Konservasi Hayati, 18 (2): 80-87, Oktober (2022)
https://ejournal.unib.ac.id/index.php/hayati/
p-ISSN: 0216-9487 email:konservasihayati@unib.ac.id e-ISSN: 2722-1113

PRELIMINARY SURVEY OF HERPETOFAUNA IN UNIVERSITAS SEBELAS MARET AREA, SURAKARTA, CENTRAL JAVA

Iman Akbar Muhtianda[1*], Mei Lailasari[2], Ayu Astuti[3]

[1] Jurusan Biologi, Fakultas Biologi, Universitas Gadjah Mada. JL. Teknika Selatan, Sekip Utara. Sleman. DI Yogyakarta
[2] Jurusan Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Sebelas Maret. Jebres, Surakarta. Jawa Tengah
[3] Jurusan Biologi, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Sebelas Maret. Jebres, Surakarta. Jawa Tengah
[*]*Corresponding author*: imanakbarm@gmail.com

ABSTRACT

Indonesia is an archipelago country located in South-East Asia and has high numbers of species biodiversity and ecosystem variations, including herpetofauna. Herpetology comes from Greek which consists of "herpein" which means "to creep", and "-logia" which means "knowledge", which together can be translated as a discipline of zoology that focused on amphibians and reptiles (herpetofauna). Amphibians and reptiles are widespread across the globe in a wide variety of habitats, with some limitations around the earth's poles, from mountain to sea. They play various roles in the ecosystem from the first consumer to the third consumer and can act as bioindicators, pest controllers, or even recreational targets for hunting. This preliminary survey had been conducted at the university area (human-modified habitat) in Universitas Sebelas Maret, Surakarta, Central Java, Indonesia from 13-15 November 2020. The aim of this study is to enlist herpetofauna species that exist in Universitas Sebelas Maret. The study used the Road Cruising method combined with the Visual Encounter Survey. Data was presented using DNRGPS and QGIS version 3.10.14. including descriptions for each species. The study recorded three amphibians namely Duttaphrynus melanostictus (Bufonidae), Kaloula baleata (Microhylidae), and Polypedates leucomystax (Rhacophoridae); and four reptiles Calotes versicolor (Agamidae), Gekko gecko, Hemidactylus frenatus, and Hemidactylus platyurus (Gekkonidae).
***Keywords**: amphibians, reptiles, Road Cruising, Visual Encounter Survey*

ABSTRAK

Indonesia merupakan negara kepulauan yang terletak di Asia Tenggara dan memiliki jumlah keanekaragaman hayati spesies dan variasi ekosistem yang tinggi, termasuk herpetofauna. Herpetologi berasal dari bahasa Yunani yang terdiri dari "*herpein*" berarti "merayap", dan "*-logia*" berarti "pengetahuan", yang bersama-sama dapat diterjemahkan sebagai disiplin zoologi yang berfokus pada amfibi dan reptil (herpetofauna). Amfibi dan reptil tersebar luas di seluruh dunia di berbagai habitat, namun dengan jumlah yang sedikit di area kutub. Herpetofauna berperan penting dalam ekosistem mulai dari produsen sampai konsumen tingkat ketiga, dan berperan pula sebagai bioindikator, pengendali hama, atau bahkan target rekreasi untuk berburu. Survei pendahuluan ini telah dilakukan di area universitas (habitat buatan manusia) di Universitas Sebelas Maret, Surakarta, Jawa Tengah, Indonesia pada 13-15 November 2020. Tujuan dari penelitian ini adalah untuk mengetahui spesies herpetofauna yang ada di Universitas Sebelas Maret. Metode pengamatan menggunakan *Visual Encounter Survey* (Perjumpaan Langsung). Data disajikan menggunakan DNRGPS dan QGIS versi 3.10.14., termasuk deskripsi untuk setiap spesies. Spesies yang ditemukan antara lain tiga spesies amfibi yaitu *Duttaphrynus melanostictus* (Familia Bufonidae), *Kaloula baleata* (Familia Microhylidae), dan *Polypedates leucomystax* (Familia Rhacophoridae); dan empat spesies reptil yaitu *Calotes versicolor* (Familia Agamidae), *Gekko gecko*, *Hemidactylus frenatus*, dan *Hemidactylus platyurus* (Familia Gekkonidae).
Kata kunci: amfibi, reptil, *road cruising*, perjumpaan langsung.

