

## An Analysis of Recent Crocodile Attacks in the Republic of Indonesia - a Case Study on the Utility of the CrocBITE Database

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### Abstract

As the country with the highest number of recent attack reports and very little crocodile population data, Indonesia is a perfect example of how CrocBITE can be used as a tool to help inform crocodilian conservation and management. Indonesia is a large, heavily populated nation composed of 34 provinces over an archipelago of 17,508 islands. There are currently four recognized crocodilian species in Indonesia - Saltwater crocodile (*Crocodylus porosus*), Siamese crocodile (*C. siamensis*), New Guinea freshwater crocodile (*C. novaeguineae*) and Tomistoma (*Tomistoma schlegelii*). Between 1 January 2007 and 6 June 2014 we recorded 279 crocodilian attacks resulting in 139 deaths in 27 of the 34 provinces. Attack reports were acquired almost entirely from online news reports, the vast majority of which were reported solely in the Indonesian language. The majority of attacks and deaths were attributed to *C. porosus* (268 attacks resulting in 135 deaths), while *T. schlegelii* was responsible for a small number of attacks and deaths (10 attacks resulting in 4 deaths); a single non-fatal attack was attributed to *C. siamensis*. The information derived from these attacks provides us with important information regarding human-crocodile conflict within Indonesia and which problem areas likely require greater attention.

### Introduction

Indonesia is a very large, heavily populated tropical archipelago nation covering over 1.9 million square kilometres and consisting of 17,508 islands over 34 provinces. The current human population of Indonesia is over 253 million people and covers a large number of ethnic groups speaking over 700 different languages (The World Factbook). There are currently four recognized crocodilian species present within the country - Saltwater crocodile (*Crocodylus porosus*), Siamese crocodile (*C. siamensis*), New Guinea freshwater crocodile (*C. novaeguineae*) and Tomistoma (*Tomistoma schlegelii*). The worldwide crocodilian attack database (CrocBITE/www.crocodile-attack.info) has allowed us to examine current and historical crocodilian attack reports. Historical attack reports suggest a much wider distribution for crocodilians in Indonesia during historic times than today. Our more recent attack data, combined with relevant publications regarding population status, suggest that crocodilians are still present throughout the lowlands of Sumatra, Kalimantan (Borneo), Sulawesi, Papua, and many of the smaller islands. On Java the only recent records of attacks on humans have come from western Banten province near Ujung Kulon National Park. The large size and number of islands present within Indonesia, combined with the numerous different ethnic groups present and widely varying infrastructure throughout parts of the archipelago, makes the obtaining of crocodilian attack records quite difficult. In addition, nearly all attacks that are reported by the media never go beyond the local Indonesian language news services.

### Methods

Nearly all of the attack records we have obtained from Indonesia came from online news articles that were mostly reported locally and exclusively in the Indonesian language. We used online search engines to find attack reports; important search terms for finding attacks included “buaya diterkam” (“crocodile pounced”), “buaya dimangsa” (“eaten by crocodile”), etc. Online translation tools were then used to translate the articles into the English language. Most of these Indonesian attack articles provided detailed location

specifics, including river (“sungai”), village (“desa”), sub-district (“kecamatan”) and regency (“kabupaten”). Attack location was usually limited to waterbody and precise location was rarely known, thus the coordinates used for the attack location specify the general area in which the attack may have occurred. Some articles even provided information on which species may have been responsible, which was particularly useful in areas where the determination of the responsible species was difficult (eg non-fatal attacks in far inland areas); “buaya muara” (which translates to “estuary crocodile”) referred to *C. porosus*, while “buaya supit” (which translates to “chopstick crocodile”) referred to *T. schlegelii*. In most cases however, *C. porosus* was the obvious culprit given habitat type or location; in addition, in most areas *C. porosus* is the only species known to be present. The details of the attack were then entered into an Excel database before being transferred to the online CrocBITE database and publically displayed. Historical attack data (19th Century through to the mid-20th Century) came from news archives of the Dutch East Indies in the Dutch language. The historical data is significantly more limited and less accurate than the modern data, but has nonetheless provided interesting information. There is a noticeable blind-spot in our data from 1960 through 2000, likely due to Indonesian language news archives from this period not being available.

## Results

Historical attack data for Indonesia is very limited and sporadic, but so far we have been able to find 131 attacks resulting in 76 deaths dating from 1854 to 1957. New historical reports are consistently found and put into the CrocBITE database. While the historical data is too sparse to providing any useful analysis of historic attack trends, it does provide us with details on the historical distribution of crocodiles (primarily *C. porosus*) within Indonesia and attack frequency in highly-populated areas from which crocodiles have been extirpated in modern times. Historically, attacks were frequently reported from Java, including within the major cities of Jakarta, Semarang and Surabaya. Attacks were also frequently reported from North Sumatra (particularly around Tanjung Balai, where a ban on bathing was reportedly considered during the mid-1930s) and from within the city of Banjarmasin, South Kalimantan. Inland records also suggest a much wider historic distribution of crocodiles in portions of Indonesia than in the present day- attacks were reported from North Sumatra in the Batang Gadis Marsh, an inland valley south of Padang Sidempuan, and from near Pematang Siantar, approximately 33 km east of Lake Toba.

