

A case study of shorebirds at coastal habitats in Lagos, Nigeria

By Esther Nosazeogie

Introduction

Within coastal areas, wetlands (defined as “areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres” {RAMSAR 2016}) are important habitats for migratory and resident bird species.

Shorebirds refer to water birds which use coastal habitats, namely: wildfowl, waders and seabirds (Mendoza *et al.* 2007). Shorebirds are ecologically dependent on coastal wetlands for life-sustaining activities such as feeding, roosting, molting and breeding (Wetlands International 2010). For the purpose of this report, I include raptors (which are also predators within coastal systems) in the shorebird category, even though they are not ecologically dependent on wetlands. Coastal wetlands provide important food resources for shorebirds, namely: small fish, insects, macrobenthic invertebrates including annelids, molluscs and arthropods (Zhang *et al.* 2016), and even plant seeds (Lovas-Kiss *et al.* 2019).

Ecological and hydrological conditions of wetlands determine the trophic resources and breeding conditions available to resident bird species. Additionally, some populations of many migratory shorebird species which occur in western Africa depend on coastal wetlands for survival in their non-breeding season. However, wetlands around the world are being lost and degraded, not least of all, in Lagos, Nigeria, where wetlands are continually being reclaimed for development.

Lagos is a low-lying coastal city, and bounded in the south by the Atlantic Ocean. It is marked by several tidal wetlands and water bodies: lagoons and creeks. It is the most populated state, and the economic hub of Nigeria, West Africa (Obiefuna *et al.* 2012). Thus, it is a rapidly growing city with a steady influx of young people seeking economic opportunity, from all over the country. Many of the natural wetlands in Lagos have been destroyed, and others continue to be destroyed in order to make space for human habitation and development.

Very little, however is known about the threats being faced by the shorebird community in the coastal wetlands of Lagos. Thus, a survey was undertaken to collate information on the status of shorebirds and their wetland habitats in Lagos, Nigeria, in order to enable us make recommendations on shorebird conservation in the area.

Methods:

Field surveys were done by a two-member team. In February 2021, from five locations in Lagos, Nigeria, we used collected bird data from coastal wetlands, using area search method (Wetlands International 2010). At each location, we went on a fibre-glass or wooden boat (as available) fitted with an outboard engine and searched the area for 2 hours, looking out for birds. Along the routes we took, in addition to collecting bird data, we observed the activities going on. Also, we engaged the boatman (who doubled as guide) at each location to find out about management status and practices. Only a few of the boatmen were knowledgeable about the area, so we relied on observation for the most part.

Each observer had a pair of 8 X 42 binoculars and we identified birds by means of the field guide by Barlow and Dodman. We visited each site at a time when the tide was expected to be low in case there were tidal mudflats in the area so that we would be able to count waders. But this also means that we might have also missed shorebird species which roost in mangroves at high tide, especially in areas without tidal flats (Reiter *et al.* 2020).

Results:

Our area searches in five locations turned up twenty-eight (28) bird species that are known to use coastal habitats, some classified as shorebirds.

Table 1. List of the 28 shorebird species recorded from wetlands during this survey (listed after Barlow and Dodman 2015), Migratory status: R = Resident, IM = Intra-African migrant, PM = Palearctic migrant

Family	Common name	Species name	Migratory status
Anatidae	White-faced Whistling Duck	<i>Dendrocygna viduata</i>	R

