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List of Threatened Fauna in Mt. Hamiguitan Range Wildlife Sanctuary, Davao Oriental, Mindanao Island, Philippines

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ABSTRACT

Mount Hamiguitan Range Wildlife Sanctuary (MHRWS) is a home to many endemic, rare and threatened species of flora and fauna making it a UNESCO and ASEAN biodiversity heritage site. Out of the roughly 600 species of fauna from all taxa surveyed in Mt. Hamiguitan, 35 species belonging to 25 families and 5 classes were identified as threatened. *Pithecophaga jefferyi* Ogilvie-Grant, 1897 (Accipitridae) and *Cacatua haematuropygia* (Müller, 1776) (Cacatuidae) are Critically Endangered while *Gorsachius goisagi* (Temminck, 1836) (Ardeidae), *Penelopides panini* (Boddaert, 1783) (Bucerotidae), and *Risiocnemis antoniea* Gassman & Hamalainen, 2002 (Platycnemididae) are Endangered species. Twenty-four species belonging to 5 classes are Vulnerable. Class Aves has the greatest number of threatened species (14 spp.) followed by class Insecta with 11

species. Researchers, stakeholders, and policy makers should give high priority in doing research and conservation activities for the threatened species in MHRWS.

Keywords: Conservation, MHRWS, threatened species, IUCN, philippines.

INTRODUCTION

Mt. Hamiguitan Range Wildlife Sanctuary (MHRWS) is one of the two biodiversity sites in the Philippines highly distinguished as both ASEAN and UNESCO biodiversity heritage sites (UNESCO, 2014). MHRWS forms part of the Pujada peninsula in Davao Oriental and one of the mountain ecosystems constituting the Eastern Mindanao Biodiversity Corridor (EMBC), one of the largest forest remains in the country (Conservation International, 2016). MHRWS is an ultramafic mountain which covers an area of 6834 hectares and towers to an altitude of 1600masl. It is teeming with diverse and unique microecosystems and serves as sanctuary for endemic, rare, and threatened species of flora and fauna thus it was declared by Conservation International as one of the biodiversity hotspots in the country requiring conservation and protection (Protected Area Sustainability Assessment, 1998).

Currently, due to the alarming and unprecedented habitat loss, the Philippines is considered as one of the hottest hotspots and top priority conservation (Myers et al., 2000). Many of the Philippine endemic species have become extinct before they could be documented or named (Amoroso and Aspiras, 2011). Based on the recent list of threatened Philippine fauna provided by DENR Administrative Order No. 2017, 1096, the Philippines have 58 Critically Endangered species, 63 Endangered, 436 Vulnerable, and 539 are near threatened (DENR-DAO, 2017). As member of the Convention on Biological Diversity, we are obliged to take immediate measures for the conservation and protection of our species. One of the most important activities to protect our biodiversity is by conducting field surveys to assess species richness and diversity of flora and fauna.

One important aspect of biodiversity research is the assessment of the species conservation status. Hence it is very important to determine or identify which species are endemic or threatened so that an appropriate conservation management plan can be drafted. In MHRWS, the inventory of several flora and fauna inventory have been done (Amoroso et al., 2009; Amoroso et al., 2016; Baron et al., 2007; Balete et al., 2008; Villanueva & Mohagan, 2009; Mohagan & Traedaway, 2010; Relox et al., 2011; Medina et al., 2017; Supsup

et al., 2017; Hlavac, 2018) both in the core and buffer zone which supported its bid for ASEAN and UNESCO biodiversity heritage site. The first publication which provided the list of threatened flora was produced by Amoroso and Aspiras (2011). As for the fauna group, no such publication has been provided with regards to the list of threatened species. Hence, this paper presents the first list of threatened species of MHRWS.

OBJECTIVES OF THE STUDY

Effective conservation efforts must and always starts with knowing what species to conserve. The present list is provided to guide policy makers in making practical conservation initiatives such as declaring critical habitats in areas where these species are found in order to conserve the existing threatened species in Mt. Hamiguitan Range Wildlife Sanctuary.

