AMPHIBIANS AND REPTILES OF BOHOL ISLAND, THE PHILIPPINES: THE HERPETOFAUNA OF RAJAH SIKATUNA PROTECTED LANDSCAPE

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Abstract

This study conducted from August to October 2019 at Rajah Sikatuna Protected Landscape (RSPL), Bohol, The Philippines, recorded a total of forty-two (42) herpetofauna species, of which 18 were amphibians (one toad and 17 frogs), and 24 were reptiles (11 snakes and 13 lizards). Including the data from other research conducted on the island of Bohol, our records had a total of 54 cumulatively; Twenty-four (24) of which are Philippine endemics, with one species (*Philautus* sp.) inhabiting the forest limestone of RSPL. Despite the extensive sampling effort in this study, there were some species that were not observed but recorded in other literature. Most of the reptilian species recorded were new species. This survey also revealed that the forest areas of Bohol inhabit eight species of herpetofauna, which are categorized as threatened and vulnerable. Compared to other islands in Central Visayas, this study found a smaller but similar number of species that would merit further taxonomic studies like gene sequencing and DNA barcoding. With these findings, RSPL could be a possible herpetofauna diversity hotspot on Bohol Island, and conservation of these resources should be continuously implemented.

Key words: Assessment; Central Visayas; Conservation; Frog and snake species; Protected area.

INTRODUCTION

The geological history of the Philippines, with its complex tectonic past and fluctuating sea levels, has sculpted a dynamic and ever-changing landscape that has played a pivotal role in shaping the country's herpetofauna diversity. Its archipelago is recognized as one of the most important centers of herpetofauna diversity in Southeast Asia (Diesmos *et al.* 2002). The Philippines is represented by 112 species of amphibians, at least 80% of which are endemic to the archipelago and 361 species of reptiles (Diesmos *et al.* 2015). The herpetological fauna of the country is high in diversity and endemism, yet faces threats such as habitat modification and loss, natural catastrophes, invasive species and hunting for food (Sodhi *et al.* 2004). Many studies have been conducted on the diversity of amphibians and reptiles in the country, particularly in Luzon, Mindoro, Palawan and the Central Philippines (Alcala and Brown 1998). Since the Philippines is archipelagic in nature, efforts to study herpetofauna across the country are challenging and therefore not enough.

The Department of Environment and Natural Resources (DENR) designated Rajah Sikatuna Protected Landscape (RSPL) as a national park in 1987 and a protected landscape in 2000 (Aureo *et al.* 2020). The non-governmental group Soil Water Conservation Foundation (SWCF) pioneered conservation assessment in 1996, which served as the foundation for the aforementioned declaration. The SWCF, on the other hand, has ceased biodiversity assessment and monitoring efforts, with the Bohol Environment Management Office

(BEMO) now in charge. Apparently, Bohol, specifically RSPL, still needed to be surveyed extensively, which resulted in the unavailability of a clear, full understanding of its biodiversity. The RSPL is a protected area with forest over limestone, meadows, and natural springs situated in the Central Visayas region. It is Bohol's largest remnant natural forest stretch. It has an average elevation of 400 masl and is composed of 60% limestone forest, 15% grassland, 5% plantations and 10% permanent agricultural areas within its present area of 10,452.6 hectares (Bird Life International 2014, Birding 2 Asia 2014). The climate classification falls within type IV, wherein rainfall is more or less evenly distributed throughout the year with no dry season and with an annual rainfall of 3,756 mm (en.climate-data.org 2019). With its rich tapestry of flora and fauna, this protected landscape has earned its reputation as a sanctuary of biodiversity in the heart of the Philippine archipelago.

Studying herpetofaunal diversity in the Philippines, especially in unique areas, such as the forest over limestone of RSPL, is of paramount importance due to its multifaceted significance. This archipelago hosts an exceptional range of amphibians and reptiles, many of which are endemic and endangered (Diesmos *et al.* 2002). By unraveling the secrets of these creatures, we gain insights into their unique adaptations, evolutionary history and ecological roles. Moreover, this knowledge is pivotal for effective conservation efforts, enabling us to identify and manage fragile ecosystems, develop strategies for mitigating climate change impacts, and inform policy decisions that safeguard both the country's biodiversity and its intricate web of life. In essence, the study of RSPL herpetofauna is not just a scientific pursuit; it is a cornerstone of ecological preservation and a testament to our commitment to safeguarding the natural heritage of this remarkable area. The lack of comprehensive data on distribution, population trends and abundance of more than 85% of amphibian fauna and more than 90% of reptilian fauna hinders a more accurate conservation status, which is essential for the management, conservation and preservation of these species (Diesmos *et al.* 2002). This knowledge gap represents a critical challenge for conservationists, scientists and policymakers alike, as it hinders our ability to understand and protect these important species. Thus, this study looks into the distribution and inventory of amphibians and reptiles in the selected barangays within Rajah Sikatuna Protected Landscape (RSPL), which will serve as additional and updated information to strengthen conservation efforts.

