Journal of Research in Forestry, Wildlife &Environment Vol. 8(2):171- 182
http://www.ajol.info/index.php/jrfwe
jfewr ©2016 - jfewr Publications
E-mail:jfewr@yahoo.com
ISBN: 2141 – 1778
Shitta et al., 2016

SEASONAL ABUNDANCE AND TREND OF AVIAN SPECIES OF LAKE MARMAI WETLAND, TARABA STATE, NIGERIA

[1]Shitta, E.A., [2]Egwumah, P.O. and [3]Akosim, C.

[1]Department of Forestry,College of Agriculture Jalingo Taraba State,Nigeria.
[2]Department of Wildlife and Range Management, University of Agriculture, Makurdi.
[3]Department of Forestry and wildlife management, Modibbo AdamaUniversity of Technology Yola. Adamawa State, Nigeria.

Corresponding author: +2348182444100; *arundeshitta@gmail*

ABSTRACT

A reconnaissance survey was caarried out on Lake Marmai to select sites where census of birds will be studied. The selection was based on the water dept and ecological characteristics of the fringing vegetation. Point count census tecniques as outlined by (Bibby et al, 1992 and Sutterland, 2000) were used to count the birds. Fifty three (53) species of birds belonging to 27 families were recorded. Checklist of birds showed that there were variation in the abundance of bird species between wet and dry seasons. Data were collected in early dry seasons (Oct-Dec), late dry seasons (Jan-Mar), early wet seasons (April-Jun) and late wet seasons (July-Sept); for a period of two years. The families Ardeidae and Columbidae show the highest number of species while the species Dendrocygna viduatahas the highest density of 421.37/ha. in early dry season. Avian abundance indicated unstable population pattern for all the species in all the seasons, while the species compositionandseasonal abundance compared favourably with those declared as Ramsar sites in Nigeria.

Key words: Seasonal abundance, reconnaissance, diversity, checklist and seasonal variation.

INTRODUCTION

Wetlands provide suitable habitats for diverse plants and animals that are adapted to shallow and oftenthe dynamic water regimes (Aynalem and Bekele, 2008). The convention on wetlands of international importance on waterfowl habitat,often called the “convention on wetlands” Ramsar, signed in Ramsar, Iran in 1971, defines wetlandsas “areas of marsh, fen, peat land or water, wether natural or artificial, temporary or permanent, with water that is static or flowing, fresh, brackish or salt, including areas of marinewater, the depth of which at low tides does not exceed six meters”(Lameed, 2011). The convention, further provides that wetlands may incorporate ripaian

and coastal zones adjacent to the wetlands and islands or bodiesof marine water deeper tha six meters at low tideslying within the wetland(Ramsar Convention Bureau, 2007).There are also man-made wetlands such as fish ponds, irrigated agricultural lands, reservoir, gravel pits,sewage farms and canals(Ramsar, 2002).

Wetlands are important breeding and stop-overareas for migratory birds, insects and mammals(Rana, 2005). The use of wetlands and there resources is widspread within the many diverse bird taxa as avian adaptation to utilze wetlands include anatomical, morphologicaland behavioural changes. These adaptation include designsfor diving and swimming, very light body due feathers, ossified and hollow bones filled with air, lungs serve as air bags that retain enough oxygen,feet that allow walking on mudflat and bills tha can strain, peck and spear preys (Ezealor, 2001). As a result of these adaptations, birds are well equiped to exploit wetland resources and are often used as indiators of conditins within a wetland ecosystem.

