Assessment of the current status of endemic bird species to the Albertine Rift in Gishwati Forest Reserve, Rwanda



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December, 2009

EXECUTIVE SUMMARY

An Assessment of the status of the Albertine Rift Endemic (ARE) bird species in Gishwati Forest was conducted in the period of October to November 2009. The survey aimed at providing basic information on the density and distribution of Albertine Rift Endemic bird species in Gishwati Forest, at documenting their habitat and at producing a bird checklist of the site.

The point counts and opportunistic sampling methods were used in 6 transects selected in the remaining natural and disturbed forests and each point was visited twice. GPS points were taken at each point and analyzed using the GIS 9.2 software while the common vegetation was recorded at each point.

A total of 101 bird species were recorded and among them 14 are endemic to the Albertine Rift while 2 are listed as vulnerable on 2009 IUCN Red List. Purple-breasted Sunbird represented the highest population density with 19.429 (11.422-33.048) where as the frequencies of 7 other species were too low for the density estimation with distance program. The distribution of ARE in Gishwati is related to the habitat status where some species are highly represented in the remaining natural forest while others are distributed at the same level in disturbed and undisturbed areas.

Gishwati forest is a home for not only endemic and the global conservation concern bird species but also for other threatened species including Golden Monkey (EN) and Chimpanzees (EN). Hence the site fills criteria to be an Important Bird Areas.

Key words: Gishwati forest, Albertine Rift Endemic Species, density, Important Bird Areas,

ACKNOWLEDGEMENTS

In the end of this assessment, we are grateful to Albertine Rift Conservation Society (ARCOS), and Great Apes Trust of Iowa/Gishwati Area Conservation Program for granting this work.

Our thanks are addressed to Madelene Nyiratuza, the Coordinator of the Great Ape Trust of Iowa/Gishwati Area Conservation Program, Rebecca Chancellor and Aaron Rundus, researchers in Gishwati Forest Reserve for the information, GPS data and advices to achieve this survey.

We acknowledge the effort made by Sylvain Nyandwi, a Research Assistant, and Banamwana Marshall, a Community Engagement Assistant, with the Great Ape Trust of Iowa/Gishwati Area Conservation Program to facilitate our stay at their field station based at Kinihira, in Rutsiro District.

Our special thanks are addressed to Cecily Kabagumya, Conservation and Network Manager with ARCOS and Paul Kariuki Nda'nga'nga, a species manager with Birdlife International African Secretariat, for the assistance in the elaboration of the proposal and Julius Arinaitwe, the regional IBA Programme Manager for Africa for commenting on the present report.

We acknowledge the varied support from local guides Mr. Rwamucyo and Kabenga for guiding us during the data collection. We acknowledge also their valuable information on the nicknames of plants of Gishwati Forest and the history of the destruction and rehabilitation of Gishwati forest.

Introduction

1.1 Albertine Rift

The Albertine Rift is a region stretching from the northern end of Lake Albert to the southern end of Lake Tanganyika. Extending through countries of Uganda, Rwanda, Democratic Republic of Congo, Burundi and Tanzania, the Albertine Rift is one of Africa's most important sites for the conservation of biodiversity. Its huge diversity of habitats incorporate the ice fields on top of the Rwenzori Mountains at 5,000 meters (16,000 feet), active volcanoes, hot springs, bamboo frests, alpine vegetation, montane forest, savannah down to the lowland forests of Semuliki at 600 meters (1,800 feet).

The Albertine Rift is very rich in species, including a large number of endemic species. The region is a home for 402 species of mammals, 175 species of reptiles, 118 species of amphibians, over 400 species of fish, 5,800 species of plants and 1,061 species of birds have been recorded here[1] . A total of 41 bird species are endemic to the region and 25 of them are found in Rwandan mountain forests including Volcanoes National Park, Nyungwe National Park, Cyamudongo forest, Mukura Forest Reserve and Gishwati Forest (Plumptre et *al.*, 2002). On these forests other sites like Rugezi wetland host a number of Albertine Rift endemic species.

The region is one of the most densely populated areas in Africa and therefore suffers from a high degree of direct and indirect threats to the entire ecosystem, such as unsustainable timber extraction, general forest clearance and conversion to agricultural land, grazing, hunting and firewood collection[2].

[1] http://programs.wcs.org/albertine/WhatistheAlbertineRift/tabid/1998/Default.aspx

[2] *http://www.panda.org/who_we_are/wwf_offices/eastern_southern_africa/our_solutions/projects/?uProjectID=9F0734*

1.2 Study area

Gishwati Forest Reserve is located in the Northwestern part of Rwanda, in the Albertine Rift region, at 29° 21'40" to 29°28'50" East and 1°36'52" to 1°52'17" South (Map1).

