A site specific total count of Shoebill *Balaniceps rex* and Wattled Crane *Bugeranus carunculatus* in the Malagarasi – Moyowosi Ramsar Site

Commissioned by; The Sustainable and Integrated Management of Malagarasi – Moyowosi Ramsar Site Project (SIMMORS), September 29th – October 3rd 2005

Background

As part of its commitment to the sustainable management of the Moyowosi – Malagarasi Ramsar site (MMRS), SIMMORS has commissioned the Tanzanian Wildlife Research Institute (TAWIRI), assisted by Ngorongoro Conservation Area Authority (NCAA), Tanzanian National Parks (TANAPA) and the Wildlife Division (WD) to carrying out a series of aerial surveys of the RAMSAR site. The main part of this survey is aimed at large mammals, vegetation and human activities and is conducted by TAWIRI. Previous surveys of his area have shown that the standard Systematic Reconnaissance Flight (SRF) methodology used by TAWIRI is unsuitable for Shoebill and Wattled Crane (Dinesen and Baker, *in press*) and thus a total count and site specific SRF of Lake Nyamagoma was carried out with a focus on these target species. In order to fully meet the requirements outlined by SIMMORS, a review was made of previous surveys and a detailed study was made of the area, which then enabled us to concentrate on five main areas. Three days where then spent conducting total counts and specifically adapted SRF in the five main areas, as well as Shoebill and Wattled Crane all waterbirds that it was possible to identify were recorded.

Introduction

The MMRS is located in Western Tanzania and encompasses between 3.5 - 4 million hectares of mainly *Brachystegia, Julbernardia* and *Isoberlinia* woodland (Miombo), grassland and seasonal floodplain (TAWIRI, 2001 give a figure of 4.2 million ha, Nakotagu & Ndaro, 2004 give a figure of 3.25 Million ha). The permanent wetlands are restricted to parts of the Moyowosi River, Moyowosi / Kigosi floodplain, Lake Nyamagoma, Lake Sagara and the Ugalla River, and encompass approximately 517,352ha, 12.4% of the total Ramsar site[1] (NB. Dry season estimate, November 2001). The riverine is dominated by *Borassus* and *Phoenix* palm with stands of *Acacia* Spp on the floodplain and in low lying areas.

The permanent wetland area is a complex of drainage systems and small lakes which form a core dry season wetland area in the centre of the Ramsar site. In terms of catchment, the main Moyowosi and Malagarasi Rivers both originate in the highlands of Burundi, whilst the Nikonga, Kigosi and Gombe Rivers drain the Central Plateau and south of Lake Victoria. These Rivers join to form Lake Nyamagoma, the second largest lake in the MMRS, and then flow west into Lake Tanganyika as the Malagarasi River. Lake Sagara, the largest lake in the MMRS is located south of Lake Nyamagoma, this lake is fed mainly by the Ugalla River and other smaller wet season drainage. Lake Sagara drains into Lake Tanganyika via the Ugalla River, which joins the Malagarasi River north of Lake Sagara.

[1] TAWIRI. *Aerial Census of Malagarasi-Muyowosi Ramsar Site, November 2001.*

Previous Ornithological Surveys of the area

TAWIRI[2] has been carrying out aerial surveys of the Game Reserves with the Ramsar site over the past 10 years in order to provide the wildlife division with population estimates for hunting quotas. Although the main focus has been on counting large mammals, data has also been collected on Shoebill, with more recent surveys including summary counts of; Wattled Crane, Goliath Heron, Saddle-bill Stork, Crowned Crane, Pelican (exact species not defined) and Fish Eagle. Although this methodology is not designed to count wetland birds, it does give us some indication of population levels for this large wetland site, which would otherwise remain an avifaunal enigma.

In 1992, a survey of the Moyowosi and Kigosi Game Reserves as well as Gombe and Luganzo Game Controlled Areas, was carried out by Frankfurt Zoological Society (TWCM)(Jones and Hill, 1994) for the Director of Wildlife. This survey was conducted to provide a complete overview of the wetland eco-system, both concentrations and populations of wildlife as well as issues relating to the conservation and sustainable utilisation of the area. An element of the aerial surveys in 1992 carried out by TWCM focused on Shoebill and Wattled Crane habitats and recorded five Shoebill per square kilometre in areas of flooded grassland (Jones and Hill, 1994). Using data collected during aerial surveys in 1992, population estimates of some wetland bird populations were calculated, the results of which are summarised below in table 1..