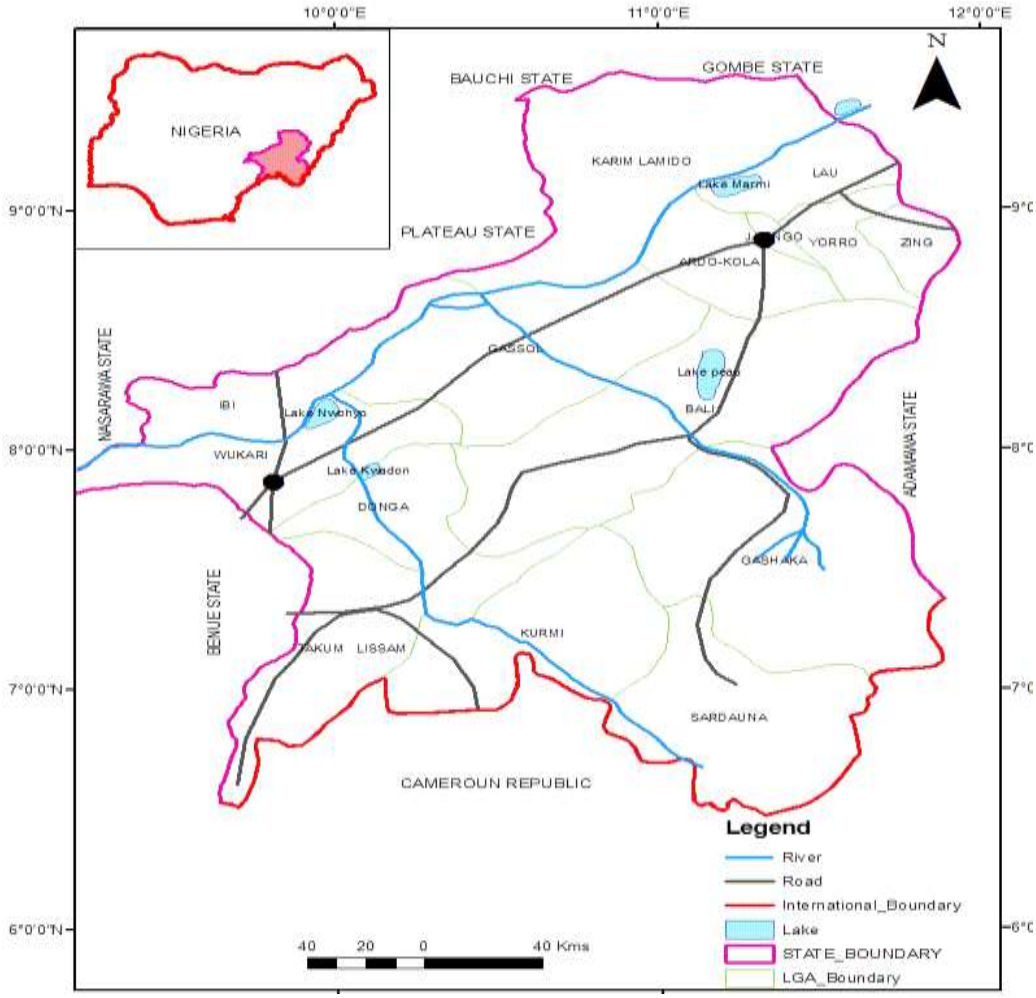
In Nigeria,the Hadeija- Nguru wetland complex is a desgnated Ramsar site, with a surface area of about 58,100 hectares and with diverse flora and floraof both sahel and sudan savanna ecosystem (Lameed, 2011). This wetland supports about 20,000 water birds and it is a wintering ground to many palearctic migrants and a total of 377 species of wetland birds have been recorded. This study is therefore, to assess the seasonal abundance and avian species diversity in Lake Marmai wetland.

METHODOLOGY

Study area

Lake Marmai is a circular lake, located within Dobdi village in Lau Local Government Area of Taraba State and within the valley of River Benue. It is located in latitudes 09°09'Nand 09°10' N and longitudes 11° 09' E and 11° 09' E (according to Nigeria topographic sheet number 794, scale 100,000, 1963). The major ethnic community in the study area includes, Shomowa, Jole and Bandawa. Their major occupations are fishing, farming and livestock rearing. The surrounding

has significantly been converted to rice farms. The area is dominated by the following plant species: *Brysocorpus coccineus, Zanthoxylum ganthoxyloides, Vitex doniana, Piliostig mathomingii, Entanda abyssinica*and *Vitex doniana* (Taraba State Ministry of Land and Survey, 2005). (Figure 1).



The Location of Study site in Taraba State
Source: Taraba State Land and Survey

Study Design and Data Collection Techniques

Point count census technique as outlined by Bibby*et al.*, (1992), Ralph *et al*, (1993) and Sutherland (1997), were used to count the birds.Counting stations were established using some conspicuous land marks such as stones, posts or trees which were marked with water resistant paint. The minimum distance between two counting stations forforested site was 50m while 200m for grass-shrub habitat. Data on each site was collected in early dry season

(Oct to Dec) and late dry season (Jan to Mar), early wet season (Apr to June) and late wet season (July to Sept).Each counting station was visited 20 times in each season (dry and wet seasons). Data were collected for a period of two years. The data obtained in the second year was used to validate the first year's data. On arrival at each counting station, the observer waited for three minutes before beginning to count. This was to allow the birds to settle down following disturbance by the arrival of the observer. The observer ateach countingstation recordedthe entire birds identified with binocular.

