Density, habitat association and distribution of BINP avifauna along altitudinal gradient

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Presentation outline

- Introduction
- Aim of study
- Study sites
- Methods
- Results
- Conclusions
- Recommendations

Introduction

- BINP is one of the few remaining areas of montane forests,
- One of worlds's hotspot for endemism.
- Despite its status and with the challenge of a warmer climate-pop change, range shifts.
- very little known-about density, habitat preferences and distribution of many of its bird species.
- Information needed for conservation planning and baseline for future monitoring.

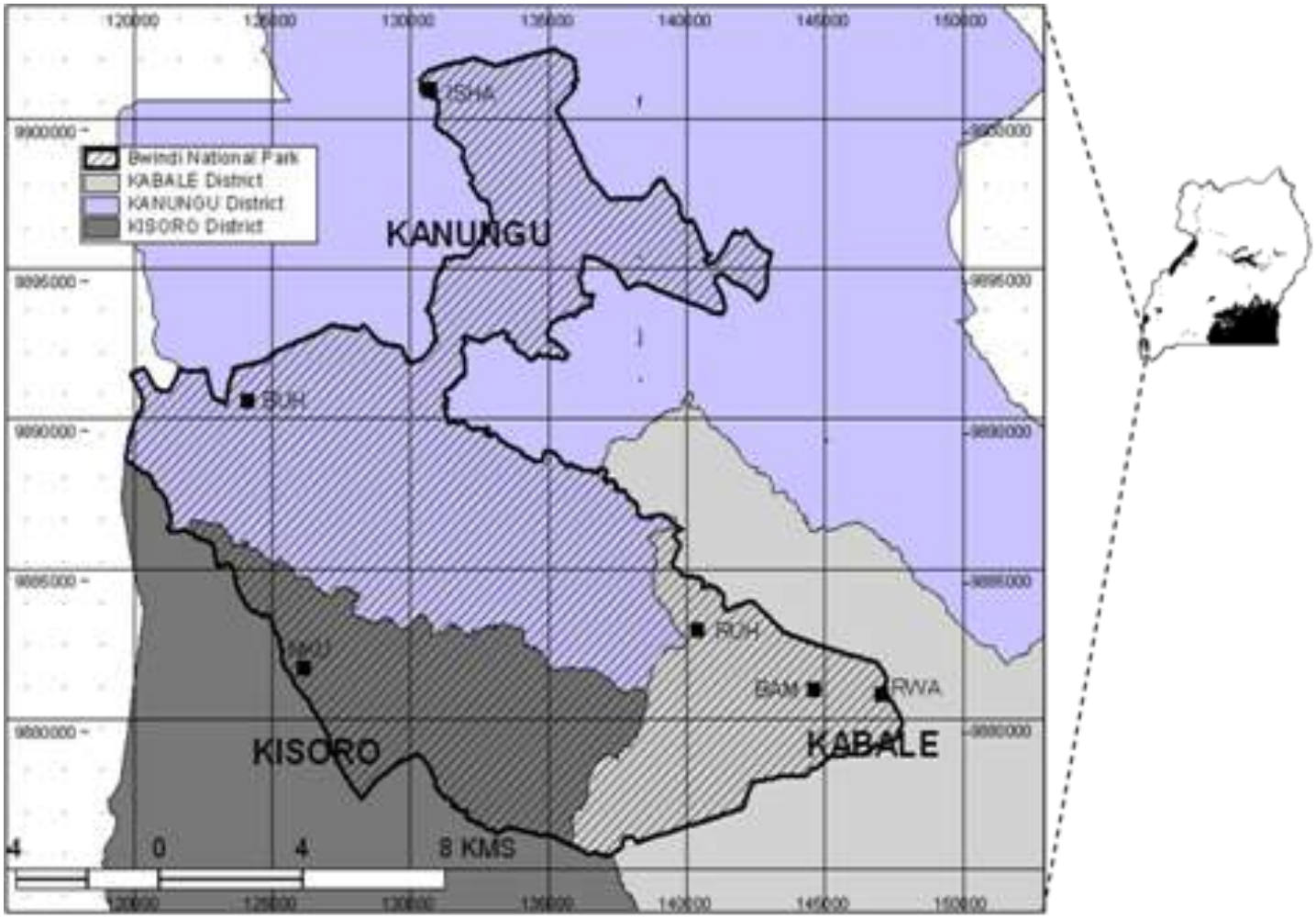
Aim of the study

- To establish baseline information on bird species' altitudinal distributions and patterns of abundance which will help promote their conservation.

