



2025 _____ Activity Report

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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.

About Hutan





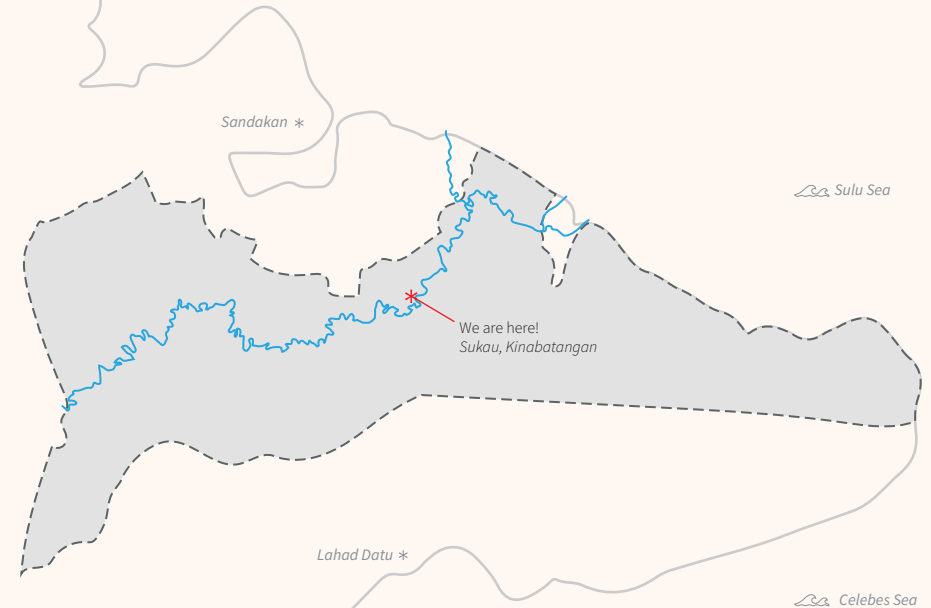
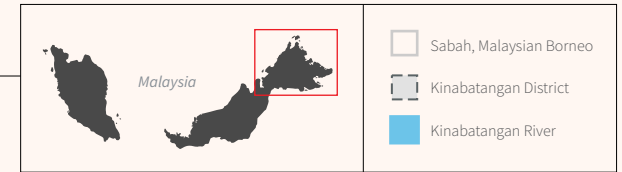
Hutan is **a grassroots wildlife research and conservation organisation** established in 1998 in the Kinabatangan floodplain of Sabah, Malaysian Borneo.

The region is 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.

However, past human activities 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.

Our team has come together with remarkable dedication and expertise to protect their natural heritage, and fulfill Hutan's mission of developing community-driven solutions for the harmonious coexistence between humans and wildlife.





Biodiversity
Research &
Protection

Orangutan Behavioural Studies & Population Monitoring

Population Monitoring and Socioecological Research in our study site.

The Hutan Orangutan Research Unit has been monitoring orangutan population trends and studying the socioecology of three generations of orangutans in our research site – a 10 km² area of regenerating secondary forest in the Lower Kinabatangan Wildlife Sanctuary – since 1998, making it **one of the longest running wild orangutan research operations** in Borneo.

Orangutan population density has remained consistently high at our site, typically ranging between 2.5 and 3.5 individuals per km² since we started monitoring the population in 1999. However, in 2018 and 2019, the natural deaths of three orangutan matriarchs caused a decline in orangutan presence (less than 1 individual per km²), which is steadily recovering as the years pass. Additionally, the resident young females are approaching adulthood, which means their presence is beginning to attract more males to the area. **In 2025, orangutan density was recorded at 1.84 individuals per km², an improvement from last year's 1.71 individuals per km².**



The socioecological studies of the orangutans in our study site involve intensive observation of the resident animals from dawn-to-dusk. Locating and following wild orangutans in the forest is particularly challenging due to their solitary and shy nature. In 2025 our team spent **73 days dedicated to socioecological study, with about 22% of their time was spent in direct observation of seven wild orangutans** – five resident females and two newly observed individuals at our study site – collecting a wide range of data on their activity budgets, feeding behaviour, social interactions, and ranging patterns.

In 2025 the **diet of our focal orangutans comprised 20 plant species from 15 families, including 14 tree species and 6 vine species**. The most consumed species were *Ficus* spp. (75%) and *Neolamarckia cadamba* (10%). Overall the diet was dominated by ripe fruits (65%), followed by unripe fruits (18%), and tree bark (10%).

Over the years, the data we have collected regarding orangutan populations in the area and across Sabah, as well as our socio-ecological monitoring, has **provided critical understanding of how wild orangutans have been able to adapt to the Kinabatangan's agro-forest mosaic landscape**. We continue to investigate orangutan resilience to the changes in their natural habitat, which aids in conservation planning and sound orangutan population management strategies in Sabah.

Sabah-wide Orangutan Population Monitoring

State-wide orangutan **population surveys are a critical tool for conservation planning** in Sabah. In a landscape shaped by changing land use, evolving policy frameworks, and efforts to restore habitat connectivity, these large-scale assessments are needed to monitor not only the size and distribution of Sabah's orangutan population, but also how these changes affect the species' long-term survival.

In 2023, the Sabah Wildlife Department and Hutan launched Sabah's third major state-wide orangutan survey. The project aims to update orangutan population data in key protected and non-protected areas, including mixed forest – agricultural landscapes such as Kinabatangan, and **to assess orangutan conservation status through a combination of ecological and social survey methods**. It also provides an important platform for training and capacity building among relevant stakeholders.

Across 2024 and 2025, teams completed **118 line transects (95 km)** and **117 recce walks (162 km)**. Aerial surveys included 3 **helicopter flights covering 36 transects (260 km)**, as well as **117 daytime drone flights for nest counts**, **107 night-time thermal flights**, and more than **200 additional daytime flights** to directly detect individual orangutans.





In 2025 specifically, we **conducted 5 field expeditions covering approximately 185,516 hectares of key protected and non-protected areas in Sabah**. These expeditions were conducted by our Orangutan Research Unit and Wildlife Survey and Protection Unit, in collaboration with Sabah Wildlife Department, Sabah Forestry Department, and Sabah Parks.

Location & Size	Dates	No. of Staff	Remark
Tabin Wildlife Reserve <i>approx. 122,500 ha</i>	20-29 April	23 (OUR, WSP)	The eastern half of the Tabin Wildlife Reserve has historically been more populated by orangutans than its western counterpart, which was reflected in the findings from this expedition. However, our team also noted that the population density of orangutans was higher further into the forest and lower at the fringes, where the forest neighbours oil palm plantations. This contrasts with surveys from the Kinabatangan region, where orangutans are likely found nesting near to—and crossing in-and-out of—plantations.
Tawai Forest Reserve <i>22,697 ha</i>	19-28 May	26 (OUR, WSP, Pangl)	Our survey showed that the spread of the current orangutan population of the Tawai Forest Reserve will be divided in half by the planned route of the Pan Borneo highway; potentially splitting orangutan family units apart and severely disrupting their future movements due to the fragmentation of the forest.
Tawau Hills Park <i>approx. 28,000 ha</i>	7-16 July	25 (OUR, WSP, Pangl)	Our team discovered that Tawau Hills Park is home to a small resident orangutan population, as well as 194 other animal species, including 23 endemic species, and 16 species that are listed in the IUCN Red List as Critically Endangered, Endangered, or Vulnerable; showing that this is an extremely biodiverse region that must continue to be protected.
Lower Kawag <i>707 ha</i>	6-15 August	29 (OUR, WSP, Pangl)	These field expeditions were carried out in two regions in the Ulu Segama forest that were severely degraded, and are actively being restored by various reforestation efforts. We discovered that the orangutan populations in these regions were stable, meaning that the restoration efforts are working as intended.
Bukit Piton <i>11,612 ha</i>	21-30 October	27 (OUR, WSP, Pangl)	

Wildlife Population Monitoring

In 2025, Hutan continued its long-standing research and monitoring programmes to advance the knowledge on wildlife population dynamics and resilience in the Kinabatangan region. This also helps us assess the impact of our conservation actions.

Frog Monitoring

Assemblages of frog species are often used as **indicators for ecosystem health and effectiveness of habitat restoration efforts**, as they are sensitive to changes in microclimate and vegetation. Hutan has been monitoring the trends and dynamics of amphibian populations along 20 transects in various habitat types since 2017.

