

Aspects of Biodiversity and Fish Production in The Kukobila Wetland in The Savelugu-Nanton District Of The Northern Region, Ghana

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Abstract

This study was conducted to provide baseline data on aspects of biodiversity and fish production in the Kukobila wetland. The objectives were to: identify the major animal and plant species of economic importance to the surrounding communities; identify fishing gears used and (iii) assess fish species diversity and production. Information on biodiversity was obtained through personal observation, transect walk, use of pair of binoculars and literature materials. Fish production figures were obtained by weighing daily catches of five fishermen operating in the wetland, during the dry season and in the wet season. The results indicate that Kukobila wetland has high diversity of animal and plant species that are exploited for various purposes by the local communities. Five types of fishing gears were used for exploiting the fishery resources of the wetland. Twenty-three (23) fish species belonging to nineteen (19) families were encountered. Fish production was significantly higher during the dry season (75 000 kg) than in the wet season (45 000 kg). The high diversity probably reflects high tourism potential of the wetland.

Introduction

Wetlands are areas of marsh, swamp, fens and peat lands, whether artificial or natural, permanent or temporal, where the water is stagnant, flowing, fresh, brackish or saline, including areas below sea level where the depth at low tide does not exceed six metres (UNESCO, 1994). Keddy (2000) defines a wetland as “an ecosystem that arises when inundation by water produces soils dominated by anaerobic processes and forces the biota, particularly rooted plants to exhibit adaptation to tolerate flooding”. There are three main types, namely: marine/coastal wetlands; inland and man-made/artificial wetlands.

However, Keddy (2000) identified six types of wetlands. These include: Swamp, Marsh, Bog, Fen, Wet meadow and Shallow water, adding that any attempt to sort the diversity of nature into four to six will have its limitation. It is clear that no single system of classification can accurately portray the diversity of wetlands (Cowarding and Golet, 1995). Until recently, wetlands were considered as wastelands, where mosquitoes and dangerous reptiles were bred. So they were used as refuse grounds or reclaimed for other use. However, since the Ramsar Convention in 1971, wetlands have been given international recognition as ecosystems of considerable importance, compared to forest resources, marine and rangeland ecosystems. In 1987, a report of the World Commission on Environment and Development described protected areas including wetlands as

indispensable pre-requisite for sustainable human development. Today, wetlands are known to have economic, ecological and social functions (Symoens, 1995). Turner (1982) argued that the ecological and social functions of wetlands give them an added economic worth over their productive value, and warned that failure to treat these functions with respect could result in seriously damaging consequences on the environment or a great loss which could cost a community a great deal to repair and offset.

Ghana's wetland ecosystems constitute about 10% of the country's total land surface (Ministry of Lands and Forestry, 1999). In Ghana, there are three main types of wetlands, namely the marine/coastal wetland represented by the numerous lagoons and swamp mangroves (Yankson and Obodai, 1999), artificial ones like Golinga and Buipela; and inland wetlands such as Kpasinkpe, near Walewale, Nasia, near Nasiatownship Gbani, Nalerugu Nabogu and Kukobila wetlands all in the Northern region of Ghana. Economically, the local communities around the Kukobila wetlands exploit its plants resources such as the pigweed (*Ipomoea aquatic*) for feeding cattle and pigs and for preparing soup for human consumption. Some species of grass are used for fencing and roofing houses. The animal resources of the wetland include fish, amphibians, birds and mammals all of which serve as sources of protein for the inhabitants. Ecologically, Kukobila wetland is a habitat of a wide variety

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of classes of organisms (both plants and animals).

In spite of the immense socio-economic and ecological importance, this wetland has not received much attention by way of scientific research hence, there is no information on this wetland. The current work seeks to provide baseline data on biodiversity and fish production from the Kukobila wetland. The specific objectives are to: identify the major animal and plant species that are of economic importance to the surrounding communities; identify fishing gears used in the wetland and assess fish species diversity and production from the wetland.

Study area

The study was carried out at Kukobila in the Savelugu-Nanton District in the Northern Region of Ghana. The study area lies between latitudes $10^{\circ} 6^1$ and $10^{\circ} 8^1$ N and longitudes $1^{\circ} 8^1$ and $1^{\circ} 12^1$ East (Figure 1). Kukobila is about 57 km northwest of Tamale, on the Tamale-Bolgatanga trunk road. It shares boundary with West Mamprusi on the west. The wetland covers an area which varies in size between 0.175 km² (dry season) and 18 km² at the peak of the rainy season, when water depth averages 2.3 m (Nsor, 2004).