Specific objectives

1) To assess bird species richness, relative abundance and avifaunal composition along altitudinal gradient
2) To determine densities and population estimates of commonest bird species along altitudinal gradient
3) To establish general habitat features associated with endemic and threatened bird species along altitudinal gradient

Study sites in BINP



METHODS

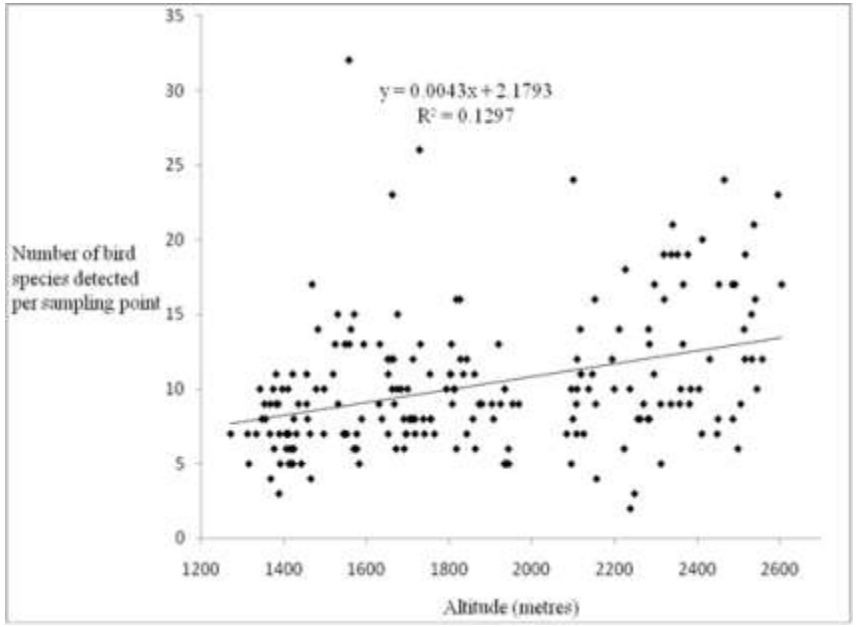
- **Timed point counts (281)-6 sites**.
- Individual bird seen/heard and its radial distance estimated in bands.
- Density estimated using DISTANCE.
- Full range of models fitted, most appropriate detection function selected by AIC.
- Density estimates among altitude zones-one way ANOVA in GenStat.
- CCA-bird habitat associations
- Linear regression- bird spp richness, relative abundance and altitude.
- Similarities in avifaunal community composition-MDS. Test of significant difference-PERMANOVA.

