

ECOLOGICAL RESEARCH-STUDIES REGARDING THE AVIFAUNA DURING THE HIEMAL PERIOD FROM THE BASINS AREA OF THE ARGEȘ RIVER BETWEEN 2000 AND 2010

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Abstract

The basins from the middle and upper part of the Argeș River are included in “The Basins of the Argeș River”, site of the Nature 2000 Network and Important Bird Area. The paper show some results of the International Waterbird Count, organized on international level by the Wetland International and on national level by the Romanian Ornithological Society. The analyze was performed only for 2000 – 2010 period, the researches in area being done after 1990. 116994 individuals and 73 birds’ species, which belong to 14 orders, were recorded. Regarding the number of families the best represented was the Passeriformes order. 9 species are protected by the Annex I of the Birds Directive. In the area of the Pitești Basin was observed the majority of the number of species and in the area of the Golești Basin was registered the biggest number of the observed individuals. The Anseriformes order had the most of observed individuals, on the first place being Anas platyrhynchos. The best similarity was between Pitești and Budeasa basins (by Bray-Curtis index) and between Valcele and Budeasa basins (by Jaccard index). For the whole period, Anas platyrhynchos was the only dominant species (by index of relations). Considerations are also effectuated in relation with other few ecological indexes.

Keywords: hydrographical basins, avifauna, water bird, anthropogenic impact, complex habitats

1. INTRODUCTION

The only important programme that is focused on the evaluation of the birds’ population size from the main wetlands of Romania is the International Waterbird Count. This was organised on an international level by the Wetlands International starting with 1967 year. In Romania, the count is organised by the Romanian Ornithological Society beginning with 1990 year. It takes place every year between 10 and 20 January and it is also a long term programme for monitoring of the changes happened in the effectives of the birds’ coenosis.

In the Argeș County, the programme started in 2000, the present paper showing some results of this ecological study performed on the basins from the middle and upper course of the Argeș River [1-6].

The area was intensively studied lately, because it is an important place for wintering and passage for the birds that were observed during the Count. It is to be mention that the

basins are in the continuation of the Rucăr-Bran Carpathian Corridor.

2. MATERIAL AND METHODS

The Argeș River has the sources in the Făgăraș Mountains, under the Negoiu and Moldoveanu Peaks. It flows in the Danube River and drains the main part of the south slope of the Făgăraș Mountain, the homologous subcarpathian area, the eastern part of the Getic Piedmont and a waste area of the Romanian Plain. It crosses a great variety of habitats that are favourable for the birds along all the year (both in the breeding season and in the wintering one). The building of the basins determined a strong change of the landscape and of the qualitative and quantitative structure of the avifauna. The valley becomes attractive for many species of water birds that, in passage and in the winter time, reach an impressive number of individuals.

The vegetation is characteristic for the wetlands from the south of the Romania, the increased process of silting permitting the

evolving of the reedbeds (*Phragmites*, *Typha*) and other typical wetland plants (*Carex*, *Juncus*, *Salix*, *Alnus*, *Populus* etc.).

The studied area belongs to the land of the hilly continental climate. It is situated at the border of the temperate climate of the hilly zone and of the dry one of the Romanian Plain. The annual temperature of the air is closely to 9 °C. The annual temperature of the water fluctuates between 6.4 °C, in the Argeş Gorges and 9 °C, at Piteşti. In winters with accentuate continental influence, at the beginning of the January, the temperature decreases in the low areas below 0 °C and the bridge of ice is formed.

The researches were performed on the basins: Goleşti (649 ha), Piteşti (122 ha), Bascov (162 ha), Budeasa (412 ha) și Vâlcele (408 ha) - component parts of the Nature 2000 site and of the Important Bird Area “The Basins of the Argeş River” - and in the adjacent areas (Figure 1).