Our surveys are conducted during the rainy season, when the frogs are more active. However, the 2025 surveys were affected by unusually prolonged floods that rendered several transects inaccessible.



Friilled tree frog (*Rhacophorus appendiculatus*)



Bornean long-nosed horned frog (*Megophrys nasuta*)

We have **recorded a cumulative total of 40 frog species in this region**. In this time, the highest frog species diversity was recorded in dry forests (34 species), and the lowest in oil palm plantations (5 species). We have also found that **active reforestation sites gradually attract more species** over time.

During a previous reporting period, we **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 may suggest that some species could be expanding their range – potentially due to climate changes or human-induced disturbances – and possibly competing with less resilient local frog species.

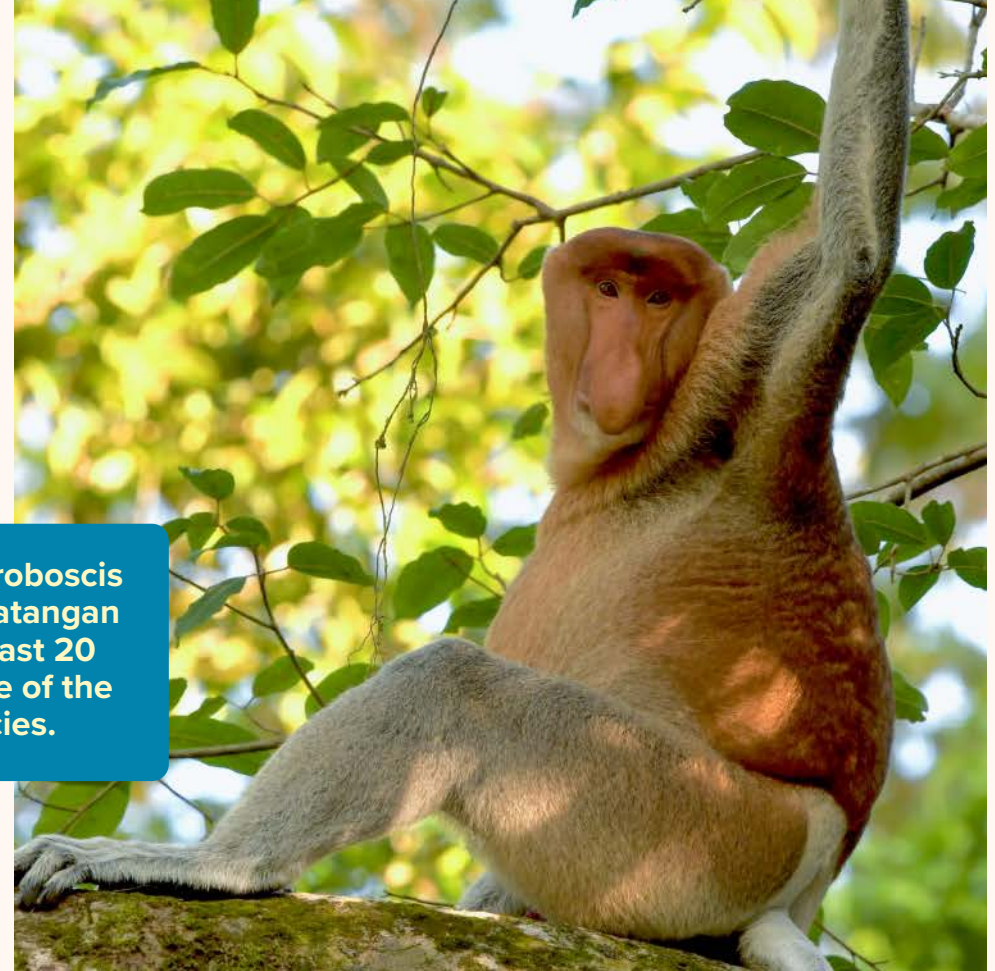
Primate Monitoring

Hutan has been monitoring **the population trends of six local primate species** since 2007. Our Wildlife Survey and Protection Unit run quarterly primate spotting operations along a predetermined 16km stretch of the Kinabatangan River, and use the sightings **to estimate and generate kilometric sighting indexes, which we compare over time to gain insight on shifts in population.**

2025 Sighting Indexes

Proboscis monkey <i>Nasalis larvatus</i>	1.08 groups/km
Silvered leaf langur <i>Trachypithecus cristatus</i>	0.65 groups/km
Long-tailed macaque <i>Macaca fascicularis</i>	1.28 groups/km
Pig-tailed macaque <i>Macaca nemestrina</i>	1.03 groups/km
Maroon langur <i>Presbytis rubicunda</i>	Not sighted
Bornean orangutan <i>Pongo pygmaeus morio</i>	Not sighted

Our surveys show that the proboscis monkey population of Kinabatangan has remained stable for the last 20 years, making this region one of the last strongholds for this species.



Long-tailed macaque (*Macaca fascicularis*)

Compared with previous years, proboscis monkey populations have remained stable, while populations of silvered langurs have increased. We also note that in the last year, the **average proboscis monkey group consisted of 10.8 individuals, and these groups were primarily sighted on 14 different tree species**, with the most commonly species known colloquially as 'lamba' (*Colona serratifolia*) and 'bangkal' (*Nauclea sp.*). **This information helps us construct reforestation strategies by targeting native tree species that are commonly used by primates.**



Maroon leaf langur (*Presbytis rubicunda*) and juvenile

Migratory Bird Surveys

Far Eastern curlew (*Numenius madagascariensis*)



Wetlands are crucial ecosystems for migratory birds, providing safe areas for them to rest and find shelter while they are moving between their winter and summer habitats.

The Kulamba Wetlands are integrated into the Lower Kinabatangan-Segama Wetlands – a recognised Ramsar site – and are an important stopover point along the East Asian-Australasian Flyway, which means tens of thousands of migratory birds pass or stop by yearly.

This is a new initiative, with Hutan beginning to collect data in 2024. The team travels by boat from Sukau village to the Kulamba Wetlands, aiming to identify the migratory bird species that are present in the area. These bird surveys were carried out in 2024 and 2025 between October and March in a few specific locations across the wetlands, covering habitats like sandbanks and mangroves. **The 2025 surveys were made particularly challenging due to the higher rainfall this year, and the unusual tide levels that partially covered the sandbanks that the birds rest on.**



Greater crested tern (*Thalasseus bergii*)



Our bird monitoring efforts have recorded various waterbirds and waders using the Kulamba Wetlands, including several species of sandpipers, terns, and a peregrine falcon. In October 2024, we recorded 21 migratory bird species, with the most commonly spotted being the great crested tern. A year later, **only 16 migratory species were recorded**, the majority sighted at one single sandbank.

In both 2024 and 2025, we **sighted 13 resident bird species in the Kulamba wetlands, including threatened resident species like the Storm's Stork and Lesser Adjutant**. Both species were recorded in our 2025 survey, and we intend to survey their local populations every year as well.

As few migratory bird surveys have been conducted in this region, the data collected by the teams will be crucial to inform future conservation strategies.

Lesser adjutant (*Leptoptilos javanicus*)



Sanderling (*Calidris alba*)



Bar-tailed godwit (*Limosa lapponica*)



Great-billed heron (*Ardea sumatrana*)

Remote Sensing Tools for Wildlife Surveys

We employ a range of survey techniques for our monitoring work, using and trialling cutting-edge technology that allows us to detect species across the different land-use types in the Kinabatangan.