Rallidae	Common Moorhen	<i>Gallinula chloropus</i>	R
Threskiornithidae	African Openbill	<i>Anastomus lamelligerus</i>	IM
Ardeidae	Little Bittern	<i>Ixobrychus minutus</i>	R
	Green backed Heron	<i>Butorides striata</i>	R
	Cattle Egret	<i>Bulbicus ibis</i>	R
	Purple Heron	<i>Ardea purpurea</i>	PM
	Intermediate Egret	<i>Ardea brachyrhyncha</i>	R
	Black Heron	<i>Egretta ardesiaca</i>	R
	Little Egret	<i>Egretta garzetta</i>	R/IM
	Western Reef Egret	<i>Egretta gularis</i>	R
Phalacrocoracidae	Long-tailed Cormorant	<i>Phalacrocorax africanus</i>	R
Recurvirostridae	Black-winged Stilt	<i>Himantopus himantopus</i>	R/IM
Charadriidae	Grey Plover	<i>Pluvialis squatarola</i>	PM
	Common ringed Plover	<i>Charadrius hiaticula</i>	PM
	Spur-winged Lapwing	<i>Vanellus spinosus</i>	R
Jacanidae	African Jacana	<i>Actophilornis africanus</i>	R
Scolopacidae	Whimbrel	<i>Numenius phaeopus</i>	PM
	Common Greenshank	<i>Tringa nebularia</i>	PM
	Common Sandpiper	<i>Actitis hypoleucos</i>	PM
Sternidae	Common Tern	<i>Sterna hirundo</i>	IM
	Royal Tern	<i>Sterna maxima</i>	R/IM
Accipitridae	African Harrier-hawk	<i>Polyboroides typus</i>	R
	Yellow-billed Kite	<i>Milvus migrans</i>	IM
Alcedinidae	Pied Kingfisher	<i>Ceryle rudis</i>	R
	Blue-breasted Kingfisher	<i>Halcyon malimbica</i>	R
	Woodland Kingfisher	<i>Halcyon senegalensis</i>	R
Motacilidae	African Pied Wagtail	<i>Motacilla aguimp</i>	R

Sites visited:

Badagry Creek:

This creek, though more than 50km from the main Lagos metropolis, empties into the Lagos Harbour. It is an important part of the drainage system (lagoons and creeks) that flows into the Atlantic Ocean through the Lagos Harbor. The Badagry Creek also extends to Port Novo in Benin Republic, and receives tidal influences from both the Lagos and Cotonou Harbors (Akintola *et al.* 2011)

The key habitats in this area include open water, grass-covered swamps and vegetation including: oil palm, raphia palm and coconut palm, and floating weeds such as: *Eicchornia sp.*, *Pistia sp.* and *Ceratophyllum sp.* A previous study suggested that this area is rich in species of the order Ciconiiformes: herons, bitterns and storks (Okosodo *et al.* 2018). However, we observed the following species in our short survey time: African Harrier-hawk, Yellow-billed Kite, Blue-breasted Kingfisher, Woodland Kingfisher, Pied Kingfisher, White-faced Whistling Duck, Spur-winged Lapwing, Purple Heron, African Jacana and Cattle Egret.

The locals majorly carry out the following activities in the area: artisanal fishing, transportation services (commercial boating) and aquaculture. Commercial sand dredging is also carried out in the creek, although there is some local regulation, such that people are prohibited by the Baale (traditional ruler) from dredging in some areas.

The people of Badagry consider their creek with a special historical and cultural significance (since it featured prominently in the trans-Atlantic slave trade), and this seems to shape their use of the water body. However, it appears that the main conservation issue in this area is insufficient knowledge of shorebirds and the habitat they use, as well as other biodiversity. I suggest that we need more extensive studies of the area, including the beaches, to understand its value for shorebirds. This will provide an occasion for conservation education, which will enable the locals have a stronger sense of the value of their environment and what it means to use it sustainably. Local understanding of the area's biodiversity and its value will be useful when decisions need to be made by community leaders about economic/development pressures encroaching from the nearby Lagos metropolis.

Ibeju-Lekki

The Lekki Lagoon, accessed through Ibeju-Lekki, drains directly into the Lagos Lagoon in the west. The key habitats at Lekki are similar to those at Badagry, including open water, floating vegetation, swamp forest (containing mangrove trees), palm trees and grasses. We encountered the following species: Spur-winged Lapwing, Long-tailed Cormorant (which were so many that they seemed to be everywhere), African Jacana, Yellow-billed Kite, African Harrier Hawk, Pied Kingfisher and Cattle Egret.

Artisanal fishing seems to be the major activity in this area. Transportation services (commercial boating) are not so developed here, as there is no commercial jetty (like the one in Badagry), and wooden (fishing) boats fitted with outboard engines were the only available means of transportation. Commercial sand dredging is also a common feature in the Lekki Lagoon, and does not appear to be regulated since there is a huge demand for sand due to the many building projects that surround the Lagoon. Logging is also likely being driven by the demand for wood for building projects and domestic use for firewood.

