

Three decades of the Orangutan Foundation's conservation programmes in Central Kalimantan, Indonesia

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Abstract : Despite a large amount of information being published on the decline in orangutan populations, there is far less on the actions being taken to address the underlying reasons, which are the loss and degradation of their habitat, hunting, and fires. There is also limited understanding of the complementary role played by different parties conducting conservation efforts on the ground. Here we address this by describing the conservation programmes of the Orangutan Foundation that have developed over the past three decades to support the Indonesian government's efforts to conserve the Bornean Orangutan in Central Kalimantan Province, Indonesian Borneo. These programmes, which are mutually synergistic in a holistic approach to orangutan conservation, cover habitat and species protection in conservation areas, landscape conservation outside conservation areas, rescues of orangutans in danger and translocations to protected forests, restoration of degraded forest habitat, research, education and awareness, community involvement, and coordination with stakeholders. The achievements of these programmes are described, with a particular focus on the Lamandau Wildlife Reserve. The collaboration with the Ministry of Environment and Forestry's national and regional conservation agencies and related stakeholders shows how major progress can be made through a collaborative approach to planning and implementing conservation programmes.

Keywords: Bornean Orangutan, endangered, conservation, habitat protection, Orangutan Foundation

INTRODUCTION

Orangutans are only found in Sumatra, where two species are recognised: Tapanuli Orangutan (*Pongo tapanuliensis*) and Sumatran Orangutan (*Pongo abelii*); and Borneo (*Pongo pygmaeus*), with three sub-species: the topotypical *Pongo pygmaeus pygmaeus* in Sarawak and the northern border of West Kalimantan, the Southwest Bornean Orangutan, *P. p. wurmbii*, in West and Central Kalimantan, and Northeast Bornean Orangutan, *P. p. morio*, in Sabah and East Kalimantan. Population estimates for each species are: Tapanuli <800, Sumatran 13,846 (Wich *et al.*, 2016), and Bornean between 57,350 (Utami-Atmoko *et al.*, 2017) and 104,700 (Ancrenaz *et al.*, 2016). Each species is currently classified as Critically Endangered by IUCN. The designations were based on the sharp decline in orangutan populations and projections based on ongoing decline. The main threats to the survival of orangutans come from the loss, degradation, and fragmentation of their tropical forest habitats, together with hunting. This loss of forest habitat has been ongoing for many decades, and was primarily due to industrial scale commercial logging, followed by conversion for agricultural development.

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Information on efforts that have been conducted to address these issues is not widely available, in contrast to documentation of orangutan population and habitat loss, or recommendations for actions. The Orangutan Foundation's programmes are described to provide insight into orangutan conservation actions from an implementing NGO perspective.

BACKGROUND TO THE ORANGUTAN FOUNDATION

The Orangutan Foundation was founded by Ashley Leiman OBE in 1990 and has been registered as a charity in the UK since 1994. The charity is managed on a pro bono basis by Ashley Leiman, who is a Director and Trustee. The UK office is in London (website www.orangutan.org.uk), whilst its country office is in Central Kalimantan Province, Indonesia, where just over half of all Bornean Orangutans are found. Fulltime staff numbers are \pm 60 in Indonesia, supported by four in the UK (two fulltime employees). The mission of the Orangutan Foundation is to support efforts to conserve orangutan populations and their tropical forest habitats in Borneo and Sumatra, through conservation, research, and education.

Most support has been provided for conservation efforts in Central Kalimantan, (for the Southwest Bornean Orangutan *P. p. wurmbii*) through the Foundation's Indonesia country office, which implements its long-term programmes and other specific project grants. These programmes are funded through Orangutan Foundation members and supporters, grants from donors, and other donations, with all funds coming from international sources. Support to NGOs or researchers carrying out projects in other areas has been limited to exceptional cases in Sumatra (for the Sumatran Orangutan and Tapanuli Orangutan) and in Sabah and East Kalimantan (for the Northeast Bornean Orangutan *P. p. morio*), due to the limited availability of funds.