Table 1. Summary of wetland bird population estimates (Jones and Hill, 1994).

Species	Population estimate	Standard Error (se)
Goliath Heron	521	441.8
Saddle-bill Stork	1,398	776.9
Crowned Crane	58	37.2
Pelican	29	18.0
Fish Eagle	850	551.9
Shoebill (Sept, 1990)	2,528	899
Shoebill (June, 1993)	1,028	442.7
Wattled Crane	204	96

In January 1995, the first co-ordinated count of the major wetlands of Tanzania was conducted by the Wildlife Conservation Society of Tanzania (WCST) (Baker, 1996). This included land based counts of the Moyowosi and Kigosi Game Reserves and Ugalla River Game Reserve. These counts resulted in two species being counted in sufficient numbers to qualify (biologically) the site as a Ramsar area under the defined Ramsar 1% levels; Great White Egret (Jan 95' Count: 802, 1% level: 300) and White-winged Black Tern (Jan 95' Count: 2,408, 1% Level: 2,300) (Baker, 1996). In addition to these two species, a further 10 species of wetland birds were counted in sufficient numbers at this site as to qualify (Ramsar 1% level) if the area had been counted more thoroughly (Baker, 1996). Although subjective, this is an important consideration and outlines how much we do not know about the avifaunal diversity at this wetland site and its biological potential.

[2] Previously the TWCM under Frankfurt Zoological Society, thus referred as such in reports prior to 2002.

Species of Global significance at the Malagarasi --Moyowosi Ramsar site

Other than globally significant numbers of migratory waterbirds, which have been outlined in the *Tanzania Waterbird Count* (Baker, 1996) the MMR supports significant numbers of rare and restricted range species which have specific habitat and ecological requirements that limits their global range. Due to their current global status and specific habitat requirements. Shoebill (Whale-headed Stork) *Balaniceps rex* and Wattled Crane *Bugeranus carunculatus* are considered to be of special interest to the SIMMORS projects sustainable and integrated management of this globally important wetland. For this reason the main focus of the survey and thus the report concentrates on these species.

Shoebill (Whale-headed Stork) *Balaniceps rex*

Global range and current status

From the Sudd region of Sudan, west to the Aweil area and east to the swamps of western Ethiopia. Uganda to Katanga in Southern Zaire and the Bangwelu wetlands in Zambia. In Tanzania, is restricted to the MMR, with odd records from Rukwa Game Reserve, Amboseli National Park (Kenya) (in; 1999), Katavi National Park (in; 1983), Lake Burigi (in; 1995), Serengeti National Park (in; 2000) and the Kagera River (Baker, 1984) (Map 1). The current population levels are estimated to range from; 11,000 to 15,000 birds (Hancock *et al*, 1992), 12,000 to 15,000 birds (Rose and Scott, 1995). These population levels are based on aerial survey techniques due to the near impossibility of conducting accurate land based surveys of this species.

Collar *et al* (1994), considers this species to be near-threatened, this category is subjective, however based on the ***level of current knowledge of the species***, this category allows for upgrading to threatened if data becomes available to indicate a greater level of threat to this species than is currently known.

General Habits

Frequents large freshwater swamps with vegetation, grasses, reeds and papyrus (Brown *et al*, 1982) but none specifically. Extended toes indicate an adaptation to walking on floating vegetation. Shoebill obtain their prey (mainly fish) in shallow water, or in deeper water if platforms of floating vegetation are present (Guillet, 1979). The aspects of foraging sites are specific with birds preferring vegetation along the edge of open water or in channels (often created and maintained by large mammals) with sparse emergent cover (Guillet, 1979). Prey is predominately fish, however frogs, turtles, water snakes, possibly some small mammals and waterbirds have also been recorded as a food sources (Brown *et al*, 1982). Main prey is Catfish and Lungfish taken from the surface by a unique "collapsing" method (Guillet, 1979). These species of fish are known to frequent large ephemeral wetlands such as the MMR, preferring well oxygenated waters. The populations of these fish species are know to follow a boom and bust life-cycle pattern, expending rapidly with flooding following the long rains and decreasing or (in the case of Lungfish) burrowing into mud during the dry season, thus becoming unavailable to as a food source for Shoebill. Laying dates; (Uganda; April – June)(Zambia; April – early May (Buxton et al, 1978)), nests in swamps, usually on floating vegetation.

