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A Preliminary Survey of Siamese Crocodile Habitat Preferences:

Floating Vegetation on Lake Mesangat, Muara Ancalong, East Kutai, Indonesia

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ABSTRACT

Floating vegetation is one of the biotic components in the Mesangat Lake ecosystem, which plays an essential role for Siamese crocodiles. Floating plants in the Mesangat Lake can be used as an indicator of habitat preferences and Siamese crocodiles' success rate in nesting. This research aimed to find out floating plants that dominate Mesangat Lake, especially when the probability of encountering the crocodile is high. A visual encounter survey with patch sampling was used in this research. We found twelve main species of floating plant species in the Mesangat Lake, dominated by *Leersia hexandra* (36%), followed by *Cyperus rotundus* (19%) and *Eichhornia crassipes* (15%). *L. hexandra* and *C. rotundus* are potential resources of nesting materials for Siamese crocodiles. On the other hand, *E. crassipes* is possibly not an option for nesting. *E. crassipes* is considered an invasive aquatic plant and could represent disrupted habitats in the wetland. Since the presence of this plant species is not dominant in Lake Mesangat, we predict that the habitat is still relatively suitable to support the Siamese crocodiles population.

Keywords: *Siamese crocodile, Habitat preference, Floating vegetation, Mesangat Lake*

1. INTRODUCTION

Siamese crocodile (*Crocodylus siamensis* (Schneider, 1801)) is one of the most threatened crocodile species among crocodiles around the world [1]. Species that live in various freshwater habitats such as rivers and near the lake slowly, permanently, and seasonal, are overgrown with vegetation and floating marshes until at an altitude of 730 m above sea level [2,3,4,5]. Although this species is already more than 200 years ago, almost none of its ecological information [4,6]. Although *C. siamensis* previously distributed throughout mainland Southeast Asia including Indonesia's territory as well as some of the remaining population in the wild is limited to remote locations in Cambodia, Laos, and East Kalimantan in Indonesia [2,3,4,5,7,8,9,10]

Lake Mesangat is suggested to be the last remaining habitat of the Siamese crocodiles in Indonesia. Located in Muara Ancalong sub-district, East Kutai district of East Kalimantan, this wetland area is characterized by swamp plants' floating vegetation. It continues to form a mixed swamp forest [13]. The Wetland International – Indonesia Programme has proposed Mesangat Lake as a conservation area within a wetland agriculture matrix [12]. Siamese crocodile population in the area is estimated less than 30 individuals [11]. In addition to the Siamese crocodiles, there is also false gharial (*Tomistoma schlegelii*) which is only found in the flooded forest area or on the river with the suburbs dry [14].

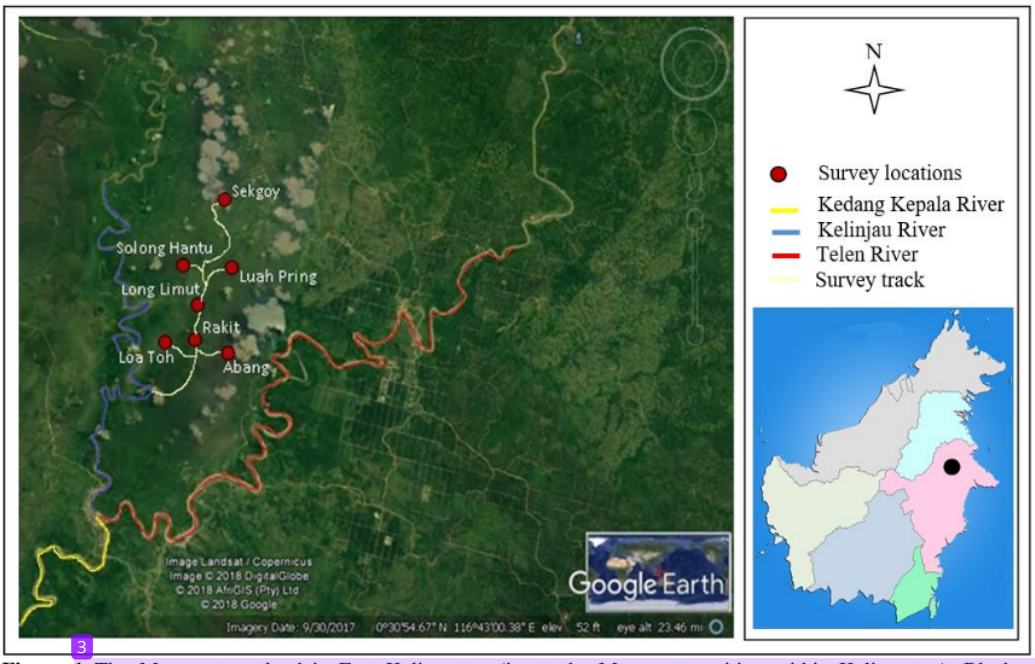

Figure 1 The Mesangat wetland in East Kalimantan (inset: the Mesangat position within Kalimantan). Black – Villages; White with Red dot – Survey locations; maps modified after © Google Earth).