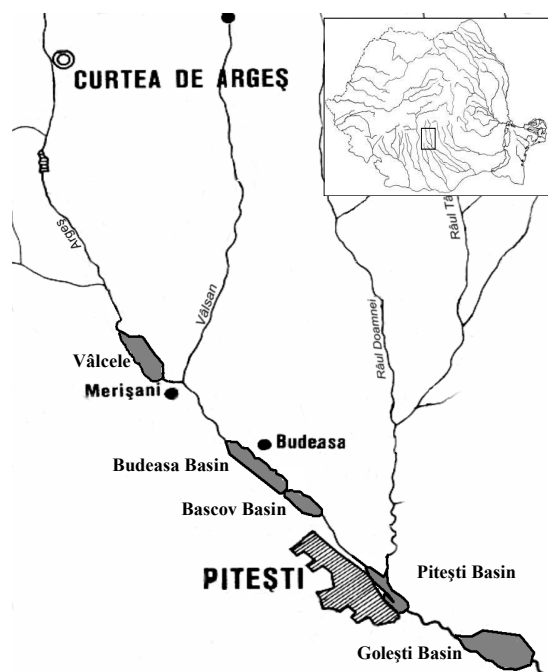


Figure 1 The map of the area

We used the itinerary method, in same day walking each time on the same shore of every basin, the most favourable for the birds' observation. The species were identified visually, with the scope and binoculars, and auditory.

3. RESULTS AND DISCUSSIONS

In the interval 2000 – 2010, on the International Waterbird Count, on the basins from the middle and upper valley of the Argeş River, 73 bird species (19,11% of all Romanian species) that belong to 14 orders (73,68% of all Romanian orders) were observed. These orders are: *Gaviiformes* (with a family: *Gaviidae*), *Podicipediformes* (with a family: *Podicipedidae*), *Pelecaniformes* (with a family: *Phalacrocoracidae*), *Ciconiiformes* (with a family: *Ardeidae*), *Anseriformes* (with a family: *Anatidae*), *Falconiformes* (with two families: *Accipitridae* and *Falconidae*), *Galliformes* (with a family: *Phasianidae*), *Gruiformes* (with a family: *Rallidae*), *Charadriiformes* (with two families: *Scolopacidae* and *Laridae*), *Columbiformes* (with a family: *Columbidae*), *Coraciiformes* (with a family: *Alcedinidae*), *Piciformes* (with a family: *Picidae*) and *Passeriformes* (with 13 families: *Alaudidae*, *Motacillidae*, *Laniidae*, *Sturnidae*, *Corvidae*, *Troglodytidae*, *Prunellidae*, *Turdidae*, *Paridae*, *Sittidae*, *Passeridae*, *Fringillidae* and *Emberizidae*), (Table 1).

Among the observed species, 9 (12.32%) are included in the Annex I of the Bird Directive. Special safety measures of protection regarding the habitat in order to ensure the surviving and the reproduction in their area of distribution had been provided for these species (Table 1).

Regarding the number of species, the most was observed in the area of Piteşti Basin (78.08%), and the less in the area of the Bascov Basin (50.68%). Regarding the number of the observed individuals, of the 116994 observed ones, the most was counted in the area of the Goleşti Basin (54.95%) and the less in the area of Bascov Basin (3.48%), (Table 1).

Relative to the number of individuals, the best represented was the *Anseriformes* order (79175 individuals, 67.67%), followed by: *Gruiformes* (15831 individuals, 13.53%), *Charadriiformes* (15792 individuals, 13.49%) and *Passeriformes* (4321 individuals, 3.69%). The other orders had few individuals and small weights. On the first place was *Anas platyrhynchos* (with 57291

individuals, 48.96%), *Fulica atra* (with 15793 individuals, 13.49%), *Larus ridibundus* (with 9406 individuals, 8.04%) and *Aythya ferina*

(with 7834 individuals, 6.69%), (Table 1, Table 4).