Map 1 : Localization of Gishwati Forest Reserve



The elevation ranges from 2000 to 3000m above sea level. The forest constituted the relic of the ombrophyllous montane forests (Fishel, E. and Hinkel, H., 1992). The Forest was in 1933 and until the mid 1970s, its extent was approximately 280km^2 of which 100km^2 were converted to posture and another 100km^2 to pine plantations in the early 1980s (Plumptre et *al*., 2001). Beside the developing projects, the main cause of deforestation was the increase in population in the Gishwati area during the 1980s which led to an increase in livestock numbers, hence increasing demand for grazing, settlement, crop land and fuel food (MINECOFIN 2002).

Gishwati Forest Reserve is surrounded by farmlands and grazing areas and is crossed by Pfunda River. More than 90% of Gishwati was cultivated (Blondel, 2006). In 2005, the remnant forest was 600 hectares. With efforts of PAFOR to restore the forest, 286 hectares were added.

In November 2008, with demarcation of the forest, GATI/GACP added 336 hectares which are under reforestation using indigenous species and in November 2009, GATI/GACP added 262 hectares more which are planned to also be reforested with indigenous species in 2010. This means that the current Gishwati Forest Reserve is **1484** hectares.

The cultivated site is now regenerating with the plantation of nursed trees and the forest fallow is composed mostly by *Neoboutonia macrocalyx* and *Polyscias fulva* (Banamwana, 2008). The introduced trees, including Eucalyptus, Reeds, Avocadoes, Cyprus and Acacia are growing as well.

Beside these threats, Gishwati remains among the richest forests in terms of biodiversity. Hence, the Rwandan government, Great Ape Trust of Iowa and Earthpark have announced that the Gishwati Forest Reserve is the future site for the Rwanda National Conservation Park. Currently, guarding and research activities are put in place and research on the behavior and ecology of Chimpanzees, Phenology study as well as the daily patrol are being undertaken by the Great Ape Trust of Iowa/ Gishwati Area Conservation Program (GATI/GACP).

A total of 58 species of trees and shrubs were recorded in Gishwati forest and 34% of the total number of tree species are exotic species (Uwimana, 2007). The fauna includes four types of primates including Chimpanzees (*Pan trogrodytes schweinfurthi),* Mountain monkeys (*Cercopitecus l'hoesti),* Golden Monkeys (*Cercopitecus mitis kandti*) and Blue Monkeys (*Cercopitecus mitis doggetti*) (Blondel, 2006). Species like Hyrax and other small mammals, insects and reptiles are also found in Gishwati Forest Reserve (Pers. Observations).

Methodology

Point counts

Points were established at an interval of 200m along seven transects. A point is a single station from which a count is made and each point in this study was visited twice. At each point we waited for 3 minutes to allow birds to settle down and then recorded all sightings and calls of birds for a period of 10 minutes. We counted all individuals on either side of a circle of 25 m radius while standing in the centre (point count) designed as a census station. We then moved on to the next point and repeated the same process.

Birds flying away from the immediate area were recorded and a distance estimate to their point of departure made. The DISTANCE 6.0 is the version used for population data analysis. GPS points were taken in each point of counting or where we opportunistically record a rare ARE in order to map the distribution of the species using the ARC GIS 9.2 software. Common plants species at each point were also recorded.

Opportunistic sampling

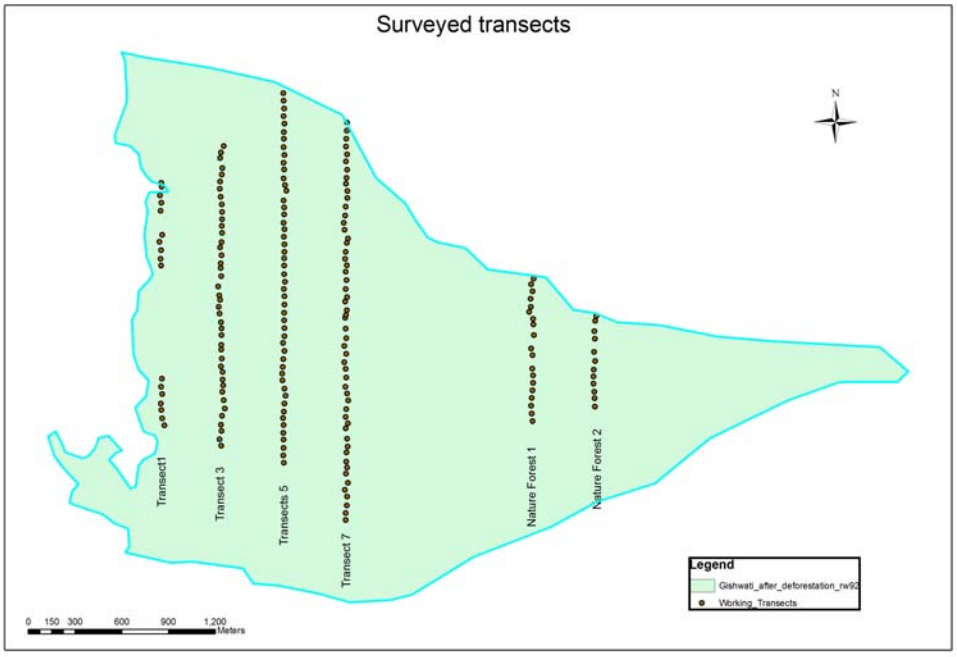
Opportunistic recordings were used to maximize the number of species encountered in each point of surveyed transect. All bird species seen or heard at different times of the day were documented. This data was used to complete the total record list of birds in Gishwati Forest. Information on migration and breeding was also recorded using this method.

