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This Issue:

Pangolin Project Update

Abang (Credit: HKU)

Lisa and her pup (Credit: HKU)

The pangolin project is a collaboration between Danau Girang Field Centre (DGFC) and Hong Kong University (HKU), investigating the role of Sunda pangolins (*Manis javanica*) in the emergence of SARS-CoV-2 and other viruses in humans. The last couple of months have seen several events happen for the pangolin team, and here is an update on the project!

A pangolin we named Raya was rescued from a school in the nearby village of Kampung Bilit in November 2022 and, after being radio tagged and translocated to the forest surrounding DGFC, made his way downstream, successfully settling around an oil palm plantation. At the time, it was unsure whether Raya would establish a home range or use it as a temporary area before moving further downstream. However, since then it has become clear that Raya has established a firm home range, creating his own network of tree hollows, burrows, and tree branches.

Translocations are not always as smooth as Raya's, as exhibited by one our new tagged pangolins, Abang, meaning 'older brother' in Malay. Abang was captured in the nearby village of Batu Puteh in mid-May where he was tagged and then released into the forest nearby. However, it was far more difficult to follow his signal compared to Raya, with one period of unsuccessful searches lasting for two weeks. Despite this, we did recently rediscover his signal in a nearby plantation, but it is unclear whether he is settled here or whether he will move on again, as many rescue pangolins tend to do.

The most recent pangolin capture was a female named Lisa, who was named after Elisa Panjang, a former PhD student at DGFC who laid much of the groundwork for the pangolin project. Lisa was found in the same sleeping site as Raya, whom we had located in order to change the batteries for his tag, and so we were able to opportunistically tag Lisa at the same time! Lisa was also found with a three-month-old pangopup, although the pup was too small to be tagged. The father of the pangopup is unknown, however, due to the age of the pup and the gestation period of pangolins, we know it cannot have been Raya. This is an interesting revelation, as little is known about the ecology and life history of pangolins due to their elusive nature, and so it is unclear the relationships between individuals in the same region. This would also have implications for viral networks, as pangolins may be able to spread pathogens to each other by spending nights in the same sleeping sites.

Miami University Field Course

Credit: Rhiannon Peacock

Danau Girang Field Centre (DGFC) welcomed 18 post graduate students from the 11 to 16 June as part of the annual Miami University field course to Sabah.

Many of the students have full time jobs in education, such as teaching, and zoological institutions (a wide range of zoo's from across the United States were represented) and were all part time masters students with Project Dragonfly; a biology master's initiative, under Miami University, allowing students to choose a program and tailor it to their own areas of interest such as education, community partnerships and community outreach.

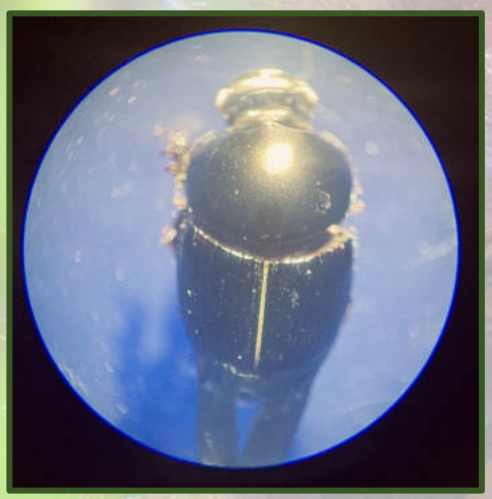
Despite the field course lasting for only six days, the students experienced a wide variety of tropical biodiversity research techniques they could sign up to daily, including: bird and primate surveys, night walks and boats, leopard cat tracking, pangolin tracking, dung beetle pitfall trapping, earthworm collection and frog surveys. The students also had a day to complete their own mini projects and present their findings.

Following their stay at DGFC, the field course was heading to Sukau, where they would spend several days living in homestays and working alongside the community under a wildlife conservation focus, before finally spending some time at the Sepilok Forest Reserve.