MATERIALS AND METHODS

Data on the list and distribution of the threatened species in MHRWS is obtained through extensive literature review (Baron et al., 2007; Balete et al., 2008; Villanueva & Mohagan, 2009; Mohagan & Traedaway, 2010; Relox et al., 2011; Quisado, 2013; Amoroso et al., 2016; Supsup et al., 2017; Medina et al., 2018; Hlavac, 2018) and field sampling for invertebrates in July-August 2015 and December-March 2018. Opportunistic and belt transect survey was done using photo-documentation, hand picking, hand netting, light trapping and the use of several traps. Identification particularly on the beetles was done by examining the specimens using stereo microscope and comparing morphological characters with those in monographs and published papers (Schultze, 1923,1925; Cassola, 2011; Cabras et al., 2016). Conservation status was assessed using International Union on Conservation of Nature (IUCN, 2018-1) and the National List of Threatened Philippine Fauna and Their Categories (DENR DAO, 2017-11).

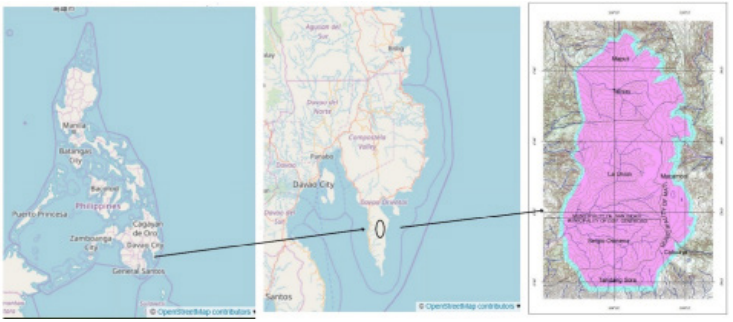

*Figure 1***.** Map of the Philippines, B. Location of MHRWS, C. Core zone of MHRWS [Map credits: A-B. OpenStreetMap Contributors, C. DENR MHRWS PASu].

RESULTS AND DISCUSSION

A total of 35 species belonging to 25 families and 5 classes were identified as threatened in MHRWS accounting for 5.8% of its known fauna. Two species namely Pithecophaga jefferyi Ogilvie-Grant, 1897 and *Cacatua haematuropygia* (Müller, 1776) are Critically Endangered while two species *Gorsachius goisagi* (Temminck, 1836) and *Risiocnemis antoniae* Gassman & Hamalainen, 2002 are assessed as Endangered species based on IUCN-2017 assessment. In addition, twenty-four (24) species belonging to 5 classes are considered Vulnerable. Class Aves has the highest number with 14 threatened species followed by class Insecta with 11 species. Among the 35 threatened species of Mt. Hamiguitan, 18 species (51%) or more than half of the species are found only in Mindanao Island or Greater Mindanao Pleistocene Aggregate Complex.

Table 1

List of threatened species of MHRWS

Class	Family	Species	Conservation Status	Geographic Distribution
Mammalia	Tarsiidae	*Carlito syrichta* Linnaeus, 1758	OTS	Greater Mindanao
	Suidae	*Sus philippensis* Nehring, 1886	Vu	Philippine

