CZU: 599:502.742=111
DOI: 10.46727/c.v2.07-08-06-2025.p226-233

ASPECTE ALE STRUCTURII ȘI DIVERSITĂȚII COMUNITĂȚILOR DE MAMIFERE DIN REZERVAŢIA ŞTIINŢIFICĂ „PĂDUREA DOMNEASCĂ”

ASPECTS OF THE STRUCTURE AND DIVERSITY OF MAMMAL COMMUNITIES IN THE "PADUREA DONMEASCA " SCIENTIFIC RESERVE

Veaceslav SÎTNIC, *dr., cercet.confer.,*
Universitatea de Stat din Moldova, Institutul de Zoologie
Natalia CARAMAN
Universitatea de Stat din Moldova, Institutul de Zoologie

Veaceslav SÎTNIC, *PhD, associate professor*
Moldova State University, Institute of Zoology
ORCID: 0000-0003-3919-9232
e-mail: sitnicv@gmail.com
Natalia CARAMAN,
Moldova State University, Institute of Zoology
ORCID: 0000-0002-2506-3556
e-mail: CNatusea@yahoo.com

Abstract. Aspects of the structure and diversity of communities of mammals from the scientific reserve "Padurea Domneasca". Research in the "Pădurea Domnească" reserve was carried out during the years 1995-2023. A rich diversity of the mammal fauna was confirmed, consisting of about 30 species. In the reserve, the value of the edge effect index in the meadow biotope is 0.19, and in the forest - 0.41. The following share of rodents was established according to the predilection for the biotope: meadow – 30.4%, ecotone – 47.4% and forest – 22.2%. If in spring the Simpson index was respectively in the meadow – 0.312; ecotone – 0.404 and forest – 0.379, later, in the autumn period, an increase in this index was recorded, the diversity being respectively 0.578; 0.852; 0.422.The diversity of mammals during the last 30 years decreases from 1.97 to 1.62. It was established that both the specific

composition and the spatial distribution of mammals on the territory of the reserve demonstrate a wealth of ecological niche diversity. The reserve has a special social and economic value, and its protection measures need to be intensified.
Keywords: diversity, landscape reserve, rare species, abundance, ecotone.

Rezumat. Cercetările în rezervația „Pădurea Domnească" au fost efectuate pe parcursul anilor 1995-2023. A fost confirmată o diversitate bogată a faunei de mamifere, ea fiind constituită din cca 30 de specii. În rezervație valoarea indicelui efectului de margine în biotopul de luncă este 0,19, iar în cel silvic – 0,41. S-a stabilit următoarea pondere a rozătoarelor în funcție de predilecția față de biotop: lunca – 30,4%, ecoton – 47,4% și pădurea – 22,2%. Dacă primăvara indicele Simpson constituia respectiv în luncă – 0,312; ecoton – 0,404 și pădure – 0,379, ulterior, în perioada de toamnă, s-a înregistrat o creștere a acestui indice, diversitatea fiind respectiv 0,578; 0,852; 0,422. Diversitatea mamiferelor pe parcursul ultimilor cca 30 de ani descrește de la 1,97 la 1,62. S-a stabilit, că atât componenţa specifică, cât şi distribuţia spaţială a mamiferelor pe teritoriul rezervaţiei demonstrează o bogăţie a diversităţii nişelor ecologice. Rezervația prezintă o valoare socială şi economică deosebită, iar măsurile de protecție ale ei necesită să fie intensificate.
Cuvinte-cheie: diversitate, rezervație peisagistică, specii rare, abundență, ecoton.