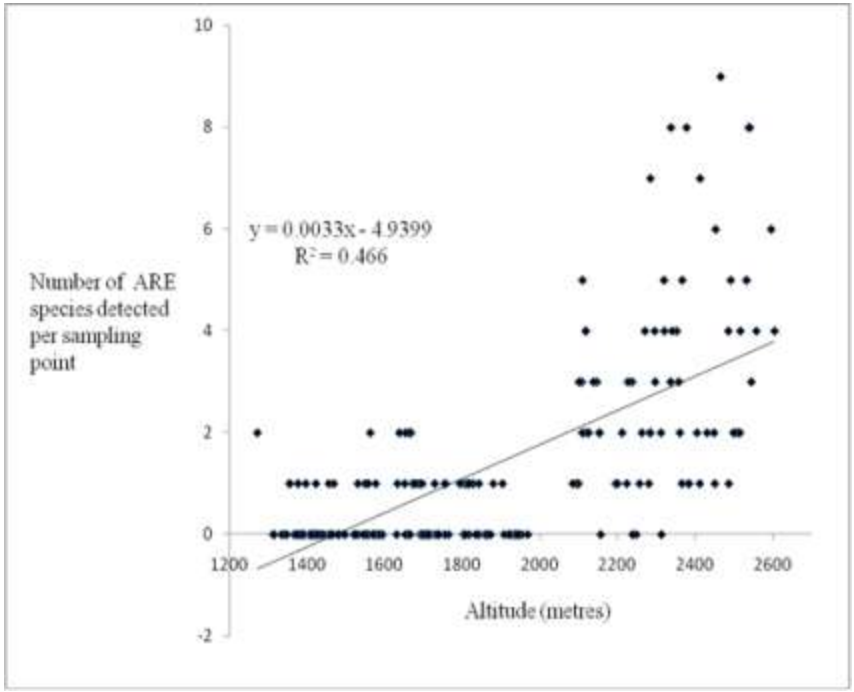
RESULTS
Bird species richness

- Recorded 149 species.
- 17 ARE, 1 Globally NT(Dwarf honey guide), 1Globally Vulnerable(AGBB), 1 Globally endangered(GR Warbler), 70(FF),54(F),23(f),6 afrotropical migrants, 1 pelearctic migrant.

Bird species richness

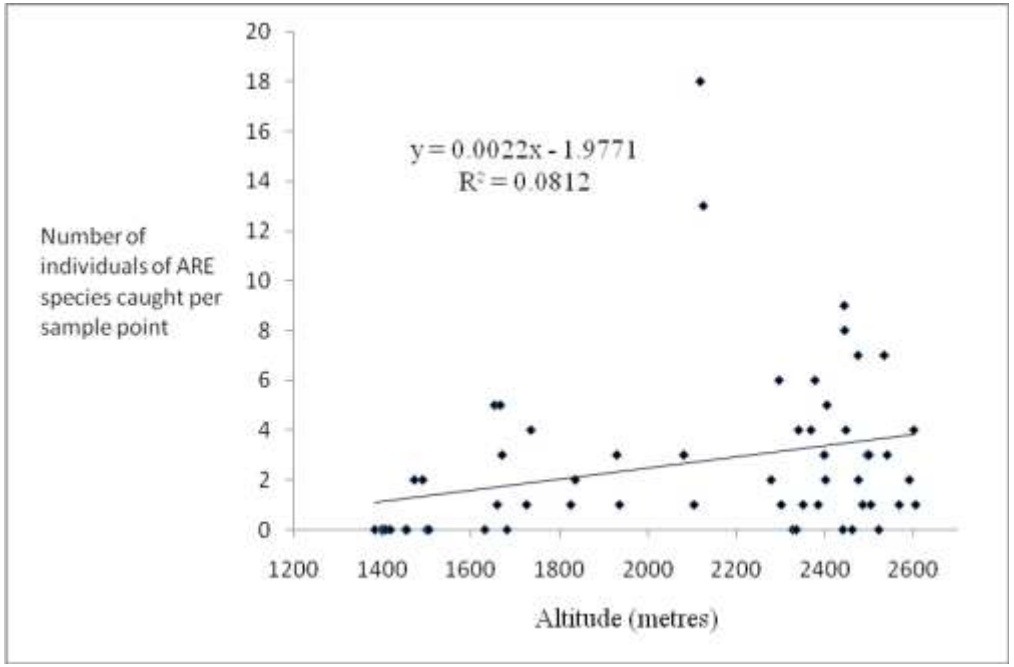
Bird species richness, S	Variable			
	Altitude	R2	Significance	Slope coefficient
All bird species	+ve	0.129	***	4 bird spp/1000m
FF species	+ve	0.058	Ns	
F species	+ve	0.235	***	
ARE species	+ve	0.466	***	3.3 ARE spp/1000m





