

Water Bird Species to protect in the Ruzizi Delta, Great Lakes Region, in Burundi and the Democratic Republic of Congo

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ABSTRACT

The water bird species to be protected in the Ruzizi Delta in Burundi and in the Democratic Republic of Congo (DRC) was investigated from April 2019 until August 2021 in five sites in the Rusizi Burundian Delta (RBD) and five sites in the Ruzizi Congolese Delta (RCD). Each site was visited three times a year during the years 2019, 2020 and 2021. The investigation was conducted by direct observation on transects, counting points and on bird species recognition routes using binoculars and two telescopes. Displacements were done by the motorized fiberglass boat and the double cabin field vehicle of the Centre for Research in Hydrobiology (CRH) of Uvira, DRC. At the end of our investigations, we drew up the list of 490 species divided into 84 families and 18 orders. 176 (36%) species were water bird species. Of them, 140 (80%) meet the Ramsar A4i criterion for bird conservation, and 36 species do not meet this criterion. Of these 36 species, we recognized 9 species (5%) of waterbirds specializing in aquatic environments (WBS), and 27 species (15%) of Water Bird species Generalists or visitors to aqueous environments. 26 species of aquatic birds (15%) were recorded in the unprotected Ruzizi Congolese Delta (RCD), 49 (28%) in the protected Rusizi Burundian Delta (RBD), and 101 species of aquatic birds (57%) were recorded both in the Ruzizi Congolese Delta and in the Rusizi Burundian delta. The difference in the distributions of aquatic birds between the Ruzizi Congolese Delta and the Rusizi Burundian Delta is significant. Waterbirds are not affected by the boundaries between RCD and RBD. Their sustainability in the Ruzizi Delta requires the protection of the Ruzizi Congolese wetlands as is the case for the Rusizi Burundian Delta.

Keywords: Aquatic bird species; Conservation of water bird species; Bird species specialized in aquatic environments; Water Bird Species Generalists of aquatic environments; Water Bird species visitors of aquatic environments.

INTRODUCTION

The groups of bird species to protect in the Ruzizi Delta (RD) in Burundi and the Democratic Republic of Congo (DRC) were investigated from April 2019 until August 2021 in five sites of the Rusizi Burundian (RBD) Delta and five sites of the Ruzizi Congolese Delta (RCD). Each site was visited three times a year during the years 2019, 2020 and 2021. Following documents are published about birds for the Ruzizi Delta in the Democratic Republic of

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Congo (DRC) and in the Republic of Burundi. Ornithological importance of DRC and conservation issues in protected and unprotected areas including wetland areas, are published by (Demey & Louette, 2001).

The Rusizi Burundian Delta is an Important Bird Areas (Nkezabahizi & Manirambona, 2011); (Dowset & Dowset-Lemaire, 1993) and (Gaugris, 1979). Authors (Ntakimazi, Nzigidahera, Nicayenzi, & West, 2000) inventoried 120 bird species and their terrestrial or aquatic biotopes in the Rusizi Burundian Delta. Finally the following authors (Nkezabahizi & Bizimana, 2008) investigated Burundi's Important Bird Areas Status and Trends 2008 listing only two birds, the White-winged Tern (*Chlidonia leucopterus*) and the African Skimmer (*Rynchops flavirostris*) fulfilling the Ramsar Criteria A4i and A1 in the Rusizi Natural Reserve. The very rich ornithological fauna of Rusizi Burundian National Park and Ramsar site includes 350 sedentary and migratory bird species (MEEATU, Ramsar, & WWF, 2014). For his dissertation, the graduate student Apollinaire Ntakiyica (Ntakiyica, 2008) checked the bibliographic State of knowledge on the distribution sites of ornithological fauna in Burundi. He presented 638 bird species for Burundi of which 410 were listed in the Rusizi Burundian Delta.

My doctoral research is unique to investigate bird species groups to protect in the Ruzizi Delta simultaneously in the Ruzizi Congolese Delta (RCD) in DRC and the Rusizi Burundian Delta (RBD) in Burundi. It has updated the list of bird species in the RCD and the RBD (Bashonga, Sande, Kahindo, & Ntakimazi, 2023). It will contribute to the Ruzizi Congolese Delta wetlands protection for bird and biodiversity conservation, strengthening the management of protected areas in Burundi with a view to combating climate change, epidemics and disasters and preventing the extinction of certain species of birds (Chapman A. D., 2009); (Butchart, Stattersfield, & Collar, 2006); (Chapman A. D., 2005); (Deanna, Brunner, Nige, Karr, & Nielsen, 1998). To constitute the bird groups to protect in the Ruzizi Delta we referred essentially to the following authors (Stevenson & Fanshawe, 2002); (Fishpool & Evans, Important Bird Areas in Africa and Associated Islands, Priority Sites for Conservation., 2001); (Demey & Louette, 2001); (Zimmerman, Turner, & Pearson, Zimmerman D. A., Turner D.A. & Pearson D.J. Birds of Kenya and Northern Tanzania, 1999);

(Williams & Arlott, 1988); (Guggisberg, 1988) and ; (Guggisberg, 1986).