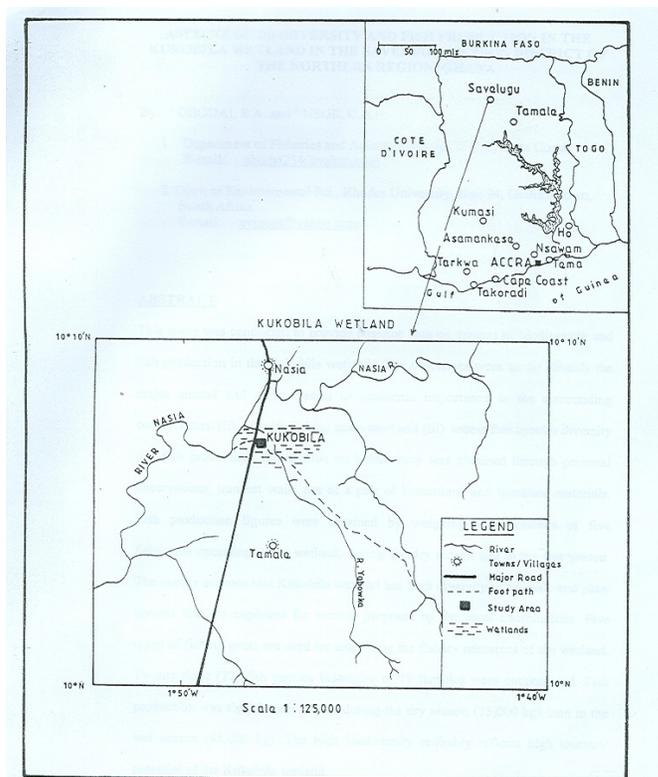


FIG. 1. A MAP OF GHANA SHOWING THE STUDY AREA (KUKOBILA WETLAND)

Methodology

Data Requirements

This involved identification of major animals and plants of economic importance, identification of fishing gears used and determination of fish species diversity. This was achieved through primary and secondary data collection.

Sampling techniques

Identification of major animals and plants of economic importance

Birds were identified by the use of a pair of binoculars and literature by Serle *et al.* (1997). Reptiles such as python were identified through personal observation during transect walk, whereas plant and fish species of economic importance were equally identified with the aid of literature (e.g., Johnson, 1997;

Okezie and Agyakwa, 1998), with the indigenous people as facilitators.

Identification of fishing gears

Fishing gears were identified by personal observation; help from some fishermen and by the use of literature by Holden and Reed (1991) and Templeton (1995). Holden and Reed (1991) present pictures and sketches of a wide range of fishing gears used in freshwater capture fishery activities. All the fishing gears encountered in this study are found in this book. Templeton (1995) deals with gear use in relation to proper freshwater capture fishery management.

Determination of fish species diversity

To do this, all the five fishermen who operated in the wetland were covered. They used various gears for their operations. Their catches were identified by personal observation, with the aid of literature materials by Holden and Reed (1991) and Dankwa *et al.* (1999). And weighed in bulk. Holden and Reed (1991) present coloured pictures of West African freshwater fishes of economic importance, all of which were found in this wetland; while Dankwa *et al.*(1999) give detailed presentations on Freshwater fishes of Ghana: Identification, ecological and economic importance. All the freshwater fish species encountered in the Kukobila wetland have been identified and described described in this literature.

Data obtained were subjected to descriptive statistics.

Results and Discussion

The current work examines fishing gears and biodiversity of the Kukobila wetland and its

economic importance. Fishing is the main occupation of the people of the people of Kukobila. The fishes of the wetland are well known in most Ghanaian households.

Socio-economic background of the people in this area

The inhabitants of the communities around the Kukobila wetland are the rural poor, who depend solely on the wetland for their livelihood. They exploit the animals for consumption and for sale harvest the plant resources for use as fodder crops, for building houses and also for use as vegetables.

Animals of economic importance

Animals identified in the wetland included fish of different species.

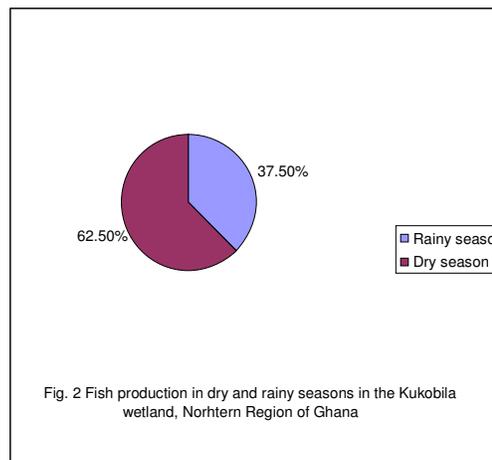
Fish species abundance and diversity

A total of 23 fish species, belonging to 19 families (Table 1) were identified.

