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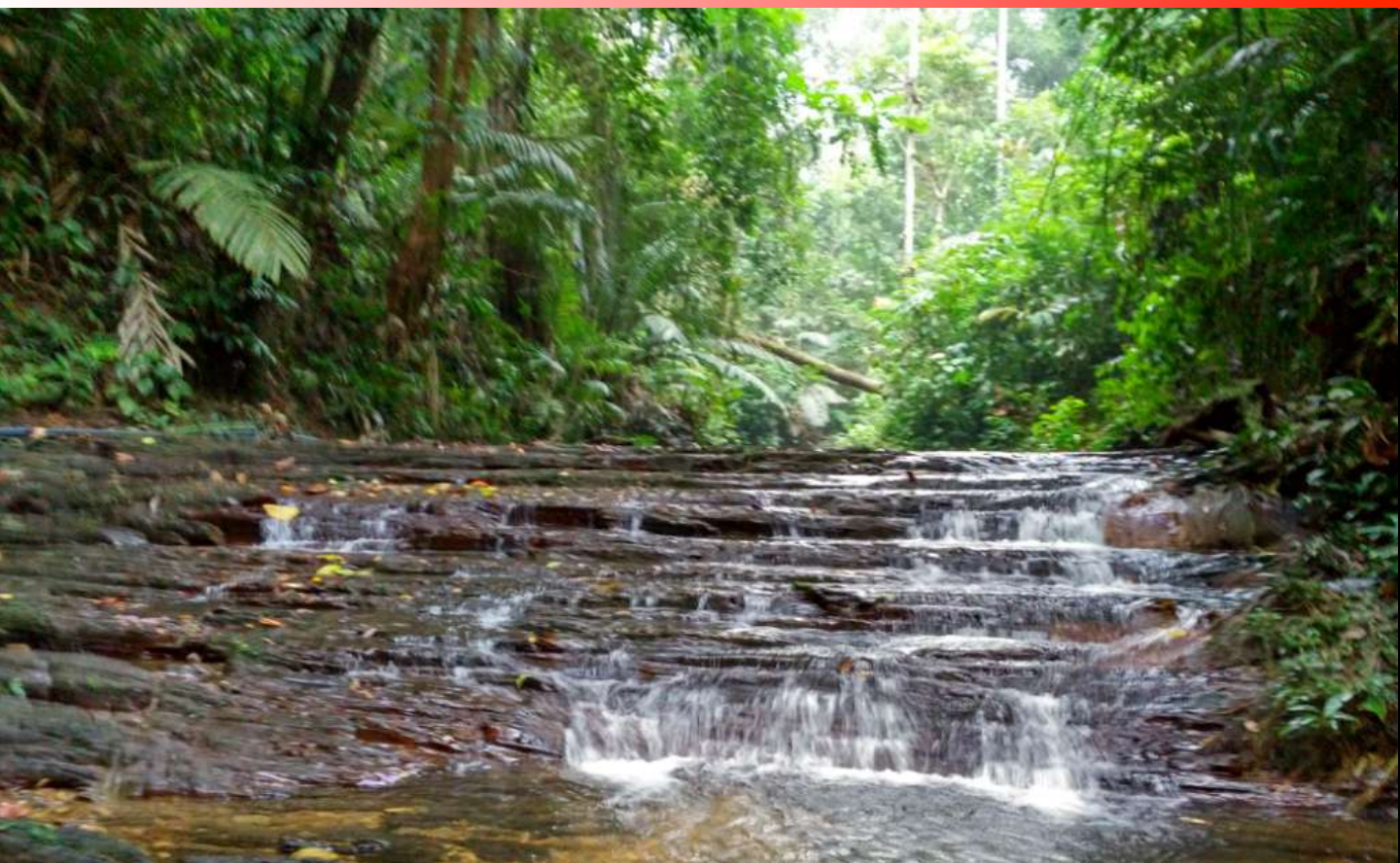

QUARTERLY UPDATES FROM THE INSTITUTE OF BIODIVERSITY AND ENVIRONMENTAL CONSERVATION

IBEC BULLETIN 2020 Vol. 1 No. 4 – December

Table of Contents

Please submit all materials for inclusion to the Editor.

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Front cover, top, Borneo Highlands, bottom, Sungai Seranau, Kapit (photos Wong SY)

FRGS GRANTS 2020

By
Mohd Azlan Jayasilan

IBEC has recently secured three projects under Fundamental Research Grant Scheme 2020, amounting to RM387,600.00. Congratulations to all!

Project: FRGS/1/2020/WAB11/UNIMAS/02/3. Principal investigator: AP Dr Mohd Azlan Jayasilan.

