

## Short Communications

# Herpetofauna and Their Potential Threats in Karimata Island, Indonesia

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### Keywords:

Biodiversity  
Herpetofauna  
Karimata Island

### Submitted:

10 June 2023

### Accepted:

08 December 2024

### Published:

12 August 2024

### Editor:

Ardaning Nuriliani

### ABSTRACT

Karimata Island is an island about 100 km west of Borneo, causes geographical isolation and generally always shows an impact on the diversity of animal communities that are less, one of the communities affected is herpetofauna. Herpetofauna is very important in an ecosystem so it is necessary to conduct a survey. The survey was conducted from April 1 to April 7, 2023 in Betok Jaya Village, Karimata Island which was divided in 3 observation areas based on habitat type using the Visual Encounter Survey method. Herpetofauna found consisted in 22 species divided into 5 species of amphibians and 17 species of reptiles with a total of 43 individuals. Herpetofauna located adjacent to human areas is vulnerable to various disturbances such as maritime transportation activities, household waste pollution and land clearing, which can be a threat to the herpetofauna community of Karimata Island.

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Karimata Island as an island that is separated about 100 km west of the mainland of Borneo. The separation of an island according to [Barquero et al. \(2010\)](#) and [Losos & Ricklefs \(2009\)](#) results in geographic isolation and generally always shows an impact on the diversity of animal communities that are less, one of the communities affected is herpetofauna. According to [Christoffel & Lepczyk \(2012\)](#) herpetofauna plays an important role in an ecosystem in the food chain that can control the population and as a bio-indicator of environmental change.

The existence of herpetofauna is important to know through surveys conducted both short and long term. Few surveys have been conducted in Karimata Island, the last of which found 26 species of herpetofauna in Padang Village ([Arifin et al. 2011](#)). The survey was limited to the eastern Karimata Island. Thus, it is necessary to survey herpetofauna on the western side of the island, which is in Betok Jaya Village, west of Karimata Island, to add information about the herpetofauna diversity and identify the threats to herpetofauna of Karimata Island.

