case of illegal actions.

L 90/00 = Adhesion Law 90/2000 of Romania to the Agreement on the bat conservation in Europe, approved in London, on the 4th of December 1991.

R.G.O. 57/07 (with annexes) = Romanian Government Ordinance No. 57/2007, on the regime of the protected areas, conservation of the natural habitats, of wild flora and fauna.

R.B.V.R./05 = Red Book of Vertebrates from Romania/2005.

Taking into consideration the population evolution tendencies of the 39 mammal species reported from the Zarand Mountains (Tab. 3), 13 species can be considered having stable populations, other 10 declining in the number of individuals, and 12 species are in drastic decline. Only four species (*Ondatra zibethicus*, *Rattus norvegicus*, *Mus musculus* and *Sus scrofa*) recorded an increasing of their populations. The first species is in a continuous distribution along all water flows. The next two are competitive both because they are synanthropic, foraging easily and finding good shelters among the human ones, and because they adapted to live in natural ecosystems, at least in warm seasons. Finally, the last species is of a wide hunting and economic interest, and it is protected, nationally and internationally, and recorded an increasing of its population all around the country.

As regards IUCN statute, from the same 39 species, 15 do not need special protection. For another two species there are not sufficient data on the estimation of their populations. Three species are vulnerable, seven almost threatened and 12 threatened. It results the need of documentation on declaring some protected areas in the Zarand Mountains.

Also, from table 3, it results that in the annexes of the national legislation there are included 28 mammal species from the Zarand Mountains, which need special habitats and protected areas, and in the annexes of the European legislation, there are 27 species, with the same protection needs.

In conclusion, the over 74 bird species observed in the Zarand Mountains along time belong to 12 orders and 30 families. From the preferred habitat point of view, the birds characteristic to the deciduous forests are prevalent (35 sp.), eight species prefer the mixed forests, and two species, the coniferous ones; from the arboreal species, some of them prefer the orchards in this area (17 sp.). Some of the arboreal species can be also occurred in other habitats (Tab. 1); other 12 species are aquatic, and 10 species are synanthropic.

Also, we think that the Zarand Mountains are crossed frequently by birds both during annual migrations and during the local feeding ones, being a barrier between the Mureş floodplain and the wet areas of the Criş rivers. The list presented by us is a preliminary one, that is why we consider that new elaborated studies on the vertebrate fauna of these mountains will reveal important aspects, especially because the area represents a white spot from the biodiversity point of view. Also, the forest habitat deterioration, because of the massive cuttings of the ancient forest of the area, will have led to irreversible changes of the biodiversity before they will be known at least from the species lists.

Collected or observed mammals, reported for the Zarand Mountains, sum up 39 species which belong to 28 genera of 15 families. For the fauna of this area, all of them represent the orders Insectivora, Chiroptera, Lagomorpha, Rodentia, Carnivora and Artiodactyla.

Only the populations of four mammal species, reported from Zarand Mountains, recorded an increasing of the number of the individuals. Other 13 species have relatively stable populations, and 22 species have their populations in decline. This situation suggests the need of the necessary steps for declaring some protected areas, for offering them optimum refuges.

Besides the importance of the mammal species within the trophic relations from the ecosystems of the studied area or the importance of some of them from economical or hunting point of view, there are some species (mainly rodents) important in epidemiology.

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CONTRIBUȚII LA CUNOAȘTEREA FAUNEI DE PĂSĂRI (AVES)
ȘI MAMIFERE (MAMMALIA) DIN MUNȚII ZARANDULUI (ROMÂNIA)

REZUMAT

Munții Zarandului au fost mai puțin în atenția specialiștilor pentru cunoașterea speciilor de păsări sau chiar totalocoliți pentru raportarea mamiferelor. Pe baza colectărilor și observațiilor în zonă, în anii 2007 și 2008 am inventariat 64 specii de păsări și 39 specii de mamifere. În decursul timpului în Munții Zarandului au fost observate peste 74 de specii de păsări, care aparțin la 12 ordine și 30 de familii. Din punct de vedere al habitatului preferat, majoritare sunt păsările caracteristice pădurilor de foioase (35 sp.), opt specii preferă pădurile mixte, iar două specii pădurile de conifere; alte 12 specii sunt acvatiche, iar 10 specii sunt sinantropice. De asemenea, credem că Munții Zarandului sunt traversați în mod frecvent de păsări atât în migrațiile anuale cât și în migrații locale de hrănire, fiind o barieră între lunca Mureșului și zonele umede de pe Criș. Din punct de vedere al conservării din cele 64 de specii de păsări observate în 2007 și 2008, 34 de specii sunt cuprinse în anexele OU 57/2007 (Ordonanță de urgență nr. 57 din 20 iunie 2007 privind regimul ariilor naturale protejate, conservarea habitatelor naturale, a florei și faunei sălbatice) cu grade diferite de protecție.

Speciile de mamifere se bucură în majoritatea lor de scutul legilor naționale și internaționale de ocrotire, dar 22 dintre ele înregistrează în continuare declin numeric în populațiile lor și au nevoie de refugii fără degradarea și distrugerea habitatelor; acestea se pot asigura prin declararea unor noi arii protejate. Din totalul speciilor raportate, 29 sunt amenințate sau aproape amenințate cu dispariția.

Ocrotirea speciilor de păsări și de mamifere este necesară atât pentru importanța lor ca elemente faunistice din fauna României și a continentului, dar și pentru locul și rolul lor în relațiile trofice din zonă, precum și pentru importanța unora din punct de vedere economic și cinegetic; o parte dintre speciile de mamifere rozătoare sunt de interes epidemiologic.

Lista prezentată de noi este una preliminară, de aceea considerăm că studii noi aprofundate asupra faunei de vertebrate din acești munți vor aduce rezultate deosebite, mai ales că zona reprezintă o pată albă din punct de vedere al biodiversității, iar degradarea habitatului forestier prin defrișările masive ale pădurilor seculare din zonă vor produce modificări irecuperabile ale biodiversității, înainte ca aceasta să fie cunoscută cel puțin ca listă de specii.

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Dumitru Murariu, Angela Petrescu, Năstase Răduț,
Gabriel Chișamera
Muzeul Național de Istorie Naturală „Grigore Antipa”
Șos. Kiseleff 1, 011341 București 2, România
e-mail: dmurariu@antipa.ro
angelap@antipa.ro
nesti@antipa.ro
gabriel_chisamera@antipa.ro

Cornelia Ceianu, Raluca Pănculescu
Institutul Național de Cercetare-Dezvoltare
pentru Microbiologie și Imunologie „Ion Cantacuzino”
Splaiul Independenței 103, 050096
Sector 5, București, România
e-mail: cornelia_ceianu@yahoo.com