



## FIELD STATION PROFILES

### DANAU GIRANG FIELD CENTRE

Amaziasizamoria Jumail<sup>1</sup>, Milena Salgado-Lynn<sup>1,2,3,4\*</sup>

<sup>1</sup>Danau Girang Field Centre, Sabah Wildlife Department, Wisma MUIS, Kota Kinabalu, Sabah, Malaysia.

<sup>2</sup>Organisms and Environment Division, School of Biosciences, Cardiff University, UK.

<sup>3</sup>Sustainable Places Research Institute, Cardiff University, UK.

<sup>4</sup>Wildlife Health, Genetic and Forensic Laboratory, Sabah Wildlife Department, Kota Kinabalu, Malaysia.

\* **Corresponding Author:** Milena Salgado-Lynn, [Salgado-LynnM@cardiff.ac.uk](mailto:Salgado-LynnM@cardiff.ac.uk)

#### NAME OF FIELD STATION

Danau Girang Field Centre (DGFC)

#### GEOGRAPHIC LOCATION

- Malaysia, Sabah
- 118.03771 Easting, 5.41382 Northing; 10-20 m asl

#### HABITATS

The Malaysian state of Sabah is located on the northern portion of Borneo, the world's third largest island. Sabah covers an area of about 76,000 km<sup>2</sup> and shares the island with the Malaysian state of Sarawak, the State of Brunei Darussalam and the Indonesian province of Kalimantan. The base camp, Danau Girang Field Centre (DGFC), is located in eastern Sabah, in the Lower Kinabatangan Wildlife Sanctuary (LKWS). The LKWS consists of 10 forest blocks totaling 27,960 ha, attempting to create a link between the forest reserves (approximately 15,000 ha) and state- and privately-owned land (approximately 10,000 ha) along the river (Ancrenaz *et al.*, 2004) (Fig. 1). The Sanctuary lies along the Kinabatangan River, a widely meandering water flow, which is also the longest in Sabah (560 km). Its floodplain (16,800 km<sup>2</sup>) is the largest still forested in Sabah (Horton *et al.*, 2017). The forest types represented include a mixture of lowland dipterocarp forest (ranging from primary forest to disturbed secondary forest), forest over limestone, seasonal and tidal swamps, permanent freshwater swamp, and mangroves. These forest types are located within a matrix landscape with significant human impact, including villages, small scale agriculture and