INTRODUCTION

Indonesia is a tropical archipelago country that is rich in biodiversity. Amphibians and reptiles are part of Indonesia's high biodiversity. They inhabit various types of habitats ranging from aquatic to arboreal ecosystems. Therefore, they play many important ecological roles from being predators or prey, which may directly or indirectly contribute to the balance of the ecosystem. Despite the differences in their taxonomical and morphological aspects, amphibians and reptiles are studied in a branch of zoology discipline called herpetology which they both call herpetofauna. Ecologically, they can be studied using similar methods due to the similarity of their physiological character and behavior (Yanuarefa *et al*., 2012; Vitt & Caldwell, 2014).

Although Indonesia has a high diversity of herpetofauna, they still need more scientific attention due to many of their aspects remaining unknown. Amphibians and reptiles also suffer from overexploitation or other anthropogenic causes which tremendously reduces their ecological benefits (Hanifa *et.al*., 2022). For example, Water Monitor (*Varanus salvator*) is overly hunted for its skin, meat, or for recreational purposes using various hunting methods (Boscha *et.al.,* 2020; Yudha *et.al*., 2022). While many snake species are captured and bred for supplying pet markets (Kusrini *et.al*., 2021).

Universitas Sebelas Maret is a state university that was established in 1976 and situated in the more than 60 ha area of Kentingan, Jebres, Surakarta. In addition, Universitas Sebelas Maret area also has walls around it that separate the university area from the outer area. The establishment of this campus in the lowland area of Central Java has brought major changes in the environment and hence the biodiversity residing in it. Therefore, this study is needed as a primary study about herpetofauna in this campus area.

METHODS

Time and Place of Study

The area of Surakarta City or also known as "Solo City" is a lowland area with an altitude of ±92 m above sea level. The city of Solo is bordered to the north by Boyolali Regency, to the east by Karanganyar Regency, to the south by Sukoharjo Regency, and to the west by Sukoharjo Regency. The area of Surakarta City is 44.04 km² which is divided into 5 sub-districts, namely: Laweyan, Serengan, Pasar Kliwon, Jebres, and Banjarsari districts. Most of the land is used as a residential area 65%, while for economic activities it also takes up quite a large area, which is around 16% of the existing land area. The average air temperature in Surakarta City in 2016 ranged from 21.8°C to 33.1°C. While the humidity ranges from 77 % to 95 %. The rainiest days fall in February with 23 rainy days. Green areas in the city of Surakarta consist of parks, urban forests, and green lanes, both in the form of public and private green spaces, which are managed by agencies or individuals.

This study had been conducted between 13-15 November 2020, located at the area of Universitas Sebelas Maret, Surakarta, Central Java (7°33'35" S, 110°51'22" E, 92 meters above sea level). Most of the areas were human-modified habitats with one artificial river and one artificial lake named "Danau UNS". Trees existed among the building. Universitas Sebelas Maret on the whole has walls that separate it from the outside area. The study used a Visual Encounter Survey as this is a method oriented to target all taxa, and for general inventory (McDiarmid et.al., 2012). The survey lasted between 20:00 to 22:00. Every amphibian and reptile found was identified and their photo was collected. Along with the photo collected the coordinate where it was taken. Aside from looking for amphibians and reptiles at the main survey trail, some potential locations in the surrounding also searched, such as near water bodies, tree trunks, pools, bushes, dead leaves, and logs.

The herpetofauna specimens were then identified using McKay, 2006 (A Field Guide to the Amphibians and Reptiles of Bali), Das, 2010 (Reptiles of South-East Asia), Iskandar, 1998 (Amfibi Jawa dan Bali), and Kusrini, 2013 (Panduan Bergambar Identifikasi Amfibi Jawa Barat). Additional information was collected from sharing platform website named iNaturalist (https://www.inaturalist.org/). Photographs and sighting coordinates were taken using the smartphone Xiaomi Redmi 5A, Samsung M30, and digital camera Panasonic Lumix FZ-40. The data was presented using DNRGPS application and QGIS version 3.10.14. using a map from OpenStreetMap, while each species character found is described. Dichotomical keys were made using characters that can be observed by the eye found in the specimens.

