COMMON AND RARE BIRD SPECIES IN THE SOUTHERN PART OF SAADANI NATIONAL PARK

Jasson John

Department of Zoology and Wildlife Conservation, University of Dar es Salaam, P.O Box 35064, Dar es Salaam.

wildornithology@udsm.ac.tz

ABSTRACT

Saadani National Park (SANAPA), located along the eastern coastline of Tanzania, is the closest wildlife sanctuary from the business capital, Dar es Salaam. Although the populations of game animals do not attract many tourists at the moment, it has a potential of becoming a bird watching paradise. Nonetheless, very little ornithological observations have been documented. This study, based mainly on the species encounter rates, provides indices for 'common' and 'rare' bird species in the southern part of SANAPA. Between June and July (touristic peak season for eastern Africa parks) 2013, timed species counts (TSCs), mist netting, total counts and opportunistic observations were used to study the avian diversity in woodland-bushed grassland, riverine forests, and mangrove-saltpans habitat. In total, 97 species were recorded from 26 TSCs, among these 76 were sighted in woodland-bushed grassland and 47 from mangrove-saltpans habitat. About 50% of all recorded birds were common (with >1.0 mean score, MS) at mangrove-saltpans while 4 species were very rare (0.8<, MS) at this site. Moreover, in the woodland-bushed grassland, 19 species were common and three were recorded only once. Twenty two species were added from opportunistic observations and mist netting. A total count at salt works on 3rd and 18th July estimated an average of 400 greater and 500 lesser flamingos. Black-winged stilts were also abundant (350 birds) at the saltpans. Observations in this study amounts to over 30% of total bird species within SANAPA. The study provides information on site-specific species commonness (likelihood of encounter) which is crucial for avi-tourism promotion and park management.

Keywords: Birding, bird mean scores, dry season, Saadani, salt pan

INTRODUCTION

The eastern Africa coastline habitats are facing threats from human population growth from internal immigrants and natural population growth which results into high demands for investments. In Tanzania, urbanization

along coastline, from Tanga, Bagamoyo, Dar es Salaam to Mtwara town, is growing at higher rate than inland and as a result very little natural habitat remains outside the protected areas. However, the growing human population and economies along the coastline towns with limited recreation parks offers opportunities for holiday and weekend trips to natural habitats. For example, Dar es Salaam will register the fastest growth in the number of households (8.7% of Tanzania population will be living in Dar es Salaam by 2025) in the emerging middle class ($5,000 - $20,000 per year in revenue) by 2030 (World Bank, 2012; The Africa Report, 2013). This has a potential of increasing or stimulating domestic tourism especially for attractions in close proximity such as Saadani National Park (SANAPA) which is about 100 km from Tanzania's financial capital, Dar es Salaam. Dar es Salaam is also is home to diplomats and the leading tourists' entry point for Tanzania. Studies on the tourists' choice have indicated that distance could affect preference of destinations (Nicolau & Más, 2006; Nicolau, 2008). Travel from one's place of usual residence to destination entails physical, temporal and monetary costs (Taylor & Knudson, 1976).

SANAPA is among the few protected areas along the eastern Africa coastline, others include the marine parks and reserves. Saadani is the only fully protected area in Tanzania with a mixture of terrestrial, littoral and marine resources (Baldus *et al.*, 2007; Marttila, 2011), this complex environment is home for many life forms, and the reason why it has a potential of attracting many visitors for wildlife viewing. Conversely, biodiversity or species richness contributes to nature-based tourism by enhancing attractiveness of an area to tourists. For example, a study by Naidoo and Adamowicz (2005) in Uganda, reported that as the number of bird species increased, tourists demonstrated an increase in willingness to visit a protected area. With over 300 bird species (Marttila, 2011), Saadani has a potential of becoming a birdwatching paradise given the growing avitourism industry in tropical region (Motsumi *et al.*, 2003). Furthermore, avian diversity, which has not been intensively studied (Marttila, 2011), in combination with other attractions and uniqueness could be used in the park tourism marketing strategy. Available information on SANAPA birdlife (Baldus *et al.*, 2007; Marttila, 2011) gives only the checklist and accounts on few species. However, for proper planning of birding trips, information on the status of avian species diversity and likelihood of encounter is crucial.