Modern attack reports are, however, much more numerous and useful. For 1 January 2007 to 6 June 2014 we recorded 279 crocodylian attacks resulting in 139 deaths (49.8% fatality rate); the more numerous reports are from the years 2010 through 2014 and this is likely due to the disappearance of media reports from the internet (we didn't start collecting data until October of 2010), rather than an actual increase in the numbers of attacks. Unsurprisingly, the majority of attacks (96.1%) and deaths (97.1%) were attributed to *C. porosus*, while a small number were also attributed to *T. schlegelii* (10 attacks resulting in 4 deaths) and a single non-fatal attack was attributed to *C. siamensis*. Attacks were only attributed to *T. schlegelii* under specific circumstances, including if (in a fatal attack) the victim's remains were recovered from the Tomistoma, if (in a non-fatal attack) the species was positively identified by the victim or if crocodile specialists with knowledge of the attack location or circumstances suggested that the attack was more indicative of *T. schlegelii* than *C. porosus*. The single non-fatal *C. siamensis* incident may have been a case of unintentional provocation by the victim (Agata Staniewicz, pers. comm.). No attacks were attributed to *C. novaeguineae*, although it is possible that attacks did occur, as no attack information for any species is available from the mainland portions of Papua and West Papua where *C. novaeguineae* is present. Skins larger than 3.5 m in length for this species are apparently “regularly reported” from the Sepik River region in neighboring Papua New Guinea (Cox 2010), thus the species certainly grows large enough to represent a potential danger to humans.

Specific provinces and regencies have been the site of high levels of attack frequency. The province with the highest number of reports was East Kalimantan with 40 attacks resulting in 25 deaths, the majority of

these reports came from Kutai Kartanegara regency (eg Mahakam River Delta, Santan River) and East Kutai regency (eg Bengalon River, Sangatta River). It is worth mentioning that the number of attacks reported from East Kalimantan has dropped during the past 2 years. The province of South Sumatra had reports of 27 attacks resulting in 20 deaths; the majority of these attacks (85.2%) and deaths (90%) were reported from the Banyuasin regency. The eastern Lesser Sunda Islands province of East Nusa Tenggara had reports of 28 attacks resulting in 14 deaths; the majority of these attacks were reported from Kupang regency (West Timor) and Lembata regency (Lembata Island). Other provinces with high attack report frequency were Riau (25 attacks resulting in 12 deaths), Bangka-Belitung (33 attacks resulting in 11 deaths), Lampung (19 attacks resulting in 9 deaths), Central Kalimantan, and West Kalimantan (each reporting 12 attacks resulting in 7 deaths).

In addition to providing important information on human-crocodile conflict, the Indonesian portion of the CrocBITE database has also revealed some very interesting recent species distribution records through the reporting of attacks. The current distribution of *C. porosus* within Indonesia is poorly known, thus such distribution reports provide useful information. It is unclear if attacks in an area signify a resident crocodile population or itinerant animals and all reports presumably involve *C. porosus*. The small island of Lembata lies approximately 40 km to the east of Flores Island and approximately 100 km northwest of Timor in East Nusa Tenggara Province. From December 2011 through June 2014 8 crocodile attacks resulting in 4 deaths were reported from Lembata's coastal estuaries and beaches. The attack reports suggested that the locals were familiar with crocodiles and viewed them with reverence in much the same way as the Timorese. A single fatal attack was also reported from Flores Island itself, specifically at Lembor in West Manggarai regency in western Flores. Only one non-fatal attack was reported from the western Lesser Sunda Islands province of West Nusa Tenggara. This report came from Woja in Dompu regency on Sumbawa Island. The Riau Islands province had non-fatal attack reports from Great Karimun Island and Bintan Island (both near Singapore), as well as from Lingga Island to the south. Interesting inland attack reports came from Tugumulyo and Purwodadi in the Musi Rawas regency of South Sumatra (approximately 500 km upriver) and the Kuantan Singingi regency of Riau (approximately 375 km upriver); later news reports warning of the crocodile danger in Musi Rawas stated that the crocodile involved was "buaya muara" (*C. porosus*).

Of the 249 attacks in which the sex of the victim was provided, males comprised the majority of victims (77.3%) and deaths (79.1%) within Indonesia. The most common activities associated with attacks were fishing (36.8%), bathing (17.6%) and swimming (14.7%). Fishing activities were defined as any activity where the victim was intentionally attracting or catching fish in the attack area (eg placing/retrieving fishing/shrimp nets, collecting clams or crabs, etc.) since such activities may have caused the crocodile to be attracted to the area. Bathing activities included ritual washings (ablutions), washing faces/feet, etc. and swimming activities included diving for shells, snorkeling, etc. The highest number of attack victims were in the 11-20 year old, 31-40 year old and 41-50 year old age groups, while the highest fatality rates came from the 1-10 year old and 11-20 year old (children and teenagers) age groups.

In some portions of Indonesia the killing of crocodiles in retaliation to attacks appears to be a problem. In recent years there have been numerous reports from Bangka Island of *C. porosus* of all size classes being killed following attacks on humans. On Bangka Island many of these attacks occurred in tin mines and on tin mine workers. In some attack reports from various parts of Indonesia local residents suggested that crocodile attacks did not occur or were rare prior to the destruction of crocodile habitat within the region (in many cases reportedly to make way for oil palm plantations, timber or mining).

## Discussion

In the future we hope to find better regional contacts within portions of Indonesia; the country is so large and diverse (ethnically, geographically, etc.) that contacts for particular regions within the country would be very helpful. Of particular importance would be the provinces of Papua and West Papua, from which we

have no attack data, and from the Maluku Islands, from which we have limited attack data. We also plan on seeking funding for localized human-crocodile conflict surveys in hot-spot regions; these surveys would include interviews/questionnaires with local people, visiting attack sites, determining the level to which attacks may go unreported, localized surveys for crocodile presence, etc. Similar surveys have been conducted by the Madras Crocodile Trust in the Maharashtra state of India (Whitaker 2007) and Little Andaman Island of the Andaman & Nicobar Islands (Whitaker 2008).

## References

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