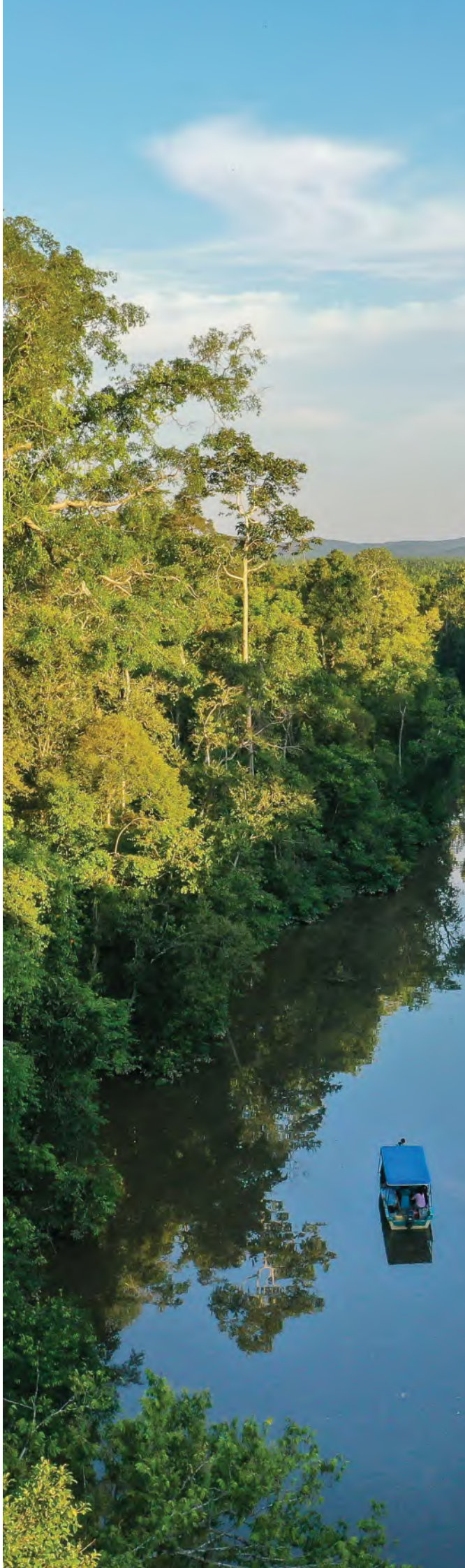
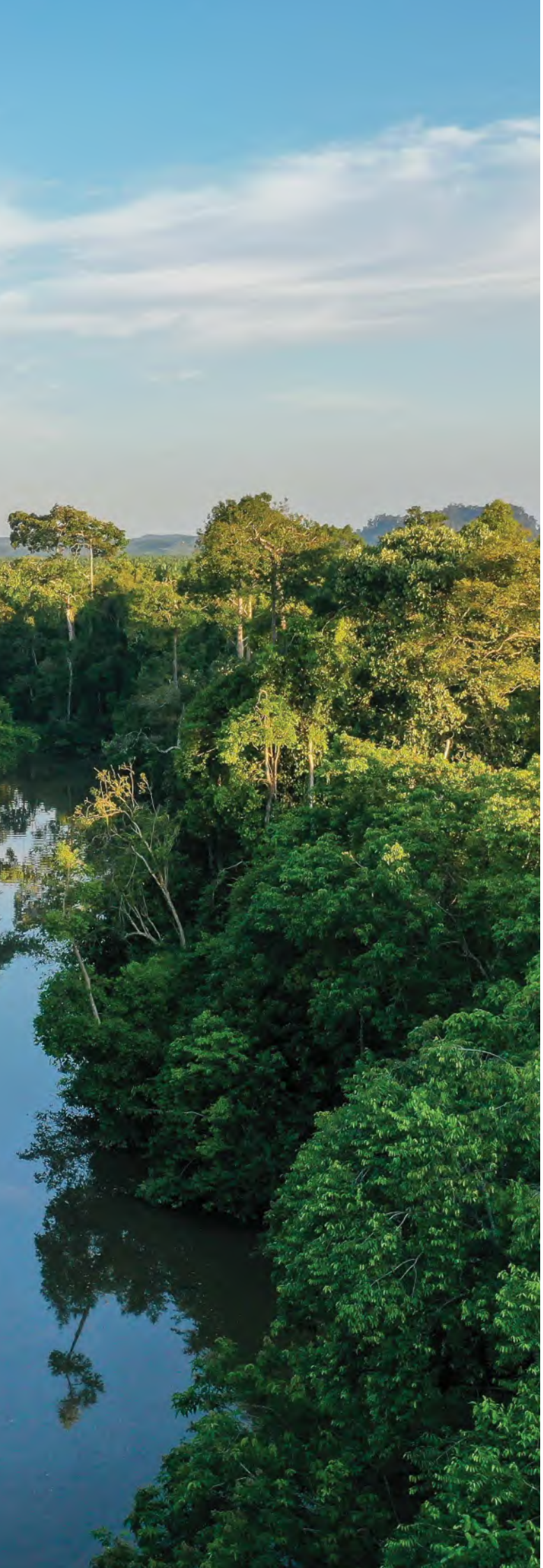
HUTAN

Annual Report
2024

We extend our sincere gratitude to all our partners for their long-term trust, support, and collaboration. In particular, we thank the **Sabah Wildlife Department** for over 25 years of close partnership under a longstanding Memorandum of Understanding with Hutan.





Contents

About Hutan 04

Biodiversity Research & Protection 05

Restoring & Reconnecting Habitats 20

Stakeholder Engagement & Partnerships 26

Vision for a New Hutan Campus 35

Hutan is a **grassroots wildlife research and conservation organisation** established in 1998, Sabah, Malaysian Borneo. Our mission is to develop community-driven solutions for the harmonious **coexistence between humans and wildlife**.

Hutan's work is rooted in the Kinabatangan floodplain, one of **Southeast Asia's richest biodiversity hotspots** and home to many endemic and iconic species such as the Bornean orangutan, Bornean elephant, proboscis monkey, and eight species of hornbills.

Past human activities, however, have fragmented large swathes of natural forest into small, isolated patches, threatening wildlife populations and the region's ecological balance. Today, the **Kinabatangan landscape has become a complex mosaic** where protected forest fragments are hemmed in by extensive oil palm plantations and village areas, disrupting wildlife movement and escalating human–wildlife conflict.

To address these environmental and social challenges, Hutan has developed a holistic approach that combines scientific research, habitat restoration and protection, environmental education, outreach and capacity building.

Over the years, Hutan has built a team of over a hundred staff members, the vast majority of whom come from the **local Orang Sungai community**, working with remarkable dedication and expertise to protect their natural heritage.

Hutan's **long-term biodiversity research**–including one of the world's longest-running wild orangutan studies–provides critical insights into species ecology and adaptation to human-altered landscapes, forming a strong scientific foundation for **effective conservation planning and management**.

We also work closely with stakeholders across the region to develop innovative and practical solutions for **restoring habitat connectivity** and to empower communities in sustainable natural resource management, **balancing conservation goals with the needs and aspirations of local people**.

In addition, Hutan raises environmental awareness and forges strong commitment and capacity among stakeholders to build an **interconnected, thriving and resilient Kinabatangan landscape** where people coexist peacefully with nature

Biodiversity Research & Protection

In order to advance the knowledge on **biodiversity dynamics and resilience in the Kinabatangan mosaic landscape**, Hutan continues to expand its long-standing research and monitoring programmes, covering a wide range of taxa, including orangutans and other primates, amphibians, and birds, such as hornbills.

Orangutan Behavioural Research

Hutan operates one of the longest-running wild orangutan research sites in the world. Since 1998, **Hutan's Orangutan Research Unit** has studied the socio-ecology of three generations of orangutans within our research site, a 10 km² lot of regenerating secondary forest in the Lower Kinabatangan Wildlife Sanctuary (LKWS).

In 2024

991
man-days

The 12 person orangutan research team conducted individual orangutan follows, population survey and monitoring, and phenology studies in our study site.

387
man-days

Socio-ecological study with 65% of the days spent in **direct observation of 10 wild orangutans**–seven resident individuals and three newly observed at the site–collecting a wide range of data including activity budgets, feeding behaviour, movements, social interactions and other information.

38
full days

Dawn-to-dusk follows were carried out on six orangutans, yielding **466 hours of direct observation**.

Orangutan	Age Category	Days Followed
Mallotus	Adult Female	13 days
Manis	Adult Female	2 days
Mubali	Flanged Male	8 days
Oceanne	Female (10 yr old)	10 days
Wawa	Female (9 yr old)	4 days
Mamai	Adult Female	1 day

Wild orangutans are **solitary and cryptic** in nature, so locating and following them **requires significant effort**.

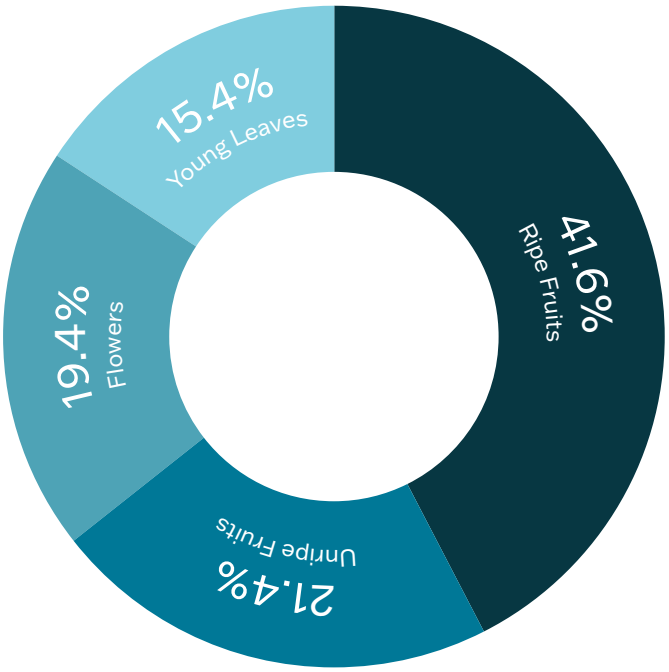
Diet of Wild Orangutans

In 2024, our focal orangutans consumed **62 plant species** from **31 families**, including **41 tree species** and **15 vine species**, with an additional **6 unknown species**.