MATERIAL AND METHODS

Study Area and Studied Sites

The Ruzizi delta extends from Vugizo, the point of separation of the small Ruzizi River from the Great Rusizi River with the Vugizo 1 site (Vug 1), S 03° 16' 08.5" E 029° 14' 27.1" 781 m altitude in the Ruzizi Congolese Delta (RCD) and Vugizo 2 (Vug 2), S 03° 16' 04" E 029° 14' 37" 779 m altitude in the Rusizi Burundian Delta (RBD) along the Grande Rusizi River to the Great Rusizi River Bridge (GRRB), S 03° 20' 33" E 029° 16' 25" 777 m altitude up to the Great Rusizi River Mouth (GRRM), S 03° 20' 27.8" E 029° 16' 23.5" 779 m above sea level, then along the shore of Lake Tanganyika towards the west passing through the Small Ruzizi River Mouth (SRRM), S 03° 21' 259" E 029° 12' 746" in the DRC, up to Kilomoni 2 (Kilo 2) Fishing Beach, S 03° 20' 49.2" E 029° 11' 30.7" then, turning north to the Nyangara pond (NyaP), S 03° 20' 22.4" E 029° 11' 42.9" 772 m above sea level, along the Small Ruzizi River towards the northeast as far as Vugizo, junction with the Grande Rusizi River (Figure 1).

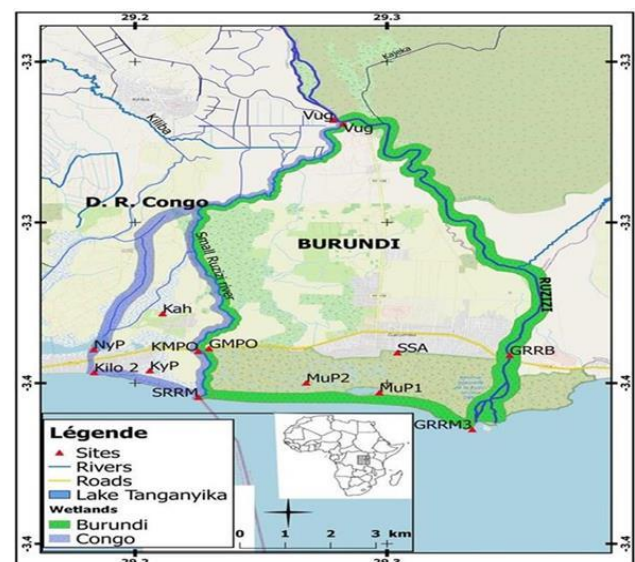


Figure 1 Map showing the study areas and studied sites in Ruzizi Delta

Source: Our fieldwork of 2019-2021

Research Materials

A meter, a three meters length surveyor and a tape decametre were used to measure length, width,

and depth of ponds, rivers, river banks and marshes; A GPS was used to record geographical coordinates, length of sampling areas and sampling sites; A digital camera was used to capture birds and site features; Three binoculars and two telescopes were used in direct observation technique to distinguish birds (Figure 2); A vehicle and a medium ship were used for displacements; We used bibliography from three institutional libraries including the CRH (Centre for Research in Hydrobiology) at Uvira, DRC; the CRSNE (Centre for Natural Research and Environment) of Burundi University, and the library of the Department of Zoology, Entomology and Fisheries Sciences of Makerere University, Kampala Uganda. Finally we checked Internet literature.



Figure-2. Some Bird sampling materials in the Ruzizi Delta

Source: CRH-Uvira, fieldwork 2019-2021

Research Methods

Regular weekly bird direct observations (Richer, 2018) were made in ten sites of two study areas, the Ruzizi Congolese Delta (RCD) and the Ruzizi Burundian Delta (RBD) from April 2019 to August 2021 for the period of 32 months to record all bird species seen or heard in the Ruzizi Delta. Birds were

observed by direct observation (Richer, 2018) on transect counts, point counts and on road bird counting using binoculars and telescopes. They were identified using available field guide books: (Stevenson & Fanshawe, 2002); (Zimmerman, Turner, & Pearson, 1999); (Williams & Arlott, 1988); (Guggisberg, 1988) and (Guggisberg, 1986).

