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RARE, VULNERABLE AND PROTECTED BIRD SPECIES IN THE AREA OF THE RESERVOIRS FROM THE MIDDLE BASIN OF THE ARGEŞ RIVER AND MEASURES FOR THEIR PROTECTION

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Abstract

The present paper provides the results of the ecological research conducted over 16 years on the avifauna of the reservoirs (a site of the Natura 2000 Network) located in the middle valley of the Argeş River.

Biodiversity protection is becoming more problematic, paradoxically due to thoughtless human interventions. Out of the 11,121 species identified so far, one third are in danger of extinction worldwide. With reference to the Bern Convention on the conservation of wildlife and natural habitats in Europe, 200 species (95.69%) identified in the area under research are included in its annexes. 101 species are recorded in the annexes of the Bonn Convention. 53 species (Phalacrocorax pygmeus, Pelecanus crispus, Anser erythropus, Aythya nyroca, etc.) are enlisted in Annex 1 of the Birds Directive. 12 species are found in the IUCN Red List (International Union for Conservation of Nature) considered to be threatened or endangered species and 8 species are protected globally. An important role in preserving biodiversity is played not only by natural lakes and meadows but also by reservoirs, many of them host to a quantitatively unique and diverse fauna. A necessary measure for the protection of most vulnerable bird species is the preservation of their habitats through the identification, conservation and global expansion of valuable areas – Special Protection Areas (SPA). Awareness on the importance and management effectiveness of these protected areas becomes mandatory in the context of the international and national strategies for the protection and conservation of nature. We have to abide by the requirements of the Birds Directive and of the Water Framework Directive and to eliminate all the unsustainable practices promoted in the studied area. The unsustainable economic interests must not prevail upon the problems related to the conservation of biodiversity. Only the joint effort of all the states may save the bird species (biodiversity in general) and contain other dire effects caused by climate change.

Keywords: Argeş River, protected bird species.

1. INTRODUCTION

The problem of biodiversity protection is rapidly growing more acute by the day, due to thoughtless human interventions. In 1992 the Convention on biological diversity was adopted, which requires the states to grant enhanced attention to biodiversity conservation activities in natural habitats, to restore degraded ecosystems and endangered species. Romania has ratified this Convention, as well as other international conventions (The Bern Convention, Bonn Convention, and Hague Agreement) and it also has to meet the terms of the Birds Directive, which jointly constitute an international legal basis and a professional framework for the conservation of European nature and a basis for the long-term conservation of biodiversity. Nevertheless, there are few those who are

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aware that we have the obligation to maintain biodiversity not only to secure life in the present, but also for future generations. Birds are very good bioindicators (and, in some cases, the only ones) for environmental changes, to which they react by modifying the composition of their species in a biocenosis, by changing their behaviour or their aspect and reproduction capacity (Mihăiescu, 2014). Worldwide, 222 out of the 11,121 bird species identified so far are now considered critically endangered, which places them one step above extinction; 461 bird species are now listed as endangered, with another 786 considered vulnerable. About 13%, or one in eight, of the 11,121 species are currently listed as threatened globally (http://www.iucnredlist.org/; http://www.birdlife.org/worldwide/news/red-list-2017/). The Argeş River is the most important flowing water in the Argeş county; it originates at the confluence of the rivers Capra and Buda and it is one of the main tributaries of the Danube River (Barco and Nedelcu, 1974). A few decades ago, a series of reservoirs was built on its stream, resulting in a series of succeeding dams, which are from upstream to downstream: Vidraru, Oieşti, Cerbureni, Zigoneni, Vâlcele, Budeasa, Bascov, Piteşti, Goleşti, etc. (Fig. 1). These reservoirs had a significant effect on the landscape and influenced the composition, as well as the temporal and spatial dynamics of the bird species in these areas (Mătieş, 1969; Munteanu and Mătieş, 1983; Mestecăneanu et al., 2003; Conete and Mestecăneanu, 2004; Conete, 2011, etc.). The research on the aquatic avifauna of the reservoirs, newly built at that time on the upper and middle stream of the Argeş River, was initiated by Dan Munteanu and then continued by the author together with Matieş (1973-1983). In their study "*Modificări induse de lacurile de acumulare în structura şi dinamica avifaunei*" (*Changes caused by the reservoirs in the structure and dynamics of the avifauna*) (1983), **Munteanu** and **Matieş** synthesized the data regarding the changes observed in the structure and dynamics of the avifauna as a result of the changes occurred in the Argeş River basin. After 1999, many articles (Radu, Mestecăneanu, Conete) have completed the series of research studies on this area (Conete, 2013). The decline of wild bird populations in Europe is happening at the same time as the degradation of their habitats, the destruction of their nesting places and the reduction of their natural food resources increase. These facts imposed special conservation measures (Gava, 1997; Munteanu, 2009; Conete, 2015, etc).