Table 1. The bird species and their number of individuals, observed during 2000 – 2010

No.	Species	Golești Basin	Pitești Basin	Bascov Basin	Budeasa Basin	Vâlcele Basin	Birds Directive
1	<i>Gavia arctica</i>	0	0	0	0	1	AI
2	<i>Podiceps cristatus</i>	17	3	1	69	8	
3	<i>Podiceps grisegena</i>	0	1	0	0	0	
4	<i>Podiceps nigricollis</i>	11	0	0	0	0	
5	<i>Tachybaptus ruficollis</i>	105	286	206	98	209	
6	<i>Phalacrocorax carbo</i>	135	16	54	182	4	AI (<i>sinensis</i>)
7	<i>Phalacrocorax pygmeus</i>	25	173	23	53	2	AI
8	<i>Egretta alba</i>	23	8	10	37	6	AI
9	<i>Ardea cinerea</i>	7	1	3	38	16	
10	<i>Cygnus olor</i>	525	1529	440	245	163	
11	<i>Cygnus cygnus</i>	6	23	0	0	27	AI
12	<i>Anser albifrons</i>	576	0	0	0	0	
13	<i>Anas platyrhynchos</i>	42904	4510	1142	5650	3085	
14	<i>Anas acuta</i>	0	3	0	1	0	
15	<i>Anas penelope</i>	170	25	163	54	0	
16	<i>Anas crecca</i>	3392	1433	184	1157	428	
17	<i>Tadorna tadorna</i>	0	23	0	0	0	
18	<i>Aythya marila</i>	3	0	0	0	0	
19	<i>Aythya fuligula</i>	1069	911	14	684	83	
20	<i>Aythya ferina</i>	4507	1992	24	1080	231	
21	<i>Aythya nyroca</i>	2	4	0	0	0	AI
22	<i>Bucephala clangula</i>	238	64	8	144	159	
23	<i>Mergus albellus</i>	35	4	0	1	60	
24	<i>Buteo lagopus</i>	0	0	0	1	0	
25	<i>Buteo buteo</i>	7	8	2	7	7	
26	<i>Accipiter gentilis</i>	0	1	0	0	2	
27	<i>Accipiter nisus</i>	0	2	4	1	2	
28	<i>Circus cyaneus</i>	1	0	0	1	1	AI
29	<i>Falco tinnunculus</i>	5	0	1	1	3	
30	<i>Perdix perdix</i>	0	7	0	5	34	
31	<i>Phasianus colchicus</i>	0	0	0	0	1	
32	<i>Gallinula chloropus</i>	0	10	0	0	28	
33	<i>Fulica atra</i>	4260	2958	1042	4994	2539	
34	<i>Gallinago gallinago</i>	0	4	0	0	2	
35	<i>Tringa ochropus</i>	3	2	2	2	5	
36	<i>Larus cachinnans</i>	1625	480	147	1355	451	
37	<i>Larus canus</i>	480	1436	18	373	1	
38	<i>Larus ridibundus</i>	2760	5152	351	1110	33	
39	<i>Streptopelia decaocto</i>	0	9	1	0	0	
40	<i>Alcedo atthis</i>	0	0	0	1	0	AI
41	<i>Picus canus</i>	0	0	0	0	1	AI
42	<i>Dedrocopos major</i>	0	0	1	0	0	
43	<i>Galerida cristata</i>	4	2	10	0	0	
44	<i>Anthus spinoletta</i>	56	3	0	29	6	
45	<i>Motacilla alba</i>	3	1	0	0	0	

46	<i>Lanius excubitor</i>	1	0	0	2	4	
47	<i>Sturnus vulgaris</i>	0	1	0	2	0	
48	<i>Garrulus glandarius</i>	0	1	0	0	0	
49	<i>Pica pica</i>	78	145	41	55	136	
50	<i>Corvus monedula</i>	428	309	0	7	0	
51	<i>Corvus frugilegus</i>	401	765	50	0	0	
52	<i>Corvus corone cornix</i>	64	10	0	14	1	
53	<i>Corvus corax</i>	18	4	21	7	78	
54	<i>Troglodytes troglodytes</i>	0	1	0	0	0	
55	<i>Prunella modularis</i>	0	3	0	0	0	
56	<i>Phoenicurus ochruros</i>	0	0	0	0	1	
57	<i>Turdus merula</i>	0	2	0	1	4	
58	<i>Turdus viscivorus</i>	0	0	0	0	1	
59	<i>Turdus pilaris</i>	0	7	0	50	9	
60	<i>Parus caeruleus</i>	0	17	8	3	9	
61	<i>Parus major</i>	0	28	5	2	0	
62	<i>Passer domesticus</i>	30	12	1	10	2	
63	<i>Passer montanus</i>	0	69	35	38	5	
64	<i>Fringilla coelebs</i>	82	95	2	8	0	
65	<i>Fringilla montifringilla</i>	9	1	0	0	0	
66	<i>Pyrrhula pyrrhula</i>	0	0	3	0	11	
67	<i>Coccothraustes coccothraustes</i>	0	2	0	0	0	
68	<i>Carduelis chloris</i>	0	8	5	1	1	
69	<i>Carduelis spinus</i>	0	0	0	4	1	
70	<i>Carduelis carduelis</i>	204	245	35	262	48	
71	<i>Carduelis cannabina</i>	5	6	0	0	0	
72	<i>Emberiza schoeniclus</i>	1	19	1	9	3	
73	<i>Emberiza citrinella</i>	9	8	13	32	5	
Number of species		43	57	37	46	48	
Percentage of the number of species (%)		58.90	78.08	50.68	63.01	65.75	
Number of individuals		64284	22842	4071	17880	7917	
Percentage of the number of individuals (%)		54.95	19.52	3.48	15.28	6.77	