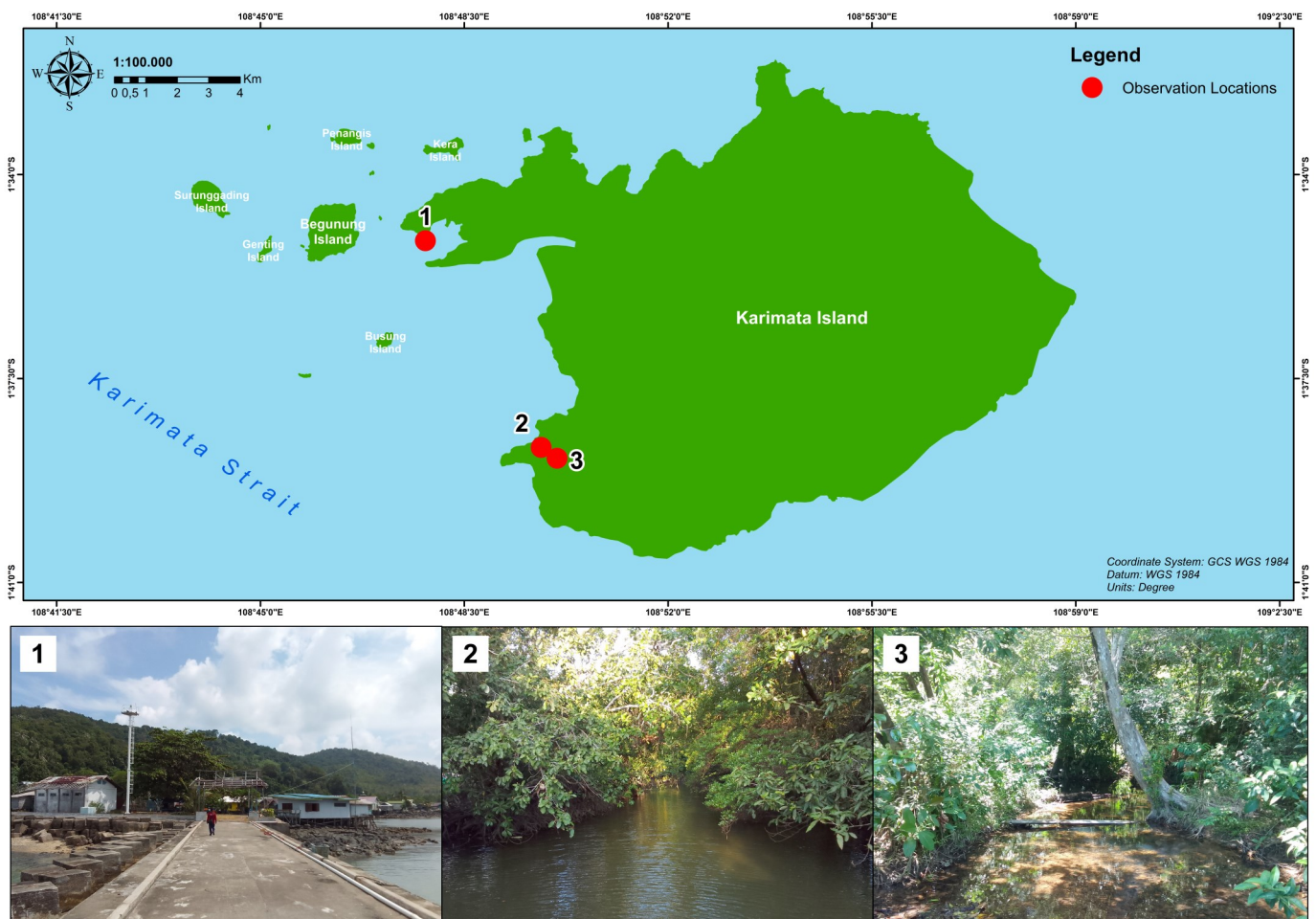
The herpetofauna survey was conducted for 7 days from April 1 to April 7, 2023 on the western side of Karimata Island in Betok Jaya Village, North Kayong, West Kalimantan, Indonesia. Karimata Island has an area of up to 156.25 km<sup>2</sup> with a mountainous landscape of Karimata Island consisting of various habitat types with the highest peak being Mount Cabang (1,030 m asl) ([KLHK 2016](#)). Herpetofauna observations

were divided into 3 locations separated by habitat type (Figure 1). Location 1 is along the coast with coral reef habitat in Betok Jaya Hamlet ( $1^{\circ}35'8.06''\text{S}$ ;  $108^{\circ}47'50.08''\text{E}$ ), location 2 is a mangrove forest area in Kelumpang Hamlet ( $1^{\circ}38'40.91''\text{S}$ ;  $108^{\circ}49'49.34''\text{E}$ ), and location 3 is a secondary forest area in Kelumpang Hamlet ( $1^{\circ}38'52.10''\text{S}$ ;  $108^{\circ}50'5.75''\text{E}$ ).

Herpetofauna found were documented using a camera and identified directly in the field with herpetofauna identification books (Das 2010; Inger et al. 2017; Das et al. 2022). Herpetofauna identified are then recorded and released back into their habitat and descriptive analysis is carried out based on the location of the observation.

The method used for herpetofauna surveys is the Visual Encounter Survey method for rapid assessment with limited time available (Ackley et al. 2009; Zakaria et al. 2022). Surveys were conducted in the morning and evening with a maximum observation time limit of 3 hours from 6–9 a.m and 6–9 p.m. Identification was carried out by matching of morphological characteristics and all herpetofauna encountered were subsequently released back into their natural habitat. During the observation, tools such as stationery, Garmin 64s GPS, grab stick, head lamp, and snake hook were used.

