The Estuarine Crocodile (*Crocodylus porosus*) is one of the world's most well-known crocodile species, as it is one of the largest of present-day reptiles, and a macro-predator of large mammals. It inhabits both marine and freshwater habitats. Crocodiles are a living link with the dinosaur-like reptiles of prehistoric times and are the nearest living relatives of birds, and have been in existence for the past 200 million years. Crocodiles loom large in human imagination and perceptions amongst many local communities in Sarawak. Without a better understanding on the nature, biology and ecology of crocodiles, these perceptions can create antagonistic attitude towards the species. Better understanding of crocodiles would also allow improved management of the species. Estuarine Crocodile has been widely studied elsewhere, but in Sarawak, Malaysia, have been limited. In Sarawak, the species is protected under Wild Life Protection Ordinance, 1998 and has been down-listed to CITES Appendix II, allowing trade of the species taken from the wild. Thus a study on ecology of the species in Kuching Wetland National Park (KWNP), an analysis on possible factors that lead to increase in Human-Crocodile Conflict in Sarawak and the introduction of a Management Plan for the species within the State for a period from 2016 until 2020 were conducted. The study was aimed at investigating its habitat use within the Park, to test for effect of forest cover, tidal and lunar cycles on its activities, abundance and distribution within the area. The study also aimed to determine population structure and dietary preference of the species, particularly juveniles. On the other hand, the aims of the Human-Crocodile Conflict analysis are to identify factors associated with attacks, and to address the issues while the introduction of the management plan aims to reduce conflict, guiding the Government and the general public on sustainable management of crocodile and assure returns for local communities and the State of Sarawak

from commercialization of the species. The study shows that all four size classes of the Estuarine Crocodiles inhabit the Park all year round, with a peak of its breeding season in the months of August and September, indicating that KWNP is of Type-I habitat for the species. Clearing of mangrove forests along Sungai Lemidin Besar and Sungai Lemidin Kecil affects distribution, abundance and activities of hatchlings along the rivers, as the area could no longer support food supplies for hatchlings and nesting materials for adults. Conversely, the absence of forest cover and vegetation do not affect activities of adult crocodiles. Activity pattern of the species in KWNP was not significantly affected by lunar cycles, though adults seemed to be more wary towards humans during bright moon-lit nights. Tide levels also did not seem to affect activities of all size classes of the species. The study also shows that Estuarine Crocodiles in KWNP were not evenly distributed along rivers, but tend to congregate at parts of the Park, presumably with greater food sources and forest cover. Analysis on Human-Crocodile Conflict shows that most of the attacks over the last 23 years were associated with activities of its victims such as bathing, wading or fishing in rivers during late afternoons or at dusk. Though Estuarine Crocodiles are predators and opportunistic feeders, the attacks that occur at dusk might be due to mistaken identity for monkeys. The implementation of the management plan for crocodile in Sarawak has the potential to reduce the rate of crocodile attacks on humans while at the same time would ensure sustainable management of the species in the State.

Keyword: Macro-predator, antagonistic attitude, prehistoric time, habitat, lunar cycle

Ekologi Populasi Buaya Katak, <u>Crocodylus porosus</u> di Taman Negara Kuching Wetlands (KWNP), Konfliks Manusia-Buaya di Sarawak dan Pelan Pengurusan untuk Buaya di Sarawak, 2016-2020, Sarawak, Malaysia (Borneo)

ABSTRAK

Buaya katak (Crocodylus porosus) adalah antara spesies buaya yang amat dikenali di dunia sebagai haiwan reptilia yang terbesar pada hari ini yang merupakan pemangsa-makro haiwan-haiwan mamalia yang bersaiz besar. Spesies ini mendiami habitat air masin, air tawar dan darat. Buaya, yang telah wujud sejak 200 juta tahun yang lalu, mempunyai pertalian dengan haiwan reptilia yang menyerupai dinosur pada zaman silam dan juga dengan spesies burung. Buaya sering menjadi igauan ngeri yang menimbulkan pandangan negatif di kalangan kebanyakan masyarakat tempatan di Sarawak. Tanpa pengetahuan tentang biologi dan ekologi buaya, pandangan negatif tersebut boleh menimbulkan sikap antagonistik terhadap spesies ini. Pengetahuan tentang biologi dan ekologi buaya membolehkan pengurusan yang lebih baik untuk spesies ini dan dapat mengurangkan konflik Manusia-Buaya. Banyak kajian telah dijalankan terhadap buaya katak di dunia tetapi di Sarawak kajian sedemikian amat terhad. Di Sarawak buaya katak adalah terlinding di bawah Wild Life Protection Ordinance, 1998 dan disenaraikan dalam Appendiks II, CITES, membolehkan pemburuan komersial dilakukan terhadap spesies ini. Oleh yang sedemikian, satu kajian ekologi terhadap buaya katak di KWNP dijalankan untuk menentukan penggunaan habitat, kesan litupan hutan, kesan air pasang-surut dan kesan kitaran lunar terhadap aktiviti, kelimpahan dan taburan spesies tersebut di KWNP. Kajian tersebut juga bertujuan untuk menentukan struktur populasi dan jenis pemakanan anak-anak buaya di KWNP. Analisis berkenaan Konfliks Manusia-Buaya di Sarawak bertujuan untuk mengenalpasti punca serangan tersebut demi membolehkan serangan dibendung dimasa yang akan datang. Pengenalan pelan pengurusan buaya pada kajian ini

pula bertujuan untuk memberi panduan kepada kerajaan serta orang awam untuk melakukan pengurusan buaya secara mampan, pada masa yang sama mengurangkan konflik tersebut di masa yang akan datang. Kajian ini menunjukkan KWNP menampung kesemua empat saiz kelas buaya katak disepanjang tahun, dengan kemuncak pembiakan berlaku pada bulan Ogos dan September, menunjukkan KWNP adalah 'Type-I Habitat' untuk spesies tersebut. Pembersihan hutan di Sungai Lemidin Besar dan Sungai Lemidin Kecil telah menjejaskan taburan, kelimpahan dan aktiviti anak-anak buaya di kawasan tersebut, mungkin disebabkan kurangnya habitat untuk membekalkan makanan untuk anak-anak buaya disamping tiada tempat untuk bertelur. Sebaliknya, ketiadaan litupan hutan tidak menjejaskan aktiviti buaya katak dewasa. Tidak seperti kebanyakan spesies lain, kitaran lunar tidak menjejaskan aktiviti buaya katak di KWNP walaupun buaya dewasa menjadi lebih liar semasa terang bulan diwaktu malam. Aktiviti buaya katak juga tidak terjejas oleh air pasang-surut. Taburan buaya katak disepanjang sungai-sungai di KWNP didapati tidak seragam dan lebih banyak tertumpu di bahagian sungai yang mempunyai banyak sumber makanan dan litupan hutan.

Kata kunci: *Pemangsa-makro, sikap antagonistic, zaman silam, habitat, kitaran lunar*