



## *Trans Papuan Highway Construction and Honey Eater Bird (Macgregoria pulchra) Population*

Sri Een Hartatik<sup>1,a</sup>, Ratri Ma'rifatun Nisaa'<sup>1,b</sup>, Lita Witasari<sup>2</sup>, Indra Fardhani<sup>3</sup>, Enny Widyati<sup>1,\*</sup>

<sup>1</sup>Research Center of Ecology and Ethnobiology, National Research and Innovation Agency  
Republic of Indonesia, Jl. Raya Jakarta-Bogor Km 46 Cibinong, Bogor 16911

<sup>2</sup>Lorentz National Park, Jl. SD Percobaan Potikelek, Wamena 99511

<sup>3</sup>Faculty of Mathematics and Science Universitas Negeri Malang, Jl. Semarang 5 Malang,  
65145

<sup>a</sup>Email penulis pertama: [sri.een.hartatik@brin.go.id](mailto:sri.een.hartatik@brin.go.id), <sup>b</sup>email penulis kedua:

[ratri.marifatun.nisaa@brin.go.id](mailto:ratri.marifatun.nisaa@brin.go.id), \*corresponding author: [indra.fardhani.fmipa@um.ac.id](mailto:indra.fardhani.fmipa@um.ac.id)

Diterima: 7 November 2023; Disetujui: 1 Desember 2023; Diterbitkan: 1 Desember 2023

### **Abstract**

**Trans Papuan Highway Construction and Honey Eater Bird (*Macgregoria pulchra*) Population.** Lorentz National Park has a high degree of endemism; however, it is vulnerable to extinction. One of the most attractive birds is MacGregor's Giant Honeyeater (*Isap Madu Elok*, Indonesian Language) that nested on the *Dacryocarpus compactus* tree. However, either the birds or the trees have very little information. On the other hand, they are impacted by the massive local development. Trans Papuan Highway Project crossing the Lorentz National Park area threatens to the sustainability of the habitat and population of that bird. This mini-review highlights several impacts of road construction on the population of *Isap Madu Elok* birds in LNP: the habitat fragmentation; the potentially increasing human disturbance due to open access; and lastly the mitigation strategy for minimizing the impact.

**Key Words** : *Dacryocarpus compactus*, *Isap Madu Elok*, Lorentz National Park, Sustainability.

### **Intisari**

Taman Nasional Lorentz memiliki tingkat endemisme yang tinggi; namun, rentan terhadap kepunahan. Salah satu burung yang paling menarik adalah Isap Madu Elok yang bersarang di pohon *Dacryocarpus compactus*. Namun, baik burung maupun pohon memiliki sedikit informasi. Di sisi lain, mereka terpengaruh oleh pembangunan lokal yang masif. Proyek Jalan Raya Trans Papua yang melintasi area Taman Nasional Lorentz mengancam keberlanjutan habitat dan populasi burung ini. Tinjauan mini ini menyoroti beberapa dampak konstruksi jalan raya pada populasi burung Isap Madu Elok di Taman Nasional Lorentz: fragmentasi habitat; potensi peningkatan gangguan manusia akibat akses terbuka; dan terakhir, strategi mitigasi untuk meminimalkan dampak.

**Kata Kunci** : *Dacryocarpus compactus*, Isap Madu Elok, Taman Nasional Lorentz, Keberlanjutan.

### **1. Introduction**

Lorentz National Park (LNP) is the largest protected area in Southeast Asia with a total area of 2.35 million ha. It is in the longitude of 136° 59' 36,168" W - 139° 09' 25,308" W and latitude of 3° 43' 10,992" S - 5° 26' 39,12" S. The Lorentz area, located between two

connected tectonic plates, has a continual process of mountain building as well as enormous sculptures generated by the glacier process results in a high degree of endemism. It contains a substantial area of alpine, sub-alpine, and montane habitat, which exhibits a rich diversity of plants including many local endemics (IUCN, 2020). One of the famous yet poorly known endemic species is MacGregor's Giant Honeyeater (*Macgregoria pulchra*). Unfortunately, the information on population (density, home range, egg production, sex ratio, etc.), behavior (mating rituals, brooding period, parenting behavior, etc.), and the habitat tree (carrying capacity, regeneration, etc.) has not been revealed.