Number of individuals detected

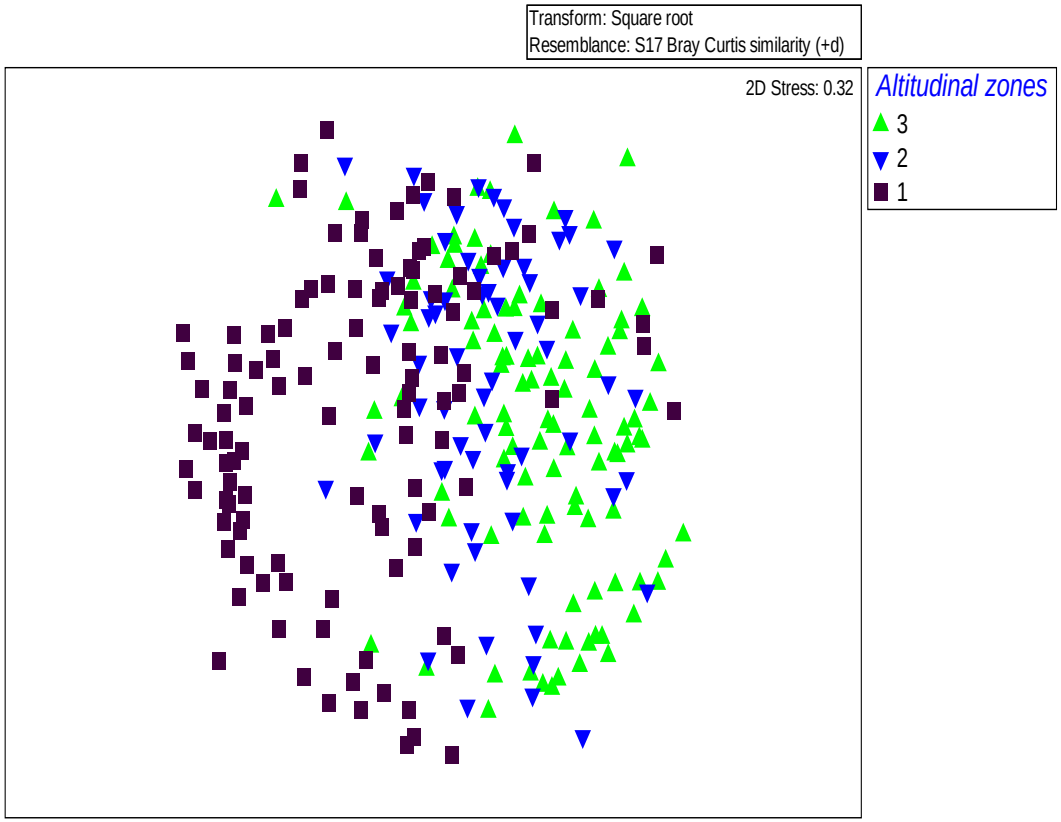
Number of individuals detected				
	Altitude	R2	Significance	Slope coefficient
All bird species	+ve	0.183	***	
ARE	+ve	0.413	***	7ARE/1000m



Both species richness and abundance of ARE and all bird detected increase with altitude

Avifaunal community composition

- *There is **significant difference in bird community composition among altitudinal zones (PERMANOVA,F=13.142, P=0.001).***
- *Pairwise comparisons (1,2, 3 significantly different from the other)*
- *Dominant species at higher altitude zone: AREs: Dusky Crimsonwing,Handsome francolin,Mountain masked Apalis,Red-Faced woodland warbler, Archer's Robin chat and Collared Apalis (SIMPER)*



MDS ordination of avifauna composition among three altitudinal zones based on a Bray-Curtis similarity matrix generated from square-root transformed abundance data

Bird Density and population estimates of commonest spp

- Estimated density and population size for 32 species>30 registrations, including 7 endemics
- 7 species (4 AREs) achieved highest densities at higher altitudes
- All AREs Population>2,500 individuals.
- All widespread species pop>10,000 individuals

