

Water Bird of Turdat El Rahad, North Kordofan State, Sudan

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Abstract:

The study was conducted in Turdat El Rahad - North Kordofan State, Sudan, from 2014- 2016. The main purpose of the present study was to identify water bird's species, Status and abundance of birds and total number of birds in Turdat El Rahad. Observations were made during the dry and wet seasons. and facilitated by using a binocular. Documentation was made by a Conan digital camera. The avifauna of Turdat El Rahad included 93 of water birds out of the 216 wintering species recorded for Sudan. The listed birds represented about 43% of the 216 species. The results showed that, the species were belonging to 20 families and 8 orders. The Resident, African migrants, Local migrants and Palearctic migrants' species were 18 (19.3%), 7 (7.53%), 19 (20.4%), 49 (52.7%), respectively. Thirteen species were recorded breeding during the study period e.g., *Ciconia abdimii* and *Porphyrio porphyrio*. The total number of birds is about 39061. The order Charadiiformes was the largest including 7 families and 36 species. Two species were Passerines, and 91 species were Non-passerines. According to IUCN Red List, most species were categorized under the Least Concerned while six species recorded as Near Threatened, two species were Vulnerable (*Ciconia episcopus*, *Aythya ferina*). The possibility of recording more species was discussed.

Keywords: Water Birds, Status, Abundance, Turdat El Rahad, Sudan

الطيور المائية في ترrede الرهد - ولاية شمال كردفان- السودان

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المستخلص:

إجريت الدراسة في ترrede الرهد - ولاية شمال كردفان- السودان في الفترة من 2014-2016 م . الهدف الاساسي من الدراسة معرفه انواع الطيور المائية و وضعها ووفرته بالمنطقة اثناء فترة الدراسة. حيث تمت مراقبة و رصد انواع الطيور المائية في موسمي الجفاف و الرطوبة باستخدام منظار للمراقبة و كاميرا رقمية من نوع كونن لتوثيق انواع الطيور.تم تسجيل 93 نوع من الطيور المائية بالترrede من 216 نوع من الطيور المائية الشتوية المسجلة بالسودان. قائمة الانواع التي سجلت تمثل حوالي 43% من 216 نوع. اظهرت النتائج ان 93 نوع من الطيور المائية منتمية الي 20 عائلة و 8 رتبة منها المستوطنة و المهاجرة الافريقية والمهاجرة المحلية و المهاجرة الاوروبية هي: 18 نوع (19.3%), 7 انواع (7.53%), 19 نوع (20.4%) و 49 نوع (52.7%) علي التوالي. 13 نوع منها سجلت متوالدة اثناء فترة الدراسة منها طير السمبر و دجاجة الماء الزرقاء. العدد الكلي لانواع الطيور التي سجلت في فترة الدراسة حوالي 39061 فرد.تعتبر رتبة الزقازقيات اكبر الرتب باحتوائها علي 7 عوائل و 36 نوع 91. نوع من الطيور التي سجلت غير عصفورية و نوعان من العصفوريات. وفقا للقائمة الحمراء للانواع المهددة بالانقراض عالميا وجد ان معظم الانواع التي سجلت اثناء الدراسة مدرجة بانها مستقرة او غير مهددة. وسجل 6 انواع تحت التهديد وسجل نوعان كمعرضة للانقراض هما بجبار صوفي العنق والحمراوي الشائع. امكانية تسجيل مزيد من انواع الطيور المائية بترrede الرهد قد تمت مناقشتها. الكلمات المفتاحية: الطيور المائية ، وضع الحالة، الوفرة، ترrede الرهد، السودان.