Happy Miami students after a successful morning leopard cat tracking (Credit: Amanda Wilson)

Invertebrate sampling for earthworms (Credit: Nick Porter)

Maz is visited by dung beetle expert Eleanor Slade



Entophagus genus (Unknown species)
(Credit: Amaziasizamoria Jumail)

(Left to right) Li Yuen, Maz and Eleanor
(Credit: Amaziasizamoria Jumail)

Assistant Professor in Forest Invertebrate Ecology, Eleanor Slade, of the Asian School of the Environment at the Nanyang Technological University (NTU) Singapore, visited Danau Girang Field Centre (DGFC) for several days at the end of May. Accompanying her were Post-Doctoral student Li Yuen and PhD Student Ong Xin Rui. Having been in Sabah for an undergraduate field course with NTU students visiting Danum Valley, Sepilok and KOPEL, Eleanor and her post graduate students visited DGFC to discuss experimental design for dung beetles with DGFC PhD student Amaziasizamoria Jumail (Maz), who is studying forest restoration ecology.

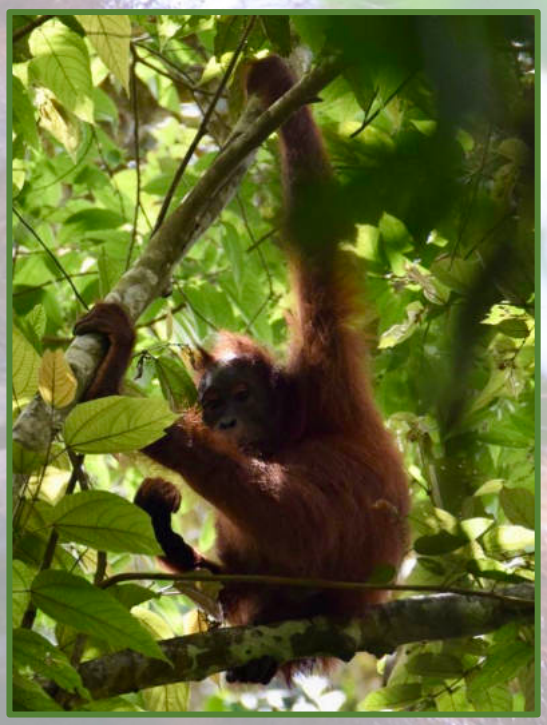
Dung beetles are a useful bioindicator for the environment, providing information about the health of an ecosystem, changes in the landscape (even to a microclimate level) and the community of mammal species living in an ecosystem. Dung beetles are also important for cycling nutrients such as nitrogen back into the soil, aerating and preventing the compaction of soil by burrowing and helping with seed dispersal. Some dung beetles also burrow through dung and have been shown to reduce methane emissions, which is a greenhouse gas. As a result, dung beetles are an important area of study for Maz regarding forest restoration ecology and given the lack of taxonomic understanding of the dung beetles of Borneo – are a crucial area for future studies and collaboration between researchers.

(Left to right) Eleanor, Li Yuen, Ong Xin Rui and Maz
(Credit: Amaziasizamoria Jumail)

Pitfall trapping for dung beetles
(Credit: Amaziasizamoria Jumail)

Masters student Maddy's Orangutan diet project

(Credit: Maddy Barnes)



(Right) Bornean Orangutan (*Pongo pygmaeus*) (Credit: Maddy Barnes)

Hi, my name is Maddy Barnes and I am an MSc student in Conservation and Biodiversity at the University of Exeter. I have spent the last three months in Sabah, since April, to study the dietary ingestion of ethanol by Bornean orangutans in the Lower Kinabatangan Wildlife Sanctuary (LKWS). Most of my time in Sabah has been spent at the Danau Girang Field Centre (DGFC), however, I was also fortunate enough to spend three weeks with Dr Marc Ancrenaz at the Kinabatangan Orangutan Conservation Project (KOCP) established by the French NGO, HUTAN, in Sukau.

My project contributes to a bigger, evolutionary medicine-focused, project incorporating various primate species from around the world. The goal of this project is to look beyond the microbiological aspects of alcohol-related diseases and to instead focus on the evolutionary processes that shaped its origin by using nonhuman primates as a model for our own ancestors.

To study ethanol ingestion by Bornean orangutans, I have both opportunistically followed orangutans and collected fruits they are known to eat. I test these fruits for ethanol and sugar concentration to determine if there is any ethanol within fruits eaten by orangutans, if the ethanol is a deterrent to them, and why they might ingest it. By knowing this information and by collaborating with other primate researchers, I hope that this project will aid in our understanding of the origin of human alcohol consumption.

When trying to find a place to conduct my research, I came across DGFC on the internet. I am extremely glad that I found it because the work that I have done at DGFC has been invaluable to my education. I have learned a lot about what it is like to work in the field, and it has been invaluable to have connected with other researchers in my field that I would never have met otherwise. It is amazing to be surrounded by so much wildlife and so many knowledgeable people!