Herpetofauna found during observations at the three locations belonged to 22 species with a total of 43 individuals (Table 1), including 5 species of amphibians and 17 species of reptiles. A survey conducted by Arifin et al. (2011) found 26 species that were higher than the current survey results. Many factors can affect the species richness of an area, one of the most influential in this survey according to Kusriani (2019) is the observation time and methods used. The relatively faster observation



**Figure 1.** Herpetofauna survey map along with the environmental setting of the observation locations in Karimata Island.

**Table 1.** Herpetofauna found during observation in Karimata Island.

No	Family	Species	Location			n
			1	2	3	
<b>Amphibians</b>						
1	Dicroglossidae	<i>Fejervarya cancrivora</i>		√		5
2		<i>Limnonectes paramacrodon</i>			√	2
3		<i>Limnonectes</i> sp.			√	1
4	Ranidae	<i>Chalcorana</i> cf. <i>raniceps</i>			√	3
5		<i>Pulchrana baramica</i>			√	1
<b>Reptiles</b>						
1	Agamidae	<i>Draco</i> sp.		√		2
2	Colubridae	<i>Boiga drapiezzi</i>			√	1
3		<i>Dendrelaphis haasi</i>			√	1
4		<i>Xenochrophis trianguligerus</i>			√	1
5	Crocodylidae	<i>Crocodylus porosus</i>		√		2
6	Elapidae	<i>Laticauda colubrina</i>	√			1
7	Gekkonidae	<i>Cyrtodactylus</i> sp.			√	1
8		<i>Gehyra mutilata</i>		√		1
9		<i>Gekko gecko</i>		√		5
10		<i>Hemidactylus frenatus</i>		√		2
11		<i>H. platyurus</i>		√		2
12	Homalopsidae	<i>Cerberus schneiderii</i>		√		2
13		<i>Homalopsis buccata</i>		√		1
14	Scincidae	<i>Eutropis multifasciata</i>	√	√	√	6
15	Typhlopidae	<i>Indotyphlops braminus</i>		√		1
16	Varanidae	<i>Varanus salvator</i>		√		1
17	Viperidae	<i>Tropidolaemus subannulatus</i>		√		1
<b>Total</b>						43

Notes: n: number of individuals

time and only using one observation method had a big impact on the species richness found.

A total of 13 herpetofauna species that had never been found in previous surveys are new records for the herpetofauna diversity of Karimata Island (Table 2). Some herpetofauna were only found in one of the observation locations such as *L. colubrina* in location 1. *L. colubrina* was found in the morning actively moving around the coral reef. This is in line with the statement from Heatwole (1999) and Lane et al. (2010) which explained that these snakes are often found in coral reefs, coral islands, high seas, and coastal areas.

All observation locations adjacent to areas of human activity according to Urbina-Cardona et al. (2006) are very vulnerable to various disturbances that have an impact on reducing the quality of herpetofauna habitat (Figure 2). Location 1, which is adjacent to Betok Jaya Harbor, is often visited by ferries and various fishing boats. The activities of anchored ships can unwittingly damage coral reef ecosystems as found by Flynn (2015) and Nama et al. (2023) caused by anchor dropping and ship waste pollution. This can be seen from the condition of the coral reefs around location 1 which has been marked by coral bleaching. Thus, there is a need for proper management of ship activities and planned coral reef restoration actions should be implemented.

Location 2, which is the estuary of the Kelumpang River, is often used as a garbage dump by villagers. Trash can be a threat to herpetofauna, for example varanid lizard can be stuck in discarded drinks cans (Zdunek & Kolenda 2022) and microhabitat pollution by garbage

