



WATERBIRD SURVEY OF LOZA BAY, NORTH WEST OF MADAGASCAR
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SUMMARY

Through the ABC small grants scheme, three surveys of waterbirds were carried out in Loza Bay, north-west Madagascar in 2014 and 2015 (24 August to 02 September 2014 & 01-07 December 2014 and 10-15 February 2015). This was the first time that this important area of mangrove and bay has been surveyed for waterbirds. In total 37 waterbird species were recorded, belonging to 10 families. Four species are threatened with extinction; Madagascar fish-eagle *Haliaeetus vociferoides* (CR), Humblot's heron *Ardea humbloti* (EN), Madagascar sacred ibis *Threskiornis bernieri* (EN), and Madagascar teal *Anas bernieri* (EN). Significant numbers of greater and lesser Flamingo *Phoenicopterus ruber* and *Phoeniconaias minor* were recorded during the surveys. In addition, 30 forest bird species were inventoried; all of them were endemic or regionally endemic species.

Interviews were also conducted with local people, to collect information on their use of natural resources. Results from the interviews showed that local people are predominantly fishermen and there is significant pressure on natural resources through unsustainable use and disturbance.

INTRODUCTION

Loza Bay in the North West of Madagascar, district of Analalava and Antsohihy, is rich in biodiversity and plays an important role in the economy of the Sofia region. Three major rivers flow into the Loza Bay: the Tsinjomorona, the Maevarano and the Anjingo which feed into several wetland habitats for waterbirds. The bay is also important for transportation for local people as it links the Antsohihy and Analalava districts.

Loza Bay and surrounding wetlands support important populations of waterbird species, some of which are endemic and endangered according to BirdLife International 2015. At least four of these endemic species are threatened with extinction: Madagascar teal *Anas bernieri* (EN), Madagascar sacred ibis *Threskiornis bernieri* (EN), Humblot's heron *Ardea humbloti* (EN) and Madagascar fish-eagle *Haliaeetus vociferoides* (CR). The Madagascar teal and Madagascar sacred ibis are endemic waterbirds found only in wetlands of the west coast of Madagascar close to the sea. Humblot's heron is more widespread in Madagascar but found mostly in the west and Madagascar fish-eagle *Haliaeetus vociferoides* has been previously recorded in Loza Bay (Razafimanjato, 2011).

The site is also known to support nesting colonies of waterbirds that could contain thousands of nests composed of several species (Koenig, 2012). Two threatened endemic species *Ardea humbloti* and *Threskiornis bernieri* are known to nest together in colonies with other species.

Loza Bay is a potential site for the New Protected Area system (through the "Durban Vision" see Norris, 2006) and classed as an Important Bird Area (IBA) according to Birdlife International (Projet ZICOMA, 1999). Despite this biodiversity importance, no conservation measures have been undertaken at this site to date.

In 2014, Durrell Wildlife Conservation Trust Madagascar Programme received a grant from the African Bird Club to fund surveys of the waterbirds in this site. The project title is "Waterbird survey of Loza Bay, North West of Madagascar".

STUDY SITE

Loza Bay, in Analalava and Antsohihy district of North-Western Madagascar is located between 14°31' to 14°58'S and 47°44' to 48°58'E (Figure 1). Elevation ranges from 0- 34m above sea level with an area of about 60,700ha including 18,000ha of mangroves. Three major rivers flow into the Loza Bay: the Tsinjomorona, Anjingo and Maevarano (Figure 1). This area contains extensive muddy salt pans, brackish shallow lakes inside and, behind the mangroves, lagoons which flood at high tide and mangrove islets. These variable habitat types are important sites for waterbirds.