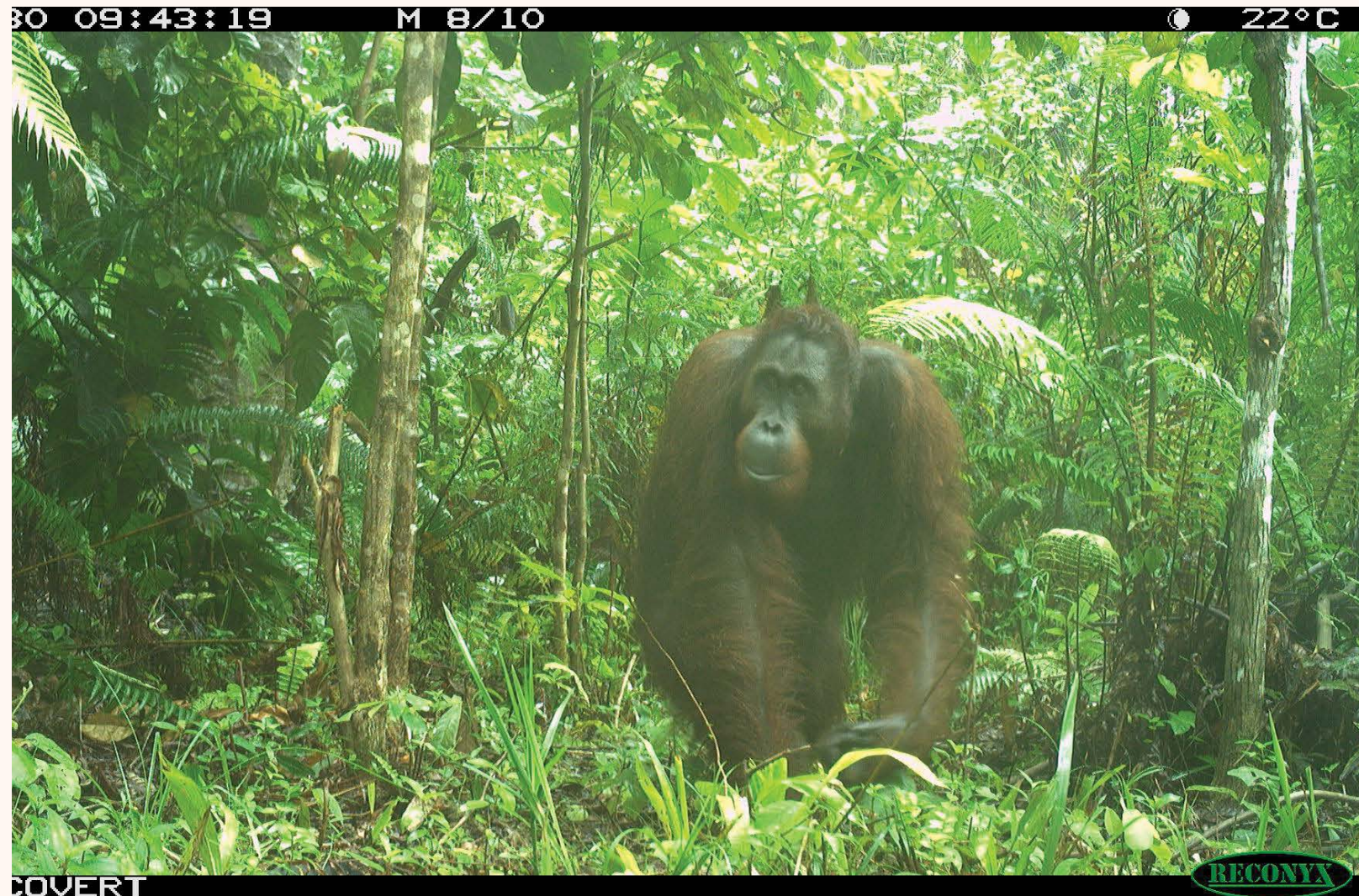
Camera Trapping

Hutan has been using camera traps to monitor medium-to-large sized terrestrial animal presence in the Kinabatangan and other locations across Sabah during field expeditions. **Camera traps give us insight into species diversity, distribution, and behaviour** in specific human altered areas across various habitats.

Ten camera trap units are deployed in each habitat type, each mounted 0.3 meters above the ground and set to take a burst of ten photos upon a motion trigger, with a 3-minute quiet period between triggers. In most cases, we also deploy an additional four camera units in video mode mounted near the other cameras.



13 Sun bear (*Helarctos malayanus*)



Northeast Bornean orangutan (*Pongo pygmaeus morio*)



Bornean sambar deer (*Rusa unicolor brookei*)

We deployed 30 cameras in the Keruak Wildlife Corridor (see pp. 24-25) for the 2025 camera trap cycle, producing a total of 24,090 pictures and 840 videos – a sampling effort equivalent to 1,047 active days of work. Through this, we gathered 518 independent detection events and identified 29 species – including **seven endemic species and twelve species that are listed in the IUCN Red List as Vulnerable or Critically Endangered**.

In 2025, we **recorded images of bearded pigs (*Sus barbatus*) twice, indicating the slow recovery of the species after the 2020 outbreak of African Swine Fever**; as well as several images of Sambar deer – a species that is heavily hunted in most of its range – in small family groups or alone.



Sunda pangolin (*Manis javanica*)



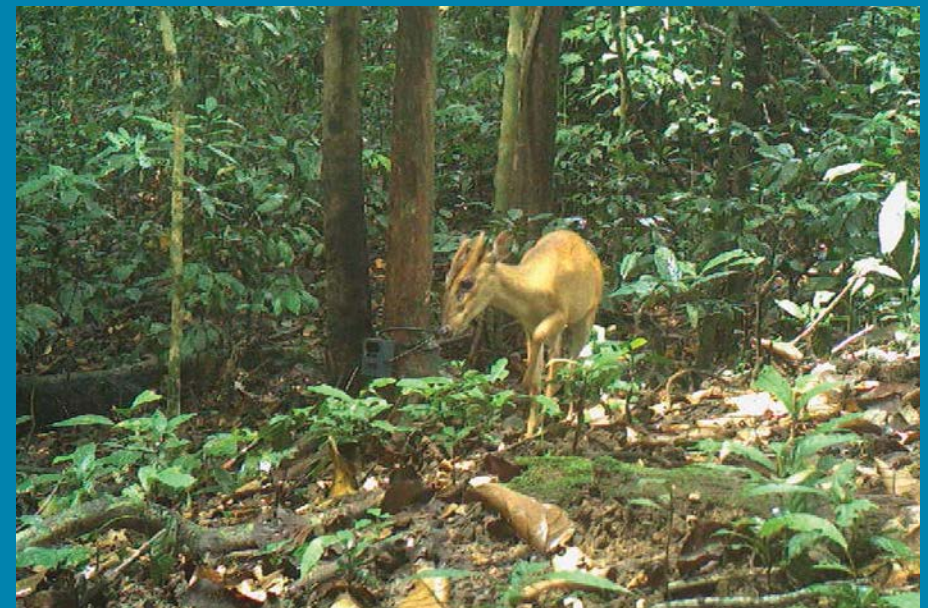
Bornean elephant (*Elephas maximus borneensis*)



We also captured a video of the Bornean yellow muntjac (*Muntiacus atherodes*), also known as barking deer, at our intensive research site for the first time. **This endemic species is known to be very sensitive to habitat disturbance and hunting pressure, and its Kinabatangan population had been severely affected by past human activities. This new sighting may be a first sign of the species' local recovery.**

Bornean bearded pig (*Sus barbatus*)

For the first time ever, our camera traps captured a shot of the Bornean yellow muntjac, a small-sized Bornean endemic deer long thought to be almost extinct in the Kinabatangan.



Drone Tech Trials

Surveying wild orangutans is inherently challenging as they are solitary, highly cryptic, wide-ranging primates with naturally low densities across their habitat. Population monitoring has traditionally relied on walking along ground transects and counting the nests that orangutans build to rest and sleep in. Helicopter surveys, which detect nests from above the canopy, proved more effective than ground-based methods but are also more expensive.





In early 2025 the Hutan team documented multiple cases of orangutans entering small-holders' oil palm and fruit orchards around Sukau village, feeding on crops. Thermal imaging drones allowed us to identify up to 20 individual orangutans in the forest patches within and around the village.



Hutan has been exploring the use of **drone technology as a tool for orangutan monitoring** since 2023, combining ground-based and aerial methods for more accuracy, and using artificial intelligence where necessary to automate nest detection from drone footage. Drone work includes both daytime nest counts and night-time surveys, in which drones equipped with thermal imaging detect orangutans in their nests in the dark. In total, the team has tested the method across 25 survey plots covering 1,600 hectares, completing 107 night-time drone flights and detecting 227 individual orangutans over this period.

Night-time surveys using drones equipped with thermal cameras are the newest of the drone methods we are experimenting with. By detecting the body heat emitted by orangutans, these drones can locate individuals directly in the canopy while they rest or sleep in their nests. Systematic trials for **this method began in mid-2025, with survey flights usually being conducted for three consecutive nights in both pre-set line transects and random flight routes.** In these initial trials, thermal imaging is proving to be a highly promising tool for orangutan population monitoring without causing apparent disturbance to the animals.