While *Macgregoria pulchra* is poorly studied, infrastructure development in the region is increasing, hence threatening the habitat and ecosystem of this species. The most recent infrastructure development is the Trans Papuan Highway built across the LNP which lead to some consequences for the forest ecosystem in the LNP (Sloan et al., 2019).

This mini-review will highlight several impacts of road construction on the population of Isap Madu Elok birds in LNP: the habitat fragmentation; the potentially increasing human disturbance due to open access; and lastly the mitigation strategy for minimizing the impact.

## 2. The Isap Madu Elok bird (*Macgregoria pulchra*) population in LNP

LNP located in Papua Island of Indonesia is home to a large number of restricted range (45) and endemic (9) bird species (UNESCO WHC, 2023). MacGregor's Giant Honeyeater (*Macgregoria pulchra*) or the beautiful honeyeater or 'Isap Madu Elok' in Indonesian Language is one of the endemic bird species in LNP. Until the year of 1999 this species was included in the bird of paradise (Paradisaeidae) group, however, now it included in the honeyeater group (Meliphagidae) (Cracraft & Feinstein, 2000).

Despite their large appearance, up to 40 cm long, this beautiful honeyeater receives very little attention from scientists and has long become a mystery. Since 2018 there has been no recent study on this species in wildlife and most of the researchers focused on the genetics and the evolution and the taxonomic of this bird (Andersen et al., 2019; Frith, 2020; Marki et al., 2019). Studies about the habitat and ecology of this bird were very rare. One study known was about *Dacrycarpus compactus*, an endemic tree where this bird is commonly observed in groves when the trees are fruiting, but relatively little is known about where it moves to when the trees are not fruiting (Clench, 1992).



**Figure 1.** *Macgregoria pulchra* perched on *Dacrycarpus compactus* tree (documented by Lorentz National Park, 2020)

## 3. Road Construction Project and Honeyeater Habitat

Trans Papuan Highway (TPH) is the new emerging regional 'development corridor' in Papua Island of Indonesia where once completed will be a ~4000 km highway for linking several main sectors such as mining, oil/gas extraction, agriculture, forestry, and aquaculture, but it raises concerns for its environmental impact and degradation on the forest (Sloan et al., 2019). Human infrastructure in the form of highways, railroads, and road

construction has been a major driver for forest fragmentation in the world such as in China (Liu et al., 2019), Europe (Bekker & Iuell, 2003), and India (Nayak et al., 2020).

Unfortunately, the construction of TPH will definitely cause habitat fragmentation and degradation in Papua Island's vast forest and specifically the honeyeater habitat in LNP. Several impacts of fragmentation are: 1) altering vegetative regeneration through the increase of tree mortality and decrease of seedling regeneration, hence changing the biomass of the forest; 2) catalyzing changes in forest ecology; 3) raising ground temperature and reducing precipitation, thereby heightened the drought risk and increase forest fire risk (Arima et al., 2005). Moreover, the relatively unknown habitat and behavior of the species will pose a high risk for further conservation due to lack of knowledge and scientific-based information.

#### **4. Mitigation Efforts and Conservation Measures**

Efforts to mitigate the impact of the Trans-Papua Road construction have been limited. UNESCO has previously expressed concerns regarding potential threats the road may pose to the national park's outstanding universal value, which includes the highest level of biodiversity in the area, a high level of endemism, and fossil sites that show how life evolved in New Guinea. The Indonesian government has made efforts to mitigate the environmental impacts by doing an Environmental Impact Assessment (EIA) (Sari & Rahman, 2021). Despite acknowledging major environmental implications, the EIA declares that the road is environmentally feasible. In 2017, UNESCO observed that the project's environmental impact assessment had already issued a warning about possible effects on the protected region (UNESCO WHC, 2017) However, in 2021, UNESCO call for the closure of the road. UNESCO has urged the Indonesian government to temporarily close the road for public use and only reopen it after mitigation measures are fully implemented. UNESCO also asked the government to submit details of the mitigation measures that have been taken, and those that are planned, to the World Heritage Centre. UNESCO also requests the Indonesian government to make sure that fire management, particularly factors connected to climate change, is included in the property's management plan (UNESCO WHC, 2021).

