



RESEARCH PAPER

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Study of aquatic ornithological biodiversity in Setif (Algeria)

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Abstract

The region of Setif is rich in wetlands which represent habitats populated by a considerable ornithological biodiversity. This has an economic and ecological importance. In this study we tried to make an inventory of aquatic birds and make an analysis of the ornithological fauna of the wetlands prospected in the Setif area. This allowed us to draw up an inventory representing the species collected during the year 2019-2020. The results made it possible to highlight the presence of showing the species status of 29,652 individuals of waterbirds listed in 32 species and 12 families. The most representative of which are Anatidae, Charadriidae and Scolopacidae and the Grebes, more than 3 species for each family. There is a diversity of diet, habitat and lifestyle. Our study allowed us to find that in this study area there is a dominance Trophic category polyphagous by 16 species on consumers of invertebrates represented by 8 species. For only 1 species for the other trophic category.

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Introduction

According to Ramsar, Algeria is among the countries rich in wetlands, which are the most productive and precious ecosystems on earth, the resources of which are of great scientific, economic and aesthetic interest which requires the implementation of conservatory measures (M. Saheb, 2009). In terms of biological diversity, these environments play an important role in the processes vital, maintaining hydrological cycles and also constitute a privileged habitat for an important flora and fauna, particularly many species of migratory waterbirds. When these areas have not been drained or destroyed, they regularly attract large numbers of Anatidae and Coots, which find favourable conditions for wintering (Isenmann and Moali, 2001). Fifty Algerian sites have been classified on the Ramsar list of important wetlands international in 2012 with an area varying between 3.2 and 3.5 million ha and 10 others are in the process of being classified (Anonymous, 2012). The Main Algerian wetlands which are located on the two main roads of migration of the International Fly-Way of the East Atlantic and North Algeria, play an important role of relay between the two obstacles constituted by the Mediterranean Sea on the one hand and the Sahara on the other hand for migratory fauna (Metallaoui and Houhamdi, 2010).

Several statistical studies have been carried out by DGF (Directorate General of Forests) of Setif on aquatic fauna, in particular migratory water birds in the region of Setif where wetlands are very abundant of both natural and artificial. We are trying to illustrate and value the ornithological species of the region of Setif, this study is the first inventory in all waterbirds in that region, our study from Mars 2019 to April 2020 on all waterbirds aims to:

Knowing the potential richness of an aquatic environment and the structure of the stands of waterbirds, the classification of species, description of groups of species and common morphological and ecological characteristics, their diverse diet and even their belonging to the biographical categories of faunal effect of these distinct species. Make descriptive and meaningful statistics that serve to enrich the data and the protection of aquatic birds

that shelter the wetlands of the Setif region at least once in their life cycle. The counts carried out by the help of DGF (Directorate General of Forests) of Setif.

Materials and methods

Study area

Setif region is located in the northeast of Algeria. Setif is formed by an eco-complex of wetlands belonging to the semi-arid and cold winter bioclimatic stage. Its lakes are more or less vast, we quote: Sebkhet Melloul (500 ha), Sebkhet El-Hameit (1300 ha), Chott El-Fraïne (1500 ha), Sebkhet Bazer-Sakra (1550 ha) and Chott El-Beida (3000 ha) (Fig. 1).

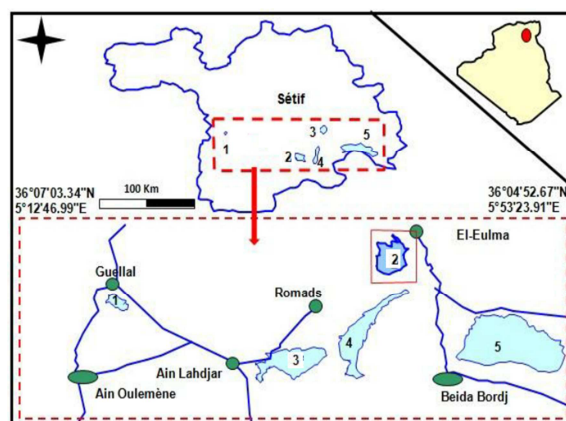


Fig. 1. Geographical location of the eco-complex of wetlands in the Setif region (1: Sebkhet Melloul, 2: Sebkhet El-Hamiet -Sakra, 3: Sebkhet Bazer, 4: Sebkhet El-Fraïne, 5: Chott El-Beida).