MATERIAL AND METHODS

Study areas

Survey areas included six small administrative districts called barangays within RSPL. These are Bugsoc, Cabacnitan, Cambuyo, Nan-od, Omjon, and Villasuerte (Fig. 1). **Location 1**: Barangay Bugsoc is located in the municipality of Sierra Bullones with GPS coordinates of 9°45'7650" N and 124°15'8320" E. The area is mainly dominated by indigenous plants and some dipterocarp species. Exotic species, such as *Swietenia macrophylla* and *Tectona grandis*, are commonly observed along rivers at study sites. **Location 2**: Barangay Cabacnitan with GPS coordinates of 9°44'0510" N and 124°11'5180" E can be found in the municipality of Batuan, with vegetation dominated in the patches of open to closed forest types, which were mainly dominated by indigenous and some dipterocarp species. The presence of pioneer species was commonly distributed along forest edges at the site. There are lots of leaves and litter, with fewer shrubs and ferns like *Selaginella*. **Location 3**: Survey

area 3 is located at 9°42'5210" N and 124°15'4780" E of the municipality of Garcia Hernandez, with observed anthropogenic disturbances like the cutting down of *Swietenia macrophylla* and other pioneer species in the forest edges. **Location 4**: Barangay Nan-od is located at 9°44'7760" N and 124°15'7690" E in a less disturbed forest that is rich in vegetation formations and is mostly indigenous, and dipterocarp species dominate. The presence of litter thickness was also observed, as were stagnant rivers and swamps. **Location 5**: Barangay Omjon is located at 9°43'6520" N and 124°13'5080" E of Valencia, with a less disturbed vegetation formation and a presence of riparian vegetation in which indigenous plants and dipterocarp plantations dominates. The presence of forest litter thickness was also observed at the site. Lastly, **Location 6**: Barangay Villasuerte in Bilar, with coordinates of 9°42'5960" N and 124°10'8530" E is dominated by indigenous plant species, and the presence of other herbaceous understory plants, such as herbs and ferns, are commonly observed in the area.

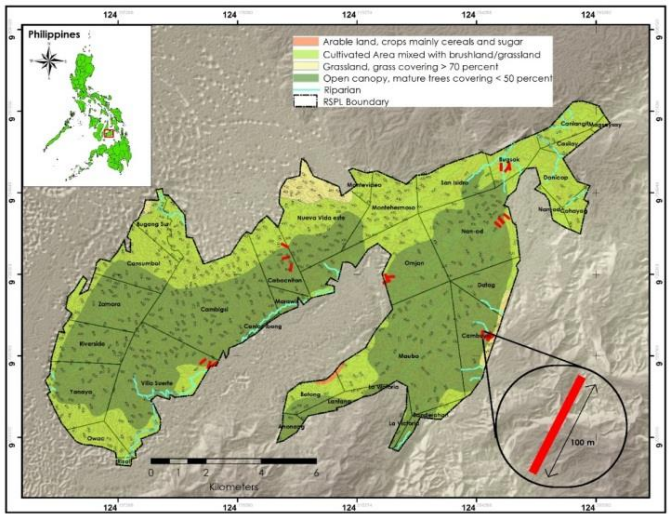

Fig. 1. Vegetation map of Rajah Sikatuna Protected Landscape, Bohol, Philippines showing the established transect lines (red) within surveyed areas.

Sampling method

Three transect lines were established for each survey area (Fig. 1). Transect lines were positioned parallel to the existing trails and perpendicular to rivers. This is to ensure heterogeneity of species to be sampled. The length of the transect line is 100 × 20 meters, with an interval distance between each transect line of 100 meters. Amphibians were collected in the early morning at 6:00-9:00 hr and in the evening at 19:00-22:00 hr (Warguez *et al.* 2013). The visual encounter survey was employed to search for high-potential areas throughout the survey areas. These are on the surface and under rocks, logs, litter, trees and other remains along the transect lines and within the plots. All objects displaced from the area were returned to their original positions to avoid further disturbance to the habitats.

Species collection and identification

Each species collected was photographed and measured for its morphometry using the standard measurements adopted from the Haribon Foundation Guidelines for Amphibians and Reptiles Survey, 2004. This was done in order to support the identification. Pre-identification was done with the aid of the field guides from Barley *et al.* (2020), Brown *et al.* (2013),

Diesmos *et al.* (2015), Frost (2017), Leviton *et al.* (2014), Leviton *et al.* (2018), Sanguila *et al.* (2016), Siler *et al.* (2014), Siler *et al.* (2016), Uetz *et al.* (2019), Weinell *et al.* (2019) and the IUCN List of Threatened Species available at https://www.iucnredlist.org/amphibians&reptiles. Moreover, photos and morphometric measurements were sent to the Philippine National Museum for species confirmation and verification. The species that are difficult to identify were collected under Wildlife Gratuitous Permit No. VII-2019-04 issued by the Department of Environment and Natural Resources (DENR) Region VII. A standard preservation technique was employed, and it followed the procedure of Heyer *et al.* (1994). Specimen Collection Gratuitous Permit (GP) Number VII-2019-04 (DENR Region VII) and Prior Informed Consent (PIC) were secured before conducting the research. In addition, the research proposal was also endorsed by the Central Visayas Agriculture, Aquatic and Natural Resources Research and Development Consortium (CVAARRDEC) to Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) for funding after passing ethics and security standards of the university, consortium and the council.

RESULTS AND DISCUSSION

Species account

Based on the survey, a total of 18 amphibian species belonging to 6 families and 24 reptilian species belonging to 11 families, with a total of 42 herpetofauna species, were recorded in the study sites during the survey period (Table 1). For amphibian species, Jose (2012) reported only 15 anuran species in the Loboc watershed, which is less than the 18 species recorded in this study. An additional 12 species were added to this account, which was recorded by Jose (2012) and Soil and Water Conservation Foundation (unpublished data) for a total of 54 species, approximately 11.42% of the total Philippine herpetofauna (Diesmos *et al.* 2015, Uetz and Stylianou 2018). There were 19 species added to the record of the Central Visayas faunal region and 35 new records in Bohol. The high number of newly recorded herpetofauna in Bohol is due to a lack of published literature about reptiles. There are twenty-four species that are endemic to Philippines and eight species that are considered threatened. The species characteristics, habitat and elevation are also described in this study.