Based on habitat suitability, most species distribution areas still be appropriate habitat around 46% [15]. About 63% reside in Cambodia from the relevant region area, and only 39% in Borneo (Kalimantan). However, only a fraction of the proper habitat (11%) is located in areas protected. While in Borneo alone, only ranges between 2%-7% are included in the protected area. However, the potentially suitable habitat in Kalimantan belongs to small. The population's potential needs to be taken into account based on a field survey. The variable prediction based on satellite imagery cannot be guessed in detail conditions of habitat and estimate the population. Habitat conditions may affect the Siamese crocodile population's existence, especially in areas for activity, rest, and reproduction. The Siamese crocodile's nest was made generally floating on the water vegetation's surface is relatively extensive [13,14,16]. Floating vegetation cover change from year to year is very likely to occur, and the condition will undoubtedly affect the activity of nesting for crocodiles. This study was conducted to find out the floating vegetation cover change as the preference for the habitat's suitability.

2. MATERIAL AND METHODS

This study was carried out in April of 2018 at Lake Mesangat, Muara Ancalong, Kutai Timur, Kalimantan Timur. The Mesangat wetland is located between two rivers, the Kelinjau and the Telen, joining their junction downstream to form the Kedang Kepala, which flows into the Mahakam. The area of Lake Mesangat contained an open location that created a lake which the local fishermen know as Abang, Long Balau, Loa Toh, Sekgoy and Solong Hantu (Figure 1). These locations were selected based on local fishermen's activity due to their ease of access and abundant fish results. In open areas, the water surface is covered almost entirely with floating vegetation.

The methods used in this research is a visual encounter survey with a patch sampling of the selected location. A survey using a boat on the appropriate habitat in open areas that overgrown vegetation floating. Measurement of floating vegetation in a manner surrounded the boat on the vegetation of the area. Coordinates all selected locations are recorded using the Garmin GPSmap 60CSx and Avenza maps application. The survey Area covers location: Abang (50 N 467121 55158), Long Balau (50 N 465956 56265), Loa Toh (50 N 465890 55567), Sekgoy (50 N 465048 62367), Solong Hantu (50 N 465177 58450). Floating vegetation of the area is measured based on the GPS track recording.

Table 1. Table 1. Floating vegetation diversity of Mesangat Lake: Comparison with the results of earlier research. " √ " = present; " √* " = Dominant

Floating Vegetation	Research Result					
	Kurniati (2008)	Staniewicz (2011)	Stuebing (2015)	Platt (2018)	Behler (2018)	Recent Survey
Leersia hexandra	√				√	√*
Cyperus rotundus					√	√*
Diplazium sp						√
Ludwigia octovalvis						√
Panicum sp.						√
Eichhornia crassipes	√*	√*	√*	√*	√*	√*
Scleria sumatrana	√				√	√
Salvinia molesta,			√*	√*		√
Nymphoides sp.						√
Polygonum barbatum						√
Hanguana malayana	√*			√*	√	√
Polygonum sp.						√
Ipomea aquatic		√*			√	√
Salvinia cucullata		√*			√*	
Hymenachne acutigluma					√	
Imperata cylindrica					√	
Miscanthus sp.					√	
Salvinia terrestris					√	
Nelumbo sp.				√*		
Thoracostachyum sumatranum	√					

3. RESULTS AND DISCUSSION

Some of the observed floating vegetation on land coverage area at Lake Mesangat, Muara Ancalong, Kutai Timur, Kalimantan Timur. The floating vegetation includes: *Leersia hexandra*, *Cyperus rotundus*, *Diplazium* sp., *Ludwigia octovalvis*, *Panicum* sp., *Eichhornia crassipes*, *Salvinia molesta*, *Scleria sumatrana*, *Nymphoides* sp., *Polygonum barbatum*, *Hanguana malayana*, *Polygonum* sp., *Ipomea aquatica*. Some of the vegetation of the results of the survey conducted by the [17] has many similarities, including the following species: *Eichhornia crassipes*, *Hanguana malayana*, *Leersia hexandra*, aquatic *Ipomea*, *Scleria sumatrana*, *Cyperus rotundus* and several other species different: *Salvinia cucullata*, *Imperata cylindrica*, *Hymenachne acutigluma*, *Miscanthus* sp., *Salvinia terrestris*. Whereas ten years earlier, floating vegetation consists of some of the same species: *Hanguana malayana*, *Leersia hexandra*, *Scleria* sp., *Eichhornia crassipes* and except *Thoracostachyum sumatranum* [18].

Floating vegetation is dominated by *Leersia hexandra* (36%), *Cyperus rotundus* (19%), and *Eichhornia crassipes* (15%) (Table 1). The research of [16] mentioned that the floating vegetation Eichhornia crassipes is dominating and *Salvinia molesta*. Almost all open acreage, particularly Abang and Long Balau is covered by floating vegetation, including *Eichornia crassipres*, *Salvinia cucullata* [17] and *Ipomea aquatica* [14]. Another study mentions the floating vegetation species dominated by *Hanguana malayana*, *Nelumbo* sp., *Eichornia crassipes*, and *Salvinia molesta* [19].

The previous research only focused on the condition of the Siamese Crocodile population [14,16,18,19]. Only a few research has identified floating vegetation [17]. However, the study only informed the kind of floating vegetation, which tends to dominate the area. No estimate has been conducted on floating vegetation cover in the area. From previous research to date, *Eichhornia crassipes* remains dominant. Seasonal changes can cause changes in the composition of floating vegetation.

4. CONCLUSIONS

Vegetation cover changes have occurred in Mesangat Lake's waters, floating with the addition of new species and the loss of some species. Only certain species can survive until now, mainly the invasive. Lake Mesangat can not hold water in the dry season to the rainy season caused the switchover of speed the vegetation change. Despite this, Mesangat Lake can still be categorized as a suitable habitat. Based on observations of the overall span of the Mesangat wetlands, then more precisely called freshwater swamp than a lake.

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