The availability of food sources greatly influences the feeding habits of orangutans, therefore **Hutan tracks plant phenology each month to understand patterns of flowering and fruiting**. The impact of flowering/fruiting seasons on the animals' diet shows the **importance of selecting asynchronously fruiting species in forest restoration efforts**.

Annual analysis of research data provides critical understanding of **how wild orangutans adapt to the agro-forest mosaic landscape of the Kinabatangan region**. This information has been instrumental in collaborative stakeholder efforts to develop sound orangutan population management and conservation strategies.

In 2024, the orangutans' diet was dominated by **ripe fruits** (41.6%), followed by **unripe fruits** (21.4%), **flowers** (19.4%) and **young leaves** (15.4%).



Flower consumption was particularly high in 2024, coinciding with an extended flowering period on *Maranthes corymbosa*, one of the orangutan's favoured tree species.

© Sankowsky, G.
www.anbg.gov.au

Monitoring Wildlife Population Trends

Orangutan Surveys

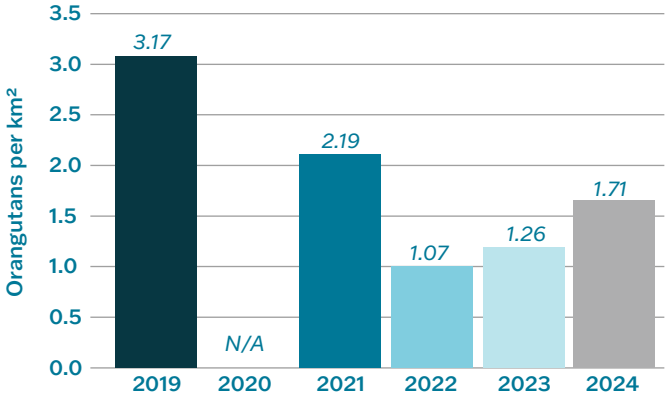
At Hutan's long-term research site:

The orangutan research team assesses **orangutan population trends and seasonal density fluctuations** at our research site through repeated nest counts along 12km of fixed line transects across various habitat types, including dry, riparian, semi-inundated, and swamp forests.

Orangutan densities are usually consistent at our research site, ranging from 2.5 to 3.5 individuals per km². However, the natural deaths of three matriarchs in 2018 and 2019 led to a significant decline in orangutan presence, with densities dropping to approximately 1 individual per km² in 2022. Since then, we have observed a steady increase in orangutan presence, with the resident young females nearing adulthood, attracting more males to the area.

In 2024, two survey rounds were completed in four forest types (dry, riparian, semi-inundated, and swamp). Our results show that the **orangutan density averaged 1.71 individuals per km²**, showing a continued recovery from the decline observed in 2022.

Results of semester nest count and orangutan density estimates in Lot 2 of the LKWS (ind. per km²)



Across the Kinabatangan landscape:

1. Helicopter Surveys

In January 2024, Hutan launched **a two-year orangutan population assessment** across the Kinabatangan landscape. This survey is part of our long-term effort to monitor population trends and will provide critical insights into the status, trends, and dynamics of the Kinabatangan orangutan population, guiding future conservation strategies.

ORANGUTAN NEST SURVEY

March 2024

The survey covered 360 km² of suitable orangutan habitat both in protected areas and private land, extending across 235 km of transects.

5,131 total nests recorded

867 individuals estimated

2.4 avrg. orangutans per km²

Of this total, it is **estimated that 478 live within the Lower Kinabatangan Wildlife Sanctuary**, while the rest live in smaller forest reserves and on private land.

The region may have supported as many as 20,000 orangutans in the early 1900s, declining to around 4,000 by the 1960s due to intensive deforestation in the Kinabatangan region. Our previous assessments in 2002, 2008, and 2015 revealed a slower decline, with population estimates of 1,150, 800, and 780 respectively, likely due to habitat loss and degradation in non-protected areas. The findings of our 2024 (estimating 867 individuals in the region) surveys underscore the species' resilience and highlight **the importance of active landscape management** to sustain viable orangutan populations in a multiple-use landscape dominated by oil-palm agriculture.

2. Ground Nest Surveys

Ground-based nest surveys were conducted in six of the ten lots of the Lower Kinabatangan Wildlife Sanctuary over the period of February to October 2024. The findings from the ground-based surveys complement those of the aerial surveys.

Overall, orangutan nest abundance was higher at the **boundaries between protected forest lots and oil palm plantations** compared to the forest interior. This preference for forest edges may indicate a **shift in ranging patterns and feeding behaviour**, with orangutans increasingly venturing into oil palm plantations to reach other patches of forests and feeding on oil palm fruits and young leaves. Additionally, there were lower orangutan population densities in heavily disturbed or waterlogged forests and higher densities in areas with better habitat quality. We have also observed orangutan nests in small, **heavily disturbed forest islands located within oil palm plantations**, a finding consistent with Hutan's earlier studies showing the species' ability to persist in these small forest fragments.

Importantly, ground-based surveys also allow crucial **botanical assessments** to be gathered and to evaluate habitat health and conditions. These assessments revealed that the **most used nesting sites were small-diameter pioneer trees**, particularly laran (*Neolamarckia cadamba*) and bayur (*Pterospermum sp.*).

Frog Surveys

Harlequin flying frog
Rhacophorus pardalis

Hutan began monitoring the trends and dynamics of amphibian populations in the Kinabatangan in 2017, focusing on 20 designated plots in various habitat types. We have now recorded a cumulative **total of 40 frog species** across all habitat types.

The **highest diversity of frog species was found in dry forests** (34 species), followed by semi-inundated forests (23 species), limestone habitat (18 species), and oil palm plantations where only 5 species were recorded. Over the years, however, frog encounter rates and relative abundance have declined.

Frog species assemblages reflect habitat preferences and sensitivity to microclimate and vegetation, providing **insights into ecosystem health and the effectiveness of habitat restoration**. For instance, we have observed that **our active reforestation corridor is starting to attract more forest-dependent species** than in oil palm plantations, signalling the gradual recovery of natural forest conditions.

We have recently observed a **growing presence of the carnivorous mangrove-specialist frog *Fejervarya cancrivora* in oil palm plantations** far away from their usual habitat: estuary mangroves. This suggests that some species could be expanding their range–potentially due to climate changes or human-induced disturbances–and possibly favouring competition with less resilient local frog species.

Primate Surveys

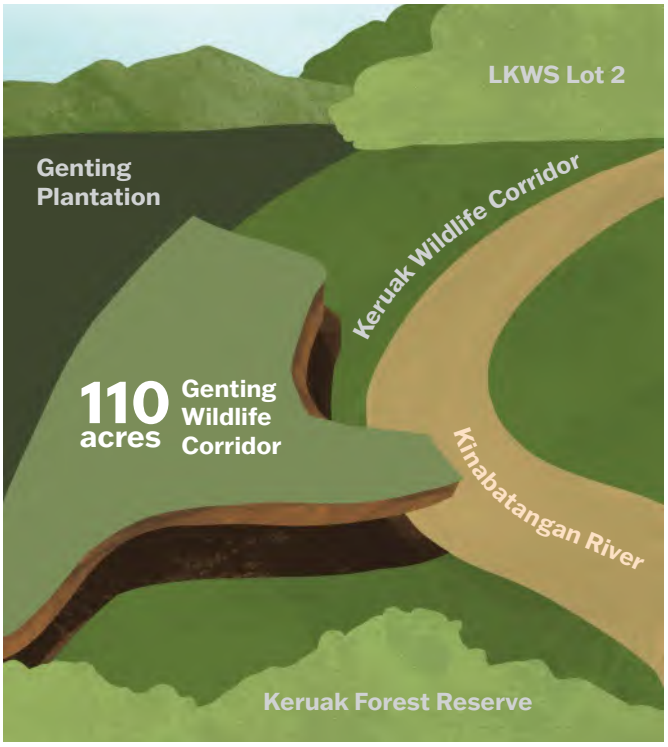
Since 2007, Hutan has been **monitoring population trends for six primate species** in the Kinabatangan with quarterly surveys along a predetermined 16 km stretch of the Kinabatangan River near Sukau. These quarterly surveys generate kilometric sighting indexes that are compared over time. Through these regular observations, we gain insight on shifts in population.

We have observed that the average size of proboscis monkey groups (an iconic, endangered species of Borneo) has increased steadily **from 11.1 individuals in 2018 to 13.8 individuals in 2024**. Proboscis monkey groups were sighted on **16 tree species**, most commonly on lamba (*Colona serratifolia*, 27%) and bangkal (*Nauclea sp.*, 18%), highlighting the importance of a healthy and diverse ecosystem.

Silvered leaf monkey
Trachypithecus cristatus

Monitoring Wildlife Corridors

In 2018, long-term biodiversity monitoring was initiated at the **110-acre Genting Wildlife Corridor, a section of the larger Keruak Wildlife Corridor** that is covered with abandoned mature oil palms. The **Hutan Reforestation team** has been working to restore this corridor by planting native trees in between the palms. To assess the impact of these efforts, the **Wildlife Survey and Protection (WSP) Unit** has been conducting **biodiversity monitoring** through various methods, including small mammal trapping, frog and bird surveys, bioacoustics, and camera trapping.



Camera Traps for Biodiversity Monitoring

Hutan uses camera traps to **monitor medium size mammal species (such as carnivores, pangolins, and wild boars etc.) presence and population trends** across the fragmented Kinabatangan landscape. This approach helps us better understand species diversity, distribution, and behaviour in human-altered areas across the various habitat types of our study area.

The study area is divided into three distinct habitats: an actively exploited oil palm estate; a protected yet degraded forest; and the reforested wildlife corridor.

In each habitat type, ten camera traps (Reconyx Hyperfire 2) were deployed, each mounted 0.3 m above ground level. Each camera trap was set to take a burst of three photos upon a motion trigger with three minutes of quiet period between triggers.

