BIODIVERSITY OF LAKE VICTORIA:

ITS CONSERVATION AND SUSTAINABLE USE

[THE UGANDAN VERSION]

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CHAPTER 11

THE DIVERSITY OF AMPHIBIANS, REPTILES AND MAMMALS AND THEIR IMPORTANCE IN THE VICTORIA AND KYOGA LAKE BASINS

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1.0 IMPORTANCE

The documentation of the biodiversity of Lake Victoria and her surroundings carumt be complete without studying the amphibian, reptile and mammal fauna.

Some amphibian fauna such as *Bulo vitallus* are known to be common inhabitants of the littoral and ecotone zones of lacustrine ecosystems and can even indicate how far inland the flood zones of a lake extends.

Some reptiles, such as the Water Cobra - *Naja melanoleuca* and the File Snake - *Meheleya capensis* are important predators of fish in while the Nile Crocodyle - *Crocodylus nilolicus* uses aquatic ecosystems for its habitation and the Nile - *Varanus niloticus* constantly uses the wetlands fringing aquatic ecosystems as a habitat and constantly visits the Iittoral zone to feed on fish.

Some mammals also use aquatic ecosystems as their only habitats. These include the Spot Necked Otter - *Llilra maculicollis* and the Hippopotamus - *Hipopolamus amphibius.*

The shore margins of Lakes in the Victoria basin are highly dented and mostly swampy, fringed by *Papyrus* and other wetland vegetation types important habitats for herpetofauna and wetland adapted mammals. Of recent, the extent of the 'wetland' has been extended in several places by the Water Hyacinth *(Eichornia cryaseps).*

Ecologically, amphibians are important in many ways; they are mostly predators, acting as primary and secondary carnivores. Their prey consists mostly of insects, some of which are pests to crops or disease vectors. They are also inter-inked in food chains, often acting as food for other vertebrates, such as pigs, birds, snakes and sometimes man. Because of their ectothermic physiology, the life history and ecology of amphibians often differ markedly from that of birds or mammals (McCollough *el ai, (992).*

Amphibians are known to be an easily recognisable taxon in given habitats; and populations are sometimes specialised within a narrow habitat. This makes it easy and practical to monitor changes in composition over time, given different conditions (Heyer *el al 1994,* Phillips 1990). Impacts on their habitat are reflected in changes in numbers and species

diversity in a short time. These are some of the factors that have made amphibians to be recognised, nowadays, as good indicators of habitat change.
Though small by nature, Insectivores and Rodents are very good indicators of habitat change. In addition they are important as a prey base for animals higher in the food chain, such that an abundance of these small mammalian taxa can be safely deduced to mean 'a healthy presence of predators that may not actually be sighted due to their habit. Locally too certain categories of rodents are often important as pest species. Carnivores help in population control of their prey species therefore environmental changes may have important consequences for either. The ungulates on the other hand are highly valued for aesthetic reasons (e.g. game viewing) and for hunting. However, they also compete for forage and can cause serious damage in agricultural areas.

2.0 COMPOSITION

Reptiles are a class of vertebrates, comprising of turtles and tortoises, lizards including chameleons, skinks including limb-less skinks, geckoes, crocodiles, monitors and all types of serpents commonly known as snakes (Heyer *el a11994*, Goin *el al 1962).*

Amphibians are a class of vertebrates, comprising of frogs, toads, caecilians, newts and salamanders; forms that are phylogenetically intermediate between fish and reptiles (Drewes, 1984; Noble, 1931; Young, 1981).

Mammals are a class of vertebrates compnsmg of warm blooded hairy animals that nourish their young using mammary glands; forms that are phylogenetically more advanced than fish, amphibians and reptiles and at about the same evolutionary level with birds.

3.0 FACTORS INFLUENCING DIVERSITY

The presence of amphibians in relation to aquatic environments is mainly determined by the size and extension of the littoral zone, macro and microhabitats availability for the different aquatic fauna and the extension of wetland ecotones with the subsequent terrestrial wetland ecosystems surrounding the aquatic environments.