Legend:

AI – Annex I of the Birds Directive.

On the subject of the similarity of the basins, we noticed that, by Bray-Curtis index, the best similarity was between Pitești and Budeasa and the least between Golești and Bascov basins (Table 2, Figure 2). By the Jaccard index, the best similarity was between Vâlcele and Budeasa and the least between Golești and Vâlcele basins (Table 3, Figure 3).

The differences between the values of similarity between the basins are explainable because the Bray-Curtis index is based on the presence/absence of the species in the samples and on their number of individuals and Jaccard index is based only on the presence/absence of respective species on each basin.

Table 2. The values of the Bray-Curtis index

Bray-Curtis Index	Golești	Pitești	Bascov	Budeasa	Vâlcele
Golești	*	40,02	11,39	40,83	20,83
Pitești	*	*	28,64	65,29	49,33
Bascov	*	*	*	32,48	51,85
Budeasa	*	*	*	*	57,82
Vâlcele	*	*	*	*	*

Themselves, the presence/absence of the species and their number of individuals are influenced by a series of factors like: the surface and the deep of the every basin, the speed of the water (that determines consequently the frozen surface of the water), the trophic supply and the occurrence of the

available shelters, the presence in the perimeter of the basins or in their neighbourhoods of the complex habitats and, no lastly, the anthropogenic impact on these.

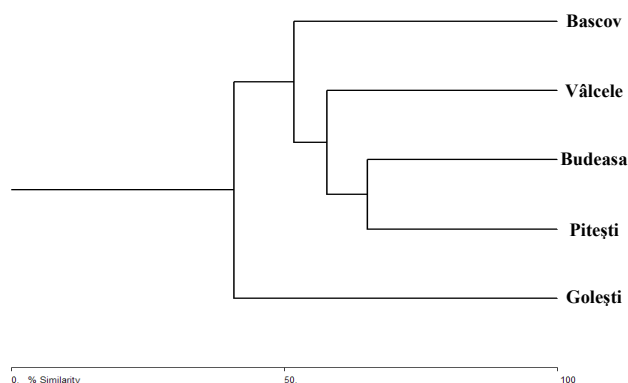


Figure 2 The dendrogram of the Bray-Curtis similarity

Table 3. The values of the Jaccard index

Jaccard Index	Golești	Pitești	Bascov	Budeasa	Vâlcele
Golesti	*	58,73	56,86	58,92	51,66
Pitești	*	*	56,66	63,49	56,71
Bascov	*	*	*	62,74	54,54
Budeasa	*	*	*	*	67,85
Vâlcele	*	*	*	*	*

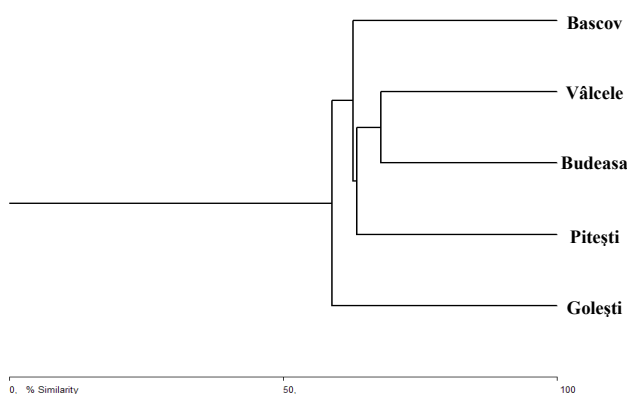


Figure 3 The dendrogram of the Jaccard similarity.

