



2021-2022 REPORT

PREPARED BY

*Marc Ancrenaz, on behalf of the HUTAN team
March 2023*



POST COVID RECOVERY

Malaysia lifted lock-downs and other COVID-related restrictions last year, which allowed us to resume our field conservation activities.

More than ever, our priority is to promote peaceful coexistence between people and wildlife that are sharing the same habitat.

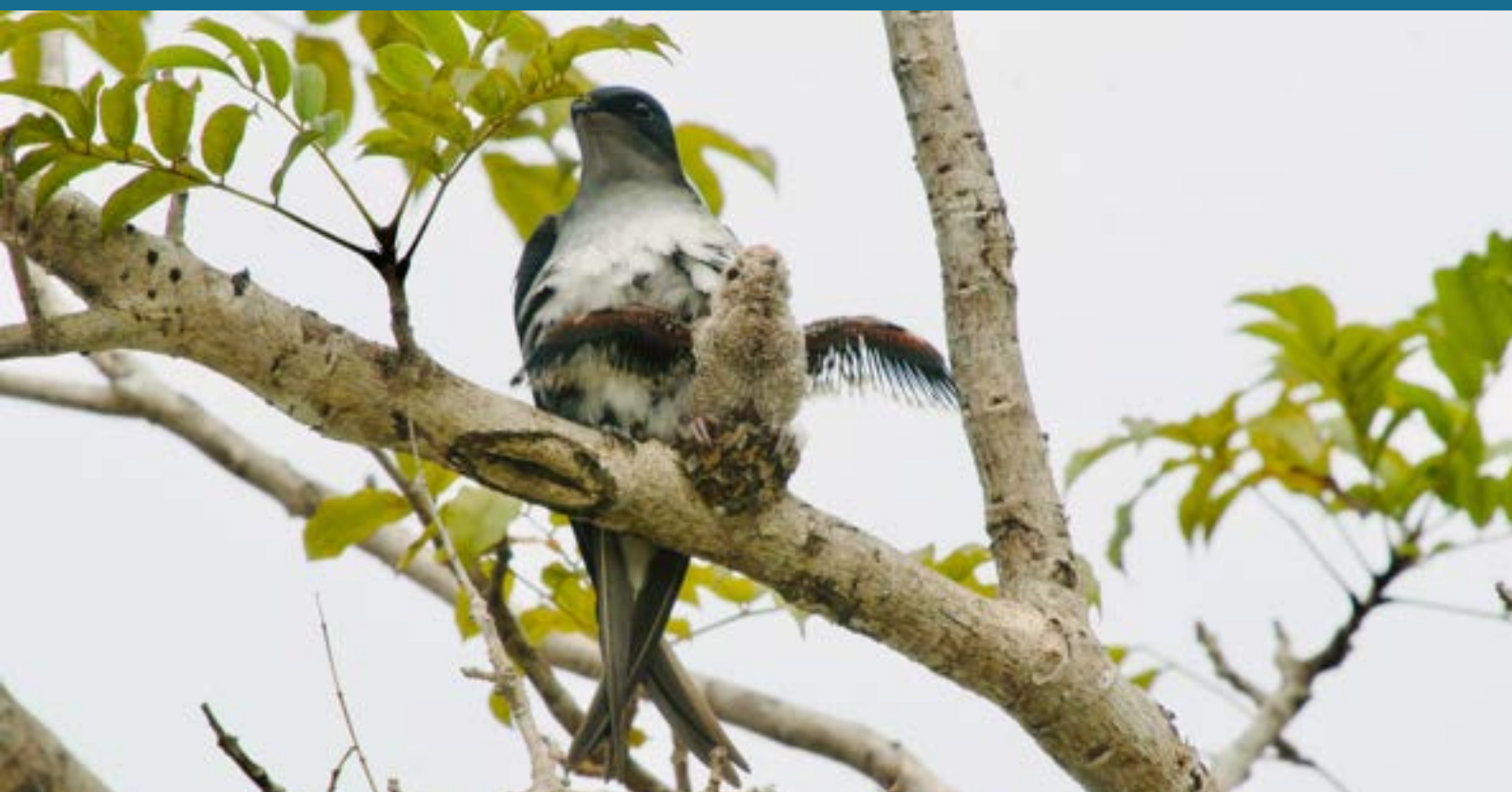
Our work brings new understanding about how orang-utans or elephants survive in agricultural landscapes dominated by oil palm plantations. We investigate the ecology of restored habitats, the dynamic of recolonization of forest corridors by biodiversity, and how to promote and develop resilience to climate changes and support wildlife in the Anthropocene or promote peaceful coexistence between people and wildlife in Sabah.

None of this would be possible without your support. On behalf of HUTAN, we want to thank you all for your interest and efforts to save wildlife.



