

ECOLOGICAL RESEARCH ON AVIFAUNA OF RESERVOIRS IN THE MIDDLE OF ARGES VALLEY. THE PREVERNAL SEASON

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Key words: birds, prevernal season, reservoirs on the Argeș River

INTRODUCTION

Argeș River is a watercourse in the S-SE of Romania, which runs into the Danube in Oltenița (Fig. 1). The study area is located in the middle basin of Argeș river, at the contact between the Căndesti and Cotmeana Plateaus and the High Plain of Pitești [Barco & Nedelcu, 1974].

60 years ago, on the Argeș Valley, a series of reservoirs has been arranged (Fig. 2), with a significant impact on the landscape, influencing the spatial and temporal component and dynamics of the birds' species in the area. The newly created lakes have turned, in time, through clogging, the preferred areas of some birds' species, some of them reaching those areas for nesting, most of them arriving in the areas for the wintering process or passing by during the migration, as the middle basin of the Argeș comes as an extension of the Rucăr – Bran Corridor, one of the corridors that migrating birds use to get across the Meridional Carpathians [Mătieș, 1969; Gava, 1997; Conete, 2011].

This study has contributed to the knowledge of the birds in the area, mainly in the hydrographic basin of

Argeș river, and alongside to the actions of the Romanian Ornithological Society (SOR), stood at the basis of the declaration of the area as ROSPA0062 site – "Lacurile de acumulare de pe Argeș", integrating part of the Natura 2000 network.

This paper also represents a red flag for some key birds' species, with significantly lowered population, in the study area, due to the human pressure, the degradation and fragmentation of the habitats. Though, from the ornithofaunistic perspective, the researched lakes display significantly important habitats at the level of the Argeș Valley.

Due to the reckless human intervention, nowadays, the most affected by the human impact are the steppe, the meadow and the aquatic ecosystems. During the last 50 years, their surface has reduced by approximately 80%. An important role in the maintenance of the diversity of the vegetal and fauna world is attributed to the wet areas, rivers and floods, natural lakes, basins, pools and meadows, very much of them with a unique and diversified fauna.

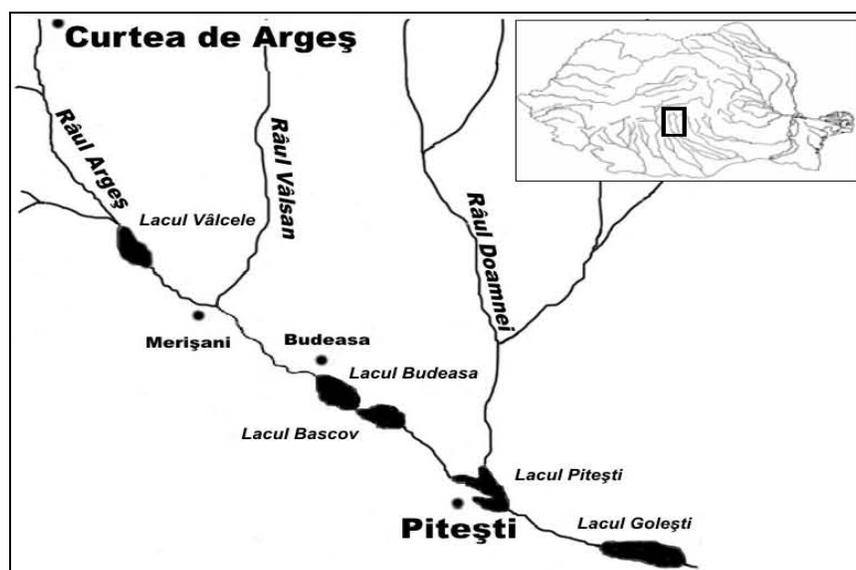


Fig. 1. The middle basin of the Argeș

The economic-social factors has a significant influence on the hydro-biological features of the basins. In this context, the artificial wetlands can contribute to preserving biodiversity [Zhijun, M. et al., 2004; Gache, 2002; Conete, 2011].

Common efforts are also required from the local community, the authorities, of the capable and dedicated people, in order to maintain the natural beauties and values unaltered, with their whole biodiversity [Munteanu, 2009; Conete, 2011].

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MATERIAL AND METHODS

The researched area includes some of the most important aquatic ecosystems on the Argeş Valley, significant wintering areas (large concentrations of aquatic birds), feeding, passing and nesting for numerous species of birds: Vâlcele (408 ha), Budeasa (412 ha), Bascov (162 ha), Piteşti (122 ha) and Goleşti (649 ha) (Fig. 2).