1. Introduction:

Diverse climate and geographical habitats in Sudan led to a large diversity in the fauna and flora (1), (2). A wide variety of habitat types in the Sudan are classified as wetlands including large Swamps, Black swamps, Oasis, Lakes. According to (3), (2). Wetland habitats make up 20% of the total area of the Sudan. They include the River Nile and its tributaries (a drainage network of 9000 km), 750 km of coastline along the Red Sea, a number of inland lakes, 2000 "haffirs" and 10,000 km of canals in the Gezira irrigation scheme in addition to innumerable seasonal swamps (4). Wetlands are the best known functions to provide a habitat for bird (5). Wetlands refer to a landscape saturated with water or covered by water either perennially or for a major part of the year; there are numerous definitions of wetlands but all essentially agree to the above (6), (7). Under the Convention on Wetlands, wetlands are defined as

areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters; this may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six meters at low tide lying within the wetlands (8). Wetlands are the most productive and biologically diverse in the world but very fragile ecosystems (9). Wetlands are important bird habitats, birds use them for breeding, nesting and rearing young. Also as a source of drinking water and for feeding, shelter and social interactions (10). Wetlands and water birds are inseparable elements and thus form a rich array of water bird communities (11). Population of birds is a sensitive indicator of pollution in both terrestrial and aquatic ecosystem (12), (13). The estimation of local densities of avifauna helps to understand the abundance of various species of other organisms. (14). One of the major priorities in conserving animals is monitoring their populations to find methods for their long term survival (15). Water birds are an important component of most of the wetland ecosystems as they occupy several trophic levels in the food web of wetland nutrient cycles. Activities of water birds are considered as indicator of quality of the wetland ecosystem and form the terminal links in many aquatic food chains, and as a result they reflect changes originating in several different ecosystem components (16). Water-birds are among the most mobile birds, many are dependent for their survival on a national and even an international network of wetlands. Resident water-birds must move to take advantage of ever changing surface water (17), (18).

Some locality records of birds were published. Of these are bird fauna of Um Bbadr by (19); Hantub (20); Dinder National Park (21), (22); Khartoum (23); El Ga'ab Depression (24); Alsalam and Abyei-Muglad (25); Shendi area (26); Sinnar State, (27) and Jabel El Dayer National Park (28). A lot of studies in different countries have been carried out on bird fauna in various natural and semi natural ecosystems. Some examples included the coun-

tries of India (29), Jordan (30), Palestine (31).

Only patchy information available on the avifauna of the Turdat ElRahad, the study of the area has become a basic necessity. The aims of the study focus mainly on the identification of the water bird fauna, the quantification seasonal changes. Also it aimed to contribute to birds' species recorded for the area and Sudan.

2. Materials and Methods:

2.1. The Study area:

Turdat ElRahad is a natural fresh water lake following lentic water system. It is situated in western part of ElRahad town, between latitudes $12^{\circ} 43' 7''$ North and longitudes $30^{\circ} 37' 10''$ East, with an elevation of 444m above sea level. The Surface area reaches 3500 ha, depth varies between 2-4m and maximum water level is 6m, storage volume is 85000000 m³. It is Surrounded by fruit gardens, orchards, vegetables farms and Elregalh Gardener Project from western bank (32) and (Fig.1,2,3,4).



Figure (1): Study area, Turdat ElRahad Modified
 .(/from ([Http:// www.google.com/earth](http://www.google.com/earth)



Figure (2): Turdat ElRahad, on the background appeared ElRahad Town.



Figure (3): Turdat ElRahad.



Figure (4): Fruits gardens along the banks of the Turdat ElRahad.

2.2. Methods:

The investigation was carried out between February- Decembe 2014 and August (2015)- April 2016. The study area was reaches by ca

2.2. Methods:

The investigation was carried out between February- December 2014 and August (2015)- April 2016. The study area was reached by car and boats and patrolled on foot. The study covered both dry and wet seasons. Observations started at 7:00 Am to 7:00 Pm. However, many visits were carried out in earlier hours and extended to later hours for monitoring some nocturnal species. The birds were recognized directly and facilitated by using a Pentax binocular (12x50, 5.500). Documentation was made by a Nikon digital camera of the type DX (AF-SNIKKOR 18-55mm 1:3.5-5.6GVR) and Canon digital camera. Classification and valid species name followed (33). Identifications followed (34), (35), (33) and (36). In this study the number of individuals were recorded (Direct count in 2016) and percentage of each variable was calculated. In spite of all these some species might have been missed, in view of difficult access, hiding or shyness of some species.