2. MATERIALS AND METHODS

The research was conducted in the area comprising the following reservoirs: Vâlcele (408 ha), Budeasa (412 ha), Bascov (162 ha), Piteşti (122 ha) and Goleşti (649 ha), which are important wintering, feeding and nesting areas for many bird species (Fig.1). This Nature 2000 site (ROSPA0062 - "Reservoirs on the Argeş River") consists of a mosaic of habitats: vast expanses of water with reed belts, stretches of rivers, smooth hills covered with forests, meadows, shrubbery, meadow forests and orchards with agricultural plots. As regards the vegetation of the reservoirs, this is represented by *Phragmites* sp., *Typha* sp., *Carex* sp., *Juncus* sp., *Salix* sp., *Alnus* sp., *Populus alba*, *Rubus* sp., etc. The process of silting permitted the establishment of reedbeds - *Phragmites*, *Typha* and other typical wetland plants. The attractivness of the five reservoirs (anthropic aquatic ecosytems) for the avifauna is different; first, it is subject to the

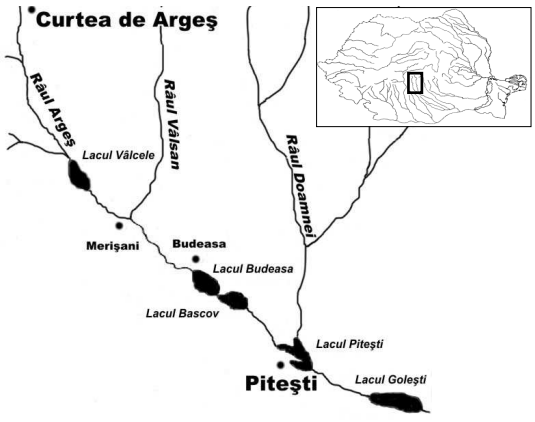

Figure 1. The middle basin of the Argeş River

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surface area of the water body, but also to the heterogeneity of the habitats adjacent to the reservoirs under research (Alexiu, 2008; Conete, 2011). Our field research was permanently conducted on these reservoirs and in the adjacent areas (including the neighbouring settlements and in agroecosystems), between March 2002 and March 2018. The research was focused on bird communities in wetland habitats, open habitats (meadows and shrubbery), in forest habitats found in the immediate vicinity of the reservoirs and in built-up areas. We used the following methods: the itinerary method (routes along the shores and dams), the fixed-point observation, and also the observation on the move on the lakes and in the shrubbery, using the boat. The observations were made with the naked eye, with binoculars (10 x 42), a telescope (20 – 50 X 60) and auditorily. The birds were identified using the Hamlyn Guide (Bruun et al., 1999).

3. RESULTS AND DISCUSSIONS

During the period of the study, in the area under research we identified 209 bird species from 17 orders, 49 families and 117 genera, indicating a relatively high biodiversity level; 88 species are dependent on the wetlands. Of the bird species identified in the research area, many are threatened at international, European or regional level (Tab.1). They were the subject of some international protection laws which were adopted by our country as well.

Table 1. Bird species observed in the the area of the reservoirs from the middle basin of the Argeş River and their protection status

No.	*Species*	Bird Directive	Bern Convention	Bonn Convention	SPEC List	Law no.47/2006	Romanian Red Book of Vertebrates	IUCN Red List of Threatened Species
1	*Gavia arctica*	AI	AII	AII	3	*		LC
2	*Gavia stellata*	AI	AII	AII	3	*		LC
3	*Podiceps cristatus*		AIII		ns	*		LC
4	*Podiceps grisegena*		AII	AII	ns	*		LC
5	*Podiceps nigricollis*		AIII		ns	*		LC
6	*Tachybaptus ruficollis*		AII		ns	*		LC
7	*Phalacrocorax carbo*		AIII		ns	*		LC
8	*Phalacrocorax pygmeus*	AI	AII	AII	1	*	•	LC
9	*Pelecanus crispus*	AI	AII	AI	1	*	•	NT
10	*Botaurus stellaris*	AI	AII	AII	3	*		LC
11	*Ixobrychus minutus*	AI	AII	AII	3	*		LC
12	*Egretta garzetta*	AI	AII		ns	*	•	LC
13	*Egretta alba*	AI	AII	AII	ns	*	•	LC
14	*Ardeola ralloides*	AI	AII		3	*	•	LC
15	*Ardea cinerea*		AIII		ns	*		LC
16	*Ardea purpurea*	AI	AII	AII	3	*	•	LC