Over the past few years, our orangutan research has been showing **an increasing number of orangutans venturing outside of protected areas, and this was corroborated by our drone survey findings.** This suggests a shift in orangutan ranging and feeding patterns in the Kinabatangan agro-forest mosaic landscape.

Bioacoustic Monitoring

Bioacoustic monitoring uses specialised acoustic technology to detect distinct calls or songs produced by animals. Hutan has been partnered with Rainforest Connection since 2021 to test the use of “Audiomoth” devices, which are designed to passively capture animal sounds from the forest environment.

In 2025, we deployed the bioacoustic devices at five protected areas across Sabah, capturing a total of 93,595 audio files and yielding 18,751 distinct vocalisation detections, which allowed the identification of 147 bird species.



Among these were ten Borneo-endemic species, including the Bornean banded pitta, Bornean bristlehead and Bornean ground-cuckoo, as well as **two globally threatened hornbills: the Critically Endangered helmeted hornbill and the Endangered wrinkled hornbill.**

So far, we have recorded audio for about half of the 420 recorded bird species found in lowland areas in Sabah. Over time, we hope to expand our audio library to include them all.

Also in 2025, we continued to explore the use of bioacoustic techniques to detect bat species. As most bats emit ultrasonic pulses for both navigation and communication purposes that are above the range of human hearing, bioacoustic recorders have the potential to be highly effective in detecting and identifying species of bats in a specific area.



We used ultrasonic recording devices at seven locations across Sabah, collecting 3,921 audio files, and identifying 18 bat species. **In Kinabatangan alone, 16 bat species have been recorded with this method in just 2 years,** an encouraging result given how little is still known about this ecologically important taxon in the area.

eDNA Trials

Hutan and Beauval Nature partnered in 2019 to test the use of environmental DNA (eDNA) as a new tool for biodiversity monitoring.



When animals interact with the environment, DNA is shed from their cells, tissues, fluids, and excrement – which accumulates in water and soil, and can be detected with environmental sampling and molecular analysis. This gives eDNA a strong potential for detecting rare and cryptic species.

Our first campaign in the Kinabatangan detected 160 species in collected water samples from flowing water bodies in the region, including the main Kinabatangan River channel, its tributaries, oxbow lakes, mangrove and estuarine areas, as well as run off streams in nearby oil palm plantations. The species detected included 49 mammal species, 24 bird species, 9 amphibian species, 4 reptile species, and 74 fish species.

A second eDNA campaign was carried out between 2022 and 2024, this time focusing on stagnant water bodies. Analysis of this second campaign was completed in 2025, detecting 84 species: 33 mammal species, 25 bird species, 9 amphibian species, 4 reptile species, and 13 fish species.

Despite its capacity for species detection, eDNA still has a practical limitation: proper analysis requires access to suitable local molecular laboratory facilities, and many tropical species are still not represented in the genetic reference databases currently used for eDNA identification.

Still, eDNA will be a useful tool for future fish studies in the Kinabatangan. Fish are a historically underrepresented taxon when it comes to conservation, and have a particularly high significance for local communities that rely on the river for their livelihoods. These eDNA campaigns will allow us to create an inventory of the composition and status of fish in the Kinabatangan and inform future action and management strategies.



Monitoring Fish Species

Hutan has been working with K-KALOI – a local NGO aiming to preserve freshwater fish populations in Sabah – to manually assess the status of freshwater fish communities in the Kinabatangan floodplain. In the last 2 years, we have been creating a record of fish species in the various habitat types through simple catch-and-release techniques and interviewing local fishermen. In the future, we intend to use electric fishing to capture rare or cryptic species.

Biomass and Soil Health Monitoring

Biomass and soil health monitoring have been integrated into Hutan's reforestation programme since 2022, as an assessment of how well restored sites can recover their carbon storage capacity and ecological function over time.

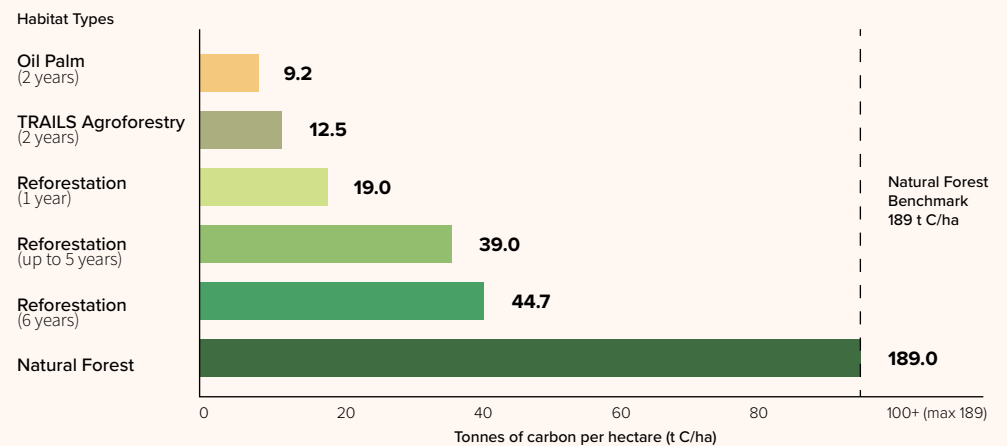
Biomass and Carbon Assessments

Biomass is the total weight of organic material – both living and dead – found above and below the ground, providing a basis for estimating carbon storage.

We measure biomass in a network of 1,000m² monitoring plots in reforestation sites, natural forests, oil palm plantations and agroforestry systems. In each plot, we record standard metrics such as tree diameter and height, size of fallen branches and other deadwood, and collect samples of leaf litter and small vegetation, which are then oven-dried to determine dry mass. At reforestation sites, **carbon stock estimates derived from dry biomass measurements are a key indicator of forest health and ecosystem recovery.**

In 2025, we **sampled 40 plots across various habitat types, bringing the total to 151 plots since 2022.** Natural forest plots averaged 189 tonnes of carbon per hectare, providing the benchmark for long-term recovery.

Average Carbon Stocks Across Habitat Types



The TRAILS agroforestry plots averaged 12.5 tonnes of carbon per hectare two years after planting, while pure oil palm plots of the same age averaged only 9.2 tonnes of carbon per hectare. These findings suggest that **the presence of trees contributes to a higher carbon storage capacity in the agroforestry plots.** Continued monitoring will track these trends over time and guide restoration strategies across the Kinabatangan landscape.



Soil Health Evaluation

Healthy soils are fundamental to forest ecosystems by supporting nutrient storage; regulating water movements; improving root growth; and hosting essential microorganisms, fungi and invertebrates.

Hutan has been monitoring changes in soil health using three low-tech methods that assess soil structure, measure soil biological activity linked to decomposition, and test how quickly water can infiltrate the soil.



In 2025, Hutan assessed 40 study plots across four land-use types: reforestation sites (21 plots), natural forest (5 plots), oil palm plantations (4 plots), and agroforestry plots (10 plots). The results show that natural forest soils generally show the strongest soil health indicators, with higher biological activity, better structure and stronger water infiltration.

A key finding from the reforestation sites is that soil biological activity recovers relatively quickly as planted areas mature, as soil organisms begin to return and begin breaking down organic matter again, often within the first months or years of restoration. By contrast, improvements in soil structure and water movement are much slower, indicating that the physical recovery of degraded soils takes considerably longer.

Oil palm sites generally scored lowest on the soil health indicators. Oil palm-based agroforestry plots that are newly planted over pure oil palm sites still show signs of compaction and slower water absorption but appear to be gradually recovering, with biological activity increasing over time.

We plan to continue monitoring these plots over the coming years to better understand the effects of land-use changes on soil health. Identifying effective ways to support soil recovery in human-altered habitats is crucial to building the resilience of the ecosystem, which will be beneficial to both humans and wildlife.

Protection

The Kinabatangan, one of the most biodiverse floodplains in Malaysia, is home to rare and endemic species. However, past human activities – timber exploitation and agriculture development – have degraded and fragmented natural habitats, leading to human-wildlife conflicts, and increased poaching pressure. Today, Kinabatangan wildlife populations are severely affected by these land use changes and many are classified as threatened by the IUCN Red List. Hutan is committed to work with the region's stakeholders to develop realistic solutions for the protection of the unique Kinabatangan biodiversity.