RESULT AND DISCUSSION

Species inventory

The survey recorded both amphibians and reptiles from within the campus area of Universitas Sebelas Maret. We found a total of 7 species which consist of 3 species of amphibians and 4 species of reptiles. A total of 37 individuals were found which consist of 20 individuals of amphibians and 17 individuals of reptiles. The detail on observed species, individual counting, total counting, and comparison amount for each species can be seen in Table 1 and Figure 3.

Table 1. Species and amount of herpetofauna in Universitas Sebelas Maret

No.	Ordo	Familia	Species	Σ Individual
1.	Anura	Bufonidae	*Duttaphrynus melanostictus*	5
2.		Microhylidae	*Kaloula baleata*	9
3.		Rhacophoridae	*Polypedates leucomystax*	6
Total Amphibia				**20**
4.	Squamata	Agamidae	*Calotes versicolor*	11
5.		Gekkonidae	*Gekko gecko*	3
			Hemidactylus frenatus	2
			Hemidactylus platyurus	1
Total Reptilia				**17**
Total Herpetofauna				**37**

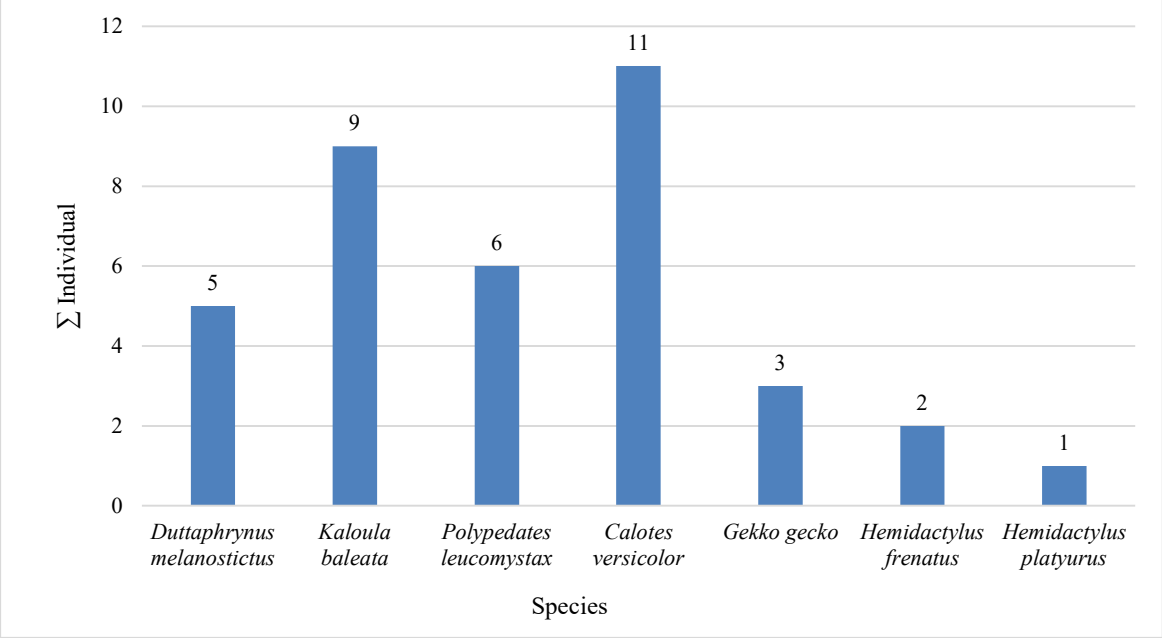

Figure 1. Histogram of herpetofauna amount for each species found in Universitas Sebelas Maret