Title: The role of Pteropodid bats in pollination of native durian species (*Durio* spp.) in managed orchards in Sarawak.

Approximately 79% of Bornean *Durio* spp. is found in Sarawak (15 species). However, there are very few attempts to investigate on the relationships of *Durio* with its primary pollinators, bats (Pteropodidae). This study will focus on investigating the floral biology and pollination strategy of selected native *Durio* spp. Field observations such as flowering time, period of anthesis, presence of visitors, and confirmation on the role of pollinators will be conducted. Several controlled pollination experiments (open pollination, autogamic pollination, and hand pollination) will be carried out to to confirm *Durio* breeding system. Molecular phylogenetic analysis will be carried out to investigate the relatedness among Durio spp. and bats separately to determine if there is a correlation among the plant hosts and its pollinators. The project is expected to produce evidence of the dependency of *Durio* spp. on bats for fruit set success. Therefore understanding wildlife pollinators to an economically important plant species and critical services to the ecosystem, society livelihoods and the mutual relationship are vital for management and conservation of both the mutually dependent species.

Durio kutejensis

Fruit bat

Project: FRGS/1/2020/WAB11/UNIMAS/02/1. Principal investigator: AP Dr Wong Sin Yeng.

Title: Bornean palms: phylogenomics, diversification and biological interactions.

Given that palms are extremely diverse in Borneo, there is yet to be a comprehensive and in situ study on Bornean palms to cover its diversity and biological interactions. The aims of the project are: 1) to collect extensive genome-scale DNA sequence data (plastid genomes, 100s of nuclear genes) using the latest high-throughput sequencing methods; 2) to infer a species-level tree-of-life for Bornean palms from these phylogenomic data; 3) to conduct comparative biogeographic and diversification analyses across the island; 4) to explore factors (e.g. traits, lineage history, climate, biological interactions) driving diversity across Bornean island and lineages; and finally, 5) to investigate on the pollination guilds of several endemic palm taxa in Sarawak. Research methodology includes intensive fieldwork (sampling collection and pollination work) and molecular work. We aim to cover ground efficiently, dividing time among different localities in Sarawak and Sabah. Outputs from the project will lead to high impact research publications and new knowledge on the origin of Bornean palms and its biological interactions especially, pollinator-plant host interactions.

Top image: *Oncosperma*. Image below: Rattan fruits

Project: I01/FRGS/2032/2020. Principal investigator: Ms Cindy Peter.

Title: Investigating diet choice of coastal cetaceans and the overlapping risks between fisheries activities with cetacean occurrence.

Globally, accidental catch (bycatch) in fishing gear is attributed as the main cause of death for cetaceans. Coastal cetaceans are prone to bycatch due to the ever-present artisanal fisheries which supports the livelihood of local villagers. Being the feeding ground of cetaceans, major sites of fisheries and a booming ecotourism location, Kuching Bay, Sarawak could pose as a high risk area for both cetaceans and fishermen. The overlap of distributions between fisheries activities and coastal cetacean in Kuching Bay has to be ascertained in order to understand the magnitude of risk between the artisanal fishing industry and the wildlife that lives there.

Soon researchers from IBEC comprising of Cindy Peter, Prof Dr Andrew Alek Tuen and Dr Jongkar Grinang with support from Sarawak Forestry Corporation (SFC) will be able to conduct research to determine the diet choice of stranded ceteceans found along the coast of Sarawak, investigate the risk of overlap between fisheries activities and ceteaceans as well as determine the effect of fisheries activities on behaviour of cetaceans under the Fundamental Research Grant Scheme (FRGS) 01/2020 which they secured in November 2020. The two-year grant worth RM162,200 was obtained from the Ministry of Higher Education (MoHE) Malaysia in the field of Biology under the National Priority Area.

Investigating diet choice of coastal cetaceans will enable us identify the cetacean's dietary preferences, provide information on their foraging behaviour, and potential interactions with commercial fisheries. Certain prey species which are recognized as important for cetaceans may have a high economic value for fisheries industry. Over-exploitation of fish species which are food for cetaceans can result in reduced prey availability and modifications of their foraging habits. It is also important to ascertain the locations where the highest risk of overlap between fisheries activities and cetaceans would occur and how cetaceans react to these activities in order to determine the severity of the overlap.