The Pangli Swiftlet Recovery Project

Initiated in 2010, this project has been focused on protecting the population of swiftlets (*Aerodramus* sp.) in the Pangli Forest Reserve, which was facing a severe decline. The birds, which build their collagen-rich edible nests in limestone caves, were affected by rampant nest theft, abandonment of sustainable traditional harvesting practices, and profound landscape changes.

In collaboration with the Sabah Wildlife Department and the Sabah Forestry Department, Hutan's project aims to restore and protect the swiftlet population in the Pangli Forest Reserve. Our team monitors population trends, controls illegal nest harvests through anti-poaching patrols, and takes part in capacity-building exercises to conserve the unique flora and fauna of the limestone forest.

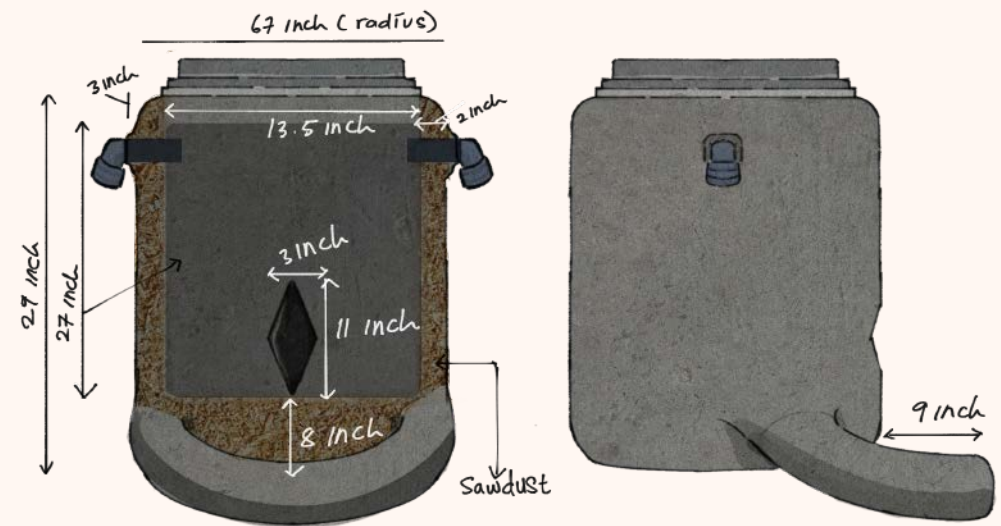
With about 5,000 breeding pairs detected in 2025, the project has successfully increased the Pangli swiftlet population by 1,400% from the original count of 317 pairs in 2010.

In April 2025, members of **the team completed an advanced caving techniques course conducted by professional trainers from the Malaysian Speleological Association**, as part of our on-going commitment to ensuring that all members of Hutan have the essential knowledge and skills to carry out their work safely and effectively.

Hornbill Artificial Nest Boxes

The Kinabatangan is home to all eight of Borneo's hornbill species, including the critically endangered helmeted hornbill (*Rhinoplax vigil*). Due to scarcity of tall emergent trees with sufficiently large cavities for hornbills to nest in, the bird's populations have been declining over the past decades.

Hutan has been partnered with a Malaysian hornbill research and conservation NGO, Gaia, since 2013 to closely monitor the hornbill populations in the Kinabatangan, and survey forests to locate natural tree cavities suitable for breeding. In some cases, these natural cavities sometimes need to be “remodelled” by adding a cavity floor or a perch by the entrance of the cavity to facilitate feeding by the male during nesting.



To address the issue of scarcity, **we also construct artificial nest boxes to be installed at strategic locations in the forest.** The nest boxes are made out of recycled water drums camouflaged to blend into the natural environment and hung throughout the forest canopy. In the last 12 years, we have hung 46 artificial nest boxes across the Kinabatangan and also in peninsular Malaysia, and 22 are still functional today, being mostly used by 3 species of hornbills: the rhinoceros hornbill, bushy-crested hornbill, and oriental pied hornbill. **Two Kinabatangan nest-boxes were used in 2025 by a pair of bushy-crested hornbills and a pair of oriental pied hornbills respectively.**



In 2025, we built and installed five artificial hornbill nest boxes for the first time in Brunei, in partnership with University Brunei Darussalam.





Restoring &
Reconnecting
Habitats

The Keruak Wildlife Corridor

Connectivity Conservation in Practice

The Keruak Wildlife Corridor is located along the Kinabatangan River, connecting two protected areas, namely the Lower Kinabatangan Wildlife Sanctuary (LKWS) and the Keruak Forest Reserve. It aims **to create a safe passageway for wildlife to move through this bottleneck** without having to cross into human settlements.

The corridor comprises 130 acres of land allocated by the Sabah government; 110 acres of mature, abandoned oil palm stands contributed by Genting Plantations (forming the Genting Corridor within the Keruak Wildlife Corridor) and 185 acres of privately owned, forested land procured by Hutan, that is being surrendered to the government for gazettelement as protected area. **With the reforestation of the Genting Corridor completed in 2024, the Keruak Wildlife Corridor is now fully established.**

An aerial photograph of a vast, dense tropical forest. A prominent, straight, light-colored corridor, likely a road or a cleared path, runs horizontally across the middle of the image, bisecting the dense green canopy. The forest appears to be a mix of different tree species, with varying shades of green and some visible palm trees. The overall scene is one of a large-scale natural landscape with a human-made or managed corridor.

We have been monitoring the biodiversity and wildlife recolonisation of the corridor since 2019, and the general ecosystem health (through biomass and soil health evaluation) since 2023. There are three distinct habitat types being monitored: the surrounding degraded natural forest of the protected areas, the reforested corridor, and an adjacent active oil palm plantation. The goal of our monitoring work is **to better understand the dynamics of wildlife recolonisation in reforested corridors and to provide sound recommendations for sustaining biodiversity in multi-use landscapes.**

Wildlife has been increasingly using the Keruak Wildlife Corridor and the surrounding forests, including rare, elusive species such as the Bornean clouded leopard spotted in 2024, and **the Bornean yellow muntjac which was recorded for the first time in 2025.** Since 2019, we have identified 197 wildlife species using the corridor, comprising 53 mammal, 115 bird, 26 frog, and 3 reptile species.

The Keruak corridor is also the main site of our carnivore monitoring project. Carnivores play a critical ecological role, but many species are threatened by human alterations to the habitat. Their status is poorly known due to their elusive nature, therefore, a special component of Hutan's camera trap monitoring is dedicated to detecting carnivore species. To date, **we have identified 14 carnivore species** across the multi-year study, with the majority being found in natural forests.

In our biomass and soil health studies, **we are learning that the corridor is showing early signs of ecological recovery, with carbon storage levels gradually increasing over time and positive results in all four soil health indicators.** Our findings show the important role of reforestation corridors in reconnecting fragmented forests within oil palm-dominated landscapes, supporting wildlife movement, and contributing to the reversal of local biodiversity decline. The continuous monitoring of this corridor will quantify this impact, which will aid our understanding of connectivity as a conservation strategy.

Reforestation

Hutan's reforestation team currently comprises 25 indigenous women and 2 drivers, and has been pursuing the long-term mission of forest rehabilitation since their establishment in 2008. With a focus on restoring a continuous forested corridor along the Kinabatangan River, the team has planted 254,085 trees in total across 13 reforestation sites, including protected areas, riparian zones, and on private land.

As very few women in Kinabatangan villages have permanent jobs, Hutan is proud to offer access to a steady income and the ability to make a difference in their local environment through our flexible employment scheme. All members of the reforestation team receive in-depth training in tree planting and sapling maintenance, and have opportunities to participate in workshops and training programmes run by botanists and reforestation professionals.

In 2025, the reforestation team continued routine operations, including sapling production and planting, maintenance, and survival monitoring. The team also conducted phenology, biomass, and soil health studies to assess restoration outcomes, the results of which are outlined here.



The Hutan Reforestation team planted 71,443 trees from 56 native tree species in the Genting Wildlife Corridor between 2019 and 2025. The species planted were selected for their ecological function as pioneer species, and as favoured food sources for orangutans and other species.



