ECOLOGICAL RESEARCHES ON THE AVIFAUNA OF THE GOLEŞTI BASIN IN THE HIEMAL AND PREVERNAL ASPECTS (2008 – 2009)

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Abstract
The Goleşti Basin is situated in the South of the Piteşti town and it is 649 ha surface. It is part of the "Basins of the Argeş River", site that is included in the Important Bird Area Program and in the Nature 2000 network. It represents an important place for breeding, feeding, passage, and, principally, for wintering for many water bird species. In the mentioned period, in the area of the Goleşti Basin were identified 84 bird species, belonging to 12 orders, 27 families and 55 genera. In the Annex I of the Bird Directive, 11 species (13%) are included (Phalacrocorax pygmaeus, Egretta garzetta, Egretta alba, Nycticorax nycticorax, Cygnus cygnus, Sterna hirundo, Alcedo atthis etc.) Related to the hiemal aspect, in the Anseriformes population (the most important concerning the number of exemplars), 1 species is overdominant (Anas platyrhynchos) and 3 species are in the zone of dominance (Anas crecca, Aythya ferina and Aythya fuligula).

Keywords: birds, hiemal and prevernal aspects, Goleşti basin

1. INTRODUCTION

After 1960 on the course of the Argeş River many dams were constructed; the new basins provide the necessary of water for the producing of the hydro-electrical energy, but simultaneously they have determined big changes in the qualitative and quantitative structure of the ornitofauna, changes associated with a strong anthropisation of the natural landscape (Figure 1). In the same time with the process of silting the birds conditions more and more favourable for feeding, shelter, nesting, and passage and wintering are found here [1, 2, 3, 4].

2. MATERIAL AND METHODS

The Goleşti Basin (649 ha), is one of the greatest lakes from the middle hydrographic basin of the Argeş River, river that have his source at the confluence of the Buda and Capra streams. It is one of the principal affluents of the Danube.
The researches were conducted during November 2008 – May 2009. For the identification of the bird species, we have used the itinerary and the fix point observations methods. We have made observations on the diurnal period, using 10 x 50 binoculars.

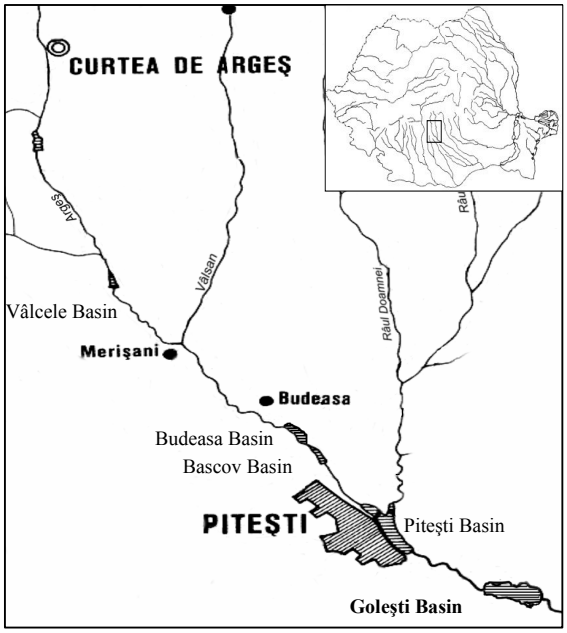

Figure 1. The upper and midle hydrographic basin of the Argeş River.

3. RESULTS AND DISCUSSIONS

In the area of the Goleşti Basin we have identified 84 bird species, belonging to 12

orders, 27 families and 55 genera (Table 1). The **Passeriformes** is the most representative order, with 12 families and 44 species; it is followed by the **Anseriformes** order (with one family and 13 species), *Charadriiformes* (with 7 species), *Ciconiiformes* (with 4 species), *Podicipediformes, Falconiformes* and *Galliformes* (both with 3 species), *Strigiformes* and *Pelecaniformes* (both with 2 species), *Gruiformes, Columbiformes*, *Apodiformes* (each with one species) (Table 2). The orders the observed species on the Goleşti Basin belong to represent 63.15% from the 19 orders of the Romania avifauna, families represent 42.18% from the 64 of our ornitofauna and the species represent 22.4% from all the 375 bird species.