Data Analysis

Avian Species Checklist

Tables were used to present thespecies list of birds of the study site for different seasons, according to Lameed (2011)

Avian Species Estimate of Absolute Population Density

Estimate of absolute population density of bird species at the site across seasons were determined using Bibby*et al* (1992) formula.

$$D = \frac{n_1 + n_2}{\pi r^2 m} \text{Log}_e \left(\frac{n_1 + n_2}{n_2} \right)$$

Where: D = density

r = radius of the first zone

n1 = number of birds counted within the first zone

n2 = number of birds counted beyond the first zone

m = the total number of counts in each study site.

Trend of avian species abundance over the period of the study

The trends of avian species abundance were determined using the line graphs.

RESULTS

Checklist of avifauna species at Lake Marmai

There were 27 avifauna families and 53 bird species in Lake Marmai. The seasonal chechlist shows that there were 31 bird species in early dry season (Nov-Jan), 28 bird species in late dry season(Feb-Apr), 18 bird species in early wet season (May-July)and 27 bird species in late wet season (Aug-Oct.). The family Ardeidae has the highest number of bird species of 8, followed by the family Columbidae 7 and Alcedinidae 3, as shown in (Table 1).

Table1: Seasonal Checklist of Avifauna Species at Lake Marmai

Family	Scientific Name	Common Name	Early Dry Season (Nov.-Jan.)			Late Dry Season (Feb.-Apr.)			Early Wet Season (May.-Jul.)			Late Wet Season (Aug.- Oct)		
			S	I	H	S	I	H	S	I	H	S	I	H
Phalacrocoracidae	*Phalacrocoraxcarbo*	Great Cormorant	-	-	-	-	-	-	-	-	-	X	-	-
	Phalacrocoraxafricanus	Long-tailed Cormorant	-	-	-	-	-	-	-	-	--	X	--	-
Ardeidae	*Ardeacinerea*	Gray heron	-	-	-	-	-	-	X	-	-	X	-	-
	Ardeamelanocephala	Black-headed Heron	X	-	-	X	-	-	X	-	-	X	-	-
	Ardea goliath	Goliath Heron	X	-	-	X	-	-	X	-	-	X	-	-
	Ardeapurpurea	Purple Heron	X	-	-	X	-	-	X	-	-	X	-	-
	Ardea alba	Great White Egret	X	-	-	-	-	-	X	-	-	-	-	-
-	*Egrettaardesiaca*	Black Heron (Egret)	-	-	-	-	-	-	X	-	-	X	-	-
	Ardeolaralloides	Squacco Heron	X	-	-	X	-	-	X	-	-	X	-	-
	Bubulcus ibis	Cattle Egret	X	-	-	X	-	-	-	-	-	X	-	-
Scopidae	*Scopus umbretta.*	Hammerkop	-	-	-	X	-	-	-	-	-	X	-	-

Table 1 continued

Family	Scientific Name	Common Name	Early Dry Season (Nov.-Jan.)			Late Dry Season (Feb.-Apr.)			Early Wet Season (May.-Jul.)			Late Wet Season (Aug.- Oct)		
			S	I	H	S	I	H	S	I	H	S	I	H
Ciconiidae	*Anastomuslameligerus*	African Openbill	-	-	-	X	-	-	X	-	-	X	--	-
	Ciconiaabdimii	Abdin Stork	-	-	-	-	-	-	-	-	-	X	-	-
Anatidae	*Dendrocygnaviduata*	White-faced Whistling-Duck	X	-	-	-	-	-	X	-	-	X	-	-
Accipitridae	*Milvusmigrans*	Black Kite	-	-	-	-	-	-	-	-	-	X	-	-
Falconidae	*Falco ardosiaceus*	Gray Kestrel	-	-	-	-	-	X	-	-	-	-	-	-
Phasianidae	*Francolinusalbogularis*	White-throated Francolin	-	-	-	-	-	-	-	-	-	X	-	-
	Francolinusbicalcaratus	Double-spurred Francolin	-	-	-	-	-	-	-	-	-	X	-	-
Rallidae	*Amaurornisfiavirositris*	Black Crake	-	X	-	-	X	-	-	-	-	-	X	-
Jacanidae	*Microparracapensis*	Lesser Jacana	X	-	-	X	-	-	-	-	-	-	-	-
	Actophilornisafricanus	African Jacana	X	-	-	X	-	-	-	-	-	X	-	-
Haematopodidae	*Haernatopusostralegus*	Eusaisna Oystercatcher	-	-	X	-	-	-	-	X	-	-	-	-
Burhinidae	*Burhinussenegalensis*	Senegal Thick-knee	X	-	-	-	-	-	-	-	-	X	-	-
	Burhinuscapensi	Spotted Thick-knee	-	X	-	-	X	-	-	-	-	-	-	-