3. Results:

The bird species recorded in both seasons in Turdat El Rahad were given in Table (1) that there were marked seasonal changes in species of birds inhabiting the study area. Their status information followed (37). And their abundance (C=Common; VC= Very common; U=Un common; R=Rare; VR= Very Rare) followed (1). and their categorization was based on (38) A total of 93 species, 20 families and 8 orders of water birds were recorded from Turdat El Rahad Table (I). During the first season 58 species and 87 species during the second season. The total numbers of individuals observed were 39061. Among of them 8 were rare, 21 were very rare, 26 were common, 29 were very common, 9 were uncommon. Thirteen species were recorded breeding during the study period e.g. *Actophilornis africanus*, *Egretta garzetta*, *Ceryle rudis*, *Vanel-lus spinosus*, *Ciconia abdimii*, and *Porphyrio porphyrio* (Fig. 5, 6 and 7). The *Bubulcus ibis*, *Ardea cinerea* (Fig. 8 and 9) were very common near human activities.



Fig. 7. *Vanellus spinosus*, with nest and eggs on the ground.



Fig.8. *Bubulcus ibis*. Fig.9. *Ardea cinerea*.

Table (1): Water birds of Turdat ElRahad, with their numbers observed from August (2015)- April 2016, Status (ST), Abundance (AB) and IUCN red list Categorization (RLC).

Common name	Scientific name	Number observed in 2015/2016	ST	AB	RLC
Order: Podicepediformes - Family: Podicipedidae					
Little Grebe	<i>Tachybaptus ruficollis</i>	176	LM+B	C	LC
Order : Pelecaniiformes 1- Family: Pelicanidae					
Great White Pelican	<i>Pelecanus onocrotalus</i>	114	M+P	C	LC
Pink-backed Pelican	<i>Pelecanus rufescens</i>	18	LM+B	VR	LC
Dalmatian Pelican	<i>Pelecanus crispus</i>	7	M+P	U	VU
Order :Pelecaniiformes 2- Family: Phalacrocoracidae					
Great Cormorant	<i>Phalacrocorax carbo</i>	199	M+P	R	LC
Long-tailed Cormorant	<i>Phalacrocorax africanus</i>	7	LM+AM	VC	LC
Order : Pelecaniiformes 3- Family: Anhingidae					
African Darter	<i>Anhinga rufa</i>	2	R+B	C	LC
Order : Ciconiiformes 1- Family: Ardeidae					
Cattle Egret	<i>Bubulcus ibis</i>	3383	M+W+B	VC	LC
Little Egret	<i>Egretta garzetta</i>	446	M+W+B	VC	LC
Intermediate Egret	<i>Egretta intermedia</i>	132	LM+B	VC	LC
Great white Egret	<i>Egretta alba</i>	407	M+W+P	VC	LC
Little Bit-tern	<i>Lxobrychus minutus</i>	14	M+P+B	U	LC