Results

Surveyed area

Our survey was carried out in 6 transects (Map 1). These were four transects in the disturbed side namely Transect 1 (T1), Transect 3 (T3), Transect 5 (T5), Transect 7 (T7), and two transects in the remaining natural forest, Nature 1 and Nature 2.

Map 2 : Surveyed transects



Bird checklist

A total number of 101 bird species were registered during our assessment of ARE in Gishwati forest (appendix 1). Among them, 4 species (3.962%) are migrants, 2 species (1.98%), Grey-crowned Crane "*Balearica regulorum*" and Martial Eagle "*Polemaetus bellicosus"*, are Vulnerable while 14 (13.86%) are Endemic to the Albertine Rift. The appendix 1 gives the full checklist of birds recorded during our assessment. The bird list and the migratory status are adapted to the African Birding Club list[3].

Albertine Rift Endemic bird species

ARE and IUCN listed species recorded in Gishwati Forest

Our assessment reveals that Gishwati Forest Reserve is a home for 14 species endemic to the Albertine Rift and two vulnerable bird species as they are listed below:

Table 1: List of ARE and IUCN listed Bird species in Gishwati Forest Latin names

Common Name	Status
1. Blue-headed Sunbird	ARE
2. Collared Apalis	ARE
3. Dusky Crimsonwing	ARE
4. Handsome Francolin	ARE
5. Mountain Masked Apalis	ARE
6. Purple-breasted Sunbird	ARE
7. Red-throated Alethe	ARE
8. Regal Sunbird	ARE
9. Ruwenzori Batis	ARE
10. Ruwenzori Double-collared Sunbird	ARE
11. Ruwenzori Nightjar	ARE
12. Ruwenzori Touraco	ARE
13. Strange Weaver	ARE

[3] http://www.africanbirdclub.org/fpdf/testv8.php

14. Stripe-breasted Tit	ARE
15. Martial Eagle	VU
16. Grey Crowned Crane	VU

Distribution of ARE bird species in the assessed transects

A total of 6 transects were assessed and 4 of them were found in fallow forest while two crossed the undisturbed natural forest. A high number of species were tracked opportunistically moving either between points or on the way going and/or coming from the field (photos).