In 2024, we captured a total of **49,813 photos and 338 videos**. After processing the collected data, we chose to omit over 40,000 photos taken by a single, faulty camera trap, leaving us with 9,132 photos and 338 videos for analysis.


Bearded pig
Sus barbatus


Malayan civet
Viverra tangalunga

In the reforestation corridor, our deployment campaign gathered 692 independent detections and identified **36 species**, twelve of which are listed in the IUCN red list as Critically Endangered, Endangered, or Vulnerable. Amongst the recorded species is the **thick-spined porcupine (*Hystrix crassispinis*)**, a species endemic to Borneo, which we captured on a camera trap for the first time with our cameras.

Since we began our camera trap monitoring in **2019**, our various approaches (including camera trapping) **identified 196 wildlife species across all sites**, including 52 mammals, 115 birds, 26 amphibians, and 3 reptiles. Among them, 30 species are Bornean endemics, and 32 species are classified as threatened (CR, EN, VU) on the IUCN Red list. As expected, species diversity was highest in natural forests, followed by reforestation sites, and oil palm plantations.

Keruak Wildlife Corridor 2019-2024

196 species recorded

30 species **endemic to Borneo**

32 species listed in the **IUCN Red List**

- CR — 2 Critically Endangered
- EN — 10 Endangered
- VU — 20 Vulnerable

52 Primates

115 Birds

26 Frogs

3 Reptiles

94 species recorded in Oil Palm Plantations

121 species recorded in the reforested wildlife corridor

136 species recorded in areas of natural forests

Carnivore Surveys

Carnivores play critical ecological roles, but many of these species are threatened, and their status is poorly known, particularly in human-altered landscapes such as the Kinabatangan floodplain. A special component of Hutan's camera trap monitoring is **dedicated to detecting carnivore species to better understand the ecology of these highly elusive animals**, and to find out whether they use the forest corridors created by Hutan's reforestation team.

In addition to the Genting Wildlife Corridor campaign, we deployed additional camera traps in two more habitat types of protected natural forests in the Lower Kinabatangan Wildlife Sanctuary (LWKS): dry forest, and seasonally-flooded forests.

In 2024, the combined captures in the LKWS and Genting Wildlife Corridor represented a total of 13,539 pictures and 338 videos leading to 3,141 detections over five habitat types. The most commonly recorded species were the Malay civet, followed by the banded palm civet and the Bornean sun bear. To date, we have identified 13 carnivore species across our multi-year study.

A total of **10 carnivore species were detected** in 2024. **Carnivore diversity was highest in the reforestation site**, where all 10 species were present, including the rare and elusive **Bornean clouded leopard**. These encouraging results suggest that carnivore communities are already using the newly established corridor, even at an early stage of ecological recovery.

In natural forests, seven carnivore species were detected, and only four species in oil palm plantations, where the Bornean leopard cat was the most frequently recorded. Only two species—the Bornean sun bear and the Malay civet—were found across all habitat types, indicating their high adaptability. These findings strongly support Hutan's **connectivity conservation strategy**, highlighting the importance of establishing reforestation corridors and preserving forest fragments within oil palm plantations to maintain carnivore diversity and overall ecosystem health in the Kinabatangan landscape.

Bornean clouded leopard
Neofelis diardi borneensis

Sunda leopard cat
Prionailurus javanensis

Yellow-throated marten
Martes flavigula

Biomass & Soil Monitoring

Hutan aims to monitor ecosystem health across various land-use types and reforested areas by assessing **biomass, carbon storage, and soil quality**. The findings inform restoration strategies and support climate change mitigation by identifying which land uses best support ecological recovery and sustainability.

Biomass and Carbon

Biomass includes all living and dead plant material. Hutan measures all trees and plants within 1000 m² plots, before using formulas to estimate above ground biomass in metric tonnes per hectare (t/ha). Based on previous scientific research, it is estimated that about **half of this is assumed to be made up of carbon**.

Hutan has been **monitoring biomass as a proxy for carbon storage across various habitats**: natural forests, reforestation sites, agroforestry plots, and oil palm plantations. This information allows us to assess their carbon sequestration capacity and overall ecological health.

By **evaluating how effectively these habitats capture carbon**, we can compare the evolution of carbon storage across different land-uses, assess the progress and success of reforestation efforts over time, and guide future strategies for forest restoration and climate change mitigation efforts.

In 2024

Hutan sampled **51 biomass plots** and calculated carbon stocks across different land-use types:

Land-use Type	Carbon (t/ha)	Findings
Natural Forests	200.0	The highest biomass and carbon levels of all land-use types
Mature Oil Palm Sites	104.0	Although substantial, the value is significantly lower than that of Natural Forests.
Planted Reforestation Sites	71.0 - 106.0	Older reforestation plots demonstrated significantly higher values, at 106 t/ha. This suggests that as the reforested area is maintained, growth will be experienced.
Agroforestry Plots *(See TRAILS project on page 29)*	16.2	Lowest carbon levels by far, however, carbon stocks in these plots rose markedly from 7.3 t/ha in 2023, demonstrating a **rapid growth trend**.

Soil Health

Healthy soils support biodiversity, help plants grow, and allow water to filter naturally. In 2024, Hutan staff used the following low-tech, easy-to-apply methods to **assess soil quality across various habitats** (natural forests, reforestation sites, oil palm plantations, and agroforestry plots):

Test	Purpose
Visual Evaluation of Soil Structure (VESS)	To measure soil structure
Bait Lamina Test	To check how actively soil organisms break down organic matter
Beerkan Infiltration Test	To gauge how fast water can soak into soil

Findings show that natural forests generally have the healthiest soil structure, with abundant earthworm activity and strong water infiltration. Oil palm areas generally scored lowest on the soil health indicators. Newly established oil palm-based agroforestry plots *(See TRAILS project on page 29)* still show signs of compaction and slower water absorption but appear to be gradually improving, with biological activity recovering over time, although they will need more time to reach the quality of natural forests.

Hutan will continue to monitor these plots over the next few years to better understand the long-term impact of land-use changes on soil health and **identify the most effective strategies for supporting soil recovery in human-altered habitats**.

Wildlife Population Recovery

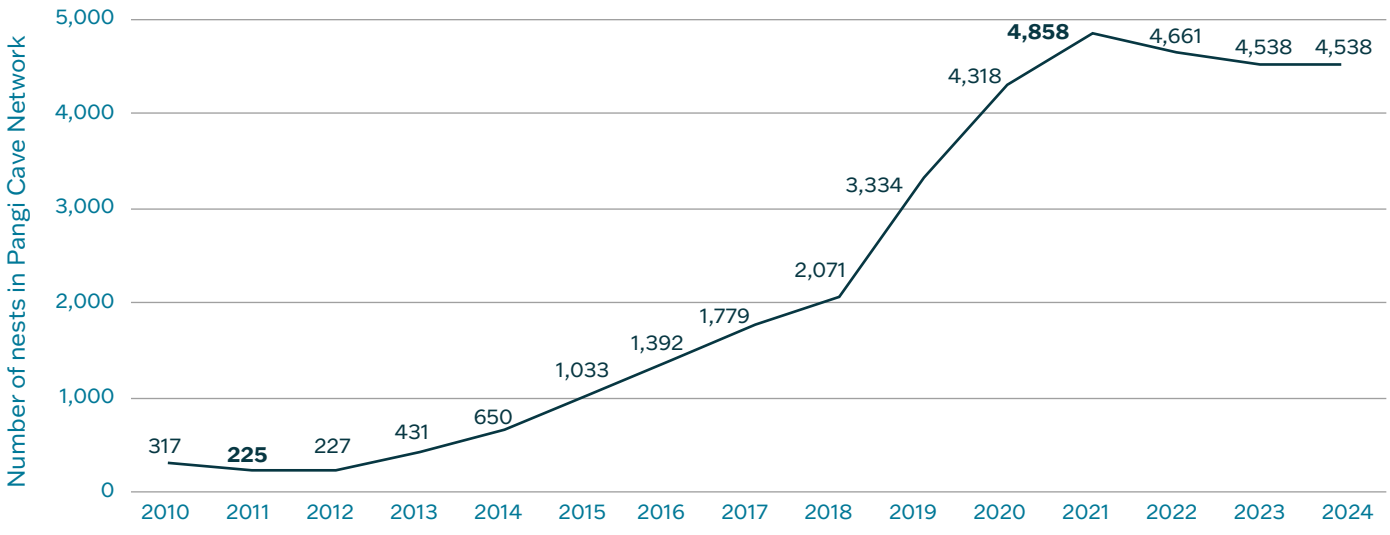
Pangi Swiftlet Population Recovery Project

The **Pangi Swiftlet Population Recovery Project** was initiated by Hutan in 2010 in response to the severe decline of swiftlet populations in the Kinabatangan region. Swiftlets (*Aerodramus sp.*), which build their edible nests in limestone caves, are an important resource for traditional Chinese medicine, and their nests have been harvested by the indigenous Orang Sungai peoples for centuries. However, changes in cave ownership, the abandonment of sustainable traditional harvesting practices, rampant nest theft and profound landscape changes have led to local extinctions of these swiftlets in many areas.

In collaboration with the Sabah Wildlife Department and the Sabah Forestry Department, Hutan's project aims to restore and protect the swiftlet populations in the Pangi Forest Reserve, which was once one of the most productive caves in the region. The project includes **monitoring population trends, controlling illegal harvesting** via daily patrols, **building local capacity, and conserving the unique flora and fauna of the limestone forest**.

This initiative has successfully increased the swiftlet population from **317 breeding pairs in 2010 to around 5,000 in 2024, a recovery of more than 1,400%**. It also aims to raise awareness about sustainable natural resource use and revive traditional Orang Sungai knowledge of swiftlet and limestone cave management.

Evolution of the number of nests in Pangi over the years 2010-2024



In 2021, the Pangi caves reached nesting capacity and nest numbers have since remained relatively constant.

Hornbill Nest Boxes

The Kinabatangan region is home to **all eight of Borneo's hornbill species**, including the **critically endangered helmeted hornbill (*Rhinoplax vigil*)**. The Kinabatangan hornbills are now severely threatened due to the scarcity of nesting opportunities in hollow cavities of tall emergent trees, a consequence of the region's extensive logging history. Additionally in Borneo, these birds are poached for their decorative casques, and only very low numbers remain in Sabah.