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17	*Platalea leucorodia*	AI	AII	AII	2	*	•	LC
18	*Nycticorax nycticorax*	AI	AII		3	*	•	LC
19	*Ciconia ciconia*	AI	AII	AII	2	*	•	LC
20	*Ciconia nigra*	AI	AII	AII	2	*	•	LC
21	*Cygnus olor*	AII/2	AIII	AII	e	*		LC
22	*Cygnus cygnus*	AI	AII	AII	e	*		LC
23	*Anser erythropus*	AI	AII	AI	1	*	•	VU
24	*Branta ruficollis*	AI	AII	AI	1	*	•	VU
25	*Anser anser*	AIII/2	AIII	AII	ns			LC
26	*Anser albifrons*	AII/2, AIII/2	AIII	AII	ns			LC
27	*Anas platyrhynchos*	AII/1, AIII/1	AIII	AII	ns			LC
28	*Anas strepera*	AII/1	AIII	AII	3			LC
29	*Anas acuta*	AII/1, AIII/2	AIII	AII	3			LC
30	*Anas penelope*	AII/1, AIII/2	AIII	AII	e			LC
31	*Anas querquedula*	AII/1	AIII	AII	3			LC
32	*Anas crecca*	AII/1, AIII/2	AIII	AII	ns			LC
33	*Anas clypeata*	AII/1, AIII/2	AIII	AII	3			LC
34	*Tadorna tadorna*		AII	AII	ns	*	•	LC
35	*Netta rufina*	AII/2	AIII	AII	ns	*	•	LC
36	*Aythya marila*	AII/2, AIII/2	AIII	AII	3			LC
37	*Aythya fuligula*	AII/1, AIII/2	AIII	AII	3			LC
38	*Aythya ferina*	AII/1, AIII/2	AIII	AII	2			VU
39	*Aythya nyroca*	AI	AIII	AI	1	*	•	NT
40	*Bucephala clangula*	AII/2	AIII	AII	ns		•	LC
41	*Mergus merganser*	AII/2	AIII	AII	ns	*		LC
42	*Mergus albellus*		AII	AII	3	*	•	LC
43	*Melanitta fusca*	AII/2	AIII	AII	3	*		VU
44	*Haliaeetus albicilla*	AI	AII	AI	1	*	•	LC
45	*Aquila pomarina*	AI	AII	AII	2	*	•	LC
46	*Circaetus gallicus*	AI	AII	AII	3	*	•	LC
47	*Buteo lagopus*		AII	AII	ns	*		LC
48	*Buteo buteo*		AII	AII	ns	*		LC
49	*Pernis apivorus*	AI	AII	AII	e	*	•	LC
50	*Accipiter gentilis*		AII	AII	ns	*		LC
51	*Accipiter nisus*		AII	AII	ns	*		LC

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52	*Accipiter brevipes*	AI	AII	AII	2	*	•	LC
53	*Circus aeruginosus*	AI	AII	AII	ns	*		LC
54	*Circus cyaneus*	AI	AII	AII	3	*		LC
55	*Circus pygargus*	AI	AII	AII	e	*	•	LC
56	*Falco peregrinus*	AI	AII	AII	ns	*	•	LC
57	*Falco subbuteo*		AII	AII	ns	*		LC
58	*Falco columbarius*	AI	AII	AII	ns	*		LC
59	*Falco vespertinus*	AI	AII	AII	3	*	•	NT
60	*Falco tinnunculus*		AII	AII	3	*		LC
61	*Perdix perdix*	AII/1, AIII/1	AIII		3			LC
62	*Phasianus colchicus*	AII/1, AIII/1	AIII		ns			LC
63	*Coturnix coturnix*	AII/2	AIII	AII	3			LC
64	*Rallus aquaticus*	AII/2	AIII		ns	*		LC
65	*Porzana porzana*	AI	AII	AII	e	*		LC
66	*Crex crex*	AI	AII	AII	1	*	•	LC
67	*Gallinula chloropus*	AII/2	AIII		ns			LC
68	*Fulica atra*	AII/1, AIII/2	AIII		ns	*		LC
69	*Vanellus vanellus*	AII/2	AIII		2	*		NT
70	*Charadrius dubius*		AII	AII	ns	*		LC
71	*Pluvialis apricaria*	AI,AII/2,	AIII	AII	e	*		LC
72	*Scolopax rusticola*	AII/1, AIII/2	AIII	AII	3			LC
73	*Gallinago media*	AI	AII	AII	1	*		NT
74	*Gallinago gallinago*	AII/1, AIII/2	AIII	AII	3			LC
75	*Numenius arquata*	AII/2	AIII	AII	2	*		NT
76	*Limosa limosa*	AII/2	AIII	AII	2	*		NT
77	*Calidris alpina*		AIII	AII	3	*		LC
78	*Calidris minuta*		AII	AII	ns	*		LC
79	*Calidris temminki*		AII	AII	ns	*		LC
80	*Actitis hypoleucos*		AII	AII	3	*		LC
81	*Tringa ochropus*		AII	AII	ns	*		LC
82	*Tringa glareola*	AI	AII	AII	3	*		LC
83	*Tringa nebularia*	AII/2	AIII	AII	ns	*		LC
84	*Tringa totanus*	AII/2	AIII	AII	2	*		LC
85	*Tringa erythropus*	AII/2	AIII	AII	3	*		LC
86	*Tringa stagnatilis*		AII	AII	ns	*		LC
87	*Philomachus pugnax*	AI, AII/2	AIII	AII	2	*		LC
88	*Himantopus himantopus*	AI	AII	AII	ns	*	•	LC
89	*Larus fuscus*	AII/2			e	*		LC
90	*Larus cachinnans /michahellis*	AII/2	AIII		e	*		LC
91	*Larus canus*	AII/2	AIII		2	*		LC
92	*Larus ridibundus*	AII/2	AIII		e	*		LC
93	*Larus minutus*	AI	AII		3	*		LC
94	*Chlidonias niger*	AI	AII	AII	3	*		LC

