



## **Conservation Leadership Programme: Project Reporting**

### **FINAL REPORT**

#### **CLP PROJECT ID & PROJECT TITLE:**

0105610\_Status and Ecology of Sokoke pipit in Zaraninge Forest, Tanzania

#### **HOST COUNTRY, SITE LOCATION AND THE DATES IN THE FIELD:**

Tanzania, Zaraninge Forest, August 2010 – August 2011

#### **NAMES OF INSTITUTIONS INVOLVED IN THE PROJECT:**

Sokoine University of Agriculture

#### **OVERALL AIM:**

To generate information for the conservation of Sokoke pipit in the Zaraninge forest

#### **AUTHORS:**

Robert Modest Byamungu, Amani Kitegile & Michael Muganda

#### **CONTACT ADDRESS:**

Po Box 3073, Morogoro, Tanzania\_robertya@yahoo.com

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## **Section 1**

### **Summary**

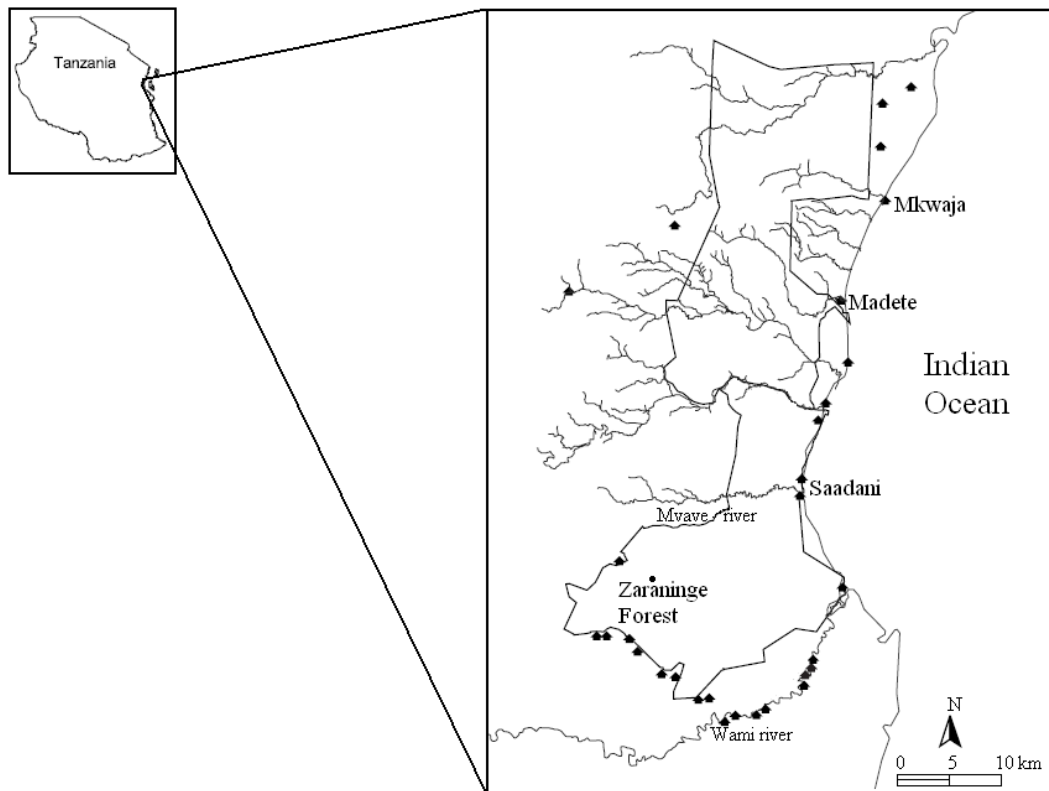
Our study focused on endangered bird species, Sokoke pipit, which has a very small range, and its habitat is declining owing to clearance for cultivation, intensive charcoal production and logging. Our aim was to generate information relevant for conservation of Sokoke pipit in Zaraninge forest. We collected data for density estimation using distance sampling techniques, alongside recording habitat data. We also collected data regarding familiarity of species among surrounding local communities, which was followed by awareness-rising on missing knowledge. Result showed that *S. pipit* preferred least disturbed habitats with tall trees that are less influenced by human activities. Analysis using DISTANCE program revealed that the pipit population is very low in Zaraninge forest (1.6 individuals/km<sup>2</sup>). Furthermore, in this forest, the species is only restricted in the forest core habitats. Although some members of the local community claimed to know the species, results showed that there were confusion of our species with other birds especially House sparrow and other species of pipit. We concluded that *S. pipit* in Zaraninge forest avoided areas that experienced frequent human interference including places next to pineapple and maize fields. Overall, the findings appeared to suggest that local communities in the study area had little knowledge about the study species.

