**Supplementary Material**

# Impact of informal timber harvesting on habitat structure and bird assemblages in a coastal forest of the Eastern Cape, South Africa

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**Figure S1.** Incidence-based species accumulation curves from harvest gaps (red), natural gaps (blue) and intact (green) sites sampled in Mqaba forest. Values shown are based on frequency of occurrence of species across plots sampled, with 95% confidence intervals shown.

ab

a

b

b

a

b

a

a

b

bb

a

b

a

a

a

b

a

b

a

b

ab

ab

a

b

ab

b

a

**Figure S2**. Habitat variables compared across harvest gaps (n = 6), intact site (n = 6) and natural gaps (n = 6). Different letters indicate significant difference across groups (P < 0.05).

χ2 = 19.93, df = 6, **p = 0.003**

χ2 = 18.2, df = 6**, p = 0.006**

χ2 = 17.6, df = 6, **p = 0.007**

**a)**

**b)**

**c)**

**Figure S3.** Presence of **a)** fruit, **b)** flowers and **c)** exotic species in the understory as percentage in each abundance class (0 = none; 1 = 1 – 10; 2 = 11 - 20; 3 = > 20) across harvest gaps (n = 6), intact sites (n = 6) and natural gaps (n =6) in Mqaba forest. Results of Chi-squared test comparing differences across groups are shown.

**Table S1.** List of bird species recorded during bird survey in Mqaba forest, and occurrence at different habitat types sampled: harvest gaps, intact forest and natural gaps.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Common name** | **Scientific name** | **Harvest gap** | **Intact forest** | **Natural gap** |
| African Dusky Flycatcher | *Muscicapa adusta* | x | x |  |
| African Emerald Cuckoo | *Chrysococcyx cupreus* | x | x | x |
| African Goshawk | *Accipiter tachiro* | x | x | x |
| African Green Pigeon | *Treron calvus* | x | x |  |
| African Olive Pigeon | *Columba arquatrix* |  |  | x |
| Bar-throated Apalis | *Apalis thoracica* | x |  | x |
| Black Cuckoo | *Cuculus clamosus* | x | x | x |
| Black-backed Puffback | *Dryoscopus cubla* | x | x | x |
| Black-bellied starling | *Notopholia corruscus* | x |  | x |
| Black-headed Oriole | *Oriolus larvatus* | x | x | x |
| Blue-mantled Crested Flycatcher | *Trochocercus cyanomelas* | x | x | x |
| Brown Scrub Robin | *Cercotrichas signata* | x | x |  |
| Cape Batis | *Batis capensis* | x | x | x |
| Cape White-eye | *Zosterops capensis* | x | x | x |
| Chorister Robin-chat | *Cossypha dichroa* | x | x | x |
| Collared Sunbird | *Hedydipna collaris* | x | x | x |
| Dark-backed Weaver | *Ploceus bicolor* | x | x | x |
| Dark-capped Bulbul | *Pycnonotus tricolor* |  |  | x |
| Forest Canary | *Crithagra scotops* |  |  | x |
| Fork-tailed Drongo | *Dicrurus adsimilis* | x | x | x |
| Greater Double-collared Sunbird | *Cinnyris afer* | x |  | x |
| Green twinspot | *Mandingoa nitidula* |  | x |  |
| Green Wood-Hoopoe | *Phoeniculus purpureus* | x | x |  |
| Green-backed Camaroptera | *Camaroptera brachyura* | x | x | x |
| Grey Cuckooshrike | *Coracina caesia* | x | x | x |
| Grey sunbird | *Cyanomitra veroxii* |  |  | x |
| Knysna Turaco | *Tauraco corythaix* | x | x | x |
| Knysna Warbler | *Bradypterus sylvaticus* | x | x |  |
| Knysna Woodpecker | *Campethera notata* | x | x |  |
| Little Sparrowhawk | *Accipiter minullus* | x |  |  |
| Narina Trogon | *Apaloderma narina* | x | x |  |
| Olive Bushshrike | *Chlorophoneus olivaceus* | x |  | x |
| Olive sunbird | *Cyanomitra olivacea* | x | x | x |
| Olive Thrush | *Turdus olivaceus* | x | x | x |
| Olive Woodpecker | *Dendropicus griseocephalus* | x | x |  |
| Red-chested Cuckoo | *Cuculus solitarius* |  | x |  |
| Red-fronted Tinkerbird | *Pogoniulus pusillus* | x | x | x |
| Sombre Greenbul | *Andropadus importunus* | x | x | x |
| Southern Boubou | *Laniarius ferrugineus* | x | x | x |
| Southern Double-collared Sunbird | *Cinnyris chalybeus* | x | x | x |
| Spotted Ground Thrush | *Zoothera guttata* | x | x | x |
| Square-tailed Drongo | *Dicrurus ludwigii* |  | x |  |
| Terrestrial Brownbul | *Phyllastrephus terrestris* | x | x | x |
| Trumpeter Hornbill | *Bycanistes bucanitor* | x |  | x |
| White-starred Robin | *Pogonocichla stellata* | x | x | x |
| Yellow-breasted Apalis | *Apalis flavida* |  | x |  |
| Yellow-streaked greenbul | *Phyllastrephus flavostriatus* | x | x | x |
| Yellow-throated Woodland Warbler | *Phylloscopus ruficapilla* | x | x | x |