**Table 2.** Checklist of herpetofauna species that have been found on Karimata Island.

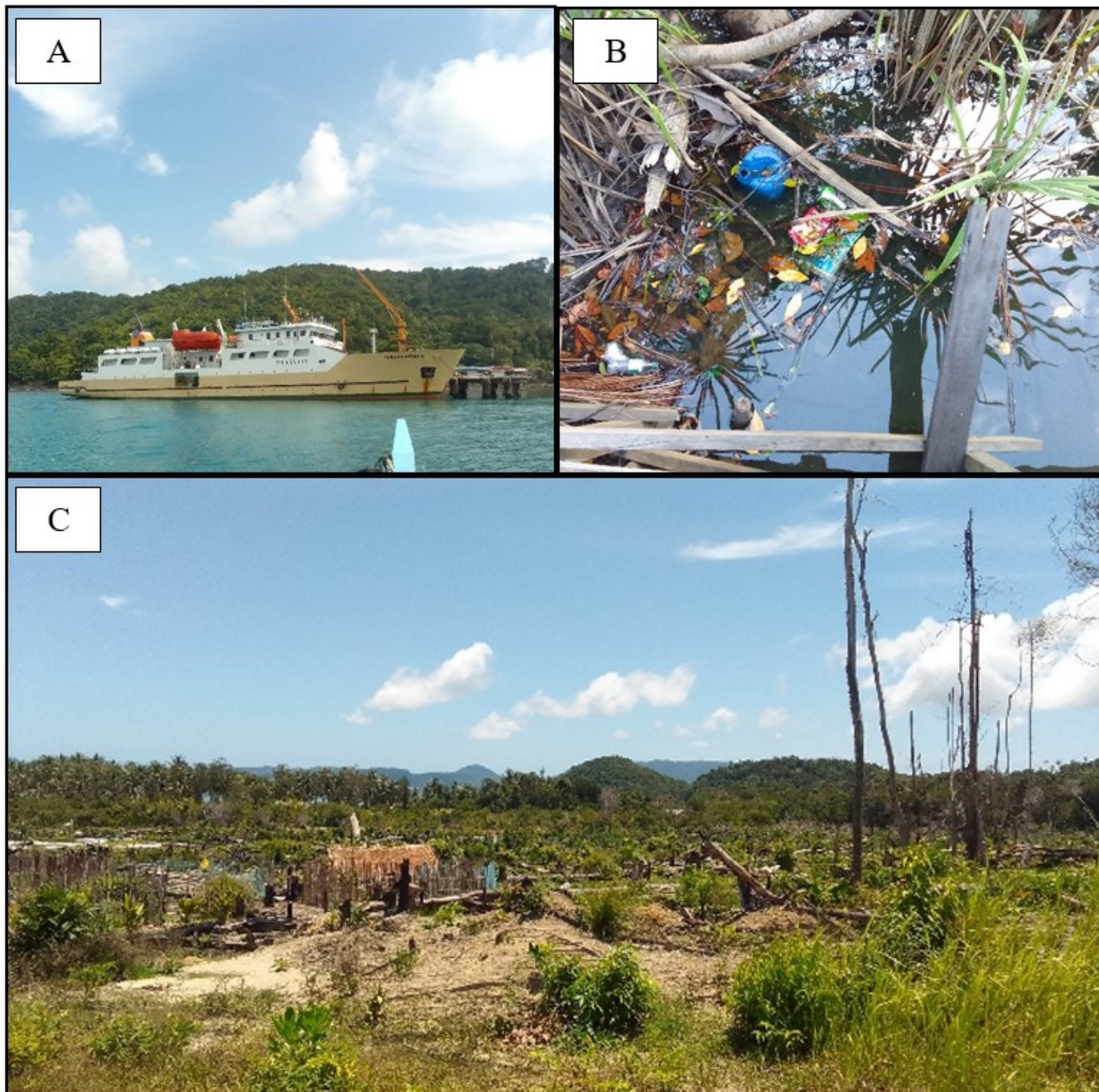
Family	Species	Observation result	
		Arifin et al. 2011	This survey
<b>Amphibians</b>			
Dicroglossidae	<i>Fejervarya cancrivora</i>	√	√
	<i>Limnonectes ingeri</i>	√	
	<i>Limnonectes malesianus</i>	√	
	<i>Limnonectes paramacrodon</i>	√	√
	<i>Limnonectes</i> sp. +		√
Megophryidae	<i>Leptotalax</i> cf. <i>gracilis</i>	√	
Ranidae	<i>Hylarana</i> ( <i>Chalcorana</i> ) cf. <i>raniceps</i>	√	√
	<i>Pulchrana baramica</i> +		√
	<i>Staurois guttatus</i>	√	
Rhacophoridae	<i>Philautus</i> sp.	√	
<b>Reptiles</b>			
Agamidae	<i>Draco</i> sp.	√	√
	<i>Gonocephalus liogaster</i>	√	
Colubridae	<i>Ahaetulla prasina</i>	√	
	<i>Boiga drapiezzi</i> +		√
	<i>Dendrelaphis haasi</i> +		√
	<i>Gonyosoma oxycephalum</i>	√	
	<i>Oligodon purpurascens</i>	√	
	<i>Xenochrophis trianguligerus</i> +		√
	<i>Crocodylus porosus</i> +		√
Elapidae	<i>Laticauda colubrina</i> +		√
Gekkonidae	<i>Cnemaspis kendallii</i>	√	
	<i>Cyrtodactylus</i> sp.	√	√
	<i>Gehyra mutilata</i> +		√
	<i>Gekko monarchus</i>	√	
	<i>Gekko gecko</i>	√	√
	<i>Hemidactylus frenatus</i>	√	√
	<i>H. platyurus</i> +		√
	<i>Batagur affinis</i>	√	
Geoemydidae	<i>Orlitia borneensis</i>	√	
	<i>Cerberus rynchops</i>	√	
Homalopsidae	<i>Cerberus schneiderii</i> +		√
	<i>Homalopsis buccata</i> +		√
	<i>Emoia atrocostata</i>	√	
Scincidae	<i>Eutropis multifasciata</i>	√	√
	<i>Lygosoma</i> ( <i>Subdoluseps</i> ) <i>bowringii</i>	√	
	<i>Tropidophorus beccarii</i>	√	
	<i>Indotyphlops braminus</i> +		√
Typhlopidae	<i>Varanus salvator</i> +		√
Varanidae	<i>Tropidolaemus subannulatus</i>	√	√
Viperidae			