Introduction

The specific diversity of the animal world is largely determined by the structure and functioning of ecosystems. The structure of communities and ecological diversity represent the fundamental manifestations of species interaction. Diversity is the main parameter of the evolutionary process, being the factor that acts according to the principle of inverse connection [13, pp. 74-81; 14, p. 321]. In the case of a decrease in diversity, along with the disappearance of background species, some auxiliary species also disappear [9, pp. 244-265; 15, p. 36]. In biotopes with extreme conditions, species with a narrow specialization and an increased number of individuals dominate. The mentioned processes are most pronounced in protected natural areas. The scientific reserve "Pădurea Domnească" is located in the area of the localities of Cobani, Balatina, Bisericani, Cuhnești, Moara Domnească in the Glodeni district and Chetriș, Călinelști, Hâncești, Drujineni and Pruteni in the Fălești district in the floodplain of the Prut river [1, pp. 7-9]. The total area is 6032 ha, of which 4952 hectares (82%) are covered with forests. The forest area is located over a distance of about 40 km. Three types of vegetation have formed: forest, meadow

meadows and aquatic vegetation [1, pp. 7-9]. The tree species are from the genera *Quercus, Populus, Salix, Acer, Fraxinus, Ulmus* [1, pp. 7-9; 11, p. 131]. The presence of some mammal species is indicated in the Atlas of Vertebrate Species [8, pp. 19-39]. The aim of the work was to identify mammal species and study the diversity, as well as the structure of their communities.

Materials and methods

Research in the "Padurea Domneasca" reservation has been carried out periodically for about 30 years. Research methods in nature related to the characteristics of structural ecological indices were used: the trail method, the square method [10, pp. 31-33]. The edge effect index was calculated [15, p. 36]. The determination of the specific composition and abundance of small mammal species was carried out by the method of relative assessment of the numerical population – night traps, and of carnivorous and ungulate mammals – on sample plots, by footprints and trophic activity [10, p. 31]. For the characteristics of the biotope distribution of species, the index of frequency, dominance and ecological significance was used [10, p. 32]. The indices of specific diversity, evenness and Simpson diversity, specific richness [15, p. 144], as well as the index of anthropogenic adaptation of small mammal species [14, p. 25] were calculated.

Results and discussions

Following the research carried out, a rich diversity of the mammal fauna in the "Pădurea Domnească" scientific reserve was confirmed, consisting of approximately 30 species: Insectivora –*Erinaceus concolor, Talpa europaea, Sorex araneus, Sorex minutus, Crocidura leucodon, Crocidura suaveolens*, Rodentia – *Microtus arvalis, Microtus rossiaemeridionalis, Mus musculus, Mus spicilegus, Apodemus sylvaticus, Apodemus flavicollis, Apodemus agrarius, Apodemus uralensis, Nothocricetulus migratorius, Cricetus cricetus, Driomys nitedula, Clethrionomys glareolus*, *Arvicola amphibius,* Carnivora – *Meles meles, Felis silvestris, Mustela putorius, Mustela nivalis, Martes martes, Martes foina, Lutra lutra, Vulpes vulpes,* Lagomorfa – *Lepus europaeus*, Artiodactyla – *Capreolus capreolus, Cervus elaphus* și *Sus scrofa*. Of the species included in the Red Book, 3rd edition, we mention: *Crocidura leucodon, Spermophilus suslicus, Myoxis glis, Cricetus cricetus, Felis silvestris, Martes martes* [4, pp. 236-265]. From previous sources, but also from the information provided by the reserve employees, the presence of the *Canis lupus* was reported [5, p. 273-276].

The diversity of the mammal fauna within the scientific reserve "Padurea Domnesca" is conditioned by a complex of different types of natural ecosystems (forest, meadow, aquatic, marsh) and a wide variety of ecological niches quite

favorable for different ecological groups of animals. The communities of small mammals are particularly diverse [12, p. 34].