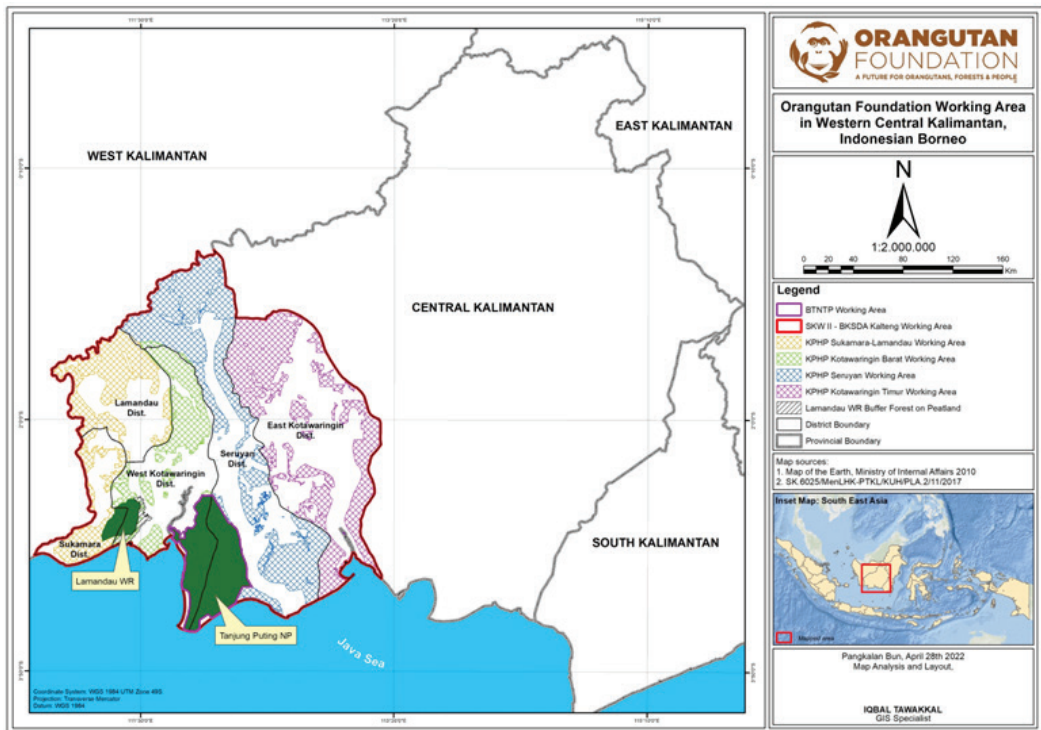
The Orangutan Foundation is registered with the Government of Indonesia and has an operating licence through an MoU with the Ministry of Environment and Forestry (MoEF). All activities are carried out in collaboration with technical implementing agencies of the MoEF's Directorate General for Conservation of Natural Resources and Ecosystems (Ditjen KSDAE), especially the Central Kalimantan Agency for Conservation of Natural Resources (*Balai Konservasi Sumber Daya Alam Kalimantan Tengah* – BKSDA Kalteng) and the Tanjung Puting National Park Agency (*Balai Taman Nasional Tanjung Puting* – BTNTP). The Foundation also works in collaboration with a local Foundation in Central Kalimantan, Yayasan Orangutan Indonesia, better known as Yayorin, especially through collaborating on the design and implementation of specific grant projects; and participating in national and regional orangutan forums (Forum Orangutan Indonesia, FORINA; Forum Orangutan Kalimantan Tengah, FORKAH).

ORANGUTAN FOUNDATION'S ONGOING PROGRAMMES

The main long-term programmes currently being supported are: habitat and species protection, landscape conservation (including population monitoring), rescues and reintroduction, habitat restoration, research, education and awareness. These are implemented by the Foundation's Indonesia country office (known locally as OF-UK Indonesia) in five adjacent districts in western Central Kalimantan. These programmes are mainly carried out in four types of forest (Figure 1):

- Lamandau Wildlife Reserve.
- Tanjung Puting National Park.
- Forest Management Units – state forests for Limited Production Forest, Protection Forest, Production Forest (including Industrial Timber Plantations), Conversion Forest.
- Forests in high conservation value areas outside state forests (including within oil-palm plantation concessions).

Figure 1. Location of forest areas where Orangutan Foundation works.



The first two are conservation areas, whilst the next two are referred to as areas outside conservation areas. Most of the Foundation’s support is for conservation programmes in the Lamandau Wildlife Reserve, which covers some 61,425 ha of mainly secondary peatswamp forest and is managed by BKSDA Kalteng. A study commissioned by the Foundation found the area contained over 36.5 million tons of carbon (Forest Carbon 2010).

Habitat and species protection

Efforts to protect orangutans and their tropical forest habitats are one of the highest priority actions. The Lamandau Wildlife Reserve is threatened by encroachment, illegal logging, outbreaks of fire, and hunting. To counteract these threats, the Foundation built nine guard posts at strategic points around the boundaries of the reserve and adjacent buffer zone forest (Figure 2). These served as a preventive deterrent for the rangers stationed there (currently two per guard post) to prevent illegally felled timber from being transported out, and a base to conduct weekly forest monitoring patrols.

All illegal activities detected are reported directly to BKSDA for follow-up. Sometimes this requires launching a joint patrol with BKSDA’s Forestry Police. The result of this patrolling effort has been that, despite continuous pressure, there have been no major outbreaks of illegal logging since 2009. This situation was aided by the closure of the last sawmill around the reserve in early 2010 due to the effectiveness of BKSDA and Foundation patrol teams stopping logs being removed from the reserve. Consequently, any illegal loggers must now cut the logs into beams on site, which increases the chance of rangers detecting chainsaw sound after only one or two trees have been felled. Nevertheless, about five to ten such small cases are still detected each year.

