STUDY TO ESTABLISH THE ECOLOGICAL SIMILARITY BETWEEN ROMANIAN COUNTIES UNDER ASPECT OF SEVERAL SPECIES OF PROTECTED MAMMALIANS

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Abstract: *This study aimed to establish the ecological similarity existing between Romanian counties under aspect of protected species of mammalians. In order to reach this, there was used the method of Sörensen coefficient of ecological similarity. Within this study 21 species of protected mammalians founded in 40 Romanian counties have been used. There was found 100% Sörensen ecological similarity among only three pairs of counties in Romania (Alba-Arad, Dolj-Giurgiu, Mureş-Suceava). The values of Sörensen ecological similarity in these counties show that there are environmental factors with similar values that satisfy the needs to exist of the protected species of mammalians found there, being characterized from this point of view by similar habitats. The lowest ecological similarity under species composition (protected mammalians) was found between counties Bistriţa Năsăud-Braila and Ialomita-Maramures (59%) and between Ialomita-Covasna (61%) and Constanţa-Maramures (62%).*

Key words**:** *protected species, mammalians, Sörensen coefficient, ecological similarity, counties, Romania.*

INTRODUCTION

In the last decades, the conservation of the environment and particularly the conservation of biological diversity have become a priority of the European Union where they promoted numerous regional initiatives for the protection of ecological processes, habitats and Community interest species. The European philosophy of conservation – evolutionist-ecological – relies on the preservation of habitats and plant and animal species representative for certain biogeographical areas and at European Community level. Anthropic activities are allowed in delimited protected areas provided they have no actual or potential impact on species or habitats. Eliminating or reducing actual or potential activities in protected areas of Community interest suppose compensations for the land owners. The involvement of local communities is a key-element of this philosophy that complicates conservation approaches in areas with valuable natural elements and high economic potential because communities depend on the exploitation of natural resources and lands do not belong to the public domain [PRIMACK ET AL., 2008].

MATERIAL AND METHODS

To reach the goal and objectives of the study, we used data regarding mammalians species protected in Romania by Law 462/2001 for the application of the Government's Emergency Ordinance 236/2000 regarding the regime of protected natural areas, conservation of natural habitats, of wild flora and fauna (Annexe 3) [4]. Data regarding the mammalian species protected in Romania are supplied for each county by the Biodiversity Compartment of the Ministry for Environment [5].

We calculated the *Sörensen (Ss) coefficient (index) of ecological similitude.* This coefficient reflects the degree of resemblance between two associations/groups of

species/biocoenoses. Depending on the presence/absence of species, this index shows the degree of similitude between two samples/associations/biocoenoses/etc. It was calculated with the formula [GOMOIU & SKOLKA, 2001; IORDACHE & BORZA, 2008]: S_s = (2 x number of the species common for the samples A and B) / (number of species in sample A + number of species in sample B). This coefficient has values ranging between 0 and 1, thus reflecting, through a relationship of direct proportionality, the degree of ecological similitude.

RESULTS AND DISCUSSION

The results of the calculus of the Sörensen (Ss) coefficient (index) of ecological similitude for Romania's counties are shown in Table 1, 2 and 3 below.

Table 1

Ecological similitude of Romania's counties with protected mammalian species according to the Sörensen (Ss) coefficient (index) of ecological similitude

	Alba	Arad	Argeș	Bacău	Bihor	Bistrița-Năsăud	Botoșani	Brăila	Brașov	Buzău	Călărași	Caraș-Severin	Cluj	Constanța
Alba		1	0,88	0,94	0,97	0,88	0,90	0,66	0,88	0,91	0,78	0,94	0,93	0,78
Arad			0,88	0,94	0,97	0,88	0,90	0,66	0,88	0,91	0,78	0,94	0,93	0,78
Argeș				0,88	0,91	0,88	0,77	0,66	0,88	0,91	0,78	0,94	0,87	0,78
Bacău					0,97	0,94	0,83	0,66	0,94	0,91	0,71	0,94	0,93	0,71
Bihor						0,91	0,87	0,64	0,91	0,94	0,75	0,97	0,90	0,75
Bistrița-Năsăud							0,77	0,59	0,88	0,85	0,64	0,88	0,87	0,64
Botoșani								0,75	0,78	0,87	0,88	0,83	0,82	0,88
Brăila									0,62	0,64	0,85	0,66	0,72	0,76
Brașov										0,91	0,66	0,88	0,88	0,66
Buzău											0,75	0,97	0,90	0,75
Călărași												0,78	0,76	0,90
Caraș-Severin													0,93	0,78
Cluj														0,76

Table 2

Ecological similitude of Romania's counties with protected mammalian species according to the Sörensen (Ss) coefficient (index) of ecological similitude (continuation)

	Covasna	Dâmbovița	Dolj	Galați	Giurgiu	Gorj	Harghita	Hunedoara	Ialomița	Iași	Maramureș	Mehedinți	Mureș
Cluj	0,87	0,90	0,81	0,72	0,81	0,93	0,93	0,93	0,75	0,81	0,84	0,96	0,93
Constanța	0,71	0,81	0,95	0,95	0,95	0,78	0,71	0,71	0,90	0,78	0,62	0,74	0,71
Covasna		0,90	0,75	0,66	0,75	0,94	0,94	0,88	0,61	0,82	0,97	0,90	0,94
Dâmbovița			0,85	0,76	0,85	0,96	0,90	0,84	0,72	0,71	0,88	0,93	0,90
Dolj				0,90	1	0,82	0,75	0,75	0,85	0,83	0,73	0,78	0,82