Among the rodent species, the *A.sylvaticus, A.flavicollis, A.agrarius şi C.glareolus*, the share of which varies depending on the season, year and habitat [3, p. 126-133; 7, pp. 39-41]. For example, *A.flavicollis* is present among the animals captured from 5.5% in the summer period to 43.8% in the autumn. The share of *C. glareolus* is less variable (11.6-25.3%). For *A.agrarius*, a large amplitude of numerical dynamics was recorded with a pronounced depression phase in the spring period, and at the peak phase its share is 17.3% of the capture. The dominance of the *A.sylvaticus* species varies from 8% in spring to 45% in autumn. Following the analysis of the stationary distribution of background species in different types of biotopes, we mention that *A.flavicollis* populates almost to the same extent all types of biotopes (8.4-16.7%). *A.agrarius* prefers reedbeds (45.7%), then the pond ecosystem with grass cover (33.3%), and to a lesser extent other stations, being a hydrophilic species. *A.sylvaticus* is more frequent in ecotone areas, this distribution being determined by competition with the *A.flavicollis* species. *Micromys minutus* populates open meadow spaces with developed grassy vegetation, feeding and reproducing in the second floor of the grassy carpet. The presence of the species *M.arvalis* and *M.rossiaemeridionalis* was recorded in small numbers in the meadow glades and near the reedbed. *M.subterraneus* is a forest species, which populates the meadow forest in smaller numbers. *D.nitedula* and *M.avellanarius* inhabit oak forests, as well as forest sectors with hazel and fruit trees. In oak sectors with hollow trees, the density of these arboreal rodents is higher, constituting about 0.1-0.4 individuals per hectare. Aquatic and marsh biotopes are populated by the amphibian species *O.zibethicus* and *A.amphibius* with a frequency of about 45% and accessory ecological significance. In the 1995 *Cricetus cricetus* was reported in the meadows in the eastern part of the reserve, and the density was constantly decreasing.

The value of the edge effect index in the meadow biotope is 0.19, and in the forest biotope – 0.41. The following share of rodents was established depending on the predilection for the biotope: meadow –30.4%, ecotone – 47.4% and forest – 22.2%. If in spring the Simpson index was meadow – 0.312; ecotone – 0.404 and forest – 0.379, then, in the autumn period, an increase in this index was recorded, the diversity being 0.578; 0.852; 0.422, respectively. A summary analysis of the dominance of small mammal species in different types of biotopes was carried out (Tab.1). In the forest-meadow ecotone, the species *A.flavicollis* dominates (39.1%), and in second place is *C.glareolus* (23%). They are followed by the species

A.agrarius and *A.sylvaticus* (13.5% and 7.5%). *A.uralensis* was reported with a dominance of 8.2%. In another type of ecotone – the forest-meadow ecotone, the highest dominance is also manifested by *A.flavicollis* (45%), then – with an almost halved relative abundance – *C.glareolus* (28%). These species exceed the species *A.agrarius* (13.7%). In the reed ecosystem, *A.agrarius* dominates with 42%. *M.arvalis* dominates in the year of the peak phase in the meadow (46%), followed by the species *A.agrarius* (23%). Of the small mammal species recorded, the highest dominance (21.6% and 23.6%) is that of the species *A.sylvaticus* and *A.flavicollis*, and their frequency is maximum (71.4% and 85.7%). Species *M.musculus, Cr.migratorius*, *D.nitedula*, *C.cricetus* with a significance of up to 1% in the analyzed coenoses are considered accidental; *M.spicilegus*, *M.rossimeridionalis* – accessories; *A.uralensis*, *A.agrarius*, *M.arvalis, C.glareolus* – characteristics and *A.sylvaticus*, *A.flavicollis* – constants.

The highest specific diversity was established in the forest-meadow ecotone (1.95), followed by the reedbed ecosystem (1.67). In terms of the Simpson diversity index, the biotopes are in descending order: fallow (6.24), reedbed (5.73), forest-meadow ecotone (4.51), alfalfa-forest edge (3.76), forest-clearing ecotone (3.26).

Table 1. Dominance (%) of small mammal species in different types of biotopes

N/o	Species Biotope	Ecotone forest-clearing	Ecoton forest-meadow	Alfalfa-forest edge	Meadow	Forest strip	fallow ground	Reed bed
1.	*A.uralensis*	5	8,2	39,8	17	50,9	29	8
2.	*A.sylvaticus*	4,1	7,5	22	9	0	3	6
3.	*A.agrarius*	13,7	13,5	7,8	23	7,3	19	42
4.	*A.flavicollis*	45	39,1	20,8	0	11,7	0	0
5.	*M.musculus*	0	0	0	0	0	9	0
6.	*M.spicilegus*	0	0	0	2	0	17	9
7.	*C.glareolus*	28	23	0	0	10	0	3
8.	*M.arvalis*	0	0	0	46	11,7	15	2
9.	*M.rossimer.*	0,6	3,5	9,7	0	0	0	30
10.	*Cr.migrator.*	0	0	0	0	4	8	0
11.	*D.nitedula*	3,6	5,5	0	0	4,4	0	0