Amphibia: Family Bufonidae

Rhinella marina (Linnaeus, 1758) – The giant toad (Fig. 2a) is an introduced invasive species, very dominant in the agricultural and riparian zones of all the survey areas. It was even observed to be inhabiting the forest areas as well, up to 450 m^2. This species was also observed by Jose (2012) and mostly near household ditches and agricultural areas.

Collection site(s): Disturbed areas in all locations.

Amphibia: Family Ceratobatrachidae

Platymantis corrugatus (Dumeril, 1853) – This species (Fig. 2b) is one of the most common forest species in the survey. It inhabits the forest floor stratum in undisturbed and disturbed lower montane and lowland forests and is occasionally found in anthropogenic habitats beside the forests. Snout-vent length ranges from 28 to 45mm.

Collection site(s): All six locations.

Table 1. Recorded amphibians and reptiles from RSPL.

Taxa		Records	Location site(s)	Distribution	IUCN Status
Family	**Scientific names**				
AMPHIBIA					
Bufonidae	*Rhinella marina*	R12, B11, S16	1, 2, 3, 4, 5, 6	W	IN
Ceratobatrachidae	*Platymantis corrugatus*	R12, B11, S07, S16	1, 2, 3, 4, 5, 6	W	LC
	P. dorsalis	N, S07, S16	2,6	W	LC
	P. guentheri	N, R12	1, 2, 3, 4, 5, 6	W	VU
	P. rabori	S07		E	VU
Dicroglossidae	*Fejevarya cancrivora*	R12, B11, S07		W	LC
	F. moodiei	N, S16	1, 2, 3, 4, 5	W	DD
	Limnonectes leytensis	R12, S07, S16	5	W	LC
	L. visayanus	R12, B11, S16	6	W	NT
	Occidozyga laevis	N, B11, S16	4	W	LC
Megophryidae	*Megophrys stejnegeri*	N, R12	1, 3, 4, 5	W	LC
Microhylidae	*Kalophrynus pleurostigma*	N, R12	1, 3, 4, 5	W	LC
	Kaloula picta	S07, S16		E	LC
	K. conjuncta	S07, S16		E	DD
Ranidae	*Pulchrana grandocula*	N	1, 3, 5	W	LC
	Sanguirana everetti	N	1	W	NT
	Staurois natator	N	1	W	LC
Rhacophoridae	*Kurixalus appendiculatus*	N	4	W	LC
	Nyetexalus spinosus	S07		E	VU
	Philautus sp.	N	1, 2, 6	E*	DD
	Polypedates leucomystax	N, R12, S16	1, 2, 3, 4, 5, 6	W	LC
	Rhacophorus bimaculatus	N	3	W	LC
	R. pardalis	R12, B11	2, 3, 5, 6	W	LC
REPTILIA (LIZARDS)					
Agamidae	*Bronchocela cristatella*	N, S16	6	W	DD
	Draco spilopterus	N, B11, S16		E	LC
	D. bimaculatus	N	1, 6	E	VU
	Gonocephalus semperi	N	1, 2, 3, 4, 5, 6	E	DD
	Hydrosaurus pustulatus	N, B11, S16	6	E	VU
Gekkonidae	*Cyrtodactylus philippinicus*	N, B11	1, 2, 3, 4, 5, 6	E	LC
	Gekko gecko	N, B11, S16	6	W	LC
	Lepidodactylus herrei medianus	N, S07, S16		E	LC
	Pseudogeckko pungkaypinit	N	1	E	LC
Scincidae	*Brachymeles bicolor*	N	1, 3, 4	E	NT
	Lipinia pulchella	S07		E	LC
	Eutropis indeprensa	N, S16		W	LC
	Sphenomorphus cumingi	N	1, 6	E	LC
	Tropidophorus grayi	N, S16	1, 6	E	LC
REPTILIA (SNAKES)					
Colubridae	*Ahaetulla prasina*	S07, S16		W	LC
	Boiga dendrophila	S07		W	LC
	Calamaria bitorques	N	6	E	LC
	Dendrelaphis pictus	N, S07		W	LC
	Coelognathus erythrurus	N, S07		W	NE
	Gonyosoma oxycephalum	N	1	W	LC
	Lycodon aulicus capucinus	N, S16	4	E	LC
	Oxyrhabdium modestum	N, S07		E	LC
	Psammodynastes pulverulentus	N, S16	1, 6	W	LC

	Rhabdophis sp.	S07		E	NE
Lamprophiidae	*Oxyrhabdium modestum*	N	1	E	LC
Phythonidae	*Malaphyton reticulatus*	N, S07, S16		W	LC
Viperidae	*Tropidolaemus* cf. *subannulatus*	N	1	E	LC
	Trimeresurus flavomaculatus	N	3, 6	E	LC
Elapidae	*Hemibungarus calligaster*	N	1, 2, 3, 6	E	LC
Natricidae	*Rhabdophis lineatus*	N	1	W	LC
Pareidae	*Aplopeltura boa*	N	4	W	LC

N = Major new record for RSPL, recorded in this survey; R12 = Recorded from Loboc Watershed in Bohol Island reported by Jose (2012); B11 = Recorded from Siquijor Island by Bucol *et al.* (2011); S07 = Recorded in the island of Bohol by SWCF *unpublished*; * = Recorded only from Bohol Island; S16 = Recorded from Cebu Island by Supsup *et al.* (2016), W = Widespread; E = Endemic; IN = Introduced; LC = Least concern; DD = Data deficient; VU = Vulnerable; NE = Not evaluated; and NT = Near threatened.

