

RESEARCH PROPOSAL

Revealing the Bioacoustic Characteristics of Bleeding Toad (*Leptophryne cruentata*) in Gunung Gede Pangrango National Park, Indonesia

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RESEARCH BACKGROUND

The bleeding toad (*Leptophryne cruentata*) holds a unique status as the only protected amphibian species in Indonesia, as designated by Permen-LHK P.106/2018, and it is Critically Endangered according to the IUCN Red List (IUCN, 2021). This species faces significant threats due to its narrow distribution (endemic), susceptibility to diseases, habitat destruction, population decline, and the risk of natural disasters such as climate change and volcanic eruptions. Currently, bleeding toad can only be found in mountain rivers and waterfalls across 12 areas in Gunung Gede Pangrango National Park (TNGGP), 8 areas in Halimun Salak National Park (TNGHS), and the Taman Safari Cisarua Waterfall in Bogor (van Kampen, 1923; Liem, 1971; Iskandar, 1998; Kurniati, 2003, 2006; Kusrini *et al.*, 2005, 2018, 2021; Kusrini, 2007; Yazid, 2007; Ningsih, Kusrini and Kartono, 2013; Siregar, 2016; Permana, Alhadi and Kaprawi, 2020; Setiawan, Putra and Nuroktafaedi, 2021; Hasan, 2022). The limited habitat distribution of bleeding toad is further threatened by habitat destruction and pollution resulting from tourist activities, as well as by the *Batrachochytrium dendrobatidis* fungus, which poses a severe threat to amphibians (Kusrini, 2007; Kusrini *et al.*, 2008; Hasan, 2022).

Despite being a protected species and facing high threat levels, bleeding toad have received minimal research attention. As of 2022, there are only 19 literature sources and studies focusing on the bleeding toad. The available research concerning this species is conspicuously scarce. Hence, there exists a compelling need for comprehensive research aimed at elucidating the bioacoustic characteristics of this species. This study seeks to address the following research questions:

1. What is the bioacoustic characteristics of bleeding toad?
2. Might divergent habitats lead to variations in acoustic characteristics of bleeding toad?
3. What communication strategy does the bleeding toad employ within a waterfall habitat that has high noise disturbance?

Conserving endangered species characterized by limited research data presents formidable obstacles. Compounding these challenges is the species' lack of charismatic appeal, resulting in diminished attention. Prospective investigation into acoustic characteristics through Passive Acoustic Monitoring (PAM) holds the potential to swiftly furnish data for the identification of bleeding toad presence, enabling early detection. This is particularly pertinent given the existing scarcity of information pertaining to bleeding toad existence.

Furthermore, this study has the capacity to yield novel insights into communication strategies employed by amphibians amidst locales marked by substantial environmental noise perturbation. In this regard, it stands to enrich scientific comprehension of amphibian behavior within mountainous terrains. This research also holds significant value as an addition to the compendium of frog vocalizations documented in Indonesia.

METHOD

This research will utilize Passive Acoustic Monitoring (PAM) using SwiftOne autonomous recording. Derived from our ongoing investigation, we have discerned a range of distinctly varied habitat types that the bleeding toad occupies. These encompass four primary habitats, namely waterfalls, fast rapids, slow rapids, and swamps. Consequently, the placement of recording equipment will be tailored to each respective habitat (Fig 1). The data were subjected to analysis using Raven Pro (1.6.5), wherein the spectrogram and oscillogram of the sound were visualized.

