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Current Population and Ecological Habitat of Critically Endangered Long-billed Tailorbird (*Artisornis moreaui*) in Nilo Nature Forest Reserve, Tanzania

Fredrick Ojija^{1,3*}, Cecilia Leweri², Beatus Mwendwa³, Sayuni Nasari⁴

¹Mbeya University of Science and Technology, Box 131, Mbeya, Tanzania

²Tanzania Wildlife Research Institute, Box 661, Arusha, Tanzania

³Nelson Mandela African Institution of Science and Technology Box 447, Tanzania

⁴Stefano Moshi Memorial University College, Box 881, Moshi, Tanzania

Abstract

We report the result from habitat and *Artisornis moreaui* bird population survey conducted in Nilo Forest Nature Reserve in Tanzania. About 42 individuals and 18 heard of *A. moreaui* in 22 territories were observed in established transects. It was learnt that *A. moreaui* prefers vines, lianas and climbers nearby *Ocotea usambarensis*. A survey conducted in nearby cardmom, banana and cassava farms did not locate the bird apart from the forest edges. This implies that *A. moreaui* prefers natural sub-montane forests dominated by tall trees and with some gaps at altitudinal range of 800 to 1200 m. Moreover, it was observed that *A. moreaui* does not prefer living in disturbed habitats because no individual was sighted in degraded buffer zones, forest edges and crop fields that are adjacent to Nilo Forest Nature Reserve. Therefore, we recommend that, conservation education and community empowerments might help to prevent and reduce degradation and deforestation of the nature reserve specially the buffer zones. This will subsequently enhance habitat quality for *A. moreaui* and its population.

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1. Introduction

The world's rarest bird species commonly known as Long-billed tailorbird (*Artisornis moreaui*) is a songbird in the family Cisticolidae ((BirdLife International, 2018b,c; del Hoyo et al. 2016). It is listed in Red List of Threatened Species by the International Union for Conservation of Nature (IUCN) as critically endangered bird species. The species is small with very long black bill, long tail, and rounded head with filoplumes extending over to the back of the head. It is a species of forest edge and canopy gaps which is found mostly at low density forest in the Amani Nature Reserve, East Usambaras and Nilo Forest Nature Reserve (NFNR) in Tanzania (del Hoyo et al. 2016). Its population is suspected to decrease due anthropogenic pressure and climate change that are impacting most territories of the NFNR and unprotected parts of its buffer zones surrounding the East Usambaras, and Amani Nature Reserve (BirdLife International, 2018a,b,c). Study by Collar et al (1994) showed that territories of *A. moreaui* were around territories of NFNR in areas such as Zirai, Nkombola, Kweng'wiza, Kilangangua and Kiziga and northward to Lutindi.

Previous studies such as Frontier Tanzania (2002), Johansson and Sandy (1996), and Mlingwa et al (2000) have indicated that NFNR has about 80 territories of *A. moreaui*. However, for more than 15 years there has been no updated information on whether the territories have increased or decreased. Therefore, in order to establish the current bird status, the field surveys were conducted to come up with the current data to update available information in data databases. Furthermore, the study aimed to enhance and restore ecological habitats of NFNR for the Long-billed tailorbird, which is endemic to Tanzania. Because of this, habitat restoration and conservation education to reduce human negative impact to the reserve was also conducted during the study. Specifically, the following were the study objectives: (i) to assess the current population of endangered *A. moreaui*, (ii) to assess the current status of ecological habitat of *A. moreaui*, (iii) raising conservation awareness to local people, and (iv) initiation of alternative sustainable income activities to local communities to reduce over dependence on forest reserve.