Platymantis dorsalis (Dumeril, 1853) – *Platymantis dorsalis* (Fig. 2c) inhabits the forest floor stratum in undisturbed and disturbed lower montane and lowland forest in RSPL, and is occasionally found in human-controlled environments besides the forest. The collected samples of this species have an average snout-vent length from 24 to 52 mm.

Collection sites(s): The trails in location 2 and 6.

Platymantis guentheri (Boulenger, 1882) – This species (Fig. 2d) inhabits arboreal microhabitat in the lowland forests of Bohol with an elevation ranging from 582 to 589 masl. The species collected, has a distinguishing feature having longer tibia relative to snout-vent length, prominent ridges and tubercles at the back and the tips of fingers, and toes are also moderately dilated described by Alcala and Brown (1998). Sixteen (16) individuals were recorded in Location 5. Snout-vent length ranges from 24 to 40 mm.

Collection sites(s): All six locations.

Amphibia: Family Dicroglossidae

Fejevarya moodiei (Taylor, 1920) – *Fejevarya moodiei* (Fig. 2e) was encountered in flooded rice fields, swamps and ponds with elevations ranging from 305 to 564 masl. We have recorded more than 30 individuals in the survey areas. The average SVL is 47.64 mm.

Collection sites(s): All locations except location 6.

Limnonectes leytensis (Boettger, 1893) – This species (Fig. 2f) has a distinguishing feature having protruding tubercles beneath its finger (Alcala and Brown 1998). Snout-vent length ranges from 35 to 55 mm. This species was found in a river with only one individual in a single location with an elevation ranging from 350 to 469 masl.

Collection sites(s): Streams and rivers in location 5.

Limnonectes visayanus (Inger, 1954) – *Limnonectes visayanus* (Fig. 2g) has a distinguishing feature having a stocky body and distinctly enlarged round disk with completely webbed toes (Alcala and Brown 1998). It had a snout-vent length that ranged from 35 to 70 mm. It inhabits a swampy area near agricultural plantations with an elevation ranging from 383 to 500 masl.

Collection sites(s): Streams and forest edges in location 6.

Occidozyga laevis (Gunther, 1858) – *Occidozyga laevis* (Fig. 2h) is found throughout the Philippines in shallow, slow-moving streams, small pools of water in disturbed habitats, it is also found in anthropogenic habitats in the lowlands and occasionally in undisturbed lower montane and lowland forests. In this study, I observed this species with 8 individuals in a

stream inside the forest with an elevation of 591 masl. Snout vent length ranges from 32.8 to 43.9 mm.
Collection sites(s): Shallow streams in location 4.

Amphibia: Family Megophryidae

Megophrys stejnegeri (Taylor, 1920) – This widespread species (Fig. 2i) inhabits primarily in secondary montane and lowland rainforests and is dependent on mountain streams where it breeds. The individuals of this species are found in leaf-litter, or exposed on the forest floor, near tree roots and standing water pools (Plaza and Sanguila 2015). Snout-vent length ranges from 40 to 75 mm.
Collection sites(s): Slow flowing streams in location 1, 3, 4, and 5.

Amphibia: Family Microhylidae

Kalophrynus pleurostigma (Tschudi, 1838) – *Kalophrynus pleurostigma* (Fig. 2j) is found in the leaf-litter of lowland and hill forests and occasionally in disturbed forests with an elevation ranging from 325 to 587 masl. It has a distinguishing feature having a stout body and pointed projecting snout (Alcala and Brown 1998). Its snout-vent length ranges from 30 to 50 mm. It has two dots in its waist facing opposite.
Collection sites(s): Leaf litters and forest floor in location 1, 3, 4, and 5.

Amphibia: Family Ranidae

Pulchrana grandocula (Taylor, 1920) – *Pulchrana grandocula* (Fig. 2k) is a least concern and widespread species, which inhabits undisturbed and disturbed streams and rivers in montane and lowland forests. It breeds and lays its eggs in mountain streams, and the tadpoles develop in water. The specimen was collected in a stream with an elevation of 460 masl. It has a distinguishing feature having a slender body and long legs. Skin on back smooth and digit tips are slightly enlarged (Alcala and Brown 1998). Snout-vent length ranged from 35 to 75 mm.
Collection sites(s): Streams in location 1, 3 and 5.

Sanguirana everetti (Boulenger, 1882) – *Saguirana everetti* (Fig. 2l) is a near threatened species and widespread on its distribution. It inhabits undisturbed and disturbed streams and rivers in lower montane and lowland forests. Specimen was collected from a tree fern near a stream with an elevation ranging from 425 to 550 masl. Average snout-vent length is 53.66 mm.
Collection sites(s): Stream in location 1.

Staurois natator (Gunther, 1858) – The species is mostly found along clear, small rocky streams and large rivers with boundaries in primary and secondary forests in hilly terrain. Adults perch on the twigs of vegetation overhanging streams or on rocks lining the banks. It breeds, lays its eggs and undergoes larval development in water. The specimen of this species (Fig. 2m) was collected in a branch of shrub growing on the edge of a stream with elevation ranging from 318 to 325 masl. The average snout-vent length is 30.98 mm.
Collection sites(s): Twigs and small branches of shrubs in location 1.

Amphibia: Family Rhacophoridae

Kurixalus appendiculatus (Gunther, 1858) – *Kurixalus appendiculatus* (Fig. 2n) is an arboreal species of tropical forest and shrubland. Breeding choruses have been observed at lower elevations in swampy areas and small quiet mountain streams. It was found in swampy areas with elevations ranging from 482 to 593 masl. Snout-vent length ranges from 25 to 35 mm.
Collection sites(s): Big leaf of *Pandanus* sp. alongside a river in location 4.