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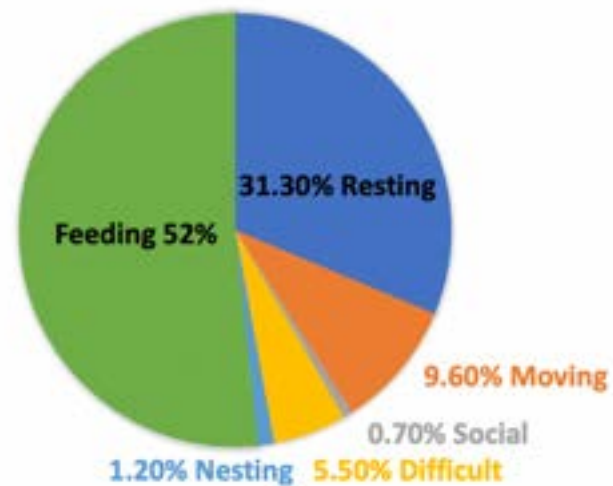
ORANG-UTAN RESEARCH

Here are some news and figures from our nine km sq. research site (map below) over the last two years:

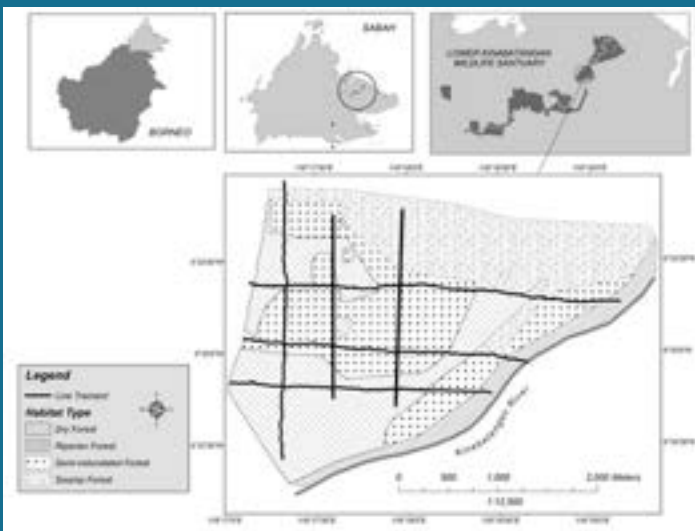
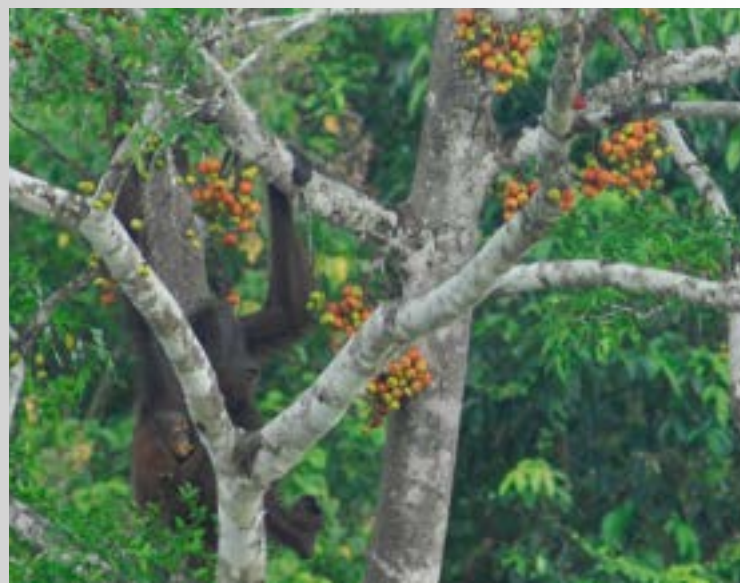
- Sixty-two full days of observation with 17 different wild orangutans.
- Orang-utans spent half their waking hours (about 10 hours per day on average) feeding and a third resting: see graph.
- The top three plant species eaten by orangutans at our site for their fruits are *Ficus sp.*, *Dracontomelon sp.*, and *Cananga odorata*; for their leaves: *Spatholobus sp.* (climber), *Diospyros sp.* and *Ficus sp.*
- Orang-utan densities fluctuated between 1.4 ind./km sq in 2021 and 1.1 ind./km sq in 2022. This low density results from the lack of adult breeding females following the death of our resident females in the past five years.
- The team followed more than 12 different orangutans in the Keruak Corridor. These encouraging results indicate that forest restoration is an efficient strategy to enhance the chances of orangutan survival in oil palm-dominated landscapes.



MAJOR ACTIVITIES OF THE TIME BUDGET OF FULLY HABITUATED ORANG-UTANS (YEAR 2013-2022)



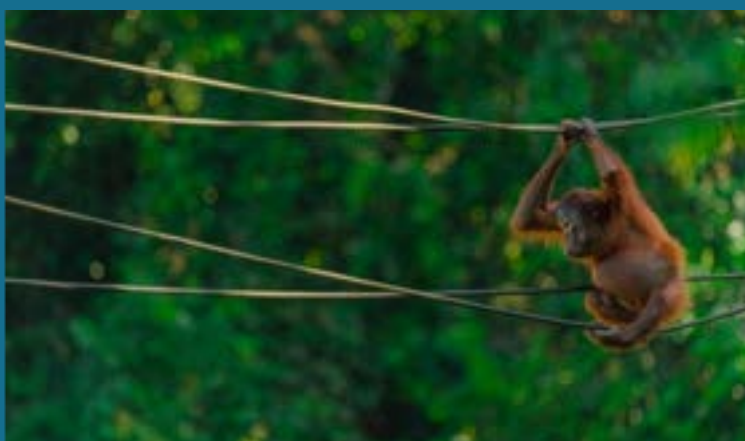
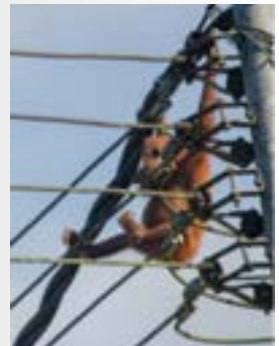
A female orang-utan and her young eating ripe fruits of *Ficus racemosa*