In this article, I provide an assessment of bird species commonness (likelihood of encounter) in the southern part of SANAPA during the dry season, the peak of touristic season in eastern Africa parks.

METHODS

Study area and sites

SANAPA lies along the Tanzania coastline, about 100 km North of Dar es Salaam, and it is 50 km from Bagamoyo town. Gazetted in 2005, the park has five principal habitats; savanna-grassland mosaic, coastal lowland forest, riverine forest, mangrove forest and sea shore. It has a maximum length of 69 km from south to north (Marttila, 2007). The park has two main seasons; dry season from July to September and wet season from November to May with less rain in December to February.

The study was conducted in the southern part of the park, mostly south of Mvave River outside of Zaraninge Forest (Figure 1). The areas covered were wooded and bushed grassland (this area has a savanna-grassland mosaic with a varied habitat complexity of short grasslands, wooded grassland and thickets, *hereafter*, termed as woodland-bushed grassland), riverine forests, and mangrove-saltpan habitats. Major concentration was in areas between sea salt village and Wami estuary, Kinyonga campsite and Wami gate, Matipwili village and Wami gate, and park tourism office/Saadani Village and Mvave gate (Figure 1). The study was conducted between 20th June and 20th July 2013.

Survey Methods

Survey methods used include; Timed Species Count (TSC), total counts (TC), mistnetting and opportunistic observations.