Indonesia's government has also faced criticism from analysts and activists who argue that the road hurts the environment and threatens indigenous land rights. Research conducted by Kambu et al. (2022b) concluded that the community should be involved in the design and execution of development initiatives. The local population plays a vital part in safeguarding the plant and animal biological systems from harm resulting from the construction of the Trans Papua Road (Druce, 2020; Kambu et al., 2022a).

Conservation efforts for other honeyeater species can provide insights into potential conservation measures that could be implemented due to limited information available on MacGregor's honeyeater. Here are some potential conservation measures or practices that could be implemented to protect honeyeater habitat: 1) preserve and restore habitat (Heinsohn et al., 2022; Walsh et al., 2023); 2) reduce habitat fragmentation (Crates et al., 2018); 4) raise community awareness (Walsh et al., 2023); 5) collaborate with stakeholders (Heinsohn et al., 2022).

#### **5. Conclusion**

This review emphasizes the potential negative effects of road construction on the Isap Madu Elok bird population, including habitat fragmentation and increased human disturbance, stressing the immediate necessity for effective mitigation strategies. Despite a limited understanding of the honeyeater's ecology, the ongoing Trans Papuan Highway (TPH) project raises UNESCO's environmental concerns, prompting a call for road closure until comprehensive mitigation measures are in place. Critiques about the project's environmental impact and its implications for indigenous land rights underscore the importance of community participation in development initiatives. To safeguard the

MacGregor's Giant Honeyeater and its habitat in Lorentz National Park (LNP), suggested measures include preserving habitats, minimizing fragmentation, promoting community awareness, and fostering collaboration with stakeholders.

### Acknowledgements

We would like to express our sincere gratitude to Mr. Acha Anis Sokoy, S.Hut. as The Head of Lorentz National Park, for giving us permission to use their monitoring data for this mini-review.

### References

- Andersen, M. J., McCullough, J. M., Friedman, N. R., Peterson, A. T., Moyle, R. G., Joseph, L., & Nyári, Á. S. (2019). Ultraconserved elements resolve genus-level relationships in a major Australasian bird radiation (Aves: Meliphagidae). *Emu - Austral Ornithology*, 119(3), 218–232. <https://doi.org/10.1080/01584197.2019.1595662>
- Arima, E. Y., Walker, R. T., Perz, S. G., & Caldas, M. (2005). Loggers and Forest Fragmentation: Behavioral Models of Road Building in the Amazon Basin. *Annals of the Association of American Geographers*, 95(3), 525–541. <https://doi.org/10.1111/j.1467-8306.2005.00473.x>
- Bekker, H., & Iuell, B. (2003). Habitat fragmentation due to infrastructure. *Proceedings of the 2003 International Conference on Ecology and Transportation*, 1–14. <https://escholarship.org/uc/item/9693w540>
- Clench, M. H. (1992). Pterylography of Birds-of-Paradise and the Systematic Position of Macgregor's Bird-of-Paradise (*Macgregoria pulchra*). *The Auk*, 109(4), 923–928. <https://doi.org/10.2307/4088177>
- Cracraft, J., & Feinstein, J. (2000). What is not a bird of paradise? Molecular and morphological evidence places *Macgregoria* in the Meliphagidae and the Cnemophilinae near the base of the corvoid tree. *Proceedings of the Royal Society of London. Series B: Biological Sciences*, 267(1440), 233–241. <https://doi.org/10.1098/rspb.2000.0992>
- Crates, R., Rayner, L., Stojanovic, D., Webb, M., Terauds, A., & Heinsohn, R. (2018). Contemporary breeding biology of critically endangered Regent Honeyeaters: implications for conservation. *Ibis*, 161(3), 521–532. <https://doi.org/10.1111/ibi.12659>
- Druce, S. C. (2020). Political Impasse vs Economic Development: A History and Analysis of the West Papua Conflict in Indonesia. In M. Oishi (Ed.), *Managing Conflicts in a Globalizing ASEAN*. Springer Singapore. [https://doi.org/https://doi.org/10.1007/978-981-32-9570-4\\_5](https://doi.org/https://doi.org/10.1007/978-981-32-9570-4_5)
- Frith, C. B. (2020). The New Guinea bird names Macgregor's Bowerbird and Macgregor's Honeyeater. *Bulletin of the British Ornithologists' Club*, 140(2), 214. <https://doi.org/10.25226/bboc.v140i2.2020.a12>
- Heinsohn, R., Lacy, R., Elphinstone, A., Ingwersen, D., Pitcher, B. J., Roderick, M., Schmelitschek, E., Van Sluys, M., Stojanovic, D., Tripovich, J., & Crates, R. (2022). Population viability in data deficient nomadic species: What it will take to save regent honeyeaters from extinction. *Biological Conservation*, 266, 109430.