Amphibians found in UNS area are all from Ordo Anura. The number of amphibians found in UNS was higher than reptiles. This could probably because of the season when the survey was conducted. November in Indonesia is a rainy season. In the abundance of water, amphibians are more active and can be found often. In Universitas Sebelas Maret, amphibian can be found in artificial rivers under UNS boulevard, pools in the Faculty of MIPA, and in general water drainage that spread across the university area. The most abundant amphibian was *Kaloula baleata* (Flower Pot Toad). *K. baleata* is a fossorial species, which means it preferred to burrow under the ground or on dead leaves (Iskandar, 1998; Yudha & Eprilurahman, 2019). *Kaloula baleata* are dispersed in UNS area and most often found in water drainage. This is because water drainage is dark and sometimes filled with dead leaves or mud, this became suitable habitat for burrowing species like *Kaloula baleata*. The second most abundant species of amphibian are *Polypedates leucomystax* (Common Tree Frog). As we can see on the map, *P. leucomystax* was found in the southern area of UNS area. Different from other members of Rhacophoridae that prefer to live in pristine habitats, *Polypedates leucomystax* can be found in disturbed habitats, like gardens, low vegetation areas, or around marshes and shrubby areas (Yudha & Eprilurahman, 2019). This explains the reason *Polypedates leucomystax* is only found in the southern part of UNS. The southern area of UNS have more tree and water bodies, thus it became suitable habitat for *P. leucomystax* which prefer stable water body like pools with trees around for their reproduction process (Iskandar, 1998). The least abundant species of amphibians found in UNS area was *Duttaphrynus melanostictus* (Asian Common Toad). This species is a common species to be found in human-modified habitat, and according to Yudha & Eprilurahman (2019); Iskandar (1998) *Duttaphrynus melanostictus* are related to disturbed habitat like human settlement and most unlikely to be found in the forest. This is the reason this species amount was less because UNS area has a lot of green space and is not heavily modified.

Reptiles found in UNS area were all from Ordo Squamata, specifically Subordo Lacertilia or as people know as “lizard”. The

most abundant species are *Calotes versicolor* (Oriental Garden Lizard). This species is found mostly in the Frangipani (*Plumeria* sp.) tree, resting at the night. According to Das (2010) *Calotes versicolor* can be found in open forests as well as disturbed habitats. *Calotes versicolor is* only found in the southern part of UNS probably because it prefers open forests while the most tree in the northern part of UNS are big, tall trees which have huge distance from each other. Frangipani around UNS lake planted in a small garden setting with small bush plants also appears around. This composition became suitable habitat for *Calotes versicolor.* In UNS this lizard is found mostly around UNS Lake. Other species of reptiles found in UNS were from Familia Gekkonidae, each was *Gekko gecko*, *Hemidactylus frenatus*, and *Hemidactylus platyurus*. These three species of Gekkonidae were very common species to find in human-modified habitats (Das, 2010). All of these Gekkonid were found in the southern part of UNS. The reason could be because of prey availability, as insects are attracted to light and water. Thus, these three Gekkonid species can be found in the southern part of UNS which has a body of water. In our observation, both *Hemidactylus frenatus* (Common House Gecko) and *Hemidactylus platyurus* (Flat-tailed House Gecko) are communal with each other and can be found in the same hunting ground like near the lamp of a building, hunting for insects for food. The distribution map of species is:

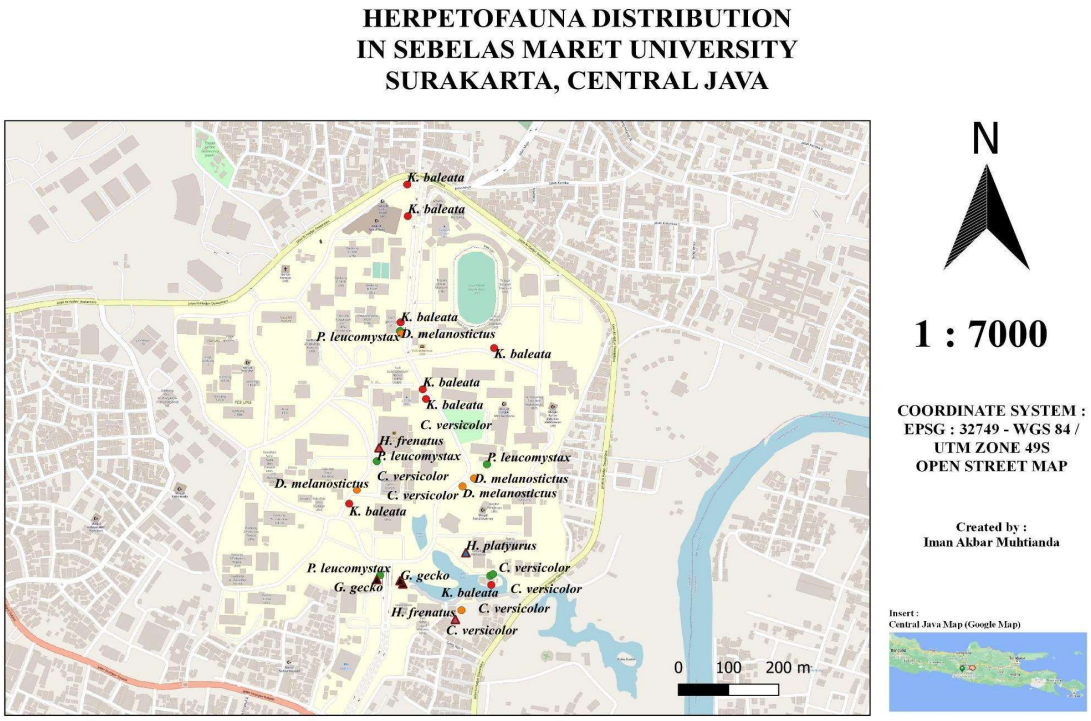

Figure 2. Finding spots for herpetofauna in Universitas Sebelas Maret

From Figure 2 above we can see that most species were found in the southern area of UNS and only amphibians were found in the northern area. Generally, the southern area of UNS has more varied habitats from the artificial forest, artificial lake, and artificial river. This combination of forest and water became suitable habitats for many species of herpetofauna. It provides many possible shelters and niches for different species. In addition, water bodies and trees around attract insects that one of herpetofauna prey.

a. Duttaphrynus melanostictus
(Asian Common Toad)

b. Kaloula baleata
(Flower Pot Toad)

c. Polypedates leucomystax
(Common Tree Frog)

d. Calotes versicolor
(Oriental Garden Lizard)

e. Gekko gecko
(Tokay Gecko)

f. Hemidactylus frenatus
(Common House Gecko)

g. Hemidactylus platyurus (Flat-tailed House Gecko)

Figure 3. Amphibian (a-c) and Reptiles (d-g) species found in Universitas Sebelas Maret area

Identification key for herpetofauna in Universitas Sebelas Maret area

This identification key was made solely based on a specimen found in this research and can be used as a tool for the next researcher to determine current or possibly new findings in Universitas Sebelas Maret area. The researcher should look to another field guide or source if they find a specimen that character does not fit in these keys:

1.a. Body covered with scales; tail exist 2

b. Body without scales nor tail ……..……,. 3

2.a head shape in dorsolateral configuration,
the underpart of the finger with comb-like structure,
claws small or absent,
the tail can do autotomy ……..……..…… 4

b. head shape not in dorsolateral configuration,
claws prominent and used to climb,
scales appear under the finger,
the tail cannot do autotomy ……..…….…. *Calotes versicolor*

3.a. Skin covered in bumps of various sizes,
glands appear behind the temple,
have ridge from in front of the eye
up to the upside of the eardrum……....… *Duttaphrynus melanostictus*

b. Skin not covered in bumps,
seems wet and shiny.
No rodge around the eye ……..…… 5

4.a. Skin covered in various size tubercle scales,
Each tubercle scale can be seen clearly.
Robust body.…….....…. *Gekko gecko*

b. Skin covered in almost similar size tubercle scales.
Each tubercle are obscure. Body relatively slim ……..…..…..…… 6

5.a. Dark body coloration, similar to dead wood or mud,
mouth narrow. hips have yellow-orange bright color,
small body size ……..….. *Kaloula baleata*

b. Body color is around yellow-creamish,
medium to large body size, lips with a white streak.
some obvious pattern
would exist in the back ..……..... *Polypedates leucomystax*