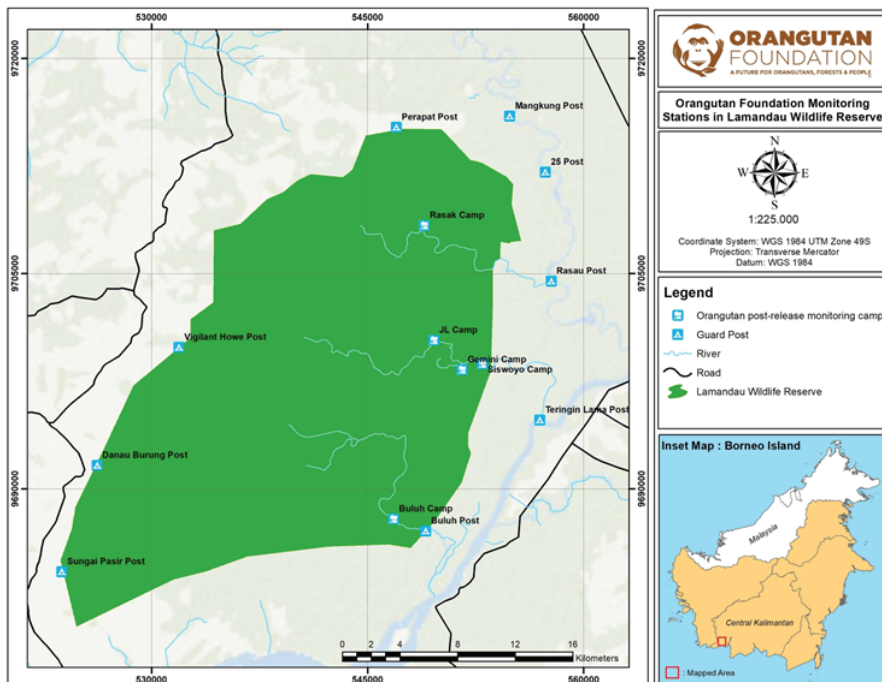
Encroachment deep in the reserve has increased recently, influenced by two long unresolved fruit-tree plantations. Preliminary ground surveys in 2021 identified 13 cases of land clearing covering 124.8 ha. Most involved two or three local people planting oil palm or fruit trees in small patches, with ten cases less than eight ha. The Foundation is currently

working with BKSDA to resolve this encroachment in accordance with current government guidelines, which allow harvesting rights to those who have used the land for five years or more, through establishing a special-use management zone. A separate case of illegal mining, in which a group of illegal miners set up camps in three locations to mine for zircon, caused the devegetation of 65 hectares. This was eventually resolved after several years with special assistance from the provincial SPORC team (Rapid Reaction Forestry Police Unit) from MoEF.

Due to the past logging history of the reserve, there are significant areas of savannah and shrublands on the western side of the reserve. These are often repeatedly burned by some local community members – either to stimulate new growth for subsequent deer hunting, or for encroachment. A rapid response is required to prevent these outbreaks from spreading into standing forest. On most occasions, the fires can be extinguished by the guard post ranger teams using jet shooters with 20-litre water backpacks, replenished using mobile water tanks. A critical factor to support the fire-fighting teams is the availability of water for jet shooters. During the dry season, the nearest water sources are often 5-10 km away. To help overcome this, more than ten deep-bore wells have been installed. A recently donated 4WD vehicle will help transport portable water tanks much closer for refilling the jet shooter backpacks.

The frequency and intensity of these fires is much greater during the dry season drought in *El Niño* years, and conversely, much less during the ‘rainy dry season’ in *La Niña* years. During the 2015 *El Niño* year, 11,654 ha of mainly shrublands burned inside the reserve, and 9,287 ha in the surrounding buffer zone area. For such larger outbreaks, assistance is sought from the MoEF regional Forest Fire Control Brigade (Mangala Agni) and local communities. Fires in peatlands can burn underground for many days and produce thick haze. The assistance of the multi-agency Regional Disaster Response Board (BPBD) was essential to provide aerial water bombing by helicopter to help extinguish the 2015 fires. Before each dry season, awareness raising in forest fire prevention for communities in the surrounding area is carried out together with BKSDA and Mangala Agni. The online fire hotspot data provided daily by NASA, LAPAN, and SIPONGI, are especially useful during the dry seasons.

Figure 2. Lamandau Wildlife Reserve in Central Kalimantan, showing locations of guard posts and orangutan post-release monitoring camps.

