

Microhabitat Assessment of Mangrove Pit Viper *Cryptelytrops purpureomaculatus* in Restricted Mangrove Area, Dumai, Riau Province, Sumatera

Nia Kurniawan ^{1*}, Bagus Priambodo ¹, Fitra Arya Dwi Nugraha ¹, Andri Maulidi ¹, Agung Sih Kurnianto ²

¹ Biology Departement, Faculty Mathematics and Natural Sciences, Brawijaya University, Malang, Indonesia

² Post-Graduate Program, Brawijaya University, Malang, Indonesia

ABSTRACT

Bandar Bakau is a mangrove conservation area with approximately 20 ha that preserves many kinds of fauna, including mangrove pit viper *Cryptelytrops purpureomaculatus*. However, the settlements, industrial and harbor activities surrounding the area lead to conservation problems of mangrove pit viper. The main purpose of this study is to evaluate the microhabitat of mangrove pit viper *C. purpureomaculatus* that found at Bandar Bakau. Visual Encounter Survey and deep interview methods were used in this study. The survey found six individuals of *C. purpureomaculatus* that mostly basking on grey mangrove, *Avicennia marina*. It suggest that mangrove is an important habitat for *C. purpureomaculatus*. No snakebite cases were found at Bandar Bakau, despite the area has been used for tourism object and the snake often come into people houses to avoid the tidal wave. Local people aware to conserve mangrove pit viper species by not killing them as well as they conserve Bandar Bakau through several activities.

Keywords: Microhabitat, *Cryptelytrops purpureomaculatus*, Bandar Bakau, mangrove

INTRODUCTION

Mangrove pit viper is a venomous snake that widely distributed through the coastal area of South Myanmar, Thailand, Malaysia, Singapore, to Indonesia, especially Sumatera Island. Mangrove pit viper had long been classified as *Trimeresurus*, but then it was classified into *Cryptelytrops* genus [1]. In Sumatera, *C. purpureomaculatus* was reported in Indragiri, Riau Province [2]. *Cryptelytrops purpureomaculatus* is listed as Least Concern (LC) species due to its abundance and ranging in a wide distribution [3].

However, we have surveyed other areas that have suitable characteristic as *C. purpureomaculatus* habitat. One of the areas is Bandar Bakau which has mangrove communities. Bandar Bakau is a mangrove conservation area that basically organized by the local people in Dumai, Riau province, Sumatera Island. This area has long been threatened by the development of the settlement [4, 5], harbor and industrial area [6]. The condition may bring a high risk extinction of mangrove pit viper in Bandar Bakau as happened in Singapore [7].

Hence, the study of microhabitat in this area is important for the extinction risk assessment, although this area conserves 24 mangrove species and diverse fauna. Our study used the social and ecological approach in order to evaluate the microhabitat of mangrove pit viper at Bandar Bakau, Dumai, Riau Province, Sumatera Island.

MATERIALS AND METHODS

A field study was conducted on August 27-29, 2016, when nocturnal reptiles are appeared to do their activities and avoid the tide, between 2.00-5.00 pm and 6.00-9.00 pm [2,8]. The study was taken place at mangrove conservation area, Bandar Bakau, Dumai, Riau Province (Figure 1). The visual encounter survey technique (VES) was applied. The VES technique involves walking the tourism track by four surveyors systematically searching for *C. purpureomaculatus*. During the survey, all specimens found were photographed. The photographs were matched with referred Das (2015) and identified properly. We also recorded the behavior of *C. purpureomaculatus*, vegetation, and habitat. We im-

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*Corresponding author:

Nia Kurniawan

Biology Departement, Faculty Mathematics and Natural Sciences, Brawijaya University

Jalan Veteran, Malang, Indonesia 65145

E-mail: wawan@ub.ac.id



Figure 1. (A) Dumai in Sumatera island, (B) Bandar Bakau (C,D) Study area at Bandar Bakau and some spots of *C. purpureomaculatus* were found.