(Right) Collected fruit samples were sealed in Ziploc bags and the air left to equilibrate for the ethanol content to be measured using a breathlyser. (Credit: Maddy Barnes)

Photographer Rudi Delvaux returns

Bornean Pigmy Squirrel *(Exilisciurus exilis)* (Credit: Rudi Delvaux)

Photography enthusiast, Rudi Delvaux, returned to Danau Girang Field Centre (DGFC) for a five week stay. With a photography passion extending over twenty years, Rudi has been a long-time recurring visitor to DGFC due to his friendship with DGFC's director, Dr Benoit Goossens, since they initially met each other on a trip to the Congo in 2003.

Rudi has held a lifelong passion for wildlife, which culminated in him graduating as a mature student with a degree in Biology from Antwerp University; currently he works at the Grenspark Kalmthoutse Heide Nature Reserve, coordinating 60 students and volunteers, managing projects such as peat swamp restoration and yearly biodiversity monitoring. Rudi's passion for photography has stemmed from his love of wildlife and he has greatly enjoyed the opportunities the hobby affords such as being able to connect with like-minded people like Benoit.

Initially visiting DGFC in 2009, one year after the centre opened, Rudi has visited several times with his last visit in 2016. He noted how the centre has changed in the seven years since his last visit and appreciated the newly installed solar power (providing electricity throughout the day) and washing machine access. His days and nights would be spent on excursions out on the Kinabatangan River, oxbow lakes, tributaries and the trails surrounding the centre, searching for wildlife to photograph. Some highlights included capturing pictures of a malay badger around the main building as well as parakeets flying around the oxbow lakes - something he had never seen on his prior visits.

Rudi is highly regarded for his photography for some of DGFC's merchandise books such as "ITIN: A Bornean Elephant" (2nd edition) and "OPOGI: A Bornean Crocodile". Rudi is still processing some of his pictures from this trip, but take a look at some of his highlights so far on this page and the highlights page (pages 10 & 11) of the newsletter to see a few of his fantastic shots so far!

Wallaces's Hawk Eagle *(Spizaetus nanus)* (Credit: Rudi Delvaux)

White-Rumped Shama (*Copsychus malabariucs*) (Credit: Rudi Delvaux)

Project Feature: Rhiannon Peacock

Research Assistant Rhianon Peacock was initially supposed to spend a year at Danau Girang Field Centre (DGFC) in 2020 as a Professional Training Year (PTY) student from Cardiff University. However, due to the COVID19 pandemic, this wasn't possible. Instead, having now graduated, Rhiannon is spending a year at DGFC as a research assistant and (similar to the PTY students) was completing an independent project of her own….at least until the elephants showed up…

(Credit: Rhiannon Peacock)

(Credit: Rhiannon Peacock)

The aim of my project was to try and find a cost-effective way for the Regrow Borneo project to maximise sapling growth and survivorship at the planting sites. I have always been interested in human-wildlife conflict mitigation, and so was really intrigued to try and find a way to successfully reduce herbivory damage to the saplings. This led me to investigate tree shelters, and how they are utilised in other areas of the world. Current research on tree shelters is incredibly limited to temperate environments, and the vast majority of publications focus on slow-growing species and herbivores of either the Bovidae (Bovine) or Cervidae (Deer) families. I was really excited to test whether the results of previous tree shelter studies would be replicable in an extreme environment such as here in the Kinabatangan.

I intended to measure the health and growth of Nauclea spp. saplings over twelve weeks across four conditions: 6-month-old saplings with and without a tree shelter, and 9-month-old saplings with and without a tree shelter. I measured health and growth by recording height and crown width measurements, and quantifying the amount of insect, rot and mammalian damage to each tree on a weekly basis. However, six weeks into my study, the elephants came through the planting site. I had placed camera traps around the site to monitor mammalian activity, and so managed to capture the fun the elephants had dismantling my project; the younger elephants in particular appeared to take great pleasure in kicking, squashing, and throwing my tree shelters around!

My preliminary statistical data on the first six weeks of measurements has shown that the tree shelters did not improve growth rate as impressively as in other studies, with only the 9-month-old, sheltered saplings showed a slightly significantly increased growth rate compared to the other conditions. I believe this is due to the fact that fast-growing tropical species surpass the height of the tree shelter so quickly that the benefits provided are limited. I can conclude with confidence that tree shelters are not well suited to environments where elephants will have access to the planting site!

