IMPACTOFSEASONALCHANGESONAVIFAUNADIVERSITYINNGURUWETLAND, YOBESTATE,NIGERIA

ABSTRACT

The researchon impactofseasonalchangeson avifaunadiversityinNguruLake of Hadejia-NguruWetland wascarried outintwodifferentseasonsforthe period ofsix6 months,from ApriltoJune(dryseason)and JulytoSeptember(wetseason).Theaim wastoevaluatethe impactofseasonalchangesonavifaunadiversityand thespecies richnessinthe studyarea. Areconnaissancesurveywascarried outto selectstudy sitesand samplingpoints.Five(5)differentpointswere selectedwhich comprisesof Madauka, Kayayyashi, FarinRuwa, Badumrespectively and Point count census techniqueswere adopted.Ineachcountingstation,bird observationwascarried outtwice daily;morning between6:00amand 10:00amand evening between4:00pm and 6:00pm.Data compilationwasdone using MicrosoftExcel andwere analysedusing statistical softwarePast 326b. Bird diversitywascalculatedusingShanon-Weiner diversityindex. The findingofthisresearchshowedthat themajority ofbirdspecies identified were Resident(12,225),Migratory (8,186)and PalearcticMigrant (10,876) species in the studyarea. Dominant birdspeciesinNgurulake were Philomachuspugnax,Actophilornisafricanusand Phalacrocoraxafricanus,Atotal of 5,538birds' specieswasidentified (DrySeason)inNguru lake '' belongingto21familiesinwhich Ardeidae have the highest(7)speciesofbird.ShannonDiversityIndex'has2.55 indry season,whileinWetSeason'has3.40.Thisindicatedthat therewasrelativelyequal and highdiversityofbirdspeciesinWetSeasoninthestudyarea and hasthetotal species richness of 6,711. Overgrazing and other anthropogenic activities which affectthe population diversity of avifauna species serveas major threats to the continued existence of Wetlands. Typha grassalso remained pressing problemwhich create microhabitatsreducingcriticalhabitat forfeeding,nesting androostinghabitat forbirds, aswellashampersthesmoothflowofwater usedbymany water birdspecies.Inview of thefindingsof thisstudy,effectivemonitoringand strategiesfor conservationto restorethe population of bird species, provide public enlightenment of the people aroundthe wetlandand managementof Hadejia-NguruWetland promptly advice the significantimportanceofthewetlandinservingashome forresidentandmigratorybird

species.

Key Words:Impact,Seasonal,Changes,Avifauna,Diversity,Reconnaissance,Survey, Sampling.

INTRODUCTION

Avifauna isa generalnamefor birdspecies.Birdsare feathered,winged,egg–laying vertebrates.They belongto the Kingdom “Animalia,” Phylum “Chordata” and Class “Aves”.Theyhave aworldwide distribution,livinginand aroundoceans,rivers,forests andmountains.Theyarethemost noticeablegroup intheanimal kingdom.Theirbright colours,distinctsongsand calls,and showydisplaysadd fun to humanlife. Many peoplederivegreat pleasurefromwatchingbirdsand listeningtotheirbeautifulsongs. Birdsare socialanimalsthat communicatewith visualsigns,callsand songs.They display socialbehaviourssuchas cooperative breeding and hunting, flocking and mobbingofpredators.Birdsliveand breedinmostterrestrialhabitatsand on allthe sevenContinents.Nigeria isblessedwithmany speciesofbirdsscatteredthroughout the differentecologicalregions.Aswithanynaturalhabitat,wetlandsare importantin supportingbirdspeciesdiversity.Wetlandsprovide foodforbirdsintheformofplants, vertebrates,and invertebrates.Some birdsforageforfood inthe wetlandsoils,while some find food in the water column and others feed on the vertebrates and invertebratesthatlive onsubmergedandemergentplants.(Labeetal.,2018).