The study area is located in the area of the continental hill climate, at the limit of two climate types: the tempered climate of the hills and choline of Muscel and the more arid one of the Eastern Plain. The average annual temperature of the water in Argeş River is 1-2° C lower than the one of the air and fluctuates between 6,4° C in the Argeş canyon and 9° C in Piteşti.

During the winters with accentuated continental influence, at the beginning of January, in the low areas, the temperature goes under 1° C and ice bridges are formed. The average annual temperature of the air fluctuates around 9° C – 10° C [Barco & Nedelcu, 1974]. The coldest month of January between 2003 and 2011 was in 2006, the average monthly temperature being - 3,7°C, and the warmest month of January had been in 2007, with 4,8°C. The minimum temperature between 2003 and 2011 had been -20,7°C (24.01.2006).

The geographical conditions of the Arges river basin are variable and they determine a corresponding variation of the phytocenosis complexes. The vegetation in the area of the lakes is characteristic to the southern hill area. The hills and the meadows are covered in deciduous forests, orchards of fruit trees and agricultural lands.

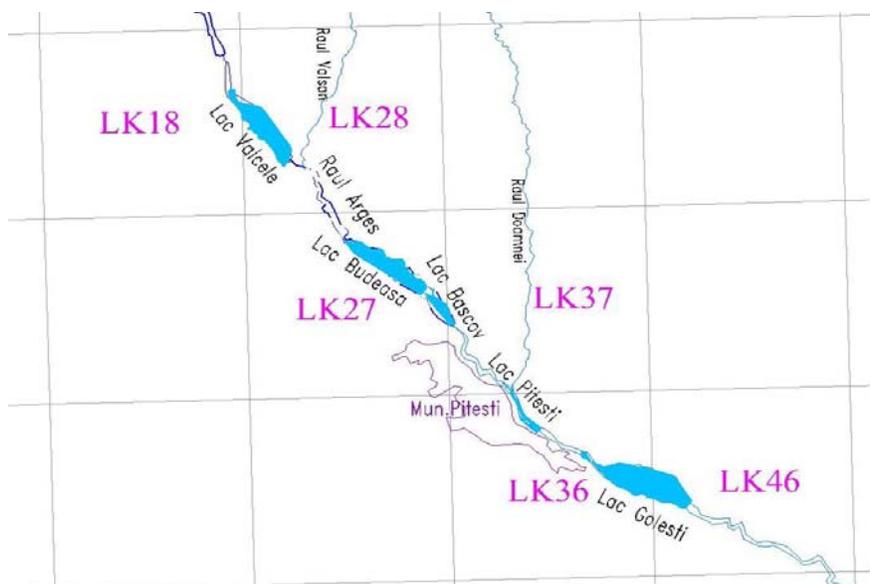


Fig. 2. The division of the middle basin of Arges in 10x10 km² areas according to the UTM (Universal Transverse Mercator) network and their numbering (after Lehrer & Lehrer, 1990 – modified)

Large surfaces consist of secondary steppe grasslands, developed on the place of the holm oak forests, which include both mesophile and xerophile plants. As for the lake vegetation, this is represented by *Phragmites*, *Typha*, *Carex*, *Juncus*, *Salix* sp., *Alnus incana*, *Populus alba*, *Rosa canina*, *Rubus* sp. etc. The process of silting permitted the establishment of the reedbeds - *Phragmites*, *Typha* and of the other typical wetland plants. The areas with massive deforestation in the south of the Arges County evolve towards strongly degraded and xerophytic forms, with a low covering degree and decreased fauna diversity. We can rarely meet plantations of black locust trees and pine, described by some authors as well contoured associations. The attractiveness of the five lakes (human aquatic ecosystems) for the bird population is different, firstly conditioned by the size of the water surface area and also by the heterogeneity of the habitats in the close proximity of the researched lakes [Alexiu, 2008; Conete, 2011].

The study of the bird population on the Arges Valley has been started by the well-known ornithologist Dan Munteanu (1961). A great contribution regarding the birds' migration through the superior and middle basins of the Arges has been attributed to Mircea Maties, who, together with Dan Munteanu, has published a series of significant materials [Conete, 2013].