Since 2013, Hutan has been partnered with Gaia, a Malaysian NGO dedicated to hornbill research and conservation, to **closely monitor the hornbill populations in Kinabatangan**. We survey forests to locate **natural tree cavities suitable for breeding** that may require restoration. In certain cases, for example, these cavities need to be "remodelled" by adding a cavity floor or a perch at the entrance to facilitate feeding by the male during nesting.

During the breeding season, we patrol natural cavities occupied by hornbill pairs to protect them from poachers. Recently, we monitored nest cavities used by bushy-crested, oriental pied, and white-crowned hornbills.

Rhinoceros hornbill
Buceros rhinoceros

Over the past 10 years, we have constructed a total of **44 artificial nest boxes** and installed them in the forest canopy at strategic locations throughout the Kinabatangan. These nest boxes have been used by different pairs from three hornbill species: the rhinoceros hornbill, bushy-crested hornbill, and oriental pied hornbill. Five rhinoceros hornbill chicks and one oriental pied hornbill chick have successfully been produced from these nest boxes. In 2024, we built and installed **five new artificial nest boxes**–three in Kinabatangan, and two more in Peninsular Malaysia.

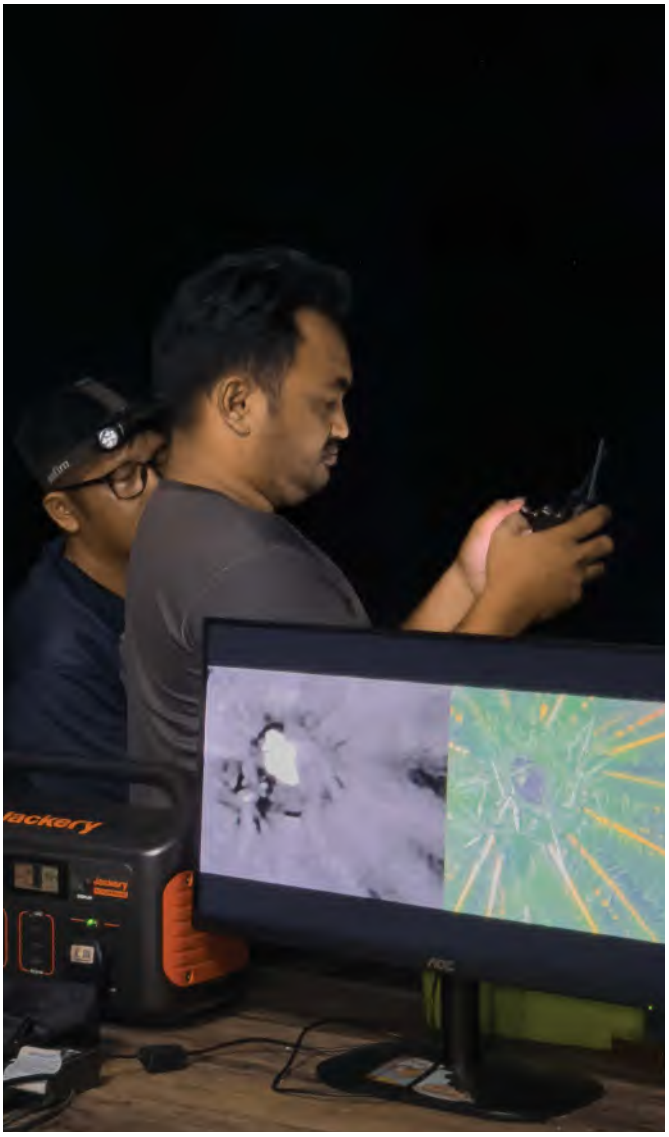
Natural and artificial nest monitoring also allows us to **study hornbill diets** in greater detail. Our team collects faecal samples and regurgitated seeds from the base of hornbill nesting trees, which are then propagated at the Hutan Tree Nursery. Once the seeds grow into saplings and develop leaves, the species can be identified and planted at one of our reforestation plots, where their growth is monitored. To date, we have **identified 27 plant species eaten by hornbills** with this method.

Trialling Technology for Conservation

Drone & Thermal Imaging

Despite their size, wild orangutans are very difficult to find in the forest (see above). Aerial helicopter surveys are an effective method to detect orangutan nests, but are expensive and logistically intensive. We are exploring the use of **drone technology and thermal imaging as an alternative tool for monitoring orangutans** in both forested and oil palm plantation areas.

In 2024, we **compared drone-based nest counts with helicopter data and traditional ground surveys**. In semi-open forests, drone-detected nests closely matched ground survey data, whereas dense canopy or swampy terrain skewed results. Occasionally, the orangutans themselves could be observed in their nests. For example, drones identified 12 nests in a narrow 21 km riparian corridor between Lots 3 and 6 of the Lower Kinabatangan Wildlife Sanctuary, confirming orangutan movement even along thin forest corridors.



A recent breakthrough occurred when we realised that we could use thermal imagery at night to identify the orangutans in their nests. We are currently developing a new approach for surveying orangutans at night using this new thermal drone technology.

The use of drone technology and other advanced software, combined with traditional helicopter and ground-survey methods holds great promise to capture a **more accurate picture of orangutan distribution** and, ultimately, to improve the effectiveness of orangutan monitoring and conservation efforts.

Bioacoustics

Bioacoustic Monitoring is based on the sound detection of various species in the forest. Since 2021, Hutan has partnered with Rainforest Connection, a group specialised in acoustic technology, to test the use of "Audiomoth" devices designed to capture animal sounds from the forest environment.

Since 2021, 30 devices have been deployed at various locations, including protected areas, reforestation sites, and oil palm plantations. This effort has resulted in a collection of **121,830 audio files**, yielding **1,867 distinct vocalisation** detections and has led to the **identification of over 70 different species**, predominantly birds as well as mammals and amphibians. Among these, 19 species are listed as threatened in the IUCN red list, and 31 species identified using the bioacoustic method had not been previously identified at the same sites using traditional monitoring methods.

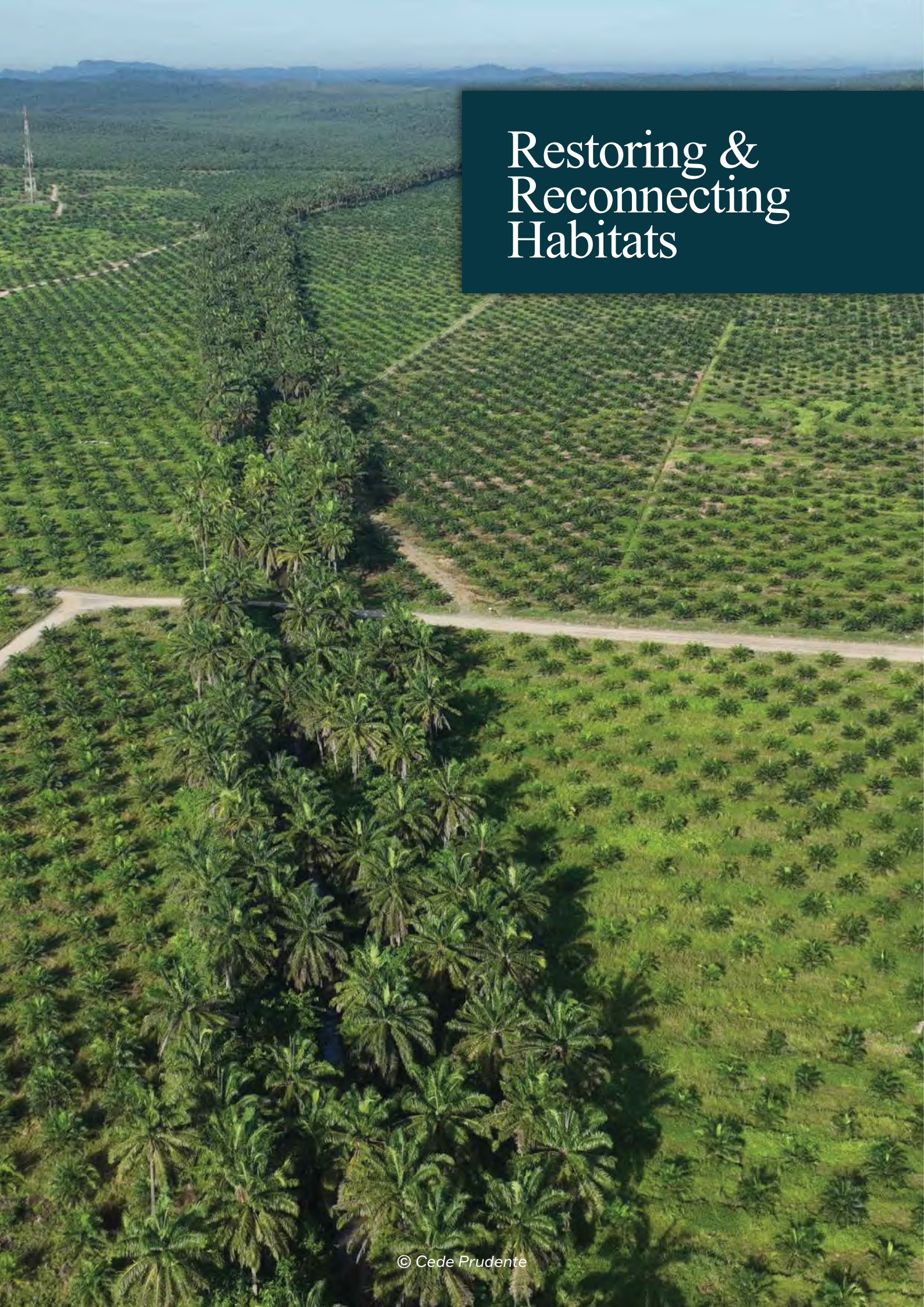
In 2024, we deployed bioacoustic devices at the Deramakot Forest Reserve and in two oil palm plantations (including High Conservation Value areas and agroforestry sites), capturing 8143 audio files, generating 916 distinct vocalisation detections.