A tree shelter being pulled out the ground and thrown by a juvenile elephant (Credit: DGFC)

Project Feature: Jack Gibbon

Research Assistant Jack Gibbon was initially supposed to spend a year at Danau Girang Field Centre (DGFC) in 2020 as a Professional Training Year (PTY) student from Cardiff University. However, due to the COVID19 pandemic this wasn't possible. Instead, having now graduated, Jack is spending a year at DGFC as a research assistant and (similar to the PTY students) is completing an independent project of his own.

Asian Water Monitor Lizard (*Varanus salvator*) Credit: Rudi Delvaux

The Asian water monitor lizard (*Varanus salvator*) is an important part of the lower floodplain ecosystem, filling ecosystem niches as an active predator near the top of the food chain while also being a prolific scavenger. Despite this, research on these reptiles is limited, with very little being known of their life histories, especially regarding their nesting habits and the use of tree hollows and underground burrows. My research project is an investigation into using camera traps to study behavioural patterns of the Asian water monitor lizard at pangolin sleeping sites in the Lower Kinabatangan Wildlife Sanctuary.

My project involves me working closely with Hong Kong University (HKU) pangolin project research assistants JiaZhen Lim and Dr Macarena Gonzalez. This is because while infrared cameras haven't generally been considered suitable for studying reptiles, their existing network of camera traps for monitoring pangolin sleeping sites regularly captures monitor lizards - which has formed the basis of my project.

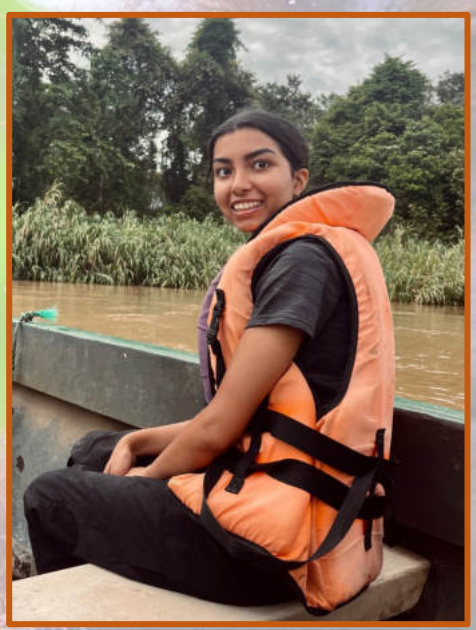
Over the last ten months I have been collecting data on thirteen pangolin sleeping sites and (very excitingly) I have been collecting data over the last three months on a monitor lizard burrow we recently discovered in the forest near to the field centre. Using these videos, I identify behaviours exhibited in and around the tree hollow or underground burrow (e.g. foraging, resting, nesting) and record their specific body movements (e.g. walk, dig, tongue flick). By analysing this data, I am hoping to improve our understanding of the behaviour of Asian water monitor lizards while also demonstrating the future potential of camera traps for this type of study.

Jack (Credit: Bryce Johnson)

Davina and Alessandra's volunteer experience

Computer Science student Davina and Australian Zoology student Alessandra, visited Danau Girang Field Centre (DGFC) for three and six weeks respectively in June and July. Read about their experiences below!

Davina Sanghera



Credit: Maddy Barnes

"During my volunteer placement I gained hands on experience with many different projects, such as radio tracking pangolins and leopard cats. A highlight for me, however, was when the Cardiff field course arrived and I joined in with the activities that they had planned. My favourite activity was the mist netting that began early in the morning. We were relatively lucky and managed to catch three kingfishers and a woodpecker which we tagged, measured and then released. Following this we had an informative ornithology lecture, which was interrupted when we all were called outside to see the orangutans that were spotted along the main path. Days like these reminded me how lucky I was to have such a wide array of wildlife at my doorstep. Overall, I thoroughly enjoyed my experience and I'm grateful to the staff and students who allowed me to partake in their projects!"

As a second year Cardiff University computer science student, Davina visited DGFC for a three week volunteering placement offered through the school of computer science. The purpose of the placement was to familiarise Davina with the ongoing work at the field centre so she can create a suitable computing-based project to assist with research projects. Together with Dr Pablo Orozco-terWengel (Cardiff University), Davina also helped to set up an image recognition Artificial Intelligence (AI) system which had been developed by a masters student; the professional training year students at the field centre now have access to this, and can begin to help verify the systems accuracy in identifying animals on the camera traps.