Densities of 5 most commonest spp

	Altitude zones (m)		**<1,750m (104 km²),**	**1,750-2,249m (175 km²),**	**>=2,250m (42 km²),**	**ANOVA Test result**
Atlas No	**Bird's spp**	**Detect.**	**D ± SE**	**D ± SE**	**D ± SE**	
431	Yellow-rumped Tinkerbird	179	70.9 ± 13.5	108.0 ± 21.3	69.7 ± 12.9	$F_{(2,3)}$=1.77, P>0.05
537	Mountain Greenbul	67	69.4 ± 11.0	179.7 ± 32.7	182.4 ± 29.7	$F_{(2,3)}$=6.02, P>0.05
542	Yellow-whiskered Greenbul	268	362.9 ± 50.5	498.0 ± 64.4	547.6 ± 71.5	$F_{(2,3)}$=2.32, P>0.05
562	Common Bulbul	52	184.0 ± 38.9	137.6 ± 29.0	98.2 ± 20.1	$F_{(2,3)}$=2.01, P>0.05
568	**Equatorial Akalat**	**35**	**79.0 ± 15.9**	**125.1 ± 25.1**	**9.9 ± 2.0**	**$F_{(2,3)}$=11.37, P<0.05**

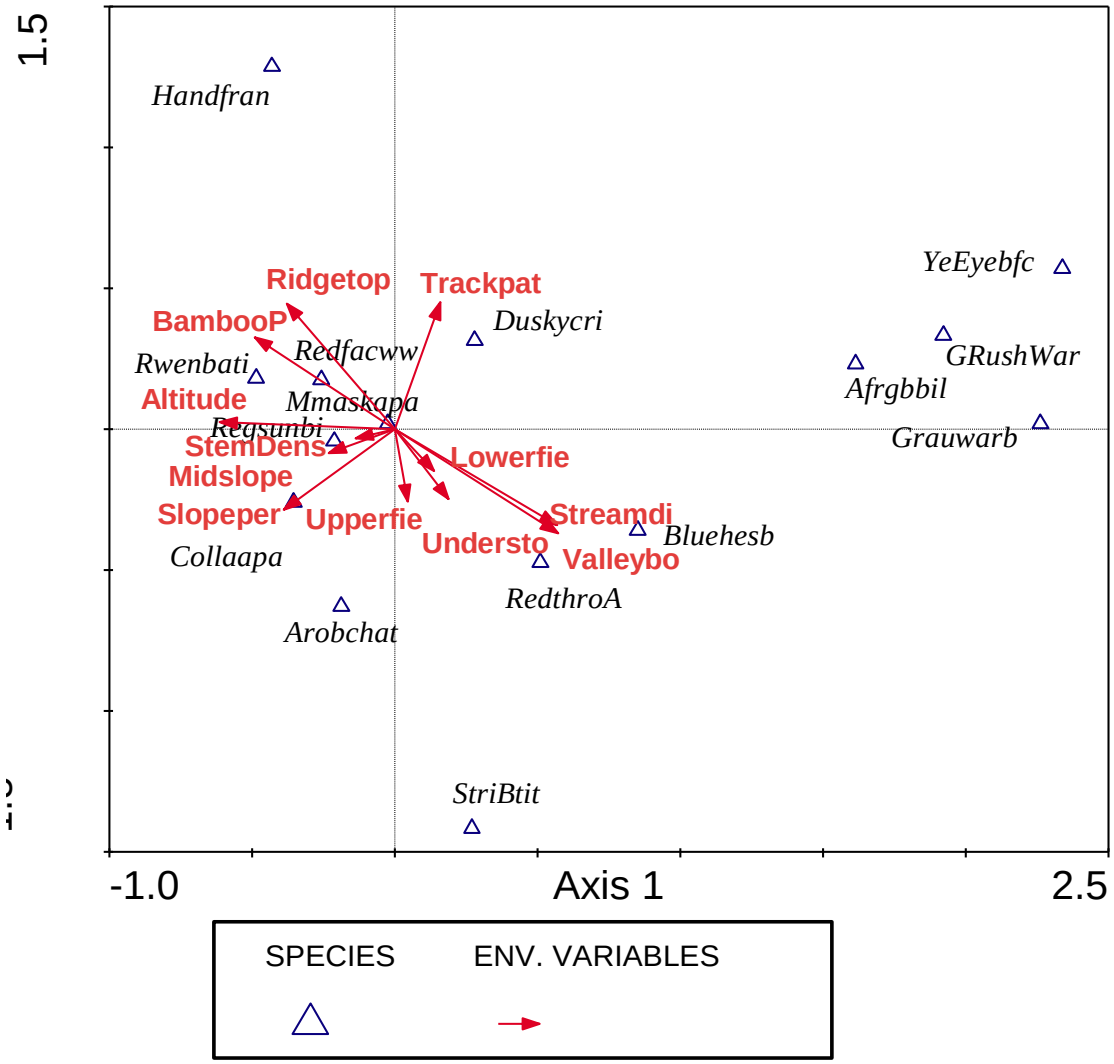
ARE species densities

	Altitude zones (m)		<1,750m (104 km^2),	1,750-2,249m (175 km^2),	>=2,250m (42 km^2),	ANOVA Test result
Atlas No	**Bird's spp**	**Detect**	**D± SE**	**D± SE**	**D ± SE**	
572	**Archer's Robin Chat**	**60**	**0**	**52.5 ± 8.5**	**283.3 ± 51.8**	**$F_{(2,3)}$=24.90, P<0.05**
666	**Collared Apalis**	**104**	**0**	**48.5 ± 12.7**	**169.4 ± 40.8**	**$F_{(2,3)}$=12.50, P<0.05**
669	**Mountain Masked Apalis**	**48**	**11.4 ± 1.8**	**49.8 ± 8.7**	**82.6 ± 16.8**	**$F_{(2,3)}$=10.55, P<0.05**
699	Red-faced Woodland Warbler	44	49.2 ± 10.3	91.9 ± 20.3	180.9 ± 38.5	$F_{(2,3)}$=6.77, P>0.05
783	Blue-headed Sunbird	31	60.6 ± 13.0	64.8 ± 14.5	70.5 ± 15.2	$F_{(2,3)}$=0.12, P>0.05
800	**Regal Sunbird [1]**	**21**	**0**	**15.6 ± 3.0**	**108 ± 24.4**	**$F_{(2,3)}$=17.18, P<0.05**
950	Dusky Crimsonwing	30	37.7 ± 9.4	84.5 ± 21.3	177.0 ± 44.9	$F_{(2,3)}$=5.89, P>0.05

ARE population size estimates