## Introduction

The importance of the Tanzanian coastal forests with regards to biodiversity is well recognized, however this is not adequately reflected in the protection efforts allocated to these forests. Needless to say the mountains forests in Tanzania have been widely recognized and put under adequate protection of either National Parks (Udzungwa Mountains), Nature Reserve (Amani) or Forest reserve (Udzungwa escarpment), and are also included in the list of 11 tropical areas that demand special attention (Sheil, 1992, Burgess, 1993). On the other hand, the coastal forests which are much smaller have only been recently recognized as needing a similar attention. However, still the current status of most of these forests is not well known, although it is strongly believed that most of these forests are under severe threats through charcoal burning, agriculture, logging and pole cutting. The Zaraninge Forest (fig 1) is part of this wider East African Coastal Forest Ecosystem (Mligo et al, 2009). It is one of the remnants of the once much more extensive forest of the Zanzibar-Inhambane Phytocoria vegetation zone (White, 1993; Clarke, 2000; Linder et al, 2005).

The Zaraninge forest is known for its support of high level of local endemic plant and animal species, and therefore has been named as UNESCO biodiversity hotspot. The forest at a wider scale is highly fragmented but contains vegetation communities which support a wide diversity of animal species including the endangered Sokoke pipit. Although the forest is very small about 2100 ha (21 km<sup>2</sup>) (Bloesch and Klotzli, 2002, 2004), it is of importance conservation consideration due to high level of local endemic plant and animal species (Burgess and Clarke, 2000). As pointed out earlier the Zaraninge forest like many other coastal forests is facing severe anthropogenic deleterious effects (Mligo et al, 2009). This affects many forest dependant species like primates and forest birds that are sensitive to habitat change. Among a number of species of the Zaraninge forest facing this pressure is an endangered bird species, the Sokoke Pipit (*Anthus sokokensis*), first recorded in this forest in 1991 by Neil Burgess (Burgess, 1991). But since then no further studies on the species status has been conducted.

The most alarming situation is that the population status of Sokoke pipit in Kenya (in Arabuko Sokoke forest) is well known. However, the species population in Tanzania is uncertain. Therefore it was the aim of this study to determine the population and ecological status of Sokoke pipit in the Zaraninge Forest Reserve. The information is useful to promoting both conservation and protection of the species in the area.



**Fig 1:** Map of study area. Modified after Tobler, et al., (2003)

## **Project members**

### **(i) Robert Modest Byamungu**

Robert is 33 years old and is working with Sokoine University of Agriculture, Tanzania as a Lecturer, where he collaborates with other Senior Lecturers in teaching students in the Department of Wildlife Management. He holds a bachelor's degree in Wildlife Management and a Master's degree in (Biology) Dryland Biodiversity. Robert is currently enrolled under a PhD programme at Sokoine University of Agriculture, where he is working on bird population connectivity in fragmented habitats in Saadani National Park, Tanzania. As part of his career, Robert is interested in research under fields of Wildlife Management, Wildlife Ecology and Evolutionary Biology. He is particularly dedicated in conservation of biodiversity hotspots and coastal forests of Tanzania. During his spare time he enjoys evening walk and watching movies.