Studiesonbirddiversitybyburgessetal.(2002),Doggart etal.(2005),Frontier-Tanzania(2005),and Yandaand Munishi(2007) inthe Uluguruarea were confinedto the forest emphasisinthe generalnegativeeffectsof forestconversionto human dominatedhabitats.Nevertheless,human dominatedandagriculturalhabitatsvaryalot and thereforethe effecton birdscan be verydifferent(Tworek,2002). Responsesof birdsto habitatchangesdiffer dependingon their strategies,somelifestylesbenefit from habitatchange,whileforothersitisaprincipal threat(Tworek,2002). Birdsare

veryvisibleandintegral partoftheecosystemthat occupy manytrophic levelsinafood chain ranging from consumersto predators.Theiroccurrenceshave beenhelpful as environmentalhealth indicator,plant pollinatorsand seeddispersalaswell aspest controller (Hadley etal., 2012; Ramchandra, 2013). This researchwork identified avifaunaspeciesanddetermineitsdiversity inthestudyarea.

MATERIALSANDMETHOD

StudyArea

This researchwas carried out at Hadejia-NguruWetlands (HNWs) located in the SahelianZone ofNigeriaatapoint where RiverHadejiaand flowthroughafossildune fieldbeforeconvergingand draining intoLakeChad. Itliesbetweenlatitude12^{0}13'Nto 12^{0}55'Nandlongitude10^{0}15'Eto 11^{0}30'E(Ayenietal.,2019),covering three Nigerian statesnamely;Bauchi,JigawaandYobe(Figure1).TheHadejia-NguruWetlandsnamed after twomajor towns(Hadejiaand Nguru)areextensivefloodplainwetlandsinthedry landsof northernNigeria which are surroundedbymany villages.Itsupportsa widerange ofbiodiversityandlivelihoodactivities.(Ayenietal.,2019).

Thewetlandsextendforapproximately120kmfromwesttoeast withinJigawa Stateandforafurther 60-70kmdown-streaminadjacentYobeState(Caroetal.,2011). Inwidth,the wetlandsrange from 10km tomore than 50kmfrom north tosouth,with approximately8000km^2 offloodplain.Theextentofthe floodplainvariesconsiderably from year to year dependingon rainfall and complexinteractionsof riverflow,dam releases, floodregimesandtopography. (Bourn,2003).