The Ibeju-Lekki area is experiencing intense development, including the creation of a sea port and a petroleum refinery, as well as housing developments due to the economic opportunities. The area appears to be managed directly by local community leaders, and indirectly by the government since the development activities have been approved by the government. Additionally, we saw signs around the area that indicated that some small areas were designated Lagos State Government protected areas, but we were unable to gain access into those areas.

Here also, we don't know much about how birds use this area. We need this knowledge in order to engage the local communities around the lagoon, and encourage them to regulate their sand-dredging and development activities.

Bariga/Ilaje:

In this area, we observed both artisanal and commercial sand dredging activities which do not seem to be regulated. Artisanal fishing is also very common. The greatest issue we observed in

the area is the plastic pollution. This area is like a huge dumpsite, full of huge piles of plastic and surrounded by slums.

However, in addition to open water, we encountered several tidal mudflats in the area, with scanty vegetation. On those flats, we encountered the following species: Green-backed/Striated Heron, Little Egret, Cattle Egret, Black-winged Stilt, Spur-winged Lapwing, Common Greenshank, Black Heron, Common Sandpiper, Long tailed Cormorant, Western Reef Egret, Pied Kingfisher, Common Tern (flying over the open water) and Yellow-billed Kite (hunting alongside the water birds on the mudflats).

This area is also being managed by community chiefs led by the Baale. One of the concerns about this area is that the plastic waste may cover valuable feeding areas on the mudflats, and reduce the amount of food available to birds. The value of this area as bird habitat also needs to be understood. Additionally, the people need to be educated on the need to take better care of their environment.

Badore, Ajah/Ikorodu

We accessed this part of the Lagos Lagoon through Badore in Ajah. But this wetland was also connected with some parts of Ikorodu. The major habitats in this area include open water and mudflats which were mostly vegetated by grasses (we encountered a flock of around 150 individuals of White-faced Whistling Duck roosting on the bare part of one of such mudflats). Additionally, the wetland was surrounded by swamp forests containing mangrove vegetation.

This area is also controlled by local community leaders, and there doesn't appear to be any regulatory management practices in this area. The activities we encountered in this area include fishing and dredging, as well as developed commercial boat transportation.

Here, we encountered White-faced Whistling Duck, Royal Tern, Common Tern, Long tailed Cormorant, Spur-winged Lapwing, Pied Kingfisher, Cattle Egret, African Openbill and African Pied Wagtail.

It appears that here, as in the other areas, more extensive, and continued bird surveys as well as local community education would be necessary to promote the management of this area for shorebirds.

Ijora/Apapa

Ijora and Apapa are different locations with similar activities, and were visited on the same day since they are not far from each other. Also, our 2-hour area search spanned both areas, so they are discussed together.

The Ijora Creek is a shallow tidal creek located on the Lagos mainland. It carries water directly into the Lagos Harbor, and receives saltwater from the Atlantic Ocean at high tide through the Harbour. The Apapa area is located around the mouth of the Lagos Harbour i.e. where the Lagos Lagoon empties into the sea, and consists of a collection of islands and creeks.

The Ijora wetland is surrounded by factories and oil depots, as well as homes, which are sources of indiscriminate disposal of (both municipal and industrial) waste (Ogungbile *et al* 2017). Battery chargers and auto-mechanics dispose their waste into the wetland. Also, it is quite common to see people defecate openly in these areas. Similarly, Apapa is home to a container terminal, the Lagos Port Complex, as well as several factories and refineries. There are also several housing settlements (mostly slums) on islands of Apapa. In addition to the industrial activities going on in both areas, fishing is also commonly carried out.

The key habitats in both of these areas are tidal mudflats (which are rich in visible benthic shells and crabs), sandy vegetated shores (at Apapa), mangrove trees and shallow open water. And these habitats were being used by the following species: Grey Plover, Common Ringed Plover, Common Greenshank, Whimbrel, Common Sandpiper, Little Egret, Cattle Egret, Western Reef Egret, Long-tailed Cormorant, Pied Kingfisher, Spur-winged Lapwing and Black Heron.