The highest values of the anthropogenic adaptation index were recorded for *A. sylvaticus* (17.3) and *A.uralensis* (14.5). The anthropogenic adaptation of the

community is the greater, the more species are from the group of eusynanthropic, synanthropic and anthropophilic species, with the higher anthropogenic adaptation indices and the lower the number of "neutral" and anthropophobic species. The similarity index for the forest, ecotone and meadow ecosystems is 0.82.

In the reserve, a decrease in the density of carnivorous mammals per 1000 ha has been recorded in recent years (Tab. 2). The *Canis lupus* species was reported in the reserve in the last decade, being absent in the previous period due to intense human activity [5, pp. 273-276]. The presence of the invasive species *C.aureus* was recorded at a density of about 6 individuals per 1000 ha. The density of carnivorous mammal species has decreased recently, with the exception of the species *V.vulpes* [6, p. 34]. Among the ungulates, we mention the species *S.scrofa*, the density of which is about 10 individuals/1000 ha, decreasing compared to 30 years ago [2, p. 65-185]. The density of the species *C.capreolus* is 15 individuals/1000 ha compared to 60 in the previous period [2, p. 65-185]. *C.elaphus* has a population of 15 individuals. The reserve has favorable conditions for ungulate species, and they sometimes feed in adjacent agrocenoses.

Table 2. Density of carnivorous mammal species (individuals/1000 ha)

N/o	Species	80s of the 20th century	2nd decade of the 21st century
1.	*Vulpes vulpes*	2	5
2.	*Meles meles*	6	4
3.	*Martes martes*	2	1
4.	*Martes foina*	0,8	0,5
5.	*Mustela putorius*	1,6	0,6
6.	*Mustela nivalis*	5	2
7.	*Mustela erminea*	2,3	1,4
8.	*Mustela lutreola*	0,3	0
9.	*Felis silvestris*	2,4	1,3
10.	*Nyctereutes procyonoides*	4	2
11.	*Canis lupus*	0	0,5
12.	*Canis aureus*	0	6
13.	*Lutra lutra*	1,6	0.6 individuals per 1 km from shore

A decrease in the diversity of mammals in the reserve over the past 30 years from 1.97 to 1.62 has been established, the main cause being the reduction of favorable habitats. It is necessary to increase the population's interest in nature protection. This protected area is a perspective one for the development of ecological tourism.

Conclusions

A rich diversity of the mammal fauna in the scientific reserve "Padurea Domneasca" has been confirmed, consisting of approximately 30 species. The value of the edge effect index in the meadow biotope is 0.19, and in the forest biotope - 0.41. In spring, the diversity index was meadow - 0.312; ecotone - 0.404 and forest - 0.379, and in the autumn period, an increase in the value of this index was recorded, the diversity being respectively 0.578; 0.852; 0.422. The reserve has a special social and economic value, and its protection measures need to be intensified.