	Dete	<1,750m (104 km²),	1,750-2,249m (175 km²),	>=2,250m (42 km²),	Total Pop estimates	95% CLs
Dusky Crimsonwing	30	3,920	14,791	7,434	26,145	16,074-42,527
Regal Sunbird	21	0	2,727	4,569	7,297	4,846-10,997
Blue-headed Sunbird	31	4,155	7,363	1,953	20,606	13,471-31,521
Red-faced Woodland Warbler	44	5,116	24,311	6,171	28,800	18,939-43,798
Mountain Masked Apalis	48	1,184	8,710	3,470	13,363	9,408-18,996
Collared Apalis	104	0	8,494	7,116	15,610	9,593-25,410
Archer's Robin Chat	60	0	9,192	11,900	21,092	7,240-61,497

CCA ordination diagram : All endemic bird spp-habitat associations (Point Counts)



Conclusions

- Habitat variables for mgt for conservation of ARE/GTS-most important:altitude,streams,stem density,vegetation cover.
- The no. of species and no. of individuals for all bird species and AREs increased with altitude.
- Bird community at all altitude zones-cleary distinct from each other-AREs dominant at higher altitudes
- Most of the commonest avifauna species densities were not significantly different among altitudinal zones.
- Densities of 4 of the 7 AREs -significantly highest at higher altitudes
- All 7 AREs pop. sizes>2,500 individuals implying the spp poulation are currently secure.

Recommendations

- Maintain structural diversity of all microhabitat features along altitudinal gradient.
- Set consistent multi-year monitoring program for AREs and GTS.
- Detailed study on precise ecological requirements of each ARE/GTS species
- Further work to establish density eatimates and population sizes of the other AREs.
- Use of sensitive spp e.g.FF,AREs to evaluate conservation values of altitudinal zones

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