METHODS

Surveys were carried out during three sessions: August-September and December (2014), and February 2015. The last visit was conducted in the south part of the bay only, where nest searches for the Madagascar teal and other species were carried out. The southern part of the bay is composed of mangrove forest, salt lakes and muddy salt pans. Through collaboration with local people, all known important waterbird sites and colonial nest areas in Loza Bay were visited. The census was done systematically on foot or by boat and all individual birds were recorded by direct counts using binoculars (10x42) and telescopes (D=80mm W30x or D=60mm W22). Apart from the three lakes inside the mangroves, all the visits were done at low tide when waterbirds were found feeding on the flooded mud pans. The census was conducted by one to three people recording data together according to the size of the site and groups of birds. Any forest species noticed were also recorded. During these surveys, interviews were conducted with local people to assess the threats to nesting colonies and biodiversity in general. The main questionnaire sections included: hunting, fishing, capture of waterbirds and plant collection (Annex 1). In this case, we carried out interviews of selected households of the villages surrounding nesting colonies. The interviews were carried out in February corresponding to the nesting period. All the nesting species were identified and number of nests in each colony was estimated.

RESULTS

Waterbird population surveys

Thirty-seven waterbird species belonging to 10 families were recorded during the surveys (Table 3). The family Ardeidae was the most represented (10 species), followed by Scolopacidae (6) and Charadriidae (4). Five species and two subspecies are endemic and four species are considered threatened with extinction (BirdLife International, 2015): Madagascar fish-eagle *Haliaeetus vociferoides* (CR), Humblot's heron *Ardea humbloti* (EN), Madagascar sacred ibis *Threskiornis bernieri* (EN), and Madagascar teal *Anas bernieri* (EN). Significant numbers of greater and lesser flamingo *Phoenicopterus ruber* and *Phoeniconaias minor* were recorded during the surveys (Figures 2 and 3). Eleven of the inventoried waterbird species are migratory birds. During our surveys we recorded a total of 3,334 waterbirds, of which 1,148, 1,797 and 389 were seen in the August-September, December 2014 and February 2015 visits respectively. Numbers of individuals recorded in February 2015 were low because the survey focused solely on the south of the bay. The list of inventoried waterbird species with numbers of each species recorded is summarized in Table 3.

Forest bird surveys

Loza Bay is home not only for waterbirds but also contains forest species given that most of the habitats are mangroves. During our surveys, all forest bird species encountered were also recorded. Thirty species were recorded; thirteen were endemics, fourteen regional endemics and four endemic sub-species (Table 4). All of the species recorded were, therefore, endemics and/or regional endemics.

Nesting colony surveys

Only one major waterbird nesting colony was found during the surveys. The number of nests in this colony on Nosiborona Island was estimated at around 1,000 nests, most of which were of cattle egret *Bubulcus ibis*. Ten nests of dimorphic egret *Egretta dimorpha* were seen. No other colonial nesting species were found during our survey conducted during the breeding period in the December visit.

Threat surveys

In total, 33 households were interviewed within the three fokontany surrounding the nesting colony: Bevoay, Ambarijeby and Antsatrana. All the fokontany were located on the south side of Nosimborona (Bird Island) where the colony is located. Of the 33 respondents, all of them reported fishing as their main activity. Table 1 summarizes the percentage of households using each type of catch as main income.

Fish	63%
Crabs	60%
<i>Patsa</i> (small shrimps)	57%
<i>Varilava</i> (small fish)	42%
Shrimps	27%

Table 1. Percentage of households using each type of catch as main income.

Hunting surveys

Hunting of waterbirds and other animals were separate questions in the survey (Annex 1). Fifteen percent of households said they hunted waterbirds. With the exception of white-faced whistling duck *Dendrocygna viduata* which is hunted from other sites, all waterbirds were collected at Nosimborona. The species hunted and percentage of respondents is shown in Table 2.

Hunting methods

Local people used mainly spears and traps for hunting. The animals collected were mainly for food, but 9% of respondents said they sell the meat.

Plant collecting

36% of the interviewed households collect plants. Of these, 33% collect mangrove wood and 3% collect *Kabija* (a liana tubercule for food). 27% responded that the mangroves were used for house building and fences, and 6% for charcoal.

