Project report: **Distribution and abundance survey of nocturnal mammals in Penang, Malaysia.**

Night Spotting Project

NSP

Survey Areas

For the start of this project I managed to survey five areas on Penang Island (Fig 1). I started two other area, the National Park and Bukit Gambir South but they are not included in the results as the data collection is still ongoing.

Bukit Gambir area (dark blue) had to be surveyed in three different parts as there are many construction sites and thus we do not have regular access to all the trails. However, the forest and the results were similar in the three areas so we can group them for the results.

Due to extreme weather (typhoon and landslides), two months of field work were interrupted from November to December.

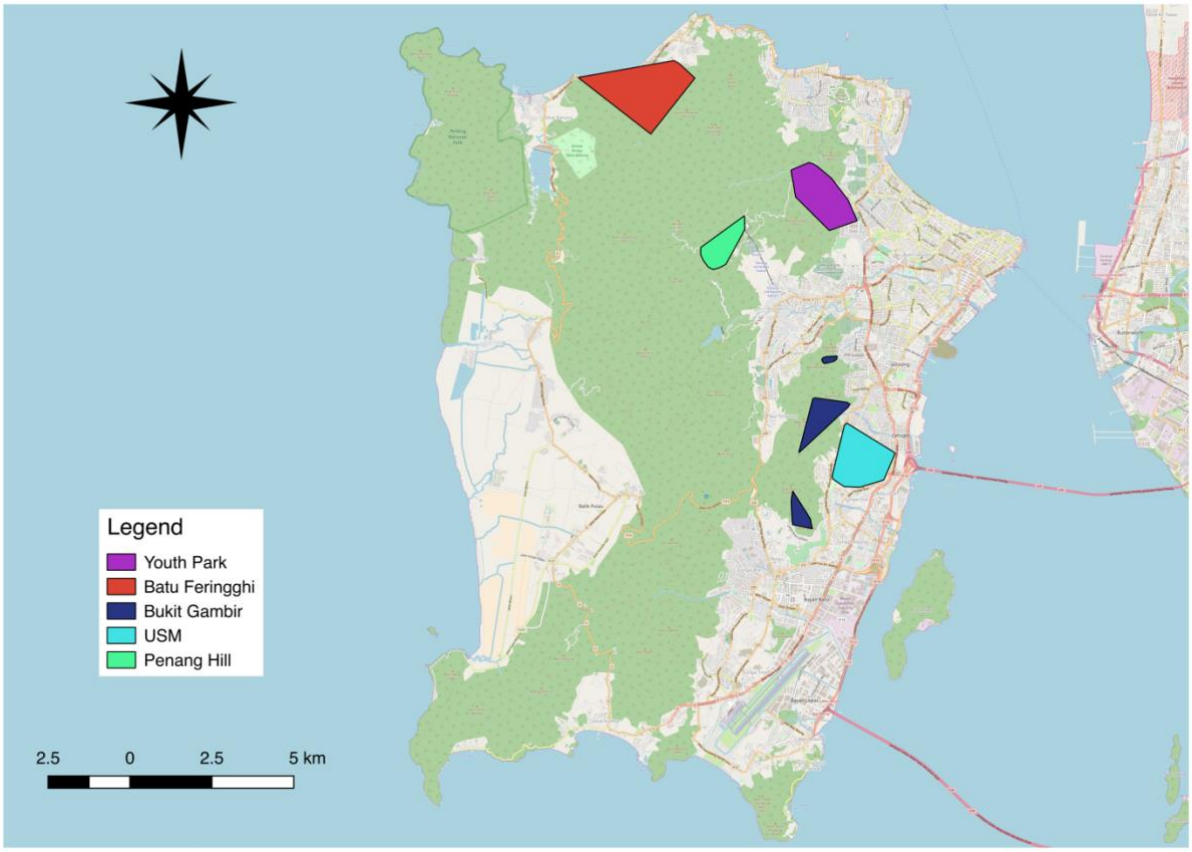


Figure 1: Map of Penang Island with the polygons of the survey areas.

