



Final report for the proposal: Reassessment of the status of the Critically Endangered Taita thrush

A project funded by the African Bird Club

Luca Borghesio, Mwangi Githiru, Lawrence Wagura, James Maina Gichia

Introduction

The Taita hills of Kenya are the northernmost tip of the Eastern Arc, a chain of mountains running through Tanzania and Southern Kenya with extremely high rates of endemism as well as human impact. The Taita suffered 98% deforestation (Newmark 1998) and are the most heavily deforested range in the Eastern Arc. Habitat degradation in the Taita continues to date, although at slower paces (Pellikka et al 2009).

Two species of birds, both Critically Endangered, are endemic to the Taita: Taita apalis *Apalis fuscigularis* and Taita thrush *Turdus helleri*. Recent studies showed a rapid decrease in both population size and range in *A. fuscigularis* (Borghesio et al. 2014). Work on other Taita forest birds also suggest high rates of nest loss (Spanhove 2012), and deleterious effects of habitat fragmentation and disturbance (Lens et al 2002b). These data contribute to a worrying picture of forest bird conservation in the Taita.

Scientific information on *T. helleri* has not been updated for almost two decades. *T. helleri* is a secretive forest specialist, rarely venturing outside the forest, and much less vocal than closely related species in genus *Turdus*. It is found in only four Taita hills forest fragments (Mbololo, Ngangao, Yale and Chawia). The area of these fragments totals less than 500ha.

Mark-recapture studies dating to the 1990s estimated a total population of c1,400 inds (BirdLife 2015). Mbololo and Ngangao were estimated to host >95% of the global population, while the Chawia and Yale subpopulation were very small (<20 inds). High levels of fluctuating asymmetry and extremely skewed, male-biased sex-ratio, also suggested low reproductive output and inbreeding (Lens et al 1998). The population trend of *T. helleri* is suspected to be decreasing, but no recent data support this hypothesis.

In 2008, a translocation of 10 individuals from Mbololo (the largest subpopulation of *T. helleri*) to Chawia (where the species was down to a few individuals) was attempted by Dr Mwangi Githiru (*T. helleri* Species Guardian; Lens et al 2009). However, the longterm outcome of this translocation has never been assessed. We do not know whether the translocated individuals have survived and bred in Chawia.

There is an urgent need to reassess the status of *T. helleri* with updated information on population estimates, range, and on basic details of its biology such as sex-ratio, breeding success and degree of fluctuating asymmetry. This information is vital to plan specifically targeted actions for the conservation of the species.

With this project, we aimed to carry out a reassessment of the conservation status of *T. helleri* in the forest fragments where the species currently survives. We used a combination of approaches, including direct observation, mark-recapture and molecular techniques to reassess the range, population size and some key biological characteristics (sex-ratio, juveniles to adult

ratio) of the target species. The final goal of this proposed work is to help devise a conservation plan for *T. helleri* in order to guide conservation actions that are being coordinated in the area by Nature Kenya (BirdLife partner in Kenya).

Field Work

The field work covered all the four forest fragment where Taita thrush occurs (Mbololo, Ngangao, Yale, Chawia).

Mbololo forest was visited from 23 to 30 October 2015 by Lawrence Wagura, James Maina and Luca Borghesio. Four days of mistnetting were done in Mbololo (25-27-28-29/10/2015).

Ngangao was surveyed from 30 August to 9 September 2016 by Lawrence Wagura and Maina Gichia (11 days of mistnetting were done).

Chawia was visited from 30 August to 10 September 2016 and mistnetting was done by Lawrence Chovu, Nathaniel Waweru and Sylvester Karimi.

Between 8 and 10 September the Kenyan team was joined by Victor Mkongewa and Martin Joho (from Tanzania, Usambara mountains BirdLife Team) who assisted the mistnetting operations in Ngangao (8 Sept) and Chawia (9-10 Sept).

Mistnetting was unsuccessfully attempted in Yale on 3rd March 2016, and the fragment was visited on several successive occasions for carrying out visual searches between September and December 2016.

At all sites, standard (12m long x 2.5m high x 16mm mesh) nets were used. The number of nets used and opening hours varied from day to day depending on the weather and logistics of the sites. Survey effort at each study site is reported in nets x hours.

Netted birds were ringed with standard National Museums of Kenya metal rings, and about 10 small body feathers were collected from each individual to carry out DNA extraction in the lab. Individuals were measured, aged and sexed following Lens et al. (1998).

Results

Sampling effort (mistnet x hours) and capture rates were inversely proportional (Table 1), as we observed by far the highest capture rate of *T. helleri* in Mbololo, where survey effort was much lower than in Ngangao and Chawia. In Chawia, despite intensive netting effort, we only captured two individuals of *T. helleri*, both of which were old, already ringed, retrapped males. In Ngangao, survey effort and capture rates were intermediate between those of Mbololo and Chawia. In Yale, we did not succeed in netting any *T. helleri*, but the survey effort was too low as only one day of mist-netting could be done in this fragment.