Waterbirds

Species		Percentage
<i>Threskiornis bernieri</i>	Madagascar sacred ibis	3%
<i>Platalea alba</i>	African spoonbill	6%
<i>Bubulcus ibis</i> +	cattle egret	3%
<i>Egretta dimorpha</i> +	dimorphic egret	
<i>Dendrocygna viduata</i>	white-faced whistling-duck	3%

+(*Bubulcus ibis* and *Egretta dimorpha* are collected at the nest)

Other animals

18% of 33 interviewed households said that they also hunt the following species and percentage of respondents is represented in the table below:

Species		Percentage
<i>Pteropus rufus</i>	Madagascar flying-fox	3%
<i>Sus scrofa</i>	wild pig	6%
<i>Tenrec</i> spp.	tenrec species	3%
<i>Numida meleagris</i>	helmeted guineafowl	6%

Table 2. Percentage of respondents and species hunted.

DISCUSSION

Loza Bay is an important bird area (Projet ZICOMA, 1999), but suffers from high levels of threats from anthropogenic activities (Koenig, 2012). Some of the birds recorded during the field surveys are endemics and globally threatened while others are migratory species visiting from outside of Madagascar. Madagascar teal, an endemic species that exhibits regional seasonal migration along the west coast (Young *et al*, 2006) was recorded during this study in Loza Bay (Figure 4). The maximum count was 36 individuals, from which we estimate that there could be up to 60-100 individuals in this area which qualifies this site as globally important for the species. Humblot's heron was found during the survey and the number varied from 4-7 individuals. Madagascar sacred ibis was also recorded with between 16 to 18 individuals. In a previous survey, Loza Bay held five individuals of Madagascar fish-eagle: two pairs and a single individual (Razafimanjato, 2011) and four individuals of this species were recorded during this survey.

Two species of flamingo occur in western Madagascar: greater and lesser flamingo. These are migratory species (Langrand 1995, Hawkins and Goodman 2003, Morris and Hawkins 1998). Both species were recorded during the dry season surveys in Loza Bay. Lesser flamingo were found only in the August-September visit, with 19 individuals, while the greater flamingo was found in two visits (August-September, December) with 190 and 170 individuals respectively. One greater Flamingo was found dead (the reason of the death is undetermined).

Thirty-one species of shorebirds have been recorded in Madagascar and 19 of these are migratory (Young 2003, 2006). Eleven migratory shorebirds including the two species of flamingo were recorded during the Loza Bay surveys (Table 3). With the exception of whimbrel *Numenius phaeopus*, which had high number of individuals (more than 600); the numbers of the migratory birds appeared to be very low during the surveys.

Interviews were conducted with the local people in conjunction with the threat surveys. These questionnaires did not include use of the bay by people from the towns or other regions. The results from households interviewed showed that fishing was the main activity of local people. 15% of the 33 households interviewed said they hunted waterbirds and 18% hunted other animal species. These numbers are concerning if carried out every breeding season. Local people collected mangroves for house building, fences and charcoal. The mangrove islets are an important roost for bats (Koenig, 2012). But during our survey no bats were found. The high number of fishermen indicates that the disturbance is intense in this area. Overall, it appears that the threats and pressures on natural resources are very high in Loza Bay.

Loza Bay is an important area for transportation of local people from Antsohihy, the biggest town in this area, to Analalava and also between all the smaller villages surrounding the bay. A large number of people, therefore, use the site, causing not only disturbance to waterbirds, but also providing an opportunity for people passing by to collect from the nesting colony.

In spite of the importance of biological diversity of Loza Bay, this ecosystem and its resources are subject to strong pressures from the human activities. Loza Bay is an important site for a potential New Protected Area and Important Bird Area. The mangrove forests play important roles for local people and also for people living in nearby towns. To date, no conservation measures have been undertaken locally to maintain long time viability of biodiversity.

We recommend that permanent conservation activities and annual monitoring of waterbirds, particularly the endangered endemic species, including Nosimborona (Bird Island) where there is a nesting colony, be continued in order to assess trends in biodiversity and human threats, and to identify conservation measures to ensure long term viability of the biodiversity of Loza Bay.