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95	*Chlidonias hybridus*	AI	AII		3	*		LC
96	*Chlidonias leucopterus*		AII	AII	ns	*		LC
97	*Sterna hirundo*	AI	AII	AII	ns	*		LC
98	*Columba oenas*	AII/2	AIII		e			LC
99	*Columba palumbus*	AII/1			e			LC
100	*Streptopelia turtur*	AII/2	AIII	AII	3		•	VU
101	*Streptopelia decaocto*	AII/2	AIII		ns			LC
102	*Cuculus canorus*		AIII		ns	*		LC
103	*Otus scops*		AII		2	*		LC
104	*Athene noctua*		AII		3	*		LC
105	*Strix aluco*		AII		e	*		LC
106	*Asio otus*		AII		ns	*		LC
107	*Caprimulgus europaeus*	AI	AII		2	*		LC
108	*Apus apus*		AIII		ns	*		LC
109	*Alcedo atthis*	AI	AII		3	*		LC
110	*Merops apiaster*		AII	AII	3	*		LC
111	*Coracias garrulus*	AI	AII	AII	2	*		LC
112	*Upupa epops*		AII		3	*	•	LC
113	*Picus viridis*		AII		2	*		LC
114	*Picus canus*	AI	AII		3	*		LC
115	*Dendrocopos major*		AII		ns	*		LC
116	*Dendrocopos syriacus*	AI	AII		e	*		LC
117	*Dendrocopos medius*	AI	AII		e	*		LC
118	*Dendrocopos minor*		AII		ns	*		LC
119	*Dendrocopos leucotos*	AI	AII		ns	*		LC
120	*Dryocopus martius*	AI	AII		ns	*		LC
121	*Jynx torquilla*		AII		3	*	•	LC
122	*Galerida cristata*		AIII		3	*		LC
123	*Alauda arvensis*	AII/2	AIII		3	*		LC
124	*Lullula arborea*	AI	AIII		2	*		LC
125	*Riparia riparia*		AII		3	*		LC
126	*Hirundo rustica*		AII		3	*		LC
127	*Delichon urbica*		AII		3	*		LC
128	*Anthus trivialis*		AII		ns	*		LC
129	*Anthus campestris*	AI	AII		3	*		LC
130	*Anthus spinoletta*		AII		ns	*		LC
131	*Motacilla flava*		AII		ns	*		LC
132	*Motacilla cinerea*		AII		ns	*		LC
133	*Motacilla alba*		AII		ns	*		LC
134	*Lanius collurio*	AI	AII		3	*		LC
135	*Lanius minor*	AI	AII		2	*		LC
136	*Lanius excubitor*		AII		3	*		LC
137	*Oriolus oriolus*		AII		ns	*		LC
138	*Sturnus vulgaris*	AII/2			3			LC
139	*Bombycilla garrulus*		AII		ns	*		LC

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140	*Garrulus glandarius*	AII/2			ns			LC
141	*Pica pica*	AII/2			ns			LC
142	*Corvus monedula*	AII/2			e			LC
143	*Corvus frugilegus*	AII/2			ns			LC
144	*Corvus corone cornix*	AII/2			ns			LC
145	*Corvus corax*		AIII		ns	*	•	LC
146	*Troglodytes troglodytes*		AII		ns	*		LC
147	*Prunella modularis*		AII		e	*		LC
148	*Locustella luscinioides*		AIII	AII	e	*		LC
149	*Locustella fluviatilis*		AIII	AII	e	*		LC
150	*Locustella naevia*		AII	AII	e	*		LC
151	*Acrocephalus schoenobaenus*		AIII	AII	e	*		LC
152	*Acrocephalus palustris*		AIII	AII	e	*		LC
153	*Acrocephalus scirpaceus*		AIII	AII	e	*		LC
154	*Acrocephalus arundinaceus*		AIII	AII	ns	*		LC
155	*Hippolais icterina*		AIII	AII	e	*		LC
156	*Sylvia nisoria*	AI	AII	AII	e	*		LC
157	*Sylvia borin*		AII	AII	e	*		LC
158	*Sylvia atricapilla*		AII	AII	e	*		LC
159	*Sylvia communis*		AII	AII	e	*		LC
160	*Sylvia curruca*		AII	AII	ns	*		LC
161	*Phylloscopus collybita*		AIII	AII	ns	*		LC
162	*Phylloscopus sibilatrix*		AIII	AII	2	*		LC
163	*Phylloscopus trochilus*		AIII	AII	ns	*		LC
164	*Regulus regulus*		AII	AII	e	*		LC
165	*Regulus ignicapillus*		AII		e	*		LC
166	*Ficedula hypoleuca*		AII	AII	e	*		LC
167	*Ficedula parva*	AI	AII	AII	ns	*		LC
168	*Ficedula albicollis*	AI	AII	AII	e	*		LC
169	*Muscicapa striata*		AII	AII	3	*		LC
170	*Oenanthe oenanthe*		AII		3	*		LC
171	*Saxicola rubetra*		AII		e	*		LC
172	*Saxicola torquata*		AII		ns	*		LC
173	*Phoenicurus phoenicurus*		AII		2	*		LC
174	*Phoenicurus ochruros*		AII		ns	*		LC
175	*Erithacus rubecula*		AII		e	*		LC
176	*Luscinia megarhynchos*		AII		e	*		LC
177	*Luscinia luscinia*		AII		e	*		LC
178	*Turdus merula*	AII/2	AIII		e	*		LC
179	*Turdus iliacus*	AII/2	AIII		e			LC
180	*Turdus philomelos*	AII/2	AIII		e			LC
181	*Turdus viscivorus*	AII/2	AIII		e			LC
182	*Turdus pilaris*	AII/2	AIII		e			LC
183	*Parus palustris*		AII		3	*		LC