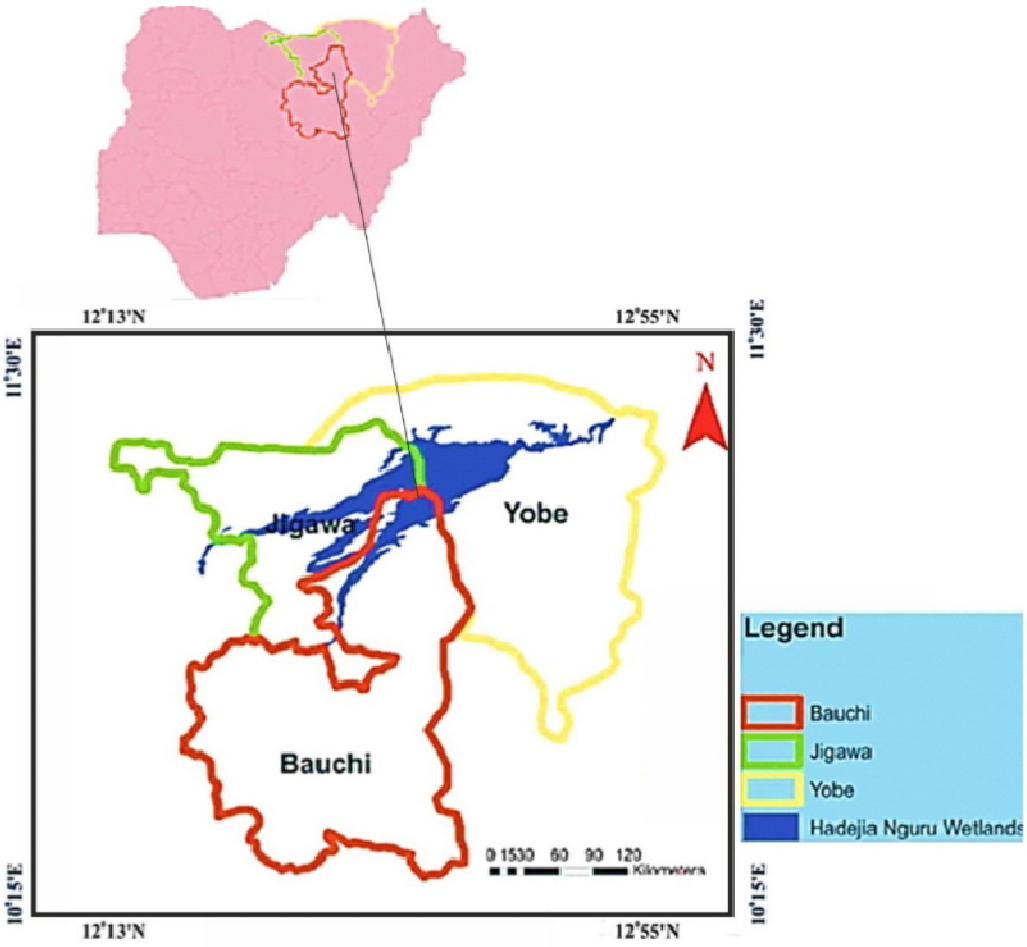

Figure1:MapofNigeriaShowing theStudyArea.
Source: (Ayenietal.,2019)

ResearchDesign

A reconnaissancesurveywas carried out with the aid of topographicmap and

personnelassistanttoselectstudy sitesandsamplingpointsinthefieldafter obtaining permissionfromtheauthoritiesofNguruWetland. Thesurveywascarried outatstudy area and five(5)pointswere been selectednamely;Madauka,Kayayyashi,FarinRuwa, BadumandGuzanlakesrespectively.Thesurveywascarried outfortheperiodofsix(6) months (three months for dry season and three months for wet season. Birds' observationwascarried out once ina month.Birdswerecountedasbirdsseenand heard aroundthearea andbirdsinflightwerealsobecountedwithin100meters radius toaiddatacollection.Apairofbinocularswithmagnification988,000mModel750was usedfor birdsviewing alongsidewith field guide book "Birdsof WesternAfrica"by BorrowandDemey(2014) foridentificationofbirds(RamsarConventionBureau,2000). AKomeryDigitalCamera24MPwasalsousedfortakingphotographsofbirds.

Method ofDataCollection

Pointcount censustechniquesasoutlined byBibbyetal.(1992) andRalphetal.(1993) were adaptedto count the birdsforthe study.Five(5)differentpointswasselected randomlyfromeachstudysites,namely;Madauka,Kayayyashi,FarinRuwa,BadumandGuzan.

Ineachcountingstation,birdobservationwascarried out twice daily;morning between6:00amand 10:00amand evening between4:00pm and 6:00pm.Onarrivalat eachcountingstation,the observersstayedfor five(5) minutesbeforebeginningto count.Thiswastoenable thebirdstosettledownfollowingdisturbancebythearrivalof the observers. The observers ateach counting point recorded the entire birds encounteredforaperiod often (10)minuteswiththe aidofbinocularsalongsidewith fieldguide book "BirdsofWesternAfrica"byBorrow and Demey (2014). Data formswerestructuredforeaseofrecording alltheinformation.

DataAnalysis

Compilationand analysisofdatawas done usingMicrosoftExcel(2013 version).Data wereanalysedusingstatisticalsoftwarePast326b.

i.Table wasusedtopresentthe typesofavifaunaspeciesidentified inthe studyarea

forrainyseasonanddryseasonaccordingtoLammeed(2011).

ii.AvifaunaspeciesdiversitywascalculatedusingShannon-Weinerdiversityindex,H:

$$H = -\sum_{i=1}^{S} Pi1nPi$$

Where:

H=Shannon-WeinerDiversityIndex

S=Totalnumberofspeciesofthecommunity(numberseenandheard).

Pi=Proportionofeachorindividual(1^{th})speciesintheSample.

1nPi=NaturalLogarithm ofthespeciesproportion.(Lammeed,2011).