Amphibians are said to be the first animals to have left water and got adapted to terrestrial conditions by acquisition of lungs (unlike lungs in fish). However, most amphibians are not completely independent of aquatic environments because they must at one time (mostly during breeding and early stages of growth) return to water for breeding and feeding.

The conservation of any aquatic ecosystems cannot therefore be complete without conserving the immediate surrounding habitats, which also happen to be important for most amphibians, some reptilian and mammalian fauna.

4,0 STUDY AREAS

Napoleon Gulf: The Napoleon Gulf was first surveyed for suitable sample sites. Four sites were selected, three on the Northern shoreline and one on the Southern shoreline. These sites were subsequently geo-referenced using a Magellan GPS 2000. The following co-ordinates represent the respective sites:

ULATI Stream:	00° 25' 22''N, 33° 13, 52''E
Masese Quarry:	00° 26' 01 "N, 3)°14' 04"E
Railway Terminal	**00° 24' 55"N, 33° 12' 32"E**
Bugungu Stream:	00° 24' 04"N, 33° II' 29"E

The dominant vegetation in the ULATI stream sample area is mostly pure stems of *Cyperus papyrus* with a few Water Hyacinths at the edges of water. This is also true for the only site sampled on the southern bank near Bugungu fishing village.

Vossia sp., the Water Reeds and the Ambach trees just at the edges of the water on the other dominate the Masese Quarry and the Railway terminal areas

Majanji - Lake Victoria: Two sites were selected along the shoreline for sampling. The following co-ordinates represent the respective sites:

Maddwa Landing Site:	00° 14' 28"N, 33° 59, 36"E
Sio River:	00° 13' 53"N, 34° 00' 30"E

The dominant vegetation in the Sio River sample area is mostly pure stems of water reeds with a few Water Hyacinth at the edges of water, while *Vossia* sp. dominates Maddwa landing site that was sampled for amphibians. A few Ambach trees just at the edges of the water were encountered scattered in the study area at the edges of water.

The whole area was characterised by a shallow shoreline such that fishermen could cross the lake at this point from Maddwa landing site to Kenya using a pole.

KOKI LAKES (MBURO AND KACHERA)

Lakes Mburo and Kachira were formed as a result of River Rwizi flooding downstream and overflowing the banks and the swamps of Mburo and Lake Nakivale and flooding the valleys along its course to Lake Victoria.

Lake Mburo, which is at the head-stream, is the smaller of the two lakes studied. To the north and west, the shoreline of Lake Mburo is generally deep with a dense mass of floating papyrus swamp (up to 50m in some places). The swamp is intermixed with twiners. The whole lake was surveyed using a boat for megafauna while two other sites were studied for amphibians and small mammals. These sites were Nyanga point 00 ° 41'\5"5; 30^0 55'32"E and shore.s of Campsite 3 on the eastern shoreline. These were

characterised with laterite beach and boulders jutting into the lake for the fonner and muddy beach with some papyrus swamp for the later. The background was of savanna woodland of mainly *Allophylus africana.*

Lake Kachera is located downstream of the Rwizi River with two outlets. One at the tip of the lake in the north-east and another at the base in the south through the swamp giving rise to Lake Kijanebalola which also has an outlet to the east and Lake Victoria. The lake has generally reduced in volume creating dry beaches with drying wetlands mainly of papyrus swamp behind. There is a lot cultivation taking place especially the northern axis of the lake sometimes up to the lake.

Three sites were studied namely at Lwanga (00034'14"S; 31^{0}06'27"E), River Rwizi inlet (00° 39'58"S; 31°04'29"E) and Kakoma landing site (00° 39'41 "S; 31°39' 14"E) where a trapline was place for catching small mammals.

LAKE WAMALA AND KYOGA LAKES

Lake Wamala: The waters of Lake Wamala have constantly been fluctuating between highs and lows over several years. At one time, when Lake Wamala receded, the swamp grew up more profusely covering large areas. When the floods came in with the £1 *nino* rains, the papyrus swamp fonned floating islands while some of it kept anchored to the Ambach trees.

The dominant vegetation of the ecotone areas of Lake Wamala was papyrus - *Cyperus papyrus* and the Ambach - *Aeschynomene* sp. These extend to fonn a swamp for over 5-km in some areas with n average of 500 -I OOOkm stretch in most areas.