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184	*Parus lugubris*		AII		e	*		LC
185	*Parus caeruleus*		AII		e	*		LC
186	*Parus ater*		AII		ns	*		LC
187	*Parus major*		AII		ns	*		LC
188	*Aegithalos caudatus*		AII		ns			LC
189	*Remiz pendulinus*		AIII		ns	*		LC
190	*Sitta europaea*		AII		ns	*		LC
191	*Certhia familiaris*		AII		ns	*		LC
192	*Passer domesticus*				3			LC
193	*Passer montanus*		AIII		3			LC
194	*Fringilla coelebs*		AIII		e	*		LC
195	*Fringilla montifringilla*		AIII		ns	*		LC
196	*Pyrrhula pyrrhula*		AIII		ns	*		LC
197	*Coccothraustes coccothraustes*		AII		ns	*		LC
198	*Serinus serinus*		AII		e	*		LC
199	*Carduelis chloris*		AII		e	*		LC
200	*Carduelis spinus*		AII		e	*		LC
201	*Carduelis carduelis*		AII		ns	*		LC
202	*Carduelis cannabina*		AII		2	*		LC
203	*Carduelis flammea*		AII		ns	*		LC
204	*Loxia curvirostra*		AII		ns	*		LC
205	*Emberiza cia*		AII		3	*		LC
206	*Emberiza schoeniclus*		AII		ns	*		LC
207	*Emberiza cirlus*		AII		e	*		LC
208	*Miliaria calandra*		AIII		2	*		LC
209	*Emberiza citrinella*		AII		e	*		LC

Legend: AI – annex I, AII – annex 2, AII/1 – annex 2, part I, AII/2 – annex II, part II; AIII – annex III, AIII/1 – annex III, part I, AIII/2 – annex III, part II; SPEC categories: 1 – SPEC 1, 2 – SPEC 2, 3 – SPEC 3, e – Non SPEC E, ns – Non SPEC; * - species whose hunting is prohibited; • - species in the Romanian Red Book of Vertebrates;
IUCN categories : VU – vulnerable species - Vulnerable; NT – near threatened species - Near Threatened; LC – least concern species - Least Concern.

Out of the total of 209 species observed on the reservoirs of the middle basin of the Argeş River, throughout the entire period of the study, 121 species are listed in the annexes of the Birds Directive on the protection of wild birds (Directive 2009/147/EC): 53 listed in annex I, 15 in annex II/1, 37 in annex II/2, 3 in annex III/1 and 13 in annex III/2 (Tab.1, Fig.2). The species in annex I are of conservation interest (http://ec.europa.eu/environment/nature/legislation/), as they are subject to some special habitat conservation measures, with a view to ensure their survival and reproduction in their distribution area: *Gavia arctica, Phalacrocorax pygmeus, Pelecanus crispus, Ixobrychus minutus, Ardeola ralloides, Egretta garzetta, Ciconia nigra, Anser erythropus, Aythya nyroca, Cygnus cygnus, Branta ruficollis, Aquila pomarina, Falco columbarius, Chlidonias niger, Alcedo atthis, Coracias garrulus, Picus canus, Lullula arborea, Anthus campestris, Lanius collurio,* etc.). Some of the species in the area are confirmed nesting species: *Ixobrychus minutus, Nycticorax nycticorax, Ciconia ciconia, Aythya nyroca, Circus aeruginosus, Chlidonias hybridus, Sterna hirundo, Alcedo atthis, Coracias garrulus, Dendrocopos syriacus, Picus canus, Lanius collurio, etc.*

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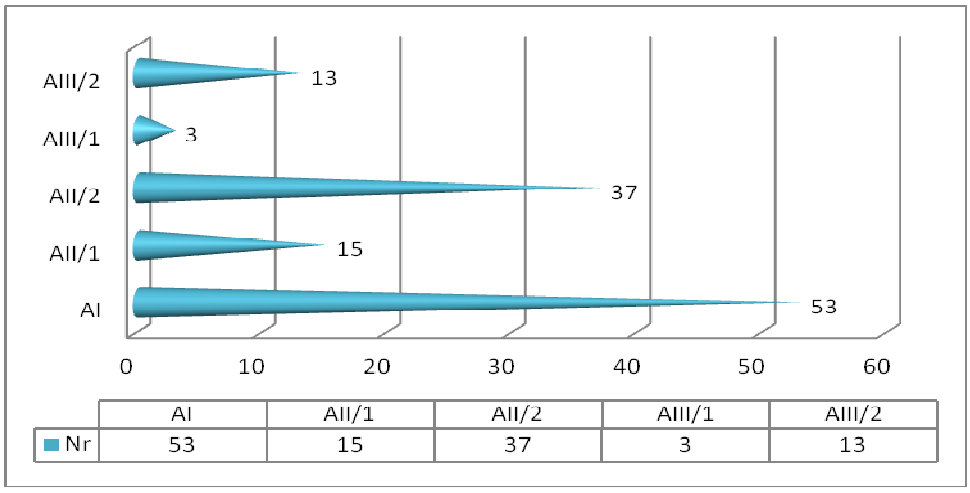

Figure 2. Distribution of bird species according to the annexes of the Birds Directive

If we consider the Bern Convention on the conservation of wildlife and natural habitats in Europe, to which Romania acceded by the Law no. 13 dated 11 March 1993 (http://legislatie.just.ro/Public/DetaliiDocument/3036), we observe that 200 species (95.69%) identified in the area under research are included in its annexes. Of these species, 128 representing 64% (*Gavia arctica*, *Podiceps grisegena*, *Ixobrychus minutus*, *Egretta garzetta*, *Anser erythropus*, *Tadorna tadorna*, *Buteo lagopus*, *Tringa glareola*, *Otus scops*, *Sylvia nisoria*, etc.) are listed in annex II (AII) and 72 species representing 36 % (*Phalacrocorax carbo*, *Ardea cinerea*, *Anser albifrons*, *Bucephala clangula*, *Mergus merganser*, *Rallus aquaticus*, *Lullula arborea*, *Miliaria calandra*, etc.) are listed in annex III (AIII) (Tab. 1, Fig. 3). The species in annex II are strictly protected and those in annex III are protected.