**Table S2.** Habitat variables included in RLQ analysis, and their mean across harvest gaps, intact sites and natural gaps.

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Harvest gap** | **Intact** | **Natural gap** |
| Shrub cover (%) | 14.33 | 14.83 | 28.00 |
| Vine cover (%) | 18.83 | 9.00 | 50.00 |
| Herb cover (%) | 5.00 | 3.67 | 13.33 |
| Grass cover (%) | 14.67 | 2.50 | 5.50 |
| Leaf litter cover (%) | 21.33 | 65.50 | 12.00 |
| Woody debris cover (%) |  30.50 | 17.17 | 33.33 |
| Bare ground cover (%) | 3.67 | 1.83 | 2.50 |
| Understory foliage density (%) | 53.32 | 14.83 | 71.03 |
| Mid-story foliage density (%) | 22.17 | 20.71 | 30.75 |
| Sub-canopy foliage density (%) | 19.46 | 50.71 | 15.17 |
| Canopy foliage density (%) | 5.75 | 35.54 | 3.03 |
| FHDI | 1.85 | 1.98 | 1.71 |
| Canopy cover (%) | 35.00 | 80.00 | 15.00 |
| Fruit availability index | 1.92 | 0.33 | 2.83 |
| Flower availability index | 1.08 | 0.00 | 2.83 |
| Exotic count | 0.67 | 0.00 | 2.33 |