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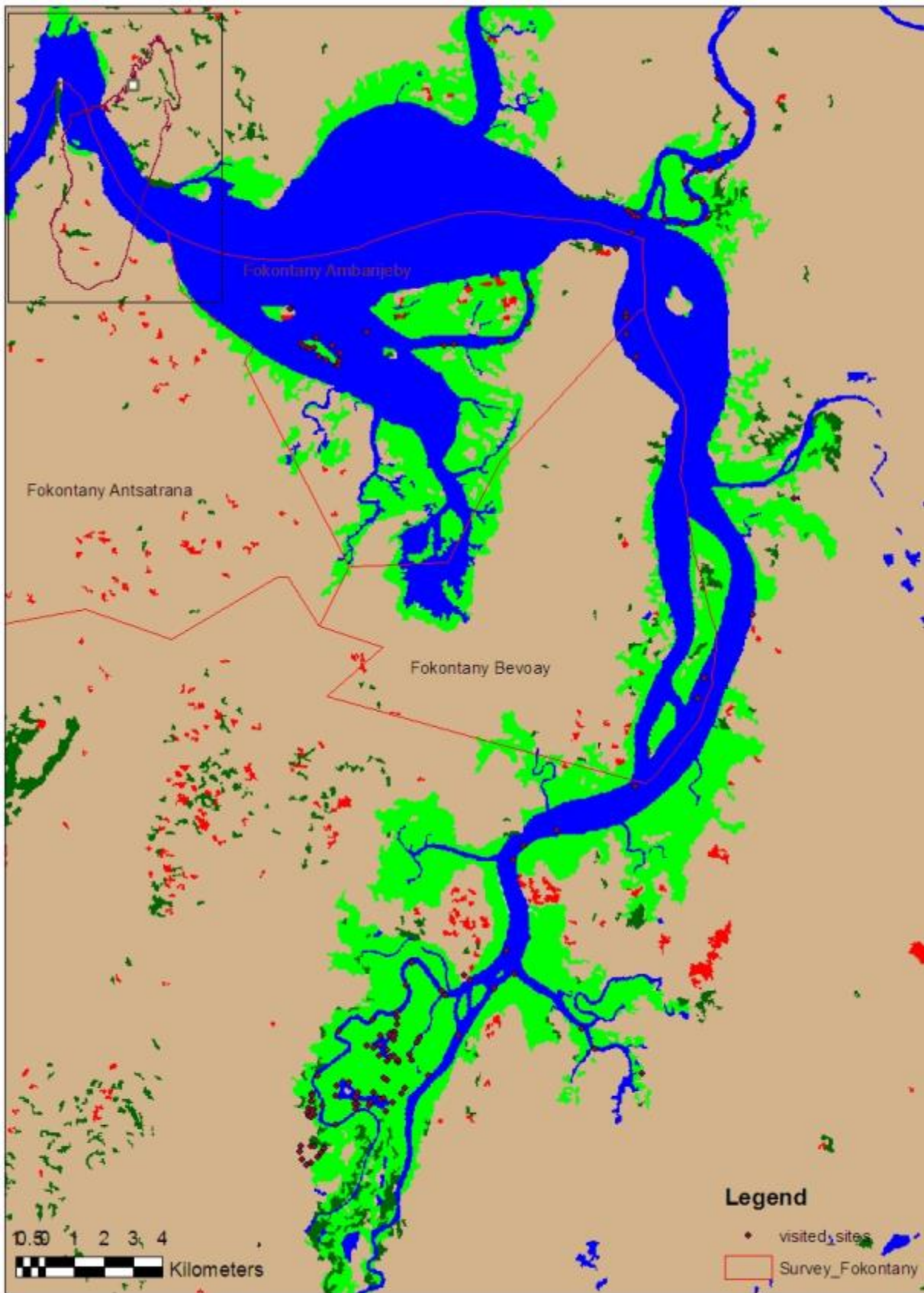


Figure 1. Sites surveyed in Loza Bay and surrounding mangroves for waterbirds in 2014-2015.