Understanding the prey species of importance and level of overlap between the cetaceans and fishermen will aid researchers and wildlife management agencies in developing effective conservation effort that will not be one-sided. Losing cetaceans which are keystone species in the ecosystem may lead to an ecological collapse and subsequently the loss of fisheries stocks while also severely impacting the economics of local people and ecotourism industry. Double-pronged conservation efforts which highlights the conservation of cetaceans while ensuring the livelihood of artisanal fishermen will ensure the oceans, seas and marine resources are developed sustainably which is Goal 14 for Life below water of the Sustainable Development Goals.

TOW NET - AN INNOVATION TO CAPTURE FLYING INSECTS

By Pang Sing Tyan

Existing methods to capture insect - which are important prey for birds and bats as well as vectors of important diseases affecting wildlife and human - are both passive and active. The hand-held sweep net is a standard active method that can be used to study insect diversity in a variety of habitat. However, all these methods cannot estimate density because the volume of sampled air is not known. Researchers in IBEC has combined the entomologist sweep net with fisherman's trawl nets and constructed a cone-shaped net with a 1m x 1m opening using the same material as the sweep net. This modified net is best mounted on the back of a pick-up truck and towed over a specified distance, normally 1000 meters (photo). In this way all the flying insects in the air passageway through which the net is towed will be trapped inside before they were counted, weighed, sorted and identified. Since the volume of air sampled is known (size of opening x distance towed), the density of total insect as well that of different orders or families can be calculated. The tow net has been used to study insects in Kuching city, smaller towns and villages outside Kuching, secondary forest and plantations. It is currently being used by Soon Vivian, a MSc student of IBEC with Prof. Dr. Andrew Alek Tuen to study prey-predator relationships in secondary forest and oil palm plantation.

Photo credit: Rahah Mohd Yakup

PULAU SATANG – THE ISLAND JEWEL OF SARAWAK

By Pang Sing Tyan

It is a relief, having known that the general public is more aware of turtle conservation by seeing baby turtles released to mother nature than having their eggs cooked in the pot! One way to really have this hands-on experience is on offer to the visitors at Pulau Satang. To be honest, their unstable, slow and adorable movements are nearly irresistible for humans to touch. But how many would know that the touching a live wild animal may put them in danger, as we don't know what disease, fungal or bacterial, would be transmitted to these hatchlings for us. In order to avoid natural predators that are mostly diurnal, the authority at Pulau Satang releases the hatchlings at night. Thus, visitors have to use torches or head lamps to see them in the dark. Lights, however, attract hatchlings, causing disorientation. Simply put, no touching, no lights allowed for hatchlings as they hurry to the sea upon emergence.

Baby turtle rushing to the sea. Photo credit: Awang Khairul Ikhwan

As known to many, Pulau Satang is famous for its marine life. However, that this island is also home to an interesting land life, such as plants and animals, within its forested area, is poorly known. Reptiles such as the water monitor lizard and a skink were sighted around the resort area and several geckos, both within the forest and inside the chalets. Birds, such as terns, are known to nest on the rocky outcrops nearby. They were often seen soaring high in numbers at dusk. Additionally, sunbirds and bulbuls are heard throughout the day in the forest, and the Edible-nest Swiftlet was often seen flying across the beach.

A skink in the beach forest. Photo credit: Wong Jye Wen

Swiftlets resting and flying at the beach. Photo credit: Pang Sing Tyan

Besides biodiversity, the island offers family activities for a day trip or for overnighting visitors. Snorkelling, kayaking, swimming, picnicking, barbequing and sandcastle-building are some of the activities visitors can enjoy doing. The crystal-clear waters and serene environment under the blue skies at Pulau Satang Besar are extra bonus to make this island a wonderful destination for both local and international tourists. Having said that, the management and the authorities should work closely and keep an eye on activities for the welfare and protection of wildlife and habitats, including regulating excess tourism and promoting less intrusive activities vis-à-vis the turtle conservation programme.

Our team of eight from the Sarawak Tourism Project, based in IBEC, and led by Prof. Dr. Indraneil Das visited Pulau Satang in early September 2020. We thank Mr. Abol for allowing us the visit, Madam Letipah for wonderful Laksa Sarawak, beverages, hospitality, stories and a warm welcome, and finally, our boatmen for the safe commute. The project 'Capturing imagery and sound associated with the culture and nature of Sarawak' is supported by the Ministry of Tourism, Arts, Culture, Youth and Sports Sarawak and Universiti Malaysia Sarawak (RG/I01/SMA/21/2019). Finally, we thank Prof Lo May Chiun and Dr. Abang Azlan of the Research Innivation and Enterprise Centre, Universiti Malaysia Sarawak, for awarding and administering the grant.