<https://doi.org/10.1016/j.biocon.2021.109430>

- IUCN. (2020). *Lorentz National Park*. IUCN World Heritage Outlook. <https://worldheritageoutlook.iucn.org/explore-sites/wdpaid/198298>
- Kambu, Z., Jinca, M. Y., Pallu, M. S., & Ramli, M. I. (2022a). Meta Synthesis of Community Participation Model on Trans-Papua Road Development. *Civil Engineering Journal (Iran)*, 8(11), 2476–2489. <https://doi.org/10.28991/CEJ-2022-08-11-08>
- Kambu, Z., Jinca, M. Y., Pallu, M. S., & Ramli, M. I. (2022b). Perspectives of the Local Communities on the Development of Trans-Papua Road Infrastructure. *Civil Engineering Journal*, 8(5), 999–1010. <https://doi.org/10.28991/CEJ-2022-08-05-011>
- Liu, J., Coomes, D. A., Gibson, L., Hu, G., Liu, J., Luo, Y., Wu, C., & Yu, M. (2019). Forest fragmentation in China and its effect on biodiversity. *Biological Reviews*, 94(5), 1636–1657. <https://doi.org/10.1111/brv.12519>
- Marki, P. Z., Kennedy, J. D., Cooney, C. R., Rahbek, C., & Fjeldså, J. (2019). Adaptive radiation and the evolution of nectarivory in a large songbird clade. *Evolution*, 73(6), 1226–1240. <https://doi.org/10.1111/evo.13734>
- Nayak, R., Karanth, K. K., Dutta, T., Defries, R., Karanth, K. U., & Vaidyanathan, S. (2020). Bits and pieces: Forest fragmentation by linear intrusions in India. *Land Use Policy*, 99, 104619. <https://doi.org/10.1016/j.landusepol.2020.104619>
- Sari, Y. I., & Rahman, E. (2021). Roads for Communities, Not Commodities: A Qualitative Study of the Consequences of Road Development in Papua, Indonesia. *Human Ecology Review*, 27(1), 139–161. <https://doi.org/10.22459/HER.27.01.2021.08>
- Sloan, S., Campbell, M. J., Alamgir, M., Engert, J., Ishida, F. Y., Senn, N., Huther, J., & Laurance, W. F. (2019). Hidden challenges for conservation and development along the Trans-Papuan economic corridor. *Environmental Science & Policy*, 92, 98–106. <https://doi.org/10.1016/j.envsci.2018.11.011>
- UNESCO WHC. (2017). 41COM 7B.29 - *Lorentz National Park (Indonesia) (N 955)*. United Nations Educational, Scientific and Cultural Organization World Heritage Centre. <https://whc.unesco.org/en/decisions/7031>
- UNESCO WHC. (2021). 44COM 7B.94 - *Lorentz National Park (Indonesia) (N 955)*. United Nations Educational, Scientific and Cultural Organization World Heritage Centre. <https://whc.unesco.org/en/decisions/7810>
- UNESCO WHC. (2023). *Lorentz National Park*. United Nations Educational, Scientific and Cultural Organization World Heritage Centre. <https://whc.unesco.org/en/list/955/>
- Walsh, J. C., Gibson, M. R., Simmonds, J. S., Mayfield, H. J., Bracey, C., Melton, C. B., Reside, A. E., & Maron, M. (2023). Effectiveness of conservation interventions for Australian woodland birds: A systematic review. *Biological Conservation*, 282(March), 110030. <https://doi.org/10.1016/j.biocon.2023.110030>

