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A photograph of two orangutans in a lush green forest. One orangutan is perched on a thick tree trunk, looking towards the camera. Another orangutan is climbing a branch above it. The background is filled with dense foliage and sunlight filtering through the leaves.

EXPERIENCES IN FOREST LANDSCAPE RESTORATION (FLR)

Lessons Learnt from 12 Years Restoring the Orangutan's Habitat: the Bukit Piton Forest Reserve in the Malaysian State of Sabah

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WWF is one of the world's largest and most experienced independent conservation organizations, with over 5 million supporters and a global Network active in more than 100 countries.

WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by: conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

PREFACE



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We are lucky enough to call Borneo home: a unique island with an amazing array of species: from butterflies as large as your fist to exquisitely colourful birds. Weird and wonderful creatures found only here include the endangered proboscis monkey (*Nasalis larvatus*), the endangered Borneo Bay cat (*Catopuma badia*) and the critically endangered painted terrapin (*Batagur borneoensis*). One of our closest relatives is also present here: the critically endangered orangutan (*Pongo pygmaeus*), or ‘person of the forest’ in local Malay. Its fate is closely intertwined with that of the forest on which it depends for food, habitat and movement.

In the last forty years, the threats to Borneo’s forests, and particularly to Sabah’s forests, have led to significant changes to the delicate natural balance that has characterised this island for millennia. Forest loss and degradation, including conversion to agricultural plantations, have taken their toll on the forest ecosystems and the unique species they harbour. Without large trees, animals are unable to hide from predators - including humans - and their movements are constrained. Without trees, they have nowhere to nest or feed. Without trees, wildlife populations become isolated and risk inbreeding.

**THIS EFFORT
TO RESTORE
ORANGUTAN'S HABITAT
NEEDS TO BE SCALED
UP AS WE LEARN AND
SHARE LESSONS.**

At WWF we have been seeking to demonstrate that restoration is an effective tool to return trees to the landscape for the purposes of recreating forest habitat and connectivity for populations of the critically endangered orangutan and associated species. This work has shown that while protection is our primary tool, sustainable forest management can maintain orangutan numbers and restoration can help to recover areas for the species to move, hide, feed and reproduce. Although the focus is on the orangutan, there is a cascading effect on all other species that share their home with the ‘person of the forest’.

We have come a long way in the 12 years since we started on the Forest Landscape Restoration (FLR) work. Within this period, over 2,000 hectares have been restored, and the return of the orangutans to the newly restored forest is a significant reward for our hard labour. However, as always, much more needs to be done. This work needs to be scaled up and improved as we learn from our mistakes and share these lessons with others. Through this new report in the ‘Experiences in Forest Landscape Restoration’ series, we hope to bring our experience to the world stage and contribute to the sharing of knowledge, experiences and lessons which are critical to truly scaling up FLR around the globe.

The successful outcome of this project would not have been possible without the leadership and guidance provided by our Strategic Operations Director, Ms Maria Christina Fung, who took on the role to lead the reforestation team midway through the project. We extend our heartfelt appreciation to Maria for her contributions and wish her all the very best in her retirement life. We have no doubt that Maria will always remember the beauty of Bukit Piton Forest with pride and the inspiration it provides to us all.

Sophia Lim
CEO WWF-Malaysia

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EXECUTIVE SUMMARY

Lessons Learnt from 12 Years Restoring the Orangutan's Habitat: the Bukit Piton Forest Reserve in the Malaysian State of Sabah



Situated in the Malaysian State of Sabah on the island of Borneo, the Ulu Segama-Malua (USM) landscape stretches approximately over a 240,000 ha area close to the Danum Valley Conservation Area and the Deramakot forest reserve. This lowland rainforest sustains one of the largest orangutan populations in Sabah with about 3,400 individuals. To the north of the landscape there lies a 12,000 ha area known as Bukit Piton Forest Reserve which has been prioritised as an area of high conservation value because of its importance as habitat for the orangutan population. Because of its degraded state and its isolation from the larger USM landscape, Bukit Piton was identified as needing restoration and since 2007, WWF, together with the Sabah Foundation, Sime Darby Foundation and Sabah Forestry Department, has been carrying out forest restoration here.