Our field observations have been made on a permanent basis on this lakes and in their area (including the neighboring communities and in the agro-ecosystems), starting from January 2003 until 2011, but we only approach the spring season in this paper. Quantitative and qualitative ecologic research has pursued the bird population in the wetland habitats, the open habitats (meadows and scrubland) and forest habitats neighboring the lakes and the built-up areas. We have used the following methods: the itinerary method (trails alongside the banks and the dams), the fix point observation method, and also the mobile observations in the lakes and the reeds by using the boat. The observation have been made to the naked eye, using the binoculars (10 x 42) or the scope (20 – 50 x 60) and by auditory means. The birds were identified with the Hamlin Guide [Bruun et al., 1999].

The period of the prevernal season is between March and April and it concurs with the spring migration.

RESULTS AND DISCUSSION

The prevernal issue between 2003 and 2011 is the richest in species reported to the all six seasons, but with a low number of individuals compared to the hiemal season. Within the prevernal issue, during the research, in the area of the reservoirs in the middle basin of Argeş river, we have noticed 186 species, 89,86% of the identified birds species (207 species

had been identified during the six seasons) [Conete, 2011]. The 186 species belong to 17 orders, 45 families and 107 genres; 77 species depend on the wetlands. The anseriformes' agglomerations in the winter season have been a constant presence in the spring season also. Of the 17 orders, the most percentage is attributed to the Passeriformes (80 species), Charadriiformes (27 species), Anseriformes (18 species), Falconiformes (15 species), Ciconiiformes (9 species), Piciformes (8 species), followed by Podicipediformes, Gruiformes, Columbiformes, Strigiformes and Coraciiformes with 4 species each, Galliformes with 3 species, Pelecaniformes with two species, and the other orders (Gaviiformes, Cuculiformes, Caprimulgiformes) have only one species each. We notice that the number of anseriformes is lower than the one in the hiemal season.

Table 1 displays the I_R (index of relation) values for the 17 orders that represent the bird population of the researched lakes in the spring season during the whole study (2003-2011), the static axis (As) having a value of 5,88 and the dominant axis (Ad) with a value of 11,76.

Within the analysis of the prevernal season, we generally notice that the Anseriformes and Passeriformes orders have been overdominating, and that the high value of the index of relation (57,67) in the case of the first order can also be explained by the surprising of the Anseriformes populations that pass towards north (*Anas platyrhynchos*, *Aythya ferina*, *Anas crecca*, *Anser albifrons* etc.), while being able to count hundreds or even thousands of individuals during this period; we mention that the winter of 2005 had prolonged until the end of March, the spring migration starting later (the lakes had been partially covered in ice). The Charadriiformes and Gruiformes orders had dominated, and the other orders (Pelecaniformes, Podicipediformes) had been complementary (Tab.1, Fig. 3).

Towards the end of March, the first individuals of *Ciconia ciconia*, *Egretta garzetta* arrive, and though, we register the most numerous population of Ciconiiformes in April (*Nycticorax nycticorax*, *Ciconia ciconia*, *Egretta garzetta*, *Ixobrychus minutus*, *Ardeola ralloides*, *Ardea purpurea*, etc.). The melting of snow and also the abundant rainfalls in the spring determine the flooding of the meadows in the area of the researched reservoirs, creating areas with small muddy waters, providing rich trophic resources especially for the shorebirds (Charadriiformes order). Thus, several species of shorebirds (*Pluvialis apricaria*, *Vanellus vanellus*, *Tringa ochropus* etc.) appear even since the end of February or even sooner (2003, 2004, 2005), the spring migration of the limicoles being extended until the end of May. Shorebirds are stationary alongside the muddy banks or at the end of the Goleşti and Budeasa reservoirs, where there are areas with little water, with muddy aspects.

Table 1. The values of the index of relation I_R for the orders of birds identified in the area during the prevernal season

No.	Orders	Participation
1.	Gaviiformes	00.1
2.	Podicipediformes	2.06
3.	Pelecaniformes	2.75
4.	Ciconiiformes	0.49
5.	Anseriformes	57.67
6.	Falconiformes	0.31
7.	Galliformes	0.17
8.	Gruiformes	9.57
9.	Charadriiformes	11.48
10.	Columbiformes	0.34
11.	Cuculiformes	0.04
12.	Strigiformes	0.05
13.	Caprimulgiformes	0.01
14.	Apodiformes	0.03
15.	Coraciiformes	0.12
16.	Piciformes	0.17
17.	Passeriformes	14.74