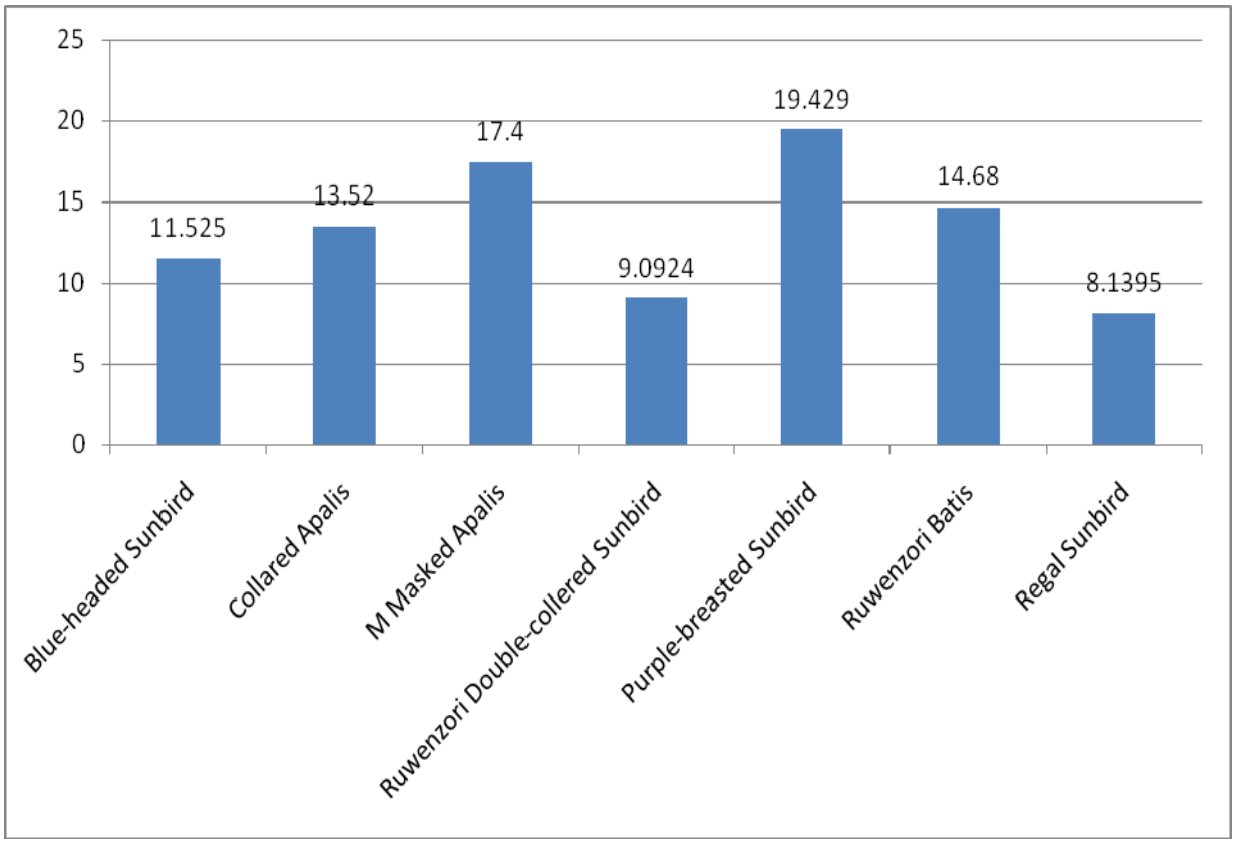
Table 2: Recorded ARE in surveyed areas

No	Common Name	T1	T3	T5	T7	Nature 1	Nature 2	Opportunistic
1	Blue-headed Sunbird	1	1	1	1	1	1	1
2	Collared Apalis	1	1	1	1	1	1	1
3	Dusky Crimsonwing		1					1
4	Handsome Francolin							1
5	Mountain Masked Apalis	1	1	1	1	1	1	1
6	Purple-breasted Sunbird		1	1	1	1	1	1
7	Red-throated Alethe					1	1	1
8	Regal Sunbird				1	1	1	1
9	Ruwenzori Batis		1	1	1	1	1	1
10	Ruwenzori Double-collared Sunbird	1	1	1		1	1	1
11	Ruwenzori Nightjar							1
12	Ruwenzori Turaco		1			1	1	
13	Strange Weaver		1	1				1
14	Stripe-breasted Tit							1
	Totals	**4**	**9**	**7**	**6**	**9**	**9**	**13**

Population density of ARE in Gishwati Forest Reserve

The frequency of 7 species (with more than 80 individuals) out of 14 allowed the calculation of the density using the distance 6.0 software. Purple Breasted Sunbird has the highest density with the pooled estimate of 19.42 individuals/ha while Regal Sunbird has the lowest density with 8.13 indiv./ha.

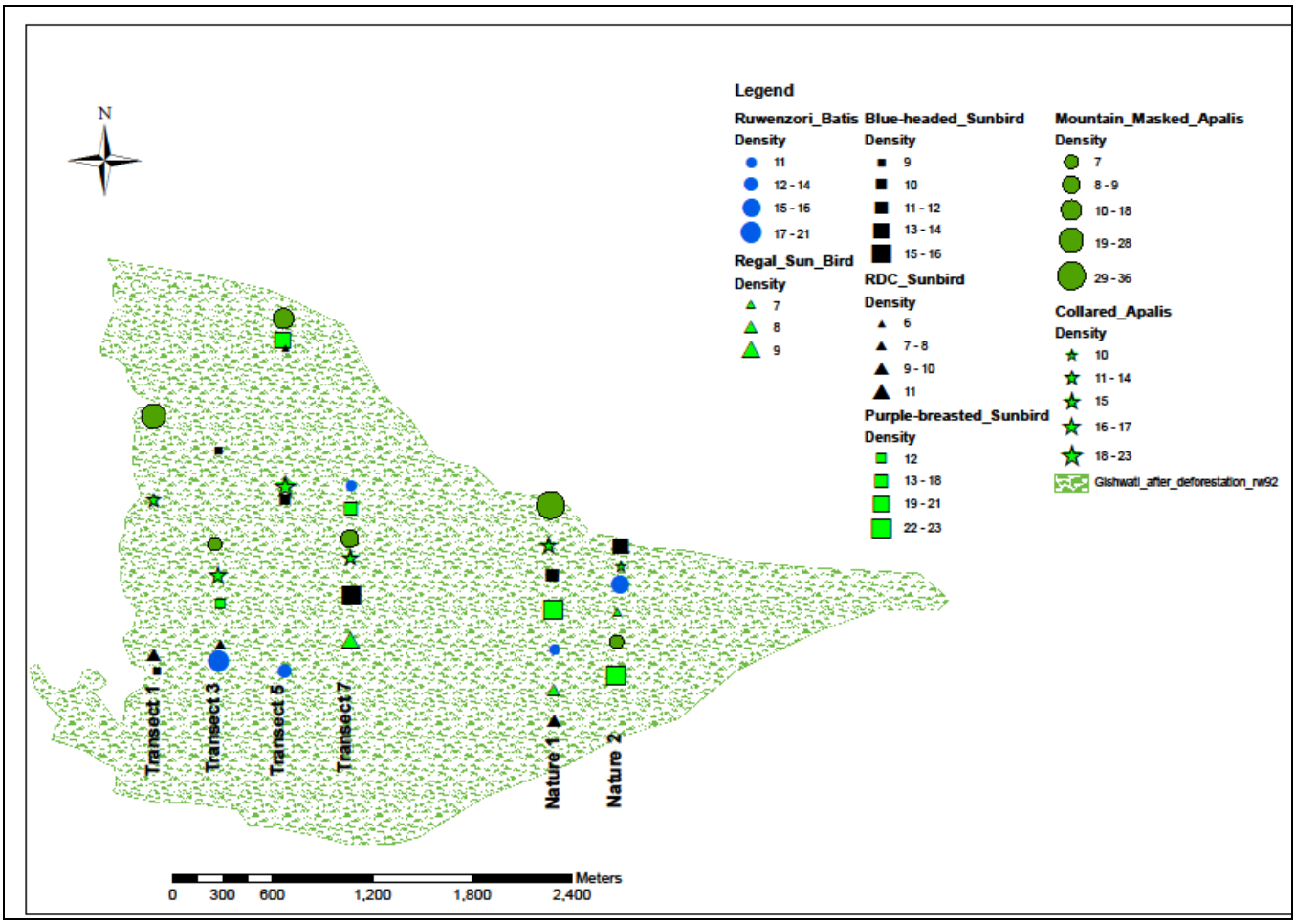
Figure 1: The density (Indiv./ha) of ARE in Gishwati Forest Reserve