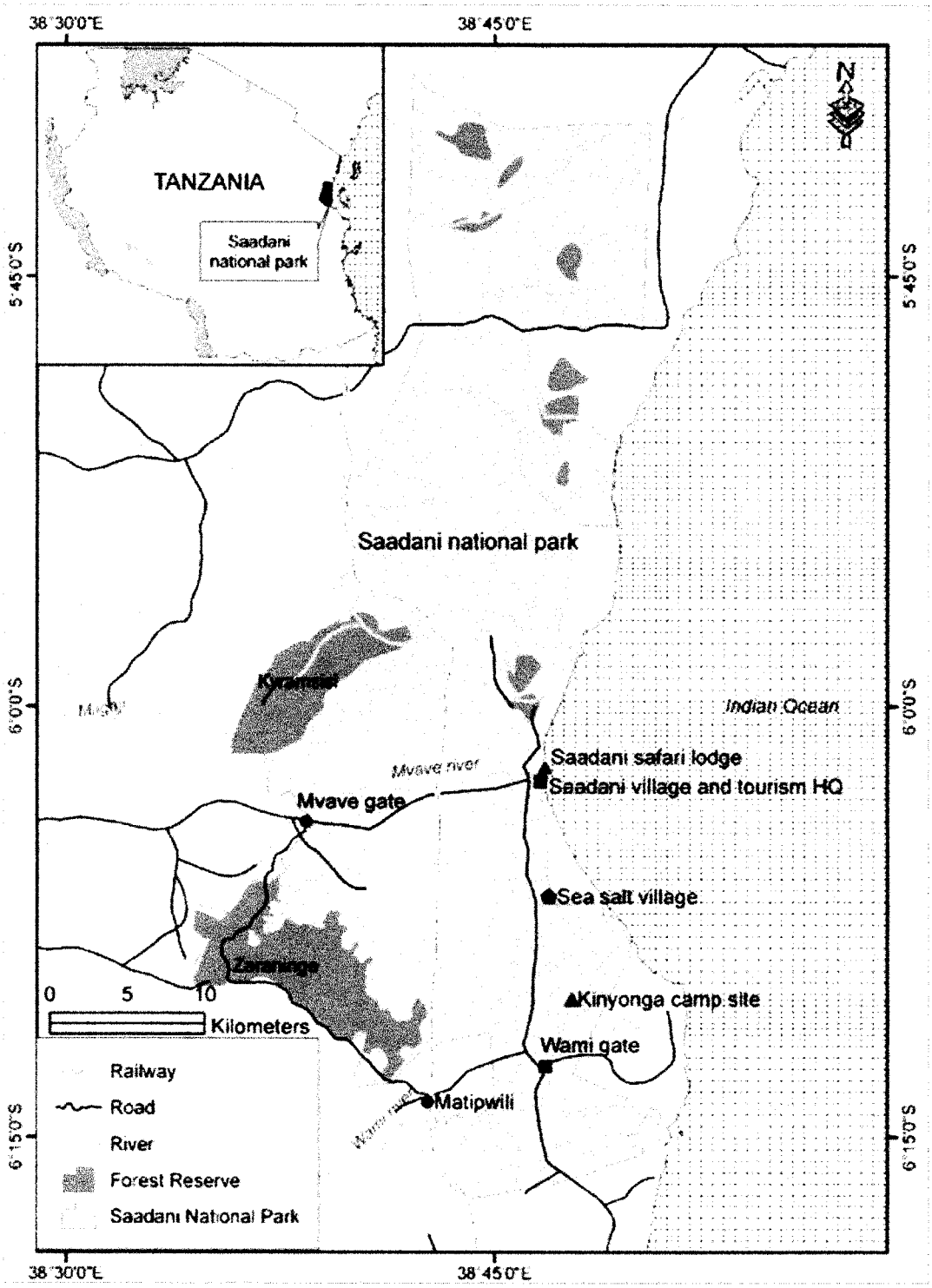


***Figure 1**: Map of Saadani National Park showing areas referred in the text*

Timed Species Counts

Timed species counts (TSCs) were carried out over a fixed period 1 h divided into shorter periods of 10 min each (Pomeroy, 1992; Bennun & Howell, 2002).

The TSCs were separated by a break of 10 min. A species seen or heard in the first 10 min received a 'score' or 'weight' of 6, while a species first recorded in the second 10 min period scored 5 and so on. Park road and trail networks were used, concentrating on places were bird activity (e.g. foraging) was greater. The survey consisted of 26 TSCs, 13 in Mangrove-Saltpan habitat and 13 in woodland-bushed grassland. This method is recommended for woodland and bush habitats (Pomeroy & Tengecho, 1986), in additional to producing a checklist; it also provides a reasonable measure of relative abundance (Bibby *et al.*, 2000). Most of the TSCs were carried out in the morning.

Total counts

Total count method as described by Norton-Griffiths (1978) was used for congregatory waterbirds in the saltpans particularly the flamingos and stilts. Counts were made using binoculars and a telescope while standing on the central dykes of the saltpans.

Mist nets

Mist nets were set along riverine habitats of Wami River at Kinyonga Campsite and Wami gate. Six nets (three at each site) were set for three consecutive days at both sites. Nets (12 x 2.5 m) were opened from 0730 to 1930 hrs, and checked every 30 to 45 minutes. To assess recaptures, birds were banded with either colour or East Africa metal rings.

Opportunistic observations

Opportunistic observations were carried out targeting species that are very hard to observe with TSCs and do not come down to mistnets. Other common animals, especially game animals, were also recorded using this method.

Data analysis

Data for TSC were analysed for species relative abundances which is expressed in mean scores (MS), and species were then ranked for commonness (likelihood of encounter) using the MS values. TSC indices were used to categorize species into 'common' and 'rare'; common = MS≥0.1, rare = MS<0.1. Because data were not normally distributed, Mann-Whitney U-test (PAST software) was used to compare MS between Woodland-bushed grassland, and Mangrove-Saltpan habitats. Shannon-Wiener Index of Diversity was used for bird species diversities in the study habitats and were tested using special *t*-test (Krebs, 1999).