During the prevernal season, though some bird species appear in the area, attracted by the food offer needed in order to regenerate the reserves that would allow them to continue the travel meant to reach the reproductive areas in northern Eurasia, and also for the rest and shelter, several species are already preparing themselves for nesting (*Ciconia ciconia*, *Cygnus olor*, *Vanellus vanellus*, *Falco tinnunculus*, *Alauda arvensis*, *Motacilla alba*, *Motacilla flava*, etc.). Towards the end of March and the beginning of April, we notice hundreds of Great Cormorants, with bridal feathers and also Pygmy Cormorants (*Phalacrocorax carbo*, *Phalacrocorax pygmeus*), which are joining the ones that had been stationary in here during winter, forming large groups (approximately 700 individuals, mostly Great

Cormorants). They stay on the three high tension electricity pillars in the area of Budeasa lake (but they feed themselves in the area of the Pitești, Golești lakes and also downstream of them), for a period of several weeks, sometimes even more, and then they leave, leaving a smaller non-nesting population. Large scale rides have been constantly observed, during this season, from a lake to another. Birds use, in their concentration areas, the existing trophic offer, namely the resting and over the night camping. During the prevernal season, the food factor cannot be qualified as a limiting factor of the species' number, as the passing by, the stationary periods of the birds on these lakes are corresponding to the abundant trophic offer period. Though, under the influence of the weather factors and the human pressure, the transit and stationary periods of different species passing by, in the researched area, face certain gaps.

As for the ecological indices (Fig. 4), relatively regarding the **constancy**, during the prevernal season, on all the 5 reservoirs, 20 species representing 10,75% (*Phalacrocorax carbo*, *Phalacrocorax pygmeus*, *Cygnus olor*, *Anas platyrhynchos*, *Anas querquedula*, *Anas crecca*, *Aythya ferina*, *Gallinula chloropus*, *Pica pica*, *Motacilla alba*, *Parus major*, *Passer montanus* și *Carduelis carduelis*) have been euconstant (C4), 22 species (11,83%, *Podiceps cristatus*, *Ardea cinerea*, *Aythya fuligula*, *Buteo buteo*, *Alcedo atthis*, *Hirundo rustica*, *Motacilla flava*, *Corvus corone cornix*, *Acrocephalus schoenobaenus*, *Acrocephalus arundinaceus*, *Parus caeruleus*, *Fringilla coelebs*, *Carduelis chloris*, *Emberiza schoeniclus* și *Emberiza citrinella*) have been constant (C3), 47 species (25,27%, *Egretta alba*, *Fulica atra*, *Anthus spinoletta*, etc.) were accessories (C2) and 97 species (52,15%, *Phalacrocorax carbo*, *Ixobrychus minutus*, *Egretta garzetta*, *Nycticorax nycticorax*, *Aythya nyroca*, *Circus aeruginosus*, *Lanius minor* etc.) were accidental (C1).

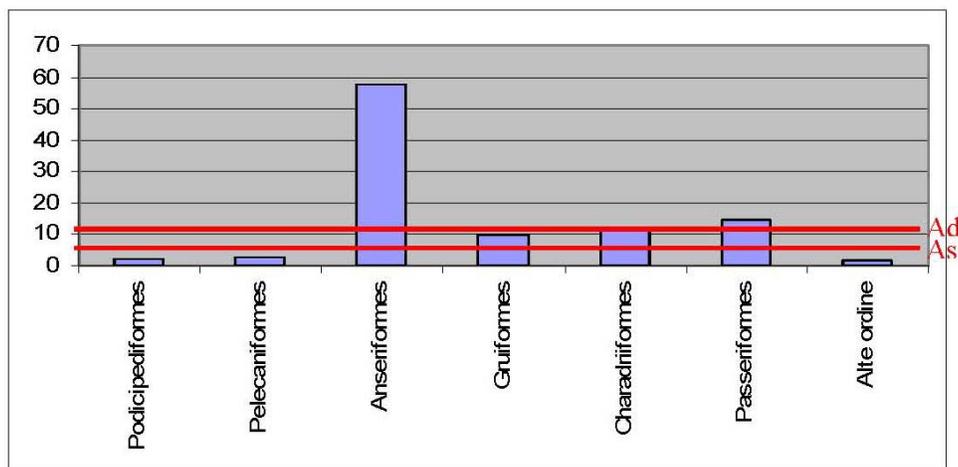


Fig. 3. The average global participation of the different orders in the avifauna of the prevernal season