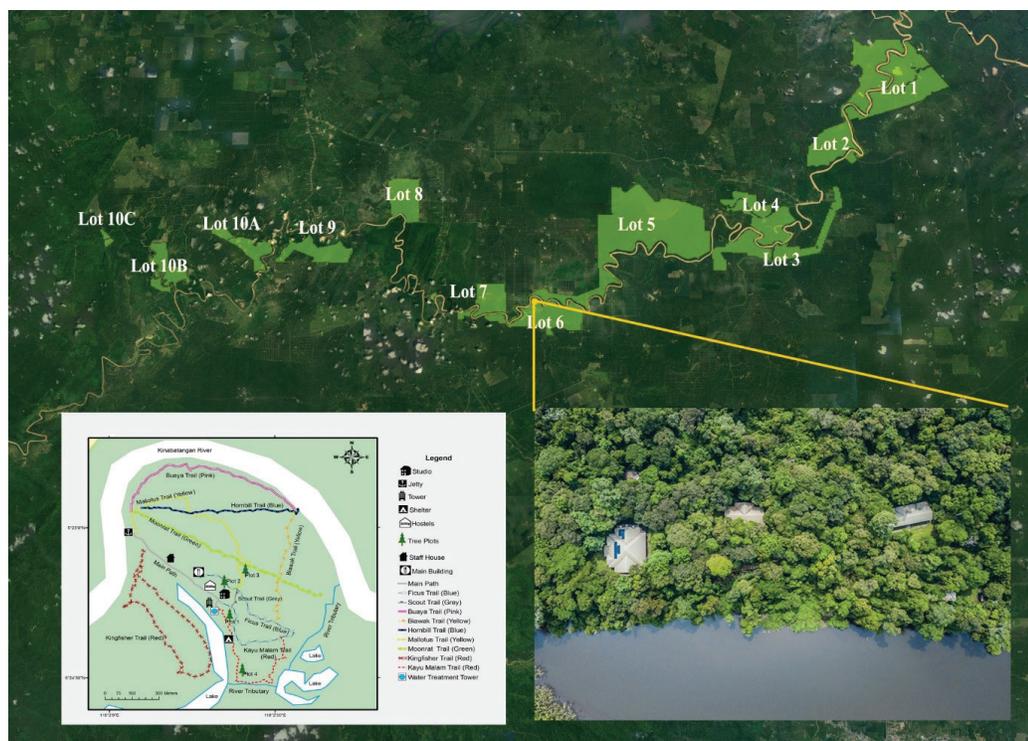
large oil palm plantations (Abram *et al.*, 2014). Other relevant features in the landscape include the world famous Gomantong cave system, an example of the limestone karst system, where edible-nest swiftlets and bat roosts potentially can be studied. Due to its high levels of biodiversity, these wetlands are one of the most important and productive in Malaysia. Species present in the sanctuary include ten species of primates (including Bornean orangutan (*Pongo pygmaeus*), proboscis monkey (*Nasalis larvatus*), Müller's gibbon (*Hylobates muelleri*) and the Philippine slow loris (*Nycticebus menagensis*) (Lackman-Ancrenaz *et al.*, 2001). The Bornean elephant (*Elephas maximus borneensis*), carnivores such as the Sunda clouded leopard (*Neofelis diardi*), other small cat and civet species, the sun bear (*Helarctos malayanus*) and binturong (*Arctictis binturong*) are also present. All eight species of hornbill found in Borneo can be observed here as well as over 300 other bird species including the rare Storm's stork (*Ciconia stormi*) and the endangered oriental darter (*Anhinga melanogaster*). Herpetofauna is also abundant and includes the saltwater crocodile (*Crocodylus porosus*), water monitor lizard (*Varanus salvator*), box terrapin (*Cuora amboinensis*), reticulated python (*Malayopython reticulatus*), king cobra (*Ophiophagus hannah*) and many others. The invertebrate and plant diversity in the sanctuary is also very high (Fig. 2).

#### ACCESS AND INFRASTRUCTURE

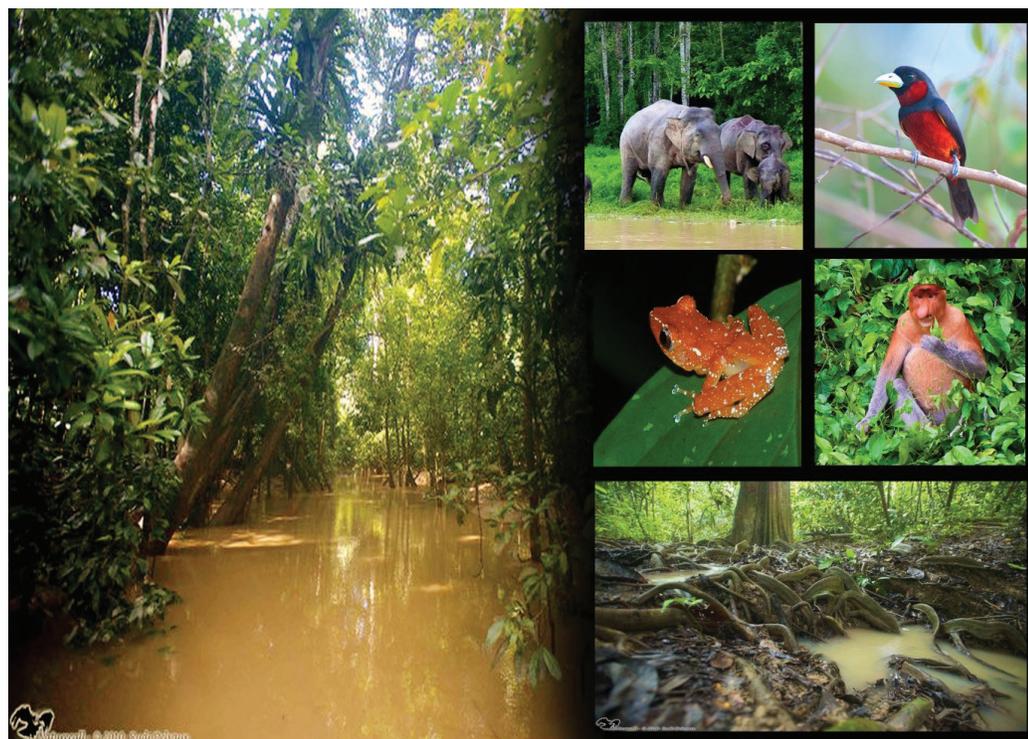
##### *Travel to the centre*

There are two major airports in Sabah (Kota Kinabalu and Sandakan). From each airport, the travel time is about seven and three hours, respectively, to Batu Puteh. We can arrange transportation from Sandakan airport, or buses are