The avifauna shows seasonal changes regarding the qualitative and quantitative aspects. The least bird species were observed in February (25 species) and the most species in May. Considering the all number of exemplars, on the first place is *Anas platyrhynchos* (with 26792 exemplars), followed by *Aythya fuligula* (with 7430 exemplars) and *Aythya ferina* (with 6195 exemplars). Important effective have had *Larus ridibundus* (2440 exemplars) and *Fulica atra* (1732 exemplars), too.

Table 1. The avifauna of the Goleşti Basin (hiemal and prevernal aspects) of the Romania avifauna.

No	Taxonomic unit	Romania	Goleşti Basin	%
1	Number of orders	19	12	63.15
2	Number of families	64	27	42,18
3	Number of species	375	84	22,4

Table 2. The avifauna from the Goleşti Basin – the hiemal and prevernal aspects.

No	Species	Hiemal aspect				Prevernal aspect			Principal habitat	Phenology	Biogeographic origin	SPEC List	Bird Directive
		XI	XII	I	II	III	IV	V					
	Ord. Podicipediformes												
1.	*Podiceps cristatus*	*	*	*	*		*	*	Ac	Ov, Ri	Tp	ns	
2.	*Podiceps nigricollis*		*		*				Ac	Mp	E	ns	
3.	*Tachybaptus ruficollis*	*		*	*				Ac	Ov, Ri	E	ns	
	Ord. Pelecaniformes												
4.	*Phalacrocorax carbo*	*	*	*	*	*	*	*	Ac	Ov, Ri	Tp	ns	AI
5.	*Phalacrocorax pygmeus*					*			Ac	Ov, Ri	M	1	AI
	Ord. Ciconiiformes												
6.	*Egretta garzetta*						*	*	Ac	Ov	M	ns	AI
7.	*Egretta alba*	*		*		*			Ac	Ov, Ri	Ch	ns	AI
8.	*Ardea cinerea*		*			*	*	*	Ac	Ov, Ri	Tp	ns	
9.	*Nycticorax nycticorax*						*	*	Ac	Ov	M	3	AI
	Ord. Anseriformes												
10.	*Cygnus olor*	*	*	*	*	*	*	*	Ac	Mp	E	e	AII/2
11.	*Cygnus cygnus*		*						Ac	Oi	S	e	AI
12.	*Anser albifrons*		*	*					Ac	Oi	A	ns	AII/2, AIII/2
13.	*Anas platyrhynchos*	*	*	*	*	*	*	*	Ac	Mp, Oi	Tp	ns	AII/1, AIII/1
14.	*Anas penelope*	*	*	*	*				Ac	P, Oi	S	e	AII/1, AIII/2
15.	*Anas crecca*	*	*	*	*	*	*	*	Ac	P, Oi, Ov	Tp	ns	AII/1, AIII/2
16.	*Anas querquedula*					*	*		Ac	Ov, P	Tp	3	AII/1
17.	*Anas clypeata*					*	*		Ac	P, Ov	Tp	3	AII/1, AIII/2
18.	*Aythya marila*		*						Ac	Oi	A	3	AII/2, AIII/2
19.	*Aythya fuligula*	*	*	*	*	*	*	*	Ac	Oi, Ov	S	3	AII/1, AIII/2
20.	*Aythya ferina*	*	*	*	*	*	*	*	Ac	Mp	E	2	AII/1, AIII/2
21.	*Bucephala clangula*	*	*	*	*				Ac	Oi	S	ns	AII/2
22.	*Mergus albellus*		*	*	*				Ac	Oi	S	3	