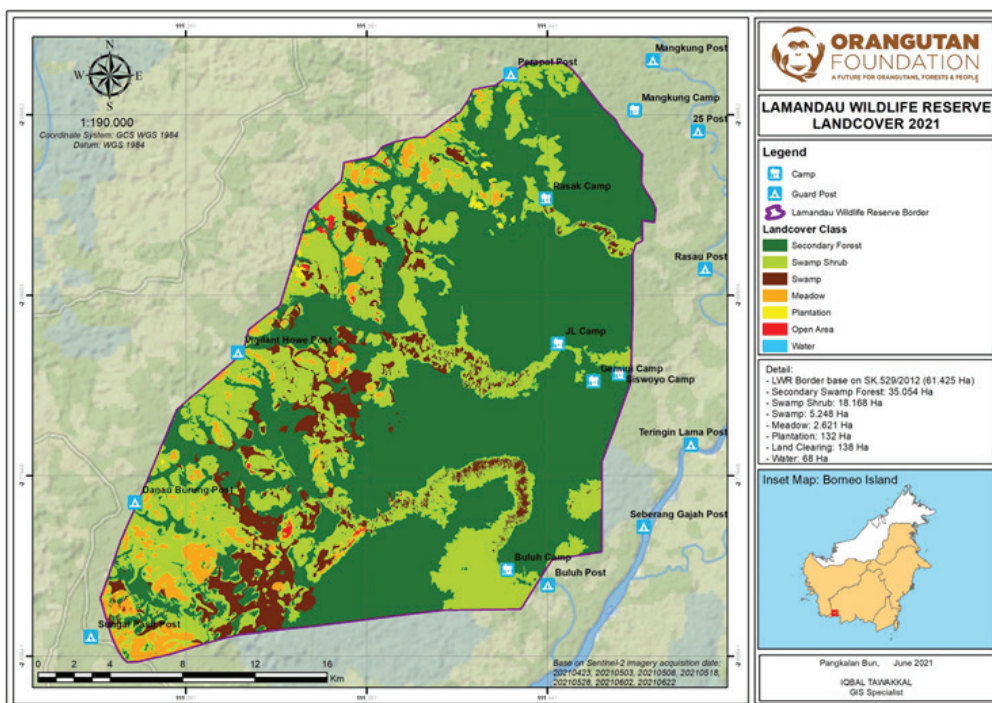


In addition to ground patrols, forest monitoring is carried out by drones and GIS analyses of satellite imagery. The drone monitoring plan for the reserve, work procedures, flight paths, registration of drones, and pilot certification, are approved with BKSDA and licenced by the Ministry of Transport/ DG of Civil Aviation. GIS analyses of satellite imagery is used to monitor encroachment and determine annual changes in land cover categories (Figure 3). This requires surveys by drones to ground truth the categorisations. The analyses are complicated by seasonal flooding and some overflow of rivers due to tidal back flow.

When the reserve was established, the eastern side had a C-shaped ‘mouth’ that surrounded 8,000 ha of secondary peatland swamp forest comprising prime orangutan habitat. In contrast, large areas on the western side were heavily degraded, becoming shrublands. To help ensure there was sufficient remaining habitat to support a viable orangutan population, the Foundation together with Yayasan provided technical justifications to BKSDA and the District Government for this area to become incorporated as an extension of the reserve. This was formally approved by the inter-agency spatial planning committee and the Ministry of Forestry, resulting in a 15% increase in the size of the reserve, with a 29% increase in peat swamp forest habitat under conservation. The Foundation then supported the Forest Inventory Agency (BPK) to delineate the boundaries of the extension in the field. The reserve now covers 61,425 ha with 35,054 ha of secondary forest (Figure 3).

In addition to supporting BKSDA protecting the Lamandau Wildlife Reserve, the Foundation also supports the Tanjung Puting National Park Agency (BTNTP) to protect the central and southern parts of the park through operating two guard posts on the main rivers and carrying out patrol monitoring and biodiversity monitoring together with BTNTP staff. The Foundation has also supported an NGO in North Sumatra to monitor trade in orangutans and help protect the Tapanuli Orangutan from hunting.

Figure 3. Land cover analysis of the Lamandau Wildlife Reserve.



Landscape conservation

Most Bornean orangutans are found outside conservation areas (Wich *et al.*, 2012). Hence, it is a top priority to focus sufficient conservation resources on these areas. In Central Kalimantan, where most Bornean Orangutans are found, about 85-90% of their forest habitats are found outside conservation areas, with most under industrial concessions. Of these areas, the forest categories containing the greatest numbers and populations of orangutans are logging concessions in natural forests categorised as Limited Production Forest (*Hutan Produksi Terbatas* - HPT), whilst smaller numbers and smaller populations are found in both Protection Forest (*Hutan Lindung* - HL) and the natural secondary forests of Production Forests (*Hutan Produksi* - HP) and some Convertible Production Forests (*Hutan Produksi yang boleh dikonversi* - HPK). Much smaller numbers and smaller populations are found in the remaining forest patches within Industrial Plantation Forest (*Hutan Tanaman Industri* - HTI, a subset of HP) and oil-palm concessions. The forests in oil-palm concessions are outside state forest lands. The other state forest categories (HPT, HL, HP [incl. HTI] and HPK) are all managed by Forest Management Units (*Kesatuan Pengelolaan Hutan* - KPH/FMU), which covered 8,510,524 ha when initially designated under the 2012 decree from the Minister of Forestry. With respect to conservation activities in logging concessions, this is now the responsibility of the concessionaires (under Law No 11, 2020) and BKSDA.

Working in collaboration with BKSDA Kalteng and Yayorin, ongoing participative collaboration has been secured with twelve industrial concessionaires operating thirteen concessions in forests that cover over one million hectares of prime orangutan habitat, together with the supervisory FMU agencies for the five districts of western Central Kalimantan. This was the result of several multi-stakeholder workshops over several years and has led to an ongoing programme to survey and monitor orangutan population trends and support the management of orangutan populations at the concession level, especially through the preparation of orangutan population management plans for each concessionaire and FMU area, and supporting concessionaires to implement best management practices (BMPs) for orangutan populations. These population surveys are crucial to determine the population health of each orangutan population on a site-by-site, concession-by-concession basis. Since orangutans only produce one infant about every eight years, it is critical to determine which populations are decreasing and consequently require urgent attention to identify and overcome the threats to their survival.