Three broad phases can be identified for WWF's restoration work in USM: 1. a two-year pilot phase beginning in 2007; 2. an implementation phase from 2008, and 3. a consolidation phase starting in 2011. Many different donors funded the restoration effort led by WWF, including private donors and companies via different WWF offices.

The objective driving the restoration work has been the immediate needs of the critically endangered Bornean orangutan, both in terms of the areas to be restored and the tree species to plant. The aim of WWF's FLR programme has been to re-establish the structure, productivity and species diversity of the forest. The main activities implemented include active restoration, maintenance and monitoring of both the restoration work and surveys of orangutans in the project area.

As of 2013, orangutans were seen using restored areas which was a positive sign as to the effectiveness of the restoration. By 2019, a total of 2,218 ha had been planted with approximately 346,000 trees. Survival rates after two years were high (close to 90%). However, after seven years they had dropped to between 10% (in open areas) and 38% (in shaded areas) due to a lack of maintenance (for example, removing creepers and replanting saplings that had been eaten by wildlife). This result highlights the importance of long-term maintenance and post-planting management.

In 2011, the Sabah Forestry Department (SFD) embarked on certification of the USM under the Forest Stewardship Council (FSC) standards even though it was already a protected area. The certification is not for timber extraction but rather to ensure that USM complies with a high standard of forest management. The FSC process has supported the allocation of adequate resources for managing this vast area, capacity building and stakeholder engagement. Through the FSC process, high conservation value areas were identified and enhanced. This process contributes to the continuous restoration effort, as has been the case in Bukit Piton.