Table 1: continued

Family	Scientific Name	Common Name	Early Dry Season (Nov.-Jan.)			Late Dry Season (Feb.-Apr.)			Early Wet Season (May.-Jul.)			Late Wet Season (Aug.- Oct)		
			S	I	H	S	I	H	S	I	H	S	I	H
Glareolidae	*Pluvianusaegyptius*	Egyptian Plover	X	-	-	X	-	-	X	-	-	-	-	-
Charadriidae	*Vanellusspinosus*	Spur-winged Plover	-	-	-	X	-	-	-	-	-	X	-	-
Columbidae	*Columba livia*	Rock Pigeon	X	-	-	X	-	-	X	-	-	-	-	-
	Columba guinea	Speckled Pigeon	X	-	-	-	-	-	X	-	-	-	-	-
	Streptopeliadecipiens	African Morning Dove	X	-	-	-	-	-	-	-	-	-	-	-
	Streptopeliasemitorquata	Red-eyed Dove	X	-	-	-	-	-	-	-	-	-	-	-
	Streptopeliavinacea	Vinaceous Dove	X	-	-	-	-	-	-	-	-	-	-	-
	Streptopeliasenegalensis	Laughing Dove	-	-	-	X	-	-	-	-	-	X	-	-
	Oenacapensis	Namaqua Dove	-	-	-	X	-	-	X	-	-	X	-	-
Musophagidae	*Criniferpiscator*	Western Plantain-eater	X	-	-	X	-	-	-	-	-	-	-	-
Cuculldae	*Ceuthmocharesgrillhi*	Yellow bill	X	-	-	X	-	-	-	-	-	-	-	-
	Centropussenegalensis	Senegal coucal	-	-	-	X	-	-	-	-	-	-	-	-

Family	Scientific Name	Common Name	Early Dry Season (Nov.-Jan.)			Late Dry Season (Feb.-Apr.)			Early Wet Season (May.-Jul.)			Late Wet Season (Aug.- Oct)		
			S	I	H	S	I	H	S	I	H	S	I	H
Apodidae	*Cypsiurusparvus*	African Palm-swift	X	-	-	-	-	-	-	-	-	X	-	-
Alcedinidae	*Alcedocristata*	Malachite Kingfisher	X	-	-	-	-	-	-	-	-	X	-	-
	Ispidinapicta	African Pygmy-Kingfisher	X	-	-	-	-	-	-	-	-	-	-	-
	Cerylerudis	Giant Kingfisher	X	-	-	X	-	-	-	-	-	-	-	-
Meropidae	*Meropsbreweri*	Black- headed bee-eater	-	-	-	-	-	-	-	-	-	X	-	-
	Meropsnubicus	NorthernCarmine bee-eater	-	-	-	-	-	-	-	-	-	X	-	-
Coraciidae	*Coraciasabyssinica*	Abyssinian Roller	X	-	-	-	-	-	-	-	-	X	-	-
	Eurystomusgularis	Broad-billed Roller	-	-	-	X	-	-	-	-	-	-	-	-
Bucerotidae	*Tockuseriythrorhnychus*	Red-billed Hornbill	X	-	-	X	-	-	-	-	-	-	-	-
Alaulidae	*Galeridacristata*	Crested Lark	X	-	-	-	-	-	-	-	-	-	-	-
Prionopidae	*Prionopsplumatus*	White Helrnetshrike	-	-	-	X	-	-	-	-	-	-	-	-
Corvidae	*Ptilostomusafer*	Black Magpie (Piapiac)	-	-	-	X	-	-	-	-	-	-	-	-