RESULTS

In total, 119 species were recorded, 97 from 26 TSCs while 22 species were added from opportunistic observations and mist netting. Although equal efforts (13 TSCs in each) were assigned in each habitat, Mangrove-Saltpan had fewer species (47 species) than Woodland-bushed grassland (76 species) with 21 species exclusively found in Mangrove-Saltpan habitats including flamingos (Table 1). The comparison of the total MS showed a significant difference (U' = 1309, n_1 = 76, n_2 = 47, p = 0.013) between the two habitats being higher in Woodland-bushed grassland. However, proportion wise; Woodland-bushed grassland had many 'rare' (73%, with MS<0.1) bird species than Mangrove-Saltpan (53%, MS<0.1). Species with MS>1.00 are locally common on a site with highest probability of being seen within one hour of observation.

Mist netting at two riverine sites, Kinyonga Campsite and Gama Bridge/Mkurunge Gate, produced 28 species; *yellow-breasted apalis *Apalis flavida*, olive sunbird, Zanzibar sombre

Table 1: TSC indices (Species Mean Scores) for species recorded in the Southern part of Saadani National Park in dry season of 2013. Zero mean score indicates that a species was not recorded in that particular site. The higher the mean scores the locally abundant the species is.

Species	Species Mean Scores (MS) for Woodland-Bushed grassland	Species Mean Scores (MS) for Mangrove-Saltpan
Zanzibar sombre greenbul *Andropadus importunes*	3.462	2.769
Red-eyed dove *Streptopelia semitorquata*	3.231	2.385
Collared sunbird *Hedydipna collaris*	2.154	1.385
Emerald spotted-wood dove *Turtur chalcospilos*	1.923	1.154
Speckled mousebird *Colius striatus*	1.538	1.846
Ring-necked dove *Streptopelia capicola*	1.462	1.769
White-browed coucal *Centropus superciliosus*	1.462	0
Village indigobird *Vidua chalybeate*	1.462	0
Common bulbul *Pycnonotus barbatus*	1.385	2.308
Red-cheeked cordonbleu *Uraeginthus*	1.231	0

Species	Species Mean Scores (MS) for Woodland-Bushed grassland	Species Mean Scores (MS) for Mangrove-Saltpan
bengalus		
Rattling cisticola *Cisticola chiniana*	1.231	0
Crowned hornbill *Tockus alboterminatus*	1.231	0
Red-fronted tinkerbird *Pogoniulus pusillus*	1.000	0.538
Pin-tailed whydah *Vidua macroura*	1.000	0
Tawny-flanked prinia *Prinia subflava*	1.000	0.154
Bronze mannikin *Lonchura cucullata*	1.000	0.308
Yellow-billed stork *Mycteria ibis*	0.923	1.462
Scarlet-chested sunbird *Nectarinia senegalensis*	0.846	0.923
Hadada ibis *Bostychia hagedash*	0.846	0
White-crested helmet shrike *Prionops plumatus*	0.769	0
Northern brownbul *Phyllastrephus strepitans*	0.769	0.769
Namaqua dove *Oena capensis*	0.769	0
Little bee-eater *Merops pusillus*	0.692	2.077
Woolly-necked stork *Ciconia episcopus*	0.615	1.692
Long-tailed fiscal *Lanius cabanisi*	0.615	0
Brown-crowned tchagra *Tchagra australis*	0.615	0
Tiny cisticola *Cisticola nanus*	0.538	0.385
Black-crowned tchagra *Tchagra senegala*	0.538	0.077
Winding cisticola *Cisticola galactotes*	0.538	0
House sparrow *Passer domesticus*	0.462	0.769
Common fiscal *Lanius collaris*	0.462	0
Black-backed puffback *Dryoscopus cubla*	0.462	0
Zanzibar red bishop *Euplectes nigroventris*	0.462	0
White-fronted bee-eater *Merops bullockoides*	0.462	0
Yellow-throated longclaw *Macronyx croceus*	0.462	0
White-eared barbet *Stactolaema leucotis*	0.462	0
Eastern green tinkerbird *Pogoniulus simplex*	0.462	0
African golden weaver *Ploceus subaureus*	0.462	1.692
Tropical boubou *Laniarius aethiopicus*	0.417	1.385
Yellow-rumped tinkerbird *Pogoniulus bilineatus*	0.385	0