Major forest types in Penang Islands are lowland dipterocarp forest and hill dipterocarp forest, peat swamp forest and mangrove forest. The forests in Malaysia are mostly dominated by trees from the *Dipterocarpaceae* family, hence the term 'dipterocarp forests'. The dipterocarp forest occurs on dry land just above sea level to an altitude of about 900 metres. This type of forest can be classified according to altitude into lowland dipterocarp forest, up to 300m above sea level, and hill dipterocarp forest, found in elevation of between 300m and 750m above sea level, and the upper dipterocarp forests, from 750m to 1,200m above sea level.

In the table 1 we described the 5 fields site surveyed with their total area. I also give a first density estimates for each species of interest occurring in Penang Island (table 2). I also calculated species diversity per site using Shannon and Simpson's index (table 3).

Table 1: Survey sites and areas description

Site	Trail type	Number of trails	Habitat Type	Min elevation (m)	Max elevation (m)	Mean Elevation (m)	Area surveyed (km)	Area surveyed (km2)
Youth Park	road/forest trail	22	Lowland dipterocarp forest	22	334	141	11	2.00
Penang Hill*	road/forest trail	11 (+4)	Hill dipterocarp forest	631	775	710	5.5	1.06
Batu Feringghi	road/forest trail	15	Lowland dipterocarp forest	0	122	46	7.5	3.97
USM	road	16	Urban/ park area	15	47	30	8	2.40
Bukit Gambir	farm roads	16	Lowland dipterocarp forest	36	346	176	8	1.5
							40	**10.93**

*Not yet finished due to weather incident (extreme rain with landslides in November)

Public awareness

I created internet platforms for this project called "Night Spotting Project", with the aim to develop engage the public (as volunteer field assistants) in long term research on nocturnal mammals in Malaysia and to share our findings to a wider audience.

I have a Facebook (https://www.facebook.com/NightSpottingProject/), Instagram (https://www.instagram.com/nightspottingproject/) and a Website page (https://www.nightspottingproject.com).

Through all those platforms I manage to reach more than 3500 people, recruit 13 volunteers so far with one long term student, Foo Kai Xin that helped us from September 2017 to end of February 2018 as part of her final year project. Volunteers are important for my work for safety reasons as I do not go alone in the forest at night. It is also an important platform for local people to be aware of our research and the importance of nocturnal animals in the wild.

I also have a student coming in September 2018 for 6 months from France to help us start a new field site in Langkawi Island.

I created a leaflet to give during interviews or events (Appendix).

Survey Results

The results presented here are for the first 6 months of study in Penang Island and I hope to finish surveying all target sites on the island by September 2018.

Night transects survey:

I have confirmations that pangolins occur in Penang Island through roadkills, tracks and faeces in the forest but no direct sightings from us (Fig 2).

Figure 2: Presence of Pangolin in Penang Island. A) The Habitat, Penang Hill, 14/02/2018 at 15:35; B) and C) Bukit Gambir, 14/02/2018 at 22:30.

Table 2: Density estimates for each species of interest in Penang Island*

Species	Scientific name	Number of sightings	Mean encounter rate (ind/km)	Species density estimates (ind/km2)
Sunda slow loris	*Nycticebus coucang*	6	0.15	0.55
Sunda colugo	*Galeopterus variegatus*	44	1.1	4.03
Common palm civet	*Paradoxurus hermaphroditus*	18	0.45	1.65
Masked palm Civet	*Paguma larvata*	1	0.025	0.09
Red giant flying squirrel	*Petaurista petaurista*	10	0.25	0.91
Horsfield's flying squirrel**	*Iomys horsfieldii*	11	0.275	1.01
Mouse deer	*Tragulus kancil*	2	0.05	0.18
Porcupine***	*Unidentified species*	1	0.025	0.09

*Data are still being collected for Penang Island until September 2018

** We are recording the small flying squirrel observed as the Horsfield's flying squirrel. There is record of another flying squirrel called the Whiskered Flying Squirrel *(Petinomys genibarbis)* that is similar to the Horfield's tarsier but have whiskered on the face. It has however never been photographed and it is too hard for us to correctly look at the face when the animals are 25+ m high in the tree.

*** We saw a porcupine during one of our night walk but only from the back. It appears to look like the Asiatic brush-tailed porcupine (*Atherurus macrourus*) or the long-tailed porcupine (*Trichys fasciculata*). We suspect the second one but we need confirmation with another sighting.