A series of 23 species have large ecological valences, they being occurred on all basins (*Podiceps cristatus*, *Tachybaptus ruficollis*, *Phalacrocorax carbo*, *Phalacrocorax pygmeus*, *Egretta alba*, *Ardea cinerea*, *Cygnus olor*, *Anas platyrhynchos*, *Anas crecca*, *Aythya fuligula*, *Aythya ferina*, *Bucephala clangula*, *Buteo buteo*, *Fulica atra*, *Larus cachinnans*, *Larus canus*, *Larus ridibundus*, *Pica pica*, *Corvus corax*, *Passer domesticus*, *Carduelis*

carduelis, *Emberiza schoeniclus* and *Emberiza citrinella*), some of them in big number (*Anas platyrhynchos*, *Anas crecca*, *Aythya ferina*, *Fulica atra*, *Larus cachinnans* and *Larus ridibundus*). Taking in account the previous factors, each species has preferences for a single or several basins: *Phalacrocorax pygmeus*, *Cygnus olor*, *Larus canus* and *Larus ridibundus*, were observed mainly on the Pitești Basin, *Anas platyrhynchos*, *Anas crecca*, *Aythya fuligula*, *Aythya ferina* and *Bucephala clangula* on the Golești Basin, *Gallinula chloropus* on the Vâlcele Basin etc. Few species were observed only on a basin, among the aquatic species, *Podiceps nigricollis* and *Anser albifrons* being observed merely on the Golești Basin and *Tadorna tadorna* being observed merely on the Pitești Basin. The species characteristic for the wood (*Parus caeruleus*, *Parus major*, *Passer montanus*, *Pyrrhula pyrrhula* etc.) were registered mainly in the perimeter of the basins where the forest was close by (Golești, Pitești, Bascov and Vâlcele). The species that in winter feed principally in the open area (*Anthus spinoletta*, *Turdus pilaris*, *Carduelis carduelis*, *Emberiza citrinella* etc.) were observed mainly in the area of the Budeasa and Golești Basins, bordered on a side by waste agricultural lands. The majority of species, regarding the dominance, was subrecedent ones (D1, 87.67%). They were followed by the subdominant species (D3, 4.11%), dominant species (D4, 4.11%), eudominant species (D5, 2.74%) and recedent species (D2, 1.37%). The accidental species were the most numerous (C1, 32.88%). Come the constant species (C3, 26.03%), euconstant species (C4, 24.66%) and accessories species (C2, 16.44%). As regards the Dzuba index of the ecological signification, the most numerous were the subrecedent species (W1, 72.60%). They are followed by the recedent species (W2, 15.07%), subdominant species (W3, 5.48%), dominant species (W4, 4.11%) and eudominant species (W5, 2.74%).

The Simpson ecological diversity is 3.63 (Table 4).

For the Anseriformes order, we calculated the index of relation IR (Table 5). The static axis is 7.14 and the dominance axis is 14.28.

Cygnus olor, excepting the year 2002, when it was the dominant species, and 2003, when it was the overdominant species, was complementary species. *Anas platyrhynchos* was each year overdominant species. *Anas crecca* was principal dominant species, in 2000-2002 and 2004 being complementary species. *Aythya fuligula* was complementary species, the only year when it was dominant species being the 2009 year. *Aythya ferina* was

in majority complementary species, in 2009 being dominant species and in 2007, 2008 and 2010 overdominant species. The group of the other 12 species (*Cygnus cygnus*, *Anser albifrons*, *Anas acuta*, *Anas penelope*, *Tadorna tadorna*, *Aythya marila*, *Aythya nyroca*, *Bucephala clangula* and *Mergus albellus*) was merely complementary (Table 5).