RESULTS

AvifaunaSpeciesIdentifiedinNguruWetland(NGW)inDrySeason

Theresultoftheavifaunaspeciesidentified in'NGW'forthe1^{st},2^{nd}and3^{rd}visits arepresentedinTable1.Thetable showedthat 2,148birdspecieswereidentified inthe firstvisit,1,658birdspecieswere identified inthe secondvisitand 1,732specieswere identified inthethirdvisit(Total=5,538)belonging to21differentfamiliesindryseason in the studyarea. The familiesof Bucerotidae, Coraciidae, Cuculidae, Motacillidae, Phalacrocoracidae,Ploceidae, Psittacidae,Pyconotidae, Recurvirostridae,Scolopacidae, Sternidae,Sturnidaeand Viduidaecontained1specieseach,familiesof Accipitridae, Alcedinidae,Charadriidaeand Jacanidaecontained2specieseach,familyofAnatidae contained 3species,whilefamiliesofColumbidaeandRallidaecontained4speciesand Ardeidae containedthehighestnumberof7speciesinthestudyarea.

AvifaunaSpeciesIdentifiedinNguruWetland(NGW)inWetSeason

Theresultoftheavifaunaspeciesidentified inthestudyarea forthe1^{st},$2^{nd}$and 3^{rd}visitsare presentedinTable2.Thetable showsthat 690,281and 202birdspecies (Total =1,173)were identified inthe first,secondand third visitsrespectivelyduring rainy season,differentfamiliesin the study area. The familiesof Bucerotidae,

Coraciidae,Cucilidae, Motacillidae,Phalacrocoracidae, Ploceidae,Psittacidae, Pyconotidae, Recurvirostridae, Scolopacidae, Sternidae, Sturnidaeand Viduidaecontained a single bird species each, meanwhile the families of Accipitridae, Alcedinidae, Charadriidaeand Jacanidaecontained 4 bird species eachwhere only Anatidaefamilycontained3speciesofbirds,the familiesofColumbidaeand Rallidaecontained4birdspecieswhileArdeidae contained7differentbirdspeciesinthe study area duringwetseason.

Table1:AvifaunaSpeciesIdentified intheStudyArea(NguruWetland) forDrySeason

S/N	Family	Scientific Name	CommonName	Frequency			Total
				1st Visit	2nd Visit	3rd Visit	
1.	Accipitridae	Circusranivorus	AfricanMarshHarrier	3	2	1	6
	“ “	Milvusaegyptius	YellowbilledKite	4	2	10	16
2.	Alcedinidae	Halcyonleucocephala	Grey-headedKingfisher	3	-	2	5
	“ “	Cerylerudis	PiedKingfisher	1	6	19	26
3.	AnatidaeNettapusauritus	AfricanPygmyGeese-	-	84	84		
	“ “	Dendrocygnabicolor	FulvousWhistlingDuck	9	7	8	24
	“ “	Dendrocygnaviduata	WhiteFace WhistlingDuck	558	26	117	701
4.	Ardeidae	EgrettaardesiacaBlackHeron		3	28	23	54
	“ “	Bubulcusibis	CattleEgret	24	22	12	58
	“ “	Ardeacinerea	GreyHeron	14	19	12	45
	“ “	Egrettaintermedia	IntermediateEgret	1	-	-	1
	“ “	Egrettagarzetta	LittleEgret	10	17	33	60
	“ “	Ardeapurpurea	PurpleHeron	8	19	17	44
	“ “	Ardeolaralloides	SquaccoHeron	128	88	65	281
5.	Bucerotidae	Tockuserythrorhynchus	Red-billedHornbill	-	2	-	2
6.	Charadriidae	Vanellustectus	Black-headedLapwing	9	11	-	20
	“ “	Vanellusspinosus	Spur-wingedLapwing	-	15	69	84
7.	Columbidae	Streptopeliadecipiens	AfricanMourningDove	18	24	25	67
	“ “	Streptopeliasenegalensis	Laughing Dove	15	14	7	36
	“ “	Columbaguinea	SpeckledPigeon	34	18	27	79