Reforesting a Wildlife Corridor within an Oil Palm Plantation

The Genting Wildlife Corridor (a 110-acre section of the Keruak Wildlife Corridor) is the outcome of a pioneering partnership between Hutan, Genting Plantations, and the Sabah State Government, established in August 2018 after Genting Plantations and Sabah Wildlife Department entered a Memorandum of Understanding which allocated the 110 acres of mature palms to be reforested and connected to the wildlife corridor.



Hutan has been planting native tree saplings in-between the abandoned palms to ensure a gradual return of the area to natural forest since 2019; making the Genting Wildlife Corridor one of our prime study sites for monitoring wildlife recolonisation, biomass improvement, and carbon storage and soil health research to assess the ecological value of reforested corridors in a mixed forest-agricultural landscape.

As most of the trees planted in the corridor are under 5 years old, intensive maintenance is required to ensure their survival.

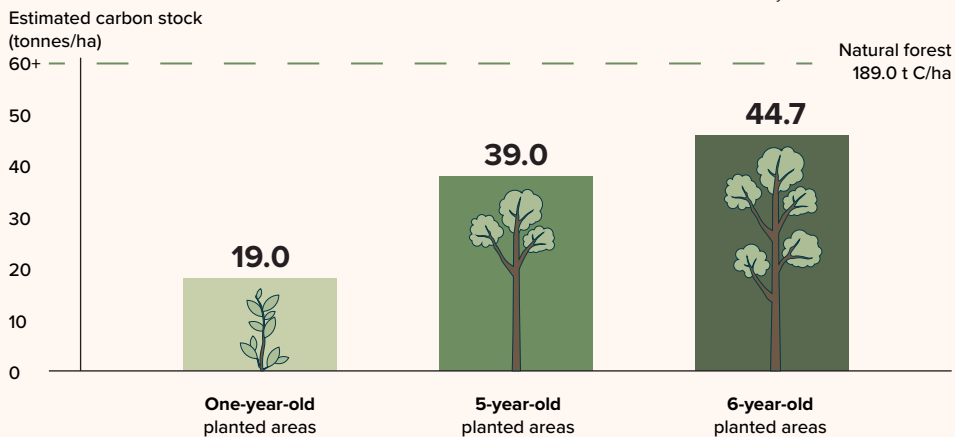
This includes manual weeding around each sapling and using grass cutters to remove tall grasses and foliage in the area, with no pesticides, fertilisers or chemicals applied. **In 2025, the team dedicated a total of 1,610 woman-days to the maintenance of 50,578 saplings at the Genting Wildlife Corridor.** Prioritising plant maintenance in this manner meant that in January 2025, **our sapling survival rates in the Genting Wildlife Corridor across 2019-2024 averaged 71%.** The next round of survival monitoring will be conducted in December 2026.

Since 2022, we have incorporated biomass monitoring into our reforestation impact programme to quantify how reforestation sites regain carbon storage capacity and ecological function over time. At reforestation sites, carbon stock estimates derived from dry biomass measurements are a key indicator of forest health and ecosystem recovery.

Our monitoring shows:

Carbon Storage Recovery in the Genting Wildlife Corridor

The estimated carbon stocks in our reforestation plots increase rapidly as planted areas mature, but remain well below natural forest levels, reflecting the long timescales needed for full recovery.



Similarly, we have also been comparing soil health across the different land-use types in the area using low-tech field methods to assess soil structure, decomposition activity and water infiltration. **A key finding from the assessments in the reforested sites of the Genting Wildlife Corridor is that soil biological activity recovers relatively quickly as planted areas mature**, as soil organisms begin to return and break down organic matter again, often within the first months or years of restoration. By contrast, improvements in soil structure and water movement are much slower, indicating that the physical recovery of degraded soils takes considerably longer.

Wildlife recolonisation monitoring shows that the **reforested corridor is frequently used by large mammals** such as elephants and orangutans, and has been attracting an ever-increasing number of forest-dependent species even when it was in an early stage of recovery. These findings show the important role of reforestation corridors in reconnecting fragmented forests within oil palm-dominated landscapes, supporting wildlife movement, and contributing to the reversal of local biodiversity decline. Hutan also shares these results with oil palm plantations to help guide the expansion of wildlife-compatible management practices across the wider landscape.



Bornean elephant (*Elephas maximus borneensis*)

The Hutan Native Tree Nursery

Hutan's native tree nursery aims to ensure the production of healthy saplings suitable for all our reforestation projects. Hutan also supports a network of village home nurseries, by providing training to the nursery operators (primarily women) on nursery management and sapling care, and we also supply the essential equipment for establishing and maintaining their nurseries.

Some of the seeds and seedlings provided for propagation to the home nurseries are collected by our reforestation team while they are in the field. Once saplings reach 1-2 feet in height, they are purchased from the village women and transported to Hutan's nursery, where our team continues their care until they are ready to be dispatched to reforestation sites. Since it came into existence, this system has generated approximately USD 119,500 in secondary income for the village home nurseries.



Hutan's native tree nursery lost more than 3,500 saplings due to repeated severe flooding of the Kinabatangan river in the beginning of 2025. We were able to relocate our nursery to a new flood-safe site with a larger capacity, which now holds 10,000 saplings.



In August 2025, the **Faculty of Tropical Forestry of University Malaysia Sabah (UMS)** ran an **intensive Plant Nursery Pest and Disease Management training course**, which provided training to staff from our reforestation team, and some of the home nursery operators. The course strengthened participants' skills to identify, monitor, and manage insect pests and disease symptoms affecting native seedlings in the nurseries.

We are partnering with UMS to continue this collaboration further in 2027, with the hopes of including the identification of healthy remnant mother trees to secure genetically robust seed sources, as well as silviculture strategies for pest and disease management to support effective forest restoration and long-term climate resilience.

Land Procurement for Conservation

Hutan is committed to supporting the restoration of ecological integrity across the Lower Kinabatangan landscape by reconnecting isolated fragments of protected areas through strategic land acquisitions that secure permanent, safe wildlife corridors along the Kinabatangan River and its tributaries.

A Project Steering Committee comprising 13 Sabah government agencies was established in 2013 to oversee this initiative and to uphold native community welfare throughout its implementation. Lands acquired through the project are intended to subsequently be gazetted as protected-area expansions, ensuring long-term corridor protection.

Since the project's inception, **a total of 61 land titles covering 305 acres of forest have been acquired to form four wildlife corridors** – the Pangi, Keruak, Menanggul and Sungai Sukau corridors – all located near the village of Sukau.

In 2025, Hutan **acquired five additional forested land titles**, including under our newest initiative - the Sungai Sukau Wildlife Corridor – to protect forests along a Kinabatangan River tributary that is a hotspot for endangered species and at high risk of being converted to agriculture and tourism infrastructure.

Long-term monitoring demonstrates that these corridors facilitate wildlife movement, especially for large mammals such as elephants and orangutans, and in reducing human-wildlife conflicts in nearby villages and plantations. These corridors also serve other long-term conservation functions by reducing genetic isolation among threatened species sub-populations, preventing riverbank erosion, sustaining freshwater fisheries, and preserving the scenic value of the Kinabatangan, a globally recognised ecotourism destination.

Orangutan Bridges

Historic commercial logging in the Kinabatangan between the 1950s and 1980s severely disrupted the forest structure and canopy. In the remaining degraded forests, smaller trees no longer form a continuous canopy connection over small tributaries of the Kinabatangan River, making it impossible for non-swimming wildlife such as orangutans to cross the waterways and further fragmenting their populations.

Since 2005, Hutan has **installed 12 hanging bridges across these tributaries to facilitate safe passage for orangutans and other arboreal species**. In 2025, we focused on monitoring the bridges installed near the village of Sukau.



A photograph of a vast, misty landscape featuring multiple layers of forested hills. The foreground is a dark, dense forest. The middle ground shows a series of rolling hills, each covered in a thick forest, with a layer of white mist or fog settling in the valleys between them. The background consists of more distant, hazy mountain ranges under a soft, warm sky, suggesting the light of dawn or dusk. The overall atmosphere is serene and expansive.

Stakeholder Engagement & Partnerships

Environmental Education and Awareness

The Hutan Environmental Awareness Programme (HEAP) unit has been conducting environmental education programmes specifically for schools and communities across Sabah since 2003, operating under a 5-year Hutan Environmental Education Master Plan.

In 2025, HEAP conducted 8 school environmental education programmes, reaching a total of 3,078 school children and 312 teachers. 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.