IBEC team members and the staff of Satang Holidays. Photo credit: Pui Yong Min

AN UPDATE OF FRESHWATER CRAB EXPLORATION IN SARAWAK

By
Jongkar Grinang

The first freshwater crab described from Borneo back in 1868 was a gecarcinucid species, *Thelphusa borneensis*, by a German zoologist, Eduard von Martens. Thirty one years later, a Dutch biologist, Johannes Govertus de Man examined several brachyuran specimens collected during a scientific expedition at central Borneo, of which he described 11 new species and revised Bornean crab fauna including the establishment of a new genus *Perithelphusa*, and transferring the gecarcinucid as *Perithelphusa borneensis* (Figure 1A). Only until in 1900, the first species from Sarawak was described, a cavernicolous crab, *Potamon* (*Thelphusa*) *bidiense* (see Figure 1B) by William Forster Lanchester, a British zoologist. Lanchester examined crab specimens of Sarawak Museum sent to him by Robert W. C. Shelford, the curator at the time.

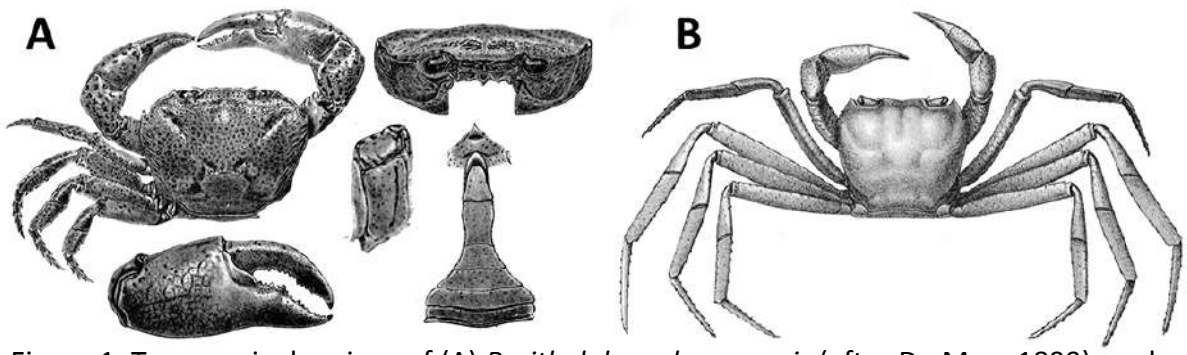

Figure 1. Taxonomic drawings of (A) *Perithelphusa borneensis* (after De Man, 1899), and (B) *Stygothelphusa bidiensis* (after Lanchester, 1900).

The taxonomic works on Bornean freshwater crabs have been relied on historical specimens that scattered over several museums include Sarawak Museum, Raffles Museum of Biodiversity Research (presently Lee Kong Chian National History Museum) of National University of Singapore, Naturalis Biodiversity Center (former Rijksmuseum van Natuurlijke Historie), The Netherlands, Senckenberg Museum und Forschungsinstitut, Germany, Naturhistorisches Museum Basel, Switzerland, Zoological Museum of the University of Turin, Italy, and Natural History Museum, London.

Thus, not surprisingly the revision of *Potamon* (*Thelphusa*) *bidiense* only happened 89 years later, when a well-known carcinologist from Singapore, Peter K. L. Ng established a new genus, *Stygothelphusa* for the cavernicolous crab species. Interestingly, designation of the genus *Stygothelphusa* was a homonym, where two taxonomic works on the same genus was published about the same year (i.e., Ng, 31st December 1989, and Alvarez & Villalobos, 18th June 1991) with the latter on cavernicolous crab from Mexico. The earlier date of publication of Bornean crab has the priority for the generic name, thus accepted as *Stygothelphusa bidiensis*, whereas the replacement of generic name for Mexican crab was *Villalobosus* (see Ng & Alvarez, 2000). The buck of taxonomic works on Bornean's freshwater crab have been started in mid-1986 by Peter Ng, who until present day has described about 60% of the total species. He has contributed to the taxonomic stability of Bornean crab fauna at the family and generic levels.