Fig. 2. Pictorial view of amphibians: **a.** *Rhinella marina* (WAA0863); **b.** *Platymantis corrugatus* (WAA8262); **c.** *Platymantis dorsalis* (WAA0011); **d.** *Platymantis guentheri* (WAA7510); **e.** *Fejevarya moodiei* (WAA4319); **f.** *Limnonectes leytensis* (WAA5601); **g.** *Limnonectes visayanus* (WAA0454); **h.** *Occidozyga laevis* (WAA7410); **i.** *Megophrys stejnegeri* (WAA5752); **j.** *Kalophrynus pleurostigma* (WAA5325); **k.** *Pulchrana grandocula* (WAA1524); **l.** *Sanguirana everetti* (WAA0182); **m.** *Staurois natator* (WAA0187); **n 15.** *Kurixalus appendiculatus* (WAA6775); **o.** *Philautus* sp. (WAA0024); **p.** *Polypedates leucomystax* (WAA8244); **q**. *Rhacophorus bimaculatus* (WAA7462); **r.** *Rhacophorus pardalis* (WAA7442); Photograph by WAA.

Philautus sp. – This anuran species (Fig. 2o) is subject for more taxonomic identification. The physical appearance is somewhat similar to a *Philautus* species, but the voice call recorded is the same as that of *Platymantis hazelae*. Therefore, I first identify it as *Platymantis hazelae* but it has some morphometric variabilities indicating different species under the genus *Philautus*. This species was collected in upper branches and leaves of the tree. I presented the complete morphometric description here as follows: eye diameter 4.4, tympanum diameter 1.4, head length 10.4, head breadth 9.5, snout-vent length 22.5, tibia 13.6, hind length 39.2 and snout length 4.3 all in mm.

Collection sites(s): Crevices of sedimentary rocks and the holes of dead trees in location 1, 2 and 6.

Polypedates leucomystax (Gravenhorst, 1829) – *Polypedates leucomystax* (Fig. 2p) is a very adaptable opportunist and commensal which occurs in beach vegetation through human habitats (such as agricultural areas, ditches, artificial ponds, and lakes, gardens, and even in houses) and natural edge habitats to closed primary forest. This anuran does not sud to any significant degree of disturbance, which could threaten its survival, and is widely distributed in the sites. It has a snout-vent length that ranges from 35 to 70 mm.

Collection sites(s): All six locations.

Rhacophorus bimaculatus (Peters, 1867) – *Rhacophorus bimaculatus* (Fig. 2q) inhabits arboreal microhabitats, usually beside water bodies in undisturbed lower montane and lowland forests. Individuals have been observed among leaves, on the leaves of trees and shrubs and pocket ferns and on rocks near rivers (Plaza and Sanguilla 2015). It builds foamy nests on vegetation above the stagnant pools of water (Siler *et al.* 2011). I only found one individual in a *Ficus* tree near a pond with the elevation of 460 masl. Snout-vent length is 33 mm.

Collection sites(s): Leaf of a tree in location 3.

Rhacophorus pardalis (Günther, 1858) – *Rhacophorus pardalis* (Fig. 2r) is known to have a widespread distribution throughout much of the Philippines. It inhabits in primary and secondary rainforests. It breeds in swampy forest pools. It is probably in higher strata and descends to the shrub layer and forms breeding aggregations around rain pools, even at the edge of the forest. The specimen was collected from a branch of a tree near a swamp with elevation ranging from 380 to 490 masl. It is different from *R. bimaculatus* because of the extensive presence of webs on fingers and toes.

Collection sites(s): Branch of trees in location 2, 3, 5 and 6.

Reptilia: Family Agamidae

Bronchocela cristatella (Kuhl, 1820) – A bright green lizard sometimes possessing a blue tint on the head (Fig. 3a) found in a branch of a small tree near a stream. The tail makes up over 75 percent of its total length. The snout-vent length and tail length are 19 and 61 mm, respectively.

Collection sites(s): Branch of small tree in location 6.

Draco bimaculatus (Günther, 1864) – I encountered *Draco bimaculatus* (Fig. 3b) in both primary and secondary forests as well as at the edges of coconut plantations immediately adjacent to the forest. I have collected one individual, which was asleep on a branch. The snout-vent length and tail length are 22 and 78 mm, respectively.

Collection sites(s): Branches of trees in location 1 and 6.

Gonocephalus semperi (Peters, 1867) – *Gonocephalus semperi* (Fig. 3c) has often been recorded from secondary tropical lowland and edge forest habitats. It was encountered

sleeping on the trunks of small trees and saplings in the forest area in the evening. The snout-vent length and tail length are 39 and 194 mm, respectively.
Collection sites(s): Branches of trees in all locations.

Hydrosaurus pustulatus (Eschscholtz, 1829) – This Philippine sailfin lizard (Fig. 3d) is an excellent swimmer and has flattened toes that enable it to run across water, similar to the basilisks. Their days are spent in vegetation overhanging the rivers and streams of the tropical jungles and dropping into the water and swimming to the bottom at the first sign of approaching danger. This was observed between large rocks probably in resting. The snout-vent length and tail length are 35 and 154 mm, respectively.
Collection sites(s): Stream in location 6.

Reptilia: Family Scincidae

Brachymeles bicolor (Siler *et al*. 2009) – *Brachymeles bicolor* **(**Fig. 3e) is a rarely encountered fossorial skink. This species is usually found in or around decaying logs in forested areas. The snout-vent length and tail length are 50 and 46 mm, respectively.
Collection sites(s): Decaying logs in locations 1, 3 and 4.