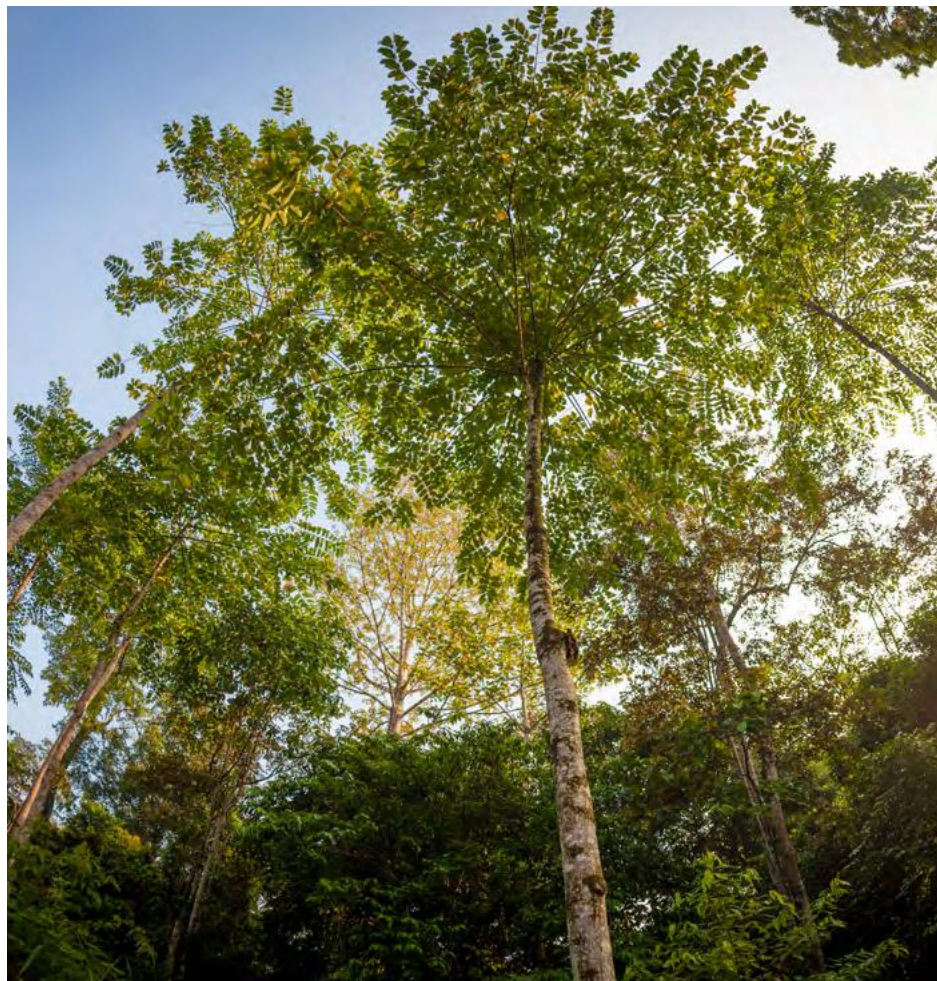
**FUNDING HAS
COME FROM
PRIVATE COMPANIES
AND FACILITATED VIA
WWF OFFICES.**

Restoration was divided into three zones within Bukit Piton and was led by three different agencies, namely Yayasan Sabah (Sabah Foundation), Sime Darby as well as WWF-Malaysia in collaboration with the Sabah Forestry Department (SFD). Activities have been designed according to a restoration protocol established by WWF-Malaysia in collaboration with the SFD.

Sabah's 2018 forest policy supports WWF's FLR work by aiming to improve connectivity, to restore degraded forest while promoting the participation of local communities and civil society in forest management.

Communications efforts have focused on the orangutan with restoration being a means to increase and improve habitat for this endangered species.

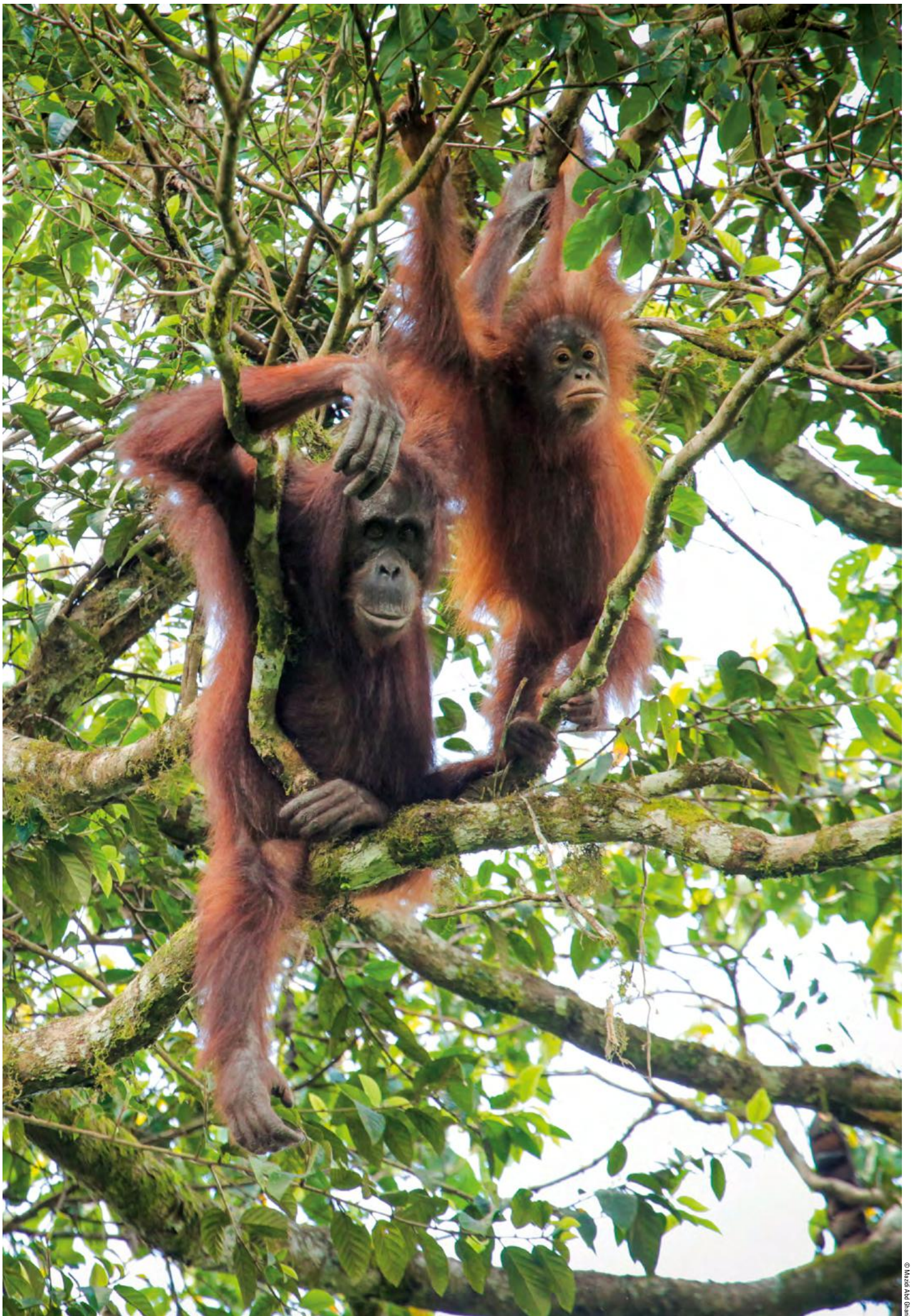
Funding for restoration has all been external - largely by private companies and facilitated via different WWF offices. Approximate total funds for the overall programme over the 12-year period amounted to over EUR 5 million. The net planting costs (excluding operational costs) amounted to EUR 980 per ha. Operational costs (staff, travel, office costs) raised this figure to EUR 1,450/ha. The management of Bukit Piton will revert to the SFD once the restoration work is completed as per the agreement between WWF-Malaysia and the SFD.