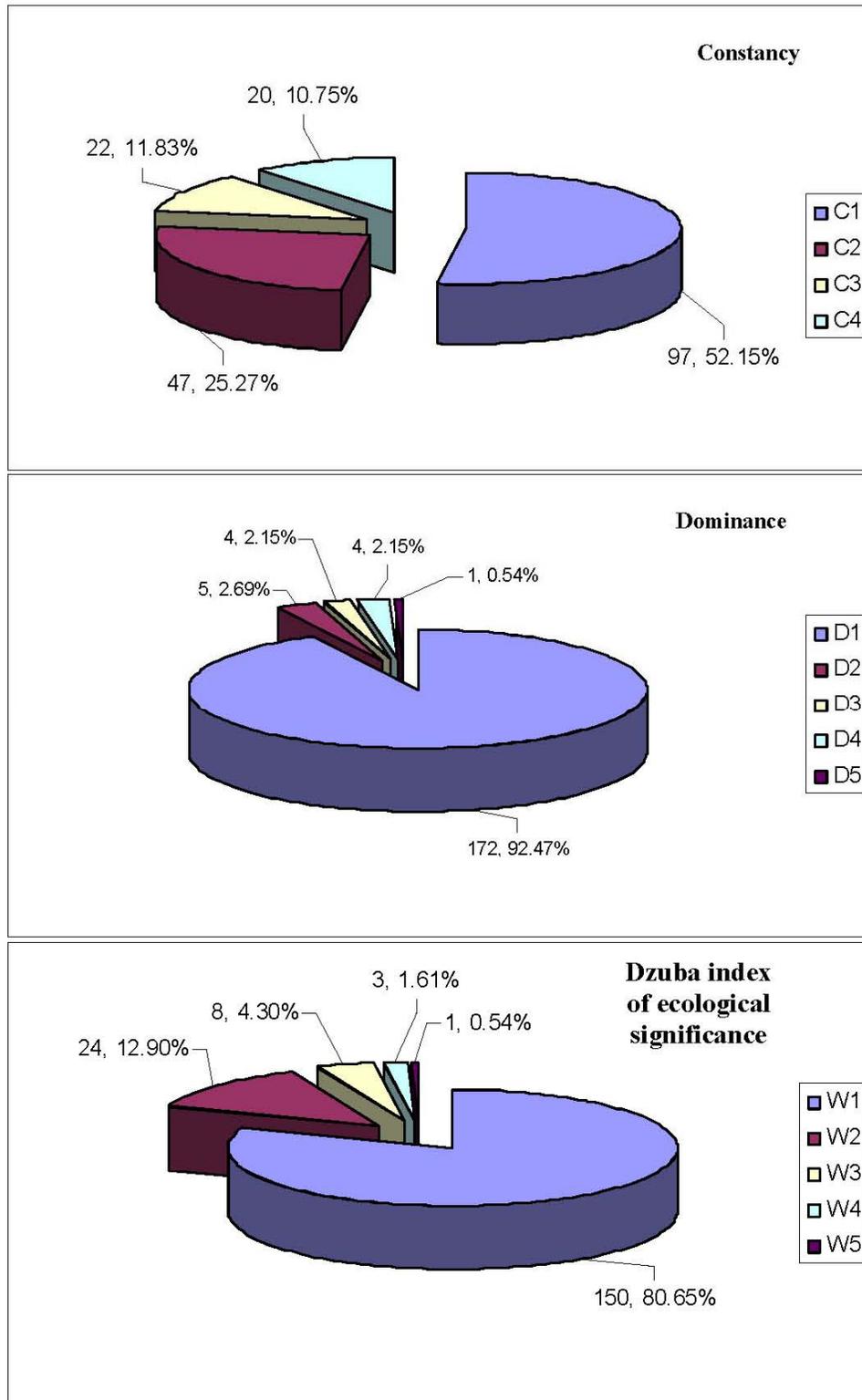


Fig. 4. The distribution on categories of the ecological indices of the avifauna in the studied reservoir areas during the prevernal season. (Legend: C1 – accidental species, C2 – accessory species, C3 – constant species, C4 – euconstant species, D1, W1 – subrecedent species, D2, W2 – recedent species, D3, W3 – subdominant species, D4, W4 – dominant species, D5, W5 – eudominant species.)