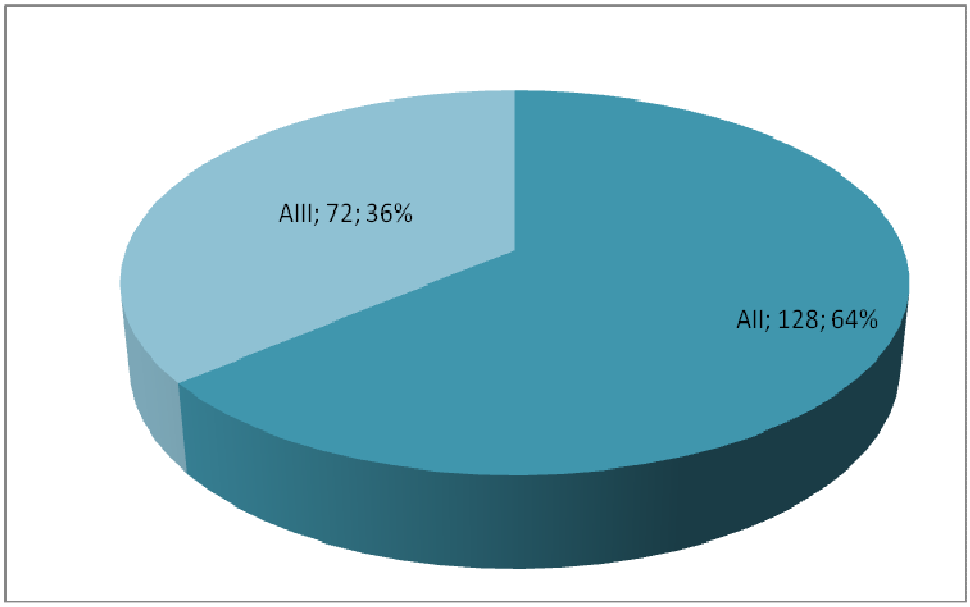

Figure 3. Distribution of bird species according to the annexes of the Bern Convention

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In the annexes of the Bonn Convention – the convention on the migratory species of wild animals (*http://legislatie.just.ro/Public/DetaliiDocument/79429/*), ratified by our country under the Law no. 13 dated 8 January 1998 (*http://legislatie.just.ro/Public/DetaliiDocument/14031/*), there are 101 species (48, 32%). Five species (5%, *Pelecanus crispus, Anser erythropus, Branta ruficollis, Aythya nyroca,* and *Haliaeetus albicilla*) are listed in annex I and 96 species (95%, *Phalacrocorax pygmeus, Ciconia ciconia, Aythya ferina, Pernis apivorus, Falco peregrinus, Gallinago media, Coracias garrulus, Ficedula parva*, etc.) are in annex II (Tab.1, Fig. 4).
The species in annex I are migratory bird species in danger of extinction globally or to a great extent in their distribution area, and the birds in annex II are migratory birds with an unfavourable protection status, which require the adoption of international conventions on their protection.

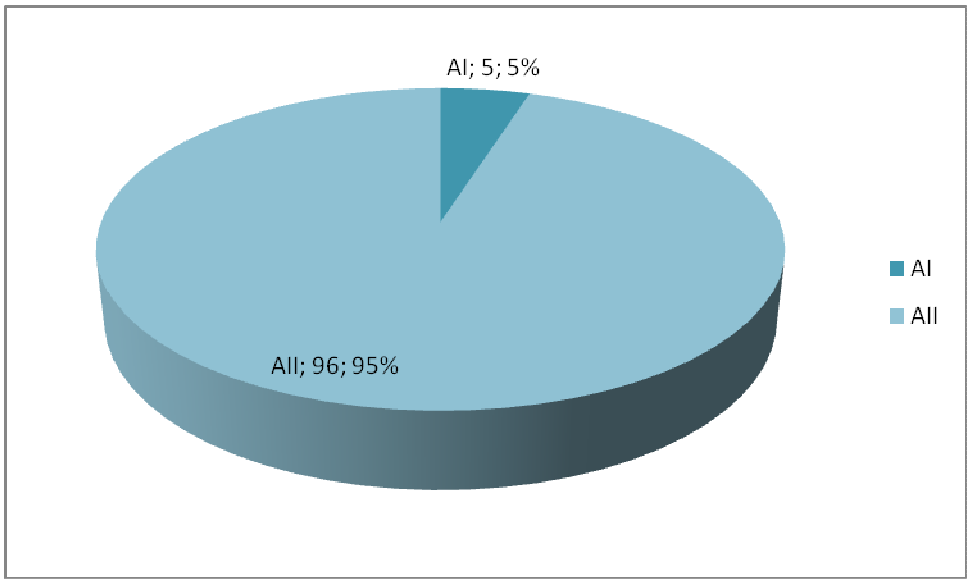

Figure 4. Distribution of bird species according to the annexes of the Bonn Convention