Species	Species Mean Scores (MS) for Woodland-Bushed grassland	Species Mean Scores (MS) for Mangrove-Saltpan
Black kite *Milvus migrans*	0.385	0.615
Bat hawk *Macheiramphus alcinus*	0.385	0
Green-backed camaroptera *Camaroptera brevicauda*	0.385	0
Hamerkop *Scopus umbretta*	0.385	0
Madagascar bee-eater *Merops superciliosus*	0.385	0
Spot-flanked barbet *Tricholaema lacrymosa*	0.385	0
Uluguru violet-backed sunbird *Anthreptes neglectus*	0.385	0
Krestchmer's longbill *Macrosphenus krestchmeri*	0.385	0
Narina trogon *Apaloderma narina*	0.385	0
Sourthern cordon bleu *Uraeginthus anglolensis*	0.385	0
Von der Decken's hornbill *Tockus deckeni*	0.308	0
Fish eagle *Haliaeetus vocifer*	0.308	0.077
Palm-nut vulture *Gypohierax angolensis*	0.308	0.077
Mosque swallow *Hirundo senegalensis*	0.308	0
African pygmy kingfisher *Ispidina picta*	0.308	0
Spectacled weaver *Ploceus ocularis*	0.308	0
Retzs helmet shrike *Prionops retzii*	0.308	0
Lesser masked weaver *Ploceus intermedius*	0.308	0
Parasitic weaver *Anomalospiza imberbis*	0.308	0
Cattle egret *Bubulcus ibis*	0.308	0.463
Olive sunbird *Nectarinia olivacea*	0.231	0
Purple-banded sunbird *Cinnyris bifasciata*	0.231	0.385
Green Wood-hopoe *Phoeniculus purpureus*	0.231	0
Gabar goshawk *Micronisus gabar*	0.231	0
Senegal plover *Vanellus lugubris*	0.231	0.385
Pied crow *Corvus albus*	0.231	0
African grey hornbill *Tockus nasutus*	0.231	0
Cardinal woodpecker *Dendropicos fuscescens*	0.231	0
White-browed robin chat *Cosssypha heuglini*	0.231	0
White-rumped swift *Apus caffer*	0.231	0

Species	Species Mean Scores (MS) for Woodland-Bushed grassland	Species Mean Scores (MS) for Mangrove-Saltpan
Red-billed firefinch *Lagonosticta senegala*	0.231	0
Eastern paradise whydah *Vidua paradisaea*	0.154	0
Village weaver *Ploceus cucullatus*	0.154	0
Plain-backed sunbird *Anthreptes reichenowi*	0.077	0
Crested flancolin *Fracolinus sephaena*	0.077	0
White-headed vulture *Trigonoceps occipitalis*	0.077	0
Lesser flamingo *Phoeniconaias minor*	0	2.308
Little egret *Egretta garzetta*	0	2.308
Lesser striped swallow *Hirundo abyssinica*	0	2.077
Pied kingfisher *Ceryle rudis*	0	1.846
Black-winged stilt *Himantopus himantopus*	0	1.462
Greater flamingo *Phoenicopterus ruber*	0	1.462
Grey heron *Ardea cinerea*	0	1.462
African pied wagtail *Motacilla aguimp*	0	1.231
Common sandpiper *Actitis hypoleucos*	0	1.154
Wire-tailed swallow *Hirundo smithii*	0	1.000
Tambourine dove *Turtur tympanistria*	0	1.000
Common drongo *Dicrurus adsimilis*	0	0.769
Saddle-billed stork *Ephippiorhynchus senegalensis*	0	0.769
Brown breasted barbet *Lybius melanopterus*	0	0.538
Eurasian roller *Coracias garrulous*	0	0.308
Black-winged red bishop *Euplectes hordeaceus*	0	0.231
Amethyst sunbird *Chalcomitra amethystine*	0	0.231
African open-billed stork *Anastomus lamelligerus*	0	0.154
Black-headed oriole *Oriolus larvatus*	0	0.154
Croacking cisticola *Cisticola natalensis*	0	0.154
Three-banded plover *Charadrius tricollaris*	0	0.077