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Key lessons learnt over the course of this project are:

- 1 Pressures surrounding the landscape need to be monitored closely** - While the focus for restoration may be the landscape, proximate pressures - notably from agriculture - can shift priorities and require a change in interventions within the landscape.
- 2 Protection and restoration complement each other and can produce quick results for endangered species** - Reducing threats by protecting land and improving habitat quality can provide a viable habitat for endangered species.
- 3 Restoring habitat for a specific species can help to focus the interventions** - Rather than exclusively restoring forest cover, focusing on the habitat and food of an endangered species helps to define the selection of tree species to use in restoration.
- 4 Unexpected challenges raise the cost of restoration and increase timeframes** - While a schedule may be in place (including the months in which to carry out planting) unexpected circumstances (such as extreme weather events due to climate change) may cause delays which may lead to missed windows of opportunity.
- 5 Choosing both fast and slow growing tree species can be an effective means of reaching different objectives** - The combination of pioneer species and slower growing species contributes to the creation of a diverse and functional forest as well as filling different ecological niches.
- 6 Laws of supply and demand affect seedling availability for some native species** - A large-scale restoration initiative may lead to significant demand for seeds and seedlings, with a subsequent impact on cost and supply.
- 7 Maintenance after planting is crucial** - A significant challenge with active restoration is to ensure long-term maintenance and management of the newly planted trees.
- 8 Restoration contributes to the enhancement of high conservation values** - Restoration complements the effort to comply with FSC certification.
- 9 Payments by companies can support long term restoration** - These payments for ecosystem services may not be termed as such, but ultimately represent funding for the service of restoring a corridor or habitat.



INTRODUCTION

Borneo - the world's third largest island - is shared by Indonesia, Brunei and Malaysia. Seven ecoregions make up the island (WWF website). Lush forests - from lowland tropical rainforest to mangrove, montane forest and peat swamps - once covered most of the island, harbouring numerous species of birds, mammals and other fauna, making Borneo one of the world's biodiversity hotspots.