The catches were dominated by cichlids (*Oreochromis niloticus*, and claroteids (*Clarotes latileps*, *Chrysichthys maurus* and *C. nigrodigitatus*). Other families that ere moderately represented were Cyprinidae and Mochokidae and Osteoglossidae. The least represented were the Scilbeidae and Tetraodontidae.

Fish production in dry and rainy seasons

Fish production levels obtained from the 5 fishermen were significantly ($P<0.05$) higher in the dry season (75,000 kg) than in the wet season (45,000 kg. Thus out of a total of 120, 000 kg of fish produced for the year, 62.5% was caught in the dry season, while 37.5% was obtained in the rainy season (Fig. 2).



The low level of fish production during rainy season could be due to physical expansion of the wetland (Abban *et al.* 1994). Breeding individuals could also take shelter in aquatic weeds, during the wet season and would not be caught. The rather high fish diversity observed in the wetland was probably a reflection of the wide range of mesh sizes and different fishing methods employed by the fishermen. The other reason could be as a result of the large area of land drained by the wetland system (Rosenzweig, 2000). Most of the fish species caught were also present in the White Volta (Obodai and Laweh, 2009); and in Lake Taakor (Obodai and Apenuvor, 2004), both at Nawuni. This phenomenon suggests links between the Kukobila wetland and these water bodies. These interconnecting channels are established during the rainy season when the water bodies get flooded. Fishing is strictly regulated by allowing fishing once every fortnight and imposition of ban during breeding season. Besides, the presence of dense aquatic weeds hampers total fish harvesting, thereby preventing over exploitation of the fish species. Templeton (1995) reported that aquatic plants serve as protected shelter from water current/ predators and spawning grounds for most fish species.

Amphibians, Reptiles and Bird diversity

Amphibians encountered were toads and frogs; while three types of reptiles such as African python (*Python sebae*), the Nile monitor lizard (*Veranus niloticus*) and the tortoise (*Pseudemys rubriventris*) were identified (Table 2). Amphibians and reptiles were used as source of animal protein and for medicinal purposes. Table 2c indicates that Kukobila wetland was rich in bird species diversity. As many as 12 bird species were identified. It was observed that bird diversity varied for the dry to wet season. Wild mammals occasionally seen included the grasscutter, rat and the mole rat.

The wide variety of birds encountered in the wetland partly indicates its ecotourism potential, and thus could serve as a source of income generating venture for the local people. The diversity of birds species present in the wetland could be attributed to the rich food base of the wetland (e.g. fish) and also acting as a safe haven for both endemic and migratory birds, since there are less hunting activities within the catchment area. Some birds use the

emergent leaves as landing sites, as they feed on fish and other aquatic insects; while others use the grasses from the wetlands in making nest within the catchment. The reptiles and amphibians are sources of protein for the local communities. The reptiles were also used for medicinal purposes (*pers. Comm.* Indigenous people of Kukobila).

Diversity of plants of economic importance

Twelve plant species belonging to four families were identified (Table 3). Their uses included medicinal, food for humans and other animals (e.g. cattle). Most of these plants were used as source materials for hats, weaving local *zana* mats and as thatch materials for roofing.

The lush green nature of most plants all year round could be attributed to availability of water throughout the seasons and the rich bottom substrates. The inhabitants of the neighbouring communities exploit sticks and grasses from the wetland for building and roofing, for making *zana mats* and for construction of storage barns. Herdsmen also use the wetland as source of watering and sheep, both of which graze on the pasture. The activities described above form the major economic ventures which generate a lot of income that sustains the inhabitants. The prevention of flooding in neighbouring community during the recent over flooding of the White Volta River, which meanders through the communities such as Kukobila and Nasia could be linked to the presence of the wetland. This can be confirmed by Novitzki (1985) and Ernest and Brown (1989) who reported that wetlands mitigate storm and flood and also acts as recharge aquifers.

Fishing gears used in the wetland

Five main types of fishing gears were used by the five fishermen operating in the wetland. These were gill nets of mesh size 1.8 cm, hook and line, fyke net, poke net and canoe made of wooden boards. The fishermen used only gill nets of mesh size 8.1 cm (on the advice of the researchers).

The wide range of fishing gears with various mesh sizes, used in fishing in this wetland selects the fishes from different size groups, rather than from a particular size group. This is a good management practice which could prevent over exploitation of fish species from the same population in the wetland.