**Figure 1.** The Lower Kinabatangan Wildlife Sanctuary. The 10 plots are depicted in light green and are surrounded by, mostly, oil-palm plantations. DGFC is located within Lot 6. The general layout of the field centre, along with the trail system and nearby botanical plots, are shown in the inset map.



**Figure 2.** Flora and fauna of the Kinabatangan floodplain.

available both from Kota Kinabalu or Sandakan to Lahad Datu, Semporna or Tawau. The stop is before the Kinabatangan bridge in Batu Puteh. DGFC is only accessible by boat from there involving a 30-40 minute journey.

### Facilities

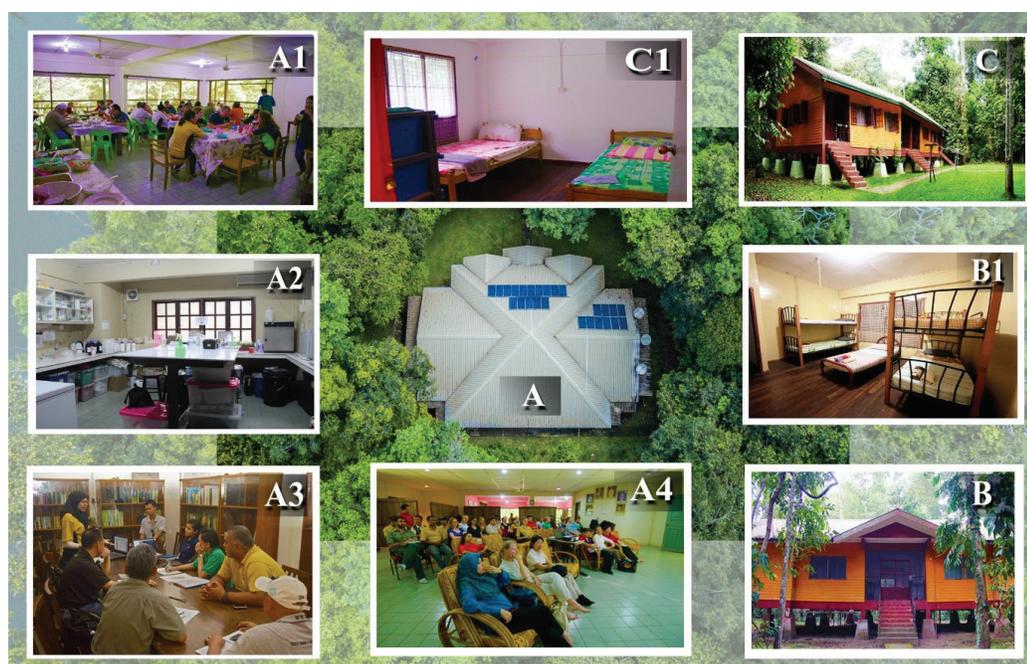
To support the research activities, the field centre provides basic but comfortable accommodation for a maximum of 60 people (including staff), catering, and other facilities contained in three main buildings (Fig. 3). The main administration building has a large teaching/lecture area equipped with a white screen, a LCD projector and 30 chairs; a small laboratory equipped with microscopes, a centrifuge and an oven as well as a library with desktop computers and more than 200 books covering general ecology and tropical ecology, behaviour, conservation biology, natural history and field guides, Sabah history and geography, tourism, etc. In the main building there are also two offices for up to 16 long-stay and short-stay scientists with internet access, a dining area with seating capacity for about 40 people and a fully-equipped kitchen. Self-catering is not allowed but three self-service buffet style meals are provided each day. Hot drinks and water are provided free of charge at all times. We can cater for visitors with allergies and special dietary requirements if we are informed in advance. The usual breakfast includes continental style buffet of bread, cereal, condiments, coffee, tea and juice and, for lunch and dinner, foods are normally prepared in Malaysian style and typically include meat, local fish and

vegetables with rice or noodles. Windows and doors are equipped with mosquito netting. Dormitories have capacity for 30 people (two bunk beds and one single bed in each room – maximum three persons per room). The bathroom and toilet facilities are shared (four individual showers and four individual toilets). Our four individual studios are primarily intended for long-stay scientists, students and volunteers. Each studio has a shared sitting area with a desk and chairs. A studio can accommodate four people (two bedrooms each with two single beds) and each studio has a shared bathroom (shower and sink) and toilet. A washing machine is available for long-stay students and scientists.