Figure 2. Two specimens of *C. purpureomaculatus*. The length of the body is 73.1 cm (left) and 69.2 cm (right)



Figure 3. The microhabitat of mangrove pit viper

plemented semi-structural deep interview ($n = 20$, including one key informant) on August 29-30, 2016 to explore local people knowledge on mangrove pit viper snakes, the way local people interact with snakes, incidences of the snake bite cases and the way local people conserve Bandar Bakau.

RESULTS AND DISCUSSION

The study area represents a condition of low light intensity, humid, warm and covered by flat mud and mangrove. We found six specimens at some random

locations, cover approximately 1600 m^2 (Table 1). The found specimens were greater than those in Singapore since [9] only found 2 specimens in the area. However, six specimens in Bandar Bakau were expected result, noting that Bandar Bakau ecosystem was already surrounded by the settlements, industrial area and human activities. It also represents that Bandar Bakau still had a good ecosystem. We found two variants color that represent polymorphism in mangrove pit viper species: dark purple and bright olive (Figure 2) [2, 9].

Grey mangrove, *Avicennia marina* is one of dominant mangrove species found during the observation (Figure 3). These trees are suitable for the habitat of the snakes, especially for resting or basking on its low branch ($\pm 0.5 \text{ m}$ above the ground) [10, 11]. Four of six specimens were found in *A. marina* tree, either resting or basking (Table 1). However, it would be possible temporally because the snakes need to rest by day and then hunt back to the mangrove ecosystem by night. Another possibility is that preys such rat moved to the buildings and settlements around the mangrove, hence the snakes moved as their preys did. However, the last possibility is need to be confirmed by further studies, since mangrove ecosystem provide diverse food for mangrove pit viper.

Two other specimens were found on the buildings (Table 1). This was unique since the snakes are very rare found in the artificial habitat [2, 9, 10]. Local people explained that snakes usually avoid the tides by climbing the higher branch or entering people's house. Dock and guardhouse that built for the tourism purpose were also incidentally used as unusual habitat for the mangrove pit viper. Based on interview, 85% of informants understood that mangrove pit viper were venomous, named as *Ulo Bakau*.

Interestingly, there was no record of snakebite cases since the Bandar Bakau was opened for public in 1999 [12]. The management institutions of Bandar Bakau and local people told us that they incidentally found 1-4 snakes on the tourism track in one day. Fortunately, local people have high awareness on the conservation action by not killing the snakes without an appropriate reason. They just remove the snakes to the save area. The snakes are not aggressive, they only attacked when feeling provoked [2].

Mangrove ecosystem takes an important part as the habitat of mangrove pit viper supported by its ecological roles [13], such as providing a suitable temperature [14]. Other ecological type seems not to be preferred by mangrove pit viper [2, 9, 10]. Bandar Bakau with a

Table 1. Characteristics and microhabitats of *C. purpureomaculatus*

	Specimens					
	1	2	3	4	5	6
The approximate of Total Length (cm)	48	75	25	60	50	20
Time (pm)	03.53	04.10	04.47	06.03	06.29	06.47
The Observed Activity	Resting inside the tree hole	Basking on the timber construction	Slither on the low canopy	Basking on the stem	Basking on the stem	Basking on the wooden board
condition	Vegetation	<i>Avicennia marina</i>	No, next to the <i>Avicennia marina</i>	<i>Avicennia marina</i>	<i>Avicennia marina</i>	Next to the <i>Avicennia marina</i>
	Artificial habitat	No	Yes, under the construction	No, next to the building	No	No
	Light	Low, covered by the canopy	Low, covered by the canopy	Extremely low, during the night	Low, covered by the canopy	Low, covered by the canopy

wide of approximately 20 ha and bordered by the settlement, industrial area, and harbor, provides a restricted habitat for the mangrove pit viper.