We are continuing to expand our audio library, which will eventually include **420 bird species** that are found in lowland areas and specific regions **in Sabah**, whereby around 50 species are endemic to Borneo.

In 2024, we also explored the use of active **bioacoustic techniques to detect bat species**. Most bats emit ultrasonic pulses (echolocation) to use the returning echoes for navigation, and to locate prey in the dark. They also produce communication calls to exchange signals during social interactions. For both call types, the main spectral components are **above the range of human hearing**, making ultrasound bioacoustic recorders incredibly effective for detecting bat activity and aiding in identification of species.

We tested **ultrasonic recording devices** (Pettersson M500 and Song Meter Minibat 2) at various locations and analysed the recordings using Kaleidoscope, a software programme designed specifically for wildlife sound analysis. During our tests, we identified **nine bat species** and detected **three additional unidentified species**. With these encouraging results, we plan to further develop the usage of this method in the coming years.

Restoring & Reconnecting Habitats



© Cede Prudente

Kinabatangan: A Fragmented Mosaic Landscape

One of the most significant challenges facing wildlife in the Kinabatangan region is **habitat fragmentation**, which prevents large mammals like elephants and orangutans from moving freely between isolated forest patches. This leads to genetic isolation among wildlife and a **heightened risk of human-wildlife conflict**.

Hutan is committed to addressing the root causes of these conflicts by expanding habitats by reconnecting fragmented protected forests along the Kinabatangan River, through a combination of **reforestation efforts** in key habitats and **strategic land procurement** to secure patches of natural forest as protected areas. Hutan aims to create critical **wildlife corridors** that facilitate safe movement and reduce encounters between humans and wildlife.

To date, three wildlife corridors along the Kinabatangan River and its tributaries have been established and are in the process of being gazetted as protected area expansions. **In 2024, Hutan launched a fourth corridor initiative** to safeguard another key biodiversity hotspot in the region.

Reforesting the Genting Wildlife Corridor

The Genting Wildlife Corridor represents **a 110-acre section** of the Keruak Wildlife Corridor, designated for reforestation in August 2018 under a **conservation agreement** between Genting Plantations and the Sabah state government. Under this agreement, Hutan was mandated to plant native trees in the allocated area, which we began in January 2019.

Hutan's All-woman Team

Since 2008, **Hutan's all-female reforestation team** has been engaged in a long-term mission to rehabilitate vital wildlife habitat in the Kinabatangan, with a particular focus on restoring a continuous forested corridor along the Kinabatangan river. As of 2024, the team consisted of **28 women from the local community** and three drivers. As very few women in Kinabatangan villages hold permanent employment, Hutan is proud to offer these women the access to both a steady income and the ability to make a difference in their local environment.

In addition, Hutan offers **flexible employment opportunities to local women**, primarily housewives, through a paid "internship" programme. Participants receive training in tree planting and sapling maintenance and engage in Hutan's environmental education programmes, which raise awareness on the importance of conserving natural habitats. In 2024, **16 women joined the team** through this programme.

Members of Hutan's reforestation team undergo rigorous, in-depth training and conduct their work in a highly professional manner, with **ongoing training programmes by botanists and reforestation professionals**.

The Village Home Nurseries Network

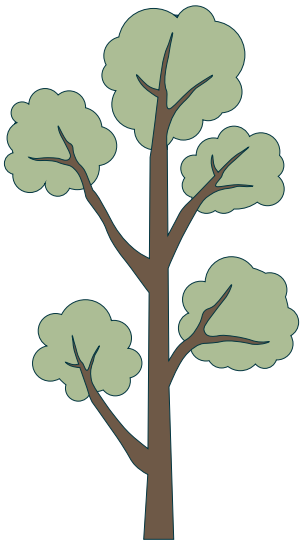
Since its creation, Hutan's reforestation team has planted over **246,000 trees across 11 reforestation sites**, including protected areas, riparian zones, and wildlife corridors on private land. To boost our supply of native plants, Hutan actively supports **a network of home tree nurseries**, providing a growing source of income for village families.

To ensure the production of healthy saplings suitable for reforestation, Hutan offers training to the nursery operators–primarily women–on nursery management and sapling care, and provides families with essential equipment to build their nursery. Once the saplings reach a height of 1-2 feet, they are purchased from the home nurseries and transported to Hutan's collection centre, where our dedicated nursery staff care for them until they are ready to be dispatched to reforestation sites.

The 246,000 native tree saplings planted by Hutan since the start of its reforestation work generated approximately **USD 115,000 in income for the village home nurseries**.

We anticipate that these village nurseries will be further strengthened by the **increasing adoption of sustainable agriculture practices across the landscape**, particularly through compliance with the now compulsory Malaysian Sustainable Palm Oil certification. This certification indeed mandates the reforestation of all High Conservation Value areas within plantations, such as riparian zones along rivers and streams.

2019 - 2024



71,347

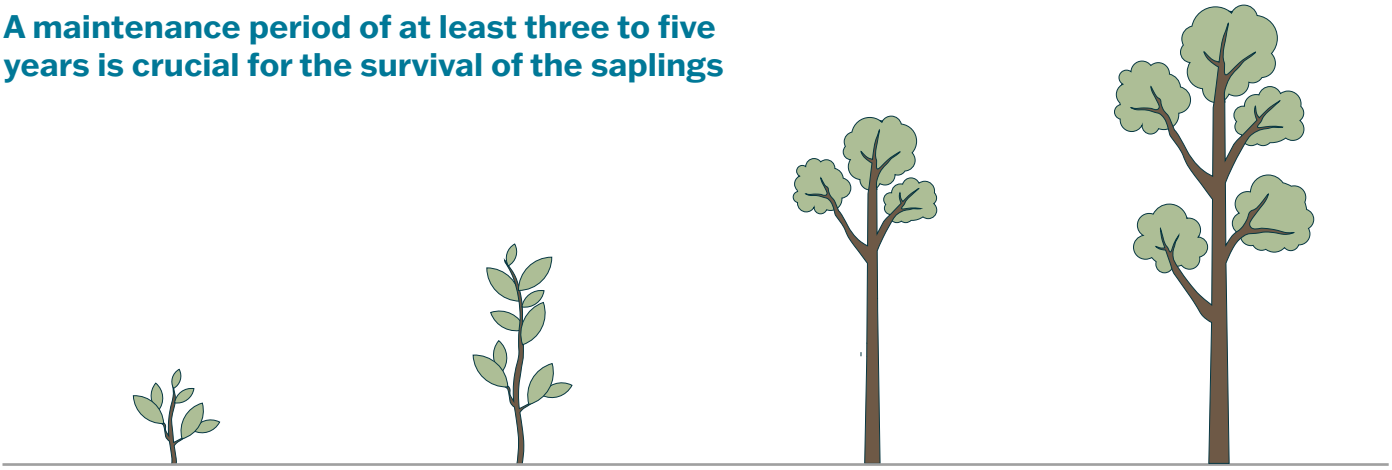
native trees from 56 different species planted in the Genting Wildlife Corridor

In 2019, our team initiated the reforestation of the Genting Wildlife Corridor, and by December 2023, the corridor was fully planted with native tree saplings. In 2024, an additional 283 saplings were added to replace those that had died, bringing the **total number of trees planted between 2019 and 2024 at the Genting Wildlife Corridor to 71,374**.

A total of **56 native tree species** were planted in the corridor, selected for being among the most favoured food sources for orangutans and other species.

Sapling Maintenance

A maintenance period of at least three to five years is crucial for the survival of the saplings

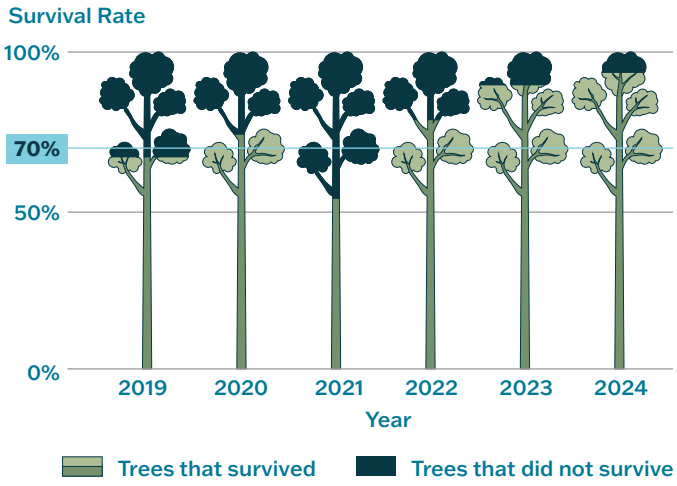


Since most trees planted are still under five years old, **intensive maintenance** was our top priority in 2024 to **maximise survival rates**. This process involves manual weeding around each sapling and using grass cutters to remove tall grasses and foliage in the area, with no pesticides, fertilisers or chemicals applied. In 2024, the team **dedicated a total of 1,130 woman-days** to sapling maintenance at the Genting Wildlife Corridor.

In 2024

Hutan's reforestation team assessed sapling survival rates at the Genting Wildlife Corridor. **The average survival rate across plantings from 2019 to 2024 was 71%**.

Survival rate by end of 2024 for trees planted between 2019-2024:



The survival rates for our early cohorts **did not meet our target of a 70% survival rate** five years post-planting.

This is largely due to the Covid-19 lockdowns in 2020 and 2021, which prevented the team from conducting fieldwork and performing regular maintenance for months in a row, resulting in an increased mortality rate. The survival rate **substantially increased in 2023 and 2024** due to the fact that few new trees were planted in the Genting corridor and the reforestation team was able to focus almost exclusively on maintaining existing saplings.

Our biodiversity monitoring programme shows that, even in its early stages, the corridor is already attracting a variety of **specialised forest species**. Notably, in 2023 and 2024, the presence of the **rare clouded leopard and banded linsang** was recorded. These findings highlight the **critical role of reforestation corridors** in reconnecting fragmented habitats and reversing biodiversity declines, especially in oil palm-dominated landscapes. The results are also being shared with oil palm plantations to promote wildlife-friendly management practices across the region.