greenbul, *red-capped robin-chat *Cosssypha natalensis,* *vitelline masked weaver *Ploceus velatus,* *eastern bearded scrub-robin *Cercotrichas quadrivirgata,* *sulphur-breasted bush-shrike *Malaconotus sulfureopectus,*

speckled mousebird, common bulbul, *red-collared widowbird *Euplectes ardens,* *mouse-coloured sunbird *Cyanomitra veroxii,* purple-banded sunbird, tawny-flanked prinia, African pygmy kingfisher, *lesser honeyguide *indicator minor,* *red-billed quelea *quelea quelea,* red-fronted tinkerbird, tambourine dove, *red-headed quelea *Quelea erythrops,* *fan-tailed widowbird *Euplectes axillaris,* *Peter's twinspot *Hypargos niveoguttatus*, *marsh tchagra *Tchagra minuta*, *yellow-fronted canary *Serinus mozambicus,* emerald spotted wood dove, red-billed firefinch, black-crowned tchagra, spot-flanked barbet and green-backed camaroptera. Thirty nine individuals (19 species) were mistnetted at Gama Bridge while at Kinyonga 26 individuals (13 species) were caught. Shannon-Wiener Index of Diversity H' index between two sites (H' = 2.517 *Versus* H' = 2.102) differed marginally $t_{(53.37)} = 2.033$, $p = 0.047$. Of the 28 species caught in mist nets, 14 species were not recorded during TSCs, starred (*) species above.

A total count at salt works on 3rd and 18th July estimated an average of 410 (400 and 420 respectively) greater and 500 (550 and 450 respectively) lesser flamingos. Black-winged stilts were also abundant (*c.*350 birds) at saltpans. Small groups of Pink backed pelicans (16-20 birds) were observed at the saltpans on 18th July 2013. Other 7 species were added during opportunistic observations; they included; Yellowbill *Ceuthmochares aereus*, Sacred ibis *Threskiornis aethiopicus*, Long-tailed cormorant *Phalacrocorax africanus*, Augur buzzard *Buteo augur*, Brown-headed parrot *Poicephalus cryptoxanthus*, Great white egret *Egretta alba* and Greater white pelican *Pelecanus onocrotalus*.

Other wildlife species recorded during this study which are likely to attract the attention of birders in the southern part of the park included: African elephant *Loxodonta Africana*, giraffe *Giraffa camelopardalis,* monitor lizard *Varanus niloticus*, common waterbuck *Kobus ellipsiprymnus*, African rocky python *Python sebae,* lion *Panthera leo,* hippopotamus *Hippopotamus amphibious*, Nile crocodile *Crocodilus niloticus*, yellow baboon *Papio cynocephalus cynocephalus*, vervet monkey *Cercopithecus aethiopicus* and warthog *Phacochoerus aethiopicus*.

DISCUSSION

Using park road and walking trail networks, mistnets and opportunistic observations, this study recorded 119 bird species in the southern part of SANAPA. About 301 bird species is reported from SANAPA (Baldus *et al.*, 2007), thus, observations from this study represent over 30% of the total bird

species for this park. This study, therefore, proves that the southern part of park is very important for birdlife because less than 30% of the park size were covered which also excluded Zaraninge Forest, a part of the Bagamoyo Coastal forest Important Bird Area (Baker & Baker, 2002). Habitat mosaics (woodland, grassland, riverine, saltpans, mangrove and intertidal zones) in the southern region support diverse avian species (Baldus *et al.*, 2007; Marttila, 2011). Moreover, southern part of the Saadani Park is also important for game wildlife populations (Baldus *et al.*, 2007; Chambegga *et al.*, 2007).