Georeferencing Sample areas
Kibinba river outlet. 00° 21' 05"N, 31° 52, 28"E
Because of the fringing and floating swamp up to about 8 kilometres from the water edge, sampling could not be done for rodent trapping.

Katiko landing site 00° 22' 57"N, 31° 58, 03"E
This site was intensively sampled for amphibian species for three nights.

Bagwe Island trap-line: 00^{0} 21' 33"N, 31° 54, 34"E
This site was sampled for small mammals.

KYOGALAKES

Iyingo Bay: Sampling for small mammals was carried out along a 200-metre access channel for canoes on the western bank. For herpetofauna, a stretch of about 1km was studied with evening sampling being carried out around lyingo landing site

where other wetland vegetation such as the water lilies, *Cyperus* species and the water hyacinth abound.

Georeference of study sites

Iyingo Bay landing site: Trap-line: 01° 18' 39"N, 33° 18, 22"E

Lake Nawampasa: Lake Nawampasa is a small lake surrounded by swamp vegetation of mainly *Miscanthidium* Papyrus abounds towards the inner edges of the water while a rare aquatic grass by the name *Urythrum digitatus* which is free floating together with the water lilies form an extensive wetland of the recently flooded area.

Sampling for small mammals was done between along a 200-metre stretch access route to landing, on ether side of the channel, up to the edges of open waters. Trap-line: 01° 16' 28''N, **33⁰ 2I, 32"E**

Lake Nakuwa: The waters of Lake Nakuwa are rillher turbid due to sedimentation and mud. banks are muddy too and the wetland is dominated on the lakeside by a healthy papyrus swamp. *Suddia* and the Water hyacinth reappear as free floating and fringing respectively. Floating islands are quite common too. Sampling for small mammals was done along a 200-metre stretch at the edges of the lake, mostly in the pure papyrus.

Trap-line: 01° 15' 25"N, 35° 25' 29"E
Sampling for amphibians was carried out close to the landing site accessing the lake.

5.0 STUDY METHODS

Museum special traps (Sherrnan..traps) and break back traps were used for sampling small mammals in the all sample sites. Other mammals were opportunistically recorded whenever they were encountered in the study area. The traps were baited using bait prepared from wheatabix and peanut butter. 25 to 30 traps were set in each study site.

An attempt to use the Time Constrained Count (TCC) technique was futile as the time of residence in each study site was short (usually 2 nights or less) the method involves moving through a homogeneous habitat in unit hour, recording every species encountered, heard or seen. It requires the person sampling to know very well the calls made by each species. Relative abundance would be estimated by giving a species that calls in the first 10 minutes of a sample hour a value of six (6), another species calling in the next 10 minutes a value of 5 and so on until the last 10 minutes when a species that calls then receives a value of 1. Subsequent TCCs would be added together for each species and a mean score calculated. A species with a high mean score is said to be more abundant than on with a lower mean score.

Opportunistic Hand catching of amphibian species was the most utilised method. Using a torch with a strong beam of light to locate the amphibians, [would grab the amphibian specimen and take it to the lab for studying morphometries. Voucher specimens would then be prepared, tissues fixed using 10% formalin and preserved using 40% alcohol.

Reptiles could only be studied using opportunistic recording.

6.0 STATUS OF EACH TAXON IN THE VICTORIA AND KYOGA LAKE BASINS WITH mCN RED LIST CATEGORISATION

A total of 18 amphibian species, 14 reptile species and 15 mammal species were recorded for the Victoria Lake Basin ecosystem. Alternatively, 18 amphibian species, 12 reptile species and 5 mammal species were recorded for the Kyoga Lake Basin.