Table 3: Species diversity per site (number of sightings)

Species	Youth Park	Penang Hill	Batu Feringghi	USM	Bukit Gambir
Slow loris	0	0	4	0	2
Sunda Colugo	13	12	17	0	2
Common palm civet	1	4	6	5	2
Masked palm Civet	0	0	1	0	0
Red giant flying squirrel	0	8	2	0	0
Horsfield's flying squirrel	6	0	3	0	2
Mouse deer	0	0	2	0	0
Porcupine	0	0	0	0	1
Shannon diversity index	**0.7910**	**1.0114**	**1.5402**	**0.2938**	**1.6462**
Simpson diversity index	**0.5105**	**0.6377**	**0.7277**	**0**	**0.8571**

Local ecological knowledge:

I interviewed 146 people on Penang Island about nocturnal mammals and what they knew about them. Here I present some preliminary results as we are still conducting the interviews.

I asked the respondents how often they were going outside in nature and how often they were going out at night (Fig 3). We can see that a majority of respondents are going in nature less than once a month (57.6%). The same trend is occurring with the people going out at night less than once a month (36.4%) or never (16.1%). This can be explained by the fact that Penang is the second largest city in Malaysia and most people do never go outside as many people living in metropoles. Another factor is that most people are afraid to go out at night for diverse reasons such as dangerous animals or spirit/ghost.

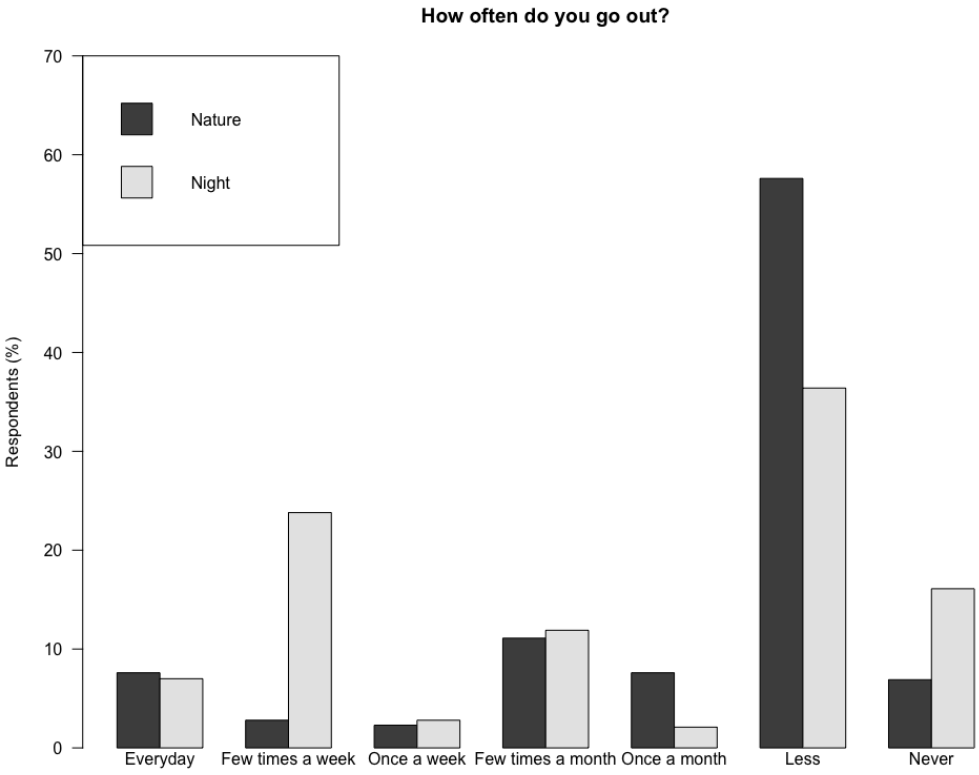


Figure 3: How often the respondents go out in nature and at night.

I asked the respondents what type of lights they were using to look for animals at night and 92.2% replied using yellow/white light with 7.8% only using red light. However, we know that white light is too bright for nocturnal animals and can hurt their eyes. Nocturnal animals do not see the red light and thus allowing us to see them for a longer period of time and observe more natural behaviour. This is something I am working on at the moment by developing best practice guidelines to spot nocturnal mammals. I already trained staff from two places on Penang Island, The Habitat Penang Hill and the Tropical Spice Garden. Their nature guides are now only using red light at night during their tour.