Shoebill, are believed to be mainly sedentary however, there is much evidence of wandering in Tanzania, indicated by the records shown on map 1. Seasonal movement to possible sites in Zambia

(Bangwelu 800km south-west of MMR), Sudan (Sudd; 1500km north-north-west, southern records 998km of MMR (Nikolaus, 1987)), Rwanda (Kagera National Park; 300km north of MMR) Uganda (Kagera River; 350km north of MMR) is unknown. However, recent satellite monitoring has shown that White Storks can fly 200km between suitable sites, this distance may also be possible for Shoebill.

Wattled Crane *Bugeranus carunculatus*

Global range and current status

Globally threatened endemic resident to two main areas in Sub-Saharan Africa; Ethiopia and Central Southern Africa. In central and southern Africa locally abundant to rare, but declining, endangered or recently extinct in some areas (). Requires large home territories and reputed to achieve low breeding success, although population levels in the major stronghold (Kafue Flats, Zambia) remain stable (Howard, 1989 in Collar *et al*, 1994). Global status; Vulnerable (Collar *et al*, 1994).

General Habits

Frequents large open areas including seasonally wet grassland, open marsh and river edge usually above 2000m, however occurs below 1000m in non-breeding season (Brown *et al*, 1982). Feeds on tubers and rhizomes in shallow water, rarely entering deep water (2.8%) (Konrad, 1981 in Brown *et al*, 1982) . Predominantly gregarious, forming flocks ranging from 5 to 300 and may fly long distances to roost. Nests are constructed from vegetation and twigs in seasonally flooded areas such as the Ugalla floodplain before water levels begin to recede. Numbers breeding depends on flood levels and thus the availability of suitable nesting sites.

Seasonal movement is poorly known, and data show a decrease in population levels following the end of the long rains in Ethiopia (October onwards); in Botswana numbers are known to increase in the wet season (January to May) (Brown *et al*, 1982). Seasonal population increase in Botswana is possibly due to movement from Kafue Flats in Zambia. Very little is known about population fluctuations in the Tanzanian population and seasonally preferred localities are possibly due to observer bias rather than evidence of movement. There are no 'odd' records for Tanzania or records outside of major wetland sites. Based on current data this would suggest no northward movement, however seasonal movement to Zambia or southern Zaire is currently unrecorded and unknown.

Study Area

The Moyowosi – Moyowosi Ramsar site is a complex of permanent wetlands (swamps and open water), seasonal floodplain and mixed woodland and bushland covering an area of some 4.1 million hectares (estimate, see Table 2). From aerial survey results (Tawiri, 2002) it is possible to estimate vegetation coverage (see Table 1 below).

Table 2.Estimated Area of habitat types in MMRS.

Habitat Type	*As percentage of total area*	*Estimated Area (ha)*
Woodland	61	2,545,042
Forest (or dense woodland)	4	166,888
Permanent Swamp	***3.2***	***133,510***
Grassland	***9.2***	***383,842***
Wooded grassland	16.9	705,102
Bushland	2.8	116,800
Cultivation	2.3	95,960
Open water	0.6	25,033
Total	**100**	**4,172,177**

Habitat suitable to Shoebill and Wattled Crane is highlighted. The combined area of Permanent Swamp and Grassland is 517,352ha (12.4%) of the total area of the MMRS.

Based on a combination of previous survey results ([3]and[4]), ground observations and known habitat data, five main study areas were identified as containing habitats where the target species are likely to occur. It was recognised by the survey team that the areas required to be surveyed during the dry season would be more restricted than those in the wet season. For the purpose of this survey, which was conducted in the dry season, it was resolved to overfly the potential habitats and assess *ad hoc* where the suitable habitat was to be found.