Related to the **dominance**, a single species has been eudominant (0,54%, *Anas platyrhynchos*) (D5), 4 species (2,15%, *Aythya fuligula*, *Aythya ferina*, *Fulica atra* și *Larus ridibundus*) were dominant (D4), 4 species (2,15%, *Phalacrocorax carbo*, *Anas crecca*, *Larus cachinnans/michahellis*, *Sturnus vulgaris*) were subdominant (D3), 5 species (2,69%, *Cygnus olor*, *Tachybaptus ruficollis*, *Corvus frugilegus*, *Passer montanus*) were recedent (D2) and 172 species (92,47%, *Gavia arctica*, *Podiceps cristatus*, *Ardeola ralloides*, *Anser anser*, *Remiz pendulinus*, etc.) were subrecedent (D1).

Related to the **Dzuba index of ecological significance**, a single species (0,54%, *Anas platyrhynchos*) was eudominant (W5), 3 species (1,61%, *Aythya ferina*, *Fulica atra*, *Larus ridibundus*) were dominant (W4), 8 species (4,30%, *Phalacrocorax carbo*, *Cygnus olor*, *Anas querquedula*, *Larus cachinnans/michahellis*, *Sturnus vulgaris*, etc.) were subdominant (W3), 24 species (12,90%, *Phalacrocorax pygmeus*, *Gallinula chloropus*, *Vanellus vanellus*, *Alauda arvensis*, *Phylloscopus collybita* etc.) were recedent (W2) and 150 species (80,65%, *Exobrychus minutus*, *Egretta garzetta*, *Aythya nyroca*, *Falco vespertinus*, *Sterna hirundo*, *Picus viridis*, *Locustella fluviatilis*, *Emberiza schoeniclus*, etc.) were subrecedent (W1).

The very large number of subrecedent species emphasize the existence of a very significant fluctuation of the bird species (especially Anseriformes, Charadriiformes, Passeriformes, Falconiformes, etc.), these lakes being located on the route of the migratory Rucar – Bran Corridor.

CONCLUSIONS

During the prevernal season, we have identified 186 species belonging to 17 orders, 45 families and 107 genera; 77 species depend on wetlands. On the whole, we notice that the Anseriformes and Passeriformes orders have been over-dominant. Under the influence of the human pressure and the weather factors, the transit and stationary periods of different species passing by face certain gaps. Long travels have been constantly noticed, during the prevernal season, from a lake to another. Comparing the six seasons, the largest specific diversity is characteristic to the prevernal season/ the spring migration (186 species – 89,86%), and the very large number of accidental species from the prevernal season (97), alongside the large number of subrecedent species emphasize the existence of a very large fluctuation of the bird species in the studied area, especially on the Golești lake (especially the Anseriformes, Charadriiformes, Passeriformes, Falconiformes etc.), these lakes being placed on the Rucăr-Bran Corridor migration route.

The five reservoirs represent, for the migrant wetland-dependent birds, important resting and feeding points on their way from the wintering areas towards the

nesting ones, representing, for many of them, favorable resting and also wintering places (within our country), alongside the lower course of the Danube and the Danube Delta, on the course of the Olt, Mures, etc. Such sites are part of the European natural protected areas Natura 2000, which provide protection to many bird species during nesting, migration and wintering, where some of these species make the subject of some international legislation (the Bonn Convention, the Hague Agreement, etc.) regarding the conservation of birds, especially of the African-Eurasian migratory wetland birds.

A wider empowerment should be imposed to the local community, the authorized organisms, of the conservators regarding the maintenance and protection of these areas and their biodiversity (especially of the birds' communities) for the following generations.

ABSTRACT

In this paper, the authors display the results of the ecologic research on the bird fauna in the area of the reservoirs on the middle valley of Arges river during the prevernal season. Thus, the spring season was the richest regarding the number of species (186 species were identified belonging to 17 orders, 45 families and 107 genera); 77 species depend on wetlands. We perform an analysis of the avifauna according to ecological indices ((I_R constancy, dominancy, the Dzuba index of ecological significance, etc.). The Anseriformes and Passeriformes orders were overdominant in the researched season. The very large number of accidental species in the spring season (97), alongside the large number of subrecedent species emphasize the existence of a very large fluctuation of the bird species (Anseriformes, Charadriiformes, Passeriformes) in the studied area, especially on Golești lake, these lakes being located on the Rucăr-Bran Corridor migration route. 39 species are listed on Annex I of the Birds Directive.

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