Common name	Scientific name	Number observed in 2015/2016	ST	AB	RLC
Dwarf Bit-tern	<i>Lxobrychus sturmi</i>	18	LM+P	U	LC
Green-backed Heron	<i>Butorides striata</i>	6	R+B	VR	LC
Black-crowned-Night Heron	<i>Nycticorax nycticorax</i>	169	R+W+B	C	LC
Common Squacco Heron	<i>Ardeola ralloides</i>	683	R+W+B	VC	LC
Black-head-ed Heron	<i>Ardea melanocephala</i>	490	LM+B	VC	LC
Grey Heron	<i>Ardea cinerea</i>	483	R+W+B	VC	LC
Goliath Heron	<i>Ardea goliath</i>	77	R+B	C	LC
Purple Heron	<i>Ardea purpurea</i>	57	R+W+B	C	LC
Order : Ciconiiformes 2- Family: Scopidae					
Hamerkop	<i>Scopus umbretta</i>	5	LM+B	VR	LC
Order : Ciconiiformes 3- Family: Ciconiidae					
Abdim's Stork	<i>Ciconia abdimii</i>	299	AM+B	C	LC
White Stork	<i>Ciconia ciconia</i>	805	M+W+P	VC	LC
Black Stork	<i>Ciconia nigra</i>	11	M+W+P	U	LC
Wool-ly-necked Stork	<i>Ciconia episcopus</i>	2	AM+B	U	NT
Yel-low-billed Stork	<i>Mycteria ibis</i>	140	LM+W+B	VC	LC

Common name	Scientific name	Number observed in 2015/2016	ST	AB	RLC
Marabou Stork	<i>Leptoptilos crumeniferus</i>	4	LM+B	VR	LC
African open-billed Stork	<i>Anastomus lamelligerus</i>	5989	LM+B	VC	LC
Order : Ciconiiformes 4- Family: Threskionithidae					
Glossy Ibis	<i>Plegadis falcinellus</i>	1639	M+W+P	VC	LC
Hadedda Ibis	<i>Bostrychia hagedash</i>	30	LM+B	C	LC
African Sacred Ibis	<i>Threskiornis aethiopicus</i>	202	LM+B	VC	LC
African Spoonbill	<i>Platalea alba</i>	28	AM+B	VR	LC
Eurasian Spoonbill	<i>Platalea leucorodia</i>	432	R+P+B	C	LC
Order : Anseriformes - Family: Anatidae					
Egyptian Goose	<i>Alopochen aegyptiaca</i>	11	M+P+B	VR	LC
Spur-winged Goose	<i>Plectropterus gambensis</i>	8	LM+B	R	LC
African Pygmy-goose	<i>Nettapus auritus</i>	5	AM+P	VR	LC
White-faced whistling-Duck	<i>Dendrocygna viduata</i>	2241	LM+B	VC	LC
Fulvous whistling-Duck	<i>Dendrocygna bicolor</i>	207	LM+P	C	LC

Common name	Scientific name	Number observed in 2015/2016	ST	AB	RLC
African Comb Duck	<i>Sarkidiornis melanotos</i>	87	AM+B	C	LC
Garganey	<i>Anas querquedula</i>	1106	M+W+P	C	LC
Common Teal	<i>Anas crecca</i>	228	M+W+P	C	LC
Hottentot Teal	<i>Anas hottentota</i>	57	AM	R	LC
Northern Shoveler	<i>Anas clypeata</i>	214	M+W+P	C	LC
Northern Pintail	<i>Anas acuta</i>	37	M+W+P	R	LC
Eurasian Wigeon	<i>Anas Penelope</i>	60	M+W+P	VR	LC
Tufted Duck	<i>Aythya fuligula</i>	10	M+W+P	C	LC
Northern Pochard	<i>Aythya ferina</i>	42	M+W+P	VR	VU
White-eyed Pochard	<i>Aythya nyroca</i>	60	M+W+P	VR	NT
Order :Gruiformes 1- Family: Rallidae					
Black Crake	<i>Amaurornis flavirostra</i>	41	R+B	VR	LC
Purple Swamp hen	<i>Porphyrio porphyrio</i>	35	R+B	C	LC
Common Moorhen	<i>Gallinula chloropus</i>	140	M+W+P	C	LC
Lesser Moorhen	<i>Gallinula angulata</i>	36	AM+B	R	LC
Order: Gruiformes 2- Family: Gruidae					
Demoiselle Crane	<i>Anthropoides virgo</i>	2105	M+W+P	VR	LC