Amphibians

Table 1: Amphibian fauna of the Victoria Lake Basin

Species	Local Name	Napo	Maja	Mbur	Kachi	Waml
1. *Buro regularis*		P	8	P	P	30
2. *Buro vitattus*		P	17			55
3. *Hyperolius cinnanamomeovenlris*		P	3			
4. *Hylarana albolabris*		P	4			1
5 *Hyperolis kivuensis*		P	17	9	P	5
6. *Hvperolius nasulus*					P	2
7. *Hyperolius quadrivittalus*		P	36		P	10
8. *Hyperolius virdiflavus bayoni*		P	21	4	P	5
9. *Hyperolius viridi/lavus viridi/lavus*						5
10. *Kassina*				P		
11. *LeploIJelis bocagei*				P		
12. *Phrynobalrachus nalalensis*					P	I
13. *Plychadena mascareniensis*		P	6	P	P	2
14. *Ptychadena porissisima*		P	2	P	P	1
15. *Ptychadena oxyrrhynchus*		P			P	
17. *Rana*		P	2			I
18. *Rana occipilalis*		P	10			1

Where:
Napo = Napoleon Gulf - Lake Victoria; **Maja** = Majanji - Lake Victoria
Mbur = Lake Mburo; **Kachi** = Lake Kachira; **Wama** = Lake Wamala

Table 2: Showing the number of species in each bio-indicator taxon in each Lake.

Sampling Site	Taxonomic Group		
	Amphibians	Reptiles	Mammals
VICTORIA BASIN LAKES			
Napoleon Gulf	12	9	6
Majanji - Lake Victoria	I 1	5	8
Lake **Mburo**	7	9	4
Lake Kachera	9	7	4
Lake Wamala	13	4	6
KYOGA BASIN LAKES			
Iyingo - Kyoga major	I I	11	5
Lake Nawampasa	13	4	4
Lake Nakuwa	12	4	4

Species Diversity

In the Victoria Lake basin, one notes that Lake Wamala was the most species diverse site in terms of amphibian fauna with 13 species (table 2 and Fig. 1), followed by Napoleon Gulf(l2 species) and trailed by Lake Mburo which was species poor with only 7 species. In the Kyoga Lake basin, Lake Nawampasa uniquely stands out as the most species rich site (13 species) Followed by Lake Nakuwa (12 species) and trailed by Iyingo (12 species).

However, overall, the Kyoga basin lakes were observed to have relatively high species diversity (average 12) than the Lake Victoria Basin sites.
In terms of reptiles, Lake Mburo and Napoleon Gulf were the most species rich sites (9 species each), while Lake Wamala was the most species poor site (4 species). This could be due to extensive swamps and the periodic flooding of the lake, causing destruction of reliable reptile habitats.

In the Lake Kyoga basin, lyingo was the most species rich site (II species) while Lakes Nakuwa and Nawampasa were species poor (4 species each). The high diversity at Iyingo could be attributed to the extensive Precambrian rock outcrops, which at some places enter the lake waters. Iyingo was also the only site so far where the Striped Skink *(Mabuya stria/a),* the Rainbow Skink *(Mabuya quinque/aenia/a)* and the Speckle-lipped Skink *(Mabuya Mculilabris)* are sympatric.

In terms of mammal species in the Victoria basin, Majanji had the highest species diversity (8 species) followed by Lake Wamala (6 species) and trailed by the Koki (Mburo and Kachera at 4 species each). The recording of the Papyrus Rat *(Pelomys hopkinsi)* in the River Sio - Majanji sampling area compounds the significant importance of conserving this area. This species has only been recorded twice in Uganda. Its presence in the swamps along the river makes the site the only third locality where this species has

recorded in Uganda. The diminutive extensive swamps of Lake Wamala are very important in conservation of the Sitatunga *(Tragelphus spekii*

In the Kyoga Lakes, Iyingo was the most species diverse site (5 species) while both Lakes of Nakuwa and Nawampasa show a poor mammal diversity of 4 species each. Note however, the presence of the Sitatunga, an IUCN indexed species, makes the swamps surrounding these lakes important habitats for its conservation.