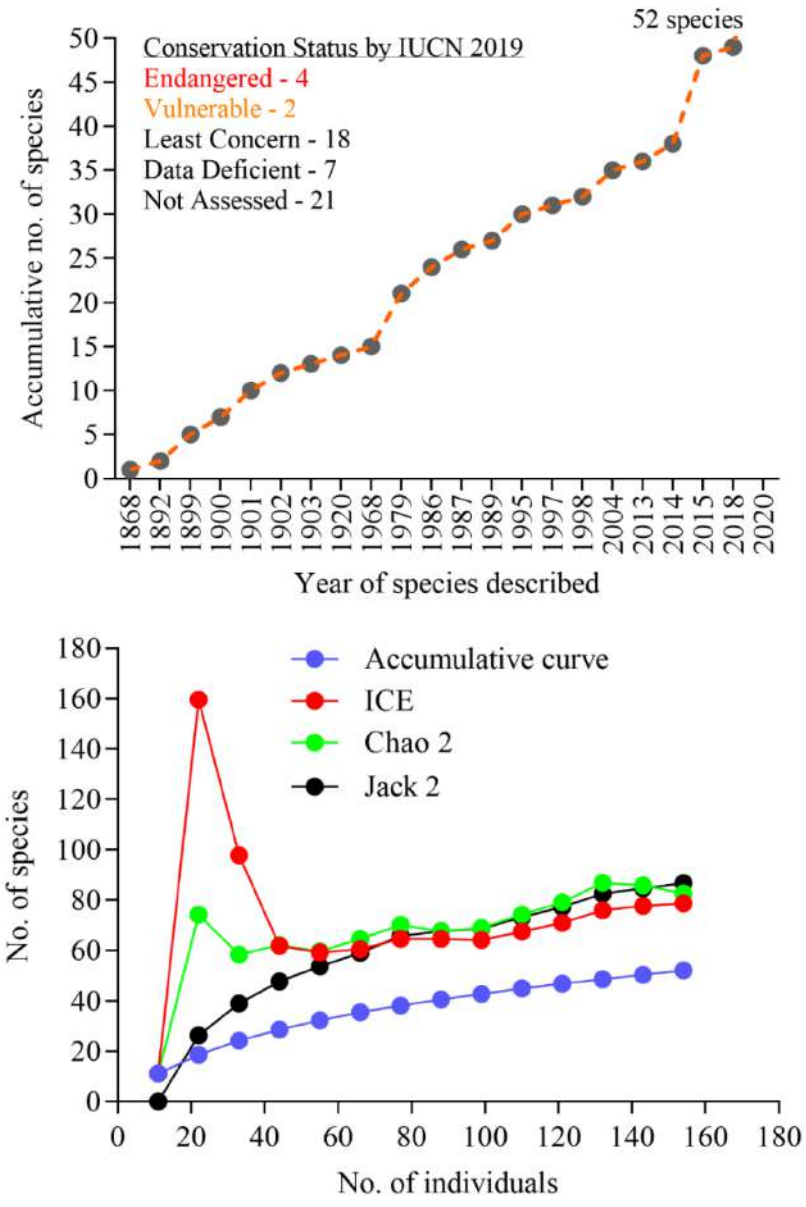

Figure 2. The known and estimated number of freshwater crabs from Sarawak. The estimates are based on presence dataset.

High species richness of freshwater crab in Borneo might be associated with stable climate and diverse habitats. Some studies noted that crab diversification is likely to be allopatric speciation resulting from geographic isolation process. Our comprehensive exploration in southwestern Sarawak have indicated that many single hills and limestone caves are inhabited by different species of crab. Currently, a total of 105 species from 12 genera and three families of freshwater crabs have been recorded for Borneo. High species representation from Sarawak (= 52 species) is partly due to more intensive surveys done in the region (Figure 2). In this update, the best non-parametric estimator of Jack 2 that follows closely the trend of accumulation curve was used to estimate the number of Sarawak's freshwater crab at 87 (Figure 2). By using extrapolation method from the total species and their geographical occurrence, the Bornean freshwater crabs are estimated at 287 species. The estimation suggests that many more species of freshwater water crab are to be discovered. No less than 12 species are being described of which the specimens are found just from few sub-catchments in Kuching, Serian and Samarahan divisions.

Our current information has also implied that conservation of freshwater crab in Sarawak is crucial. Most new species are found outside of protected areas and sensitive to habitat disturbance. Taxonomic papers in progress are as below.

- A new species of the genus *Arachnothelphusa* Ng, 1991 (Crustacea: Decapoda: Gecarcinucidae) from a limestone cave in Sarawak (Malaysian Borneo) – in press.
- On two new species of arboreal crabs from phytotelms in Sarawak, Borneo (Crustacea: Brachyura: Gecarcinucidae: *Arachnothelphusa*) – in review.

Figure 3. New species of crabs and their typical habitats. (A) *Lepidothelphusa* of Batang Sadong basin, (B) *Lepidothelphusa* of upper Samarahan basin, (C) typical habitat of *Lepidothelphusa*, (D) *Arachnothelphusa* of Baju limestone cave in Padawan, (E) feature of Baju cave. Descriptions of the species are in progress.

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Merry Christmas and Happy New Year 2021!