Alessandra Metzler

"I'm currently studying Zoology and Animal Ecology at the University of New England, Australia. I came to DGFC to build my involvement in wildlife and rainforest conservation, specifically regarding felids and human-wildlife conflict mitigation. I'm visiting DGFC for two months and I've loved being around so much wildlife and biodiversity at every turn. Highlights so far have been: catching a glimpse of the elephants, bird mist netting, finding leopard cat pug-marks, being amongst a plethora of butterfly species and contributing to reforestation with Regrow Borneo as pictured. It's been wonderful meeting new people, gaining new skills and contributing to so many great research projects."

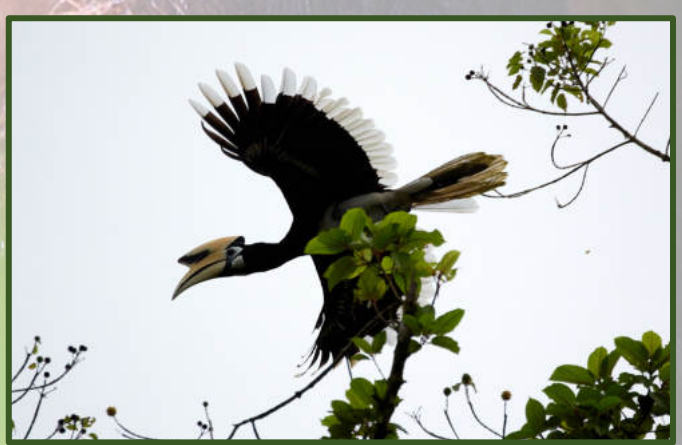
Publication Corner

Isolation of Bacteria from Freeze-Dried Samples and the Functional Characterization of Species-Specific Lactic Acid Bacteria with a Comparison of Wild and Captive Proboscis Monkeys

Available at: https://www.mdpi.com/2076-2607/11/6/1458

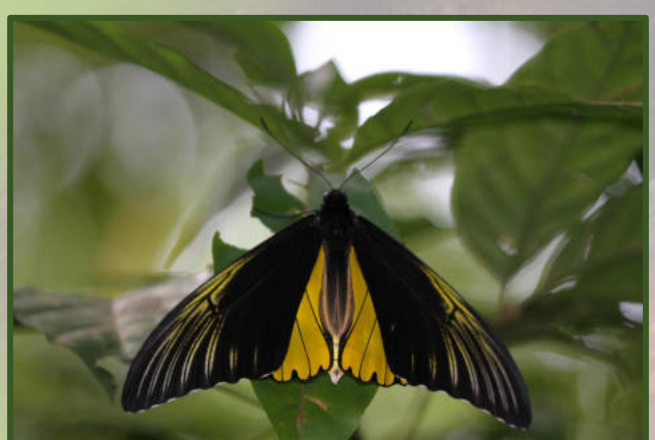
A new paper, Hashido et al. 2023, was published in the journal *Microorganisms* in which researchers successfully isolated two strains of a lactic acid bacteria (LAB) species *Lactobacillus nasalidis* from a six year old freeze-dried forestomach content sample of a wild proboscis monkey. Gastrointestinal tract (GIT) microbiota are important for many aspects of the hosts health (e.g. food digestion and pathogen resistance) and LAB are well studied group within GIT microbiota. The researchers found that strains of *L. nasalidis* isolated from the wild individual differed significantly to strains previously isolated from captive proboscis monkey individuals. The researchers suggests that captive feeding environments considerably modify the GIT microbiome composition and the physiological functionality of the same bacterial species. Therefore, the paper recommends that prior to reintroducing captive proboscis monkeys to the wild, allowing their GIT microbiomes to acclimate to wild types of food is crucial.