Table 3. Study Sites

Area	*Area description*
A	Moyowosi river valley and floodplain (to confluence with Kigosi).
B	Igombe / Kigosi river and floodplain complex
C	Lake Nyamagoma and surrounding swamp system
D	Lake Sagara and surrounding swamp system, including Ilumbe Swamp
E	Ugalla River valley and floodplain

[3] TAWIRI, *Aerial Survey in the Malagarasi-Moyowosi Ramsar Site Core Area, Wet Season 2003*.
[4] Erftemeijer, P. L. A. (2001), *Status of Vegetation, Disturbances and Threats to Habitats in the Malagarasi-Moyowosi Ramsar Site (Tanzania), November 2001*.

A. Moyowosi river valley and floodplain (to confluence with Kigosi).

The Moyowosi river rises in the north of the RAMSAR site, one tributary becoming discernible at approx E 31'30''00 S 3'32''00 running in a southerly direction, and another appearing at approx E 30'50''00 S 3'52''00 running west to east. The two tributaries join at approx E 31'15'00 S 3'43''00, and the drainage continues in a generally southerly direction until it disappears in the open floodplain adjacent to the Kigosi and Igombe river confluence[5].

The drainage line is characterised by a narrow channel of apparently permanent water in the very centre which is populated by stands of aquatic vegetation such as Papyrus (*Cyperus papyrus)*, various grasses such as *Vossia cuspidata, Andropogon africanus* and *Leersia hexandra* and other swamp vegetation including bullrushes (*Typha sp*) (Erftemeijer, 2001). This vegetation is in parts rather expansive, perhaps extending into patches 500 metres across, while in other sections it declines to nothing. Further from the centre line the land is less inundated and opens into grassy vleis in varying degrees of inundation through to completely dry. The distinction between the permanent swamp and the grassland is not always easy to make, and at different times of year and in years of extreme dry or extreme wet the types and extent of the different kinds of vegetation may vary considerably. The more inundated grassland contains species such as *Hyparrhenia rufa* and *Echonichloa pyramidalis*. Further from the permanent water species such as *Pennisetum racemosa*, *Setaria sp.* and *Themeda sp.* Dominate (Erftemeijer, 2001) .

B. Igombe / Kigosi river and floodplain complex (also known as Lake Masimba when flooded).

As for the Moyowosi River basin, the confluence of these two rivers forms a large, rather indistinct swamp area when inundated. During the wet season this area is clearly a suitable habitat for Shoebill (Jones and Hill, 1994) and historically has been characterised by permanent swamps and some open water[6].

C. Lake Nyamagoma and surrounding swamp system.

This lake lies to the south of the Moyowosi Game Reserve, partly in Gombe GCA and is formed from water draining from the three rivers Moyowosi, Igombe and Kigosi to the north east, as well as water flowing in from the Malagarasi River in the north west. The lake has a considerable area of open water (53 sq km at highest water level) fringed on the western, northern and eastern shores by large Papyrus swamps and seasonally inundated floodplains. During times of rainfall water flows out from the lake to the south west to form the Malagarasi River. During this survey the water level was low with areas of open mud flats visible on the southern shore of the lake.

D. Lake Sagara and surrounding swamp system, including Ilumbe Swamp.

Lake Sagara is a large body of open water (approx 328 sq km at high water level) within Luganzo GCA bordered by a combination of miombo woodland, seasonally inundated grassland and cultivation. According to Nkotagu & Ndaro (2004) the water level varies greatly depending on

[5] Approx taken from Aerial observations (September 2005) and Hunting Technical services map, Tanzania.
[6] Nkotagu, H. H. and Ndaro, S. G. M., *The Malagarasi Wetland Ecosystem, Dar es Salaam University Press Ltd, 2004.*

rainfall and time of year. At low water level the edge of the lake presents large areas of exposed mud flats. There are small areas of Papyrus swamp to be found at the ends of three fingers of the lake, one to the north east, one to the north west and one in the south west where the Ugalla River drains in to the lake. When the lake level is high enough, water drains out of the lake also to the south west joining the Malagarasi River further to the west. During this survey the lake was at a low water level and it is estimated that the actual area of open water was perhaps 50% of the lake's largest possible extent.