ORANG-UTAN IN THE ANTHROPOCENE

Orang-utans increasingly use the non-forest habitat for food or to move across the landscape. Consequently, the Orang-utan team is also very active outside of our study area and was involved, for example, in:

- Rescuing two orang-utans and entrusting them to the Sabah Wildlife Department (Orang-utan Sepilok Rehabilitation Center).
- Assessing and preventing the risks of electrocution when orang-utans use electrical wires for moving across the landscape.
- Mitigating conflicts between orang-utans and crop owners and promoting peaceful coexistence.
- Organizing field expeditions and aerial surveys to document orang-utan status in the Lower Kinabatangan Wildlife Sanctuary, in forest fragments outside of protected areas, or oil palm plantations (collaboration with Pongo Alliance).
- Setting up camera traps at the border between forests and oil palm plantations to identify orang-utans and to study their movements in an agricultural landscape.



REFORESTATION IN KINABATANGAN

Two teams of women are leading our reforestation efforts. The first team is restoring the Genting Wildlife Corridor (GWC), part of the Keruak Corridor. This corridor results from a pioneering partnership between Hutan, the oil palm producer Genting Plantations, the Sabah State government, and the Sukau community (see the section about Keruak Monitoring). The project aims to establish a 450 acres riverine forest corridor to link two isolated protected forest patches. The GWC covers about 110 acres of land planted with abandoned mature oil palms. The Reforestation team is planting native trees under the palms to recreate a forest suitable for wildlife.

In 2022, the team planted 16,082 seedlings at the GWC (68,336 seedlings since 2019), and 56,226 trees are still alive today (survival rate of 79%). In 2021, we experienced unusually high mortality rates following covid-related lockdowns that prevented the regular field maintenance of our plots. We intend to complete the GWC planting by 2023, but regular maintenance will continue until 2026.

Since 2008, the teams have restored over 150 acres of land in 12 different Reforestation plots: 221,230 trees (belonging to 85 species and 35 families) have survived until today.

In 2022, the team comprised 11 full-time women, a man (driver), and six to 15 interns, a position offered to community members every month.





REFORESTATION IN KINABATANGAN

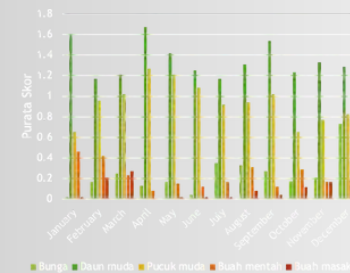
The 11 women of the Nursery and Monitoring Team are organizing the HUTAN Seedling Collection Center (or Nursery), maintaining and monitoring the reforestation plots, and developing new research protocols.

In 2021 and 2022, HUTAN purchased 37,573 seedlings produced by 21 families from the village and contributed a total of 15,071 \$ to the local economy. During the same period, the Nursery sent 38,161 seedlings (51 species) to our Reforestation plots. At the end of 2022, we maintained 19,292 seedlings (from 55 species) at our Collection Center.

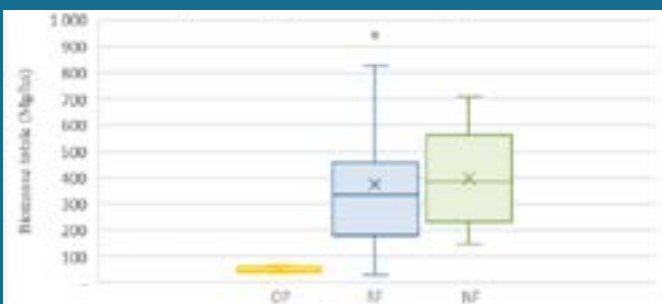
In 2021, the team started to monitor the monthly productivity of trees at the reforestation plots: see the Graph on the right.

In 2022, the team learned how to carry out biomass estimation. We are applying this newly acquired knowledge to follow the evolution of our plots in the long term.

Our data shows that restored plots contain nearly as much total biomass (Reforestation Plots: average of 381 ± 276 Mg/ha) than nearby natural forests (Natural Forest Plots: av. of 401 ± 178 Mg/ha) and significantly more than plots in oil palm plantations (Oil Palm Plots: av. of 52 ± 11 Mg/ha): see Graph below.