Orangutan Bridges

Connectivity is not only an issue on land. Historic commercial logging severely **disrupted the forest canopy** over the Kinabatangan River's tributaries, which has created **impassable barriers** for non-swimming wildlife such as orangutans, further fragmenting their populations. Hutan has been addressing this issue since 2005, installing 12 hanging bridges across key tributaries to facilitate safe passage for orangutans and other wildlife species.

In 2024, we focused on repairing two bridges above tributaries near the village of Sukau. Additionally, we collaborated with Sawit Kinabalu to construct a new orangutan bridge in their Pin Supu High Conservation Value (HCV) area—the second such bridge within this plantation—to further **support wildlife connectivity**.

Land Procurement for Conservation

Aside from reforesting key degraded areas, Hutan's strategies for reconnecting isolated forest fragments include procuring strategic land pieces along the Kinabatangan River and its tributaries to be gazetted as protected areas.

A Project Steering Committee of 13 Sabah government agencies was established in 2013 to oversee this initiative. Lands acquired through the project are gazetted as protected area expansions, ensuring long-term corridor preservation while respecting native community welfare. Since its inception, the project has secured **53 land titles covering 284 acres**, forming three key wildlife corridors **(Pangi, Keruak, and Menanggul)** near the village of Sukau.

These corridors serve multiple functions – they **provide uninterrupted movement paths** for wildlife, which **minimizes human-wildlife conflicts** in surrounding villages and plantations; **prevent riverbank erosion; protect freshwater fisheries**, and preserve the scenic value of the Kinabatangan region, a renowned ecotourism destination.

In 2024, **Hutan launched the Sungai Sukau Wildlife Corridor initiative**, to protect a crucial forested passage along a Kinabatangan River tributary near Sukau. This bottleneck is essential for the movement of many endangered species, providing a safe route that prevents wildlife from straying into the village area.

Stakeholder Engagement & Partnerships

Nomination of the Kinabatangan Biosphere Reserve

In August 2022, the Sabah Government launched the Kinabatangan Biosphere Reserve (KBR) initiative, seeking to secure designation under the **UNESCO Man and the Biosphere Programme**. It aims to integrate biodiversity conservation, cultural heritage preservation, and sustainable development, balancing ecological protection with the interests of indigenous peoples and local communities, and the region's key industries like palm oil and tourism.

Due to its long-standing work in the Kinabatangan, **Hutan was honoured to be mandated by the Sabah Government, through the Sabah Biodiversity Centre, to implement the project**. We led a **22-month stakeholder consultation process**, ensuring inclusivity through meetings, workshops, and the Free, Prior, and Informed Consent (FPIC) approach. This resulted in the **KBR Draft Management Plan**, outlining strategies for conservation, sustainable economies, and environmental education, while ensuring that all community levels, especially women and young people, were represented adequately and appropriately.

In July 2024, Hutan submitted the final report - including the Nomination Dossier, a Stakeholder Consultation Report, and the Draft KBR Management Plan - to the Sabah Biodiversity Centre, which was sent to UNESCO in October 2024. The evaluation is expected to conclude by September 2025. If successful, the KBR designation would provide international recognition, attract conservation support, and maintain the integrity of Kinabatangan's ecosystems for generations to come through sustainable and balanced development.

Kinabatangan
BIOSPHERE RESERVE

Conservation Management Planning

FORMULATION OF WILDLIFE POPULATION MANAGEMENT PLANS

Hutan is committed to supporting and collaborating with government agencies and the private sector in assessing wildlife populations across Sabah. The **survey results** from our wildlife and biodiversity monitoring **inform wildlife management plans**, map potential wildlife corridors, and develop **human-wildlife conflict mitigation strategies**.

In 2024, Hutan partnered with stakeholders to support conservation management planning in protected areas and private land:

Wilmar Oil Palm Plantation
April 2024 | 16 Days

15 Hutan staff were involved in ground and drone wildlife surveys and mapping of HCV areas for the Estate Wildlife Management Plan

Kabili Sepilok Forest Reserve & Labuk Road Forest Reserve
April 2024 | 5 Days

20 Hutan staff aided in aerial and ground orangutan surveys to assess effectiveness of Sepilok Orangutan Rehabilitation Centre

Maliau Basin Protection Area (MBCA)
May 2024 | with Sabah Foundation

Resources and a wildlife survey team (15 Hutan staff) sent to support the MBCA Strategic Management Plan Formulation

Deramakot Forest Reserve
July 2024 | with Sabah Forestry Department

16 Hutan staff were involved in aerial and ground orangutan surveys within an FSC certified-timber concession to assess effectiveness of Sustainable Forest Management in maintaining orangutan populations.

Cross-sectoral Partnerships

The TRAILS Project

The **TRAILS project**, launched in 2021 in Kinabatangan, is a collaborative initiative led by the French Agricultural Research Centre for International Development (CIRAD), Melangking Oil Palm Plantation, Hutan, and University Putra Malaysia. This pioneering project explores the environmental and economic benefits of **integrating oil palm cultivation with native forest species in agroforestry systems**. TRAILS demonstrates the potential of regenerative agriculture in oil palm landscapes with the aim of improving soil health, attracting pollinators, and facilitating wildlife movement, particularly for orangutans and elephants.

TRAILS

Innovative Planting Designs for Wildlife, Climate and Livelihoods

In 2024, Hutan's wildlife monitoring, biomass, and soil health assessments in the project's experimental plots *(see page 11)* indicated promising improvements in **microclimate stability and wildlife presence in agroforestry areas**. Additionally, the initiative engages local communities by sourcing native tree saplings from village nurseries, creating economic opportunities while fostering ecological restoration. TRAILS serves as a model for **sustainable land-sharing practices**, offering benefits to both growers and conservation efforts across the Kinabatangan landscape.

More information on the TRAILS project

Assessing the growth and recovery of young oil palm after orangutan feeding disturbance

In 2023 and 2024, Hutan conducted a study aimed to **determine whether orangutan feeding activities on young oil palms have any damaging impact** on palm growth, insect infestations and overall health.

We compared two cohorts of young oil palms at a Genting Plantations estate adjacent to a protected area: one "disturbed" group that had been fed upon by orangutans (resulting in damaged shoots and stems), and one "undisturbed" group with no observed feeding.

Initially, the disturbed palms were shorter on average (1.86 m versus 2.91 m) and had fewer shoots, but within a month they began producing new shoots at nearly the same rate as the undisturbed palms. After a year, the disturbed palms had significantly narrowed the height gap (4.6 m versus 5.2 m) and no longer showed higher insect infestations. Both cohorts eventually produced similar numbers of small inflorescences.

These findings suggest that **orangutan feeding can temporarily slow palm growth, but negative effects subside relatively quickly**, implying minimal long-term impact on yield.

Best Management Practices for Coexistence with Orangutans in Mixed-Forest Oil Palm Landscapes

OrangJUGA, a Sabah-based research and conservation group, led the development of **Best Management Practices (BMPs) for human–orangutan coexistence in mixed forest–oil palm landscapes**, published in March 2023. The guidelines were informed by two decades of Hutan's research, the PhD work of OrangJUGA's lead, and subsequent work focused on orangutan use of plantations and people's responses across the Kinabatangan, in partnership with oil palm companies and government agencies.

The BMP framework highlights key strategies such as **stakeholder cooperation**, the value of protecting even very small, degraded forest fragments on privately administered lands, appropriate diverse native species habitat restoration, and ways to facilitate coexistence and mitigate negative interactions appropriately.

In 2024, Hutan also supported OrangJUGA in promoting and facilitating the adoption of these BMP guidelines among oil palm plantations, reinforcing efforts to balance agricultural productivity with wildlife conservation.

BMP available for download here

Environment Awareness & Educational Programmes

Hutan also conducts awareness events for the general public and local communities. These outreach programmes, conducted jointly with other NGOs and government agencies, aim to **build a community that appreciates and values local biodiversity** while encouraging people to take conservation action and live sustainably. In 2024, Hutan participated in **seven environmental awareness events** statewide, reaching over **3,500 members of the public**.

The Hutan Environmental Awareness Programme

Since 2003, the **Hutan Environmental Awareness Programme Unit (HEAP)** has been conducting environmental programs for schools and communities across Sabah. HEAP operates under its current 5-year **Environmental Education Master Plan (2020–2025)** targeting schools, local communities and the general public.

These programmes, led by HEAP educators with the participation of field researchers from other Hutan units, included classroom sessions with presentations, exhibitions, drawing competitions, quizzes, and educational games, as well as outdoor activities such as camping, jungle trekking, tree planting, birdwatching, and initiation to field wildlife research.

To measure the impact of its school education programmes, HEAP uses before-and-after questionnaires to **monitor and evaluate the effectiveness of its behaviour change interventions**. Teachers are also invited to assess various aspects of the programmes.

The Junior Ranger Programme

The **Junior Ranger programme** offers year-round extracurricular educational activities for a group of village children, with the same participants continuing each year, progressively empowering them to become **ambassadors for conservation within their community**. Activities range from interactive sessions with researchers and conservationists to hands-on experiences such as reforestation, recycling, and visits to sites of special natural interest. In 2024, HEAP organised **12 sessions for 30 Junior Rangers** throughout the year, covering topics such as learning about Kinabatangan wildlife species, plastic pollution, and climate change.

Bridges to the Forest

In November 2024, Hutan's film **Bridges to the Forest was screened at the Earth In Focus: Singapore Nature Film Festival**, presenting the story of human-wildlife coexistence in the Kinabatangan floodplain.

The 15-minute film "Bridges to the Forest" originated from Hutan's nomination as an Earthshot Prize finalist in 2022, during which the BBC filmed Hutan's field activities in Sabah. Later, Hutan and the local film director obtained the rights to the full footage and combined it with Hutan's existing footage to create Bridges to the Forest.

Watch the film here

The film features **Hutan's community-led orangutan research team** and explains how past habitat degradation and fragmentation now threaten the species with extinction. It also documents a pioneering **partnership between Hutan and a forward-thinking oil palm grower** to create safe wildlife corridors for orangutans, elephants, and other wildlife through the plantation.

Capacity Building for Hutan Staff

Professional development of Hutan's staff is a core value of our organisation. In 2024, we organised and facilitated a series of targeted training sessions. The following table presents the **key training programmes attended by Hutan staff**, covering a wide range of topics essential to our research and conservation work.