	" "	Streptopeliavinacea	VinaceousDove	22	34	32	88
8.	Coraciidae	Coraciasabyssinica	AbyssinianRoller	3	-	2	5
9.	Cuculidae	Centropussenegalensis	SenegalCoucal	2	5	4	11
10.	Jacanidae	Actophilornisafricanus	AfricanJacana	245	184	475	904
	" "	Microparracapensis	LesserJacana	14	22	114	150
11.	Motacillidae	Motacillaflava	YellowWagtail	141	94	10	245
12.	Phalacrocoracidae	Phalacrocoraxafricanus	Longtail/ReedCormorant	227	109	383	719
13.	Ploceidae	Ploceuscucullatus	VillageWeaver	10	-	40	60
14.	Psittacidae	Psittaculakrameri	Rose-ringedParakeet	-	7	-	7
15.	Pyconotidae	Pycnonotusbarbatus	Common Bulbul	4	-	8	12
16.	Rallidae	Amaurornisflavirostris	BlackCrake	9	4	16	29
	" "	Gallinulachloropus	Common Moorhen	32	45	78	155
	" "	Gallinulaangulata	LesserMoorhen	-	-	10	10
	" "	Porphyriomadagascariensis	PurpleSwamphen	6	4	19	29
17.	Recurvirostridae	Himantopushimantopus	Black-wingedStilt	-	8	-	8
18.	Scolopacidae	Philomachuspugnax	Ruff	550	770	10	1330
19.	Sternidae	Sternanilotica	Gull-billedTern	36	50	-	86
20.	Sturnidae	Lamprotorniscaudatus	LongtailGlossyStarling	-	2	-	2
21.	Viduidae	Viduachalybeata	VillageIndigo	5	-	-	5
TotalNumber ofSpecies PerLocation2,148					1,658	1,732	5,538

Source: FieldSurvey,2024

Table2:AvifaunaSpeciesIdentified intheStudyArea(NguruWetland) forWetSeason

S/N	Family	Scientific Name	CommonName	Frequency			Total
				1st Visit	2nd Visit	3rd Visit	
1.	Accipitridae	Circusranivorus	AfricanMarshHarrier	1	1	-	2
	" "	Milvusaegyptius	YellowbilledKite	8	6	2	16
2.	Alcedinidae	Halcyonleucocephala	Grey-headedKingfisher	7	1	-	8
	" "	Cerylerudis	PiedKingfisher	24	11	7	42
3.	AnatidaeNettapusauritus	AfricanPygmyGeese3	-	-	3		
	" "	Dendrocygnabicolor	FulvousWhistlingDuck	10	-	-	10
	" "	Dendrocygnaviduata	WhiteFace WhistlingDuck	23	-	-	23
4.	Ardeidae	EgrettaardesiacaBlackHeron	34	17	10	61	
	" "	Bubulcusibis	CattleEgret	36	9	6	51
	" "	Ardeacinerea	GreyHeron	34	12	9	55
	" "	Egrettaintermedia	IntermediateEgret	3	-	-	3
	" "	Egrettagarzetta	LittleEgret	24	-	-	24
	" "	Ardeapurpurea	PurpleHeron	13	8	7	28
	" "	Ardeolaralloides	SquaccoHeron	32	12	7	51
5.	Bucerotidae	Tockuserythrorhynchus	Red-billedHornbill	9	5	5	19
6.	Charadriidae	Vanellustectus	Black-headedLapwing	25	14	10	49
	" "	Vanellusspinosus	Spur-wingedLapwing	14	7	4	25
7.	Columbidae	Streptopeliadecipiens	AfricanMourningDove	16	12	9	37
	" "	Streptopeliasenegalensis	Laughing Dove	20	11	11	42
	" "	Columbaguinea	SpeckledPigeon	41	20	11	72
	" "	Streptopeliavinacea	VinaceousDove	28	15	10	53