In the programme area, the northern limited logging concessions directly adjoin a long strip of Protection Forest (HL) along the provincial boundary between Central and West Kalimantan, forming a large, connected expanse of forest. Research by Yayorin (Sapari *et al.*, 2019) found the HL to be an essential refuge for orangutans to migrate into, to avoid disturbance during logging operations, from which they returned after the disturbance ceased (i.e., the operations moved to another block).

Outside of FMU areas, there are much smaller fragmented orangutan populations in smaller forest landscapes comprising forests within oil-palm concessions, some of which adjoin forests in HPK and/or Other Use Areas (*Areal Penggunaan Lain*, APL). Collaboration with oil-palm concessionaires has involved initiating orangutan surveys in the forest blocks remaining within and around their concession areas, as well as training to mitigate human orangutan conflicts, based on the standard best management practices for mitigating human-orangutan conflicts in and around oil-palm concessions (Yuwono *et al.*, 2007). Collaboration with government stakeholders and all the above industrial logging and plantation concessionaires has also involved annual capacity building workshops for biodiversity conservation, including training in biodiversity survey techniques.

The Foundation is supporting BKSDA Kalteng and district governments in promoting the designation of certain high biodiversity areas outside conservation areas to become Essential Ecosystem Areas (*Kawasan Ekosistem Esensial*), including 21,260 ha of buffer

zone peatswamp forests on the eastern side of the Lamandau Wildlife Reserve, which would allow an integrated multi-stakeholder management of these areas to strengthen biodiversity conservation. This involves providing technical justifications, joint field surveys, GIS analyses, and supporting stakeholder meetings and public consultations. Whilst a local community group authorised by the MoEF to conserve the forest and biodiversity around an oxbow lake at Lake Masoraian, was supported through capacity building involving training for ecotourism guides and producing brochures.

A survey of the orangutan population within the Lamandau Wildlife Reserve and adjoining eastern buffer zone forests in 2016 in collaboration with BNF and Yayasan found a mean density of 0.97-1.45 orangutans per sq. km, with an estimated population size of 630 individuals (range 502-724; Utami-Atmoko *et al.*, 2017). Whilst the IUCN SSC Conservation Breeding Specialist Group’s analysis of relative viability of this population predicted it had good viability and would be stable near carrying capacity (Utami-Atmoko *et al.*, 2017).

Rescue and translocation

The Lamandau Wildlife Reserve was originally established in 1998 by the Indonesian Government as a release site for orangutans on the recommendation of Prof. Dr Biruté M F Galdikas. Due to the extensive logging and encroachment history of the reserve, only about 60% of the original forest was left standing, of which about 57% was heavily degraded, and the remaining 43% lightly degraded (Forest Carbon 2010). As a result, the original orangutan population suffered a major decrease, and the reserve was considered suitable as a release site to help restock the population with rehabilitant orangutans from the Orangutan Care Centre and Quarantine (OCCQ) operated by Orangutan Foundation International (OFI). Two release camps were built by OFI to support the initial releases from 1999. Releases from 2002-2003 onwards were then carried out jointly after the Orangutan Foundation started covering all running costs, whilst the Foundation built three more release camps. The Foundation has also been collaborating with BKSDA in wild-to-wild translocations into the reserve of adult orangutans rescued from human-orangutan conflict locations, after being passed as suitable for release by the Foundation’s veterinary doctor. Between 1999 to mid-2022, 281 orangutans have been released into the reserve, comprising 148 rehabilitants from OCCQ from 1999-2008, 112 wild-to-wild translocations from 2003 to mid-2022, and 21 orphaned infants that have graduated from the soft-release process (Table 1).

Table 1. Orangutans released into Lamandau Wildlife Reserve 1999-2022.

Translocation source	Female	Male	Total
Rehabilitants ex OCCQ*	74	74	148
Wild-to-wild translocations	59	53	112
Soft released (orphaned infants)	14	7	21
Total	147	134	281

* Orangutan Care Center and Quarantine, operated by Orangutan Foundation International

The Orangutan Foundation has been monitoring the presence and health of released orangutans in the forest around each of the five post-release monitoring camps daily since 2002 (Figure 2), as well as providing supplementary food. Most of these orangutans are mother-offspring pairs, with about 60 individuals recorded each month (many daily, some only ‘present’ for a few days per month). During this period, 94 new infants have been recorded, of which three were of wild origin and 85 were born by mothers that had been released into the reserve – second generation infants. In recent years, the number of third generation births has started to increase. There have been six births of infants whose grandmothers had been released in the reserve, all since 2018 (Table 2). There were also nine second generation births since 2018. Through the combined effort of the patrol teams protecting the forest and preventing hunting, and the steady increase in second and third generation births, the orangutan population in the reserve and adjacent buffer zone forest has now become a self-sustaining viable population.

Table 2. Genealogy of third generation orangutan births in Lamandau Wildlife Reserve.