### **(ii) Michael Muganda**

Michael is 36 years old and is working with Sokoine University of Agriculture, Tanzania as a Lecturer. He holds a Master Degree in Tourism Management, and BSc. Degree in Wildlife Management. He is interested in researches related to Tourism management, Wildlife management, Rural livelihoods and Biodiversity conservation, Community - Based tourism, Sustainable tourism, Pro-poor tourism, Tourism and community development, and Tourism Policies, Legislation and Development

(iii) Amani Kitegile

Amani is 35 years old. He is an employee of Sokoine University of Agriculture, Tanzania as an Assistant Lecturer. He is involved in teaching, research and consultancy in animal classification and identification, animal behaviour, animal ecology, ecological monitoring, fish biology (Ichthyology), environmental and ecological impact assessment and natural resource conservation and protection.

## **Section 2**

### **Aim and objectives**

The project aim was to generate information for the conservation of Sokoke pipit in Zaraninge forest

The objectives were:

- (i) to determine the density of Sokoke pipit in the study area
- (ii) to establish the spatial distribution of Sokoke pipit in the study area
- (iii) to investigate habitat preference of Sokoke pipit in the study area
- (iv) to probe possible familiarity of study species among surrounding local communities
- (v) to create public awareness to surrounding communities and other stakeholders regarding the current status of the study species

### **Methodology**

We used distance sampling to collect data for density estimation (Davis, 2005; Marrison, et al., 2001; Bibby et al., 2000). The study area was stratified into different vegetation types and landforms (Marrison, et al., 2001; Sutherland, 1996). In each stratum, transects were laid down and surveyed for thirty days, where detection cue (sight/call), behavior, and perpendicular distance of birds were recorded. Positions of birds in field were recorded using GPS (Marrison et al., 2001; Bibby et al., 2000; Sutherland, 1996). We recorded habitat association of birds within circular plots of 15 m diameter placed along transects at each bird sighting. The following variables were measured within each plot following Dallimer and King, (2007): Number of trees making up canopy (canopy count); Percentage canopy cover estimated by eye (canopy cover); Maximum height of canopy (canopy height); Average number of stems in three 1m-radius circles (ground cover); Presence of fruiting/flowering trees; Abundance of climbers and epiphytes; Inclination of terrain (slope); and altitude.

To obtain information regarding familiarity of study species among surrounding local communities, interviews using semi-structured questionnaires were carried out (Fontana and Frey, 2000). This was followed by public meetings on awareness-rising regarding the species to fill gaps of missing knowledge.

To estimate density, distance data was analyzed using DISTANCE software (Thomas et al. 1998). Spatial distribution of species within study area was established after plotting GPS data using ArcView (Hunsaker, et al., 2000). Mann-Whitney U test was used to determine which variables influenced Sokoke pipit habitat preference (StatSoft, 2001). To probe familiarity of species among community, the study employed in-depth semi-structured interviews with community members, leaders and school teachers.

Interviewees were chosen based on their extensive knowledge, experience, expertise, and involvement with various issues around project area. However, to minimize language barrier and translation problems, all interviews were conducted by the researchers themselves (Tosun, 2006). Those who participated in the interviews were encouraged to give expression to their views, thoughts and intentions. Interviews were conducted in Swahili, the national language of Tanzania, which all interviewees were familiar with and in which the researchers are much fluent.

## **Outputs and Results**

We report the total number of Sokoke pipits in Zaraninge forest to be about 34 individuals, with density of 1.6 individuals per km<sup>2</sup>. Currently there are no overall estimates for the Tanzanian populations, but the sites where the bird occurs are in general patchy, and most of them are very heavily degraded (Burgess, 2007). At present, most of the known sites for Sokoke pipit have been destructed following a variety of human disturbances. For instance, there is practically no closed forest remaining at sites where the species used to occur e.g. Vikindu Forest Reserve and Pugu-Kazimzumbwe (Burgess, 2007). This implies that the population of Sokoke pipit in the named forest has gone to extinction.

Out of the ten vegetation variables that we measured, only four of them influenced our study species. The variables that influenced our study species are summarized in figure 2 below.