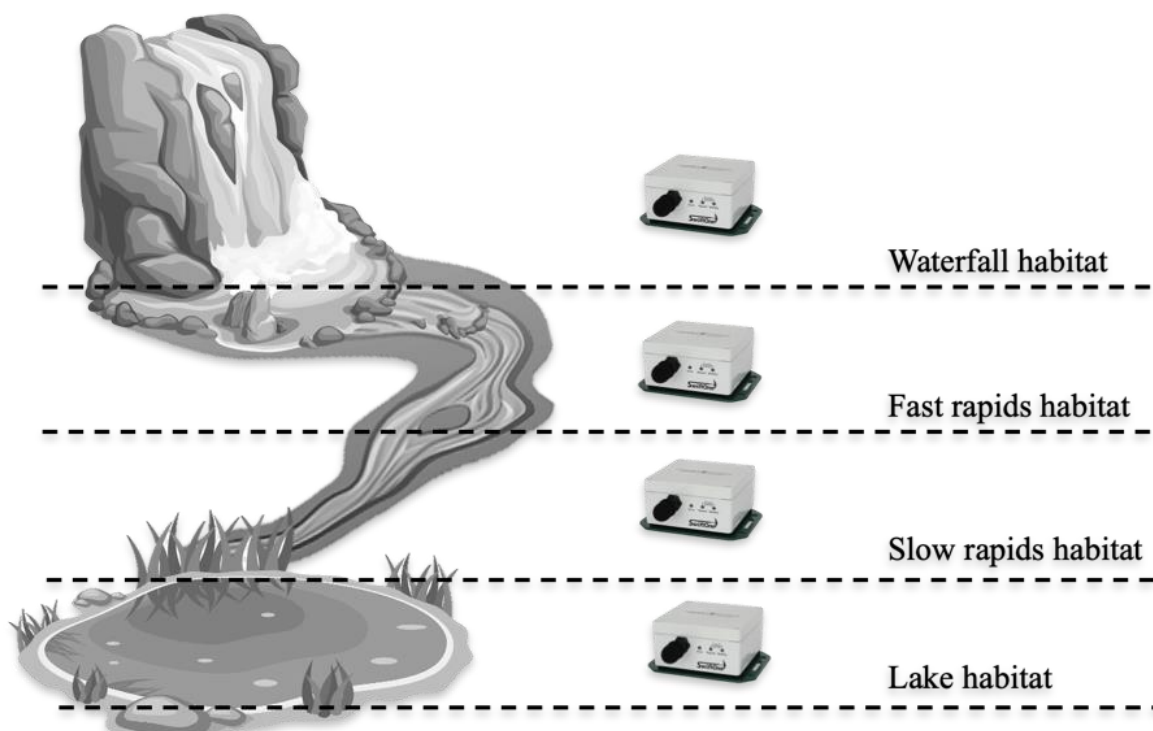


Figure 1. Bioacoustics study design

Furthermore, an analytical process was employed to delineate parameters such as Begin Time (s), End Time (s), Low Frequency (Hz), High Frequency (Hz), Maximum Frequency (Hz), Delta Time (s), Energy Peak Frequency (Hz), and additional acoustic attributes. The study

is conducted within the confines of Mount Gede Pangrango National Park, spanning across eight distinct geographical points, which include Curug Cibeureum, Rawa Denok 2, Rawa Gayonggong, Curug Pariuk, Sungai Jajaway, Sungai Kuta, Curug Rasta, Curug Cibeureum Selabintana (Fig 2).