Table 3: Amphibian fauna of the Kyoga Lake Basin

Species	Local Name	Iyingo	Nawampasa	Nakuwa
I. Sura regularis		10	6	P
2. Sura vilallus		55	41	P
4. Hy/arana albo/abri.>			2	P
j. HYlJerolis kivuensis		5	9	P
6. HVlJerolius nasulus		2	3	P
7. HVlJerolius auadrivillalus		10	13	P
8. HVlJero/ius virdiflavus bayoni		5	7	P
9. Hyperolius viridif/avus viridif/avus		5	6	P
10. Kassina senegalensis		I		
II. LelJlOlJe/is bocagei			2	
12. Phrynobalrachus nala/ensis		2	3	P
13. PIYchadena mascareniensis		2	I	P
/7. Rana		I	2	P
18. Rana occipitalis		2	7	P

About 26 amphibian species were envisaged to be encountered representing about 25% of the total number of species in Uganda. Of these, 8 species have so fan not been encountered namely: *Bu/o sleindachneri, Hy/aranti ga/amensis, Hyperolius kivuensis bilubercu/alus, H paral/e/lls argentovillis, H v. variabilis, Leplope/is christyi, Phrynobalrachus ukingensis mabibiensis* and *Ptychadena anchilae.* It is hoped that as more sampling during different climatic regimes is done, more species will be encounterd.

There is a world-wide decline of Amphibian Populations. Uganda's Amphibian populations are not well known. The IUCN Red List Category for most amphibian species can be said to be Data Deficient.

Reptiles

Table 4: Reptilian fauna of the Victoria Lake Basin

Species	Local Names	Napo	Maia	Mbur	Kaehi	Wama
1. *Adolphus Jacksonii*	Jackson's Forest Lizard			P		
2. *Mabuya maculilabris*	Speckle-lipped Skink	P	P	P	P	P
3. *Mabuya slriala*	Common Striped Skink			P	P	
4. *Chamaeleo*	Smooth Chameleon		P			
5 *alricollis*	Common Tree Agama			P	P	P
6. *Alraclaspis*	Burrowing Viper	P				
7. *Dl'omophis* sp.		P				
8. *Meheleya capensis*	File Snake	P				
9 *Naja melanoleuca*	Water Cobra	P	P	P	P	P
i 0 *Naja*	Spitting Cobra			P		
ii. Psammophis sibilans	Sand Snake	P				
12. PVlhon sebae	Rock Python	P	P	P	P	P
13. Varanus nilolicus	Monitor Lizard	P	P	P	P	
i4. Cocodylus nilolicus	Nile Crocodile	P		P	P	

Table 5: Reptilian Fauna of the Kyoga Lake Basin

Snecies	Local Names	lyingo	Nawampasa	Nakuwa
i. Hemidactylus mabouia brookii	Common House Gecko	Common		
2. *Mabuva maculilabris*	Soeckle-liooed Skink	Common	Rare	Rare
3. Mabuya auinauelaeniala	Rainbow Skink	Rare		
4. *Mabuva striala*	Common Strioed Skink	Rare		
5. *Chamaeleo*	Smooth Chameleon	Rare		
6. *Agama agama*	Common Agama	Common	Rare	Common
7. *Naia melanoleuca*	Water Cobra	Rare	Rare	
8. *Naja*	Spitting Cobra			
9. *Philovthamnus* so.		Rare		
10. Python sebae	Rock Python	Rare		Rare
11. Varanus niloticus	Monitor Lizard	Common	Common	Common
i2. Cocodvlus niloticus	Nile Crocodile	Rare		Rare

Of the predicted reptile species, only the House Snake *(Lamprophis lulginosus)* the Gracile Chameleon *(Chamealeo gracilis),* Bell's Hinged Tortoise *(Knixys belliana).* Others include the Puff Adder *(Bitis al'ietans),* the Tree Snake *(Thelotomis kirtilandi),* the Homed Viper *(Bitis nasicomis),* and the Eastern Egg-eater Snake *(Dasypellis scabra).*

The Terrapin *Pelomedusa subrufa* was recorded more kilometres for Lake Nawampasa.