A) On transect counts

Birds were counted by transect counts using binoculars and telescopes in terrestrial areas. Total number of birds seen or heard was recorded (Yee, 2022). Bird species identification was done using available field guides and following books: (Stevenson & Fanshawe, 2002); (Fishpool & Evans, 2001); (Zimmerman, Turner, & Pearson, 1999); (Williams & Arlott, 1988); (Guggisberg, 1988) and (Guggisberg, 1986).

B) From point counts

Birds were sampled on point counts in marshes (Yee, 2022), ponds, bowls, in rivers and flood areas.

C) Bird Road Counting (BRC)

Birds were counted along roads (Yee, 2022) from Kavimvira Customs Station (KCS) to Kavimvira Migration Post Offices (KMPO) in the Ruzizi Congolese Delta (RCD) and from Gatumba City to Gatumba Migration Post Offices (GMPO) in the Ruzizi Burundian Delta (RBD).

D) GPS

GPS coordinates were recorded for study areas and studied sites habitats mapping.

RESULTS

Table 1 presents the 176 water bird species of which 26 (15%) were recorded in the Ruzizi Congolese Delta (RCD), 49 (28%) in the Ruzizi Burundian Delta and 101 (57%) water bird species were recorded both in the RCD and the RBD. The difference of water bird species distribution was highly significant between the protected Ruzizi Burundian Delta and the unprotected Ruzizi Congolese Delta ($\chi^2= 27, 74; DF=2, p> 0.001$)¹. This means that water birds are so many in protected

¹ Chi Squarred test

areas of the Rusizi Burundian Delta and very few in the unprotected Ruzizi Congolese Delta. Of 176 water species listed below, 140 (80%) fulfil the Ramsar Criteria A4i, for water birds conservation

concern and 36 (20%) species do not meet that criterion. Among this ones, 9 (5%) species are water bird specialists and 27 (15%) are water bird generalists or visitors.

Table Water Bird Species to Protect in the Ruzizi Delta in RCD & RBD

RCD, Ruzizi Congolese Delta; RBD, Rusizi Burundian Delta; A4i, Ramsar Criterion for bird conservation concern; WBS, Water Bird species Specialists of aquatic environments; WBG, Water Bird Generalists including water bird visitors of aquatic environments.

Species Name	French Name	English Name	RCD	RBD	RCD RBD	A4i	WBS	WBG
<i>Tachybaptus ruficollis</i>	Grèbe castaneux	Little Grebe	1	1	1	1		
<i>Podiceps cristatus</i>	Grèbe huppé	Great Crested Grebe		1		1		
<i>Podiceps nigricollis</i>	Grèbe à coup noir	Black-necked Grebe		1		1		
<i>Pelecanus onocrotalus</i>	Pélican blanc	Great White Pelican	1	1	1	1		
<i>Pelecanus rufescens</i>	Pélican gris	Pink-backed Pelican	1	1	1	1		
<i>Phalacrocorax carbo</i>	Grand cormoran	White-breasted Cormorant	1	1	1	1		
<i>Phalacrocorax africanus</i>	Cormoran africain	Long-tailed Cormorant	1	1	1	1		
<i>Anhinga rufa</i>	Anhinga d'Afrique	Darter	1	1	1	1		
<i>Podica senegalensis</i>	Grébifoulque d'Afrique	African Finfoot	1	1	1	1		
<i>Ixobrychus minutus</i>	Blongios de Sturm	Dwarf Bittern	1	1	1	1		
<i>Ixobrychus sturmii</i>	Blongios nain	Little Bittern	1	1	1	1		
<i>Nycticorax nycticorax</i>	Bihoreau gris	Black-crowned Night Heron	1	1	1	1		
<i>Bubulcus ibis</i>	Héron garde-boeufs	Cattle Egret	1	1	1	1		
<i>Ardeola ralloides</i>	Héron crabier	Common Squacco Heron	1	1	1	1		
<i>Ardeola idea</i>	Crabier Blanc	Madagascar Pond-heron		1		1		
<i>Butorides striatus</i>	Héron strié	Green-backed Heron	1	1	1	1		
<i>Ardeola rufiventris</i>	Crabier à ventre roux	Rufous-bellied Heron	1			1		
<i>Egretta garzetta</i>	Egrette garzette	Little Egret	1	1	1	1		
<i>Egretta ardesiaca</i>	Aigrette ardoisée	Black Heron	1	1	1	1		
<i>Mesophoyx intermedia</i>	Héron intermédiaire	Intermediate Egret	1	1	1	1		
<i>Casmerodius albus</i>	Grande Aigrette	Great Egret	1	1	1	1		
<i>Ardea goliath</i>	Héron goliath	Goliath Heron	1	1	1	1		
<i>Ardea purpurea</i>	Héron pourpre	Purple Heron	1	1	1	1		
<i>Ardea cinerea</i>	Héron cendré	Grey Heron	1	1	1	1		
<i>Ardea melanocephala</i>	Héron mélanocéphale	Black-headed Heron	1	1	1	1		
<i>Scopus umbretta</i>	Ombrette africaine	Homerkop	1	1	1	1		
<i>Ciconia ciconia</i>	Cigogne blanche	White Stork	1			1		
<i>Mycteria ibis</i>	Tentale ibis	Yellow-billed Stork	1	1	1	1		
<i>Ciconia abdimii</i>	Cigogne d'Abdim	Abdim's Stork		1		1		
<i>Ciconia episcopus</i>	Cigogne épiscopale	Woolly-necked Stork	1	1	1	1		
<i>Anastomus lamelligerinus</i>	Bec-ouvert africain	African Open-billed Stork	1	1	1	1		
<i>Ephippiorhynchus senegalensis</i>	Jaribu d'Afrique	Saddle-billed Stork	1	1	1	1		
<i>Leptoptilos crumeniferus</i>	Marabou d'Afrique	Marabou Stork	1	1	1	1		
<i>Threskiornis aethiopicus</i>	Ibis sacré	Sacred Ibis	1	1	1	1		
<i>Bostrychia hagedash</i>	Ibis hagedash	Hadada Ibis	1	1	1	1		
<i>Plegadis falcinellus</i>	Ibis falcinelle	Glossy Ibis	1	1	1	1		
<i>Bostrychia rara</i>	Ibis vermiculé	Spot-breasted Ibis	1			1		
<i>Platalea alba</i>	Spatule blanche	African Spoonbill				1		
<i>Phoenicopterus ruber</i>	Flamant rose	Greater Flamingo	1	1	1	1		
<i>Phoenicopterus minor</i>	Flamant nain	Lesser Flamingo		1		1		