Monthly productivity scores (between 0 and 3) for flowers (bunga); young leaves (daun muda); shoots (pucuk); unripe and ripe fruits (buah mentah and masak) from a cohort of 339 trees



PANGI SWIFTLET RECOVERY PROJECT



Swiftlets are small cave-nesting birds using echolocation, a rare ability in the aviary world. Two species produce edible nests: the white-nest (*Aerodramus fuciphagus*) and the black-nest swiftlets (*Aerodramus Maximus*). Edible-nest swiftlets roost and breed in limestone caves. The nests are used for traditional Chinese soup. In Sabah, the birds face considerable pressure from large-scale habitat change and unsustainable nest harvesting. Most populations living in the limestone caves of lower Kinabatangan have been exploited for centuries. In 2010, less than 200 pairs were surviving in the caves of Pangi Forest Reserve, a limestone outcrop close to Sukau. HUTAN collaborated with the SWD and the SFD to protect these birds. Today the colony comprises more than 4,600 breeding couples. We are not harvesting the nests to minimize the disturbance and optimize the colony recovery. However, many birds are currently dispersing outside of Pangi caves. They colonize the artificial farms built by the villagers in Sukau. By doing so, our efforts contribute significantly to supporting the local economy.

Pangi in brief (2021-2022):

- 18 full-time staff and six full-time interns.
- Four base-camps.
- 31 caves identified; 13 caves protected.
- Increased protection efforts achieved no illegal poaching in 2022.
- Speleology expeditions in Pangi by professional speleologists from the "Malaysian Speleology Association": discovery of a new cave system and several invertebrate species.





HUTAN ENVIRONMENTAL AWARENESS PROGRAMME

The overall mission of HEAP is to strengthen the impact of HUTAN's other Units by raising awareness and encouraging behavioral changes in Sabah, and addressing the need for biodiversity conservation in general.

Following two years of virtual events during the Covid-19 pandemic, HEAP resumed in-person activities in 2022. During the year, HEAP visited 16 primary and six secondary schools and one university in six Districts of Sabah. The total audience was 7,862 persons (4,151 students, 194 teachers, and 3,517 members of the public). HEAP was also involved in more than 10 Festivals and other significant events, for example:

- World Wildlife Day: "Recovering Key Species for Ecosystem Restoration" (March).
- IUCN Asian Park Congress (24-29.05)
- "Replanting our future," Kota Kinabalu Wetland Ramsar Site (June).
- World Wetland Day: "Action for Wetlands."
- World Biodiversity Day: "Coexisting with Wildlife" (July).
- North Borneo Rainforest Festival, KK.
- Orang-Utan Caring Week with the SWD in Sepilok (December).

The HUTAN Junior Ranger Programme has also resumed field activities; in 2022, the focus for the 19 enrolled children was about nurturing tree seedlings. HEAP has also reinforced its online and social media presence with new programs to reach a wider audience. Regular monitoring of our education activities shows an increased audience knowledge. However, assessing and demonstrating behavioral changes may take more time.





WILDLIFE SURVEY AND PROTECTION

The WSP team, eight full-time researchers assisted by four interns, is responsible for biodiversity surveys and monitoring, human-wildlife conflict mitigation, droning, and tree climbing activities. They also support the HWW for enforcement or animal rescue operations, Seratu Aatai for elephants, and GAIA for hornbill activities.

In 2022, WSP was very busy learning and applying new techniques at two long-term biodiversity monitoring sites: TRAILS (1st year for this initiative) and Keruak (3rd year for this project).

In addition to biodiversity monitoring activities, WSP installed three new orang-utan bridges in oil palm plantations (Sawit Kinabalu and Melangking Oil Palm Plantations). These bridges improve orang-utan movements in oil palm landscapes, allowing a healthier genetic flow within the population. WSP also repaired the bridges located in the Meninggul and Rasang tributaries.

Over the past two years, WSP rescued two proboscis monkeys and two orang-utans entrusted to the Sabah Wildlife Department. The team was also involved in several elephant wild-to-wild translocation and collaring operations (see the elephant section).

In 2022, we tested a new type of real-time camera to assist enforcement activities and elephant detection (collaboration with Danau Girang Field Center and TOP, respectively).



The team is preparing to climb a tree and install a new hornbill nest during the Borneo Bird Festival in Sandakan



Orang-utan using one of the bridges set up by WSP to cross a tributary of Kinabatangan



WSP, SWD and Seratu Aatai celebrating the World Elephant Day



HONORARY WILDLIFE WARDENS

Honorary Wildlife Wardens (HWW) are given the same powers as the Sabah Wildlife Department rangers. They operate voluntarily but can enforce the Sabah Wildlife Enactment, 1997.

In November 2021, 21 HUTAN staff were certified by the SWD as wardens following their successful examination. As a result, HUTAN now has a team of more than 40 certified Honorary Wildlife Wardens.

In 2022, the team of HWW conducted 121 patrols at night (mainly from the river) and 33 patrols during the day (mainly on the ground). As a result, they recorded 19 illegal activities, including harvesting Gaharu trees (*Aquilaria malaccensis*) within the Sanctuary, logging in Pangli FR, and poaching (snares or hunting platforms). The primary emphasis of the team in the last two years was to prevent the illegal harvesting of swiftlet nests in Pangli, FR.

The team of wardens is also assisting other organizations to enforce the law, such as the SWD in organizing roadblocks (Nov. 2021 in Imbak Canyon) and mitigating human-wildlife conflicts or the Malaysian Police for patrolling activities (Dec. 2022).