Table 6: Showing reptilian species with their IUCN Red List Status and CITES categories

Class	Order	Family	Species	Common Name	Author & Year	IUCN St;HuS	Cites Appendix
Reptilia	Testudines	Pelomedusidae	*Pelomedusa subrufa*	African Helmeted Turtle	Bonnaterre 1789	E	III
	Crocodylia	Crocodylidae	*Crocodylus niloticus*	Nile Crocodile	1768	E	1/
	Sauria	Chamaelionidae		Gracile/Graceful iSpur-heeled Chamaeleon	Hallowell 1842	E	1/
			Chamaeleo laevigatus		Gray 1863	E	1/
	Serpentes	Boidae	*Python*	African Water/Rock Python	Gmelin 1789		

Mammals

Table 7: Mammalian fauna of the Victoria Lake B,tsin

Species	Common Name	Napo	Maja	Mbur	Kaehi	Wama
1. *Lophuromys sikapusi*		2	2			
2. *Mastomys*	Multimammate					
3. *Pelomys 170 kimi*	Papyrus Rat		2			
4. *Crocidura infinelisl1llls*	Least Dwarf Shrew					P
5 *Crocidura muurisca*	Nothern Swamp Shrew	2				p
6 *Cocidura olivieri*	Nothern Giant Musk Shrew					
7. *Crocidura I/Irbo*	Woodland Shrew			2		
8. *Gel/umys*	Rusty-nosed Rat	2	?			
9 *Praomys /c((:ks()}7;*						
11) *Atilax paludinosus*	Marsh Mongoose	P	P		P	P
11. *Lutra mucll/icu/lis*	Spot-necked Otter	6	?	6	?	P
12. *Geneta servelina*	Serveline Genet	P				
13. *Hippop0/{llJllllS*	Hippopotamus		?	181	?	
14. *rrugelphlls spekii*	Sit:.Hllllga					I)
15. *CerCIJpillJeclis*	Vervet Monkey		)			P

Table 8: Mammalian fauna of **the Kyoga Lake Basin:**

Species	**Common Name**	**Ilyingo**	**Nawampasa**	**Nakuwa**
I. *Crocidura mourisca*	Nothern Swamp Musk Shrew	P		
2. *Lutra maculicollis*	Spot-necked Oller	P	P	P
3. *Alilax oaludinosus*	Marsh Mongoose	P	P	P
4 *soekii*	Sitatunga	P	P	P
5. *Cercooithecus aethiops*	Vervet Monkey	P	P	P

In lake Mburo, the megafauna survey came up with 181 hippos *(Hippopotamus amphibius)* and 6 Spot-necked Otters *(Lutra maculicollis).* Fewer hippos (86) were recorded in the deeper waters while the shallow waters on the facing shoreline had the greater number of hippos (95).

Table 9: Showing the mammals in categories and with preferred habitats, local and global ratings

Mammal group		Preferred habitat	Global rating	Local rating
Primates	Scientific Name			
Vervet Monkey	*Cercopithecus aelhiops*	G	NE	W
Ungulates				
Sitatunga	*Tragelaphus spekii*	Wt	III	L
Hippopotamuses	*Hippopotamus amphibius*	W	V	W
Carnivores				
Marsh Mongoose	*Herpestes ichneumon*	0		W
Spot Necked Otter	*Lutra maculicolis*	Wt	[]	W
Servaline Genet	*Genella servalina*	Gn		W

The preferred habitat acronyms represent Grassland- G; Wetland (swamp or open water) - Wt; and Generalist - Gn.
Global ratings based on Standard IUCN categories are also given for some of the species where this is relevant and this shows none of the species as being of. considerable conservation status.

The extra column for the local rating probably carries more significance for purposes of this study. The Sitatunga is a species of wetland habitats, particularly preferring papyrus swamp. In many places in Uganda the extent of this kind of swamp continues to be exerted upon resulting into a loss of habitat for this species. The rest of the large mammal species recorded are generally widespread (W) in the country, although Kingdon (1997) suggested that Hippos are considered very vulnerable to determined hunting despite their extensive overall range.

The Spot Necked Otter *Lutra maculicolis* is still locally abundant on the Africa wide scale but is on the retreat in many areas.

Small Mammals

These include the non-violent rodents, and small carnivores and the bats. Although not of very much apparent economic worth, these are a very significant component of any terrestrial ecosystem. Impacts on the dynamics of their populations, species composition and preferred habitats may gross and irreversible impact on the ecosystem for the larger species of mammals.

Large mammals

These are large and conspicuous that do not require intrusive methods to document their presence. In this category are included groups of mammals such as the primates, ungulates and carnivores.