Species Name	French Name	English Name	RCD	RBD	RCD	A4i	WBS	WBG
					RBD			
<i>Alopochen aegyptiacus</i>	Ouette d'Égypte	Egyptian Goose		1		1		
<i>Plectropterus gambensis</i>	Oie-armée de Gambie	Spur-winged Goose	1	1	1	1		
<i>Sarkidiornis melanotos</i>	Canard casqué	Knob-billed Duck	1	1	1	1		
<i>Nettapus auritus</i>	Anserelle naine	Pygmy Goose	1	1	1	1		
<i>Dendrocygna viduata</i>	Dendrocygne veuf	White-faced Whisling-Duck	1	1	1	1		
<i>Dendrocygna bicolor</i>	Dendrocygne fauve	Fulvous Whisling-Duck	1	1	1	1		
<i>Pteronetta hartlaubii</i>	Canard de Hartlaub	Hartlaub's Duck	1	1	1	1		
<i>Anas erythroryncha</i>	Canard à bec rouge	Red-billed Teal	1			1		
<i>Anas hottentota</i>	Sarcelle hottentote	Hottentot Teal	1	1	1	1		
<i>Anas capensis</i>	Canard du Cape	Cape Teal	1	1	1	1		
<i>Thalassornis leuconotus</i>	Dendrocygne à dos blanc	White-backed Duck		1		1		
<i>Anas undulata</i>	Canard à bec jaune	Yellow-billed Duck	1	1	1	1		
<i>Anas sparsa</i>	Canard noirâtre	African Black Duck	1	1	1	1		
<i>Anas clypeata</i>	Canard souchet	Northern Shoveler		1		1		
<i>Anas acuta</i>	Canard pilet	Pintail		1		1		
<i>Anas querquedula</i>	Sarcelle d'été	Garganey		1		1		
<i>Anas crecca</i>	Sarcelle d'hiver	Teal	1	1	1	1		
<i>Anas penelope</i>	Canard siffleur	Wigeon		1		1		
<i>Haliaeetus vocifer</i>	Aigle pêcheur	African Marsh Fish Eagle	1	1	1			1
<i>Gypohierax angolensis</i>	Vautour palmiste	Palm-nut Vulture	1	1	1			1
<i>Trigonoceps occipitalis</i>	Vautour à tête blanche	Lapped-faced Vulture	1	1	1			1
<i>Circus ranivorus</i>	Busard grenouillard	African Marsh Harrier	1	1	1			1
<i>Circus aeruginosus</i>	Busard des roseaux	Eurasian Marsh Harrier		1				1
<i>Netta erythrophtalma</i>	Nette brune	Southern Pochard		1		1		
<i>Numida meleagris</i>	Pintade de Numidie	Helmeted Guineafowl	1					1
<i>Francolinus squamatus</i>	Francolin écaillé	Scaly Francolin		1				1
<i>Francolinus nobilis</i>	Francolin noble	Handsome spurfowl		1				1
<i>Francolinus levaillantii</i>	Francolin de Levaillant	Red-winged Francolin	1					1
<i>Francolinus streptophorus</i>	Francolin à collier	Ring-necked francolin		1				1
<i>Francolinus coqui</i>	Francolin coqui	Coqui Francolin	1					1
<i>Francolinus hildebrandti</i>	Francolin de Hildebrandt	Hildebrandt's Francolin		1				1
<i>Francolinus afer</i>	Francolin à gorge rouge	Red-necked Spurfowl	1	1	1			1
<i>Coturnix coturnix</i>	Caille des blés	Common Quail		1				1
<i>Sarothrura pulchra</i>	Râle perlé	White-spotted Fluftail	1	1	1	1		
<i>Sarothrura rufa</i>	Râle à Camail	Red-chested Fluftail		1		1		
<i>Sarothrura boehmi</i>	Râle de Böhm	Streaky-breasted Fluftail		1		1		
<i>Crecopsis egregia</i>	Râle des prés	African Crake		1		1		
<i>Crex crex</i>	Râle des genêts	Corncrake	1	1	1	1		
<i>Porzana porzana</i>	Poule d'eau	Purple Swamphen	1	1	1	1		
<i>Porzana pusilla</i>	Marouette ponctuée	Spotted Crake	1			1		