Distribution of the population density in surveyed areas

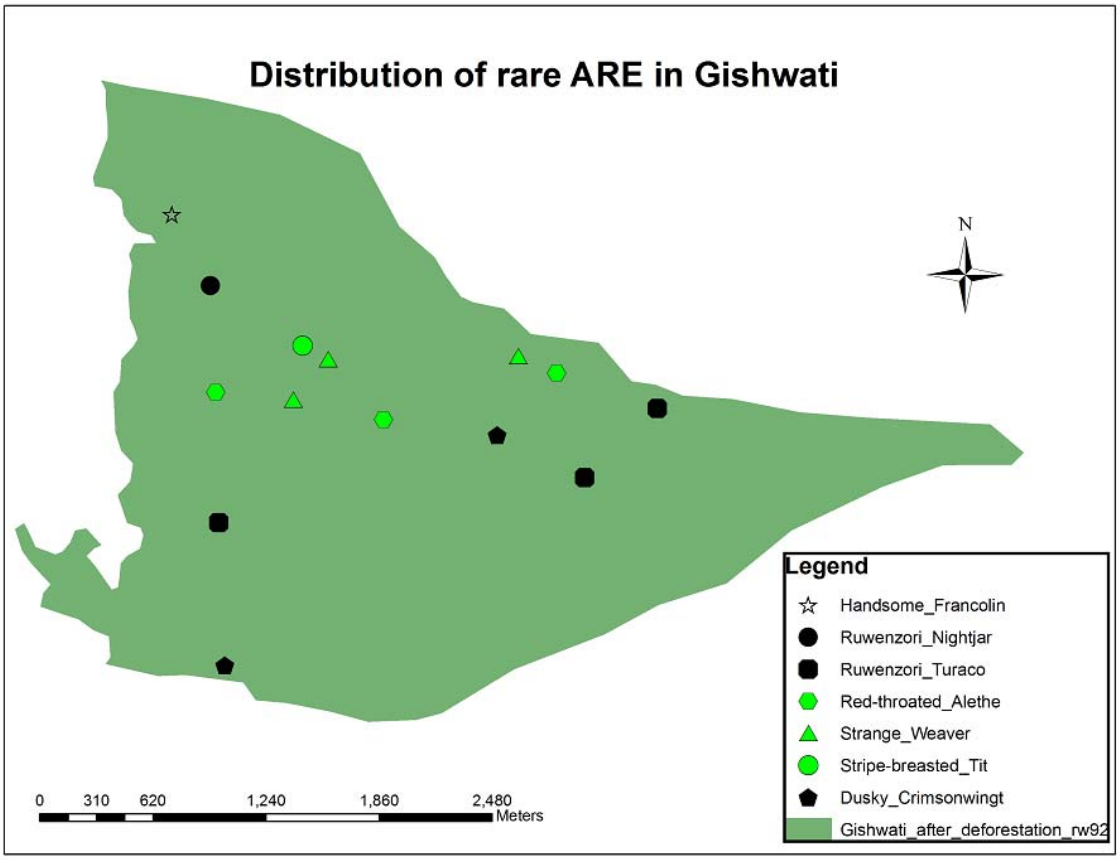
Some species were absent in some transect while all ARE species were recorded in transects crossing the remaining nature forest. The highest estimated density was for Mountain Masked Apalis (35.848) in the transect Nature 2 while the smallest counts for Ruwenzori Double Collared Sunbird (6.4946) in the transect 5 (Map3).