For the whole period, *Anas platyrhynchos* was the only overdominant species. *Anas crecca* and *Aythya ferina* were dominant species. The other species were complementary species (Table 5, Figure 4).

Table 4. The ecological indexes of the avifauna observed during 2000 – 2010

No.	Species	Dominance			Constancy			Dzuba index of ecological signification		Simpson index of diversity
		Absolute dominance	Value	Category of dominance	Absolute constancy	Value	Category of constancy	Value	Category of Dzuba index	
1	<i>Gavia arctica</i>	1	0,001	D1	1	9,091	C1	0,0001	W1	3,63
2	<i>Podiceps cristatus</i>	98	0,084	D1	8	72,727	C3	0,0609	W1	
3	<i>Podiceps grisegena</i>	1	0,001	D1	1	9,091	C1	0,0001	W1	
4	<i>Podiceps nigricollis</i>	11	0,009	D1	3	27,273	C2	0,0026	W1	
5	<i>Tachybaptus ruficollis</i>	904	0,773	D1	11	100,000	C4	0,7727	W2	
6	<i>Phalacrocorax carbo</i>	391	0,334	D1	7	63,636	C3	0,2127	W2	
7	<i>Phalacrocorax pygmeus</i>	276	0,236	D1	8	72,727	C3	0,1716	W2	
8	<i>Egretta alba</i>	84	0,072	D1	7	63,636	C3	0,0457	W1	
9	<i>Ardea cinerea</i>	65	0,056	D1	10	90,909	C4	0,0505	W1	
10	<i>Cygnus olor</i>	2902	2,480	D3	11	100,000	C4	2,4805	W3	
11	<i>Cygnus cygnus</i>	56	0,048	D1	7	63,636	C3	0,0305	W1	
12	<i>Anser albifrons</i>	576	0,492	D1	3	27,273	C2	0,1343	W2	
13	<i>Anas platyrhynchos</i>	57291	48,969	D5	11	100,000	C4	48,9692	W5	
14	<i>Anas acuta</i>	4	0,003	D1	2	18,182	C1	0,0006	W1	
15	<i>Anas penelope</i>	412	0,352	D1	7	63,636	C3	0,2241	W2	
16	<i>Anas crecca</i>	6594	5,636	D4	11	100,000	C4	5,6362	W4	
17	<i>Tadorna tadorna</i>	23	0,020	D1	2	18,182	C1	0,0036	W1	
18	<i>Aythya marila</i>	3	0,003	D1	1	9,091	C1	0,0002	W1	
19	<i>Aythya fuligula</i>	2761	2,360	D3	9	81,818	C4	1,9309	W3	
20	<i>Aythya ferina</i>	7834	6,696	D4	9	81,818	C4	5,4786	W4	
21	<i>Aythya nyroca</i>	6	0,005	D1	3	27,273	C2	0,0014	W1	
22	<i>Bucephala clangula</i>	613	0,524	D1	8	72,727	C3	0,3811	W2	
23	<i>Mergus albellus</i>	100	0,085	D1	5	45,455	C2	0,0389	W1	
24	<i>Buteo lagopus</i>	1	0,001	D1	1	9,091	C1	0,0001	W1	
25	<i>Buteo buteo</i>	31	0,026	D1	9	81,818	C4	0,0217	W1	
26	<i>Accipiter gentilis</i>	3	0,003	D1	2	18,182	C1	0,0005	W1	
27	<i>Accipiter nisus</i>	9	0,008	D1	4	36,364	C2	0,0028	W1	