The region of Setif offers a very interesting fauna and flora biodiversity with a rich and diverse aquatic avifauna. We have carried out a quantitative inventory of waterbirds, this study include the classification of species according to their family.

Results and discussion

Presentation of species

Table 1 contains 31 species belonging to the 12 families listed, there are 11 species of Anatidae (35.4%), 3 species belonging to the family of Grebes, Scolopacidae and Charadriidae (9.67%), 2 species belonging to the family of Laridae, Ardeid, Recurvirostridae and Rallidae (6.45%), the other families are poorly represented because of the large differences in numbers between species.

Thus, over all three annual cycles, four species alone constitute (68.37%) of the total number of aquatic avifauna: *Tadorna tadorna* (46.14%), *Fulica atra* (22%), *Anas platyrhynchos* (16.45%) and *Phoenicopterus ruber roseus* (13.56%).

Table 1. Global inventory of aquatic ornithological species in the Setif region.

Family	Species	Effective	
Anatidés	<i>Anas</i>	3398	
	<i>platyrhynchos</i>	1600	
	<i>Spatula clypeata</i>	1300	
	<i>Anas penelope</i>	17	
	<i>Mareca strepera</i>	03	
	<i>Anas acuta</i>	1530	
	<i>Anas crecca</i>	80	
	<i>Aythya nyroca</i>	07	
	<i>Aythya marila</i>	9530	
	<i>Tadorna tadorna</i>	02	
	<i>Tadorna ferruginea</i>	26	
	<i>Oxyura leucocephala</i>		
	Rallidés	<i>Fulica atra</i>	4547
		<i>Gallinula chloropus</i>	70
Recurvirostridae	<i>Himantopus</i>	32	
	<i>himantopus</i>	100	
Accipitridés	<i>Circus aeruginosus</i>	24	
Charadriidés.	<i>Vanellus vanellus</i>	110	
	<i>Charadrius hiaticula</i>	130	
	<i>Charadrius alexandrinus</i>	100	
Scolopacidés.	<i>Tringa ochropus</i>	22	
	<i>Calidris minuta</i>	500	
	<i>Calidris acuminata</i>	80	
Flamants	<i>Phoenicopterus roseus ruber</i>	2801	
Cormorans	<i>Phalacrocorax carbo</i>	708	
Laridés	<i>Larus michahellis</i>	1489	
	<i>Larus ridibundus</i>	03	
Grèbes	<i>Podiceps cristatus</i>	1116	
	<i>Tachybaptus ruficollis</i>	231	
	<i>Podiceps nigricollis</i>	05	
Cigogne	<i>Ciconia ciconia</i>	40	
Ardéidé	<i>Ardea cinerea</i>	28	
	<i>Bubulcus ibis</i>	23	

Trophic and faunal status

In Table 2, we have broken down the species observed by trophic and wildlife categories.

Faunal categories

The aquatic avifauna listed belong to 10 types of fauna defined according to Voous (1960) and which are represented in the table below.

Table 2. Trophic and faunal status of bird species recorded in the Setif region.