HEAP also runs the Hutan Junior Ranger programme, which offers year-round extracurricular educational activities for a group of village children. The continuing yearly programme progressively empowers them to become ambassadors for conservation within their community.

Junior Ranger activities include things like interactive sessions with researchers and conservationists; hands-on activities to do with topics like reforestation or recycling; and visits to sites of special natural interest. **The 2025 cohort comprised 30 Junior Rangers, ages ranging from 7 to 16 years old.**



To measure the impact of its children education programmes and public outreach events, Hutan Environmental Awareness Programme (HEAP) uses before-and-after questionnaires to monitor and evaluate the effectiveness of its behaviour change interventions



Hutan also closely collaborates with the Sabah Environmental Education Network, which comprises other Malaysian NGOs and government agencies, aiming to build a community that appreciates and values local biodiversity through joint outreach programmes, while encouraging people to take conservation action and live sustainably.

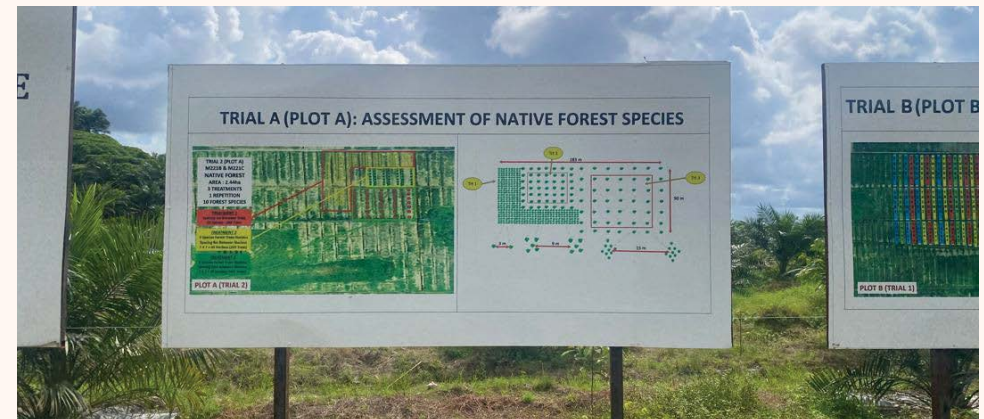
In 2025, Hutan participated in five major events statewide, including the International Day for Biological Diversity, and the Borneo Bird Festival, reaching over 5,600 members of the public. In October, Hutan was also invited to run an exhibition booth at the Marina Bay Sands Sustainability Action Day event in Singapore.

The TRAILS Project: Innovative Oil Palm-based Agroforestry for Human-Wildlife Coexistence

The TRAILS project, launched in 2021 in the Kinabatangan, is a collaboration between the French Agricultural Research Centre for International Development (CIRAD), Melangking Oil Palm Plantation, Hutan and University Putra Malaysia.

This innovative project seeks to demonstrate the environmental and economic benefits of integrating oil palm cultivation with native forest species in agroforestry systems. By conducting research on mixed plantings, **TRAILS aims to show how native trees can improve soil health depleted by successive cultivation cycles, attract pollinators, thereby enhancing crop production, and create conditions that facilitate movement of orangutans, elephants and other wildlife within the plantation matrix.**

In 2025, Hutan continued biomass and soil health monitoring in the agroforestry plots and carried out wildlife monitoring using camera traps, which recorded **first detections of the endemic Bornean crested fireback, a leopard cat and the white-crowned shama, a Borneo-endemic songbird.**



TRAILS demonstrates practical land sharing and regenerative agriculture practices that can deliver economic benefits to growers while supporting wildlife conservation, with strong potential for replication across the Kinabatangan landscape.

Designation of the Kinabatangan Biosphere Reserve

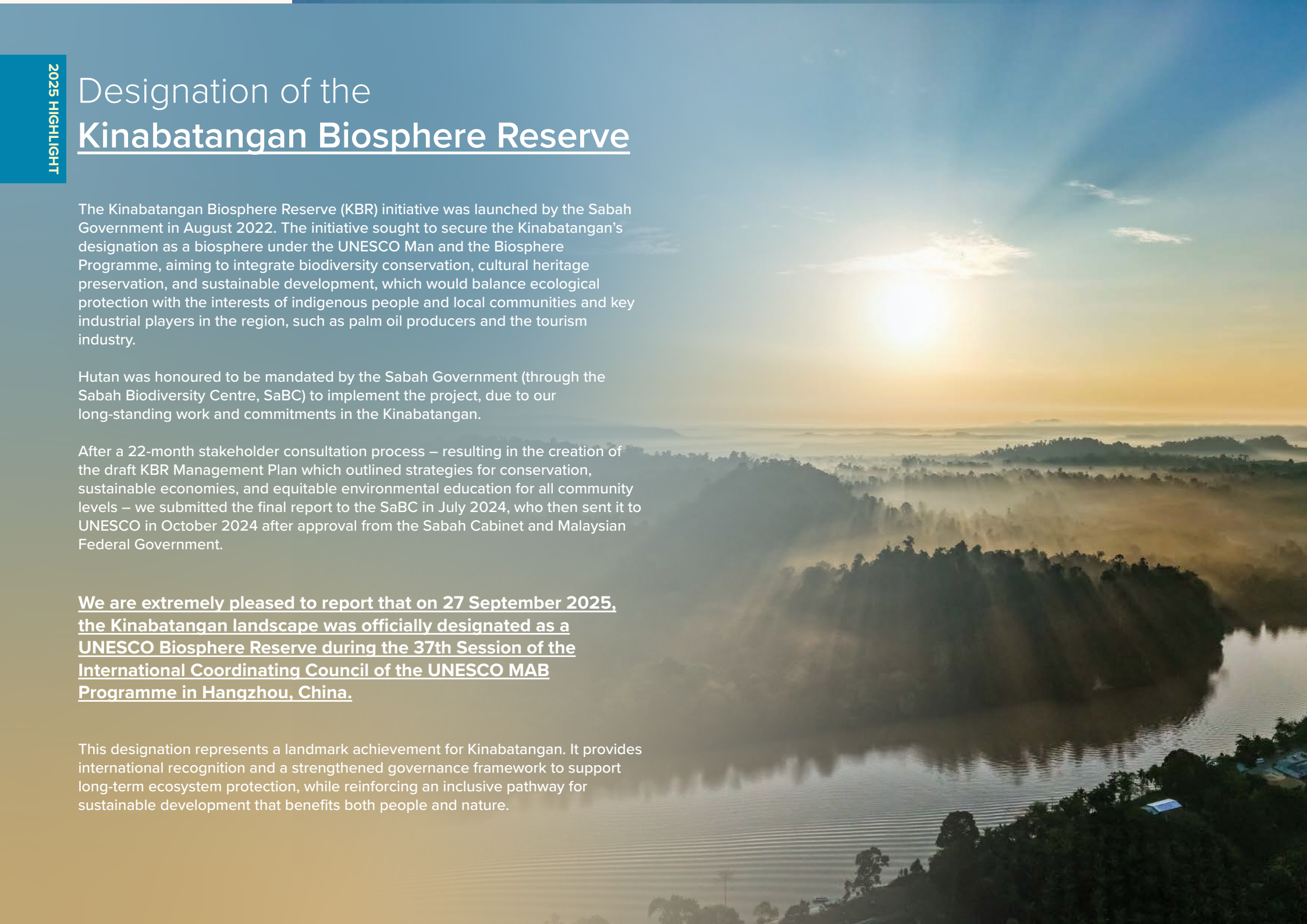
The Kinabatangan Biosphere Reserve (KBR) initiative was launched by the Sabah Government in August 2022. The initiative sought to secure the Kinabatangan's designation as a biosphere under the UNESCO Man and the Biosphere Programme, aiming to integrate biodiversity conservation, cultural heritage preservation, and sustainable development, which would balance ecological protection with the interests of indigenous people and local communities and key industrial players in the region, such as palm oil producers and the tourism industry.

Hutan was honoured to be mandated by the Sabah Government (through the Sabah Biodiversity Centre, SaBC) to implement the project, due to our long-standing work and commitments in the Kinabatangan.

After a 22-month stakeholder consultation process – resulting in the creation of the draft KBR Management Plan which outlined strategies for conservation, sustainable economies, and equitable environmental education for all community levels – we submitted the final report to the SaBC in July 2024, who then sent it to UNESCO in October 2024 after approval from the Sabah Cabinet and Malaysian Federal Government.