2. Materials and methods

2.1. Study area

The Nilo nature reserve (NFNR) is important ecological area rich in biodiversity hosting several endangered, rare, threatened and vulnerable species (Binggeli, 1989). It is among the few ecological potential areas harbouring critical endangered species in the reserve (Johansson and Sandy, 1996; Howell, 1989). Despite the higher biodiversity richness, degradation of its buffer zones have resulted into destruction of ecological habitats for bird species, for example, the most critically endangered Long-billed tailor bird (*Artisornis moreaui*). NFNR is located in the north west of the East Usambara Mountains. It falls under the jurisdiction of three districts authorities namely; Korogwe, Muheza and Mkinga in Tanga Region. In Korogwe District, NNR is bordered by Magoma Division specifically Kizara, Magoma and Kerenge Wards. In Muheza District, it is bordered by Amani Division specifically Zirai and Misalai Ward while, in Mkinga District NFNR is bordered by Maramba Division specifically Mhinduro Ward. The reserve is situated between 04° 50' - 4° 55' South and 38° 37' - 38° 40' East. NFNR is the second largest contiguous forest block under protection, preceded by Amani Nature Reserve in the East Usambara Mountains. The forest reserve has an area of 6025 ha. The boundary length of NFNR is 75km (50 km being in Korogwe District and 25 km in Muheza and Mkinga Districts). The southern border of the eastern 'arm' is close to Semdoo Forest Reserve, whilst the western border of the western 'arm' faces Lwengera valley and across to the West Usambara. A central ridge runs along the southern 'leg' of the reserve towards the proposed Derema forest corridor, which is planned to

link Nilo Nature Forest Reserve and Amani Nature Forest Reserve through Kambai and Semdoe Forest reserves.

2.2. Current status of ecological habitat *A. moreaui*

The field work was conducted between January and March 2018. Habitat surveys were conducted during the day time by using the established transects having concentric measuring plots of 50 m radius, in which all signs of forest disturbance e.g. fire incidences, pit sawing, agriculture areas, mining sites, stumps were noted along the transect within vicinity approximately at 30 m both side. Transects and plot lay out format was described by Frontier (2002) was adopted. The field team consisted of ten people including village leaders who visited and participated in habitat survey in Nilo nature reserve and adjacent villages. The territories of the reserve comprising eleven villages namely Kilangangua, Kizara, Zirai, Kiziga, Kuze, Kwemkole, Kweng'wiza, Kwetonge, Maramba, Mashewa and Nkombola were surveyed. Field works were conducted between October and December, 2017. Surveys inside the reserve were done solely wherever the weather condition was favorable.

2.3. *A. moreaui* population survey in Nilo Nature Reserve

Population survey for Long-billed tailorbird was conducted through walking in straight transects in the forest habitat for 4-5 hours/day from 7:00 am at the same time taking attention to bird calls. This is peak vocalization time for most birds, thus ensures high detectability. Concentric plots of 50m radius were established at every 250m along transects marked by GPS and tree tags. The voice of the birds was recorded by using Marantz PMD-222 audiocassette recorder and Sennheiser K6-ME66 directional microphone. Bird counts were conducted early in the morning through operating within the existing forest trails. A transect had 3 km long and 10 purpose counts with 300m intervals. 10 to 15 minutes were spent in every point count, with 2 minute playing of the *A. moreaui* playback recordings at the start and one minute of playback within the last five minutes.

All tailorbirds sounds heard were recorded. If the Long-billed (*A. moreaui*) was noted from some points, a playback sound was not played in that particular point. This geared towards minimizing the disturbance to this vital species. Moreover, playbacks were not used to draw in untargeted species apart from *A. moreaui*. Aside from recording the *A. Moreaui* presence and absence, the team additionally recorded other associated species including Fisher's turaco, urban center pecker, Southern banded snake -eagle, Red-caped forest warbler, Pale-breasted illadopsis, Red-tailed ant-thrush, Uluguru violet-backed sunbird, Amani sunbird, Spot-throat and Usambara thrush. Since the species is very shy, therefore tended to live and hide in the forest on tall trees.

3. Results and discussion

3.1. Current status of ecological habitat of *A. moreaui*

Due to conservation efforts put by the Nilo nature reserve authority, there are few cases of illegal activities currently. Also, very few habitats are still under pressure of human activities. In general, the habitats to support population of *A. moreaui* are yet to recover. However, during our survey we found that human disturbances were major challenges towards sustainable habitat conservation for *A. moreaui* population whereby farmers were encroaching the reserve through establishment of cardamom, clove and cinnamon

farms. Also, other crops including banana, cassava, maize and beans were grown very few metres from the forest boundary.