Photo Highlights

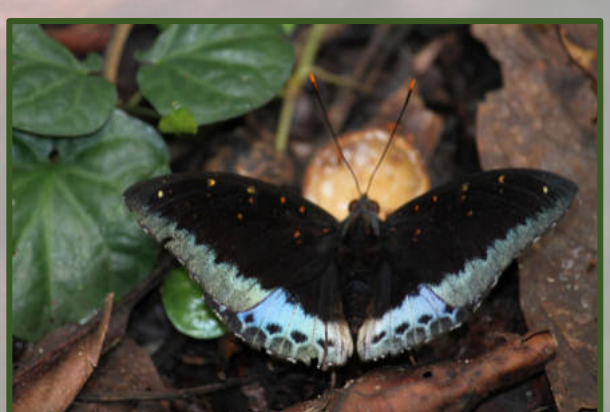


Oriental Pied Hornbill (*Anthracoceros malayanus*) (Credit: Rudi Delvaux)

Green Crested Lizard (*Bronchocela cristatella*) (Credit: Alessandra Metzler)



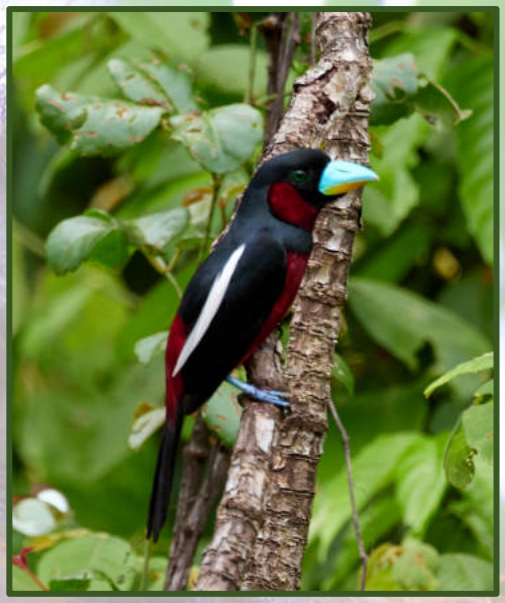
(Above) Golden Birdwing (*Troides amphyrsus*) (Credit: Alessandra Metzler)



(Right) Archduke (*Lexias dirtea*) (Credit: Alessandra Metzler)

Photo Highlights

Bornean Elephant (*Elephas maximus borneensis*) (Credit: Rudi Delvaux)



Black-and-Red Broadbill (*Cymbirhynchus macrorhynchos*) (Credit: Rudi Delvaux)

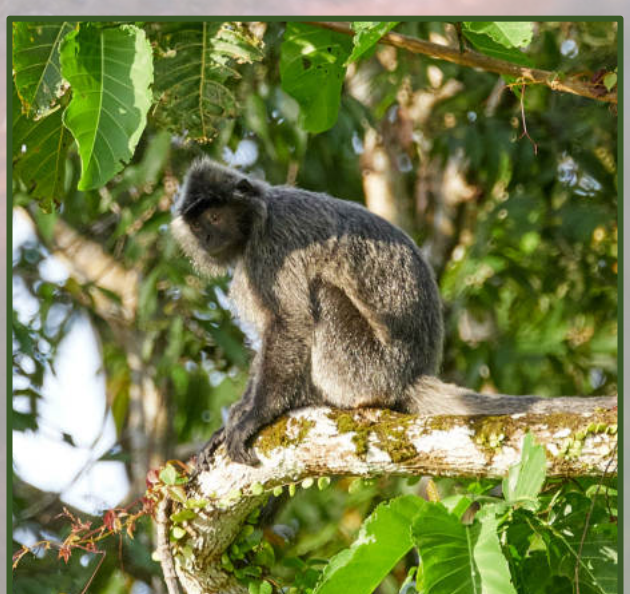
Dark-Eared Tree Frog (Polypedates macrotis)
(Credit: Rhiannon Peacock)

White Crowned Horbill *(Aceros comatus)*
(Credit: Rudi Delvaux)

Brown Wolf Snake *(Lycodon effraenis)* (Credit: Rudi Delvaux)

Great Egret (*Ardea alba*) (Credit: Rhys Davies)

Bornean Elephant (*Elephas maximus borneensis*)
(Credit: Rhys Davies)



Silvered Langur (*Trachypithecus cristatus*) (Credit: Rudi Delvaux)

Danau Girang Field Centre

Danau Girang Field Centre was opened in July 2008. It is located in the Lower Kinabatangan Wildlife Sanctuary, Sabah, Malaysia.

Danau Girang is owned by the Sabah Wildlife Department and supported by Cardiff University. Its purpose is to further scientific research with the aim of contributing to long-term conservation projects in the area, and develop a better understanding of our environment and the living things we share it with.

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