Species Name	French Name	English Name	RCD	RBD	RCD	A4i	WBS	WBG
					RBD			
<i>Amaurornis flavirostris</i>	Râle (Malouette) noire	Black Crake		1		1		
<i>Porphyrio porphyrio</i>	Poule d'eau	Purple Swamphen	1	1	1	1		
<i>Porphyrio alleni</i>	Tallève d'Allen	Lesser Gallinule	1	1	1	1		
<i>Rallus caerulescens</i>	Râle bleuâtre	African Water Rail	1			1		
<i>Fulica cristata</i>	Foulque à crête	Red-knobbed Coot	1	1	1	1		
<i>Gallinula chloropus</i>	Gallinule Poule d'eau	Moorphen		1		1		
<i>Gallinula angulata</i>	Gallinule africaine	Lesser Moorphen	1	1	1	1		
<i>Neotis denhami</i>	Outarde de Denham	Denham's Bustard	1	1	1			1
<i>Balearica regulorum</i>	Grue royale	Grey Crowned Crane	1	1	1	1		
<i>Bugeranus carunculatus</i>	Grue caronculée	Wattled Crane		1		1		
<i>Neotis denhami</i>	Outarde de Denham	Denham's Bustard	1	1	1			1
<i>Eupodotis melanogaster</i>	Outarde à ventre noir	Black-bellied Busard	1					1
<i>Actophilornis africanus</i>	Jacana à poitrine dorée	African Jacana		1		1		
<i>Microparra capensis</i>	Jacana nain	Lesser Jacana	1	1	1	1		
<i>Himantopus himantopus</i>	Échasse blanche	Black-winged Stilt		1		1		
<i>Recurvirostra avosetta</i>	Avocette élégante	Avocet	1	1	1	1		
<i>Dromas ardeola</i>	Huitrier pie	Crab Plover	1	1	1	1		
<i>Rostratula benghalensis</i>	Rhynchée peinte	Painted Snipe	1	1	1	1		
<i>Burhinus capensis</i>	Oedicnème tachard	Spotted Dikkop	1	1	1	1		
<i>Burhinus vermiculatus</i>	Oedicnème vermiculé	Water Dikkop	1			1		
<i>Cursorius temminckii</i>	Courvite de Temminck	Temminck's Courser	1	1	1	1		
<i>Glareola pratincola</i>	Glaréole à collier	Common Pratincole		1		1		
<i>Glareola nordmanni</i>	Glaréole à ailes noires	Black-winged Pratincole	1	1	1	1		
<i>Glareola nuchalis</i>	Glaréole auréolée	Rock Pratincole	1	1	1	1		
<i>Glareola cinerea</i>	Glaréole grise	Grey Pratincole		1		1		
<i>Charadrius pecuarius</i>	Pluvier pâte	Kittlitz's Plover		1		1		
<i>Charadrius marginatus</i>	Pluvier à front blanc	White-fronted Plover	1	1	1	1		
<i>Charadrius tricollaris</i>	Pluvier à triple collier	Three-banded Plover	1	1	1	1		
<i>Charadrius forbesi</i>	Pluvier de Forbes	Forbes's Plover	1	1	1	1		
<i>Charadrius hiaticula</i>	Pluvier grand-gravelot	Ringed Plover	1			1		
<i>Charadrius dubius</i>	Pluvier petit-gravelot	Little Ringed Plover	1	1		1		
<i>Charadrius alexandrinus</i>	Pluvier à collier ininterrompu	Kentish Plover	1			1		
<i>Charadrius mongolus</i>	Pluvier de Mongolie	Mongolian Plover	1	1	1	1		
<i>Charadrius leschenaultii</i>	Pluvier de Leschenault	Sand Plover		1		1		
<i>Charadrius asiaticus</i>	Pluvier asiatique	Caspian Plover		1		1		
<i>Vanellus spinosus</i>	Vanneau à éperons	Spur-winged Plover	1	1	1	1		
<i>Vanellus crassirostris</i>	Vanneau à ailes blanches	Long-toed Plover	1	1	1	1		
<i>Vanellus senegallus</i>	Vanneau du Sénégal	Wattled Plover	1	1	1	1		
<i>Vanellus coronatus</i>	Vanneau couronné	Crowned Plover	1	1	1	1		
<i>Vanellus lugubris</i>	Vanneau terne	Lesser Black-winged Plover	1	1	1	1		