Wen also asked the respondents if they think slow loris, colugo and pangolin where in Penang Island (Fig 4). At our surprise, the animal that most people think where in Penang is the

Pangolin (61.7%). They are the most trafficked mammals and thus chances of encounter are really rare as their number is really low. This can be explained by the fact that this animal is really present in media. On the other way, the most abundant one, the colugo is the one people were thinking is not in Penang. This is due to their cryptic behaviour and only seen when gliding even if they are in occurring in high number.

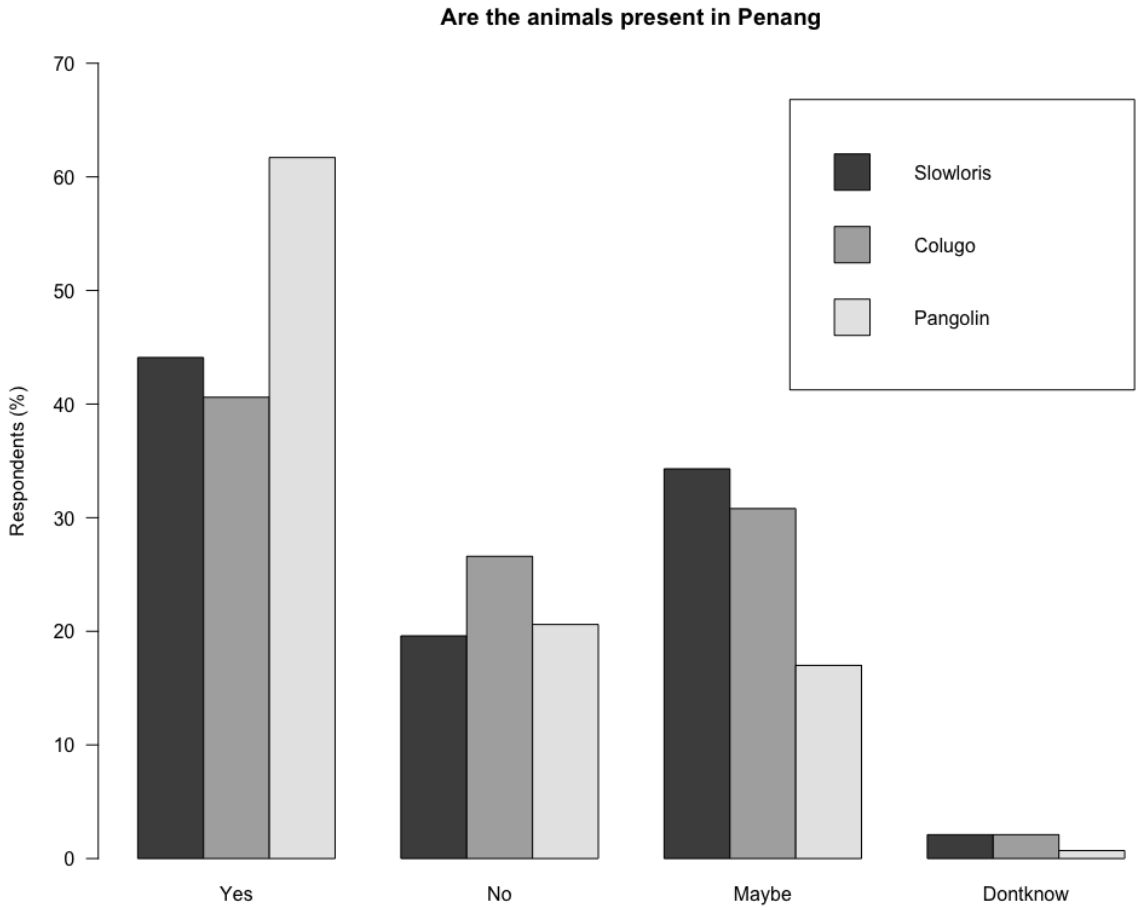


Figure 4: Respondents reply to animals occurring in Penang Island.

Other findings

As part of my field work we participated in the first "bio blitz" in Malaysia, entitled Penang Hill BioBlitz 2017 that covered all the strata of the forest in October 2017. During this event on Penang Hill, and thanks to another researcher Sim Lim (bat researcher), we manage to identify the provenance of an interesting ultrasound call (Table 4).