According to the SPEC (Species of European Conservation Concern - species of conservation importance) list, 8 species – 4% (*Phalacrocorax pygmeus, Pelecanus crispus, Anser erythropus, Branta ruficollis, Aythya nyroca, Haliaeetus albicilla, Crex crex* and *Gallinago media*) are categorized as SPEC 1, 22 species – 11% (*Accipiter brevipes, Vanellus vanellus, Limosa limosa,* etc.) as SPEC 2, 52 species – 25% (*Botaurus stellaris, Ardeola ralloides, Falco vespertinus,* etc.) as SPEC 3, 49 species – 23% (*Cygnus olor, Anas penelope, Circus pygargus,* etc.) as Non SPEC E and 78 species – 37% (*Phalacrocorax carbo, Anser anser, Gallinula chloropus* etc.) as Non SPEC (Tab. 1, Fig. 5). The SPEC categories are as follows: SPEC 1 - globally threatened species; SPEC 2 - species concentrated in Europe with an unfavourable protection status; SPEC 3 – species not concentrated in Europe with an unfavourable protection status; Non SPEC E - species not concentrated in Europe with a favourable conservation status, and Non-SPEC - species not subject to conservation measures at the European level.
In the *Red Book of Vertebrates in Romania* (Botnariuc and Tatole, 2005) there are 31 species (14.83%) and according to the Law on Hunting and Protection of the Hunting Fund no. 407/2006**,** amended by Law no. 197/2007, Government Emergency Ordinance no. 154/2008, Law no. 215/2008, Law no. 80/2010, Government Emergency Ordinance no. 102/2010, Law no. 187/2012 and updated by Law no. 149/2015 dated 24 July 2015 (*http://agvps.ro/despre/legislatie-specifica/*), there are 171 species (81.81% - *Nycticorax nycticorax, Aythya nyroca, Porzana porzana,* etc.) whose hunting is prohibited

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(Tab. 1). We mention the presence of the species *Tadorna ferruginea* (Pallas, 1764) observed outside the study period (November 2018) as a critically endangered species (Botnariuc and Tatole, 2005). Eight species (*Pelecanus crispus, Egretta alba, Corvus corax, etc*) have been declared Natural Monuments (Commission for Natural Monuments, Romanian Academy) (Botnariuc and Tatole, 2005).

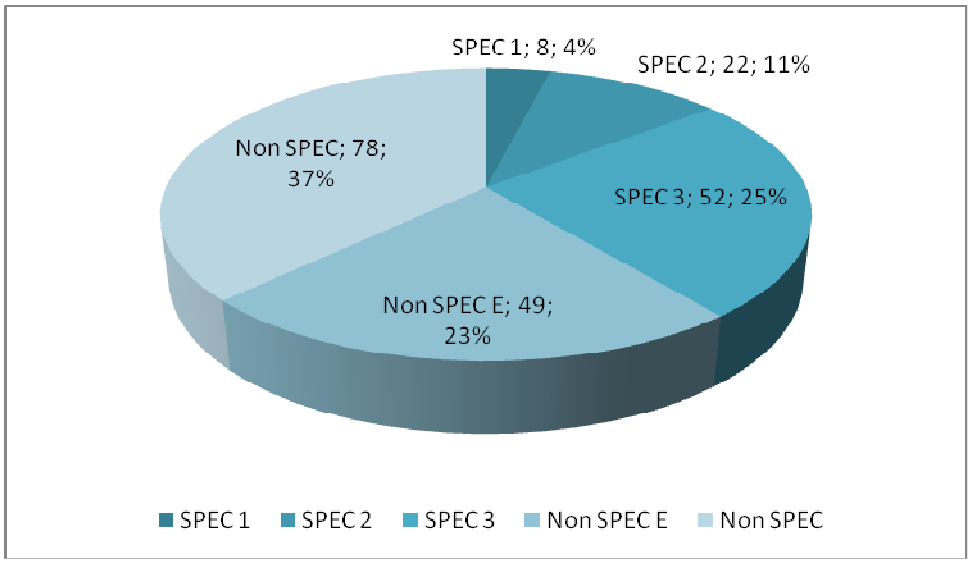

Figure 5. Distribution of bird species according to the SPEC categories

Furthermore, 12 species are found in the IUCN Red List (*International Union for Conservation of Nature*) considered to be threatened or endangered species: 5 species are vulnerable, with a high natural extinction risk (VU - *Anser erythropus, Branta rufficolis, Aythya ferina, Melanitta fusca and Streptopelia turtur*) and 7 species are near threatened (NT - *Pelecanus crispus, Aythya nyroca, Falco vespertinus, Vanellus vanellus, Gallinago media Numenius arquata* and *Limosa limosa*).