Sphenomorphus cumingi (Gray, 1845) – This species (Fig. 3f) is found under leaves and logs as well as in open spaces on the forest floor. They are found in both dipterocarp tropical moist forests and secondary growth. Animals have also been collected from dry stream beds. The snout-vent length and tail length are 78 and 60 mm, respectively.
Collection sites(s): Beneath leaf litters in location 1 and 6.

Tropidophorus grayi (Günther, 1861) – *Tropidophorus grayi* (Fig. 3g) is an endemic species occurring on major islands. This species may be common throughout its range but may rarely be seen, due to its elusive nature. The snout-vent length and tail length are 75 and 99 mm, respectively.
Collection sites(s): Branch of trees in location 1 and 6.

Reptilia: Family Gekkonidae

Cyrtodactylus philippinicus (Steindachner, 1867) – The species (Fig. 3h) is probably the most common gecko in northern Philippines, and is usually encountered in low-and mid-elevation forests. The Philippine members of the genus *Crytodactylus* can easily be distinguished from other gekkonid lizards by their bent toes. This species has been documented retreating to tree holes and rotten logs during the day. Several individuals were seen clinging to branches, vines, trunks, and boulders at night. The snout-vent length and tail length are 68 and 37 mm, respectively.
Collection sites(s): Rotten logs in all locations.

Pseudogeckko pungkaypinit (Siler *et. al.* 2014) – *Pseudogeckko pungkaypinit* (Fig. 3i) is a member of an endemic genus of geckos in the Philippines, and formerly recognized as a member of the *Pseudogeckko compresicorpus*. Specimen was collected from an *Alpinia* sp. leaf near the trail. The snout-vent length and tail length are 43 and 50 mm, respectively.
Collection sites(s): Forest floor in location 1.

Gekko gecko (Linnaeus, 1758) – This large, nocturnal gecko (Fig. 3j) which can be common in urban and rural areas and, in natural areas, has been observed in lowland and hill dipterocarp forest on the sides of trees and taking refuge in rock cracks during the day. The species thrives in artificial environments. It predates on other geckos, insects, small mammals

and small birds. The specimen was collected in rock cracks in an ecotone. The snout-vent length and tail length are 30 and 60 mm, respectively.
Collection sites(s): Rock crevice in location 6.

Reptilia: Family Colubridae

Calamaria bitorques (Peters, 1872) – *Calamaria bitorques* (Fig. 3k) is a species of snake where sexual reproduction is dioecious. These are burrowing snakes because of their cylindrical body cross-section and streamlined head shape that are rarely seen. They feed mainly on earthworms and other soft‑bodied invertebrates, and they lay their eggs under the soil. I observed this species on the ground crawling its way to the nearby stream. Snout-vent length and tail length are 343 and 22 mm, respectively.
Collection sites(s): Stream in location 6.

Gonyosoma oxycephalum (Boie, 1827)– This diurnal, arboreal snake (Fig. 3l) occurs in primary forest, but appears to prefer edge habitats, secondary growth and agricultural areas. It has a striking green color on the dorsal side, which becomes paler on the ventral side. The top of the head is darker green, and there is a vague dark stripe running through the eye. The snout-vent length and tail length are 109 and 400 mm, respectively.
Collection sites(s): Underneath of a dead tree in location 1.

Psammodynastes pulverulentus (Boie, 1827) – *Psammodynastes pulverulentus* (Fig. 3m) is a widespread species and has been documented throughout the archipelago. Three individuals were perched on vines and another was observed on a woody shrub. One male possessed a notably white iris. Two juveniles were encountered foraging along in shrubs. The snout-vent length and tail length are 47 and 40 mm, respectively.
Collection sites(s): Shrub in location 1 and 6 to forage.

Lycodon aulicus capucinus (Boie, 1827) – The species (Fig. 3n) occurs in lowland tropical forest and agricultural area. The species is nocturnal and is both terrestrial and arboreal. Shades of jet black and dark gray with speckles, blotches and spots of white or pale yellow scattered over the body are its color. Specimen was found under the big rock near the stream. The snout-vent length and tail length are 122 and 28 mm, respectively.
Collection sites(s): Forest floor of location 4.

Reptilia: Family Elapidae

Hemibungarus calligaster (Wiegmann, 1835)– *Hemibungarus calligaster* (Fig. 3o) is generally associated with tropical moist forests; this species can also be found in disturbed areas close to the forest. One juvenile of this species was encountered on the ground streamside at the edge of the forest. The snout-vent length and tail length are 400 and 30 mm, respectively.
Collection sites(s): Ground in locations 1, 2, 3 and 6.

Reptilia: Family Natricidae

Rhabdophis lineatus (Peters, 1861) – This water snake (Fig. 3p) is associated with streams and rivers in primary forested areas. It has been recorded in forest remnants and at the forest edge as well as in rice paddy. The snout-vent length and tail length are 435 and 135 mm, respectively.
Collection sites(s): A stream in location 1.