We have the first ever recording of a Sunda colugo (*Galeopterus variegatus*) call and it is in the ultrasound range (Fig.3). To make sure the call was emitted by colugos we repeated the recording few times with direct sightings of the animal emitting the calls. In one occurrence we even had the individual moving from one side of the road to the other side and we could still record the call.

This is a great discovery as Sunda colugo is not yet known to use ultrasound to communicate and its repertoire is unknown. We know they are closely related to nocturnal primates living in the area, the Slow loris and tarsier, also known to use ultrasound to communicate. This could potentially be an adaption to those closely related species and more research is needed.

We submitted an article named: "**Ultrasound use by Sunda colugos offers new insights into the communication of these cryptic mammals"** for publication in the journal Bioacoustics and it has just been considered for publication with minor revisions (in work) 22nd of February 2018. It should be published around April- May.

Table 4: Date and time of colugo calls recording.

Number of colugo sighting	Date of the sighting	Time individual was first sighted
1	20 Oct 2017	21:50
2	20 Oct 2017	22:13
3	20 Oct 2017	22:52
4	31 Oct 2017	20:29
5	5 Nov 2017	19:30
6	5 Nov 2017	19:38
7	5 Nov 2017	20:00

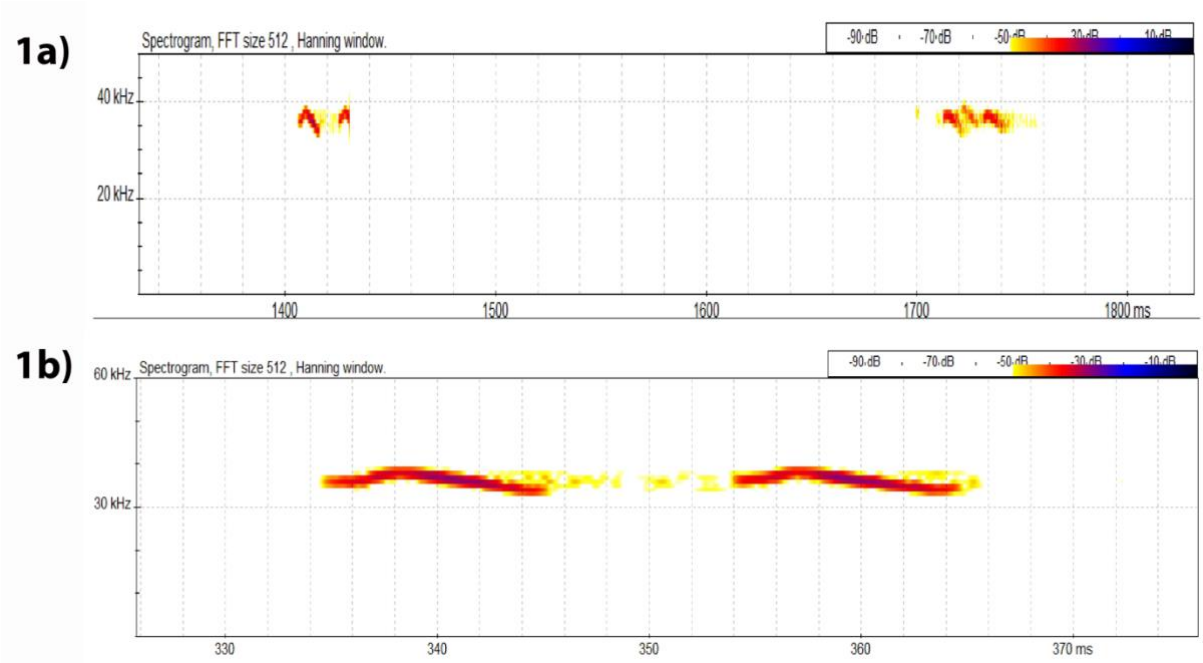


Figure 3: Recordings of colugo sequential call by one individual: **a)** Zoom in from the 1400th to 1800th ms to show the interval between calls; **b)** Zoom in on the first call to show its spectral characteristics.