**(a)**

Season	Wet	Dry
Mean	17.750	21.500
SD	3.403	6.028
Minimum	15.000	15.000
Maximum	22.000	28.000
Lower 95% CI	12.335	11.910
Upper 95% CI	23.165	31.090

**(b)**

Season	Wet	Dry
Mean	8.500	9.500
SD	3.000	1.000
Minimum	4.000	8.000
Maximum	10.000	10.000
Lower 95% CI	3.727	7.909
Upper 95% CI	13.273	11.091

**(c)**

Season	Wet	Dry
Mean	79.750	74.250
SD	10.844	14.796
Minimum	72.000	60.000
Maximum	95.000	95.000
Lower 95% CI	62.498	50.710
Upper 95% CI	97.002	97.790

**(d)**

Season	Wet	Dry
Mean	76.250	73.750
SD	6.292	11.087
Minimum	70.000	60.000
Maximum	85.000	85.000
Lower 95% CI	66.240	56.111
Upper 95% CI	86.260	91.389

**Figure 2:** Output of Mann-Whitney U test showing statistical inference of variable that influenced Sokoke pipit habitat preference in the study area as recorded during wet and dry seasons (a) maximum heights of vegetation in m, (b) abundance of climbers measured on scale of 0 (none) to 10 (dense), (c) percentage coverage of fallen leaf litter, (d) percentage crown cover of trees >10 m in height

We found out that the Sokoke pipit in Zaraninge forest preferred least disturbed habitats. The species was mainly sighted in places comprising tall trees, lianas, closed canopy and places where the forest floor was covered completely by fallen leaf litters. These attributes were in conformity with that of primary forest (Clarke 2000, White 1983). This suggests that the species prefers mature forests. We identified the core area of Zaraninge next to Kiwandi camp as sensitive and important habitat for Sokoke pipit. Practically this information adds knowledge to Saadani National Park (SANAPA). This park would use this information for example when building cases on advocating further protection measures of sensitive habitats in Zaraninge.

Generally, local communities had some knowledge about biodiversity and impact of human activities on ecosystem services (table 1).

**Table 1.** Local communities' knowledge on biodiversity (N= 56)

To what extent do you agree or disagree with the following statements about biodiversity conservation?	Percentage		
	Agree	Disagree	Don't know
Forests provide habitats to diverse animal species	98.2	0.0	1.8
Wildfire leads to loss of biodiversity	96.4	1.8	1.8
Forest clearing (e.g. for agriculture, logging, pasture etc) leads to loss of biodiversity	94.6	3.6	1.8
Tree cutting (e.g. for charcoal, poles, timber, firewood etc) leads to loss of habitats	92.9	3.6	3.6
Biodiversity generates income especially through tourism activities	92.9	0.0	7.1
Human activities are considered the most significant cause of forest loss	75.0	16.1	8.9

Source: Household survey, April - June 2011

On the other hand, analysis of quantitative data presented in Table 2 below suggest that there were some members of the local community who were familiar with the study species (Sokoke pipit). However, the analysis of qualitative data revealed the opposite. Interview results showed that those who claimed to have seen Sokoke pipit in their farms and premises confused it with House sparrow, while those who claimed to have seen the bird in the forest confused it with Night jays, weavers and other species of Sokoke pipit.

**Table 2.** Local communities' knowledge on Sokoke pipit (N= 56)

Familiarity of study species (Sokoke pipit) among local communities surrounding Zaraninge Forest	Percentage	
	Yes	No
Have you ever seen this kind of bird ( <i>showing him/her a photo of Sokoke pipit</i> )?	51.8	48.2
Do you know this bird ( <i>a photo of Sokoke pipit</i> ) in terms of density?	35.7	64.3
Do you know this bird ( <i>a photo of Sokoke pipit</i> ) in terms of distribution?	25.0	75.0
Do you know this bird ( <i>a photo of Sokoke pipit</i> ) in terms of habitat preference?	30.4	69.6
Do you know the threats currently facing this bird? ( <i>a photo of Sokoke pipit</i> )	30.4	69.6
Are there other birds that you know threats facing them?	66.1	33.9
Are there other birds that you know their information (their density, distribution and habitat preference)?	30.4	69.6
Would you like to know such and more information about this bird?	87.5	12.5