Notes: +: new record

dumping site (Lubis et al. 2008; Botejue & Wattavidanage 2012). If no waste management is implemented on Karimata Island, not only the local herpetofauna is affected, but also large-scale habitat destruction can occur. Therefore, there is need for active socialization about waste management and even providing integrated waste bins to minimize the damage caused.

The conversion into areca nut (*Areca catechu*) plantations around location 3 can have an impact on the herpetofauna community, especially due the loss of habitat for herpetofauna in terms of diversity and complexity of natural forest. The loss of natural forest can significantly





**Figure 2.** Potential threats encountered during the survey for herpetofauna on Karimata Island (A) Location 1; (B) Location 2; (C) Location 3.

affect the heterogeneity of habitat (Lehtinen & Ramanamanjato 2006; Ghosh & Basu 2020). Findings by Kwatrina et al. (2019) and Wanger et al. (2010) showed that low herpetofauna diversity due to forest conversion. Thus, regular evaluation and monitoring is needed so that it does not spread to other areas.

In conclusion, herpetofauna found during the survey were 22 species divided into 5 species of amphibians and 17 species of reptiles. The population of herpetofauna found from Karimata Island is potentially threatened due to maritime transportation activities, waste pollution, and land clearing for plantations.

#### **AUTHOR CONTRIBUTION**

FWP, OF and ML collected and analyzed the data, FWP validated, analysed the data, and wrote the manuscript.

#### **ACKNOWLEDGMENTS**

We would like to thank the Government of Betok Jaya Village, Karimata

Island, West Kalimantan, especially the people of Kelumpang Hamlet for granting research permits. We also thank Mr. Abdul Manan, Mrs. Icha, and Mr. Muhammad for providing a place to stay during the survey.

### CONFLICT OF INTEREST

Please state any conflict of interest regarding the research or the research funding.

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