The non-violent small mammals

Table 10: Showing species of the non-violent small mammals yet to be caught in the study areas

	Preferred habitat
Order Insectivora	
I. Crocidura hildef!Grdae	*Gn*
2. *Crocidura iacksoni*	G
3. *Crocidura lurba*	*Gn*
4. *Crocidura olaniceos*	*Gn*
Order Rodentia	
5. *Aelhomvs kaiseri*	G
6. *Grammomys dolichurus*	*B*
7. *Lemniscomys barbarus*	G
8. *Lemniscomvs slriarus*	G
9 *LonhuromysflavoDunclarus*	*Gn*
IO. Loohuromvs sikaousi	G
II. Mus gratus	
12. Mus minuloides	*Gn*
I3. Xerus erylhroous	0
14. Thryonomvs gregorianus	G

Table **II:** The volent small mammals or Bats yet to be recorded

Family PteroDodidae	
1. *Epomophorus labiatus*	Epaulleted Fruit Bat
2. *Rousettus*	Egyptian fruit Bats
3. *ROllsettus*	Angolan fruit Bats
4 *i'v!icropteropus pusilius*	Dwarf Epaulleted fruit Bat
Family Verspetilionidae	
5. *Pipistrelius nanus*	
6 *Eptesicus tenuipinis*	
7. *Mvotis*	
Family Me2adermatidae	
8. *Lavia frons*	Yellow Winged Bat

7.0 THREATS AND **THEIR** CONSEQUENCES

The shores of Lake Victoria are having increased human activity, which may be harmful to the survival of amphibian species and associated biodiversity such as birds and mammals that feed on them. Apart from the traditional activities of fishing and trade, dam construction, several fish factories, horticultural farming, building of beaches and other infrastructure is on an increase along the shores and the surrounding habitats. It is not well known what effect such activities are having on the survival of amphibians and other related biological diversity.

8.0 INFORMATION GAPS

Few studies documenting the status of amphibians, reptiles and mammals have ever been carried out in the study areas. This calls for an in depth research study that will give good results on the current status of the fauna. The study carried out was a form of rapid appraisal. This could have resulted in failure to record some of the predicted species. The rapid appraisal also could not allow for sampling of the violent mammal species.

Some of the methods such as the Time Constrained Count (TCC) techniques could not be utilised because of the short time of residence in each study area

9.0 STRATEGIES AND INTERACTIONS

A detailed study of the fauna shall continue looking at the following

- Identification and documentation as far as possible the presence, distribution and relative abundance of the species of mammals, amphibians and reptiles and habitat types in the affected area with special reference the area of expansion and areas affected by project activities.
- Description of the conservation status e.g. IUCN Red List and CITES categories, if known, of the fauna occurring in the area.
- Evaluation of the current state of the fauna in the study area and any important environmental constraints in terms of human impacts, from the perspective of biodiversity conservation. habitat map will be produced indicating areas of high conservation value.
- Brief description of the ecology of the species identified with special attention given any rare, threatened, endemic or near-endemic species. Particular reference will be made to environmental factors likely be altered by implementation of the landfill expansion,
- Utilisation of more trap to improve on the trap area and trap success for small
- mammals.
- Utilisation of mist nets to catch the violent mammal species (i.e. bats)
- Spending more time (at least 4 nights) at each study area to counteract the
- Negative effect of rapid appraisal.
- Identification and assessment of the potential environmental short term and long term impacts – positive and negative, of human activities on the flora and fauna in the area. Likely changes in dynamics of any meta-populations will be included.

10,0 CONCLUSIONS AND RECOMMENDATIONS

It was clearly observed that the Majanji area is a unique area worth conserving, as it contained one of the three know habitats of the Papyrus Rat *(Pe/omy hopkinsi).* The site's proximity with the border with Kenya makes this habitat worth conserving jointly. Lake Wamala is another important habitat, especially for its extensive swamp and floating islands. These sites are not only good for conservation of mammals but were also observed to equally contain high diversity of amphibians.

However for reptiles, the lakes in the rather arid countryside (Koki Lakes) seem to be more important in the conservation of this group.

[n the Kyoga Lake Basin, Lake Nawampasa stands out as the most important habitat for amphibians while Ilyingo strikes a balance for the three indicator studied.

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