BIBLIOGRAPHY

1. ANDREEV, A.; O. BEZMAN-MOSEIKO; A. BONDARENCO; V. BUDZHAK CHEREVATOV V. et al. Registrul zonelor nucleu ale Rețelei Ecologice Naționale a Republicii Moldova. BIOTICA, Chișinău: 2012, 495 p. ISBN 978-9975-106-77
2. AVERIN, Y.; M. LOZAN; A.MUNTYANU și G.USPENSKIY. Zhivotnyy Mir Moldavii. Mlekopitayushchie. Kishinev: Shtiintsa, 1979, 188 s.
3. BURLACU, Victoria; Victoria NISTREANU V; Alina LARION și Natalia CATERINCIUC. Structura comunităţilor de mamifere mici (Rodentia, Soricomorpha) în agrocenozele zonei de nord a Republicii Moldova. Buletinul Academiei de Ştiinţe a Moldovei. Ştiinţele vieţii, nr. 1(334), 2018, pp.126-133. ISSN 1857-064X.
4. Cartea Roșie a Republicii Moldova, ed. III-a. Chișinău. Ştiinţa: 2015, p. 236-265.
5. MUNTEANU, A.; A. SAVIN; N. CORCIMARU și V. CAISÎN. Aspecte privind prezența lupului (*Canis lupus*) pe teritoriul Republicii Moldova. In: „Realizările ştiinţifice ale rezervaţiei „Codrii” la 40 ani de activitate”: Materialele Simpozionului ştiinţific internaţional. Ştiinţa, 2011, p.273-276. ISBN 978-9975-67-799-8.
6. MUNTEANU A.; N. ZUBCOV; N. CORCIMARU; S. JURMINSCHI; V. ȚURCANU; V. ȚARIGRADSCHI și A.VASILIEV. Investigații asupra faunei vertebratelor terestre din rezervația naturală „Pădurea Domnească”. In: Protecția, redresarea și folosirea rațională a biodiversității lumii animale. Conferința a III-a a Zoologilor din Moldova, Chișinău, 1995, p. 34.
7. MUNTEANU, A. Componenţa şi distribuţia spaţială a speciilor de micromamalii

în rezervaţia ştiinţifică „Pădurea Domnească”. Conferința a VI a Zoologilor din Moldova, Chişinău: 2007, pp. 39-41.

8. MUNTEANU, A.; V. NISTREANU; V. ȚURCAN; N. CORCIMARU; A. CEBANU et al. Atlasul speciilor de vertebrate (mamifere, reptile, amfibieni, peşti) incluse în cadastrul regnului animal al Republicii Moldova. Chişinău, S.n., „Elan Poligraf”: 2013. 100 p. ISBN 978-9975-66-334-2.
9. MUNTEANU, A.; I. ȚURCANU; N. ZUBCOV; V. ȚURCAN; V. OSTAFICIUC et al. Natura Rezervației ”Plaiul Fagului”. Chișinău, Rădenii Vechi: 2005, 431 p. ISBN 9975-944-88-4.
10. NISTREANU, V.; A. SAVIN; V. ȚURCAN; A. LARION; V. PALADI și V. SÎTNIC. Metode de cercetare în teren a faunei de vertebrate terestre. Indicație metodică. Chișinău: 2021, 64 p. ISBN 978-5-88554-038-4.
11. POSTOLACHE, Gh. Rezervația „Pădurea Domnească”. Chișinău: S.n. (Combinatul Poligrafic), 2017. 256 p.
12. MUNTEANU, A.; N. ZUBCOV; N. CORCIMARU; S. JURMINSCHI; V. ȚURCANU; V. ȚARIGRADSCHI și A.VASILIEV. Investigații asupra faunei vertebratelor terestre din rezervația naturală „Pădurea Domnească”. In: Protecția, redresarea și folosirea rațională a biodiversității lumii animale. Conferința a III-a a Zoologilor din Moldova, Chișinău, 1995, p. 34.
13. SITNIC, V., A. SAVIN; V. NISTREANU și A. LARION. Contribuții la cunoașterea faunei de mamifere mici la ecotonul luncă-pădure în Rezervația ”Plaiul Fagului”. Analele ICASP, Chișinău: 2018, V.1, p. 74-81. ISBN 978-9975-56-555-4.
14. BIGON, M.; J. HARPER și C. TAUNSEND. Ecologia. Osobi, populeatsii i soobscestva. Moskva. Mir, 1989. (1). 667 c., (2). 477 c.
15. GASHEV, S. Mlecopitaiushcie v sisteme ecologicescogo monitoringa (na primere Tiumenskoi oblasti). Teza de doctor în științe biologice. Tiumeni. 2003. 50 c.
16. ODUM, J. Ecologia. Moskva. Mir. 1986. (10): 328 c., (2): 376 c.
17. The study was conducted within the subprogram "Assessment of the structure and functioning of the animal world and aquatic ecosystems under the influence of biotic and abiotic factors in the context of ensuring ecological security and population well-being". Subprogram code: 010701