**Table S3.** Bird species and their ecological traits included in RLQ analysis.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Scientific name** | Common name | **Diet** | **Forage** | **Strata** | **Nest** |
| *Andropadus importunus* | Sombre Greenbul | Frugivore | Harvest | Can | Ball.Cup |
| *Apalis thoracica* | Bar-throated Apalis | Insectivore | Glean | Und | Ball.Cup |
| *Apaloderma narina* | Narina Trogon | Insectivore | Per.Swo | Can | Cav |
| *Batis capensis* | Cape Batis | Insectivore | Glean | Und | Ball.Cup |
| *Bycanistes bucanitor* | Trumpeter Hornbill | Frugivore | Harvest | Can | Cav |
| *Camaroptera brachyura* | Green-backed Camaroptera | Insectivore | Glean | Und | Ball.Cup |
| *Campethera notata* | Knysna Woodpecker | Insectivore | Arb.pro | Can | Cav |
| *Cercotrichas signata* | Brown Scrub Robin | Insectivore | Ter.Pro | Gnd | Cav |
| *Chlorophoneus olivaceus* | Olive Bushshrike | Insectivore | Glean | Can | Ball.Cup |
| *Chrysococcyx cupreus* | African Emerald Cuckoo | Insectivore | Per.Swo | Can | Ball.Cup |
| *Cinnyris afer* | Greater Double-collared Sunbird | Nectarivore | Harvest | Thru | Ball.Cup |
| *Cinnyris chalybeus* | Southern Double-collared Sunbird | Nectarivore | Harvest | Thru | Ball.Cup |
| *Columba arquatrix* | African Olive Pigeon | Frugivore | Harvest | Can | Plat |
| *Coracina caesia* | Grey Cuckooshrike | Insectivore | Glean | Can | Ball.Cup |
| *Cossypha dichroa* | Chorister Robin-chat | Insectivore | Ter.Pro | Gnd | Cav |
| *Cuculus clamosus* | Black Cuckoo | Insectivore | Hawk | Can | Brood.para |
| *Cuculus solitarius* | Red-chested Cuckoo | Insectivore | Glean | Can | Brood.para |
| *Cyanomitra olivacea* | Olive sunbird | Nectarivore | Harvest | Thru | Ball.Cup |
| *Cyanomitra veroxii* | Grey sunbird | Nectarivore | Harvest | Thru | Ball.Cup |
| *Dendropicus griseocephalus* | Olive Woodpecker | Insectivore | Arb.pro | Can | Cav |
| *Dicrurus adsimilis* | Fork-tailed Drongo | Insectivore | Hawk | Can | Ball.Cup |
| *Dicrurus ludwigii* | Square-tailed Drongo | Insectivore | Hawk | Can | Ball.Cup |
| *Dryoscopus cubla* | Black-backed Puffback | Insectivore | Glean | Can | Ball.Cup |
| *Hedydipna collaris* | Collared Sunbird | Nectarivore | Harvest | Thru | Ball.Cup |
| *Laniarius ferrugineus* | Southern Boubou | Insectivore | Glean | Und | Ball.Cup |
| *Muscicapa adusta* | African Dusky Flycatcher | Insectivore | Hawk | Und | Ball.Cup |
| *Notopholia corruscus* | Black-bellied starling | Frugivore | Harvest | Can | Cav |
| *Oriolus larvatus* | Black-headed Oriole | Omnivore | Glean | Can | Ball.Cup |
| *Phoeniculus purpureus* | Green Wood-Hoopoe | Insectivore | Arb.pro | Can | Cav |
| *Phyllastrephus flavostriatus* | Yellow-streaked greenbul | Insectivore | Glean | Can | Ball.Cup |
| *Phyllastrephus terrestris* | Terrestrial Brownbul | Insectivore | Ter.Pro | Gnd | Ball.Cup |
| *Phylloscopus ruficapilla* | Yellow-throated Woodland Warbler | Insectivore | Glean | Can | Ground |
| *Pogoniulus pusillus* | Red-fronted Tinkerbird | Frugivore | Harvest | Can | Cav |
| *Pogonocichla stellata* | White-starred Robin | Insectivore | Glean | Thru | Ground |
| *Pycnonotus tricolor* | Dark-backed Weaver | Insectivore | Glean | Can | Ball.Cup |
| *Tauraco corythaix* | Knysna Turaco | Frugivore | Harvest | Can | Plat |
| *Treron calvus* | African Green Pigeon | Frugivore | Harvest | Can | Plat |
| *Trochocercus cyanomelas* | Blue-mantled Crested Flycatcher | Insectivore | Hawk | Und | Ball.Cup |
| *Turdus olivaceus* | Olive Thrush | Insectivore | Ter.Pro | Gnd | Ball.Cup |
| *Zoothera guttata* | Spotted Ground Thrush | Insectivore | Ter.Pro | Gnd | Ball.Cup |
| *Zosterops capensis* | Cape White-eye | Omnivore | Glean | Can | Ball.Cup |

**Table S4.** Standardized interaction coefficient estimates for interaction term from fourth corner analysis testing the relationship between bird functional traits and habitat characteristics, based on species presence/absence. Habitat variables PC1 and PC2 where derived from PCA of 16 measures habitat variables. PC1 and PC2 represented 60.6% and 13% of variation respectively.

|  |  |  |
| --- | --- | --- |
| **Species trait** | **PC1** | **PC2** |
| Diet.Frugivore | 0 | 0 |
| Diet.Insectivore | -0,21979 | 0 |
| Diet.Nectarivore | 0,094864 | 0 |
| Diet.Omnivore | 0,013032 | 0 |
| Forage.Arboreal probe | -0,02218 | 0 |
| Forage.Glean | 0 | 0 |
| Forage.Harvest | 0 | 0 |
| Forage.Hawk | -0,03707 | 0 |
| Forage.Perch and Swoop | 0 | 0 |
| Forage.Terrestrial probe | 0 | 0 |
| Strata.Canopy | -0,00131 | 0 |
| Strata.Ground | 0 | 0 |
| Strata.Throughout | 0 | 0 |
| Strata.Understory | 0 | 0 |
| Nest.Ball.Cup | 0,06028 | 0 |
| Nest.Brood.parasite | 0 | 0 |
| Nest.Cavity | -0,05584 | 0,038224 |
| Nest.Ground | -0,03506 | 0 |
| Nest.Platform | 0 | 0 |