8.	Coraciidae	Coraciasabyssinica	AbyssinianRoller	15	4	2	21
9.	Cuculidae	Centropussenegalensis	SenegalCoucal	8	7	7	22
10.	Jacanidae	Actophilornisafricanus	AfricanJacana	67	24	12	103
	“ “	Microparracapensis	LesserJacana	32	20	11	63
11.	Motacillidae	Motacillaflava	YellowWagtail	9	-	-	9
12.	Phalacrocoracidae	Phalacrocoraxafricanus	Longtail/ReedCormorant	28	12	11	51
13.	Ploceidae	Ploceuscucullatus	VillageWeaver	13	4	4	21
14.	Psittacidae	Psittaculakrameri	Rose-ringedParakeet	7	4	3	14
15.	Pyconotidae	Pycnonotusbarbatus	Common Bulbul	21	12	12	45
16.	Rallidae	Amaurornisflavirostris	BlackCrake	13	8	8	29
	“ “	Gallinulachloropus	Common Moorhen	5	4	8	17
	“ “	Gallinulaangulata	LesserMoorhen	11	5	4	20
	“ “	Porphyriomadagascariensis	PurpleSwamphen	4	2	2	8
17.	Recurvirostridae	Himantopushimantopus	Black-wingedStilt	4	-	-	4
18.	Scolopacidae	Philomachuspugnax	Ruff	18	-	-	18
19.	Sternidae	Sternanilotica	Gull-billedTern	9	6	4	19
20.	Sturnidae	Lamprotorniscaudatus	LongtailGlossyStarling	16	3	1	20
21.	Viduidae	Viduachalybeata	VillageIndigo	5	5	5	15
TotalNumber ofSpecies PerLocation		690	281	202	1,173		

Source: FieldSurvey,2024

AvifaunaSpeciesDiversity intheResearchArea

Theresultofavifaunaspeciesdiversityof NguruWetland duringdryseasonisshownin Table 3. The resultindicated that the ShannonDiversity Index was2.548 for total individual species in the studyarea with Philomacuspugnax(0.34258)having the highestdiversityandEgrettaintermedia(0.00156)beingthelowestdiversity.

Theresultofavifaunaspeciesdiversityof NguruWetland,WetSeasonisshown inTable 4. The resultindicatedthat ShannonDiversityIndexwas3.40307for total individual speciesinthe studyarea with Actophilonisafricanus(0.2136)having the highestdiversitywhile Circusranivorus(0.01087),Egrettaintermediaand Nettapusauritus(0.01527)respectively havingthelowestdiversity.

Table3:AvifaunaSpeciesDiversityintheStudyArea(NguruWetland) forDrySeason

S/N	Species	Frequency	Pi	lnPi	PilnPi
1.	Actophilornisafricanus	904	0.163236	1.81256	0.29587
2.	Amaurornisflavirostris	29	0.005237	5.25209	0.0275
3.	Ardeacinerea	45	0.008126	4.81273	0.03911
4.	Ardeapurpurea	44	0.007945	4.8352	0.03842
5.	Ardeolaralloides	281	0.05074	2.98103	0.15126
6.	Bubulcusibis	58	0.010473	4.55895	0.04775
7.	Centropussenegalensis	11	0.001986	6.22149	0.01236
8.	Cerylerudis	26	0.004695	5.36129	0.02517
9.	Circusranivorus	6	0.001083	6.82763	0.0074
10.	Columbaguinea	79	0.014265	4.24994	0.06063
11.	Coraciasabyssinica	5	0.000903	7.00995	0.00633
12.	Dendrocygnabicolor	24	0.004334	5.44133	0.02358
13.	Dendrocygnaviduata	701	0.12658	2.06688	0.26163
14.	Egrettaardesiaca	54	0.009751	4.6304	0.04515
15.	Egrettagarzetta	60	0.010834	4.52504	0.04903
16.	Egrettaintermedia	1	0.000181	8.61939	0.00156
17.	Gallinulaangulata	10	0.001806	6.3168	0.01141
18.	Gallinulachloropus	155	0.027988	3.57596	0.10009
19.	Halcyonleucocephala	5	0.000903	7.00995	0.00633
20.	Himantopushimantopus	8	0.001445	6.53995	0.00945
21.	Lamprotorniscaudatus	2	0.000361	7.92624	0.00286
22.	Microparracapensis	150	0.027086	3.60875	0.09775
23.	Milvusaegyptius	16	0.002889	5.8468	0.01689
24.	Motacillaflava	245	0.04424	3.11813	0.13795
25.	Nettapusauritus	84	0.015168	4.18857	0.06353
26.	Phalacrocoraxafricanus	719	0.12983	2.04153	0.26505
27.	Philomachuspugnax	1330	0.240159	1.42645	0.34258
28.	Ploceuscucullatus	50	0.009029	4.70737	0.0425
29.	Porphyriomadagascariensis	29	0.005237	5.25209	0.0275
30.	Psittaculakrameri	7	0.001264	6.67348	0.00844
31.	Pycnonotusbarbatus	12	0.002167	6.13448	0.01329
32.	Sternanilotica	86	0.015529	4.16504	0.06468

