**Matters Arising: Landscape-scale benefits of protected areas for tropical biodiversity**

Peter Kedron, Amy Frazier, Lei Song & Wenxin Yang

**ARISING FROM** Brodie et al. *Nature* <https://doi.org/10.1038/s41586-023-06410-z> (2023)

In their recent article, Brodie et al. demonstrated the efficacy of terrestrial protected areas (PA) for conserving bird biodiversity while accounting for the confounding effects of 3D forest structure and accessibility. However, this analysis does not account for PA connectivity; a widely recognized component of effective conservation, a guiding principle of the 30x30 initiative, and a possible confound of the effect of protection on biodiversity. Ecologically, the connectedness of a PA network may affect biodiversity outcomes by facilitating gene flow across locations, and may moderate the effect of protection on biodiversity by

We computationally reproduced these findings using the data shared by the authors, and extended the original analysis by introducing habitat connectivity as an independent predictor of bird biodiversity and a moderator of the PA effect.

* Analysis does not consider a second essential component of PA response, the connectivity of PA.
* In fact, the results presented in Brodie indirect support the importance of PA connectivity and its potential confounding effects on the efficacy estimate. The authors’ secondary analysis show that large PAs create spillover effect on surrounding unprotected locations suggesting they act as biodiversity reserves. Similarly, the residuals of the PA efficacy model has a spatial structure that underestimates biodiversity levels closer to PAs.

Replicating and extending the work of the original authors, we assess the effect of PA connectivity on three facets of vertebrate biodiversity (SR, FR, PD) and as a moderator of previously observed PA efficacy.

* Insert Fig. 1 showing PA effect and connectivity effect.
* For birds, we found …PA diminishes with inclusion of connectivity
* For mammals, we found…

**Methods** (3000 word limit)

Replication Data

Data used were from Brodie et al. (2023)…

Variables

Describe construction of the connectivity measure

Statistical Approach

Describe construction of the connectivity measure

**Extended data figures and tables**

Extended Data Fig 1 Sensitivity of PA and connectivity estimates to dispersal distance selection

Extended Data Fig. 2