28	<i>Circus cyaneus</i>	3	0,003	D1	2	18,182	C1	0,0005	W1
29	<i>Falco tinnunculus</i>	10	0,009	D1	6	54,545	C3	0,0047	W1
30	<i>Perdix perdix</i>	46	0,039	D1	4	36,364	C2	0,0143	W1
31	<i>Phasianus colchicus</i>	1	0,001	D1	1	9,091	C1	0,0001	W1
32	<i>Gallinula chloropus</i>	38	0,032	D1	6	54,545	C3	0,0177	W1
33	<i>Fulica atra</i>	15793	13,499	D5	11	100,000	C4	13,4990	W5
34	<i>Gallinago gallinago</i>	6	0,005	D1	3	27,273	C2	0,0014	W1
35	<i>Tringa ochropus</i>	14	0,012	D1	6	54,545	C3	0,0065	W1
36	<i>Larus cachinnans</i>	4058	3,469	D3	11	100,000	C4	3,4686	W3
37	<i>Larus canus</i>	2308	1,973	D2	9	81,818	C4	1,6141	W3
38	<i>Larus ridibundus</i>	9406	8,040	D4	11	100,000	C4	8,0397	W4
39	<i>Streptopelia decaocto</i>	10	0,009	D1	7	63,636	C3	0,0054	W1
40	<i>Alcedo atthis</i>	1	0,001	D1	1	9,091	C1	0,0001	W1
41	<i>Picus canus</i>	1	0,001	D1	1	9,091	C1	0,0001	W1
42	<i>Dedrocopos major</i>	1	0,001	D1	1	9,091	C1	0,0001	W1
43	<i>Galerida cristata</i>	16	0,014	D1	5	45,455	C2	0,0062	W1
44	<i>Anthus spinoletta</i>	94	0,080	D1	7	63,636	C3	0,0511	W1
45	<i>Motacilla alba</i>	4	0,003	D1	1	9,091	C1	0,0003	W1
46	<i>Lanius excubitor</i>	7	0,006	D1	5	45,455	C2	0,0027	W1
47	<i>Sturnus vulgaris</i>	3	0,003	D1	2	18,182	C1	0,0005	W1
48	<i>Garrulus glandarius</i>	1	0,001	D1	1	9,091	C1	0,0001	W1
49	<i>Pica pica</i>	455	0,389	D1	10	90,909	C4	0,3536	W2
50	<i>Corvus monedula</i>	744	0,636	D1	7	63,636	C3	0,4047	W2
51	<i>Corvus frugilegus</i>	1216	1,039	D1	10	90,909	C4	0,9449	W2
52	<i>Corvus corone cornix</i>	89	0,076	D1	10	90,909	C4	0,0692	W1
53	<i>Corvus corax</i>	128	0,109	D1	9	81,818	C4	0,0895	W1
54	<i>Troglodytes troglodytes</i>	1	0,001	D1	1	9,091	C1	0,0001	W1
55	<i>Prunella modularis</i>	3	0,003	D1	2	18,182	C1	0,0005	W1
56	<i>Phoenicurus ochruros</i>	1	0,001	D1	1	9,091	C1	0,0001	W1
57	<i>Turdus merula</i>	7	0,006	D1	4	36,364	C2	0,0022	W1
58	<i>Turdus viscivorus</i>	1	0,001	D1	1	9,091	C1	0,0001	W1
59	<i>Turdus pilaris</i>	66	0,056	D1	4	36,364	C2	0,0205	W1
60	<i>Parus caeruleus</i>	37	0,032	D1	7	63,636	C3	0,0201	W1
61	<i>Parus major</i>	35	0,030	D1	9	81,818	C4	0,0245	W1
62	<i>Passer domesticus</i>	55	0,047	D1	6	54,545	C3	0,0256	W1
63	<i>Passer montanus</i>	147	0,126	D1	7	63,636	C3	0,0800	W1
64	<i>Fringilla coelebs</i>	187	0,160	D1	7	63,636	C3	0,1017	W2
65	<i>Fringilla montifringilla</i>	10	0,009	D1	1	9,091	C1	0,0008	W1
66	<i>Pyrrhula pyrrhula</i>	14	0,012	D1	2	18,182	C1	0,0022	W1
67	<i>Coccothraustes coccothraustes</i>	2	0,002	D1	2	18,182	C1	0,0003	W1
68	<i>Carduelis chloris</i>	15	0,013	D1	4	36,364	C2	0,0047	W1
69	<i>Carduelis spinus</i>	5	0,004	D1	2	18,182	C1	0,0008	W1
70	<i>Carduelis carduelis</i>	794	0,679	D1	9	81,818	C4	0,5553	W2
71	<i>Carduelis cannabina</i>	11	0,009	D1	2	18,182	C1	0,0017	W1
72	<i>Emberiza schoeniclus</i>	33	0,028	D1	6	54,545	C3	0,0154	W1
73	<i>Emberiza citrinella</i>	67	0,057	D1	8	72,727	C3	0,0416	W1

Legend:

Dominance and Dzuba index: D1, W1 – subrecedent species, D2, W2 – recedent species, D3, W3 – subdominant species, D4, W4 – dominant species, D5, W5 – eudominant species; **Constancy:** C1 – accidental species, C2 – accessory species, C3 – constant species, C4 – euconstant species.