Species Name	French Name	English Name	RCD	RBD	RCD	A4i	WBS	WBG
					RBD			
<i>Vanellus superciliosus</i>	Vanneau à poitrine châtain	Brown-chested Lapwing	1	1	1	1		
<i>Pluvialis squatarola</i>	Pluvier argenté	Grey Plover		1		1		
<i>Pluvialis fulva</i>	Pluvier fauve	Pacific Golden Plover	1	1	1	1		
<i>Philomachus pugnax</i>	Combattant varié	Ruff	1			1		
<i>Tryngites subbrifcollis</i>	Bécasseau roussâtre	Buff-breasted Sandpiper	1	1	1	1		
<i>Phalaropus lobatus</i>	Phalarope à bec étroit	Red-necked Phalarope	1			1		
<i>Phalaropus fulicarius</i>	Phalarope à bec large	Grey Phalarope		1		1		
<i>Actitis hypoleucos</i>	Chevalier guignette	Common Sandpiper		1		1		
<i>Tringa glareola</i>	Chevalier sylvain	Wood Sandpiper	1	1	1	1		
<i>Tringa ochropus</i>	Chevalier cul-blanc	Green Sandpiper	1			1		
<i>Xenus (Tringa) cinereus</i>	Chevalier (du terek) bargette	Terek Sandpiper		1		1		
<i>Tringa nebularia</i>	Chevalier aboyeur	Common Greenshank	1	1	1	1		
<i>Tringa stagnatilis</i>	Chevalier stagnatile	Marsh Sandpiper	1	1	1	1		
<i>Tringa erythropus</i>	Chevalier arlequin	Spotted Redshank	1	1	1	1		
<i>Tringa totanus</i>	Chevalier gambette	Redshank	1	1	1	1		
<i>Calidris minuta</i>	Bécasseau minute	Little Stint	1	1	1	1		
<i>Calidris temminckii</i>	Bécasseau de Temminck	Temminck's Stint	1	1	1	1		
<i>Calidris ferruginea</i>	Bécasseau cocorli	Curlew Sandpiper	1			1		
<i>Calidris alpina</i>	Bécasseau variable	Dunlin	1	1	1	1		
<i>Limosa limosa</i>	Barge à queue noire	Black-tailed Godwit	1			1		
<i>Numenius phaeopus</i>	Courlis corlieu	Whimbrel	1			1		
<i>Numenius arquata</i>	Courlis cendré	Curlew	1	1	1	1		
<i>Gallinago gallinago</i>	Bécassine des marais	Common Snipe	1	1	1	1		
<i>Gallinago nigripennis</i>	Bécassine africaine	Ethiopian Snipe		1		1		
<i>Gallinago media</i>	Bécassine double	Great Snipe	1	1	1	1		
<i>Stercorarius parasiticus</i>	Labbe parasite	Arctic Skua		1				1
<i>Stercorarius pomarinus</i>	Labbe pomarin	Pomarine Skua		1				1
<i>Larus cirrocephalus</i>	Mouette à tête grise	Grey-headed Gull		1		1		
<i>Larus ridibundus</i>	Mouette rieuse	Black-headed Gull	1	1	1	1		
<i>Larus fuscus</i>	Goéland brun	Lesser Black-backed Gull		1		1		
<i>Larus ichthyaetus</i>	Goéland ichthyaète	Great Black-headed Gull		1		1		
<i>Sterna bengalensis</i>	Sterne voyageuse	Lesser Crested Tern		1		1		
<i>Sterna caspia</i>	Sterne caspienne	Caspian Tern		1		1		
<i>Sterna nilotica</i>	Sterne hansel	Gull-billed Tern		1		1		
<i>Sterna Hirundo</i>	Sterne pierregarin	Common Tern	1	1	1	1		
<i>Sternula albifrons</i>	Sterne naine	Little Tern	1			1		
<i>Chlidonias leucopterus</i>	Guifette leucoptère	White-winged Tern	1	1	1	1		
<i>Chlidonias hybridus</i>	Guffette moustac	Whiskered Tern	1	1	1	1		
<i>Rynchops flavirostris</i>	Bec-en-ciseaux	African Skimmer	1	1	1	1		
<i>Ceryle rudis</i>	Martin pêcheur pie	Pied Kingfisher	1	1	1		1	