Incidences of illegal logging, fuel wood collection, and pole cutting were also observed, however they were low due to intensive patrols and awareness among local people. Fuel wood collection inside the nature reserve was the main cause of disturbance. This is because local people adjacent the reserve use firewood as their major source energy for cooking and or warming. Another, disturbance to *A. moreaui* which was observed is the emerging challenge of increasing cover of the invasive tree species namely *Maesopsis eminii* which appears to replace natural vegetation including climbers and vines in natural forest gaps which are preferred by *A. moreaui*. *M. eminii* tends to change the forest from natural dynamic mosaics to uniform dense forest which is not preferred by *A. moreaui*.



Fig 1. Firewood collection inside Nilo nature reserve (Photo: F. Ojija, 2018).

3.2. *A. moreaui* population survey in Nilo Nature Reserve

Most *A. moreaui* were observed in natural forest gaps dominated by lianas/climbers and vines vegetation cover. During the playbacks most of them were heard responding to the playback calls and only 15 long-billed tailorbirds were visually observed. At the beginning of the trail there was a stream and a wetland whereby 18 sightings were recorded at about 1200m a.sl. In thick and dense forest sights especially those which have been invaded by *M. eminii* no sighting was recorded. At the Nilo peak trail (900 – 1200m) there were only 3 points where the bird was observed. Ascending further above 1200m did not locate any bird as the forest cover kept decline and shrubby and herb vegetation were dominant in these relatively drier areas. general, 22 territories of *A. moreaui* were recorded, 42 individuals sighted and 18 heard. It was clearly observed that *A. moreaui* prefers vines, lianas and climbers nearby *Ocotea usambarensis* and efforts searching in nearby farms planted cardmom, banana and cassava did not locate the bird apart from the forest edges implying that *A. moreaui* is a natural sub-montane forest dominated by tall trees dependent bird and with some gaps at altitudinal range of 800 to 1200 m. Nonetheless, it was observed that *A. moreaui* does not go to crop fields including tea plantations that are adjacent NNR.

3.3. Raising conservation awareness and community empowerment

Biodiversity conservation awareness among local communities adjacent to the reserve was enhanced through community meetings and public lectures as well as initiation of income generating small projects (tree nursery and beekeeping) were implemented in order to enhance conservation of ecological habitat for the *A. Moreaui* as well as to contribute in improving household livelihood strategies. These activities and empowerment are expected to reduce forest illegal activities like, encroachment for agriculture, pole cutting, and fuel wood collection which threatens conservation of biodiversity and ecological habitat of the endangered *A. moreaui* in the reserve. Expected conservation outputs from restoration and income generating activities includes increasing population of *A. moreaui*, improvement of ecological habitat conditions of *A. moreaui*, and increased conservation awareness among local people.