However, Wardens are involved in raising awareness about the law: they organize training sessions and workshops for villagers and the oil palm industry, participate in Education events, and are very active in the State-level Warden association.





ELEPHANT CONSERVATION

Conflicts between people and elephants are rampant in Kinabatangan because the landscape is highly fragmented. As a result, local stakeholders often call the WSP team to mitigate this situation. Indeed, peaceful coexistence is possible only when damages and conflicts reach a level acceptable to both people and pachyderms. Over the years, we have developed efficient ways to reduce conflicts, including regular night patrols, to use of sound and other deterrents, or protecting certain areas with electrical fences. In addition, with our colleagues from Seratu Aatai, the WSP trains the "Community Elephant Ranger Teams" from villages visited by elephants and oil palm plantations workers to mitigate these conflicts.

During the past two years, WSP assisted SWD, Seratu Aatai, and DGFC in capturing six wild elephants for translocation or radio-collaring.

In 2022, we finalized the dung decay rate analysis, a preliminary study of the line-transect dung surveys planned to take place in 2023 to determine the Kinabatangan elephant population size. The team also initiated a dung hormonal study with SA and University Malaysia Sabah. In this study, we want to investigate the stress level of elephants who spend significant time in oil palm plantations.

Lastly, we are still regularly maintaining electrical fences to protect local graveyards from elephant visits, which is one of the significant reasons for resentment toward elephants from local villagers.



Recording pictures and video for Individual identification



WSP using "sound cannon" at night to prevent elephants from entering local properties



HORNBILL CONSERVATION

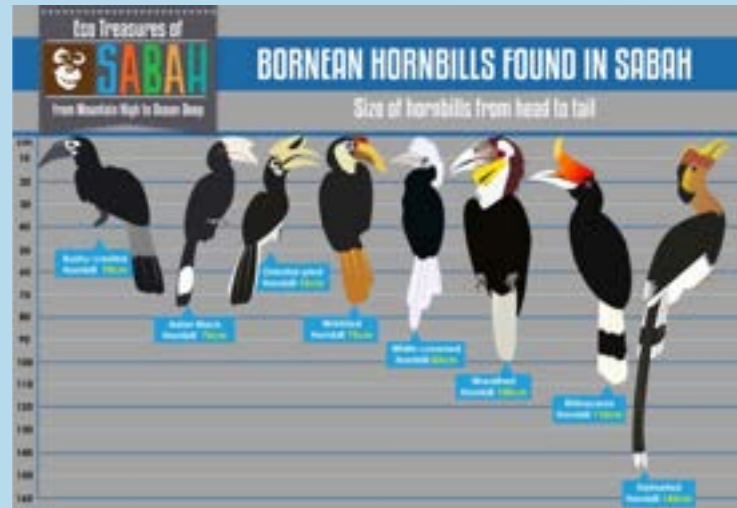


The eight species of hornbills found in Borneo occur in Lower Kinabatangan. Unfortunately, past logging activities and intense forest degradation have destroyed many tree cavities these birds need for nesting. The lack of potential breeding sites is the primary threat to their survival in the area.

For hornbill conservation, HUTAN partners with GAIA, a Malaysian NGO based in West Malaysia, led by Dr. Ravinder Kaur and her team (5 pax). One of our crucial conservation actions is the construction of artificial nest boxes to support hornbill breeding. Over the years, we have set up 29 boxes in Kinabatangan, producing six rhinoceros, two oriental pied, and one clutch of bushy crested hornbills. Last year, the Sabah Forestry Department requested three boxes for Sepilok and Deramakot Forest Reserves. HUTAN also flew to West Malaysia to bring and install two boxes in the forests of Batu Rakit to support Great Hornbill (this event received significant national media attention).

In the field, the team looks for natural cavities and repairs them if necessary (25 holes identified in two years). We retrieve seeds from fecal samples collected at the base of occupied nests and plant them. In the past two years, these seeds produced 763 seedlings (19 plant species). We now monitor 450 seedlings we planted at our "hornbill reforestation plots."

Last, GAIA and HUTAN organized several awareness events about hornbill conservation, including a Pride Campaign in Abai (a village in Kinabatangan) or during the Borneo Bird Festival in Sandakan.



BIODIVERSITY MONITORING

Monitoring and documenting population trends is essential to establish how animal species cope with the new ecological conditions in landscapes modified by human activities and understand how species react to various management decisions.

HUTAN conducts regular biodiversity monitoring activities with several species, including large (orang-utans and other primates, elephants, and carnivores) and small mammals, birds, or amphibians.

Since 2022, we have investigated how to use new technologies (eDNA, bioacoustic) and new approaches (citizen science, invertebrate trapping) to expand the range of taxa included in our monitoring activities.

We adjust the location, size, and type of our respective survey areas to the taxa we want to study and the questions we want to answer. For example, we undertake regular orang-utan monitoring at our intensive study area while we carry out regular hornbill or primate monitoring from pre-established stretches along the river.

Last but not least, we have established two long-term monitoring sites. At the Keruak Wildlife Corridor, we investigate the dynamic of wildlife recolonization of restored forests. With the TRAILS initiative, we want to understand the value of an agro-forestry approach for biodiversity in an oil palm context.