Grandmother	Source	Released	Mother	Born in LWR	Offspring	Sex	Born in LWR
Huber	OCCQ	1999	Hola	2004	Happy	F	2018
Acuy	OCCQ	2006	Amina	2007	Albie	F	2019
Paula	OCCQ	2003	Pauline	2007	Pancaran	M	2020
Lady Di	OCCQ	2006	Labetty	2007	Leon	M	2020
Sawit	OCCQ	2006	Suwita	2009	Samuel	M	2020
Sheila	OCCQ	2004	Sakura	2008	Sunar	M	2022
Betli	native	N/A	Berline	2013	Besti	F	2022

The Foundation operates a soft-release programme in the reserve for orphaned infant orangutans – most of whom had been confiscated by BKSDA from villagers who had been keeping them as pets, normally after their mothers had been killed. Most orphans are about 2 ½ to 4 years old (average 3.2) when confiscated and brought to the programme. Each infant needs to be taken out every day into a patch of small trees around a release camp where they can develop their tree-climbing skills and eventually learn how to build nests. Once proficient in climbing, they will be taken to taller trees deeper in the forest to learn to forage more widely and build their knowledge of edible foods. The soft-release process usually takes each orphan about three to four years before they have developed the full range of skills they need to survive in the forest and can then – after a final veterinary health check – be fully released. By mid-2022, 21 orphaned infants have graduated from this soft-release programme (Table 3), with another eight currently in process. In addition to dealing with the welfare aspect of returning these orphans to the wild, this programme provides a major source of interest that is used in promotional work to generate support for orangutan conservation.

Table 3. Number of years orphan orangutans in soft-release process before final release in Lamandau Wildlife Reserve.

Name	Sex	Date entered soft release	Age (yr)	Location	Date released	Age (yr)	Time in soft release (years)
Kotim	F	31.10.2014	3	Camp Rasak	09.04.2016	4.4	1.4
Torup	F	27.08.2014	4	Camp Rasak	09.04.2016	5.6	1.6
Okto	M	16.10.2014	3	Cmp. Buluh/JL	08.09.2021	9.9	6.9
Ketty	F	03.2015	1.8	Cmp. Rasak/JL	22.05.2017	4.0	2.2
Jesika	F	16.03.2016	3	Camp Buluh	22.05.2017	4.2	1.2
Sugih	F	29.03.2016	5	Camp Buluh	02.09.2016	5.4	0.4
Herni	F	22.06.2016	3	Camp Siswoyo	26.08.2016	3.2	0.2
Syifa	F	16.09.2016	2.5	Camp Rasak	19.06.2019	5.3	2.8
Bumi	M	20.06.2017	3.5	Camp Rasak	19.09.2021	7.7	4.2
Pegi	F	21.08.2019	8	Camp Rasak	26.08.2021	10	2.0
Satria	M	23.08.2017	2.5	Camp Rasak	(est. 2022)	> 7.5	> 5.0
Nyunyu	F	04.03.2017	3.5	Camp JL	(est. 2022)	> 8.5	> 5.0

During 2005-2015, most rescued orangutans were from forests adjacent to or inside oil-palm concessions. Since then, most are from community lands, whilst total numbers have decreased. The small number of orangutans known to have been shot or killed has also greatly reduced, and local farmers are more likely to contact BKSDA when they encounter orangutans in their croplands. This reduction has occurred mainly as a result of many years of awareness- raising visits with villages in high-risk areas. Not all rescued orangutans can be released. Some are too badly injured or traumatised to be able to survive in the forest. After Aan was rescued from an oil-palm plantation by the Foundation and BKSDA in 2012,

X-rays revealed 104 air pellets lodged in her face and body. She was blind after being shot in the eyes. With donor support, the Foundation has been looking after her daily needs ever since. The foundation also supports BKSDA in the rescue and release into the reserve, through a wide variety of other protected species of birds, reptiles, primates, and other terrestrial mammals. These are usually confiscated from captive or trade settings by BKSDA during enforcement operations. These confiscations are crucial to reinforce the message for the conservation of protected wildlife species.

Habitat restoration / reforestation

A significant number of orangutans in Borneo are found in small-to-medium sized isolated populations (Sherman *et al.*, 2020). Some of these are in degraded habitats in state forest lands. For the long-term survival of these populations, the long process of restoring these degraded areas needs to be initiated now, to increase the carrying capacity of habitat available. Restoring orangutan habitats also benefits hundreds of other species of fauna and flora.

In collaboration with BKSDA, the Orangutan Foundation has initiated a long-term forest restoration programme to restore degraded areas of the Lamandau Wildlife Reserve. Before the reserve was established as a conservation area, during the hiatus after two logging companies had ceased commercial operations, the western side had been subjected to rampant illegal logging and forest fires. Four temporary nurseries have been established near the reserve boundaries close to existing guard posts: on the western side at Danau Burung and at Vigilant Howe; on the south-western side at Sungai Pasir; and on the northern side at Perapat. More recently, activities at Perapat have changed from reforestation to assisting natural regeneration. Since the 2015 *El Niño* forest fires, the total number of wild seedlings that have been planted out in these areas from 2015-2021 was 137,858 in 103.30 ha, with a further 138,000 planned for 2022-2024.