33.	Streptopeliadecipiens	67	0.012098	4.4147	0.05341
34.	Streptopeliasenegalensis	36	0.006501	5.03587	0.03274
35.	Streptopeliavinacea	88	0.01589	4.14205	0.06582
36.	Tockuserythrorhynchus	2	0.000361	7.92624	0.00286
37.	Vanellusspinosus	84	0.015168	4.18857	0.06353
38.	Vanellustectus	20	0.003611	5.62366	0.02031
39.	Viduachalybeata	5	0.000903	7.00995	0.00633
Total		5,538	1		2.548

Source: FieldSurvey,2024

Table4:AvifaunaSpeciesDiversityintheStudyArea(NguruWetland) forWetSeason

S/N	Species	Frequency	Pi	lnPi	PilnPi
1.	Actophilornisafricanus	103	0.087809	2.43259	0.2136
2.	Amaurornisflavirostris	29	0.024723	3.70002	0.09148
3.	Ardeacinerea	55	0.046888	3.05999	0.14348
4.	Ardeapurpurea	28	0.02387	3.73512	0.08916
5.	Ardeolaralloides	51	0.043478	3.13549	0.13633
6.	Bubulcusibis	51	0.043478	3.13549	0.13633
7.	Centropussenegalensis	22	0.018755	3.97628	0.07458
8.	Cerylerudis	42	0.035806	3.32965	0.11922
9.	Circusranivorus	2	0.001705	6.37417	0.01087
10.	Columbaguinea	72	0.061381	2.79065	0.17129
11.	Coraciasabyssinica	21	0.017903	4.0228	0.07202
12.	Dendrocygnabicolor	10	0.008525	4.76473	0.04062
13.	Dendrocygnaviduata	23	0.019608	3.93183	0.07709
14.	Egrettaardesiaca	61	0.052003	2.95645	0.15375
15.	Egrettagarzetta	24	0.02046	3.88927	0.07958
16.	Egrettaintermedia	3	0.002558	5.96871	0.01527
17.	Gallinulaangulata	20	0.01705	4.07159	0.06942
18.	Gallinulachloropus	17	0.014493	4.23411	0.06136
19.	Halcyonleucocephala	8	0.00682	4.98788	0.03402
20.	Himantopushimantopus	4	0.00341	5.68103	0.01937
21.	Lamprotorniscaudatus	20	0.01705	4.07159	0.06942
22.	Microparracapensis	63	0.053708	2.92419	0.15705
23.	Milvusaegyptius	16	0.01364	4.29473	0.05858
24.	Motacillaflava	9	0.007673	4.8701	0.03737
25.	Nettapusauritus	3	0.002558	5.96871	0.01527
26.	Phalacrocoraxafricanus	51	0.043478	3.13549	0.13633
27.	Philomachuspugnax	18	0.015345	4.17695	0.0641
28.	Ploceuscucullatus	21	0.017903	4.0228	0.07202
29.	Porphyriomadagascariensis	8	0.00682	4.98788	0.03402

30.	Psittaculakrameri	14	0.011935	4.42826	0.05285
31.	Pycnonotusbarbatus	45	0.038363	3.26066	0.12509
32.	Sternanilotica	19	0.016198	4.12288	0.06678
33.	Streptopeliadecipiens	37	0.031543	3.4564	0.10903
34.	Streptopeliasenegalensis	42	0.035806	3.32965	0.11922
35.	Streptopeliavinacea	53	0.045183	3.09703	0.13993
36.	Tockuserythrorhynchus	19	0.016198	4.12288	0.06678
37.	Vanellusspinosus	25	0.021313	3.84844	0.08202
38.	Vanellustectus	49	0.041773	3.1755	0.13265
39.	Viduachalybeata	15	0.012788	4.35927	0.05575
	Total	3.40307	1,173	1	

Source: FieldSurvey,2024

Table 5: Shannon-WeinerIndicesfor Avifauna SpeciesDiversityin the Study Area (NguruWetland).