Species Name	French Name	English Name	RCD	RBD	RCD	A4i	WBS	WBG
					RBD			
<i>Halcyon chelicuti</i>	Martin-chasseur strié	Striped Kingfisher		1			1	
<i>Halcyon leucocephala</i>	Martin-chasseur à tête grise	Grey-headed Kingfisher		1			1	
<i>Halcyon albiventris</i>	Martin-chasseur à tête brune	Brown-hooded Kingfisher	1				1	
<i>Megaceryle maxima</i>	Martin-pêcheur géant	Giant Kingfisher	1	1	1		1	
<i>Halcyon senegalensis</i>	Martin-chasseur du Sénégal	Woodland Kingfisher	1	1	1		1	
<i>Alcedo cristata</i>	Martin pêcheur huppé	Malachite Kingfisher	1	1	1		1	
<i>Ispidina (Ceyx) picta</i>	Martin chasseur pygmé	African Pygmy Kingfisher	1	1	1		1	
<i>Alcedo quadribrachys</i>	Martin- pêcheur azuré	Shining-bue Kingfisher	1				1	
<i>Acrocephalus gracilirostris</i>	Rousserolle à bec fin	Lesser Swamp Warbler	1					1
<i>Acrocephalus rufescens</i>	Rousserolle des cannes	Greater Swmp Warbler	1	1	1			1
<i>Acrocephalus baeticatus</i>	Rousserolle africaine	African Reed Warbler	1					1
<i>Acrocephalus scirpaceus</i>	Rousserolle effarvate	Reed Warbler	1					1
<i>Acrocephalus arundinaceus</i>	Rousserolle turdoïde	Great Reed Warbler	1					1
<i>Acrocephalus shoenoaenus</i>	Phragmite des joncs	Sedge Warbler	1					1
<i>Chloropeta similis</i>	Chloropète aquatique	Mountain yellow warbler	1	1	1			1
<i>Hippolais icterina</i>	Hypolaïs icterine	Icterine Warbler		1				1
Species Number			128	148	100	140	9	27
Percentages (%)			34	39	27	80	5	15

N= 176 sp; RCD, 128 sp (34%); RBD, 148 sp (39%); RCD & RBD, 100 sp (27); A4i RC, 140 sp (80%); WBS, 9 sp (5%); WBG, 27 sp (15%)

DISCUSSION

Waterbirds

According to authors (Fishpool & Evans, 2001) the term "waterbird" is used in the same sense as that used for "waterfowl" under the Ramsar Convention, and covers (in Africa) all bird species in the following families (Wetlands & International, 2012): Podicipedidae (grebes), Pelecanidae (pelicans), Phalacrocoracidae (cormorants), Anhingidae (darters), Ardeidae (herons), Balaenicipitidae (Shoebill), Scopidae (Hamerkop), Ciconiidae (storks), Threskiornithidae (ibises), Phoenicopteridae (flamingos), Anatidae (wildfowl), Gruidae (cranes), Rallidae (rails), Heliornithidae (finfoots), Jacanidae (lilytrotters), Rostratulidae (painted snipes), Dromatidae (Crab Plover), Haematopodidae (oystercatchers), Recurvirostridae (stilts, avocets), Burhinidae (stone-curlews),

Glareolidae (coursers, pratincoles), Charadriidae (plovers), Scolopacidae (sandpipers and allies), Laridae (gulls and terns), and Rynchopidae (skimmers) (Fishpool & Evans, 2001).

By this definition water birds include, for example, cormorants, gulls and terns which some authors have more traditionally considered as seabirds (Fishpool & Evans, 2001). It also includes species such coursers and some plovers which are birds of arid lands, as well as species, some rallids for example, which are never congregatory (Fishpool & Evans, 2001).