E. Ugalla River valley and floodplain.

The Ugalla River forms the central feature of the Ugalla Game Reserve and flows east to west from the confluence of the Walla and Katubiki Rivers, eventually flowing north into Lake Sagara. Between this confluence and the point at which is crosses the Mpanda railway branch line, it is a broad slow flowing river with many ox-bow lakes and seasonally inundated areas along its length. After crossing the railway, the river channel is not clearly discernible and at the time of this survey no open water was evident. The river basin is characterised by a broad shallow channel containing some Papyrus swamp and tall grassy vegetation. As the channel turns north it becomes broader. The vegetation for most of this section until it reaches the southwest tip of Lake Sagara is seasonally inundated grassland with no permanent water.

Methodology

Introduction

The methods utilised for this total count were based largely on the Systematic Reconnaissance Flight technique (SRF). One of the aims of this total count of Shoebill and Wattled Crane was to develop a survey methodology that would serve as a template for future total counts. The survey aimed to develop a methodology and survey pattern that would provide total count data for the target species that approximates as accurately as possible the actual number of birds to be found within the MMRS at any given time of year or in any season.

The units were surveyed from the air in a Cessna 182 light aircraft using a mixture of SRF methodology and simple Linear Transects (LT) along river lines or along lake edges (see below). Both the SRF transects and the Linear Transects were conducted following the methodology described by Norton-Griffiths (1978). The flying altitude for the purpose of counting the target bird species was 200ft flying at an average speed of 200 km/h. In addition to the pilot there were three observers in the aircraft). A Front Seat Observer (FSO), plus two Rear Set Observers (RSO), who were specialist ornithologists.

Data Collection

Observations made along transects (whether by SRF or LT) were divided into sub-units of 30 seconds flying time (approx 1.7 km). The FSO announced and recorded the start and end of the transects and also recorded the flying height above the ground and the type of vegetation for each of the recorded sub-units.

The Rear Seat Observers recorded sightings and numbers of the target bird species, as well as occurrence for two other large water dependent birds (Goliath Heron and Saddle Billed Stork). In addition, any observation of a bird identifiable from the air was recorded.

Linear Transects: All observations were recorded, whether inside or outside of the designated count area (see; Norton-Griffiths, 1978) to give total count figures. The actual path followed during a transect of this nature was determined by the pilot as well as by the rear seat observers (RSO). During such transects it was possible to return to an area which had been overflown for double checking, or to change direction abruptly if an area was observed to the left or right of the transect that appeared to contain suitable habitat for the survey target species.

Systematic Reconnaissance Flight: Pre-determined transect lines were flown while data was collected in sub-units called by the FSO. All observations of bird species, inside and outside of the line traces, were recorded.

Survey Area

Five unit areas were identified to be surveyed by air, designed to cover all the above study sites (see Table 3).

The units surveyed are listed below in the chronological order in which they were surveyed from the air. There is no necessary logic to the order of these units except that they are areas that are accessible and possible to survey within the time of a single survey flight (about 3 and a half hours flying). Start and end points and transect data for each unit are given in Appendix 1.

Unit 1: Northern Section of Moyowosi River Valley and associated floodplain. This broad river floodplain can be surveyed satisfactorily by flying a single line transect north to south down the line of the drainage, adhering as much as possible to the centre of the river where it can be seen, or alternatively following the line of permanent swamps that define the river basin throughout its length. For this survey the most northerly section of the river was assessed and having ascertained that these reaches of the river were dry, the total count for our target species was begun where permanent green swamps appeared (see Appendix 1 for GPS refs).

During this survey many areas of habitat were affected by burning, including large areas of Papyrus swamp, river floodplain and bushed woodland adjacent to the target areas.

Unit 2: Lake Nyamagoma and surrounding swamp systems. This entire unit was surveyed using a the SRF technique.

Unit 3: Lake Sagara and surrounding swamp system, including Ilumbe Swamp. This unit was surveyed using a single line transect along the lake edge as a guide. Ilumbe Swamp was also assessed but found to be dry, and was therefore not surveyed systematically. It should be noted that this is a relatively rare state of affairs, since Ilumbe Swamp does not usually dry up altogether, except in very dry years.

Unit 4: Ugalla River valley (starting from the confluence of the Walla and Katumbiki Rivers) and its associated floodplain. This unit was surveyed as a single linear transect (LT) using the centre of the

river as a reference. On reaching GPS point [E 0301213, S 9363571] on the river, the survey was halted as the river basin was deemed to be too dry at that point to support any of the target species.