Common name	Scientific name	Number observed in 2015/2016	ST	AB	RLC
Order: Charadiiformes 1- Family : Jacandae					
African Jacana	<i>Actophilornis africanus</i>	334	LM+B	VC	LC
Order: Charadiiformes 2- Family: Recurvirostridae					
Black – winged Stilt	<i>Himantopus Himantopus</i>	2049	M+W+P	VC	LC
Order : Charadiiformes 3- Family: Burhinidae					
Senegal Thick-knee	<i>Burhinus senegalensis</i>	14	R+B	R	LC
Order : Charadiiformes 4- Family: Glareolidae					
Black-winged Pratincole	<i>Glareola nordmanni</i>	124	M+W+P	U	NT
Common Pratincole	<i>Glareola pratincola</i>	40	M+B+P	VR	LC
Egyptian Plover	<i>Pluvianus aegyptius</i>	2	LM+B	VR	LC
Order : Charadiiformes 5- Family: Charadriidae					
Black-headed Plover	<i>Vanellus tectus</i>	50	R+B	C	LC
Spur-winged Plover	<i>Vanellus spinosus</i>	2017	R+B	VC	LC
Long-toed Plover	<i>Vanellus crassirostris</i>	6	R+B	C	LC
African Wattled Plover	<i>Vanellus senegalensis</i>	37	LM+B	R	LC
White-tailed Plover	<i>Vanellus leucurus</i>	120	M+W+P	U	LC
Kittlitz's Sand Plover	<i>Charadrius pecuarius</i>	16	R+B	VR	LC

Common name	Scientific name	Number observed in 2015/2016	ST	AB	RLC
Common Ringed Plover	<i>Charadrius hiaticula</i>	356	M+W+P	VC	LC
Little Ringed Plover	<i>Charadrius dubius</i>	276	M+W+P	C	LC
Kentish Plover	<i>Charadrius alexandrinus</i>	4	R+W+P+B	VR	LC
Order : Charadiiformes 6- Family: Scolopacidae					
European Golden Plover	<i>Pluvialis aprinaria</i>	4	M+P	VR	LC
Ruff	<i>Philomachus pugnax</i>	2444	M+W+P	VC	LC
Common Sandpiper	<i>Actitis hypoleucos</i>	374	M+W+P	VC	LC
Wood Sandpiper	<i>Tringa glareola</i>	42	M+W+P	R	LC
March Sandpiper	<i>Tringa stagnatilis</i>	408	M+P	VC	LC
Green Sandpiper	<i>Tringa ochropus</i>	12	M+W+P	VR	LC
Common Green Shank	<i>Tringa nebularia</i>	56	M+W+P	C	LC
Common Red Shank	<i>Tringa totanus</i>	113	M+W+P	C	LC
Spotted Red Shank	<i>Tringa erythropus</i>	96	M+W+P	C	LC
Curlew Sandpiper	<i>Calidris ferruginea</i>	30	M+W+P	VR	NT
Little Stint	<i>Calidris minuta</i>	815	M+W+P	VC	LC

Common name	Scientific name	Number observed in 2015/2016	ST	AB	RLC
Temminck's Stint	<i>Calidris temminckii</i>	207	M+W+P	C	LC
Ruddy Turnstone	<i>Arenaria interpres</i>	10	M+W+P	VR	LC
Black-tailed Godwit	<i>Limosa limosa</i>	1051	M+W+P	VC	NT
Common Snipe	<i>Gallinago gallinago</i>	66	M+W+P	C	LC
Great Snipe	<i>Gallinago media</i>	8	M+P	U	NT
Order : Charadiiformes 7- Family: Laridae					
Little Gull	<i>Larus minutus</i>	20	M+P	VR	LC
Gull-billed Tern	<i>Sterna nilotica</i>	290	LM+W	VC	LC
White-winged Black Tern	<i>Chlidonias leucopterus</i>	1840	M+W+P	VC	LC
Whiskered Tern	<i>Chlidonias hybrida</i>	940	M+W+P	VC	LC
Black Tern	<i>Chlidonias niger</i>	353	M+P	C	LC
Order :Coreciiformes - Family: Alcedinidae					
Pied Kingfisher	<i>Ceryle rudis</i>	245	R+B	VC	LC
Malachite Kingfisher	<i>Alcedo cristata</i>	86	R+B	VC	LC
Order: Passeriformes – Motacillidae					
Grey Wagtail	<i>Motacilla cinerea</i>	22	M+W+P	U	LC
Yellow Wagtail	<i>Motacilla flava</i>	880	M+W+P	VC	LC
Total number observed= 39061					