Table 5. The values of the index of relation (IR) for the Anseriformes species observed during the International Waterbird Count (2000 – 2010)

Species	Year											Period
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	
<i>Cygnus olor</i>	4,92	5,91	12,46	16,72	2,78	0,80	1,01	1,32	3,13	5,51	1,31	3,67
<i>Anas platyrhynchos</i>	87,41	87,73	84,34	73,71	90,48	83,88	87,93	59,26	57,76	55,17	60,88	72,36
<i>Anas crecca</i>	6,60	6,36	0,67	7,76	1,70	9,20	10,47	13,47	7,65	9,47	11,53	8,33
<i>Aythya fuligula</i>	0,00	0,00	1,47	0,46	1,57	4,08	0,36	1,43	2,83	10,74	4,48	3,49
<i>Aythya ferina</i>	1,02	0,00	0,69	0,55	3,00	1,61	0,00	23,62	26,11	12,65	16,77	9,89
Other species	0,06	0,00	0,38	0,80	0,46	0,43	0,23	0,89	2,52	6,46	5,02	2,26

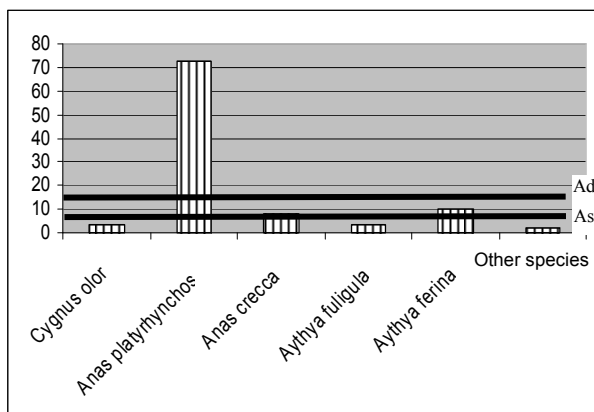


Figure 4. The global participation of the Anseriformes species to the conenose of the order during the International Waterbird Count (2000 – 2010).

4. CONCLUSIONS

- The avifauna of the hiemal period, registered on the basins from the middle and upper course of the Argeş River, that belong to the “Basins of the Argeş River” site, during the International Waterbird Count (2000 – 2010) is diverse; 73 species (19.11% af all species observed in Romania) belonging to 14 orders.
- 9 species (12.32%) belong to the Annex I of the Birds Directive.
- The majority of the species was recorded in the area of the Piteşti Basin (78.08%) and the most of the individuals was observed in area of the Goleşti Basin (54.95%).
- The most numerous were the Anseriformes species (79175 individuals, 67.67%), followed by the Gruiformes species (15831 individuals, 13.53%), Charadriiformes species (15792 individuals, 13.49%) and Passeriformes species (4321 individuals, 3.69%).

- The most numerous were: *Anas platyrhynchos* (with 57291 individuals, 48.96%), *Fulica atra* (with 15793 individuals, 13.49%), *Larus ridibundus* (with 9406 individuals, 8.04%) și *Aythya ferina* (with 7834 individuals, 6.69%).
- By the Bray-Curtis index, the best similarity was between Piteşti Basin and Budeasa Basin and by the Jaccard index, the best similarity was between Vâlcele Basin and Budeasa Basin.
- By the dominance, the most numerous species were the subrecedent species (87.67%), by the constancy, the most numerous were the accidental species (32.88%) and by the Dzuba index of ecological signification, the most numerous were the subrecedent species (72.60%).
- Because it finds here the best condition for wintering, *Anas platyrhynchos* was the only overdominant species during all the period. *Anas crecca* and *Aythya ferina* were dominant and the other species were complementary species.

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