Source: Household survey, April - June 2011

Overall results suggested that local communities in the study area were not aware of Sokoke pipit especially in terms of density, distribution, habitat preference and threats currently facing the bird. Similarly, the results suggested that they had low levels of awareness of such information about other birds as well. Interestingly, the results

revealed that the majority of local communities (87.5%) in the study area were eager to know more about Sokoke pipit and other bird species. While the results justified the need for the public awareness raising campaign to fill gaps of missing knowledge regarding the current status of the study species, it also called for more efforts to change people's mind-set towards birds. The results also suggested the need for a strategy to attract local communities' participation in bird conservation programs.

### **Achievements and Impacts**

Our findings on habitat preference and distribution of study species presented key information for our project. The variables that influenced our study species indicated that our species prefers a well established forest. Fortunately, the plateau part of Zaraninge where we recorded more individuals of this species is situated at the core habitat of the forest, and this part is under the Saadani National Park boundary. This segment of Zaraninge already receives a high level of protection that other protected areas under Tanzania National Parks receive. However, a muddy road to Gongo village, although infrequently used passes closer to the prime habitat of our species. So there is a possibility that the road is within the home range of the species. As part of its protection measures, the Saadani National park has been discouraging large trucks to use this road when traversing the forest from Mvave entrance gate to Gongo village. However, their central reason had been to protect the integrity of the forest without having prior knowledge that the road also traverse through the habitat of this Engendered and endemic bird species. Our findings therefore add knowledge to SANAPA for example when building cases on advocating further protection of sensitive habitats in Zaraninge.

On the other hand with community work, our project has reached at least 1,000 people from around project site and other stakeholders. This number of people already knows and some are keen to hear regarding our next step after end of this project. During awareness rising campaign we estimate to have reached about 400 people including school children, and the rest of community members.

### **Section 3**

#### **Conclusion**

Using a case study of Zaraninge Forest in Tanzania, this report contributes to the growing understanding of community participation in biodiversity conservation in coastal forests. The study has examined local communities' familiarity on birds using the model species - Sokoke pipit (*Anthus sokokensis*). It has also highlighted on local communities' basic knowledge on biodiversity conservation, especially from forest, wildlife, and socio-economic points of view. Overall, the findings appear to suggest that local communities in the study area had little knowledge about the study species (Sokoke pipit). This was revealed by the fact that, although partial results suggested that there were members of the local community who were familiar with the study species, end results revealed the opposite. Our findings further suggested that the majority of local communities in the study area showed desire to learn more about Sokoke pipit and other bird species. In addition, the results also suggested that there is a need for a strategy to attract local communities' participation in conservation of birds.

Regarding ecological information we concluded that Sokoke pipit in Zaraninge forest avoided areas that experienced frequent human interference including places next to pineapple and maize fields. While it might be difficult or impossible to relocate residents from Gongo village as they have settled the area for long, we recommend that Tanzania National Parks through SANAPA should emphasize participatory management strategy on protecting this forest. This can be achieved through organizing workshops and seminars to community members, and leaders from the area. A participatory management strategy can be achieved through toiler made training modules and presentations that are simple to understand and conceptualize. Emphasizes could be on the importance of protecting this forest for the sake of its biodiversity, endemism, peoples' welfare including carbon sequestration, and the water catchment potential.

### **Problems encountered and lessons learnt**

Sighting of the study species in the field was a challenge. The bird is elusive and skulking. We relied much on aural survey (with sound playback as a backup) to collect data for estimating density, distribution and habitat preference. From our community work, we learned that people get interested to know the reasons why a particular species is being researched. During data collection some people were eagerly asking us questions such as why are we so concerned with this bird species only while there are many other birds in the Zaraninge forest! After explaining to them that the bird under research is endangered and endemic to coastal forests of Tanzania, people became more interested with our research and keenly started following up on what will be the findings at the end of research.