MONTH IN 2024	TRAINING TOPIC	TRAINING TOPIC	NB STAFF TRAINED	DURATION (DAYS)
JANUARY	**Ecoacoustic analysis tools (RFCx, Arbimon platform)**	Rainforest Connection	3	1
	ArcGIS Pro - GIS Application	Esri Malaysia	2	1
FEBRUARY	**Plant species identification**	Hutan in-house botanist	16	1
	Statistical and Wildlife Analysis Bootcamp	Sunway University - Biodiversity Conservation Society Sarawak	1	11
MARCH	**Bioacoustics and direct acoustic monitoring of orangutans**	Visiting researcher University of Warwick	7	3
	Use of drone for field research	FWF World Solutions Drone Malaysia	7	3
APRIL	**Orangutan survey techniques**	Hutan's Orangutan Research Unit (for various government agencies)	10	5
MAY	**Asian Women Conservation Leadership Training Programme**	IUCN - Asian Species Action Partnership	1	10
	Decision Support System toolkit through Kernel density analysis and Species Distribution Modelling	WildCru	5	1
JUNE	**Phenology studies**	Hutan's botanist	20	1
	Biomass assessment	CIRAD	8	3
	Reforestation and tree nursery	Sabah Forestry Department	11	1
JULY	**Soil health assessment (VESS)**	Hutan's WIldlife Survey & Protection Unit	29	1
AUGUST	**Orangutan surveys and wildlife monitoring**	Hutan's Orangutan Research and Wildlife Survey & Protection Unit (for Sabah Forestry Department)	5	10
	Wildlife survey techniques (droning, forgging) and data analysis	Visiting ecology researcher	15	9
	Wildlife survey techniques	Visiting ecology researcher (for Sabah Parks)	15	3
SEPTEMBER	**Bioacoustic sampling and sound analysis (Kaleidoscope)**	Visiting researcher from Beauval Nature	5	10
	Soil health assessment	CIRAD	18	10
	Primate surveys	Hutan's Wildlife Survey & Protection Unit for Wilmar	6	5
OCTOBER	**Conservation coaching**	WIldlife Conservation Network US	2	5
	Orangutan survey techniques	Hutan's Orangutan Research Unit (for Sabah Wildlife Department)	8	7
	Biomass and soil health assessment	Hutan's Wildlife Survey & Protection Unit	15	1
	Occupational Safety and Health	National Institute of Occupational Safety and Health	1	5
NOVEMBER	**Community based conservation**	Wildlife Conservation Network Ewaso Lions Kenya	2	8
	Use of drone for field research	FWF World Solutions Drone Malaysia	8	5
OCTOBER-DECEMBER	**English language and computer night classes**	Internal training	15	3 days/week

List of Peer-reviewed Publications by Hutan and Partners in 2024

Ewers, R.M., Orme, C.D.L., Pearse, W.D., et al., 2024. Thresholds for adding degraded tropical forest to the conservation estate. *Nature*, 631;631(8022), pp.808–813. https://doi.org/10.1038/s41586-024-07657-w

Mendes, C.P., Albert, W.R., Amir, Z., Ancrenaz, M., Ash, E., Azhar, B., Bernard, H., et al., 2024. CamTrapAsia: A dataset of tropical forest vertebrate communities from 239 camera trapping studies. *Ecology*, 105(6), p.e4299. https://doi.org/10.1002/ecy.4299

Seaman, D.J.I., Voigt, M., Ancrenaz, M., Bocedi, G., Meijaard, E., Oram, F., Palmer, S.C.F., Santika, T., Sherman, J., Travis, J.M.J., Wich, S., Humla, T., Supriatna, J. and Struebig, M.J., 2024. Capacity for recovery in Bornean orangutan populations when limiting offtake and retaining forest. *Diversity and Distributions*, 31, e13852. https://doi.org/10.1111/ddi.13852

Panjang, E., Lim, H.Y., Thomas, R.J., Goossens, B., Hearn, A.J., Macdonald, D.W., Ross, J., Wong, S.T., Guharajan, R., Mohamed, A., Gardner, P.C., Koh, S., Cheah, C., Ancrenaz, M., Lackman, I., Ong, R., Nilus, R., Hastie, A., Brodie, J.F., … and Abram, N.K., 2024. Mapping the distribution of the Sunda pangolin (*Manis javanica*) within natural forest in Sabah, Malaysian Borneo. *Global Ecology and Conservation*, 52, e02962. https://doi.org/10.1016/j.gecco.2024.e02962

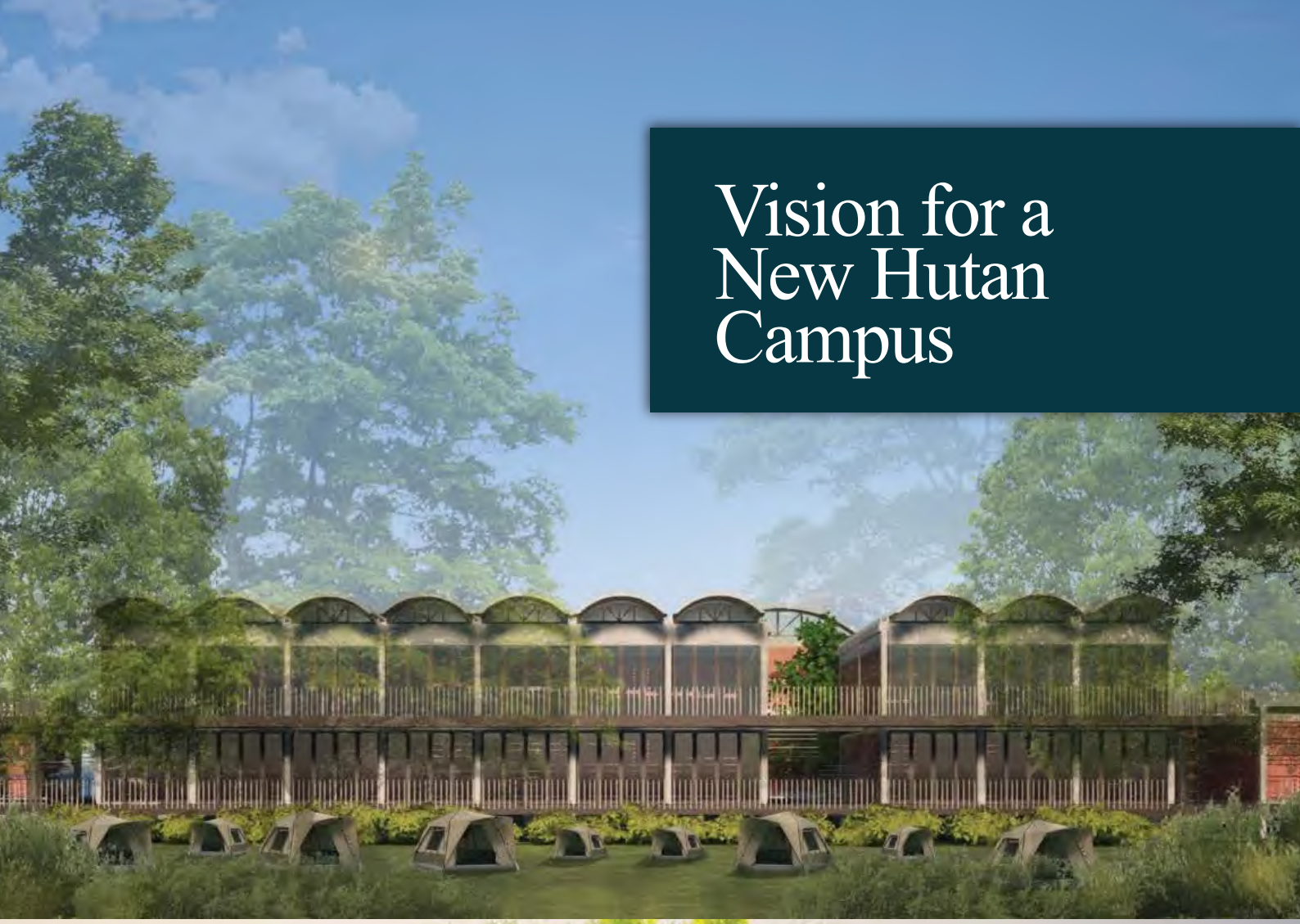
Eppley, T.M., Reuter, K.E., Sefczek, T.M., Tinsman, J., Santini, L., Hoeks, S., Andriantsaralaza, S., Shanee, S., Fiore, A.D., Setchell, J.M., Strier, K.B., Abanyam, P.A., Mutalib, A.H.A., Abwe, E., Ahmed, T., Ancrenaz, M., Andriantsimanarilafy, R.R., Ang, A., Aureli, F., … and Mittermeier, R.A., 2024. Tropical field stations yield high conservation return on investment. *Conservation Letters*, 17, e13007. https://doi.org/10.1111/conl.13007

Meijaard, E., Erman, A., Ancrenaz, M. and Goossens, B., 2024. Pig virus imperils food security in Borneo. *Science*, 383(6680), p.267. https://doi.org/10.1126/science.adn3857

Ancrenaz, M., Cheyne, S.M., Humle, T., Rawson, B.M., Robbins, M.M. and Williamson, E.A., 2024. Apes socioecology. In: *State of the Apes, Vol. V*: Disease, Health and Ape Conservation, Lanjouw, A., Rainer, H. and White, A., eds., ARCUS Foundation, USA, 13pp.

Sugnaseelan, S., Ancrenaz, M. and Bitariho, R., 2024. The impact of tourism and research activity on ape health. In: *State of the Apes, Vol. V: Disease, Health and Ape Conservation*. Lanjouw, A., Rainer, H. and White, A., eds., ARCUS Foundation, USA, pp.76–107.

Vision for a New Hutan Campus



For over a decade, Hutan has operated from a government-owned field office in the Kinabatangan, originally built to accommodate around 20 people. Today, with a team of over 100 local community members working across eight field units, the facility is no longer fit for purpose. Due to limited space, several units now work from makeshift offices in their village homes.