### Trail system and botanic plots around DGFC

There are eight trails around the centre covering a total of 10 km (average 1 km each). These trails were established for research and educational purposes. For instance, some of these trails are utilized as transects for wildlife surveys to provide knowledge and experience for visitors and students.

At DGFC, we also have ten botanic plots which were set up to study secondary forest dynamics. The plots are 50 m x 50 m, and all trees have been identified and tagged. Tag information consists of tree number, family name, species name and Malay name. Also, all trees with a diameter of 130cm (DBH) have been censused. The plots allow the study of two different kind of habitats. Four plots are within riparian forest (on the edges of streams, rivers, ponds, lakes and other wetlands and semi-inundated forests) and the



**Figure 3.** DGFC Facilities. A) Main Building with canteen [A1], laboratory [A2], library [A3], lecture area [A4]; B) Hostel and C) Studio with dormitories [B1 and C1].

six others are within semi-inundated forest (characterized by periods of inundation between three and six months, with no undergrowth, often with many vines and a lower tree species diversity). The most common species found in the plots are *Colona serratifolia* (Tiliaceae), *Mallotus muticus* (Euphorbiaceae), *Dillenia excelsa* (Dilleniaceae) and *Kleinhovia hospita* (Sterculiaceae).

### FEES

Fees include a conservation fee (USD50.00 per person), accommodation (USD30 per night (or USD35 if the stay is less than five nights), from the day of arrival to the day of departure) and transportation (USD50 for pickup to/from Sandakan and boat to/from DGFC; or USD12 for boat transportation from/to Batu Puteh only). Fees for Malaysians are negotiated on a case-by case basis. Accommodation cost cover: dormitory or studio (incl. linen and towels), access to washing machine, three meals daily at the Field Centre (arrangements can be made to provide packed lunches), hot drinks and mineral water, access to selected equipment and all facilities at the Field Centre, project administration and field staff, and internet access. Payment excludes: flights (international and domestic), travel and Medical Insurance, in-transit accommodation, personal spending money and personal kit (inc. toiletries, personal medical kits etc.).

### LEGAL REQUIREMENTS

Any user (regardless of nationality) - individual, groups, educational and research institution or corporate entity - seeking access to biological resources or the associated relevant knowledge (research) are required to apply for access license from the Sabah Biodiversity Centre (SaBC; <https://sabc.sabah.gov.my/>). However, these licenses are not required for field courses and volunteers.

All visitors must comply with all legislation, visa, immigration, customs and foreign exchange regulations of Sabah and Malaysia. In the event of a contravention of the laws of Malaysia, DGFC reserves the right to terminate the stay and will not be subjected to any type of liability. An assumption of risk and indemnity agreement must be signed prior to arrival at the field centre.

### KEY RESEARCH

Asian biodiversity is threatened by habitat loss and fragmentation. The LKWS matrix landscape is a natural laboratory for investigating the influence and interaction

of human encroachment, and human-driven land-use changes, on the diversity, behaviour and abundance of the local wildlife. Because of its location, Danau Girang is an ideal place to study wildlife and the effects of anthropogenic habitat alteration on biodiversity. In order to mitigate large-scale losses, the development of effective conservation strategies is crucial. This requires a thorough examination of the relationships between species and landscapes. Research at the centre aims to determine the landscape-level requirements critical to the viable persistence of tropical species in highly fragmented landscapes.

Focusing on multiple core species, we use advanced technologies such as camera traps, GPS collars, and drones to explore survival mechanisms. In addition, we also gather information about population genetics, disease, toxicology, behaviour and ecology. Through the knowledge we gain we can develop species action plans and landscape management guidelines for fragmented lowland tropical forests.