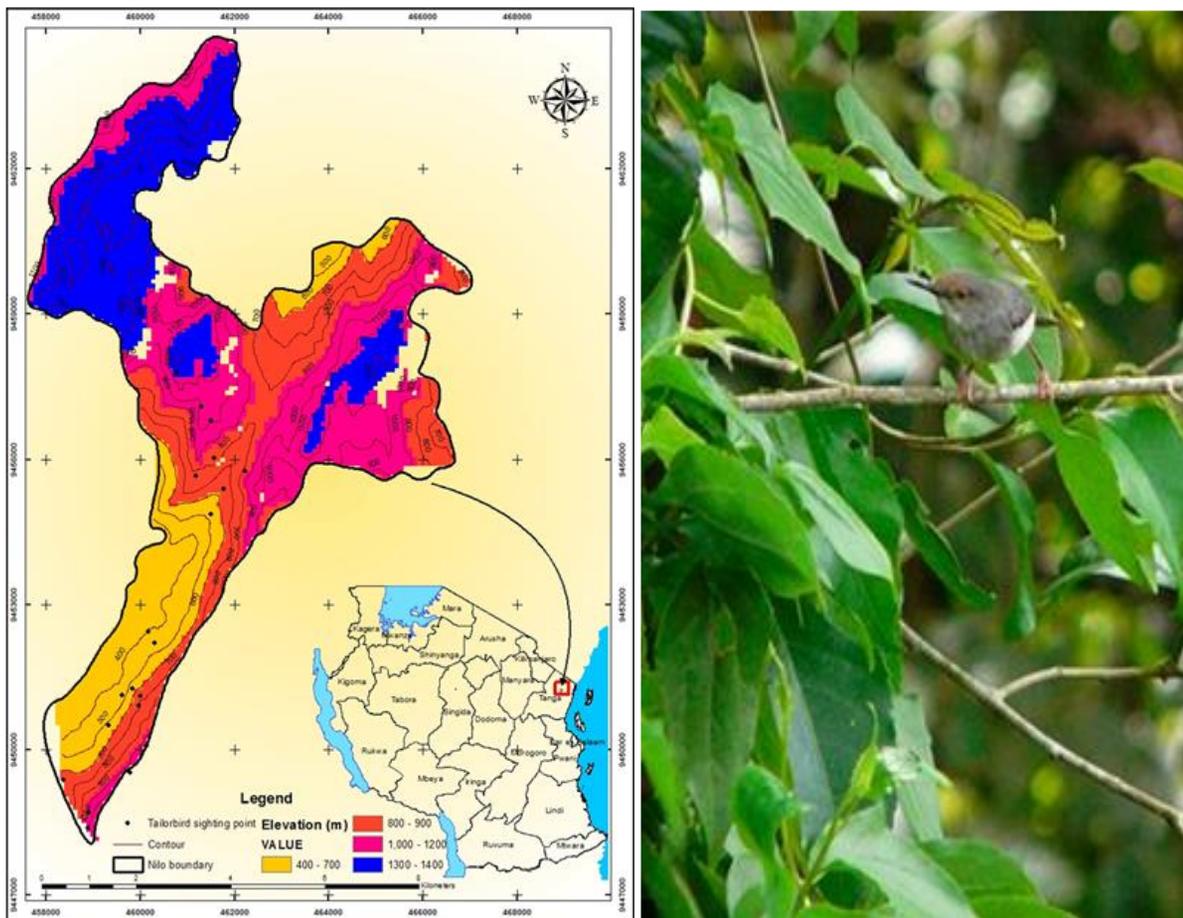


Fig 2. A map of Nilo nature reserve showing survey points where the tailorbird was sighted

4. Conclusion and recommendations

Long-billed Tailorbird is an endemic bird to Tanzania found only in the study area. The bird is listed in the IUCN Red List of Threatened Species. Critically endangered Long-billed Tailorbird is favored by relatively open parts of the medium dense forest with canopy gaps, stream lines and forest edges. In the East Usambaras, studies report that Long-billed Tailorbird inhabits sub montane and montane forest at elevations of around 850 to 1,200 metres above sea level, while favours forest edges and large canopy gaps, with high densities of vines and climbers. *A. moreaui* seldom lives in disturbed habitats, and in a very open forest edges or agricultural landscapes. Thus, conservation activities including restoration of degraded habitats implemented in Nilo nature forest reserve will benefit this critically endangered bird. Biodiversity conservation education raising awareness would reduce illegal harvesting of forest resources which threaten survival of *A. moreaui*

The study recommends that, human disturbances including tree felling at the buffer zones of the reserve for timber or opening new crop fields or human settlements should be alleviated. Efforts including the ongoing forest boundary large beacons erection, patrols and awareness creation should be reinforced. Efforts to control further encroachment of the *M. eminii* into the reserve should be undertaken. Undertake a population re-survey of *A. moreaui* during dry season when bird activities are high including breeding and the weather is conducive for clear bird sighting. This is based on the fact that the current bird survey was limited by short time and unfavorable weather.

Ongoing education on biodiversity conservation and management is recommended among local communities. However, this must be done in connection with provision of sustainable income generating activities as a means of discouraging unsustainable use of forest resources and forest encroachment. This will help to conserve the reserve and protect *A. moreaui* from extinction. Lastly, Nilo nature reserve authority must be informed on *A. moreaui* critical habitat areas (hotspots) for effective conservation plans and sustainable eco-tourism activities aiming at using *A. moreaui* as iconic species for Nilo nature reserve in bird watching and other non-consumptive tourist activities.

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