6.a. Tail is relatively flat with a serrated side.
skin extension appears in the body side ….…… *Hemidactylus platyurus*

b. Tail is relatively rounded without a serrated structure.
there is a small spike-likes structure
in tail segments ……..... *Hemidactylus frenatus*

CONCLUSION

Seven species of herpetofauna were found in the Universitas Sebelas Maret area based on a survey conducted on 13-15 November 2020. Three species of amphibians belong to three different families, namely *Duttaphrynus melanostictus* (Familia Bufonidae), *Kaloula baleata* (Familia Microhylidae), *and Polypedates leucomystax* (Familia Rhacopohoridae), and four species of reptiles belong to two different families, namely *Calotes versicolor* (Familia Agamidae), *Gekko gecko, Hemidactylus frenatus, and Hemidactylus platyurus* (Familia Gekkonidae). The most abundant species of amphibians is *Kaloula baleata*, and the most abundant species of reptile is *Calotes versicolor*. All species found are urban species, with *Calotes versicolor* highlighted as being invasive.

ACKNOWLEDGEMENT

We would like to thank Amfibi Reptil Kita (ARK) Project in iNaturalist that encouraged us to do the survey and provided a place to store survey documentation. The

author extends their gratitude to Dhinda Tazkiya that assisted during field data collection.

REFERENCES

Boscha, E., Arida, E., Yudha, D.S. (2020). Dorsal Colour Patterns of Asian Water Monitor, *Varanus salvator* Collected for Trade in Cirebon, Indonesia. *Journal of Tropical Ethnobiology* Vol. 3(2): 133-138. Doi: 10.46359/jte.v3i2.43

Das, I. (2010.)*Reptiles of South-East Asia*. New Holland Publishers. UK

Hanifa, B.F., Hasyim, M.A., Prahardika, B.A., Agustin, N.W. (2022). Reptiles and Amphibian Diversity, Along with Potential Treat in Sumber Nyolo, Malang Regency. *El-Hayah* Vol. 8(4): 130-135. Doi: 10.18860/elha.v8i4.15799

Iskandar, D.T. (1998). *Amfibi Jawa dan Bali*. Puslitbang LIPI, Bogor

Kusrini, M.D. (2013). *Panduan Bergambar Identifikasi Amfibi Jawa Barat*. Fakultas Kehutanan IPB, Bogor

Kusrini, M.D., Palesa, S.P., Masy'ud, B. (2021). Snake Pet Ownership in The City: A Case Study in Greater Jakarta, Indonesia. *Biodiversitas* Vol. 22(4): 1790-1798. Doi: 10.13057/biodiv/d220424

McDiarmid, R.W. Foster, M.S. Guyer, C. Gibbons, J.W. Chernoff, N. (2012). *Reptile Biodiversity*. University of California Press. California

McKay, J.L. (2006). *A Field Guide to the Amphibians and Reptiles of Bali*. Krieger Publishing Company. Florida.

Vitt, L.J., Caldwell, J.P. (2014). Herpetology: *An Introductory Biology of Amphibian and Reptiles 4th edition*. Elsevier Science. United Kingdom

Yanuarefa, M.F., Hariyanto, G., Utami, J. (2012). *Panduan Lapang Herpetofauna (Amfibi dan Reptil) Taman Nasional Alas Purwo*. Balai Taman Nasional Alas Purwo, Banyuwangi

Yudha, A.P., Kusrini, M.D., Arida, E. (2022). Chasing For Water Monitors Using Dog in West Java, Indonesia: A Recreational Hunting or Pest Control?. *Ethnobiology and Conservation*, Vol. 11(04): 1-10 Doi: 10.15451/ec2022-01-11.04-1-10

Yudha, D.S. Eprilurahman, R. (2019). Monitoring the Diversity of Frogs and Toads (Amphibia: Anura) Along Code River Province of Daerah Istimewa Yogyakarta. *Biogenesis Jurnal Ilmiah Biologi,* Vol. 7(2): 132-138 Doi: 10.24252/bio.v7i2.10174