The number of captured birds is too low to properly assess sex-ratios, but in both Mbololo and Ngangao there were rather similar proportions of males and females, while in Chawia no females were observed. However, at least one pair of *T. helleri* appears to exist in Chawia (see below).

Juvenile *T. helleri* were captured in Mbololo and Ngangao and observed in Yale by L. Wagura (March 2016). One nest of *T. helleri* was observed in Yale in Dec 2016 by N. Waweru, at the time of writing we don't know the eventual fate of this nest yet. No juvenile was caught or seen in Chawia, but one nest was observed in January 2017 by N. Waweru; this nest was destroyed by an unknown predator a few days later.

Discussion

Due to the low number of individuals that were observed during this study, only preliminary conclusions can be reached at this stage. On the positive side, we can confirm that *T. helleri* persists in all four forest fragments where it was reported in the past (Nature Kenya et al. 2015). Moreover, densities in Mbololo are still good, as we found that *T. helleri* was clearly one of the commonest species in this forest. In 1997, the Mbololo subpopulation was estimated at 1,060 inds (Nature Kenya 2015). We don't know whether the current Mbololo population has remained at this size, but the analysis of DNA samples that we collected should allow a more accurate estimate of its effective size, and trend over a 2-decades time frame.

The situation in the other forest fragments is more worrying. Only one pair persists in both Chawia and Yale. While breeding attempts were observed in each forest, the effective breeding success is unknown, but it must be low, because densities (as shown by mistnet capture frequencies) are low at both sites. It appears that the translocation of individuals from Mbololo to Chawia in 2008 (Lens et al 2009) might have delayed impending local extinction but has not succeeded in reversing the negative trend in this forest. The situation in Chawia is still critical and the long term persistence of *T. helleri* in this forest is highly unlikely unless action is taken.

In Ngangao forest, a subpopulation of 250 individuals was estimated in 1997 (Nature Kenya 2015). While we captured 8 individuals there, including three juveniles/subadults, we feel that the current population in Ngangao is now substantially lower than the previous figure. Further mistnetting effort currently ongoing and the analysis of DNA samples will allow us to evaluate this hypothesis.

Summing up, the preliminary conclusion of this work suggests that no improvement in the conservation status of *T. helleri* has occurred in the last two decades, and that the subpopulations in two of the four forest fragments are hanging on the edge of extinction. Future research should concentrate more closely on the assessment of the Ngangao population, and on studying the causes of nest failure that appear to be significant based on the results of a parallel study that we are carrying out. Action is urgently needed in Chawia and Yale to avoid the impending extinction of the local subpopulations of these two forests.

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References

- BirdLife International, 2015. Species factsheet: *Turdus helleri* [WWW Document]. URL <http://www.birdlife.org/datazone> (accessed 22.10.15).
- Borghesio, L., Wagura, L., Samba, D., Githiru, M., 2014. Drifting into extinction: results from the long-term monitoring of Taita apalis *Apalis fuscigularis*, in: Gereau, R.E. (Ed.), Biodiversity Status and Trends in the Eastern Arc Mountains and Coastal Forests of Kenya and Tanzania Region, 2008-2013. BirdLife International, Nairobi, Kenya, pp. 68–71.
- Lens, L., Galbusera, P., Brooks, T., Waiyaki, E., Schenck, T., 1998. Highly skewed sex ratios in the critically endangered Taita thrush as revealed by CHD genes. *Biodiversity and Conservation* 7, 869–873.
- Lens, L., Githiru, M., Callens, T., Matthysen, E., 2009. Reinforcement of a critically endangered Afrotropical bird species in a biodiversity hotspot. Report to National Geographic Society. Ghent University, Ghent, Belgium.
- Lens, L., Van Dongen, S., Norris, K., Githiru, M., Matthysen, E., 2002. Avian persistence in fragmented rainforest. *Science* 298, 1236–1238.
- Nature Kenya, BirdLife International, National Museums of Kenya, Kenya Wildlife Service, Kenya Forest Service, 2015. Action plan for Conservation of Critically Endangered Birds in Taita Hills, Kenya: 2015-2020. Kenya Wildlife Service, Nairobi, Kenya.
- Newmark, W.D., 1998. Forest Area, Fragmentation, and Loss in the Eastern Arc Mountains: Implications For the Conservation of Biological Diversity. *Journal of East African Natural History* 87, 29–36. doi:10.2982/0012-8317(1998)87
- Pellikka, P.K.E., Lötjönen, M., Siljander, M., Lens, L., 2009. Airborne remote sensing of spatiotemporal change (1955–2004) in indigenous and exotic forest cover in the Taita Hills, Kenya. *International Journal of Applied Earth Observation and Geoinformation* 11, 221–232.
- Spanhove, T., 2012. Avian persistence in a severely fragmented Afrotropical cloud forest (PhD Thesis). Ghent University, Ghent, Belgium.