The Woodland-bushed grassland had more species with lower MS because of the varied habitat complexity which provides hiding places for many species of birds. Moreover, the lower MS in this habitat could be subjected to the fact that the observers restricted themselves to the road networks and no efforts were done to search for the species in bushes far from the road network. The study assumes that birdwachers visiting the park will use park road networks because trespassing and off-road driving is discouraged. Species recorded by TSCs can easily be spotted in the open and semi-open areas of the park, whereas few of those mistnetted hide in riverine habitats and could not be easily encountered. Some of these species e.g. Eastern bearded scrub robin, Peter's twinspot, Marsh tchagra, Yellow breasted apalis, are often shy and difficult for a person on an ordinary visit to the park to see, keeping to thick vegetation cover. A visitor wanting to see such species is advised to search them in the appropriate habitats. It is also important to note that not all species can be recorded in short period of park visit; even some of the common species could go unnoticed as it was the case in this study. Temminck's courser *Cursorius temminckii*, for example, is known to be a common species in the woodland-bushed grassland within Saadani but was missed.

Morttila (2011) lists the most frequent bird species that are confined to the savanna-grassland mosaic in Saadani. In the list are the common bulbul, purple-banded sunbird, scarlet-chested sunbird, African pied wagtail, speckled mousebird and various doves, the most common being the ring-necked dove. The results of the current study support the above literature although the purple-banded sunbird had the lowest mean scores. Surprisingly, Zanzibar sombre greenbul is not mentioned in previous reports for Saadani to be among the most common species contrary to the findings of this study. This could be due to the fact that, unless, observers are familiar with its call, it could be hard to spot as it keeps on cover.

Many waterbird species were recorded in saltpan and the mangrove from the Sea-salt Ltd to Wami (Kinyonga) estuary. Saltpan provided foraging sites for flamingos, pelicans, stilts, herons, storks, egrets and small waders such as common sandpiper. Flamingos, for example, are attracted to this area because of the algae growth on the salt extraction pans (Marttila, 2011; Omari, 2013). Although Lesser flamingos are quite popular in soda lakes in northern part of Tanzania, Saadani in particular the salt pan is the single most significant site to host large groups (up to 2,500 individuals is reported here) along coastline (Wildlife Division, 2010). Not many waders were encountered because many of them are migrants and were not expected to be numerous at Saadani in northern summer, and seashore was not intensively searched. Few woolly-necked storks were recorded along the beach. Previous literature (Marttila, 2011) indicates that this species is more frequent at Saadani than in any other park in Tanzania. This species breed in the coastal areas but seasonal movements is reported (Hancock *et al.*, 1992; Marttila, 2011), and there is a limited information on breeding season and sites. Additionally, the recording of Saddle-billed stork was of interest, it is not known to permanently reside in Saadani National Park.

CONCLUSION

The coastal, riverine, forest and plains that make up Saadani's landscape not only account for its diverse and abundant avifauna, but also provides hiding places for many of the secretive species. However, with 119 bird species, over 30% of the total birdlife in SANAPA, recorded in an area less than one third of the park revealed that the southern part of the park is an important site for birdlife. The park is indeed a birder's paradise. This study represents a hypothetic tourist visit plan for birding in the southern part of SANAPA during the dry season, a major touristic period for eastern Africa parks. The study gives information on the locally common bird species and those that require patient observers. Some of the species can be seen with the first hour of birding while others will require a night stay. This information is also crucial for park management as it could be used in the marketing strategy because it has been shown that the more the animal species the higher the motives for tourists to visit an area. Visitors of the southern part of Saadani National Park could combine birding and other services within the park such as boating along the Wami River and game viewing as many game species moves south to the Wami River the during dry season.

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