We are extremely pleased to report that on 27 September 2025, the Kinabatangan landscape was officially designated as a UNESCO Biosphere Reserve during the 37th Session of the International Coordinating Council of the UNESCO MAB Programme in Hangzhou, China.

This designation represents a landmark achievement for Kinabatangan. It provides international recognition and a strengthened governance framework to support long-term ecosystem protection, while reinforcing an inclusive pathway for sustainable development that benefits both people and nature.



Appendix

List of key peer reviewed publications by Hutan and partners:

- Wich, S., Ancrenaz, M., Goossens, B., Hennekam, M., Milne, S., Burslem, D., Knott, C., Martin, J., Fergus, P. 2025. Using deep learning to automate orangutan nest detections on aerial images collected with drones. *American Journal of Primatology*, 87:e 70100 <https://doi.org/10.1002/ajp.70100>.
- Ancrenaz, M., Dennis, R., Said, S., Wich, S., Sherman, J., Rahman, H.A., Oram, F., Traeholt, C., Nawangsari, A., Silmi, M., Meijaard, E. 2025. Quantifying and managing orangutan-induced disturbance on second-rotation oil palm plantations. *The Planter*, 101 (1191), 353-367. <https://theplanter.com.my/vol-101-no-1190-may-2025/>.
- Lieb, Z.E., Meijaard, E., Brodie, J.F., Shabrani, A., Ancrenaz, M., Luskin, M.S. 2025. Mapping multiple wild pig species' population dynamics in Southeast Asia during the African Swine Fever outbreak. *Conservation Letters* <https://doi.org/10.1111/conl.13105>.
- Pringle, S., Dallimer, M., Goddard, M.A., Le Goff, L.K., Ancrenaz, M., Davies, Z.G. 2025. Opportunities and challenges for monitoring terrestrial biodiversity in the robotics age. *Nature Ecology & Evolution* <https://doi.org/10.1038/s41559-025-02704-9>.
- Sherman, J., Voigt, M., Ancrenaz, M., Meijaard, E., Oram, F., Williamson, E.A., Russon, A.E., Seaman, D.J.I., Caurant, C., Byler, D., Wich, S.A. 2025. Outcomes of orangutan wild-to-wild translocations reveal conservation and welfare risks. *Plos ONE* 20 (3), e0317862. <https://doi.org/10.1371/journal.pone.0317862>.
- Rival, A., Ancrenaz, M., Guizol, P., Lackman, I., Burhan, S., Zemp, C., Sulaiman, M.F., Djama, M. 2025. Innovative planting designs for oil palm-based agroforestry. *Agroforestry System*, 9: 27, <https://doi.org/10.1007/s10457-024-01124-1>.
- IUCN SSC Primate Specialist Group (Section on Great Apes). 2025. *Best practice guidelines for orangutan wild-to-wild translocation*. Gland, Switzerland: IUCN SSC Primate Specialist Group. 58 pp.
- Freund, C., Sherman, J., Ancrenaz, M., Wich, S., Meijaard, E. 2025. Guide to responsible support for orangutan conservation. AZA Orangutan SAFE Programme, 19 pp.
- Meijaard, E., Wich, S.A., Ancrenaz, M., Dennis, R.A., Ni'Mattulah, S., Sherman, J. 2025. Interpreting the International Finance Corporation's Performance Standard for the management of orangutans. Report providing guidance for entities wanting to align with the IFC standards. Borneo Futures, Bandar Seri Begawan, Brunei Darussalam. 37 pp.
- Meijaard, E., Unus, N., Ariffin, T., Dennis, R., Ancrenaz, M., Wich, S., Wunder, S., Chun Sheng Goh, Sherman, J., Ogwu, M.C., Refisch, J., Ledgard, J., Sheil, D. and Hockings, K. 2025. Apes and Agriculture. UNEP-GRASP, 39 pp.
- Abdullah, K.A., Ahmad, E., Sinyor, H., Ratag, M., Suali, S., Shia, A., Sawang, S., Kadim, Z.M., Ancrenaz, M., Bani, M., Sabtu, A. 2025. Wildlife assessment at Sungai Rawog Conservation Area, Segaliud Lokan Forest Reserve, Sabah, Malaysia. In SFD and KTS Eds, *Seminar on Sungai Rawog Conservation Area Scientific Expedition*. Kota Kinabalu, pp. 203-214.
- Jetony, G., Lackman, I., Markos, A., Victor, V.S. (2026). Enhancement of Ecological Connectivity Through UNESCO's Man and Biosphere Reserve: Case of Kinabatangan Landscape, Sabah, Malaysia. In: Nishi, M., M. Subramanian, S., Varghese, P., Houndonougbo, J.S.H. (eds) *Ensuring Ecological Connectivity in Socio-Ecological Production Landscapes and Seascapes (SEPLS)*. Satoyama Initiative Thematic Review. Springer, Singapore. https://doi.org/10.1007/978-981-95-1474-8_9.

List of key training programmes attended by Hutan staff in 2025:

Dates	Training Topic	Training Provider	No. Staff	No. Days
FEB	Potentials, Challenges and Knowledge Needs for Restoration with Native Tropical Rainforest Trees	Swedish University of Agricultural Sciences and Sabah Foundation	1	6
MAR	Bioacoustic Monitoring	University Brunei Darussalam	10	6
APR	Biomass and Soil Health Assessment	Hutan internal trainers	27	3
	Advanced Caving Techniques	Malaysian Speleological Association	13	4
MAY	Bioacoustic Monitoring	Chester Zoo	7	14
JUN	Use of Drone for Field Research and Data Processing (Matrice 4)	FWF World Solutions - Drone Malaysia	2	3
AUG	Plant Nursery Pest and Disease Management	Faculty of Tropical Forestry, University Malaysia Sabah	24	6
OCT	ArcGIS Pro - GIS Application	Esri Malaysia	2	1



A New Hutan Campus

From February to May 2025, repeated severe flooding of the Kinabatangan River—the worst in recent history – caused extensive damage to Hutan's long-standing headquarters, disrupting operations and placing staff at risk.

In response, **Hutan launched an Emergency Appeal in June 2025 to relocate core operations to higher, flood-safe ground and establish the Pilot Phase of Hutan's new campus.** With the support of partner organisations who responded to the Appeal, we were able to complete, in September 2025, the acquisition of a 1.4 acre land parcel, securing a site for Hutan's new Campus Pilot Phase.

The Campus Pilot Phase design was then developed with a project manager and an architect, through planning and consultations with field teams. **The architectural concept package was finalised in November 2025**, including essential workspace for displaced field teams, equipment storage, and accommodation for staff and visitors.

Key enabling work was also completed, including boundary verification and a detailed topographic survey, followed by site clearing and initial levelling. **Building permit documentation is now being prepared for submission to local authorities; construction is scheduled to proceed once approvals are cleared**, with operational use targeted for 2026.

List of Hutan Donors 2025

Government Sources

U.S. Fish and Wildlife Services - Great Ape Fund

Private Foundations and Organisations

Arcus Foundation

Basel Zoo (Zoologischer Garten Basel)

Chester Zoo (North of England Zoological Society)

Cheyenne Mountain Zoo

Cincinnati Zoo (Zoological Society of Cincinnati)

Cleveland Metroparks Zoo

Cultures of Resistance Network Foundation

Ecological Reforestation Fund

Fondation Iris (via Fondation de France)

Foundation Zoo Wrocław DODO

Hertfordshire Zoo

Hogle Zoo (Utah Zoological Society)

Houston Zoo

Kansas City Zoo (Sedgwick County Zoological Society)

Marina Bay Sands

Mohamed bin Zayed Species Conservation Fund

NPO Mirai Process

Oregon Zoo

Palmyre Conservation

Phoenix Zoo (Arizona Center for Nature Conservation)

Rainforest Trust

Saint Louis Zoo

SECAS (Les Amis du Zoo de Vincennes)

Synchronicity Earth

The Natural Travel Collection

The Orangutan Project-Australia (Wildlife Conservation Int'l)

Univet Nature

Vienna Zoo

Wildlife Conservation Network

Woodland Park Zoo

World Land Trust

Wrocław Zoo

Individual Donations

Susanna Gutjahr Scharer

Illulasiesta



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