Indices	DrySeason LAD	WetSeason LAW
Taxa_S	39	39
Individuals	5538	1173
Dominance_DM	0.1253	0.03948
Simpson	0.8747	0.9605
Shannon_H	2.548	3.403
Evenness_e^H/S	0.3277	0.7707
Equitability_J	0.6955	0.9289

Source: FieldSurvey,2024

Key:LAD–Location'A'DryandLAW–Location'A'WetSeason

DISCUSSION

Thefinding ofthisstudyshowsthat the majority ofbirdspeciesidentified during the researchwere Resident (12,225), Migratory (8,186) and Palearctic Migrant (10,876) species in the studyarea. Some of theresident species recordedinclude, African Jacana,Longtail/Reed Cormorant,AfricanMourningDove,VinaceousDove,Pied Kingfisher,CommonMoorhen;Migratory birdsinclude,YellowWagtail,African Marsh Harrier,IntermediateEgret,Red-billed Hornbill,Garganey; andthePalearctic migrantbird species were White-faced Whistling Duck, SquaccoHeron, Fulvous Whistling Duck, YellowBilledKiteandGreenSandpiper.According toOsunsinaetal.(2018) themajority of birdsobservedduring the studywere residentspecies,migratoryand Palearctic migrantspecies.Similarobservationwasmade bySabo,(2016). Thisshowsthat birdspeciesfound areeither residents,intra-migrants,Vagrant and PalearcticMigrant. Also Lameed,(2011) inhisstudy,showedthat the majority ofwetlandbirdsobservedwere Resident, Migratoryand Palearctic species. The finding of this studycould be established that the mostdominant bird species in NguruLake were Philomachuspugnax(1,330),Actophilornisafricanus(904),Phalacrocoraxafricanus(719),Columba guinea(79).

The findingsof the studyon diversityof avifaunaspecies in NguruWetland

showsthat theShannonDiversityIndexforthearea was2.55inDrySeason,whilethat ofWetSeasonthe area has3.40. Theresultsare indicativeofrelative highdiversityof birdspeciesintheWetSeason.Thisfindingstronglyagreeswiththestatementof Bibi and Ali(2013) who clearly statedthat the valuesof Shannon-WeinerDiversityIndex usuallyfallsbetween1.5 and 3.5,onlyrarelyitsurpasses4.5. Thisrelativeequal and highdiversityofbirdspeciesatNguruLakeisanindicationofquantitativemeasurethat reflectshow manydifferentspeciesare inexistenceinthe sites.Thisresultsupports Mengeshaand Bekele(2008) who reportedthat the avian diversityisan indicationof habitatheterogeneityand the numberofspeciesand individualsinanarea impliesthe importanceof the area. Each habitathasa specificsetof microenvironmentthat is suitableforthespecies.

CONCLUSION

Thisstudywasconductedto investigatethe statusand diversityof Avifauna speciesin the studyarea,the informationon the occurrenceof birdsevery month obtainedwasusedforseasonalityanalysis.However,speciesidentified in dryseason washighercomparedtothewetseason,duetothepresenceofmigrantsandPalearctic migrantavifaunaspeciesinthe studyarea (dryseason)inwhich thisstudycoincided withtheperiod oftheirmigrationinthearea. Speciesdiversityattainedconcentratedin thearea,itcouldbeduetotheavailability,abundance offoodinthearea.

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1.
2.
3.

RECOMMENDATIONS

Inviewofthefindingsofthisstudy, thefollowingrecommendationsaremade:

i. Effective monitoring andstrategies for conservation to restorethe declining populationofbirdspecies.

ii. Provide publicenlightenmentof the peoplearoundthe wetlandon valuesof

NguruWetlands.

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