KERUAK WILDLIFE CORRIDOR MONITORING

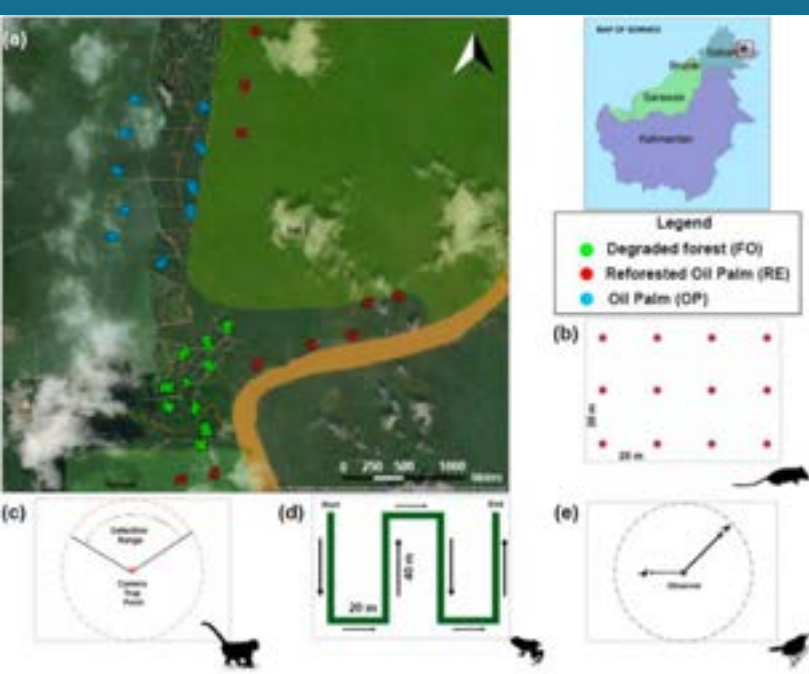


Goal: Documenting wildlife recolonization and occupancy of a reforestation corridor.

Methodology: a combination of small mammal trapping, camera trapping, amphibian visual encounter rates, bird radial point surveys, and invertebrate trapping. In 2022, we trialed new approaches, including eDNA, bioacoustics, insect light trapping, and soil health analysis.

Results:

- Species richness is higher in forest habitats than in reforestation and oil palm plots.
- 153 species identified (graph on the right).
- An increasing number of species were detected in the reforestation plots, showing wildlife use of restored forest areas.
- The most common species are pig-tailed macaques (*Macaca nemestrina*) and Tioman rats (*Rattus tiomanicus*).
- Absence of Bearded pigs (*Sus barbatus*), two years after the African swine flu outbreak.





TRAILS

Innovative Planting Designs for Wildlife, Climate and Livelihoods

The TRAILS initiative (Innovative Planting Designs for Wildlife, Climate, and Livelihoods) is an interdisciplinary research and development program that intends to (1) design and establish oil palm agroforestry systems; (2) assess their impact on the three sustainability components (environment, social, economic); (3) identify the critical factors of climate resilience; and (4) analyze the socio-economic results of the transition from monoculture oil palm plantation systems to more resilient agroforestry systems.

TRAILS in a nutshell:

- 100 ha of land allocated by MOPP for the experiments.
- Three designs:
 - Mixed plantations (trees and palms): 4 treatments - 12 replicas.
 - Pure forest islands: 7 treatments.
 - Pure palms.
- A total of 22 ha has already been planted with 3,000 trees from 15 species.

HUTAN is in charge of providing seedlings for reforestation purposes and undertaking multi-year biodiversity monitoring activities.



Monitoring soil structure and composition



The team sets up a "tarp trap" to document small critters that take refuge underneath



Location of tree and palm seedlings planted in the experimental plots (aerial picture of the entire experimentation site above)

Yellow throated marten (*Martes flavigula*)



CARNIVORE MONITORING

Goals:

1. To document the dynamic of recolonization and use of reforestation plots by carnivore species.
2. To identify critical environmental features that affect carnivore species composition in different habitat types.

- Location: Keruak Wildlife Corridor.
- Number of monitoring plots: 30.
- Camera traps: 30.
- Active Deployment days: 2,534.
- Pictures: 61,075.
- Independent detection events: 1,383.
- Carnivore species detected in Keruak: nine.
- Most common species: Banded palm civet (*Hemigalus derbyanus* - n=181); Common palm civet (*Paradoxurus hermaphroditus* - n=154); Malay civet (*Viverra zangalunga* - n=91).
- The first record of a binturong (*Arctictis binturong*) walking on the ground at the reforestation plot.
- The detection of a rare and elusive species in the oil palm plots: the yellow-throated marten (*Martes flavigula*).
- Bornean sun bears (*Helarctos malayanus*) are only detected in the forest (seven detections).

We started to restore Keruak Corridor in 2019. The increasing number of Carnivora species in the reforestation part of the corridor indicates the value of our forest restoration efforts to support these taxa.

Banded palm civet (*Hemigalus derbyanus*), the commonest carnivora species at our site in 2021-22



Leopard cat (*Prionailurus javanensis borneoensis*), the only cat detected in palm and reforestation plots



Binturong (*Arctictis binturong*) walking on the ground



Malayan sun bear (*Helarctos malayanus*), only detected in the forest plots



FROG MONITORING



Megophrys nasuta

We monitor the frog community across Kinabatangan and at the Keruak Corridor.