We believe that collaborations are key to acquiring robust information, therefore we strive to expand our knowledge of the ecosystem through them. Currently we collaborate with local and global NGOs, government agencies, local and international universities and research centres. The results from our collaborative work are shared with all partners and the public. All our results are presented to stakeholders and government agencies to influence decision-making processes attempting to apply the research to conservation activities. We also engage in education campaigns, continuous wildlife monitoring, environmental impact assessments and media outreach. Lately, we have been supporting the enforcement capacities of government agencies to combat wildlife crime.

Our current, core project is *Regrow Borneo*, which aims to mitigate climate change and forest fragmentation by restoring degraded riverine and swamp forest within the Lower Kinabatangan floodplain. Our approach is not simply to sequester carbon and enhance ecosystem resilience. We partner with local communities who grow seedlings from native tree species, paying them a living wage for their work, and providing a sustainable alternative source of income to oil palm agriculture. Through our work we aim to leave a permanent positive print upon the Kinabatangan ecosystem, influence the conservation activities in the state of Sabah, and become a model for international research. More information on our research can be found in DGFC's 10<sup>th</sup> Anniversary Report (<http://www.dgfc.life/home/others/>).

## FIVE SELECTED PUBLICATIONS

- Evans LJ, Asner GP, Goossens B. 2018. Protected area management priorities crucial for the future of Bornean elephants. *Biological Conservation* **221**: 365-373.
- Evans MN, Muller CT, Kille P, Asner GP, Guerrero-Sanchez S, Abu Bakar MS, Goossens B. 2021. Space use patterns of Malay civets (*Viverra zibellina*) persisting within a landscape fragmented by oil palm plantations. *Landscape Ecology* **36**: 915–930 doi: 10.1007/s10980-020-01187-2.
- Gardner PC, Goossens B, Wern JGE, Kretzschmar P, Bohm T, Vaughan IP. 2018. Spatial and temporal behavioural responses of wild cattle to tropical forest degradation. *PLoS ONE* **13**: e0195444.
- Hearn AJ, Cushman SA, Goossens B, Macdonald E, Ross J, Hunter L, Abram NK, Macdonald DW. 2018. Optimizing landscape connectivity and evaluating scenarios of landscape change for Sunda clouded leopards in a human dominated landscape. *Biological Conservation* **222**: 232-240.
- Scriven SA, Gillespie GR, Laimun S, Goossens B. 2018. Edge effects of oil palm plantations on tropical anuran communities in Borneo. *Biological Conservation* **220**: 37-49.

Link to all DGFC peer-reviewed publications: <http://www.dgfc.life/home/peer-reviewed-publications/>

## LINKS AND CONTACTS

<http://www.dgfc.life/home/>; [contact@dgfc.life](mailto:contact@dgfc.life)

## REFERENCES

- Abram NK, Xofis P, Tzanopoulos J, MacMillan DC, Ancrenaz M *et al.* 2014. Synergies for improving oil palm production and forest conservation in floodplain landscapes. *PLoS ONE* **9**: e95388. doi: 10.1371/journal.pone.0095388.
- Ancrenaz M, Goossens B, Gimenez O, Sawang A, Lackman-Ancrenaz I. 2004. Determination of ape distribution and population size using ground and aerial surveys: A case study with orang-utans in lower Kinabatangan, Sabah, Malaysia. *Animal Conservation*, **7**: 375-385. doi: 10.1017/S136794300400157X.
- Horton AJ, Constantine JA, Hales TC, Goossens B, Bruford MW, Lazarus ED. 2017. Modification of river meandering by tropical deforestation. *Geology* **45**: 511-514. doi:10.1130/G38740.1.
- Lackman-Ancrenaz I, Ancrenaz M, Saburi R. 2001. The Kinabatangan Orangutan Conservation Project (KOCOP). In: Brookfield Zoo and Chicago Zoological Society (eds) *The Apes: Challenges for the 21st Century*. Chicago Zoological Society, Brookfield, pp 262–265. Available at: [https://www.researchgate.net/publication/242462404\\_THE\\_KINABATANGAN\\_ORANGUTAN\\_CONSERVATION\\_PROJECT\\_KOCP](https://www.researchgate.net/publication/242462404_THE_KINABATANGAN_ORANGUTAN_CONSERVATION_PROJECT_KOCP).