The seedlings are maintained in nurseries for about 6 months until they are strong enough to survive after planting out at the start of the rainy season, usually in October/November. The seedlings collected for planting are mainly pioneer species (Table 4). All are known to be orangutan food tree species. The most critical factor for seedling survival after planting out, especially in shrubland areas with land conditions prone to competition, was found to be post-planting maintenance. This is labour intensive and is being undertaken in four maintenance treatments over a two-year period from planting out. The first at about three or four months after planting, then at intervals of about five, seven and ten months, fitting in around planting schedules for subsequent years. Plant maintenance activities included hoeing (turning the soil), weeding, and applying fertiliser.

Table 4. Number and main species of wild-collected tree seedlings planted at four sites to restore degraded areas of Lamandau Wildlife Reserve.

(a) Total seedlings planted

Year planted	Perapat	Danau Burung	Sungai Pasir	Vigilant Howe	Total Seedlings	Total Ha
2015	500	500	-	-	1,000	1.60
2016	5,872	6,000	5,000	-	16,872	7.00
2017	7,529	6,542	7,250	-	21,321	17.00
2018	6,911	6,454	6,500	-	19,865	9.30
2019	5,500	5,500	5,500	-	16,500	15.10
2020	11,500	11,500	11,500	2,000	36,500	28.00
2021	4,200	7,200	7,200	7,200	25,800	25.30
Total Seedlings	42,012	43,696	42,950	9,200	137,858	-
Total Area (ha)	33.90	30.20	31.20	8.00	-	103.30

(b) Main species planted

No	Family	Scientific name	Local name
1	Myrtaceae	<i>Syzygium muelleri</i>	Ubar Samak
2	Myrtaceae	<i>Syzygium laxiflorum</i>	Ubar Putih
3	Myrtaceae	<i>Syzygium pycnanthum</i>	Ubar Jambu
4	Myrtaceae	<i>Syzygium zeylanicum</i>	Kernasian
5	Myrtaceae	<i>Tristaniaopsis whiteana</i>	Pelawan
6	Myrtaceae	<i>Melaleuca leucadendra</i>	Galam
7	Dipterocarpaceae	<i>Shorea balangeran</i>	Balangeran
8	Anisophyllaceae	<i>Combretocarpus rotundatus</i>	Perapat
9	Lauraceae	<i>Litsea sp</i>	Medang
10	Calophyllaceae	<i>Calophyllum inophyllum</i>	Bentangor
11	Moraceae	<i>Ficus benjamina</i>	Beringin

Research

The Foundation operates an international tropical forest research station at Pondok Ambung in the northern sector of Tanjung Puting National Park. This has been used as a base for Indonesian and international researchers to carry out biodiversity fieldwork. Field research grants have been provided to Indonesian students each year since 2015 to conduct fieldwork in tropical ecology. So far, 26 Indonesian students have conducted their bachelor's fieldwork at Tanjung Puting NP or Lamandau Wildlife Reserve under this programme; whilst two Indonesian students' orangutan research has been supported for their MSc and PhD. In addition, four grants were provided to international orangutan researchers studying in Sabah, East Kalimantan and Sumatra when funds were donated under the Ook Awards. Logistical support at Pondok Ambung has been provided to a further 25 research students to conduct their fieldwork.

Foundation staff based at Pondok Ambung have carried out monthly night surveys of Western Tarsier (*Cephalopachus bancanus*) and False Gharial (*Tomistoma schlegelii*), and daytime surveys of Proboscis Monkeys (*Nasalis larvatus*). The associated camera-trap programme has recorded more than thirty rare species. Staff also conduct a survey of the phenology of 53 tree species every month, and measure growth development of thirty trees in two vegetation plots every six months. The Foundation also operates the Tanjung Harapan Information Centre in collaboration with BTNTP for national and international visitors to Tanjung Puting National Park. The Centre was renovated and a new display on the history and wildlife of the park completed in 2016, updated with information and pictures from the research programme. The park is renowned for the pioneering orangutan research carried out by Biruté Galdikas (Galdikas 1995).

Research by Yayorin in the Upper Belantikan area of Lamandau District, supported by the Foundation, led to the discovery of the largest orangutan population outside conservation areas (Simorangkir, 2003), a wild population of Banteng (*Bos javanica lowi*; Sapari *et al.*, 2019, Dewi *et al.*, 2020), and a population of the lungless Bornean Flat-headed Frog (*Barbourula kalimantanensis*; Santosa *et al.*, 2015).

Education and awareness

Each year, local awareness raising events are supported, which cover specific subjects or high-risk locations, especially for fire prevention and mitigating human-orangutan conflicts, as well as national campaigns falling in the nature calendar (including Earth Day, Primate Day, Orangutan Day, National Wildlife Day, National Tree Planting Day).

Community involvement

Local communities are involved in all the Foundation's programmes where possible. For example, collecting, maintaining, and planting seedlings; as staff to operate guard posts and release camps; and community development activities. Orangutan NGOs can normally only support community development initiatives for communities surrounding orangutan populations from grants for projects that specifically integrate conservation and development. For the Lamandau Wildlife Reserve, this task has previously been carried out with grants from the EU and The Waterloo Foundation, and in other areas through UNEP.