Map 3 : Distribution of ARE in surveyed transects



The frequency of 7 species did not allow the calculation of the density. These species are: Dusky Crimson wing, Handsome Francolin, Red-throated Alethe, Ruwenzori Nightjar, Ruwenzori Turaco, Strange Weaver and Stripe-breasted Tit. These species were recorded mostly opportunistically and were found in different localities inside the forest. The following map shows where we recorded these species:

Figure 2: The distribution of the rare ARE bird species recorded in Gishwati Forest



Breeding and Migration

During the assessment of Bird Endemic to the Albertine Rift, we recorded the breeding activities of 6 species (table 3):

Table 3 : Breeding activities recorded in Gishwati forest (October-November 2009)

Bird Species	Breeding stage
Grey-headed Sparrow	correcting the nesting materials
White-headed Woodhopoe	Immature
African Dusky Flycatcher	Immature
Mountain oriole	Immature
Doherty's Bush-shrike	Immature
Augur Buzzard	Juvenile

Five migrant bird species were recorded during the assessment period (October-November). These are:

1. Barn Swallow: Breeds in the Palearctic and winters in the country
2. Eurasian Hobby: Palearctic
3. European Bee-eater: Palearctic
4. Red-capped Robinchat: Migrant including on passage through this country and breeding records confirmed
5. Red-chested Cuckoo: Migrant including on passage through this country and breeding records confirmed

Discussion

A number of 101 species recorded in Gishwati Forest is the preliminary report. The used methodologies might have missed migrants, non-forest and most hidden species which require other methods, such as mistnetting and a long period of survey, as well. A high number of ARE bird species that were recorded while moving between points or coming to or from the forest because the used trails cover almost all habitat types.

All plant species recorded in the transect set in the remaining natural forest are also present in the fallow forest. But there are some differences, such as canopy density, which is higher in the natural forest (Uwimana, 2007) and the quantity of vines, which is higher in the regenerating forest. Bird species endemic to the Albertine Rift are present in both natural and fallow forest but Red-throated Alethe was recorded only in the natural forest.

Only four species were recorded in the transect No1. The habitat in this transect is unfavorable not only for ARE but also for other animals. It is closer to the road separating the forest and farmlands and on the edge there is presence of human activities and the road is used by both humans and vehicles. Additionally, exotic plant species including *Pinus patura, Acacia melanoxylon, acacia mearnsii, Eucalyptus sp., Grevellia robusta* are concentrated in this transect(Uwimana, 2007). Species like Strange Weaver were recorded only in the secondarised forest as it is known that the species inhabits mountain forest at 1500-2700m, forage low down in clearing, secondary growth and dense understory generally below 5m (Fanshawe et *al.* 2002). The habitat in the natural forest is less disturbed and still favorable for forest bird species and species like Red-throated Alethe. The presence and density of sunbird ARE species is also related to the period of survey and phenology. Trees like *Maeza lanceolata* (Umuhanga), *Symphonia globilifela* (Umushishi), *Crotoni macrostachis* (Umurangara), etc. were flowering and sunbirds, as a nectarivorous species, were attracted by the nectar of the flowering plants. As known, most sunbirds feed largely on nectar although they also take insects, especially when feeding young. Fruits are also part of the diet of some species[4].

[4] http://en.wikipedia.org/wiki/Sunbird

Purple-breasted Sunbird is highly dense in Gishwati Forest Reserve and all of the individuals were recorded on Symphonia tree and this is an observation from Fanshawe et *al.* (2002). Smphonia is one of the remaining trees in both degraded and natural forests and was found in almost all assessed points. As mentioned by local guides, while deforesting Gishwati for farmlands, production of charcoal, etc. people thought that where this species is found, the soil is not productive and timber and charcoal of this tree are not very good for use (photos).

Beside bird life, other animal species were opportunistically encountered. These include Hyrax spread in different localities of Gishwati forest, a group of Chimpanzees, and we heard a call of Golden Monkeys, unidentified species of butterflies and other insects; earthworms and among others.

Conclusion and recommendations

The assessment of Bird species endemic to the Albertine Rift conducted in Gishwati Forest Reserve revealed that 101 species inhabit Gishwati Forest. Some 14 of them are endemic to the Albertine Rift while 2 are vulnerable according to the 2009 IUCN Red List.

The natural forest remains on the small scale in the southwest while the other side is regenerating. Both natural and regenerating sides are home for ARE bird species but the transect 1 closer to the road hosts a small number of ARE species due to disturbances and concentration of exotic plant species. Different factors like flowering, stage of regeneration and presence of exotic plant species are factors for the distribution of the number of ARE species and the density as well.