Scientific names	TC	WT
<i>Fulica atra</i>	Pp	P
<i>Gallinula chloropus</i>	Pp	C
<i>Oxyura leucocephal</i>	O	S
<i>Himantopus himantopus</i>	(Inv)	C
<i>Recurvirostra avosetta</i>	(Inv)	T.M
<i>Charadrius alexandrines</i>	(Inv)	C
<i>Charadrius hiaticula</i>	Pp	Ar
<i>Tringa ochropus</i>	(Inv)	P
<i>Vanellus vanellus</i>	(Inv)	P
<i>Tachybaptus ruficollis</i>	(Inv)	AM
<i>Actitis hypoleucos</i>	P	I A
<i>Calidris acuminat</i>	O	P
<i>Calidris minuta</i>	Pp	Ar
<i>Tadorna tadorna</i>	Pp	S
<i>Larus michahelli</i>	PP	M
<i>Tadorna ferruginea</i>	Pp	P.X
<i>Anas platyrhynchos</i>	Pp	H
<i>Anas penelope</i>	V	P
<i>Anas crecca</i>	G	H
<i>Mareca streper</i>	Pp	H
<i>Anas clypeata</i>	Pp	H
<i>Aythya nyroca</i>	Pp	S
<i>Aythya ferina</i>	Pp	P
<i>Phoenicopterus ruber roseus</i>	Pp	M
<i>Ciconia ciconia</i>	Pp	P
<i>Ardea cineria</i>	Pp	P
<i>Ardea ibis</i>	(Inv)	IA
<i>Anas acuta</i>	O	P
<i>Podiceps nigricollis</i>	(Inv)	AM
<i>Circus aeruginosus</i>	C	P
<i>Phalacrocorax carb</i>	P	AM
<i>Chroicocephalus ridibundus</i>	Pp	P

WT: wildlife type, TC: trophic category

Table 3. the faunal types of birds recorded in the Setif region (Voous, 1960).

Trophic category	Symbol	Waterbirds	%
Palaearctic	P	11	34.375
Old world	O.W	0	0
Mediterranean	M	2	6,25
Sarmatic	S	3	9.375
Paléo-xérique	PX	1	3.12
Holarctic	H	4	12.5
European	E	0	0
Indo-Africain	I.A	2	6.25
Cosmopolite	C	3	9.37
Arctique	Ar	2	6,25
Turkestan-Méditerranéan	T.M	1	3,12
Ancien Monde	AM	3	6,25
Total		32	100

The avifauna of our study site belongs to the Palaearctic region which dominates the other types with more than a third (34.37%) (tab 3) (Fig. 2). In order to facilitate the discussion of the different types of fauna, we have established Table 4 to simplify the interpretation of the biogeographical origin of the avifauna.

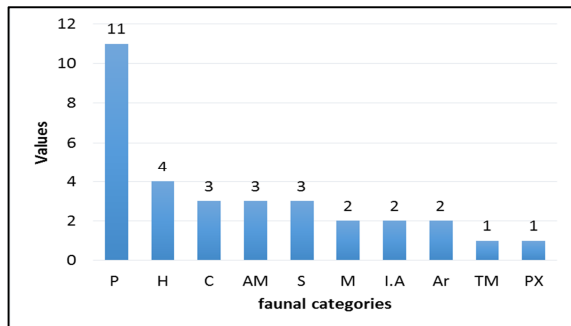


Fig. 2. Evolution of the numbers of birds recorded in the Setif region according to their faunal categories.

Tropical Categories

The avian species recorded are grouped into 7 distinct trophic categories. Polyphagous species come in first position (Fig. 3), it comprises 16 avian species, i.e. 50% of the total aquatic avifauna identified, of which the two best represented families are those of Anatidae (6 species) and Rallidae (2 to 4 species). Only one polyphagous species belongs to the flamingo family, it is the *Phoenicopterus roseus*.

We note that this category includes *Passer domesticus*. This species is defined as a major threat to Saharan agriculture given the damage caused during outbreaks (Guezoul, 2005). Consumers of Invertebrates are also well rated with 9 species (28.12%), two families most represented are those of Grebes and Recurvirostridae with 2 species or 6.25%. Then comes the Omnivorous with (9.37%), the Piscivorous with two species which form this category; the *Phalacrocorax carb* and the *Actitis hypoleucos* then the Granivores with a single species (*Anas crecca*), the Carnivorous (*Circus aeruginosus*), the insectivores and the Vegetarians (*Anas penelope*), the latter are weakly denoted with only (3.12%) (Fig. 3).