Figures 2 and 3. Greater flamingos *Phoenicopterus ruber* observed in Loza Bay in 2014. Photos by Felix Razafindraja



Figure 4. Madagascar teal *Anas bernieri* observed in Loza Bay in 2014. Photo by Felix Razafindraja

Table 3. Results of waterbird surveys in Loza Bay in 2014-2015.

Species		Aug-Sep 14	Dec-14	Feb-15	Status
1- <i>Phalacrocorax africanus</i>	Long-tailed cormorant	4	1	2	ES
2- <i>Nycticorax nycticorax</i>	Black-crowned night-heron		4	10	B
3- <i>Ardeola ralloides</i>	Squacco heron	32		1	B
4- <i>Bubulcus ibis</i>	Cattle egret	14	420	10	B
5- <i>Butorides striatus</i>	Striated heron	49	24	20	ES
6- <i>Egretta ardesiaca</i>	Black egret			100	B
7- <i>Egrettadimorpha</i>	Dimorphic egret	114	175		B
8- <i>Egretta alba</i>	Great egret	158	25	2	B
9- <i>Ardea purpurea</i>	Purple heron			2	B
10- <i>Ardea cinerea</i>	Grey heron	3	2		ES
11- <i>Ardea humbloti</i>	Humblot's heron	4	7		E, EN
12- <i>Threskiornis bernieri</i>	Madagascar sacred ibis	18	16		E, EN
13- <i>Plegadis falcinellus</i>	Glossy ibis			1	B
14- <i>Platalea alba</i>	African spoonbill	25	16		B
15- <i>Phoenicopterus ruber</i>	Greater flamingo	190	170		M
16- <i>Phoeniconaias minor</i>	Lesser flamingo	19			M, NT
17- <i>Dendrocygna viduata</i>	White-faced whistlingduck	56	7	1	B
18- <i>Sarkidiornis melanotos</i>	Comb duck			1	B
19- <i>Nettapus auritus</i>	Pygmy goose			3	B
20- <i>Anas bernieri</i>	Madagascar teal	36	1	11	E, EN
21- <i>Anas erythrorhyncha</i>	Red-billed pintail	13			B
22- <i>Haliaeetus vociferoides</i>	Madagascar fish-eagle	4			E, CR
23- <i>Dryolimnas cuvieri</i>	White-throated rail	21	4	15	E
24- <i>Gallinula chloropus</i>	Common moorhen			4	B
25- <i>Himantopus himantopus</i>	Black-winged stilt	10	2	5	B
26- <i>Pluvialis squatarola</i>	Grey plover	42	47		M
27- <i>Charadrius marginatus</i>	White-fronted plover		20		B
28- <i>Charadrius pecuarius</i>	Kittlitz's plover		10		B
29- <i>Charadrius leschenaultii</i>	Greater sandplover	34	119		M
30- <i>Limosa lapponica</i>	Bar-tailed godwit		16		M
31- <i>Numenius phaeopus</i>	Whimbrel	167	624	130	M
32- <i>Tringa nebularia</i>	Common greenshank	6	25	16	M
33- <i>Xenus cinereus</i>	Terek sandpiper		1		M
34- <i>Actitis hypoleucos</i>	Common sandpiper	114	44	46	M
35- <i>Calidris ferruginea</i>	Curlew sandpiper	15			M
36- <i>Thalasseus bergii</i>	Great crested tern		1		B
37- <i>Thalasseus bengalensis</i>	Lesser crested tern		16	9	M
Total		1148	1797	389	

E: Endemic species, ES: endemic subspecies, EN: Endangered, B: breeding, CR: Critically endangered, M: migratory, NT: Near Threatened

Table 4. Forest bird species surveyed in mangroves in Loza Bay in 2014-2015.