The efforsts of Great Ape Trust of Iowa/ Gishwati Area Conservation Program to protect the remaining forest and to regenerate the disturbed side as well as the research they are conducting, are for the high value in the protection of Gishwati Forest and the habitat revival for the forest dependents biodiversity.

The time allocated to this assessment was mostly dedicated to the Albertine Rift Endemic bird species; other species were recorded opportunistically. The survey of other biodiversity might reveal other species for conservation concern as well as other endemic species.

As defined by Fish pool (2001), Important Bird Areas are important areas for conservation of birds and other wildlife. Gishwati forest is a home for not only species for global conservation concern (A1) but also for Albertine Rift Endemic (A2). It is also a home for threatened biodiversity like Golden Monkeys, *Cercopitecus mitis kandti (*EN) and Chimpanzees, *Pan trogrodytes schweinfurthi* (EN*).*

Hence we recommend that:

1. Gishwati Forest Reserve be recognized globally as a new Important Bird Area in Rwanda
2. The bird survey be extended on different seasons to cover the migration species and all aspects of biodiversity
3. Avi-tourism in Gishwati Forest Reserve may be developed. Gishwati is an area with a high number of (endemic) species, some of them, like Doherty's Bush-shrike, very attractive, considering its size. Birds can easily be spotted.
4. Great Ape Trust of Iowa/ Gishwati Area Conservation Program is doing a very good job in protecting the forest and conducting the research, but we recommend other organizations and the Government of Rwanda to reinforce the initiative to protect Gishwati Forest Reserve and to broaden the long term research on other biodiversity rather than Chimpanzees and Phenology.

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Appendix 1: Bird checklist of Gishwati Forest Reserve and their IUCN, endemism and migration status

No	**Common Name**	**IUCN Category**	**ARE Status**	**Migration status**
1	Hamerkop	LC		RB
2	Hadada Ibis	LC		RB
3	Hooded Vulture	LC		RB
4	African White-backed Vulture	LC		RB
5	Gabar Goshawk	LC		RB
6	Mountain Buzzard	LC		RB
7	Augur Buzzard	LC		RB
8	Martial Eagle	VU		RB
9	Long-crested Eagle	LC		RB
10	Eurasian Hobby	LC		P
11	Black Kite	LC		RB
12	Lanner Falcon	LC		RB
13	Handsome Francolin	LC	ARE	RB
14	Black Crake	LC		RB
15	Grey-crowned Crane	VU		RB
16	Black-billed Turaco	LC		RB
17	Ruwenzori Turaco	LC	ARE	RB
18	Red-chested Cuckoo	LC		MB
19	Klass's Cuckou	LC		RB
20	White-browed Coucal	LC		RB
21	Blue-headed Coucal	LC		RB
22	Barn Owl	LC		RB
23	Ruwenzori Nightjar	LC	ARE	RB
24	Speckled Mousebird	LC		RB
25	Narina’s Trogon	LC		RB
26	Cinnamon-chested Bee-eater	LC		RB
27	European Bee-eater	LC		P

28	White-headed Woodhoopoe	LC		RB
29	Yellow-rumped tinkerbird	LC		RB
30	Lesser Honeyguide	LC		RB
31	Green-backed Woodpecker	LC		RB
32	Beared Woodpecker	LC		RB
33	Bleu Saw-wing	LC		R
34	Rock Martin	LC		RB
35	Red-rumped Swallow	LC		RB
36	Barn Swallow	LC		PW
37	Angola Swallow	LC		RB
38	African pied Wagtail	LC		RB
39	Grey Couckoo-shrike	LC		RB
40	Black Couckshrike	LC		RB
41	Mountain Greenbul	LC		RB
42	Slender-billed Greenbul	LC		RB
43	Yellow Whiskered Greenbul	LC		RB
44	Yellow-streaked Greenbul	LC		RB
45	Common Bulbul	LC		RB
46	White-starred Robinchat	LC		RB
47	Red-capped Robinchat	LC		RB
48	White-browed Robinchat	LC		RB
49	Common Stonechat	LC		RB
50	Red-throated Alethe	LC	ARE	
51	Olive Thrush	LC		RB
52	African Thrush	LC		RB
53	Cinnamon Bracken Warbler	LC		RB
54	Mountain Yellow warbler	LC		RB
55	White-browed Crombec	LC		RB
56	Chubb's Cisticola	LC		RB
57	Banded Prinia	LC		RB