Reptilia: Family Pareidae

Aplopeltura boa (Boie, 1828) – The blunt headed slug snake (Fig. 3q) is widespread but considered by some to be uncommon and others have documented it frequently by focusing

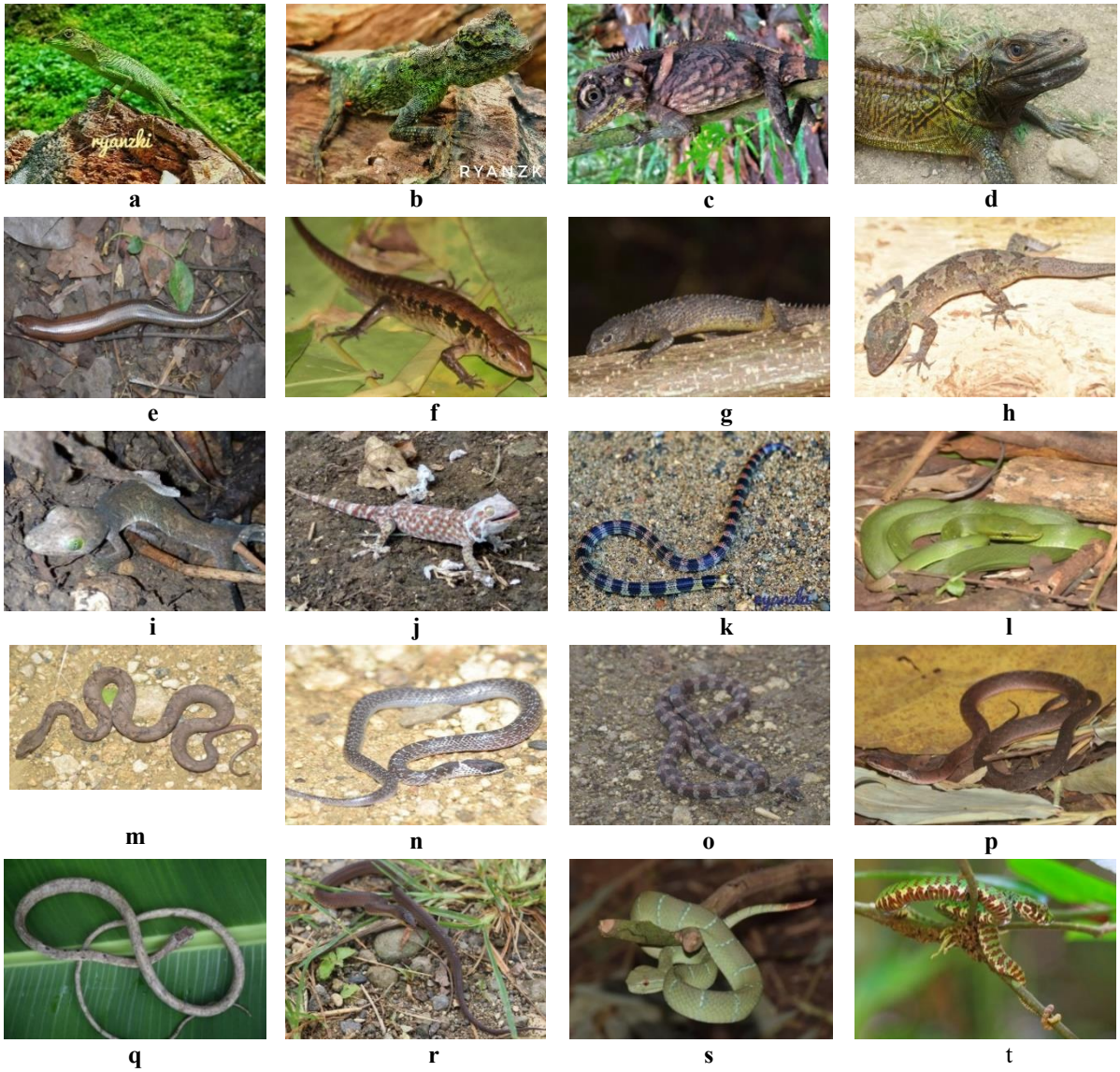

Fig. 3. Pictorial view of reptiles: **a.** *Bronchocela cristatella* (RAS0002); **b**. *Draco bimaculatus* (RAS0025); **c.** *Gonocephalus semperi* (RAS0013); **d.** *Hydrosaurus pustulatus* (RAS0125); **e.** *Brachymeles bicolor* (WAA0101); **f.** *Spenomorphus cumingi* (WAA0612); **g.** *Tropidophorus grayi* (WAA0339); **h.** *Crytodactylus philippinicus* (WAA0306); **i.** *Pseudogekko pungkaypinit* (WAA0509); **j.** *Gekko gecko* (WAA4312); **k.** *Calamaria bitorques* (RAS0146); **l**. *Gonyosoma oxycephalum* (WAA0106); **m**. *Psammodynastes pulverulentus* (WAA0022); **n.** *Lycodon capucinus* (WAA0489); **o.** *Hemibungarus calligaster* (WAA0200); **p.** *Rhabdophis lineatus* (WAA0605); **q.** *Aplopeltura boa* (WAA0200); **r.** *Oxyrhabdium modestum* (WAA0424); **s.** *Tropidolaemus subannulatus* (WAA0103); and **t.** *Trimeresurus flavomaculatus* (RAS0017). Photograph by RAS.

search efforts after rain, when its preferred prey items (snails and slugs) are active. It inhabits lowland and lower montane forest up to elevations of around 500 masl. It is nocturnal and arboreal in habits and is typically found perched on low vegetation. Its specimen was collected from the branch of small tree near the stream. The snout-vent length and tail length are 49 and 28 mm, respectively.

Collection sites(s): Vicinity of a stream in location 4.

Reptilia: Family Lamprophiidae

Oxyrhabdium modestum (Boettger, 1896) – This is the most common snake (Fig. 3r) I encountered from the low to high-elevation forest. Adults are frequently discovered at night

in vegetation beside streams, although adolescents are frequently found inside decaying trees far from water sources. The snout-vent length and tail length are 480 and 99 mm, respectively.
Collection sites(s): Stream in Location 1.