A general review of threats to shorebirds in Lagos

Threats to shorebirds do not appear to be direct. However, they may have implications for the suitability of the habitat for birds and the availability of prey. Based on observations during the survey, and a review of literature (according to Sutherland *et al.* 2012; WCPMS 2015), I have grouped the observed threats into the following general areas.

Habitat loss: Several activities are ongoing in and around Lagos, which may threaten the survival of shorebirds in the long run by removing the kinds of habitat that they need to survive. These include indiscriminate plastic waste disposal, land reclamation, dredging, beach erosion and mangrove deforestation.

Plastic pollution may also cover available mudflats, reducing or totally eliminating the area available to shorebirds for feeding (Alexandrar *et al.* 2018). This is because plastic may bury wetland vegetation and prevent benthos from thriving. Additionally, plastic waste may release harmful chemicals during decomposition.

Land reclamation, dredging and beach erosion have serious implications for benthic-dwelling species, which many shorebirds (particularly waders) feed on. Similarly, mangrove trees provide important resources for shorebirds. But a huge amount of mangrove forests has been lost in Lagos (Obiefuna *et al.* 2012), and the deforestation is ongoing as development drives the demand for resources. Vegetation and forest loss through logging can cause sedimentation and affect shorebirds.

If these activities continue unabated in Lagos, it could result in the loss of good habitat (rich in benthos) for shorebirds.

Habitat modification and deterioration: The following activities which are commonplace in Lagos, namely: boat transportation and repair, aquaculture, untreated municipal and industrial waste, and grazing of domestic animals, could reduce the value of the coastal wetland habitats in Lagos for water birds.

Boat transportation is an important alternative to the traffic-laden road transportation within Lagos. This transportation usually takes place via the Lagos Lagoon, and the creeks that connect to it. The boat operators indiscriminately dump oils and grease into the water during travel or boat repair. This could contribute to pollution in the long run, and reduce the value of the water

as shorebird habitat. Although it is yet to spread fully to the other areas, aquaculture was observed in Badagry. Aquaculture waste may contain antibiotics which are emerging pollutants (Milic *et al.* 2012).

Similarly, untreated/improperly treated waste disposal could compromise water and sediment quality in the long run. At Ijora, we observed waste being discharged from a flour mill. We don't know how much treatment it received, but Lagos is not known for strict enforcement of environmental laws. We also observed open defecation to be commonplace in the areas we visited. But it is not yet clear how this could impact shorebirds.

Invasive species: We also observed the widespread invasive species *Eichhornia crassipes* in some of the water bodies we visited, but we don't know yet how this impacts shorebirds in Lagos.

Fisheries bycatch: Although we didn't observe any bycatch with the fishers, the presence of fishing nets and traps suggests that this might be a threat to shorebirds.

General Recommendations:

The coastal areas are currently being overseen and managed by traditional leaders, namely *Baales*. However, the areas were not subject to any conservation management at the time of the survey. The threats to water birds and their habitats in Lagos would likely be posed by the consequences of unsustainable development.

I think the greatest problem may be a lack of awareness among the local population. Therefore, a lot needs to be done in terms of campaigns focused on coastal communities to promote environmental stewardship.

Additionally, although there are widespread threats, we do not yet know the degree to which they may threaten the survival of shorebirds in Lagos in the long-term. Lack of data will limit conservation efforts. Therefore, I suggest that the International Waterbird Census in Lagos be expanded to other areas than are currently being surveyed. Additionally, we require local research to collect data to enable us understand how shorebirds use their habitat so that we can

understand how these threats may potentially affect them. These surveys should include beaches and other habitats in rural coastal areas.

Long-term periodic monitoring programs for shorebirds would be effective when carried out in collaboration among researchers and conservation practitioners such as NCF (Nigerian Conservation Foundation). Such programs would also be good opportunities for raising local awareness, and encouraging younger people to consider getting involved with bird study. They would also enable us create relationships with local community people, within which we can develop ecosystem-based management approach for shorebirds in Lagos.

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