	Ord. Falconiformes												
23.	*Buteo buteo*	*	*	*			*		T	Mp	Tp	ns	
24.	*Accipiter nisus*				*		*		T	S, Oi	Tp	ns	
25.	*Falco tinnunculus*	*	*	*	*	*	*	*	T	Mp	Tp	3	
	Ord. Galliformes												
26.	*Perdix perdix*							*	T	S	E	3	AII/1, AIII/1
27.	*Phasianus colchicus*					*		*	T	S	Ch	ns	AII/1, AIII/1
28.	*Coturnix coturnix*							*	T	Ov	E	3	AII/2
	Ord. Gruiformes												
29.	*Fulica atra*	*	*	*	*	*	*	*	Ac	Mp	Tp	ns	AII/1, AIII/2
	Ord. Charadriiformes												
30.	*Vanellus vanellus*						*	*	Am	Ov	Mo	2	AII/2
31.	*Arenaria interprens*		*						Am	P	A	ns	
32.	*Himantopus himantopus*						*	*	Am	Ov	Mo	ns	AI
33.	*Larus cachinnans*	*	*	*	*	*	*	*	Ac	S	Tp	e	AII/2
34.	*Larus canus*				*				Ac	Oi	S	2	AII/2
35.	*Larus ridibundus*	*	*	*	*	*	*	*	Ac	Mp	Tp	e	AII/2
36.	*Sterna hirundo*							*	Ac	Ov	E	ns	AI
	Ord. Columbiformes												
37.	*Streptopelia decaocto*							*	T	S	M	ns	AII/2
	Ord. Strigiformes												
38.	*Otus scops*	*							T	S	Tp	ns	
39.	*Athene noctua*	*						*	T	S	Mo	3	
	Ord. Apodiformes												
40.	*Apus apus*							*	T	Ov	E	ns	
	Ord. Passeriformes												
41.	*Galerida cristata*							*	T	S	Mo	3	
42.	*Alauda arvensis*	*				*	*	*	T	Mp	Mo	3	AII/2
43.	*Lullula arborea*							*	T	Ov	E	2	AI
44.	*Riparia riparia*							*	T	Ov	Tp	3	
45.	*Hirundo rustica*						*	*	T	Ov	Tp	3	
46.	*Anthus trivialis*							*	T	Ov	E	ns	
47.	*Anthus campestris*							*	T	Ov	Mo	3	AI
48.	*Anthus spinoletta*	*	*	*	*				T	Ov	Ti	ns	
49.	*Motacilla flava*						*	*	T	Ov	Tp	ns	
50.	*Motacilla cinerea*	*	*		*				Am	Ov, Ri	E	ns	
51.	*Motacilla alba*					*	*	*	T	Ov	E	ns	
52.	*Sturnus vulgaris*					*	*	*	T	Mp	E	3	AII/2
53.	*Garrulus glandarius*							*	T	S	E	ns	AII/2
54.	*Pica pica*	*		*	*	*	*	*	T	S	E	ns	AII/2
55.	*Corvus monedula*	*		*	*	*		*	T	S	E	e	AII/2
56.	*Corvus frugilegus*	*		*	*	*		*	T	S	E	ns	AII/2
57.	*Corvus corone cornix*	*		*					T	S	E	ns	AII/2
58.	*Corvus corax*						*	*	T	S	Tp	ns	
59.	*Troglodytes troglodytes*							*	T	Ov, Ri	E	ns	
60.	*Acrocephalus schoenobaenus*						*	*	Am	Ov	E	e	
61.	*Acrocephalus arundinaceus*							*	Am	Ov	E	ns	
62.	*Sylvia borin*							*	T	Ov	E	e	
63.	*Sylvia atricapilla*							*	T	Ov	E	e	
64.	*Sylvia communis*							*	T	Ov	E	e	
65.	*Sylvia curruca*							*	T	Ov	E	ns	
66.	*Phylloscopus collybita*						*	*	T	Ov	Tp	ns	
67.	*Ficedula albicollis*						*	*	T	Ov	E	e	AI
68.	*Erithacus rubecula*							*	T	Ov, Ri	E	e	
69.	*Luscinia megarhynchos*							*	T	Ov	E	e	
70.	*Turdus merula*						*	*	T	Mp	E	e	AII/2