Bandar Bakau with the flora and fauna inside, especially mangrove pit viper is still facing numerous problems by industrial area, settlements and human activities [4, 5, 6, 13, 15] and it would be more serious conservation problem in the future if conservation action late to be undertaken by every stakeholders. Fortunately, local people has initiated to take conservation action such the establishment of ecotourism [12, 16]. The information of the herpetofauna diversity in an area is important will help to determine the ecosystem quality. Moreover, this information also helps to establish the conservation policies of mangrove [17]. Therefore, hopefully, next study is focused on assessment the ability of mangrove communities to protect many endangered species within and the threats to this vulnerable area.

CONCLUSION

We found six specimens of *C. purpureomaculatus* at about 1600 m² of the observation area. They were found more frequently at *A. marina* tree while others on artificial buildings with \pm 0.5 m height from the ground. Artificial habitat was new record for mangrove pit viper but it needs to be studied further. Bandar Bakau is threatened by the development of buildings and industries thus it need to be managed carefully in order to conserve the fauna.

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REFERENCES

- Malhotra A, Thorpe RS (2004) A phylogeny of four mitochondrial gene regions suggests a revised taxonomy for Asian pit vipers (*Trimeresurus* and *Ovophis*). *Molecular Phylogenetics and Evolution* 32 (1): 83-100. doi: 10.1016/j.ympev.2004.02.008.
- Vogel G, Grismer L, Chan-Ard T (2012) *Cryptelytropis purpureomaculatus*. The IUCN Red List of Threatened Species 2012. <http://www.iucnredlist.org/>. Accessed: December 2016.
- Das I (2015) A field guide to the reptiles of South-East Asia. London, Bloomsbury Publishing Plc.
- Chen L, Wenqing W, Yihui Z, Guanghui L (2009) Recent progresses in mangrove conservation, restoration and research in China. *Journal of Plant Ecology, Oxford Journals* 2 (2): 45-54. doi: 10.1093/jpe/rtp009.
- Zhou J (2013) China's rise and environmental degradation: the way out. *International Journal of China Studies* 4 (1): 17-39.
- Ahuti S (2015) Industrial growth and environmental degradation. *International Education and Research Journal* 1 (5): 5-7.
- Davison GWH, Ng PKL, Chew H (2008) The Singapore Red Data Book: Threatened plants and animals of Singapore. Singapore, Nature Society.
- Tides4fishing (2016) Tides and solunar charts for Bagan Siapi-Api (Sungai Rokan). <http://tides4fishing.com/>. Accessed: December 2016.
- Yeo WL, Hui TH (2016) Mangrove pit-vipers at Pasir Ris

- and Sungei Buloh. Singapore, National University of Singapore.
10. David P, Vogel G (1996) Snakes of Sumatra. An annotated checklist and key with natural history notes. Frankfurt am Main, Edition Chimaira.
11. van Dijk PP, Nabhitabhata J, Cox M, Thirakhupt K (1998) A Photographic guide to snakes and other reptiles of Thailand, Peninsular Malaysia and Singapore. London, New Holland Ltd.
12. Media Center (2016) Konservasi Bandar Bakau Dumai raih penghargaan nasional. <http://mediacenter.riau.go.id/>. Accessed: January 2017.
13. Naha D, Jhala YV, Qureshi Q et al. (2016) Ranging, activity and habitat use by tigers in the mangrove forests of the Sundarban. PLoS ONE 11(4): e0152119. doi:10.1371/journal.pone.0152119.
14. Hendy I, Michie L, Taylor BW (2014) Habitat creation and biodiversity maintenance in mangrove forests: Tere-dinid bivalves as ecosystem engineers. PeerJ 2: e591. doi: 10.7717/peerj.591.
15. Biswas, Shekhar R, Khan S, Mallik AU (2012) Invaders' control on post-disturbance succession in coastal mangroves. Journal of Plant Ecology 5 (2): 157–166. doi: 10.1093/jpe/rtr050.
16. Bertuah (2016) Ekowisata Bandar Bakau Dumai. <http://bertuah.or.id/>. Accessed: January 2017.
17. Atkinson SC, Jupiter SD, Adams VM et al. (2016) Prioritising mangrove ecosystem services results in spatially variable management priorities. PLoS ONE 11(3): e0151992. doi: 10.1371/journal.pone.0151992.