Unit 5: Lower Moyowosi River Valley and eastern floodplain and Igombe / Kigosi river and floodplain complex. Habitat description as for Unit 1. The Lower Moyowosi floodplain was surveyed as for Unit 1. The areas constituting the confluence of the Kigosi and Igombe Rivers were assessed from the air and at the time of the survey were dry and contained no suitable habitat for the target species.

Areas not covered by the survey:

1. The Malagarasi River in the west of the MMRS. Erftmeijer (2001) notes that there is a small extent of Papyrus swamp to be found in this part of the river basin.
2. The Ugalla River from [E 0301213 S 9363571] to its inflow into Lake Sagara (E 0274286, S 9417143, approx 69 km).
3. Floodplain between the confluence of Moyowosi Kigosi Igombe rivers and the north east corner of Lake Nyamagoma (approx 33 km).

Results

In order to both compare the different methodology and obtain a realistic population estimate, all results are to be incorporated for analysis.

Table 3. Results of aerial surveys, September – October 2005.

Unit	Area	MB & JA Total Count		Tawiri Total Count*		SRF transposed population levels[2]	
		SB	WC	SB	WC	SB	WC
1	Upper Moyowosi	3	2	0	4	-	-
2	Lake Nyamagoma	17	23	23	2	32 (±23)	46 (±13)
3	Lake Sagara	1	2	11	0	-	-
4	Ugalla River	0	0	0	0	-	-
5	Lower Moyowosi	2	0	9	17	-	-
	Total	**23**	**27**	**43**	**23**	**-**	**-**

Clearly, Lake Nyamagoma represents an important dry season refuge for Shoebill and possibly an important area for Wattled Crane. The figures showing total counts do not represent the same effort by the different survey teams but clearly show a site preference.

- *Tawiri Total Count data was taken during TAWIRI annual SRF counts of the area, September 2005.
- [2] SRF transposed Population levels from MB & JA Total Count.

Discussion

This dry season survey was conducted by two teams. Tawiri, as part of their annual SRF counts of the RAMSAR site, conducted transects of the area the week prior to this more specific Shoebill and Wattled Crane count of the area. The methodology differed from this survey in that Tawiri used the standard 5km transect width SRF technique over the entire are, and was not specific to our target species. However the results in table 3 clearly show that both our survey and Tawiri's recorded the majority of Shoebill at one site, Lake Nyamagoma. This discussion will focus on that site, and also reviews briefly the other four sites covered by the survey.

Lake Nyamagoma

The difference in numbers recorded (17 – 23, Table 3) could be due to a number of factors, including observer bias and the randomness which is inevitable in these types of surveys. Judging from the available data we can say that the population of Shoebill at Nyamagoma in September 2006 was in the region of 17 – 32 ind. This site also seems important for Wattled Crane (2 – 46 ind. Table 3), again the variation in results could be due to previously mentioned factors.

Of the five targeted study areas, Lake Nyamagoma and the surrounding swamp system (study site C) represented the most important area for both Shoebill (n=17 counted, 32 (±23)) and Wattled Crane (n=23 counted, 46 (±13)) (Table 3). This lake maintains water throughout the year with a high water level coverage of 58sq km fringed with large papyrus swamps, making it an ideal and possibly the most important of the few suitable areas for Shoebill during the dry season.

The Moyowosi River (Study Site)

The Moyowosi Valley yielded scant data for both the target species. The total count of Shoebill for the river valley was only 5, and for Wattled Crane only 2 individuals were seen. In contrast the Tawiri survey recorded 9 Shoebill Stork and a total of 21 Wattled Cranes. The disparate results for Wattled Crane can be explained by the fact that 17 of the 21 counted by the Tawiri team were in one flock, and the total count team passed over the same area more than a week later. Such a flock is likely to be highly mobile during the dry season and could easily have moved away from the study area.

Lake Masimba

This proposed study site, which is in essence the confluence of the Kigosi and Igombe Rivers, was assessed to be too dry to survey systematically on this occasion. However the area should be surveyed in future surveys, especially since the site yielded high numbers of shoebill according to Jones and Hill (1994). When flooded the entire swamp basin is covered in a thick papyrus swamp and as such is important potential Shoebill habitat.