71.	*Turdus pilaris*						*		T	Mp, Oi	S	e	AII/2
72.	*Parus palustris*						*		T	S	E	3	
73.	*Parus caeruleus*					*	*	*	T	S	E	e	
74.	*Parus major*					*	*	*	T	S	E	ns	
75.	*Passer montanus*						*		T	S	Tp	3	
76.	*Fringilla coelebs*	*	*	*	*	*		*	T	Mp	E	e	
77.	*Fringilla montifringilla*		*						T	Oi	S	ns	
78.	*Pyrrhula pyrrhula*							*	T	S	S	ns	
79.	*Carduelis chloris*					*			T	S	E	e	
80.	*Carduelis carduelis*	*	*	*	*	*	*		T	S, Oi	E	ns	
81.	*Carduelis cannabina*			*					T	Mp	E	2	
82.	*Emberiza schoeniclus*					*	*	*	Am	Mp	Tp	ns	
83.	*Emberiza citrinella*						*	*	T	S	E	e	
84.	*Miliaria calandra*			*			*	*	T	Mp	E	2	

Legend:
Habitat: Ac – Aquatic habitat, Am – Amphibious habitat, T - terrestrial habitat;
Phenology: Oi – winter visitor, Ov – summer visitor, Ri – scarce during winter, Mp – partial migrant, P – passage migrant, Ac – accidental species, S – resident, ? – uncertain situation;
Biogeographic origin: S – Siberian species, A – Arctic species, Tp – Transpalearctic species, E – European species, M – Mediterranean species, M- Mongolic species, Ch – Chinese species;
SPEC List: **1** – SPEC 1, **2** – SPEC 2, **3** – SPEC 3, **e** – Non-SPEC^{E}, **ns** – Non-SPEC;
Bird Directive: **AI** – Annex I; **AII/1** – annex II, part 1; **AII/2** – annex II, part 2.

From the point of view of the occupied **habitat**, 50 species (60%: *Accipiter nisus*, *Phasianus colchicus*, *Otus scops*, *Galerida cristata*, *Sylvia borin* etc.) live in the terrestrial habitat (T), 27 species (32%: *Podiceps cristatus*, *Phalacrocorax carbo*, *Anser albifrons*, *Mergus albellus* etc.) live in the aquatic habitat (Aq) and 7 species (8%: *Arenaria interprens*, *Himantopus himantopus*, *Motacilla cinerea* etc.) live in the amphibious habitat (Am) (Table 2, Figure 2).

Regarding the **phenology** of our country, 8 species (10%: *Cygnus cygnus*, *Aythya marila*, *Aythya fuligula* etc.) are winter visitors or preponderantly winter visitors (WV), 34 species (40%: *Tachybaptus ruficollis*, *Egretta garzetta*, *Lullula arborea*, *Acrocephalus schoenobaenus* etc.) are summer visitors or preponderantly winter visitors (SV), 16 species (19%: *Podiceps nigricollis*, *Cygnus olor*, *Aythya ferina*, *Fulica atra* etc.) are partial migrants or preponderantly partial migrants (PM), 4 species (5%: *Anas penelope*, *Anas crecca*, *Anas clypeata* şi *Arenaria interprens*) are passage migrants or preponderantly passage migrants (P) and 22 de species (26%: *Perdix perdix*, *Athene noctua*, *Corvus corax*, *Passer montanus*) are resident or preponderantly resident (R) (Table 2, Figure 3).