### **Future perspective**

Following scanty data that we collected on our species with only eight encounters, we recommend a follow up project that will exhaustively survey the species in the area. This could give a chance to comprehensively collect information particularly regarding density and habitat use by the species. It is important to have this data as it could be supporting information for IUCN to uplift the species to Critically Endangered category from the current one of Endangered category. The follow up project should go hand in hand with the searching for new localities of species in forests nearby Zaraninge. The same project should also engage on training local actors on environmental conservation, with particular emphasis on safeguarding the Sokoke pipit habitats. The conservation club for Sokoke pipit is also suggested to be established as an outreach scheme, with particular attention on restoring the bird's destroyed habitats. The proposed title that could handle the above named objectives could be "Advancing conservation initiatives of Sokoke pipit through integrated outreach and training around Zaraninge forest, Tanzania".

To perpetuate the conservation efforts in the area, the team will make all necessary attempts to seek grants so that the follow-up project is implemented.



- Yes (*please comment where?*)       No (*please comment why?*)

Comments:

.....  
.....  
.....  
.....

- 5) Do you know this bird (*show him/her again the photo of Sokoke pipit*) in terms of:  
a) Density?                      Yes/No

Comments: .....

- b) Distribution?                      Yes/No

Comments: .....

- c) Habitat preference?              Yes/No

Comments: .....

- 6) Would you like to know such and more information about this bird (i.e. in terms of density, distribution and habitat preference of Sokoke pipit)?  
 Yes (*please comment why?*)       No (*please comment why?*)

Comments:.....  
.....

- 7) Are their birds that you know their information (their density, distribution and habitat preference)?  
 Yes (*please mention the birds & their information?*)     No (*please comment why?*)

Comments:

.....  
.....  
.....  
.....

- 8) Do you know the threats currently facing this bird? (*again show him/her Sokoke pipit*)  
 Yes (*please mention them?*)       No (*please comment why?*)

Comments:

.....  
.....  
.....

- 9) Would you like to know more about the threats currently facing this bird?

- Yes (*please comment how?*)       No (*please comment why?*)

Comments: .....

10) Are there birds that you know their threats?

- Yes (*please mention the birds & their threats?*)     No (*please comment why?*)

Comments:

.....

**Demographic characteristics of Respondent**

Which village do you come from? .....

Which sub village do you come from? .....

What is your level of education?

- primary school       secondary school     high school  
 college               university             no formal education

Gender of Participant:     Male             Female

What is your occupation .....

How old are you?

- 16-24 yrs    25-34 yrs    35-44 yrs    45-59 yrs    60+ yrs

**Thank you for participating in this survey**

**Appendix 2: Summary of finances**

<b>Itemized expenses</b>	<b>Total CLP requested (USD)</b>	<b>Total CLP used (USD)</b>
<b>PHASE I - PROJECT PREPARATION</b>		
<b>Administration</b>		
Communications (telephone/internet/postage)	80.00	80.00
Books and printing journal articles/materials	0.00	0.00
Insurance	0.00	0.00
Visas and permits	0.00	0.00
Team training (pens/ pencil, notebooks )	0.00	7.00
<b>Reconnaissance</b>		
Medical supplies/first aid	0.00	0.00
<b>Equipment</b>		
Scientific/field equipment and supplies	0.00	0.00
Photographic equipment ( Batteries)	0.00	0.00
Camping equipment	0.00	0.00
Field guides	0.00	0.00
Maps	0.00	0.00
Boat/engine/truck (Field vehicle maintenance-shock absorber, tyres, tyre tubes, garage charges)	0.00	581.69
Fuel	0.00	0.00
Other	0.00	0.00
<b>PHASE II - IMPLEMENTATION EXPENSES</b>		
<b>Administration</b>		
Insurance	0.00	0.00
<b>Transportation</b>		
Fuel: Trips to and from project site including movements in field during data collection	3,494.00	2,760.97
Accommodation for team members and local guides		
In the field (\$15 per day for 3 people * 80 days = 3,600)	3,600.00	3,600.00
Food for team members and local guides		
(Food in field for Researchers and Local guides)	3,920.00	3,920.00
Transportation	300.00	250.00
Customs and port duties	0.00	0.00
<b>Workshops</b>		
Outreach/education activities and materials (brochures, posters, video, t-shirts, etc.)		
Brochures (180 * 2.8 = 504)	500.00	504.00
t-shirts	0.00	0.00
Other (Material supplies during awareness meeting including generator hire to show video)	0.00	227.90
<b>PHASE III - POST-PROJECT EXPENSES</b>		
<b>Administration</b>		
Report production and results dissemination		
(Printing 15 pages* 0.19/page*150 copies = 427.5, binding 150 copies*0.94 = 141)	600.00	568.50
<b>Total</b>	<b>12,494.00</b>	<b>12,500.06</b>