As the building is not under Hutan's ownership, our ability to invest in necessary long-term improvements is limited. In addition, increasingly severe annual flooding of the Kinabatangan River continues to deteriorate the structure, which sits in a flood-prone area, and causes regular disruptions to our operations.

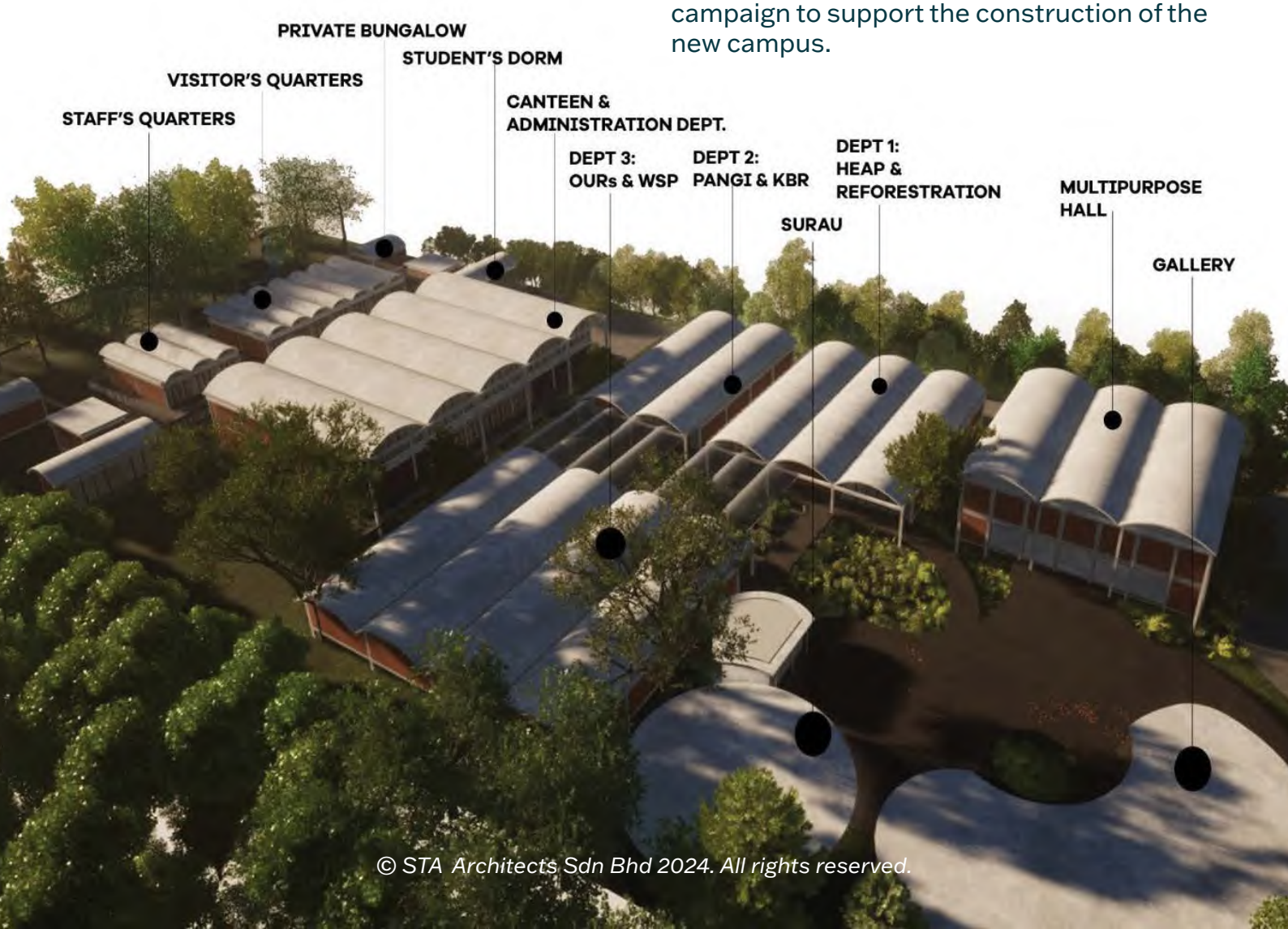
In 2024, we embarked on an ambitious project **to build a new Hutan campus**, a keystone of our ongoing organisational transformation and succession strategy.

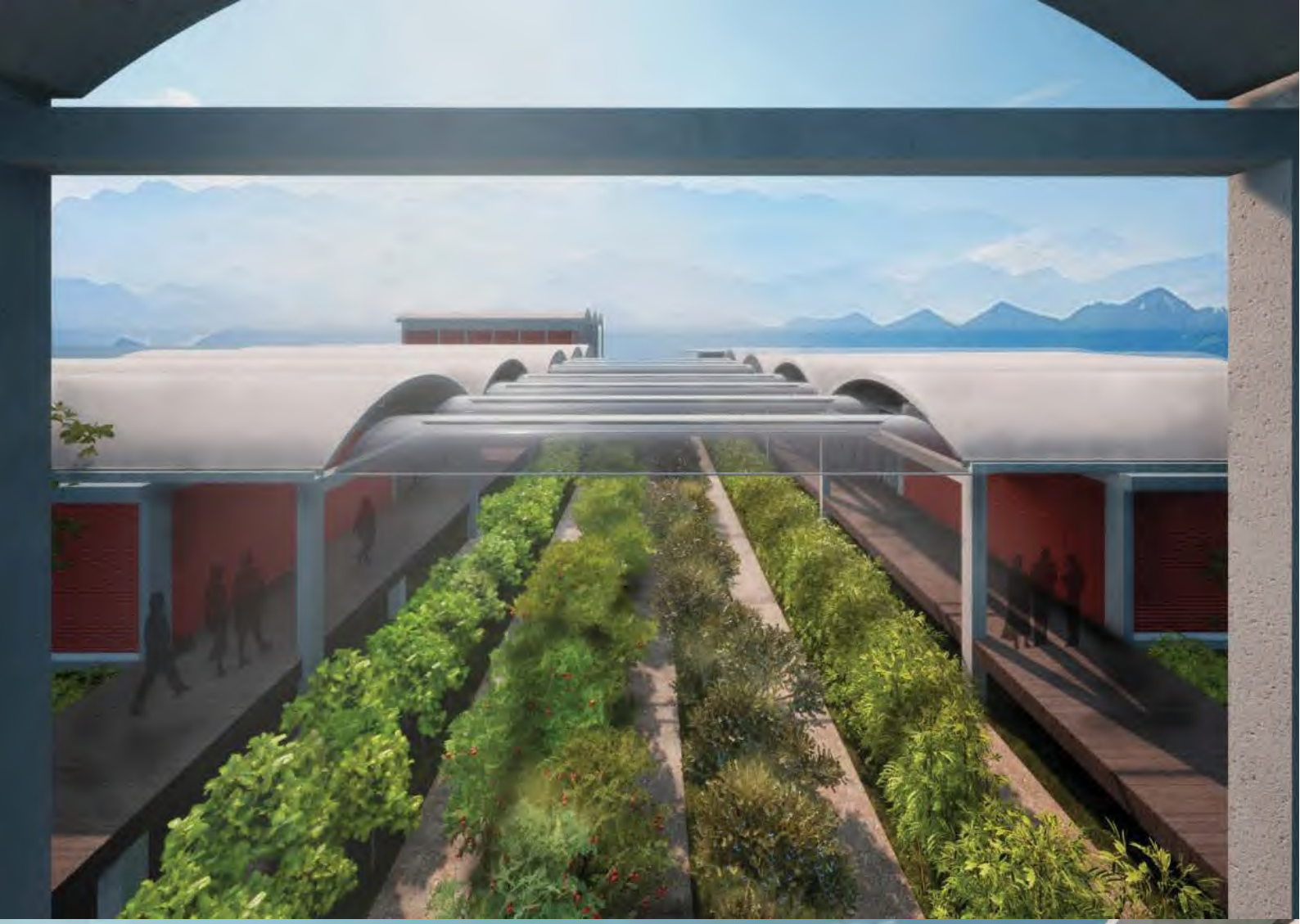
We have secured a strategically located 4-acre plot and partnered with an architect to design a state-of-the-art facility that will accommodate our growing team.

The planned campus will serve as a central hub for Hutan's multidisciplinary work. It will feature dedicated office spaces for all Hutan units, a research laboratory, fully equipped meeting rooms, a training facility, an environmental education centre, and accommodation for visiting researchers, students, and staff.

Designed in a biophilic style, the campus will integrate natural elements such as daylight, water, and vegetation into its infrastructure, creating a functional and environmentally sensitive space. Investing in this purpose-driven, nature-integrated facility will significantly strengthen Hutan's capacity for research, conservation, education, and cross-sectoral collaboration.

To bring this vision to life, we are now exploring financing opportunities, and preparing a large-scale fundraising campaign to support the construction of the new campus.





List of Hutan Financial Partners for 2024

Arcus Foundation
Apenheul Zoo
Beauval Nature
Borneo Wildlife Preservation
Cleveland Zoological Society
Columbus Zoological Park
DODO – Zoo Wroclaw Foundation
Ecological Restoration Fund
Fondation Iris
Gdansk Zoo
Houston Zoo
Incorporated NPO Mirai Process
Lynx Fundajca
North Zoological Society of England (Chester Zoo)
Oregon Zoo
Palmyre Conservation
Phoenix Zoo
Saint Louis Zoo
SAFE (AZA)
SECAS
Synchronicity Earth
The Zoological Society of Hertfordshire
Univet Nature
US Fish and Wildlife Services
Utah Zoological Society (Hogle Zoo)
Vienna Zoo
Wildlife Conservation International Limited (The Orangutan Project)
Wildlife Conservation Network
Woodland Park Zoo
World Land Trust
Zoo Basel

(+60) 13-874 3629
enquiries@hutan.earth
www.hutan.org.my

Instagram @hutan.org.my
@hutan_awareness
Facebook @hutankocp
@hutan.heap

Unit S10-S12, The Peak Vista, Block B, Lorong Puncak 1,
Tanjung Lipat, 88400 Kota Kinabalu, Sabah, Malaysia

HUTAN