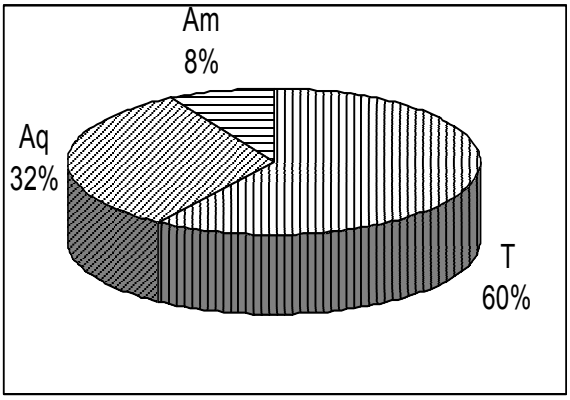

Figure 2. The distribution of the species by their principal occupied habitat.

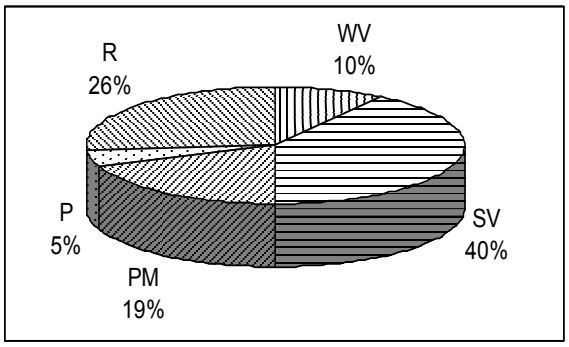

Figure 3. The distribution of the species by phenology.

By their **biogeographic origin** (Table 2, Figure 4), 38 species (45%) have European origin - E (*Aythya ferina, Perix perdix, Sterna hirundo* etc.), 21 species (25%) have Transpalearctic origin – Tp (*Larus ridibundus, Riparia riparia, Corvus corax* etc.), 9 species (11%) have Siberian origin – S (*Cygnus cygnus, Turdus pilaris, Fringilla montifringilla* etc.), 6 species (7%) have Mongolic origin – Mo (*Himantopus himantopus, Athene noctua, Anthus campestris* etc.), 4 species (5%) have Mediterranean origin – M (*Phalacrocorax pygmeus, Egretta garzetta, Nycticorax nycticorax* and *Streptopelia decaocto*), 3 species (4%) have Arctic origin – A (*Anser albifrons, Aythya marilla* an *Arenaria interpres)*, 2 species (3%) have Chinese origin – Ch (*Egretta alba* and *Phasianus colchicus*) and one species (1%) has Tibetan origin - Ti (*Anthus spinoletta*). The periods that correspond to passage, especially the moments of start of the passage, are the richest regarding the diversity. In conformity with the **SPEC List** (Species of European Conservation Concern), the birds from the Goleşti Basin area belong to four categories:

- SPEC 1 (1%): species of global conservation concern – 1 species: *Phalacrocorax pygmeus*;
- SPEC 2 (7%): species concentrated in Europe and having an unfavourable conservation status – 6 species: *Aythya ferina*, *Vanellus vanellus*, *Larus canus, Lullula arborea*, *Carduelis cannabina* and *Miliaria calandra*;
- SPEC 3 (20%): species not concentrated in Europe and having an unfavourable conservation status – 18 species: *Nycticorax nycticorax, Anas querquedula*, *Mergus albellus*, *Hirundo rustica* etc.;
- Non-SPEC^{E} (21%): species not concentrated in Europe and having a favourable conservation status – 19 species: *Cygnus olor, Corvus monedula*, *Turdus merula, Parus caeruleus* etc.