Reptilia: Family Viperidae

Tropidolaemus cf. subannulatus (Wallach *et al*. 2014) – *Tropidolaemus cf. subannulatus* (Fig. 3s) was encountered in forested areas between sea level and mid-elevation. Five individuals were encountered at night and one was in the late afternoon, three individuals were perched on vines and another was observed on a woody shrub. One male possessed a notably white iris. Two juveniles were encountered foraging shrubs. The snout-vent length and tail length are 101 and 76 mm, respectively.
Collection sites(s): Woody shrub in Location 1.

Trimeresurus flavomaculatus (Gray, 1842) – This Philippine pit viper (Fig. 3t) occurs in the island of Luzon. Throughout its distribution it is a highly polymorphic species in terms of coloration. Two color morphs have been observed at RSPL; one was apple green with red stripes seen crawling on the ground, the other one was a green morph with maroon dorsal stripes seen on a branch of a tree about 3 m high. Specimen was collected in the buttress of tree. The snout-vent length and tail length are 105 and 78 mm, respectively.
Collection sites(s): Rock crevice and a woody shrub in location 3 and 6, respectively.

Rajah Sikatuna Protected Landscape has become the subject of faunal research due to its rich biodiversity and is considered the last forest frontier of the region yet there is no published journal about its herpetofaunal record. Most of the species recorded in this study constitute a major geographical distribution record for Central Visayas. Altogether 42 herpetofauna species were recorded, of which 18 are amphibians (1 toad and 17 frogs), and 24 are reptiles (11 snakes and 13 lizards). This number is an addition to the previous studies conducted, such as Jose (2012), which reported 15 amphibians in Loboc Watershed, Bohol (Bucol *et al.* 2011), which reported 9 amphibians and 24 reptiles in Siquijor Island and 13 amphibians and 63 reptiles in the island of Cebu (Supsup *et al.* 2016).

Twenty-three (23) species (4 amphibians, 11 lizards, and 8 snakes) are Philippine endemics, with 1 species (*Philautus* sp.) inhabiting the forest limestone of RSPL, which merits further taxonomic identification. Five (5) species (3 amphibians and 2 lizards) are considered vulnerable; three species (2 amphibians and 1 lizard) are considered near threatened and seven are not evaluated or data deficient, which merits further studies. These findings are higher compared to similar studies conducted by Supsup *et al.* 2017, Clores *et al*. 2020 in Mt. Hamiguitan Mountain Range, Balesin Island, and Caramoan Island Group, respectively, but lower compared to Endozo *et al*. 2017 in Pantabangan-Carranglan Watershed and Taal Volcano Protected Landscape, respectively. Without a strategic management plan, these species are at high risk because of continued habitat fragmentation (Aureo and Decena 2023).

Areas with more streams (riparian areas) and open and closed canopy forests garnered high concentrations of species and individuals. This supports the findings of Gonzalez and Dans (1997) which explains that the presence of ecotones or intermediate habitat forms an "edge effect," which merges two habitat types and often results in the mixing of herpetofaunal elements from the adjacent habitat types. In terms of elevation, species that are more sensitive are found at higher elevations (500-600m). Elevation affects temperature and

humidity, thus affecting egg development and thermal physiology (Aureo and Bande 2019), especially for more sensitive species. This finding is consistent with other studies (Gonzalez and Dans 1997) conducted in different mountains of the Philippines. As for association, *Limnonectes, Platymantis, Rhacophorus, Kalophrynus, Kurixalus, Pulchrana, Sanguirana,* and *Staurois* showed a positive association in the forest habitat, while *Kaloula, Fejervarya, Occidozyga*, and *Polypedates* showed a positive association in the agricultural habitat. The positive association between species: forest over limestone: *Philautus* sp. *O. laevis, B. bicolor*; agriculture: *M. stejnegeri* and *K. Pleurostigma;* and ecotone: *T. grayi, S. cumingi, C. philippinicus* in different habitats may be due to water requirements, environmental variables, or the acoustic interaction of species (Andres 2009). It also showed that species are concentrating on a mix of vegetation strata and riparian areas, which were found in barangays Omjon, Nan-od and Bugsoc.

Despite the extensive survey conducted, I have only observed a few reptiles, especially species belonging to the family Dibamidae, as compared to the neighboring islands (Cebu and Siquijor), which have high number. This result could possibly be explained by the dry environment, and the survey was done during the dry season. Even if the survey accounts for a smaller number of species, it is worth noting that I have observed species of *Lipinia pulchella, Platymantis guentheri, Platymantis rabori* and five species of the family Rhacopodiaceae that are not found in Cebu (Supsup *et al.* 2016). The absence of these species could be attributed to the systematic deforestation of Cebu's forest (Brown and Alcala 1986), which affected their habitat.

Amphibian and reptile species are being influenced by the varying availability of food, habitat preferences and microclimatic conditions. The distribution patterns of amphibian species showed a high concentration of individuals and species towards mixed vegetation and riparian areas located in mid-elevations compared to agricultural, grassland and pine forests found in lower elevations. The variety of species observed showed varying requirements and preferences and could prove that species-specific conservation is important, especially for species that are sensitive. Furthermore, the high diversity, endemicity, and vulnerability of amphibians and reptiles in the survey areas is an indication of the high herpetofaunal need for conservation. Aside from Negros Oriental, which is also part of Central Visayas (along with Cebu, Siquijor and Bohol), this data update the herpetofaunal record for the entire region and would merit further taxonomic studies such as gene sequencing and DNA barcoding.

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