In Kinabatangan:

- Monitoring started in 2017 (20 sites); four monitoring sessions.
- Cumulated number of species: 37.
- Most species occur in Dry (n=34) and semi-inundated forests (n=23) compared to limestone (n=18) and oil palm plantations (n=5).
- Over the years, we documented an unexplained decline in the Anuran community's encounter rates and relative abundance.
- First record of *Chiromantis inexpectatus* for Kinabatangan.
- Two new species were detected in 2022: *Limnonectes paramacrodon* and *Megophrys nasuta*.

Keruak Corridor:

- Two monitoring sessions (2019-2022).
- Number of sites: 30.
- Number of species: 24 (17 in 2019; 22 in 2022).
- Species diversity (Shannon index) and community distribution (Simpson index) are higher in forest habitats. High canopy cover, lianas, dead wood, and leaf litter influence the community.
- The presence of grass and scrub and the distance from nearby forests influence species communities in the oil palm and reforestation plots.
- In 2022, we identified a new undescribed frog species from the Microhylidae family: *Kalophrynus sp.*

This new undescribed species might be a new genus of *Kalonyphrus*. Note that black spots between the upper parts of the hindlegs and the lower belly.





Plain treeshrew,
Tupaia minor

SMALL MAMMAL MONITORING

We monitor small mammal communities (Rodentia, Insectivora) at the Keruak Corridor.

Methodology:

- Three habitat types: Oil Palm, Reforestation, and Natural Forest.
- Ten plots in each habitat.
- One sampling session = 5 days.

Results:

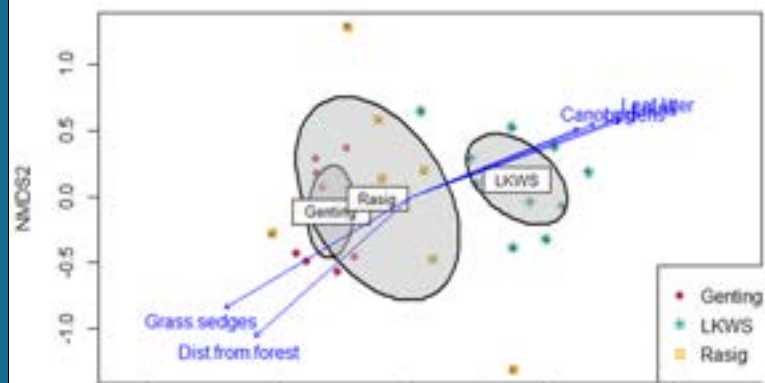
- 2021: 415 captures - 17 species.
- 2022: 373 captures - 16 species.
- Commonest captures over two years:
 - Muller's rat (*Sundamys muelleri*) - 249 captures.
 - Tioman rat (*Rattus tiomanicus*) - 134.
 - Large treeshrew (*Tupaia tana*) - 113.
- More species are captured in the Forest (11) than Reforestation (7) and Oil Palm (6) plots.
- Rats (Mueller and Tioman) and plantain squirrels (*Callosciurus notatus*) more frequent in oil palm plots.
- More Treeshrew species and individuals are captured in natural forests.
- The Prevost squirrel (*Callosciurus prevostii*) has only been captured in Reforestation plots.
- The community identified in the Forest is different and more diverse than those found at the Reforestation and Oil Palm plots (see diagram).



Hose's pygmy shrew, *Suncus hosei*, scarce endemic and first record for Kinabatangan



NMDS: Small Mammal 2022



NMDS analysis showing the different communities of small mammals in three habitats.



Moonrat, *Echinosorex gymnurus*, only captured in the forest

PRIMATE MONITORING



Sabah Grey Langur
Presbytis sabana

Monkeys are commonly seen along the edges of the Kinabatangan River in the morning and late afternoon. Recording the number of groups of primates detected along pre-established stretches of river is a simple and pleasant way to document population trends across the years.

Data collected every year between 2005 and 2022 show:

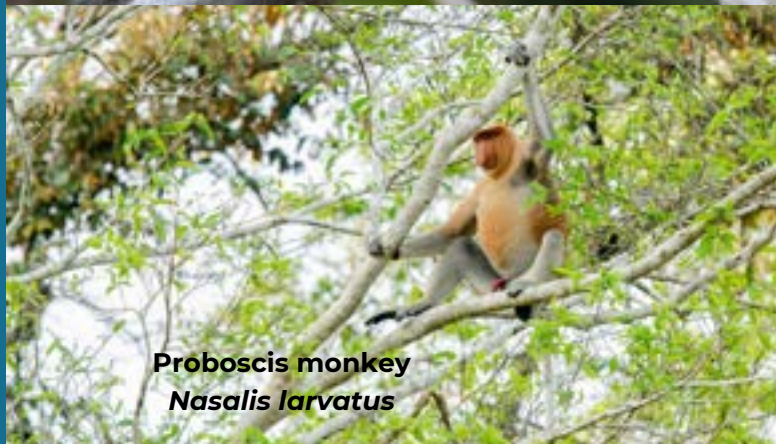
- Regular and stable sightings of groups of Long-Tailed Macaques, *Macaca fascicularis* (av. of 0.91 group/km), Pig-Tailed macaques, *Macaca nemestrina* (0.15 group/km), Silvered Langurs, *Trachypithecus cristatus* (0.2 group/km).
- Proboscis monkeys, *Nasalis larvatus*, are stable, with an overall population of 1,000-1,500 individuals for the Lower Kinabatangan.
- A steady decline in sightings of Red Leaf Langurs, *Presbytis rubicunda* (0.012 group/km).