Table 1 Continued

Class	Family	Species	Conservation Status	Geographic Distribution
Amphibia	Bufonidae	*Ansonia muelleri* (Boulenger, 1887)	Vu	Greater Mindanao
	Agamidae	*Gonocephalus semperi* (Peters, 1867)	OTS	Greater Mindanao
	Megophryidae	*Megophrys stejnegeri* (Taylor, 1920)	Vu	Mindanao
	Rhacophoridae	*Philautus acutirostris* (Peters, 1867)	Vu	Mindanao
	Rhacophoridae	*Philautus poecilus* Brown & Alcala, 1994	Vu	Philippine
	Ceratobatrachidae	*Platymantis guentheri* (Boulenger, 1882)	Vu	Greater Mindanao
	Ceratobatrachidae	*Platymantis rabori* Brown, Alcala, Diesmos and Alcala, 1997	Vu	Greater Mindanao
Reptilia	Colubridae	*Boiga cynodon* (Boie, 1827)		Asia
	Elapidae	*Ophiophagus hannah* Cantor, 1836	Vu	Asia
	Viperidae	*Trimeresurus f. flavomaculatus* (Gray, 1842)	OTS	Philippine
Aves	Alcedinidae	*Actenoides hombroni* (Bonaparte, 1850)	Vu	Mindanao
	Alcedinidae	*Ceyx argentatus* Tweeddale, 1877	Vu	Greater Mindanao
	Alcedinidae	*Ceyx melanurus* (Kaup, 1848)	Vu	Philippine
	Alcedinidae	*Todiramphus winchelli* (Sharpe, 1877)	Vu	Philippine
	Anatidae	*Anas luzonica* Fraser, 1839	Vu	Philippine
	Strigidae	*Bubo philippensis* Kaup, 1851	Vu	Philippine
	Cacatuidae	*Cacatua haematuropygia* (Müller, 1776)	CR	Philippine
	Muscicapidae	*Ficedula basilanica* (Sharpe, 1877)	Vu	Greater Mindanao
	Columbidae	*Gallicolumba criniger* (Pucheran, 1853)	Vu	Greater Mindanao
	Ardeidae	*Gorsachius goisagi* (Temminck, 1836)	En	Oriental
	Strigidae	*Mimizuku gurneyi* (Tweeddale, 1879)	Vu	Greater Mindanao
	Pittidae	*Pitta steerii* (Sharpe, 1876)	Vu	Greater Mindanao
	Accipitridae	*Pithecophaga jefferyi* Ogilvie-Grant, 1897	CR	Philippine
	Accipitridae	*Spizaetus philippinensis* Sharpe, Hand-List (1899)		Philippine
		Penelopides panini (Boddaert, 1783)	En	Greater Negros-Panay

Table 1 Continued

Class	Family	Species	Conservation Status	Geographic Distribution
Insecta	Pieridae	*Delias magsadana* Yamamoto & Takei, 1995	Vu	Southeastern Mindanao
	Platycnemididae	*Risiocnemic antoniae* Gassman & Hamalainen, 2002	En	Eastern Mindanao
	Coenagrionidae	*Pandanobasis cantuga*	Vu	Philippine
	Curculionidae	*Metapocyrtus*	OTS	Mindanao
	Curculionidae	*Metapocyrtus*	Vu	Mindanao
	Curculionidae	*Metapocyrtus*	Vu	Mindanao
	Curculionidae	*Pachyrhynchus erichsoni* Waterhouse, 1841	Vu	Philippine
	Carabidae	*Tricondyla cyanipes* Eschscholtz, 1829	OTS	Philippine
	Carabidae	*Calomera mindanaoensis* Cassola, 2000	OTS	Mindanao
	Scarabaeidae	*Chalcosoma atlas* (Linnaeus, 1758)	OTS	S.E. Asia
	Scarabaeidae	*Ixorida (Ixorida) philippinensis* Waterhouse, 1841	OTS	Philippine

Note. CR- critically endangered.
En- endangered.
Vu- Vulnerable.
OTS- other threatened species.

Among the notable threatened species of MHRWS is the critically endangered *Pithecophaga jefferyi* which is also a flagship and keystone species of the Philippine biodiversity whose survival in the wild have a strong impact on other species. *Pithecophaga jefferyi*, The Philippine National bird, has extremely low population of less than 200 pairs in the wild (PEF, 2018) and it is one of the world's most endangered eagles (IUCN, 2018; Bueser et al., 2003). Among the noteworthy birds include: Actenoides hombroni (blue-capped kingfisher), *Ceyx argentatus* (silvery kingfisher), *Ficedula basilanica* (little slaty flycatcher), *Gallicolumba criniger* (Mindanao bleeding heart), *Mimizuku gurneyi* (ginat scops owl) and *Pitta steerii* (azure-breasted pitta) which are all endemic to Greater Mindanao Island Complex. These species are considered Vulnerable because of their dwindling population due to habitat loss and fragmentation of forests (IUCN, 2018). Another noteworthy threatened bird in MHRWS is the critically endangered

and highly migratory bird Gorsachius goisagi or Japanese night heron.

