



MADAGASCAR DISSERTATION/THESIS PROJECT

MA57 - Monitoring bat populations in Madagascar using acoustic methods

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The dry forests in Mahamavo support a wide range of microchiropteran bats which use echolocation. These species can be monitored by constant effort mist netting, but this requires a huge amount of sampling effort to be able to reliably detect trends in bat populations. An alternative approach is to analyse ultrasound recordings. You would make use of a set of audimoth acoustic devices deployed at forest edges and near water bodies across the Mariarano landscape. These can be programmed to record at set times of day and are left unattended. The sound recordings can then be viewed as sonograms and automatically compared with published sonograms using machine learning to identify how many individuals of each species were present on a sampling occasion at each location. You might also want to use environmental data on vegetation structure or landscape configuration to test whether bat community composition and activity can be explained by environmental factors.

Suggested reading

* indicates particularly useful sources.

*Hill, Andrew P, et al. (2018), 'AudioMoth: Evaluation of a smart open acoustic device for monitoring biodiversity and the environment', *Methods Ecol. Evol.*, 9 (5), 2199-2211.

*Kofoky, Amyot F, et al. (2009), 'Forest bats of Madagascar: results of acoustic surveys', *Acta Chiropt.*, 11 (2), 375-92.

Goodman, Steven M, et al. (2011), 'Morphological, bioacoustical, and genetic variation in Miniopterus bats from eastern Madagascar, with the description of a new species', *Zootaxa*, 1-19.

Kofoky, Amyot, et al. (2007), 'Habitat use, roost selection and conservation of bats in Tsingy de Bemaraha National Park, Madagascar', *Biodivers. Conserv.*, 16 (4), 1039-53.

Naidoo, Theshnie, et al. (2016), 'Partial support for the classical ring species hypothesis in the *Chaerephon pumilus* species complex (Chiroptera: Molossidae) from southeastern Africa and western Indian Ocean islands', *Mammalia*, 80 (6), 627-43.

Prince, Peter, et al. (2019), 'Deploying Acoustic Detection Algorithms on Low-Cost, Open-Source Acoustic Sensors for Environmental Monitoring', *Sensors*, 19 (3),

Ramasindrazana, Beza, et al. (2011), 'Identification of cryptic species of *Miniopterus* bats (Chiroptera: Miniopteridae) from Madagascar and the Comoros using bioacoustics overlaid on molecular genetic and morphological characters', *Biol. J. Linnean Soc.*, 104 (2), 284-302.

Ramasindrazana, Beza, et al. (2013), 'Morphological and echolocation call variation in Malagasy trident bats, *Triaenops Dobson, 1871* (Chiroptera: Hipposideridae)', *Acta Chiropt.*, 15 (2), 431-39.

Ramasindrazana, Beza, et al. (2015), 'Evidence of echolocation call divergence in *Hipposideros commersoni sensu stricto* (E. Geoffroy, 1803) from Madagascar and correlation with body size', *Acta Chiropt.*, 17 (1), 85-94.

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