Key to status: B=Breeding record confirmed; M=Migrant including on passage through Sudan; P=Breed in Palearctic; R=Resident; W=Winters in Sudan.

On basis of IUCN Red List, the conservation status following www.iucnredlist.org (2022) recognized:

1. “85” bird species as Least Concerned (LC). This comprised 92% of the recorded birds.

2.”6” species were recognized as Near Threatened (NT). Following species *Limosa limosa*, *Glareola nordmanni*, *Aythya nyroca*, *Gallinago media*.

3. The following species *Ciconia episcopus*, *Aythya ferina* bird species as Vulnerable (VU).

Some species were seen once during the study period e.g. *Ciconia episcopus*, *Platalea alba*, *Pluvialis apricaria* (Fig.10). Dalmatian Pelican seen twice during the study period (Fig.11). Open-billed Stork, Demoiselle Crane, White Pelican and white-faced Whistling-Duck were seen in large flocks while the Hamerkop, Wattled Plover, Pink-backed Pelican, Long-tailed Cormorant, Hadedda Ibis, Yellow-billed Stork and Marabou Stork were seen in few numbers (Fig.12, to 22).

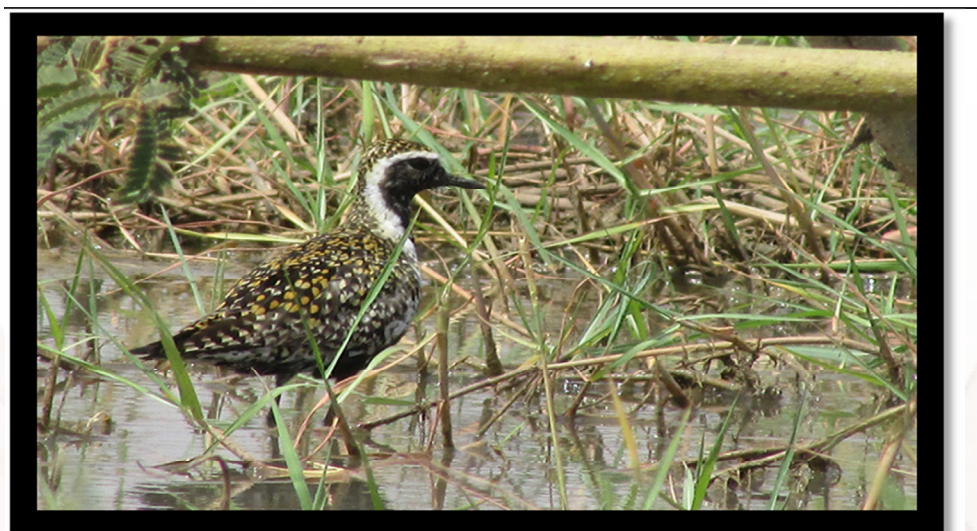


Fig.10. *Pluvialis apricaria*.



Fig.11. Dalmatian Pelican.



Fig. 12. White Pelican



**Fig.13.Open-billed Stork.
Crane.**



Fig.14. Demoiselle Crane.



**Fig.15. White-faced Whistling-Duck.
Hamerkop.**



Fig.16.