Table 1. Summary of mistnetting operations

| Site | Number of days | Number of mistnet x hours | <i>T. helleri</i> (total N captured) | <i>T. helleri</i> (capture frequency) |
|--------------|----------------|---------------------------|--------------------------------------|---------------------------------------|
| Mbololo | 4 | 88 | 14 | 0.159 |
| Ngangao | 11 | 592 | 8 | 0.014 |
| Chawia | 12 | 738 | 2 | 0.003 |
| Yale | 1 | 24 | 0 | 0.000 |
| Total | 28 | 1,442 | 24 | 0.017 |

Table 2. Details of captured birds

| Site | Total N of Individuals | N of males | N of females | Juv & subadults | Retraps |
|--------------|------------------------|------------|--------------|-----------------|----------|
| Mbololo | 14 | 7 | 6 | 1 | 0 |
| Ngangao | 8 | 3 | 2 | 3 | 2 |
| Chawia | 2 | 2 | 0 | 0 | 2 |
| Yale | 0 | 0 | 0 | 0 | 0 |
| Total | 24 | 11 | 7 | 4 | 4 |

Figure 1. General map of the Taita hills showing the distribution of *T. helleri* (from Nature Kenya et al 2015)

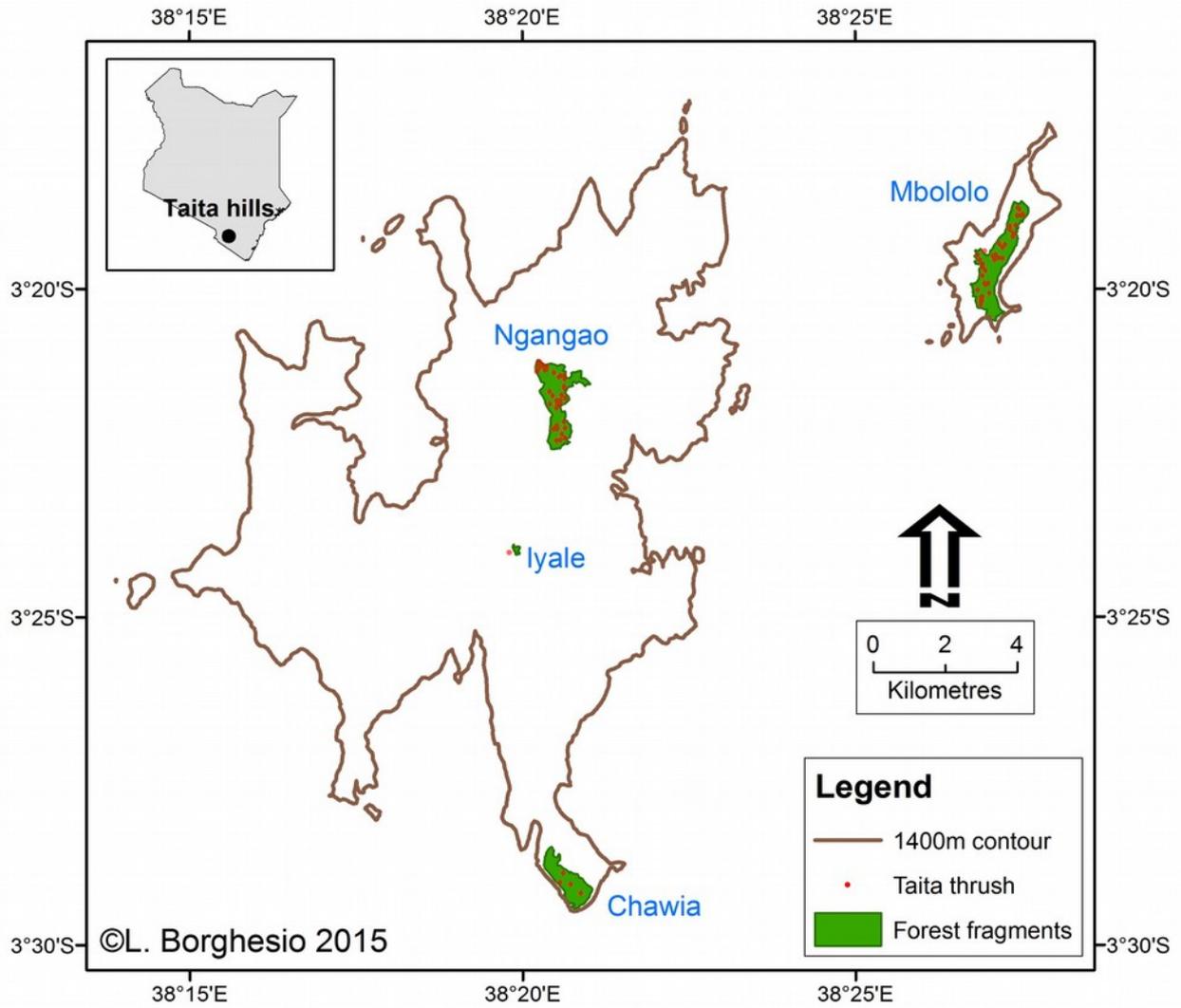


Figure 2. *Turdus helleri*, Mbololo October 2015



Figure 3. Ringing in Ngangao, September 2016



Figure 4. The research team at Ngangao Community Resource Centre