4. CONCLUSIONS

Out of the 209 bird species identified in the area, 53 bird species are included in Annex 1 of the Birds Directive (a part of these species are confirmed to nest in the area: *Ixobrychus minutus, Nycticorax nycticorax, Ciconia ciconia, Aythya nyroca, Circus aeruginosus, Chlidonias hybridus, Sterna hirundo, Alcedo atthis, Coracias garrulus, Dendrocopos syriacus, Picus canus, Lanius collurio,* etc.), 200 species (95.69%) are included in the Annexes of the Bern Convention, 101 species are found in the annexes of the Bonn Convention, and 8 species are protected globally. Eight species have been declared Natural Monuments, and 12 species are found in the IUCN Red List, four of them being breeding species in the area – *Aythya ferina, Aythya nyroca, Vanellus vanellus and Streptopelia turtur*.

The large number of protected bird species identified in the area of these lakes, which results from their favourable location on some European migration routes (fronts), has proved the local, national and international importance of this area of research. The studies lakes ensure favourable conditions for many bird species, due to their vegetation and diversity of habitats; the body of water alternates with an abundant vegetation (reed, rush, willows, alders, etc.) pine plantations, beech and oak forests mixed with other deciduous trees, damp valleys, agricultural plots and orchards in the adjacent localities. However, these anthropic lakes have a far greater importance as feeding and

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resting places during migration or in the hiemal season when we find real concentrations of birds. They are attracted by the vast expanses of water and by the agricultural plots, which offer plenty food resources. Therefore, we consider that their protection is vital.

The middle valley of the Argeş River has an important ecological, scientific, cultural and esthetic value and comprises a diversity of habitats populated by a rich flora and fauna, especially habitats of some rare bird species that are protected internationally.

The protection measures for the bird species from the middle basin of the Argeş River and their habitats include *compliance* with the legislation in force, the effective and appropriate *administration* of the reservoirs under research ensured by the adoption of a unitary and integrated management of the protected area in which the birds feed, with a view to enrich their food resources, *restoration* and *maintenance* of the anthropogenic basins (with a focus on the drainage of the basins, fluctuations in their level, pesticide pollution, eutrophication of water, silting of the anthropogenic aquatic basins, management of waste, etc.), *protection* of the reed, *restoration* of the forest stands around wetlands and/or *planting* of forest shelter belts. Moreover, the effects of intensive agriculture, grazing, fishing (using nets of any kind), of high-voltage networks (lines) and the presence of dogs and cats in the area, etc. must be closely watched. Special attention should be paid to the hunting pressure (especially on the Goleşti and Budeasa lakes), recretional activities, the presence of ballast exploitations, sun farms (Goleşti lakes) and construction sites in the area (new urban projects). In addition to an effective management of the protected area it is necessary to expand the protected area downstream, to maintain the stubble and fallow lands and to ban their setting on fire, to avoid disturbing the birds and destroying their nests, to make an inventory of the actual and potential breeding, migration and feeding areas (agglomerations), which are important for the conservation of the species in the context of climate changes, trying to avoid the restraint, fragmentation or degradation of the wetlands. It is absolutely necessary that the anthropogenic interventions (taking into account both the period when they are made and their duration and intensity) should be harmonized with the natural biological cycle of the avifauna of these lakes. It is necessary to design and promote a campaign for raising the awareness of the local community as regards the protection of these birds.

The measures taken to improve the living environment of birds are mainly concerned with harmonizing the social and economic interests in the area of the reservoirs with the ecological requirements of the bird species, complying with the legislation in force, informing (raising the awareness of) the citizens and the decision factors, and coordinating the monitoring measures and enforcing the sanctions.

The richness of the Argeş river (basin) still offers favourable conditions for many species of protected birds (especially aquatic species) of national and international importance. That is why the actual protection of birds and of their habitats has implications on a global scale in the context of diminishing natural wetlands. An important role in preserving biodiversity is played not only by natural lakes and meadows but also by reservoirs, many of them host to a quantitatively unique and diverse fauna.

When one third of the protected areas in the world are degraded by human activity due to a lack of proper management and the already high rates of biodiversity loss wil increase in the next 30 years as a consequence of climatic changes and the growth of human population, it is absolutely necessary to reach a global agreement on the protection of biodiversity, which must be as important as the Paris Agreement. Consequently, the unsustainable economic interests (decisions) must not prevail upon the problems related to the conservation of biodiversity. Only the joint effort of all the

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states may save the bird species (biodiversity in general) and contain other dire effects caused by climate change.

We have to abide by the requirements of the Birds Directive and of the Water Framework Directive and to eliminate all the unsustainable practices promoted in the studied area. It is necessary to integrate the objectives of these directives in other sectorial policies (agriculture, industry, energy, trade, constructions, public health, etc.), too.

We consider that, by expandind the area of our research (especially upstream of Golesti Lake) and by adopting a series of concrete and effective protection measures for birds and their habitats, the list we have presented could comprise even more species. It is necessary to encourage those economic activities that are in harmony with nature and not those that are not harmful to birds and their habitats, thus irreversibly changing the life balance for both animals and humans.

It is important that the avifauna of these lakes should be permanently monitored in order to identify the trends in ecosystems and bird populations, which would allow to predict to a certain extent such unwanted situations. The monitoring of the evolution trends in the number of individuals for the brooding species (at least for the key species), is necessary for the effective and efficient conservation of the diversity of avifauna, as a landmark and an instrument for the regional strategies on the conservation of biodiversity. Therefore, raising the awareness on the importance and effectiveness of management in this protected area (SPA) becomes mandatory, in the general context of the national and international strategies for the protection and conservation of biodiversity.

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