In addition to the above definition, we encountered other waterbirds in the Ruzizi Delta such as the family Numididae (1 species) *Numida meleagris* Helmeted Guineafowl; the Alcedinidae family (9 specialist species and visitors to aquatic environments): *Ceryle rudis* Kingfisher and

Megaceryle maxima Great Kingfisher, are fishing specialists in aquatic environments for their nutrition, *Halcyon chelicuti* Striped Kingfisher, *Halcyon leucocephala* Grey-headed Kingfisher, *Halcyon albiventris* Brown-hooded Kingfisher, *Halcyon senegalensis* Woodland Kingfisher, *Alcedo cristata* Malachite Kingfisher, *Ispidina (Ceyx) picta* African Pygmy Kingfisher, *Alcedo quadribrachys* Shining-blue Kingfisher; the family Phasianidae (8 species, visitors to aqueous environments): *Francolinus squamatus* Scaly Francolin, *Francolinus (Ptemistis) nobilis* Handsome Francolin, *Francolinus levaillantii* Red-winged Francolin, *Francolinus streptophorus* Ring-necked Francolin, *Francolinus coqui* Coqui Francolin, *Francolinus hildebrandti* Hildebrandt's Francolin, *Francolinus afer* Red-necked Spurfowl, *Coturnix coturnix* Common Quail; the family Gruidae (1 species) *Bugeranus carunculatus* Wattled Crane (Ramsar:Convention & Secretariat, 2013) & (Burke, Rodwell, Steinacker, & Seal, 2001); the Otididae family (2 aquatic visitor species) *Neotis denhami* Denham's Bustard and *Eupodotis melanogaster* Black-bellied Bustard; the Stercorariidae family (2 species that visit aquatic environments to pick up dead fish), *Stercorarius parasiticus*, Arctic Skua & *Stercorarius pomarinus*, Pomarine Skua; the Accipitridae family (5 species, visitors to aquatic environments), *Haliaeetus vocifer* African Marsh Fish Eagle, *Gypohierax angolensis* Palm-nut Vulture, *Trigonoceps occipitalis* Lappet-faced Vulture, *Circus ranivorus* African Marsh Harrier, *Circus aeruginosus* Eurasian Marsh Harrier and finally, the Acrocephalidae family (8 species, nesting near aquatic environments) *Acrocephalus gracilirostris* Lesser Swamp Warbler, *Acrocephalus rufescens* Greater Swamp Warbler, *Acrocephalus baeticatus* African Reed Warbler, *Acrocephalus scirpaceus* Reed Warbler, *Acrocephalus arundinaceus* Great Reed Warbler, *Acrocephalus shoenoaenus* Sedge Warbler, *Chloropeta similis* Mountain Yellow Warbler, *Hippolais icterina* Icterina Warbler.

The research contribution is 36 water bird species distributed into eight different families that do not meet the Ramsar Criteria A4i, of water bird species conservation concern. In view of the deterioration of their ecosystems and the ever-increasing shortage of fish in the Ruzizi Delta, these 36 species of waterbirds would be included in the Ramsar Criterion A4i, relating to the conservation of water bird species.

Seabird

The term "seabird" covers, in the African region, species in the following families: Spheniscidae (penguins), Diomedidae (albatrosses), Procellariidae (fulmars, petrels, shearwaters and prions), Hydrobatidae (storm-petrels), Pelecanoidae (diving petrels), Phaethontidae (tropicbirds), Sulidae (gannets and boobies), Fregatidae (frigatebirds), Chionididae (sheathbills), and Sercoracidae (skuas) (Fishpool & Evans, 2001).

No seabirds have been recorded in the Ruzizi Delta, but from an evolutionary point of view, seabirds seem to be the evolutionary origin of the families, orders and species of water birds and migratory birds that regularly or temporarily frequent the Ruzizi Delta. Among Seabirds and Gulls of Aden the Jouanin's petrel and swift tern have the smallest sub-populations and the white-eyed gull, endemic to the Red Sea and Gulf of Aden, has large populations on the northern Egyptian Red Sea islands unlike the sooty gull and spoonbill that are apparently abundant in the southern Red Sea (PERSGA & GEF, 2003)². Gulls swift terns and spoonbills recorded from the Ruzizi Delta may have their origin in seabirds or sea gulls. Further evolutionary studies are needed for this suggestion.

According to (Mubalama, 2010) the Democratic Republic of Congo (DRC) signed and ratified the Convention on Wetlands of International Importance Particularly as Waterfowl Habitat or "Ramsar", adopted in Ramsar (Iran) on February 2, 1971 and ratified on September 15, 1994 by the DRE (Department of Water Resources).

The DRC has not yet adopted and not yet ratified the Agreements on Migratory Waterbirds of Africa Eurasia (AEWA), information is available at the ICCN level (Mubalama, 2010).

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² PERSGA, Regional Convention for the Conservation of the Sea and Gulf of Aden Environment

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Conflicts of Interest

Authors declare that there is no conflict of interests regarding the publication of this paper.

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