Table 1: continued

Family	Scientific Name	Common Name	**Early Dry Season (Nov.-Jan.)**			**Late Dry Season (Feb.-Apr.)**			**Early Wet Season (May.-Jul.)**			**Late Wet Season (Aug.- Oct)**		
			S	I	H	S	I	H	S	I	H	S	I	H
	Corvusalbus	Pied Crow	-	-	-	-	-	-	X	-	-	-	-	-
Viduidae	*Vadua interject*	Long-tailed Paradise-Whydah	-	-	X	-	-	X	-	-	-	-	-	-
	Vaduaorientalis	Northern Paradise-Whydah	-	-	X	-	-	X	X	-	-	-	-	-
Fringilli*dae*	Serinusleucopygius	White-rumped seedeater-	-	X	-	-	X	-	X	-	-	-	-	-
	Serinusmozambicus	Yellow-fronted Canary	-	-	-	-	-	-	X	-	-	-	-	-
		Total	**25**	**3**	**3**	**22**	**3**	**3**	**19**	**1**		**27**	**-**	

Key: S = direct sighting I = indirect sighting H = information from hunter

A total of 12 birdspecies recorded absolute densities higher than 100 birds/ha at different seasons of the year Table 2.

Table 2: Seasonal Avifauna Species Absolute Population Density at Lake Marmai

Species	Early wet season	Late wet season	Early dry season	Late dry season
Bubulcus ibis	528.705	32.438	-	332.011
Columba livia	5.963	221.341	1.988	-
Columba guinea	200.794	-	326.963	-
Coraciasabyssinnica	596.284	-	-	5.963
Cypsiurusparvus	230.63	-	-	332.93
Dendrocygnaviduata	421.374	-	222.613	421.37
Egrettaardesiaca	-	-	110.313	3.816
Egrettagarzetta	49.69	1.272	110.313	31.816
Pluvianusaegypitus	109.319	34.346	46.709	-
Scopus umbretta	-	662.75	-	46.431
Treronwaalia	-	3.816	5.963	133.17
Vanellusspinosus	-	76.96	-	133.17

Source: Field Survey 2010/2011

Trends in Avifauna Species Abundance at *Lake Marmai*

Figure 1, shows the trend of abundance of seven selected birds' species that were present all year round at Lake Marmai.