Galaţi					0,90	0,74	0,66	0,66	0,84	0,72	0,64	0,69	0,74
Giurgiu						0,82	0,75	0,75	0,85	0,83	0,73	0,78	0,75
Gorj							0,94	0,94	0,69	0,75	0,91	0,96	0,94
Harghita								0,94	0,69	0,82	0,91	0,96	0,94
Hunedoara									0,69	0,75	0,91	0,96	0,88
Ialomiţa										0,76	0,59	0,72	0,69
Iași											0,80	0,78	0,82
Maramureş												0,88	0,91
Mehedinţi													0,90

Table 3

Ecological similitude of Romania's counties with protected mammalian species according to the Sörensen (Ss) coefficient (index) of ecological similitude (continuation)

	Neamţ	Olt	Prahova	Sălaj	Satu-Mare	Sibiu	Suceava	Teleorman	Timiş	Tulcea	Vâlcea	Vaslui	Vrancea
Mehedinţi	0,96	0,74	0,96	0,80	0,90	0,94	0,90	0,76	0,90	0,77	0,96	0,81	0,96
Mureş	0,94	0,78	0,94	0,90	0,93	0,91	1	0,74	0,93	0,87	0,94	0,78	0,87
Neamţ		0,71	0,94	0,90	0,87	0,91	0,94	0,66	0,87	0,81	0,94	0,71	0,87
Olt			0,78	0,80	0,84	0,68	0,78	0,95	0,84	0,84	0,78	0,90	0,76
Prahova				0,83	0,93	0,91	0,94	0,74	0,93	0,81	1	0,78	0,93
Sălaj					0,89	0,81	0,90	0,75	0,82	0,89	0,83	0,80	0,75
Satu-Mare						0,84	0,93	0,80	0,93	0,86	0,93	0,84	0,86
Sibiu							0,91	0,71	0,84	0,78	0,91	0,75	0,90
Suceava								0,74	0,93	0,87	0,94	0,78	0,87
Teleorman									0,80	0,80	0,74	0,95	0,80
Timiş										0,80	0,93	0,84	0,93
Tulcea											0,81	0,84	0,73
Vâlcea												0,68	0,93
Vaslui													0,78

The diagramme of ecological similitude representing the calculus of the Sörensen (Ss) coefficient (index) of ecological similitude shows that, from the perspective of specific composition of the protected mammalian species there is ecological similitude between several counties of Romania:

- 100% between the counties Alba-Arad, Dolj-Giurgiu, Mureş-Suceava;

- 97% between the counties Alba-Bihor, Arad-Bihor, Bacău-Bihor, Buzău-Caraş-Severin, Bihor-Caraş-Severin, Alba-Bacău, Arad-Bacău, Bacău-Bistriţa-Năsăud, Bacău-Braşov, Bihor-Buzău, Alba-Caraş-Severin;
- 94% between the counties Arad-Caraş-Severin, Argeş-Caraş-Severin, Bacău-Caraş-Severin;
- 93% between the counties Alba-Cluj, Arad-Cluj, Bacău-Cluj, Caraş-Severin-Cluj,
- 91% between the counties Argeş-Bihor, Bistriţa-Năsăud-Bihor, Alba-Buzău, Arad-Buzău, Argeş-Buzău, Bacău-Buzău, Buzău-Braşov, Bihor-Braşov;
- 90% between the counties Alba-Botoşani, Arad-Botoşani, Buzău-Cluj, Bihor-Cluj, Călăraşi-Constanţa.

The values of the Sörensen ecological similitude index show that there are ecological factors with similar values that meet the life requirements of protected mammalian species, i.e. counties with similar habitats.

The lowest ecological similitude from the point of view of specific composition of protected mammal species was between the counties of Bistriţa-Năsăud-Brăila and Ialomiţa-Maramureş (59%), and between the counties of Ialomiţa-Covasna (61%) and Constanţa-Maramureş (62%).

CONCLUSIONS

The following conclusions have been established through this study:

- There is ecological similitude of 100% only between three pairs of counties (Alba-Arad, Dolj-Giurgiu, Mureş-Suceava). The values of the Sörensen ecological similitude index show that there are ecological factors with similar values that meet the life requirements of protected mammal species, i.e. counties with similar habitats.
- The lowest ecological similitude from the point of view of specific composition of protected mammal species was between the counties of Bistriţa-Năsăud-Brăila and Ialomiţa-Maramureş (59%), and between the counties of Ialomiţa-Covasna (61%) and Constanţa-Maramureş (62%).

BIBLIOGRAFY

1. GOMOIU, T. M., SKOLKA, M., 2001 - Ecologie. Metodologii pentru studii ecologice, Universitatea „Ovidius", Constanţa.
2. IORDACHE, MĂDĂLINA, BORZA, I., 2008 - Ecologie şi protecţia mediului. Tematici aplicative. Editura Eurobit, Timişoara.
3. PRIMACK, R.B., PĂTROESCU, MARIA, ROZYLOWICZ, L., IOJĂ, C., 2008 - Fundamentele conservării diversităţii biologice Academia de Ştiinţe Tehnice din România Editura Agir, Bucureşti.
4. ***Law 462/2001 for the application of the Government's Emergency Ordinance 236/2000 regarding the regime of protected natural areas, conservation of natural habitats, of wild flora and fauna (Annex 3).
5. ***www.mmediu.ro.