In 2022, for the first time, we photographed a group of Sabah Grey Langur during our river survey (see picture above).

We also monitor gibbons by recording their early morning calls. Our data show that gibbons are disappearing fast from Kinabatangan, from 2-4 group/km.sq in the early 1990s to about 1 group/km.sq today. This significant decline may result from forest fragmentation and social stress.



Long-tailed macaque
Macaca fascicularis



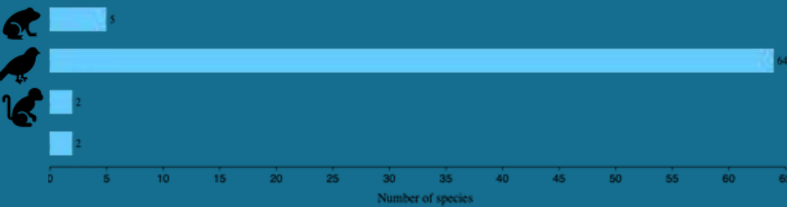
Proboscis monkey
Nasalis larvatus



BIOACOUSTIC MONITORING

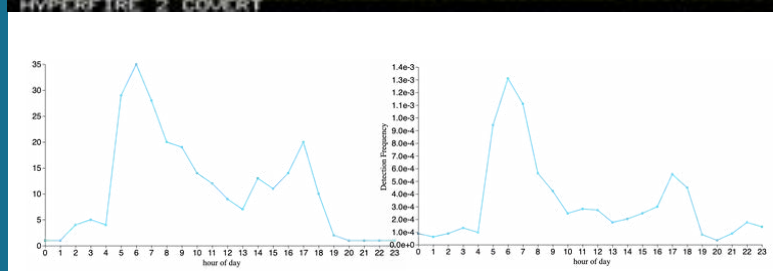
Bioacoustic monitoring offers the possibility to detect species by their calls or songs.

In 2021-2022, we entered a collaboration with the group Rainforest Connection to learn how to use Audiomoth passive devices that record audible sounds. For the first deployment, we set up 30 devices for 14 days at the Keruak corridor site. Each Audiomoth recorded 1 minute every five minutes for 14 days. This sampling effort resulted in 113,687 files totaling a size of more than 600 Gb of data! From a total of 916 different detections, we identified 73 different species, primarily birds.



Nineteen species are endangered in the IUCN Red List. In addition, we identified 31 new species in the Keruak Corridor that we did not record with other monitoring techniques. Our partners are currently analyzing the entire dataset. Still, we can already see that more species are detected with bioacoustic in the forests of the Lower Kinabatangan Wildlife Sanctuary than in the Reforestation and Oil Palm plots, mostly early morning and late afternoon: see graphs. More results are expected in the next few months.

With the assistance of our colleagues from Beauval Nature, we also started to investigate how active bioacoustic could be used for taxa that we still need to monitor, such as bats.



Graphs showing the number of species detected by hour (right) and the hourly detection frequency (left)



Heat detection map showing where recorded bouts were the most frequent



Passive audiomoth device deployed in the field, and protected with a wire mesh cage to prevent attacks from macaques and other animals!

REACHING OUT TO A WIDER AUDIENCE

One of our goals is to reach a broad audience by disseminating the results of our research and conservation efforts via various means: oral presentations at national and international conferences; social media events; articles for Malaysian and international newspapers, books, magazines, and scientific peer-reviewed journals (all available at our website).

HUTAN is also active with several national and international initiatives, such as the Sabah Jurisdictional Approach Initiative, the Round Table on Sustainable Palm Oil (Board Member), IUCN Species Specialist Groups (SSC section of Great Apes; Asian Elephant; Oil palm task Force), or the UNEP Great Ape Survival Partnership (Scientific Committee), etc.

In 2022, HUTAN was selected as one of the fifteen finalists of the Earthshot Prize for the category "Protecting & Restoring Nature."

Book chapters and peer-reviewed articles published in 2021- 2022

Ancrenaz M. 2022. Coexisting with wildlife. *Muzings* (3), ISSN: 2716-6759; Kuala Lumpur, Malaysia, pp. 106-111.

Rival, A., Ancrenaz, M., Lackman, I., Shafiq, M., Guizol, P., Djama, M. 2022. Addressing the monoculture system: challenges in oil-palm based agroforestry. *Palms*, 66(3): 147-154.

Meijaard, E., Ariffin, T., Unus, N., Dennis, R., Meijaard, E., Wich, S., Ancrenaz, M. (2021). Great apes and oil palm in a broader agricultural context. A report by Borneo Futures and the IUCN Crops Task Force commissioned by the UNEP/GRASP Program. Brunei, 61 pp.

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