Planning and coordination with stakeholders

Planning and implementation of these long-term programmes require proper coordination with related government agencies and other stakeholders, including NGOs, industrial sector concession holders and community representatives. Each programme's activities are discussed and planned together with the local conservation agencies (BKSDA and BTNTP) and other partners, to ensure they provide the maximum benefit and are in accordance with the regulations, Indonesian government priorities, and take into account recommendations from the previous period's evaluation. Each three-year programme plan is incorporated as an annex to the MoU signed with the Directorate General for Conservation of Natural Resources and Ecosystems, MoEF, which becomes the legal basis for implementing the corresponding annual work plans. Multi-stakeholder workshops have been held annually for the landscape programme to present progress and gain stakeholder participation and feedback for future activities; whilst six MS workshops were held during the process of preparing and socialising the Long-term Management Plan for the Lamandau Wildlife Reserve, which involved a multi-stakeholder working group.

DISCUSSION

This overview of the Orangutan Foundation's conservation programmes in Central Kalimantan provides an insight into the ground-level actions needed to support orangutan conservation efforts, together with the importance of the planning and implementation being done in collaboration with related government agencies and other stakeholders. These ongoing long-term programmes are integrated in a holistic approach to the conservation needs, covering: habitat and species protection, population monitoring, landscape conservation, habitat restoration, rescues and translocation, research, education and awareness, community development, and coordination with government agencies and other stakeholders. It is important to recognise the limitations of these actions in comparison with much wider structural issues that are beyond the capacity of conservation NGOs, which instead require both government and large bilateral and multi-lateral programmes to address. With the omnibus Job Creation Law of 2020, forest and biodiversity conservation has been mainstreamed into all aspects of forestry and environmental protection, whilst simultaneously prioritising work opportunities for local communities. This has provided a stronger legal basis to support the Indonesian government's efforts to reduce deforestation, which had already seen a continual reduction since 2016, and will provide a major boost to orangutan habitat protection efforts.

The Indonesian government's expectation of the role of NGOs in Indonesian conservation is 'to fill the gaps' that the government is not already able to cover and to understand that, since the government is responsible for all conservation areas and all biodiversity conservation, the NGOs' role is to support the government's conservation efforts in accordance with its current conservation priorities. All international conservation NGOs and their activities must be approved by an inter-ministerial team under the Ministry of Environment and Forestry through a regulated process to obtain an operating licence. Programme design is therefore a necessary compromise between the conservation priorities of the government and the activity types that NGOs propose and for which they can raise funds.

Figure 4. Mother-infant Bornean Orangutans Sakura and Sunar in the Lamandau Wildlife Reserve. Sunar is a 3rd generation birth, born in 2022. His mother Sakura was wild and born in 2008, while her grandmother Sheila was released into the reserve in 2004.



There is a direct correlation between the funds available and both the intensity of conservation actions that can be carried out, and the level of conservation achievements that can be made. However, most funding sources can only be allocated in accordance with the restricted conditions of grants that have been awarded. Protecting orangutans and their forest habitats through ground monitoring patrols in collaboration with MoEF Forestry Police has been shown to be effective (Sugardjito and Adhikerana, 2010). Nevertheless, securing sufficient funds for protection is usually challenging.

Many programme elements have synergistic impacts when part of a holistic approach to conservation. For example, the habitat restoration programme includes participation of local communities (providing jobs), generates awareness of the importance of the reserve and its forest to communities and local government agencies during annual National Tree Planting Day activities, and has an important impact on habitat protection and fire prevention through the high visibility of activities conducted in the field near the boundaries. None the less, promotion of stories on the progress of individual orphaned orangutans in the soft-release programme, or released mother-infant pairs, generates far more interest than forest protection, highlighting that they are effective subjects for increasing awareness on the need for habitat and species protection.

The landscape conservation programme has found that the best managed concessions still have viable orangutan populations, demonstrating that orangutans can survive in well-managed concessions; whilst populations are declining sharply in those concessions with significant loss of forest habitat. Although logging concessions are licenced for timber volumes, it is important that concessionaires can start to generate revenues from operating wildlife recreation facilities in their concessions (in blocks not currently under operations), by developing lodges, trail networks, viewing towers, site inventories and cycling facilities, etc. Outside large concessions and conservation areas, many orangutans are increasingly found in small, isolated populations well below minimum viable size, and adjacent to community lands (Sherman *et al.*, 2020). ‘Living with nature’ is therefore a major ongoing challenge for education and awareness programmes, especially due to the strong hunting tradition.

Whilst the short-term future of the Bornean orangutans in conservation areas and large well-managed concessions seems assured, especially with the recent enabling policies, increased allocation of resources from the government, and continued support from NGOs, the effects of land cover and climate change have been projected to cause a major reduction in quality of Bornean orangutan forest habitats in the long-term (a 68-81% reduction in habitat suitability by 2080; Wich *et al.*, 2015). Global climate change is therefore a major challenge for orangutan conservation efforts. How that is tackled in the short-term will have a major influence on the survival of much of Borneo's biodiversity.

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