Table 4. Numerical importance of the trophic categories of aquatic birds in the Setif region.

Tropical Categories	Symbol	Waterbirds	%
Polyphagous	Pp	16	50
Consumes invertebrates	Inv	8	25
Omnivorous	O	3	9.37
Piscivorous	P	2	6.25
Vegetarian	V	1	3.12
Granivore	G	1	3.12
Carnivorous	C	1	3.12
Total		32	100

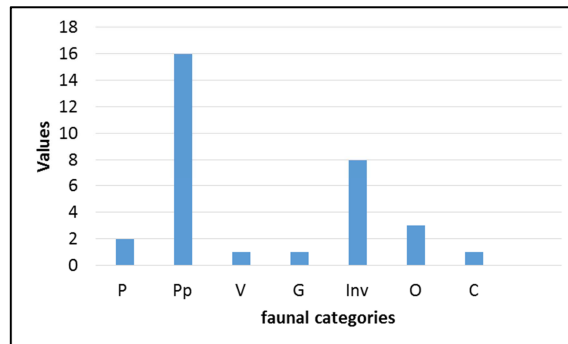


Fig. 3. Evolution of the numbers of birds recorded in the different Sebkhha according to their trophic categories.

Representation of the biogeographic categories

From the analysis of Table 5, we see a predominance of species belonging to the category of the Polarctic with 12 species, within which the Holarctic type is represented by 4 species which is equal to 12.5% of the whole of the inventoried aquatic avifauna. The Boreal / European category is represented by 34.37% of all avifauna with 11 species, followed by the Mediterranean species represented by 9 species.

Table 5. Representation of the biogeographic categories of avifauna.

sq	Wildlife type	number of species	%
Mediterranean	M,PX,IA, S,TM,	9	28.125
Boreal / European	P, E	11	34.375
Holarctic	C, Ar, H, AM	12	37.5
European-Turkestan	-	-	-

Conclusion

The region of Setif is rich in fauna and flora biodiversity including aquatic birds which are threatened due to climate change, the ratification of water and the destruction of wetlands which represent their habitat. Our inventory of waterbirds revealed the presence of over (77%) species that are linked to the presence of the water body. This shows the particular interest that this environment represents with regard to these species and in particular for those attached to the brackish environment such as *Phoenicopterus ruber roseus*, *Tadorna tadorna*, *Tadorna ferruginea*, *Recurvirostra avosetta*, *Himantopus himantopus*,

Charadrius alexandrinus, *Calidris minuta* and *Tringa ochropus* The avian population recorded belongs to 12 different families. The Anatidae family is the best represented with (59%) of all the species counted, followed by the Rallidae family (15.6%) then by the Flame (9.4%). The total numbers of birds vary according to the seasons, increasing during the fall, which generally corresponds to migratory passages and the arrival of winterers at the site. Then they decline until reaching the lowest point in winter then they stabilize (installation of sedentary). Accidental species are well represented during the autumn and spring seasons denote the site's interest in migrating aquatic avifauna. The most abundant species are *Tadorna tadorna* (32.13%), *Fulica atra* (15.32%), *Anas platyrhynchos* (11.44%) and *Phoenicopterus ruber roseus* (9.44%). The ornithological fauna listed belongs to 9 types of fauna, of which the Palaearctic fauna type dominates the other types with (34.37%). For the classification by trophic category, the polyphagous category comes in first position, it includes 16 avian species, 50% of the total avifauna recorded. The region's richness in varied food resources, of animal and plant origin justifies the presence of different trophic categories within populations of birds Finally, we note that the region of Setif is a region which has a considerable biodiversity of water birds, it is essential to ensure adequate conservation and to use these ecosystems rationally in order to protect these species and conserve their environments against the pollution and various human activities.

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