Conclusion

It can be said that the Kukobila wetland plays an important ecological and socio-economic role in the lives of the people. A total of 23 fish species belonging to 19 families were encountered in the study. Fish production was higher in the dry season than in the rainy season. Amphibians seen in the wetland were toads and frogs, while reptiles inhabiting the wetland were pythons, lizards and tortoise. Both amphibians and reptiles served as a source of protein for the inhabitants of the localities. The wetland was rich in bird species, whose diversity and abundance varied

between the dry and rainy seasons. Mammals encountered were grasscutter, rat and the mole rat.

Twelve plant species belonging to 4 families were identified in the wetland. Most of these plants were used for hats, fencing, roofing, feeding cattle and pigs and as vegetables for human consumption.

It is therefore recommended that the Kukobila wetland be declared as a Ramsar site to protect its biodiversity therein. The wetland can be developed to serve as an ecotourism destination. Further studies should be conducted on the other inland wetlands, some of which have been referred to in the introductory part of this work.

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Table 1: Checklist of fish species inhabiting the Kukobila wetland

Family	Species	Common name
Anabantidae	<i>Ctenopom patherici</i>	Climbing perch
Bagridae	<i>Bagrus bajad</i>	Bagrids
Channidae	<i>Parachanna obscura</i>	Snake heads
Characidae	<i>Alestes baremos</i>	Charicins
	<i>Hydrocynus brevis</i>	Tiger fish
Cichlidae	<i>Oreochromis niloticus</i>	Bream/mango fish
Citharinidae	<i>Citharinus citharus</i>	Moon fish
Clariidae	<i>Clarias anguillaris</i>	Mudfish/walking catfish
	<i>Heterobranchus bidorsalis</i>	
Claroteidae	<i>Clarotes latileps</i>	Claroteids
	<i>Chrysichthys maurus</i>	
	<i>C. nigrodigitatus</i>	
Cyprinidae	<i>Labeo senegalensis</i>	African carp/minnows
Gymnarchidae	<i>Gymnarchus niloticus</i>	Frank fish
Hepsitidae	<i>Hepsetus odoe</i>	African pike
Malapteruridae	<i>Malapterurus electricus</i>	Electric cat fish
Mochokidae	<i>Synodontis filamentosis</i>	Squeaker fish
Mormyridae	<i>Mormyrus rume</i>	Elephant nose fish
Osteoglossidae	<i>Heterotis niloticus</i>	Bony tongues
Polypteridae	<i>Polypterus senegalus</i>	Sailfins/Birchir
Protopteridae	<i>Protopterus annectens</i>	African lung fish
Schilbeidae	<i>Schilbe mystus</i>	Butter fish
Tetrodontidae	<i>Tetraodon lineatus</i>	Puffer fish

Table 2: Amphibians, Reptiles and Birds identified in the Kukobila wetland

Class of animal	Species	Common name
a) Amphibians	<i>Rana sp</i>	Frogs
	<i>Bufo regularis</i>	Toad
b) Reptiles	<i>Pseudemys rubriventris</i>	Tortoise
	<i>Python sebae</i>	African python
	<i>Veranus niloticus</i>	Nile monitor lizard
c) Aves (birds)	<i>Actophilornis Africana</i>	Lily trotter
	<i>Anas sparsa</i>	Ducks
	<i>Apus affinis</i>	Little African swift
	<i>Egretta alba</i>	Great white egret
	<i>Euplectes after</i>	Yellow crowned bishop
	<i>E. cerix</i>	Red bishop
	<i>E. hordeacea</i>	Fire crowned bishop
	<i>Hippolais polyglotta</i>	Melodious warbler
	<i>Hippolais sp</i>	Marsh warbler
	<i>Megaceryle alcyon</i>	King fisher
	<i>Ploceus melanocephala</i>	Black-headed weaver
	<i>Phylloscopus trochilus</i>	Willow warbler

Table 3: Plant species of economic importance in the Kukobila wetland

Family	species	Common name	Uses
Convolvulaceae	<i>Ipomoea aquatic</i>	Pig weed	feed for cattle, pigs and humans (for preparing soup)
Euphobiaceae	<i>Alchornea laxiflora</i> -		for treating toothaches
Leguminosae	<i>Centrosema pubescence</i>	Legume	for treating convulsion
Memosoideae	<i>Mimosa invisa</i>	Legume	for treating convulsion
Poaceae	<i>Andropogon gayanus</i>	Grass	for making zana mats
	<i>Diplachne fusca</i>	Grass	as roofing material
	<i>Hyparrhenis involucrate</i>	Grass	as roofing material/forage
	<i>Hyparrhenia rufa</i>	Grass	as roofing material/forage
	<i>Hyperthelis dessolute</i>	Grass	as roofing material/forage
	<i>Leersia hexandra</i>	Grass	as roofing material
	<i>Oryza longistaminata</i>	Grass	for making hats and animal feed