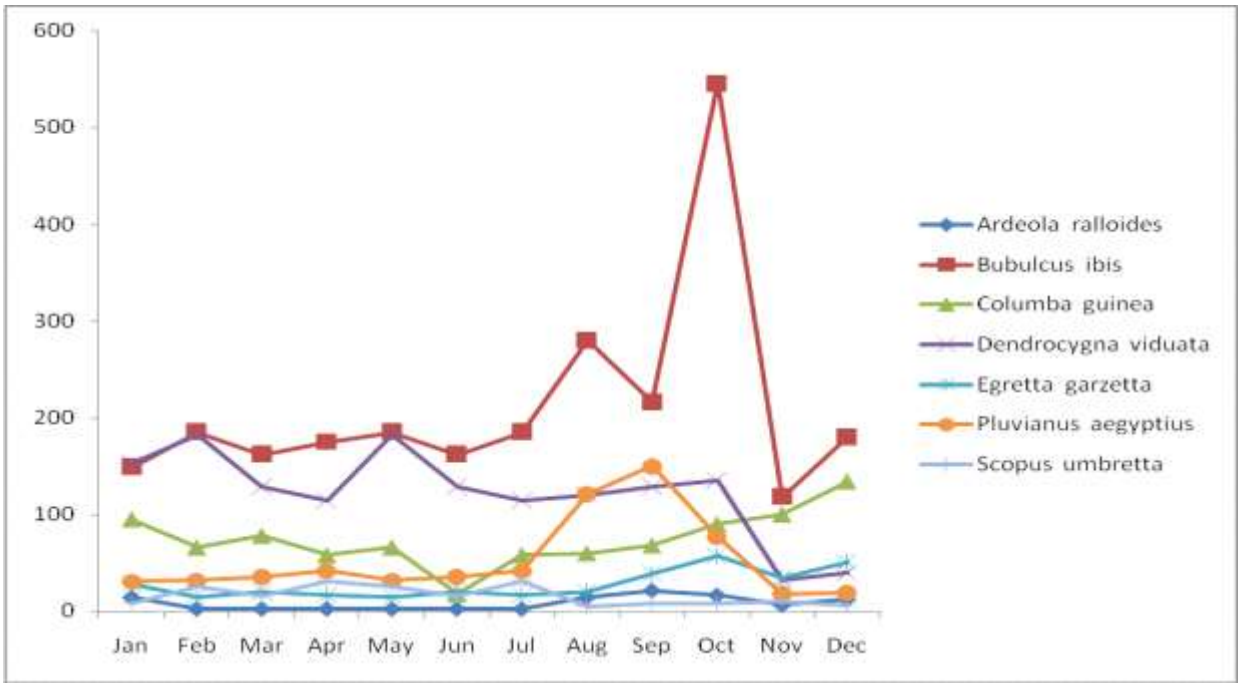


Fig. 1**:** The Trend in Avian Species Abundance in Lake Marmai

DISCUSSION

The record of 53 bird species in 27 families of Lake Marmai during the wet and dry season shows high representation of resident, afrotropical and palaearctic species. A high number of bird species in Lake Marmai wetland were observed from the month of November to February, which is in consonance with the work of (Aynalem and Bekele, 2008) on Lake Tana wetland in Ethiopia. The species composition counted during the dry season was significantly different from the number in wet season. This is due to high number of palaearctic and afrotropical migrants that winter in this wetland. The prolong time of the dry season compared to inundation period could have contributed to the significant effect of dry season on bird species composition in the favourable wetland habitat.

The relative abundance of bird species during the dry season might also be related to the availability of food, conducive habitat condition and breeding environment for the species in this dry extreme end of the guinea savanna.Mean while, the distinct seasonality of the rainfall and variation in the abundance of food resources resulted in seasonal changes in the species abundance of bird, an idea which is not at variance with (Gaston et al, 2000).

The distribution and abundance of many bird species are determined by the vegetation that forms a major part of the habitat. As the fringing riparian and the floating vegetation changes along this complexwetland environment, may appear, increase or decrease in number, and disappear again as the wetland habitat chandes (Lee and Rotenberry,2005). The high density of resident birds, together with seasonal influx of winter migrant, contributed to high bird population in the dry season all year round.

CONCLUSION

Farmers along the shores of Lake Marmai, cutivate the area when the water level receds, which has lead to the high level of reduction in the size of the; as a result of erosion and siltation. Unless an appropriate community based conservation measure is taken, the entire habitat will be lost in the near future.

REFERENCES

Aynalem, S. and Bekele, A (2008).Species composition, relative abundance of bird fauna in riverine and wetland habitats of Infranz and Yiganda at southern tip of Lake Tana, Ethiopia.*Tropical Ecology 49(2)*: 199-209.

Bibby, C. J., Burgess, N. D. and Hill, D. (1992).*Birds Census* Techniques, 1nd Edition. London, Academic Press 24-41.

Ezealor, A.U. (2002).Hadejia-Nguru Wetlands.Critical sites for Biodiversity Conservation in Nigeria, NCF, Lagos pp. 66-68.

Gatson, K.J., Blackburn, T.M., Greenwood J.D., Grereryx, R.D., Rachel, M.Q., and Lawton, J.H.(2000) Abundance-occupancy relationships. *J. of Applied Ecology 37:* 39-59.

Lameed, G. A. (2011). Species diversity and abundance of wild birds in Dagona-Waterfowl Sanctuary Borno State, Nigeria.*Afriacan Journal of Evironmental Science and Technology* Vol 5(10) 855-866.

Lee, P. and Rotenberry, J.T.(2005) Relationship between bird species and tree species assemblages in forested habitats Eastern North America. *J. Biogeography 32:* 1139-1150.

Ralph, C. J., Geupel, G. R. Pyle, P., Martin, T. E. and Desante, D. F. (1993).Handbook of field Methods for Monitoring Landbirds. United State Department of Agriculture for Sero. Gen. Tech. Rep. PSW-GTR 144. *http://www.PSWS.Gov.*

Ramsar (2002). Wetlands, Biodiversity and the Ramsar Convention: *The Role of the Convention on Wetlands in the Conservation and Wise use of Biodiversity*. Edited by Hails A.J. Ramsar, Gland, Switzerland.*http://www.Ramsar.org/lib_bio_lhtm.*

Ramsar Convention Secretariat, (2007) *Wise Use of Wetlands: A Conceptual framework for the Wise Use of Wetlands. Ramsar Handbooks for the Wise Use of Wetlands, 3rd edition,* Vol. 1. Ramsar Convention Secretariat, Gland Switzerland.

http //www.Ramsar Convention - Downloadable Books 7.mht 12/11/2011

Rana, S.V.S. (2005) *Essentials of Ecology and Environmental Science.* 2nd edition Prentice –Hall of India Ltd.,New Delhi.

Sutherland, W.J. (2000). The Conservation Hand Book Research, ManagementandPolicy.Blackwell Science Ltd. London.

Taraba State Ministry of Land and Survey, (2005). *Administrative Map of Taraba State*.Devang Nigeria Limited.