Among of the threatened species inhabiting MHRWS is the Greater Mindanao species *Carlito syrichta* which is believed to be another subspecies of tarsier but needs further study for confirmation. Sus *philippensis* or Philippine warty pig which is currently considered as Vulnerable due to the high demand for its meat is also found in MHRWS (Scheffers et al., 2012). Among of the herpetofauna, some of the notable threatened species are the *Ophiophagus hannah* or king cobra, and the Greater Mindanao frogs namely *Ansonia muelleri*, *Gonocephalus semperi, Megophrys stejnegeri Philautus acutirostris, Platymantis guentheri* and *Platymantis rabori*. These species which took refuge in MHRWS are especially vulnerable to climate change. Studies suggest that climate change is a greater diver to extinction on tropical frogs compared to deforestation (Nowakowski et al., 2016; Oyamaguchi et al., 2017). They concluded that frogs which are exclusively forest dwellers are most sensitive to the high temperatures that come from the combination of climate change and forest conversion (Nowakowski et al., 2016).

For the insect group which was highly underrepresented in the previous assessment of DENR, an astonishing 11 species are considered threatened. Among threatened species in MHRWS are the *Risiocnemis antoniea* and *Delias magsadana. Risiocnemis antoniea* is a threatened species of damselfly which can be found in the buffer zone of MHRWS which is now part of the expansion area (Medina et al., 2017). The conservation of this species should be elevated since its population was observed to be dwindling and its habitat is experiencing slash and burn farming. As for the *Delias magsadana*, it has been recorded only in MHRWS and nowhere else. Although it is not critically endangered or endangered, it is believed to be facing great threat due to its dwindling population and should be given special attention for future researches and conservation initiatives. Among other threatened species found in MHRWS are *Pachyrhynchus erichsoni,* a Philippine endemic weevil and *Calomera mindanaoensis* which are endemic to Mindanao (Cabras et al., 2016; Cassola, 2000).

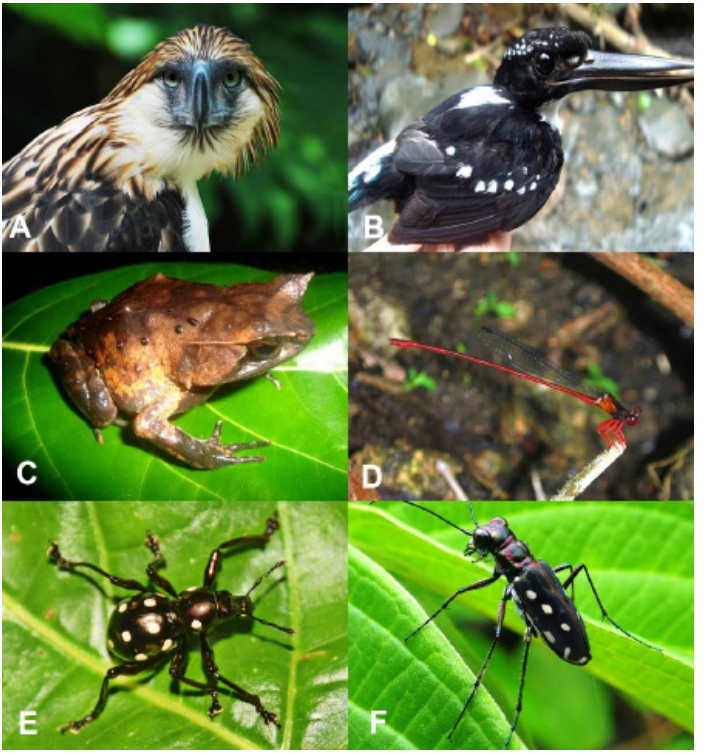

Plate 1**.** Threatened Species in MHRWS: A- *Pithecophaga jefferyi,* B- *Ceyx argentatus* Tweeddale, 1877, C-M*egophrys stejnegeri* (Taylor, 1920), D- *Risiocnemis antoniea* Gassman & Hamalainen, 2002, E- *Pachyrhynchus erichsoni* Waterhouse, 1841, F- *Calomera mindanaoensis* Cassola, 2000.

CONCLUSIONS

Mt. Hamiguitan Range Wildlife Sanctuary is home to 35 threatened fauna species of which 2 species are non-volant mammals, 7 species are amphibians, 3 species are reptiles, 14 species belong to class Aves, and 11 species are insects. Notable threatened species include the *Pithecophaga jefferyi* and *Cacatua haematuropygia* which are both critically endangered and the endangered damselfly *Risiocnemis antoniea.*

RECOMMENDATIONS

Ecological and biological data should be prioritized for future researches in MHRWS as well as mapping the population of these species to find better ways to protect them. Top priority should be given to future researches and conservation activities on all threatened species.

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