58	Mountain Masked Apalis	LC	ARE	RB
59	Chestnut-throated Apalis	LC		RB
60	Collared Apalis	LC	ARE	RB
61	Black-throated Apalis	LC		RB
62	White-eyed Slaty Flycatcher	LC		RB
63	African Dusky Flycatcher	LC		RB
64	White-tailed Blue Flycatcher	LC		RB
65	African Paradise Flycatcher	LC		RB
66	Ruwenzori Batis	LC	ARE	RB
67	Chinspot Batis	LC		RB
68	African Hill Babbler	LC		RB
69	Arrow-marked Babbler	LC		RB
70	Stripe-breasted Tit	LC	ARE	RB
71	Blue-headed Sunbird	LC	ARE	RB
72	Green-headed Sunbird	LC		RB
73	Scarlet-chested Sunbird	LC		RB
74	Purple-breasted Sunbird	LC	ARE	RB
75	Olive-bellied Sunbird	LC		RB
76	Regal Sunbird	LC	ARE	RB
77	Ruwenzori Double Collared Sunbird	LC	ARE	RB
78	Variable Sunbird	LC		RB
79	African Yellow White-eye	LC		RB
80	Mackinnon's Fiscal	LC		RB
81	Doherty's Bush-shrike	LC		RB
82	Northern Puffback	LC		RB
83	Tropical Boubou	LC		RB
84	Mountain Black Boubou	LC		RB
85	Mountain Oriole	LC		RB
86	Oriole Finch	LC		RB

87	Pied Crow	LC		RB
88	African Black-headed Oriole	LC		RB
89	White-naped Raven	LC		RB
90	Grey-headed Sparrow	LC		RB
91	Strange Weaver	LC	ARE	RB
92	Holub's Golden Weaver	LC		RB
93	Baglafecht Weaver	LC		RB
94	Dusky Crimsonwing	LC	ARE	RB
95	Yellow-bellied Waxbill	LC		RB
96	Black-crowned Waxbill	LC		RB
97	Common Waxbill	LC		RB
98	Bronze Mannikin	LC		RB
99	African Citril	LC		RB
100	Streaky Seedeater	LC		RB
101	Thick-billed Seedeater	LC		RB

R: Resident

RB: Resident in the country and breeding records confirmed

MB: Migrant including on passage through this country and breeding records confirmed.

P: Palearctic

PW: Breeds in the Palearctic and winters in the country

Appendix 2: Density of ARE in Gishwati Forest

Transect / ARE species	T1	T3	T5	T7	Nature 1	Nature 2	Pooled Estimates
Blue-headed Sunbird	8.8908 (3.1020 -25.483)	8.8908 (3.1020-25.483)	9.8787 (5.8120-16.79)	15.806 (7.0930-35.221)	11.854 (5.989-23.461)	13.830 (5.2252-36.606)	11.525 (6.6597-19.945)
Collared Apalis	9.6897 (5.8017-16.183)	14.804 (9.1412-23.974)	14.804 (9.1412-23.974)	22.710 (8.0526-64.048)	16.503 (6.1734-16.503)	14.131 (4.978-40.112)	13.520 (7.9547-22.978)
Dusky Crimsonwing	Absent	Low frequency	Absent	Absent	Absent	Absent	
Handsome Francolin	Opportunistically	Opportunistically	Opportunistically	Opportunistically	Opportunistically	Opportunistically	
Mountain Masked Apalis	7.1126 (4.5778-11.051)	8.5351 (6.2711-11.617)	17.544 (12.030-25.587)	28.044 (14.128-55.667)	7.3158 (5.6318-9.5034)	35.848 (17.844-72.017)	17.400 (12.127-24.965)
Purple-breasted Sunbird	Absent	21.250 (7.9976-56.464)	12.143 (6.9722-21.149)	18.215 (11.170-29.701)	22.768 (10.656-48.647)	22.768 (10.656-48.647)	19.429 (11.422-33.048)
Red-throated Alethe	Absent	Absent	Absent	Absent	Low frequency	Low frequency	
Regal Sunbird	Absent	Absent	Absent	7.4909 (2.4897-22.538)	8.1719 (5.0885-13.124)	8.7556 (5.3497-14.330)	8.1395 (5.2455-12.630)
Ruwenzori Batis	Absent	11.292 (5.8688-21.726)	11.292 (6.1917- 20.593)	14.115 (5.5383-35.974)	15.527 (6.7872-35.519)	21.173 (3.3784-132.69)	14.680 (7.3862-29.175)
Ruwenzori Double-collared Sunbird	11.365 (5.3803-24.009)	9.7418 (3.5142-27.006)	6.4946 (3.0775-13.706)	Absent	9.7418 (3.5142-27.006)	8.1182 (3.9693-16.604)	9.0924 (4.4199-18.704)
Ruwenzori Nightjar	Opportunistically	Opportunistically	Opportunistically	Opportunistically	Opportunistically	Opportunistically	

Ruwenzori Turaco	Absent	Low frequency	Absent	Absent	Low frequency	Low frequency	
Strange Weaver	Absent	Low frequency	Low frequency	Absent	Absent	Absent	
Stripe-breasted Tit	Opportunistically	Opportunistically	Opportunistically	Opportunistically	Opportunistically	Opportunistically	