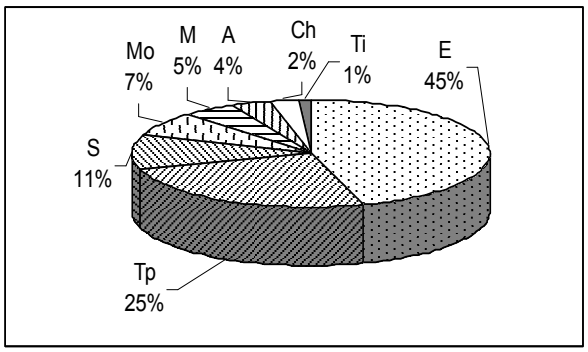

Figure 4. The bird species distribution according to their biogeographic origin.

48 species (51%) are Non SPEC being species that are not the objective of the protection European plan (Table 2, Figure 5).

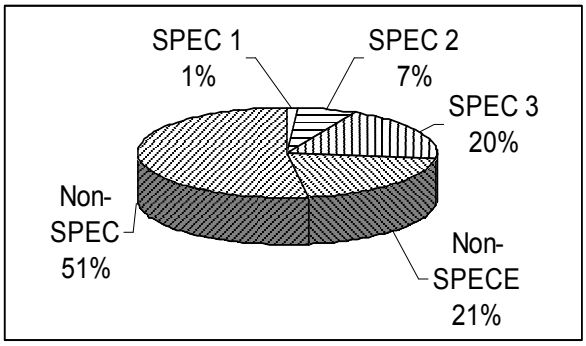

Figure 5. The distribution of species by the SPEC Category.

Considering the **Bird Directive**, 11 species (13% − *Phalacrocorax pygmeus, Egretta garzetta*, *Nycticorax nycticorax*, *Himantopus himantopus*, *Sterna hirundo* etc.) belong to the Annex I. Special safety measures of protection regarding the habitat in order to ensure the surviving and the reproduction of those species in their area of distribution had been provided. 10 species (12% − *Anas querquedula*, *Aythya fuligula, Aythya ferina*

etc.) belong to Annex II, part 1, being species that can be hunted in the maritime and terrestrial geographic area of application of this Directive, 19 species (23% − *Corvus corone cornix, Turdus merula, Turdus pilaris* etc.) belong to Annex II, part 2, and it could be hunted only in the States of the E. U. for which it is mentioned. So, 40 bird species (48%) from the 84 identified bird species belong to the annexes of the Bird Directive (Directive 79/409/EEC).

Regarding the ecological seasons, 39 bird species were observed in the hiemal season and 68 bird species were observed in the prevernal season.

Considering that the lakes from the upper and middle hydrographic basin of the Argeş River constitute important winter ward for the water birds, for the evaluation of the quantitative dynamics of the Anseriformes population in the hiemal aspect, we have calculated the index of relation (Table 3). The statistic axis (As) is 9.09 and the dominance axis (Ad) is 18.18.

Table 3. The values of the relation index for some Anseriformes species (in code EURING) from the hiemal avifauna.

Species	November	December	January	February	Interval
Cygolo	0.30	1.23	2.01	0.16	0.72
Anapla	41.72	57.24	75.38	57.10	53.98
Anacre	29.80	2.45	5.03	1.63	12.28
Aytfer	20.86	20.44	8.71	16.31	18.04
Aytful	5.96	16.35	7.54	24.47	13.65
Anapen	1.19	0.41	0.50	0.16	0.64
Other species	0.18	1.88	0.84	0.16	0.70

The hiemal avifauna of the Goleşti Basin is dominated by the *Anas platyrhynchos* (Table 3, Figure 6), but important effective have also *Aythya ferina, Aythya fuligula* and *Anas crecca*. *Anas platyrhynchos* is overdominant species; *Aythya ferina, Aythya fuligula* and *Anas crecca* are in the zone of dominance and the other species are complementary species (*Cygns olor, Anas penelop* and the group of the other species: *Anser albifrons*, *Bucephala clangula, Aythya marilla, Cygnus cygnus* and *Mergus albellus*).