Lake Sagara (including Ilumbe Swamp)

Lake Sagara, and Ilumbe Swamp are two areas that have historically given good count results for Shoebill Stork specifically (Tawiri, 1991, 1998, 1999, 2002, Dinesen and Baker 2006). Our results showed Lake Sagara and the surrounding swamp system (study site D) to be an important area for

Shoebill (n=11). Although the Lake is considerably larger (328 sq km) than Nyamagoma, the amount of fringing vegetation and papyrus is considerably less, this habitat being more suitable for Shoebill.

No Wattled Cranes were recorded in this study area. There was certainly suitable Wattled Crane habitat on the northern shoreline but the presence of a large human population and the dry conditions could be contributing factors to the dearth of observations for this species. However in the period of this survey Lake Sagara seemed to be at a very low water level and the area surrounding it was particularly dry, with no discernibly inundated grassland expanses bordering its shores. The Ilumbe Swamp, a site where Shoebill has repeatedly been observed, was completely dry with no green or inundated vegetation evident. Following the above observations is it not surprising that the count figures for the respective target species are very low, and can be considered almost insignificant in the context of the survey.

Ugalla River

No records of either target species were taken for the Ugalla River valley. However they are known to occur there, possibly seasonally, but the environmental conditions and habitat were clearly not suitable for either species at the time of the survey.

Conservation issues and possible threats to avifauna

The current game reserves, game controlled areas and the Ramsar site itself afford a considerable amount of 'legal' protection to the areas where Shoebill and Wattled Crane are known to occur, as well as other resident or migratory waterbirds. There are however considerable threats to the small areas of wetland that are located within the Lake Sagana-Sagera area (Study site D). When we consider data gathered by Tawiri (November, 2001), an analysis of human activities by admin units we see that the Lake Sagara area has the greatest amounts of agriculture and cultivation (n=3,659, Est.=39,650), Cattle (n=5,013, Est.=28,892) and human habitation (n=1,124, Est.= 10,581). Clearly what is important habitat for Shoebill and Wattled Crane is also important for the socio-economic needs of local people.

Whether or not this leads to direct conflict which may effect the distribution and populations of Shoebill and Wattled Crane is unsure. Both Wattled Crane and Shoebill are considered globally threatened due predominately to habitat loss, which is mainly caused by burning and land clearance for agricultural expansion. The burning of Papyrus and associated wetland / grassland ecocline does occur at this site (Jones and Hill, 1994, Baker, 1996) and would if uncontrolled represent a serious threat to Shoebill. Numbers of Shoebill are also taken for the Bird-trade which maintains very limited controls over actual numbers of birds taken; further investigation into this threat is required at both site and governmental level.

Recommendations for further study

Clearly a number of questions remain as to the seasonal movement (if any?) of both Shoebill and Wattled Crane. This is especially the case for the former, which, over a number of surveys (Jones and Hill, 1994, Tawiri, 1991, 1998, 1999, 2002, Dinesen and Baker 2006) shows a huge fluctuation in population numbers. Threats to the avifauna, as well as other wildlife require an in-depth study at

both site level and at governmental level, with the provision of data from the NGO (TRAFFIC) responsible for monitoring wildlife trade.

Main recommendations relating to avifauna

1. Conduct an aerial total count of all sites considered suitable for Shoebill and Wattled Crane within the Ramsar site when water levels are at there highest (April – May) and lowest (October - November).
2. Conduct land based counts of specific sites to both test the accuracy of the aerial surveys and look in more detail at basic behaviour and ecology of the target species, trying in particular to identify nest sites (if any?).
3. The University of Dar-es-Salaam should continue their surveys with local inhabitants of target areas (around Lumbe swamp and Lake Nyamagoma), to establish a baseline in terms of the target species as a resource, either food or income obtained from trade. Also establish if wetland birds are often caught in fish traps or nets.
4. Compile data from the Wildlife Division and TRAFFIC to establish numbers and trends of Shoebill being exported from Tanzania and the localities from where they were originally captured.
5. Choose a suitable site (such as Lumbe) with good access, aim to capture and ring (with both visible individual colour rings and standard rings) a number of individual birds (n=20). This could be best achieved by ringing young whilst still on the nest (applicable to both Wattled Crane and Shoebill). Following this, visits to the site following seasonal changes may give an indication of some movement (regional or local). Depending on results, Satellite transmitters could be fixed to some individuals.

References

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