**Appendix 3:** Bird checklist for Zaraninge forest and surrounding areas recorded during study

African Broadbill	Green-backed Twinspot
African Golden Oriole	Grey-headed Bush shrike
African Goshawk	Grey Hornbill
African Wood Owl	Helmeted Guinefowl
Ashy Flycatcher	House Martin
Barred Owlet	Kenya Crested Guinefowl
Bateleur	Lesser Striped Swallow
Black Crake	Little Sparrowhawk
Black Roughwing	Little yellow Flycatcher
Black-backed Puffback	Mosque Swallow
Black-bellied Starling	Narina Trogon
Blackcap	Northern Carmine Bee-eater
Black-headed Apalis	Palm Swift
Black-headed Oriole	Peters' Twinspot
Blue-cheeked Bee-eater	Plain-backed Sunbird
Blue-spotted Wood Dove	Pygmy Kingfisher
Bohm's Spinetail	Red-capped Robin Chat
Broad-billed Roller	Red-eyed Dove
Bronze Mannikin	Red-fronted Tinkerbird
Bronze-naped Pigeon	Red-naped Widowbird
Brown-breasted Barbet	Red-tailed Ant Thrush
Brown-Crowned Tchagra	Red-tailed Shrike
Brown-Hooded Kingfisher	Ring-necked Dove
Brown-necked Parrot	Silver-cheeked Hornbil
Cardinal Woodpecker	Sokoke Pipit
Chestnut-fronted Helmet Shrike	Southern Banded Snake Eagle
Collared Sunbird	Spotted Eagle Owl
Crested Flycather	Spotted Flycatcher
Crested Francolin	Square-tailed Drongo
Crowned Eagle	Square-tailed Nightjar
Crowned Hornbill	Striped Kingfisher
Dark-backed Weaver	Sulphur- breasted Bush Shrike
Eastern Beaded Scrub Robin	Tamborine Dove
Eastern Coast Akalat	Tiny Greenbul
Eastern Nicator	Tropical Boubou
Eastern Olive Sunbird	Trumpeter Hornbill
Eastern Yellowbill	Violet-crested Turaco
Emerald-spotted Wood Dove	White-browed Coucal
Eurasian Bee-eater	White-throated Bee-eater
Eurasian Swift	Winding Cisticola
Fischer's Greenbul	Yellow Bishop

Forest Batis	Yellow-bellied Greenbul
Fork-tailed Drongo	Yellow-breasted Apalis
Golden Weaver	Yellow-fronted Canary
Golden-tailed Woodpecker	Yellow-rumped Tinkerbird
Great Sparrowhawk	Yellow-streaked Greenbul
Greater Honeyguide	Yellow-throated Longclaw
Green Pigeon	Yellow-vented Bulbul
Green Wood Hoopoe	Zanzibar Sombre Greenbul
Green-backed Camaroptera	

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### **Distribution list**

The following stakeholders were supplied with copies of project report: Conservation leadership Programme (CLP), Save Our Species, Gongo primary school, Mbwebwe village – office, Gongo village office, Saadani National Park, Wildlife Conservation Society of Tanzania (WCST), Department of Wildlife Management at Sokoine University of Agriculture, Sokoine University of Agriculture National Agricultural Library, and WWF Tanzania office, Team members