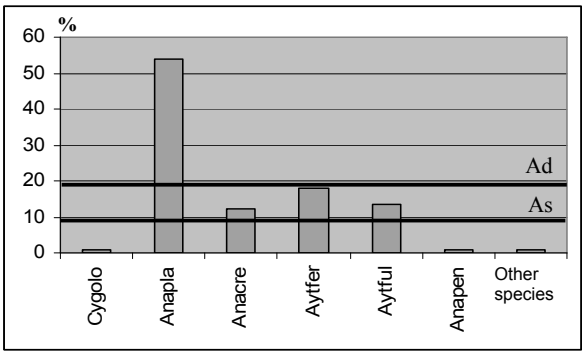

Figure 6. The globally participation of the some Anseriformes species to the structure of the avifauna in the hiemal aspect.

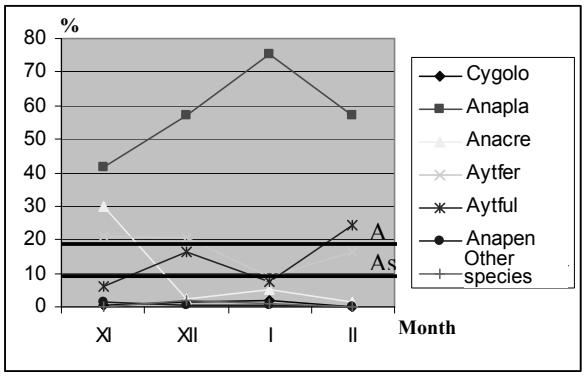

Figure 7. The dynamics of some Anseriformes species from the Goleşti Basin in the hiemal aspect.

We observed that *Anas platyrhynchos* (Table 3, Figure 7) remain overdominant species during the all hiemal aspect, it found here favourable conditions for wintering, mainly in January, when came many Nordic exemplars.

again complementary species as a result of the freezing and the low temperatures and in February it move up in the overdominance zone, because the weather condition become more tolerable. *Anas crecca* drop in December from the overdominance zone in the

complementary one where it stays in January and February, too. The other species of Anseriformes remain all the time complementary species.

4. CONCLUSIONS

The results obtained during the study of the avifauna of the Goleşti Basin area, effected in the hiemal and prevernal aspects (2008 - 2009), permit us to conclude that it is relatively rich and various: it has 84 species (25.53% of the observed bird species on the Romanian territory), 34 of them (40%) being aquatic or amphibious species. The best represented, from the point of view of the number of the species, were the orders: **Passeriformes** (44 species), **Anseriformes** (13 species) and **Charadriiformes** (7 species). Regarding the biogeographic origin, predominantly are the of distribution being provided. Because of the destruction of the natural water zones, the diminishing to extreme of the natural water ecosystems, the regularisation of the watercourses, and under an acute and straight anthropic pressure, the basins of the Argeş River represent the only and the last shelters in the zone for some huge populations of waterbirds, mainly in winter. Consequently, it is imperious necessary to protect the Goleşti Basin, harmonizing the economic interests with the ecologic needs of the birds and their habitats, especially since the Goleşti Basin is part of the "Argeş River Basins", sit included in the Important Bird Area Program and in the network Nature 2000.

European species (45%) and Transpalearctic species (25%). The periods that correspond to migration, especially at the beginning of the passage (November, March) are the richest considering the diversity.

The most exemplars belong to: *Anas platyrhyncos* (26792), *Aythya fuligula* (7430), *Aythya ferina* (6195), *Larus ridibundus* (2440) and *Fulica atra* (1732). Majority of the species live in the terrestrial habitat; the summer visitors and the resident species are predominantly.

There have been identified many rare and protected species in area. From the 84 species, 40 are in the annexes of the Bird Directive, 11 of them belonging to the Annex I, special safety measures of protection regarding the habitat in order to ensure the surviving and the reproduction of those species in their area

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