Budget Use

Expenses	Description	Fund use (€)
Equipment	Head torch with red filter x2 (Clulite)	40
	Rechargeable battery for GPS	30
	DVR recorder	50
Transportation	Volunteer transportation to field sites	230
Accommodation	Accommodation at campsite or local house for remote survey area.	150
		500

Future of the project

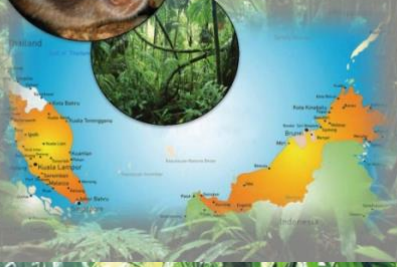
I have been awarded a grant of 5,000 Euros by The Habitat Foundation to continue the work in Malaysia for 2018. I hope to finish surveying Penang Island and to start survey Langkawi Island by September 2018. I am going to start monthly awareness activities with the Habitat Penang Hill, the Penang Botanic Garden and the Tropical Spice Garden in March 2018. During those activities, I will give talks about the nocturnal mammals, engage the younger ones with activities such as mask making or storytelling and bring people with us at night to discover how we work at the end of the day.

I will also present the results of the work conducted in Penang during the ATBC 2018 conference in Kuching, Malaysia, in July and during the International Conference on Tropical Biodiversity 2018 in Ipoh, Malaysia in October.

Appendix: Leaflet donated during interviews / talk

NOCTURNAL MAMMALS PROJECT

Night Spotting Project NSP



NIGHT SPOTTING PROJECT

Night Spotting Project (NSP) is a research project about the distribution and abundance of nocturnal mammals in Peninsular Malaysia and Brunei. We are focusing on the Sunda slow loris - "kongkang" (Nycticebus coucang), the Sunda Colugo - "kubung" (Galeopterus variegatus), and the Sunda pangolin - "tenggiling" (Manis javanica).

This project will be the first systematic survey of nocturnal mammals in Peninsular Malaysia and Brunei. We will gain improved data about the distribution and interactions of nocturnal mammals across different habitat types.

We will also look how man-made infrastructures, such as roads, light and buildings impact nocturnal mammals' distribution in the area. This will help us to develop conservation plans to minimize animal deaths by these infrastructures (e.g. electrocution or road kills).

Why nocturnal mammals are important?

Nocturnal mammals are little known even by local people because only few people go out to the forest at night and because these animals are shy and hard to see.

They are really important for the ecosystem as they are **pollinators** and **seed dispersers** for a number of plants and fruiting trees. They are also helping the environment by eating **pests**, such as insects that can destroy plantations.

They do not only live deep in the forest but also come out to gardens, orchards and human habitations.

Just ask yourself:
What will happen when all the animals are gone?

Slow loris

There is 9 recognised species of slow loris in Asia at the moment. The one on the picture is the Philipine slow loris (*Nycticebus menagensis*), occuring on the north part of the island of Borneo. They have different facemask depending on the species and thus easily recognizable.

They are nocturnal (only active at night) and the only **venomous** primate in the world. They are mainly arboreal (lives in the tree) but do sometimes use the ground when they do not have choice. They mainly eat the gum (sap) from the tree, insect, nectars and only sometimes fruit.

Pangolin

There is 8 species of pangolin and the one in Malaysia is the Sunda pangolin (*Manis javanica*).

They are the world's most hunted animal for its meat and traditional medicine. They are **Critically Endangered** and totally protected so it is illegal to kill them, keep them or even just disturb them. They only eat insects.

Colugo, flying lemur

(*Galeopterus variegatus*)

They are arboreal **gliding** (they do not fly) mammals found in Southeast Asia. Only 2 species exist but they have different colour variations. They eat leaves, shoots, flowers, sap, and fruit.

Are they good pets?

NO! No wild animal should ever be caught and kept as pet. They can hardly survive in human care and normally die fast because of wrong food. They can also become dangerous for the family members and bite in some cases. They can also make you sick, and disease from animals can be given to people and the other way.

Why do they need protection?

Deforestation in Malaysia has caused a loss of their habitat. They have not enough habitats to live and thus may disappear in few years if we don't protect them.

The **poaching & illegal wildlife trade** is a main issue for species decline. They are hunted heavily for their meat, for traditional medicine and for the pet trade locally and internationally.

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