Species	Common name	Aug- Sep 14	Feb 15	Status
1- <i>Milvus aegyptius</i>	Yellow-billed kite	7		ES
2- <i>Polyboroides radiatus</i>	Madagascar harrier-hawk	3		E
3- <i>Buteo brachypterus</i>	Madagascar buzzard	2		E
4- <i>Accipiter francesiae</i>	Frances's sparrowhawk		4	ER
5- <i>Streptopelia picturata</i>	Madagascar turtle dove	4	5	RE
6- <i>Coracopsis vasa</i>	Greater vasa parrot	11		RE
7- <i>Coracopsis nigra</i>	Lesser vasa parrot	5	7	RE
8- <i>Agapornis canus</i>	Grey-headed lovebird		11	E
9- <i>Cuculus rochii</i>	Madagascar lesser cuckoo	4	3	E
10- <i>Otus rutilus</i>	Madagascar scops owl	1	2	RE
11- <i>Caprimulgus madagascariensis</i>	Madagascar nightjar	2	5	RE
12- <i>Centropus toulou</i>	Madagascar coucal		2	RE
13- <i>Asio capensis</i>	Marsh owl		1	ES
14- <i>Merops superciliosus</i>	Madagascar bee-eater		10	RE, ES
15- <i>Alcedo vintoides</i>	Madagascar malachite kingfisher	1	3	RE
16- <i>Eurystomus glaucurus</i>	Broad-billed roller	5	7	ES
17- <i>Upupa marginata</i>	Madagascar hoopoe		1	E
18- <i>Coracina cinerea</i>	Ashy cuckoo-shrike	5	4	RE
19- <i>Vanga curvirostris</i>	Hook-billed vanga	3	3	E
20- <i>Falco palliata</i>	Sickle-billed vanga	9	6	E
21- <i>Artamella viridis</i>	White-headed vanga	2	2	E
22- <i>Leptopterus chabert</i>	Chabert's vanga		10	E
23- <i>Cyanolanius madagascarinus</i>	Blue vanga		1	RE
24- <i>Copsychus albospecularis</i>	Madagascar magpie-robin	2	8	E
25- <i>Neomixis tenella</i>	Common jery	4	6	E
26- <i>Terpsiphone mutata</i>	Madagascar paradise flycatcher	3	3	RE
27- <i>Nectarinia souimanga</i>	Souimanga sunbird	5	2	RE
28- <i>Dicrurus forficatus</i>	Crested drongo	3	4	RE
29- <i>Ploceus sakalava</i>	Sakalava weaver		12	E
30- <i>Foudia madagascariensis</i>	Madagascar red fody		16	E

E: Endemic species, RE: Regional endemic,

ES: Endemic subspecies

Annex 1 NATURAL RESOURCE USE SURVEY

Names of Interviewer:

Date:

Village:

1. Interview respondent

Age	
Sex	

2. Head of household

Age	
Sex	

3. Number of people living in household

Age	0-5	6-14	15-29	30-59	>60
Male					
Female					

4. How long have you lived here?

5. Hunting

Natural resources	1.	2.	3.	4.	5.
1. Where do you collect it from?					
2. What do you use it for?					
3. Total collected					
4. How many days per week/month/year do you collect it?					
5. Unit					
6. Percentage for own use?					
7. Percentage sold / bartered					
8. Average price per unit					

6. Survey specific for waterbirds

Species	1.	2.	3.	4.	5.
9. Where do you collect from?					
10. How do you collect it?					
11. What do you use it for?					
12. Total collected					
13. How many day per week/month/year do you collected it?					

14. Unit					
15. Percentage for own use?					
16. Percentage sold/bartered?					
17. Average price per unit					

7. Fishing

Natural resources	1.	2.	3.	4.	5.
18. Where do you collect it from?					
19. What do you use it for?					
20. Total collected					
21. How many days per week/month/year do you collect it?					
22. Unit					
23. Percentage for own use?					
24. Percentage sold / bartered					
25. Average price per unit					

8. Plants

Natural resources	1.	2.	3.	4.	5.
26. Where do you collect it from?					
27. What do you use it for?					
28. Total collected					
29. How many days per week/month/year do you collect it?					
30. Unit					
31. Percentage for own use?					
32. Percentage sold / bartered					
33. Average price per unit					