**Fig.17. African Wattled Plover.
Pelican.**



Fig. 18. Pink-backed

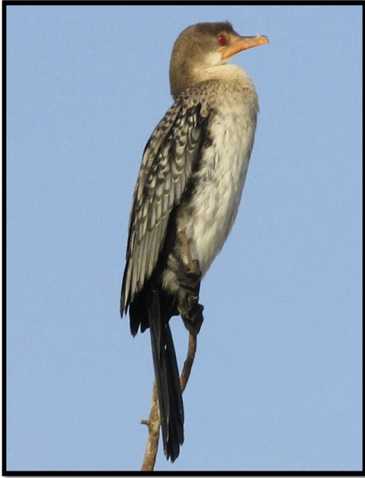


Fig.19. Long-tailed Cormorant.



Fig.20.



Fig.21. Hadedha Ibis.



Fig.22. Yellow-billed Stork.

Order Charadiiformes has highly diverse and abundant with 7 families and 36 species (Fig.23 to Fig. 36).



Fig. 23. Black-winged Pratincole.



Fig.24. Black-tailed Godwit.



Fig.25. White-tailed Plover.



Fig.26. Senegal Thick-knee.



**Fig.27. March Sandpiper.
Redshank.**



**Fig.28. Spotted
Redshank.**



**Fig.29. Great Snipe.
Stilt.**



**Fig.30. Black-winged
Stilt.**



**Fig.31. Little Stint.
Plover.**



**Fig.32. Little Ringed
Plover.**



**Fig.33. Ruddy Turnstone.
White-winged Black Tern.**



**Fig.34. White-
winged Black Tern.**



Fig.35. Gull-billed Tern.



Fig.36. Whiskered Tern.

Determinant factors included predators and game shooting of *Egretta alba* and *Dendrocygna viduata* and *Gallinago gallinago* (Fig.37,38).



Fig.37. A dead *Egretta alba*, probably due to predator.



Fig.38. A dead *Gallinago gallinago* due to hunter trap.

4. Discussions:

There were marked changes in the bird's fauna in the Turdat El Rahad study area. between February to December 2014 and August 2015 to April 2016. There is little doubt that these were associated with the climate changes resulting from the onset of rains and subsequent changes in the habitats. (39). (21) also found similar seasonal variation in birds of the Dinder National Park. (40), (41) reported that bird at Zalingei area in the West Sudan showed similar seasonal variation. Turdat ElRahad had big influx of birds to the area during winter and rainy season, because of the availability of water and food, during winter due to the arrival of Palearctic migrants. That make Turdat ElRahad an attractive a good wintering site for many Palearctic migrant's species. some species were recorded bred in Turdat ElRahad due to the availability of water, vegetation cover (trees, shrubs and grasses) which provided food, nesting, perching and sheltering site, and nesting materials. (41) recorded 29 species of water birds in Zalingei area. This difference in the number of species between Turdat ElRahad area and Zalingei area, is due to the different habitats. Turdat El-Rahad had more food (fishes, snails and insects) due to the large extend of water, while in Zalingei area water is distributed in pools and lakes. More filed work is needed on the water birds during the wet and dry seasons for more information on the breeding biology. Table I recorded two species were Passerines and categorized as least concern. All the 91 species were Non-Passerines. The order Charadriiformes included 7 families and 36 species followed by Ciconiiformes with 4 families and 26 species; Anseriformes included one family Anatidae with 15 species; Pelecaniiformes with 3 families and 6 species; Gruiformes with two families and 5 species while 3 orders were represented by one family each, with one or two species each (Table 1). Six species were found in the study area, were ranked as near threatened by (42). Two species were ranked as Vulnerable (VU).

Eighteen out of recorded 93 species are resident breeding population. Seven species were African migrants, nineteen species were Local migrants, while forty-nine species were Palearctic migrants.

5. Acknowledgments :

Thanks are due to the late Dr.Tigani M.H. Allam and to Dr. Dawi Musa Hamed for supervising this work.

6. Conclusion :

This study will provide a baseline of information for future studies concerning the birds of the Turdat ElRahad area.

7. Recommendation:

Turdat ElRahad area may be qualified to be a Ramsar site and important bird area (IBA).

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