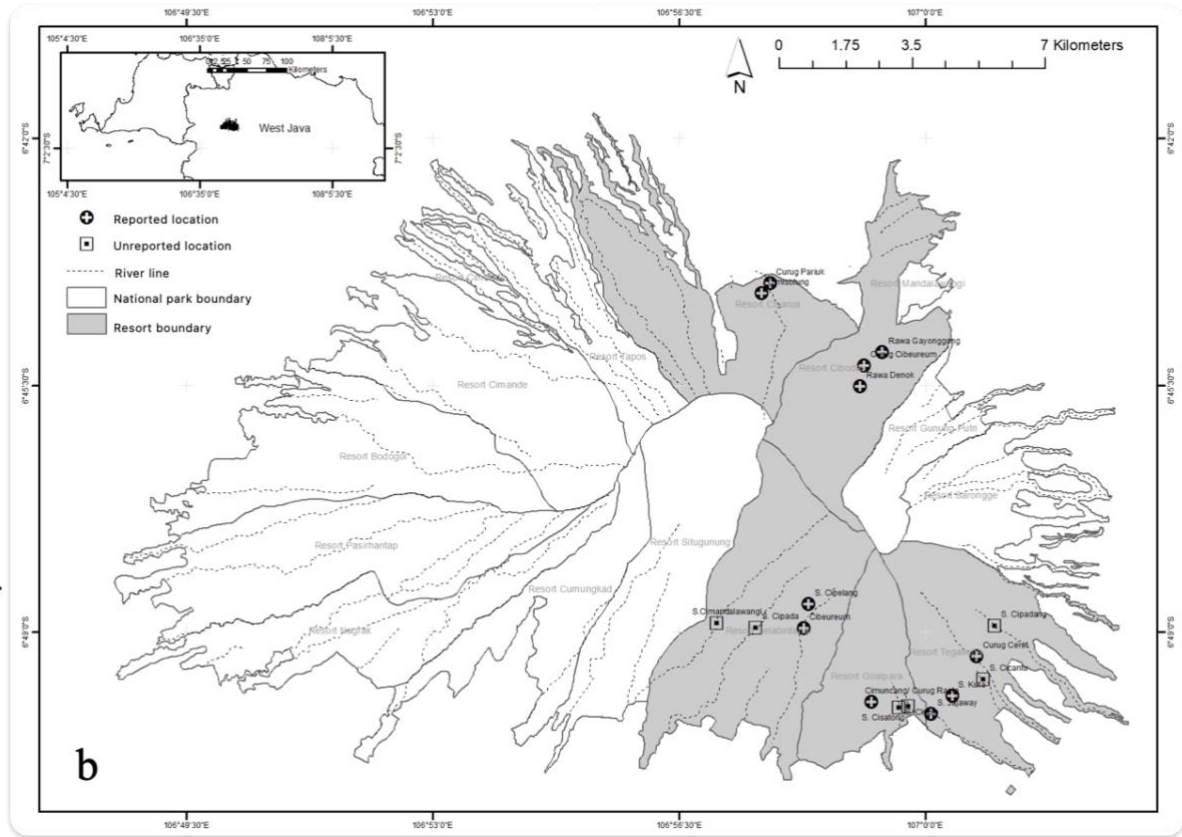


Figure 2 Research location in Gunung Gede National Park

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CV OF TEAM MEMBERS

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Relevant experience:

- Project leader on Monitoring of Biodiversity in Cukunyinyi Pesawaran, Lampung. (PTBA-ITERA) 2023
- Mammals expert of Environmental and Social Impact Assessment (ESIA) of Masang II Power plant, Agam-Pasaman, Sumatera Barat. (Andamata, PT Sinergi Karya Eunoia) 2023
- Forming Non-Detriment Findings (NDF) Report of *Macaca fascicularis* in Jawa Barat Region. Deli Island, Banten. (SKIKH BRIN-ITERA) 2022
- Bats Expert on Monitoring of Biodiversity in PT. Pupuk Kujang. Cikampek, Jawa Barat. (BRIN-ITERA) 2022
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- BIFA04-24 project - Deploying acoustic data to fill gaps in bat biodiversity information for Southeast Asia. (Southeast Asian Bat Conservation and Research Unit - Hungarian Natural History Museum - Global Biodiversity Information Foundation) 2020-2021
- Mammals expert on Monitoring of Biodiversity in Hutan Kota Ranggawulung, Subang, Jawa Barat. (Care LPPM IPB-Pertamina EP) 2019-2021
- Surveyor on Monitoring of Biodiversity in Puntang Mountain, Bandung, Jawa Barat. (Care LPPM IPB-Pertamina EP) 2021
- Mammals expert on Baseline Study PT Bumi Suksesindo, Banyuwangi, Jawa Timur. (PT Lorax Indonesia) 2021
- Surveyor on Population and Distribution of Javan slow loris (*Nycticebus javanicus*) in Cipaganti village, Garut, Jawa Barat. (Care LPPM IPB-Pertamina EP) 2021

Publication:

- Mammals Community in Ranggawulung Urban Forest, Subang (Jurnal Biologi Tropis 23(1), 101-109)
- Herpetofauna Diversity in Ranggawulung Urban Forest, Subang (Bioscientist, 10 (2), 1150-1161)
- Characteristics, Recording Method, and Habitat Impact on Bats Echolocation Calls (Thesis).
- Habitat Affect Calls Characteristics of Several Species of Microchiroptera Bats in Bogor and Sukabumi (West Java), Indonesia (Journal) 2021
- Calls Variation Under Different Recording Condition of Insectivorous Bats From Java, Indonesia (Jurnal) 2021

- Monitoring Evaluasi Keanekaragaman Hayati di Kawasan Wana Wisata Gunung Puntang, Jawa Barat (Book) 2020
- Bats Calls (Microchiroptera) from Gudawang Cave, Bogor. (Journal) 2020
- Echolocating bats of West Java, Indonesia. (Dataset) 2020

Presentations at professional meetings:

- Asian Bat Calls Database and Biodiversity Information Workshop. Universiti Kebangsaan Malaysia, Bangi, Malaysia (Southeast Asian Bat Conservation and Research Unit-Hungarian Natural History Museum -Global Biodiversity Information Foundation) 2021
- First Pacific Islands Bat Forum (Australasian Bat Society) 2021

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Relevant experience:

- Occupancy Modelling in Wildlife Monitoring Training, EMS-Laboratory, IPB University 2018
- Herpetofauna Conservation Training, Palembang, Indonesia 2019
- Herpetofauna Conservation Training, Lampung, Indonesia 2022
- Forming Non-Detriment Findings (NDF) Report of *Macaca fascicularis* in Jawa Barat Region. Deli Island, Banten. (SKIKH BRIN-ITERA) 2022
- Forming Non-Detriment Findings (NDF) Report of *Macaca fascicularis* in Bonerate and Lambego Island, South Sulawesi. (SKIKH BRIN-ITERA) 2023
- Bioacoustics Equipment & Mentorship Training Program for Indonesia and Malaysia, K. Lisa Yang Center for Conservation Bioacoustics, Cornell Lab of Ornithology, Cornell University, 2024

Publication:

- The Diversity, Distribution and Feeding Guild of Mammals and Birds in Institut Teknologi Sumatera (ITERA) Landscape (IOP Conference Series: Earth and Environmental Science 537 (1), 012014)
- Diversity And Distribution of Herpetofauna In Institut Teknologi Sumatera Campus Area (Media Konservasi 26 (1), 1-8)
- Bird Distribution In ITERA Campus Area Based On Value Changes In Normalized Difference Vegetation Index (NDVI) (Media Konservasi 26 (2), 83-91)

- Mammals Community in Ranggawulung Urban Forest, Subang (Jurnal Biologi Tropis 23(1), 101-109)
- Herpetofauna Diversity in Ranggawulung Urban Forest, Subang (Bioscientist, 10 (2), 1150-1161)

Presentations at professional meetings:

- Oral Presenter on International Ornithological Congress of Southeast Asia, Khon Kaen University, Thailand. July 2015 “Bird Diversity Study of Manusela National Park, Maluku Indonesia”
- Oral Presenter on International Conference on Science, Infrastructure Technology and Regional Development (ICoSITeR), Indonesia 2019. “The Diversity, Distribution and Feeding Guild of Mammals and Birds in Institut Teknologi Sumatera (ITERA) Landscape”
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Relevant experience:

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- Kusrini M. D. 2017. Lecturer Mobility Program, One month sabbatical leave to Sydney (Australian Museum) from IPB.
- Kusrini M. D. 2017-2019 Long Term Ecological Study: Pattern of Biodiversity along elevational gradient in Mount Halimun Salak National Park. Funded by National Institute of Ecology, Korea.
- Kusrini M. D. 2020-2021 Long Term Ecological Study: Wildlife response to phenology pattern of keystone tree species in urban areas and natural areas. Funded by National Institute of Ecology, Korea.
- Kusrini M.D. 2019-2020. Conservation Action Planning for Leptophryne spp., including the Critically Endangered bleeding toad (Leptophryne cruentata). Funded by Chester Zoo.
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- Kusrini M. D. 2022. A “One Plan” research approach on breeding ecology to inform the recovery of the Critically Endangered Bleeding toad (*Leptiphryne cruentata*). Funded by The IUCN SSC Asian Species Action Partnership (ASAP)
- Kusrini M. D. 2022. Amfibi Kita (Our Amphibian): A citizen science approach to monitoring amphibian species in Indonesia. Stiftung Artenschutz

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Presentations at professional meetings:

- International Conference on Wildlife Conservation Jakarta, 13 September 2022
- 2nd International Symposium on Transdisciplinarity Approach for Knowledge Co-Creation in Sustainability (ISTAKCOS) 2020
- Herpetology Seminar Series University of Wolverhampton, UK 2020
- 3rd International Conference on Tropical Biology, SEAMEO Biotrop (Bogor, Indonesia) 2018
- Conservation ASIA (joint meeting ATBC Asia and SCB Asia), Singapore 2016

COST ANALYSIS

Category	Quantity	Cost		Sum	
		IDR	€	IDR	€
SD Card 512 GB	5 Piece	591,000/piece	34.46/piece	2,955,000	172.29
Battery Cell D Type	30 Pack	65,000/pack	3.79/pack	1,950,000	113.69
Local transport (round trip) Rent car	1 car x 4 trip	1,500,000/car	87.46/car	6,000,000	349.83
Meal	4 person packages x 8 days	100,000/person	5.83/person	3,200,000	186.57
Guide from National Park Staff	2-person x 8 days	150,000/person/day	8.75/day	2,400,000	139.93
Total Cost				16,505,000	962,31