Today, what remains of the Borneo lowland rainforest ecoregion is under severe pressure. Industrial forest exploitation followed by the oil palm boom have significantly transformed large swathes of the island. Fragmentation and subsequent loss of large-scale continuous areas of unspoilt habitat threaten the island's diverse and unique fauna.

Borneo is home to the critically endangered Bornean orangutan (*Pongo pygmaeus*), whose population has been estimated to have dropped from about 288,500 individuals in 1973 to 104,700 individuals in 2012 and is expected to further decline to 47,000 individuals by 2025 (IUCN Redlist of Species). It is also here that the world's smallest squirrel can be found, the least pygmy squirrel (*Exilisciurus exilis*), as well as more than 380 birds and an estimated 10,000 plant species (WWF website). Borneo is also home to the endangered Bornean Elephant (*Elephas maximus borneensis*) and the vulnerable Sunda Clouded Leopard (*Neofelis diardi*).

The Malaysian State of Sabah

The Malaysian state of Sabah is situated in the north of Borneo. Remaining forests in the state have been estimated to cover 3.7 million ha (Asner *et al.*, 2018). However, they continue to face threats, with the main one being conversion to plantation development (Gaveau *et al.*, 2014). Sabah's rate of deforestation was estimated at 39.5% between 1973 and 2010, leaving an estimated 19.1% of intact forest (Gaveau *et al.*, 2014). Other estimates suggest that remaining natural forests cover about 59% of Sabah, although most of it is heavily logged (Asner *et al.*, 2018).

To face this dramatic loss of natural capital, the government of Sabah has committed to increase protected forests to 30% of the state by 2025 (Asner *et al.*, 2018). Overall, the state of Sabah's protected areas are governed by three different enactments: 1) State Parks (under the Sabah Parks Enactment 1984), administered by Sabah Parks; 2) Forest Reserves (Class I Protection Forest, Class VI Virgin Jungle Reserve and Class VII Wildlife Reserve; under the Forestry Enactment 1968), administered by the Sabah Forestry Department, and 3) Wildlife Conservation Areas and Wildlife Sanctuaries (under the Wildlife Conservation Enactment 1997), administered by the Sabah Wildlife Department. To date six state parks have been gazetted, three of which are terrestrial: Kinabalu (75,370 ha), Crocker Range (139,919 ha) and Tawau Hills (27,927 ha) (Sabah Parks website). A World Heritage site, the Kinabalu Park alone contains an estimated 5,000-6,000 vascular plant species including representatives from more than half the families of all flowering plants (WHC website).

Forest restoration: a new stake for Sabah

Deforested, fragmented and over-logged, many parts of Sabah's forest landscapes may be considered degraded. Forest restoration is thus a priority in Sabah (as well as across the island).

**SABAH HAS
COMMITTED TO
INCREASE PROTECTED
FORESTS TO 30% OF
THE STATE BY 2025.**

Early in the 2000s the WWF Network began to engage in different restoration projects in Sabah, including some initial work along the Kinabatangan river with local communities as well as attempting to test different restoration measures with oil palm companies under the forest landscape restoration (FLR) programme (Mansourian and Vallauri, 2014). Since 2007, WWF has focused on a major area of forest in the centre of Borneo: the Heart of Borneo and a more rigorous approach was taken through systematic conservation planning as of 2013 which led to prioritising areas for protection, sustainable forest management and restoration.

As of the mid-2000s, restoration objectives for WWF have focused on recovering the habitat of critically endangered species such as the Bornean orangutan. The emphasis on the orangutan has determined the selection of the priority landscape for restoration as well as the methods and the choice of species for effective restoration. Wild orangutans are highly dependent on the forest for their survival as they spend more than 95% of their time in the trees to find food, nest and roam. The removal of forest adds further pressure on these critically endangered great apes.

This report reviews main achievements, activities, results and draws the lessons learnt from 12 years of work on forest landscape restoration in the Bukit Piton Forest Reserve in the Malaysian State of Sabah in Borneo.

Remaining forests surrounded by oil palm plantations



FLR in WWF's Global Forest Programme

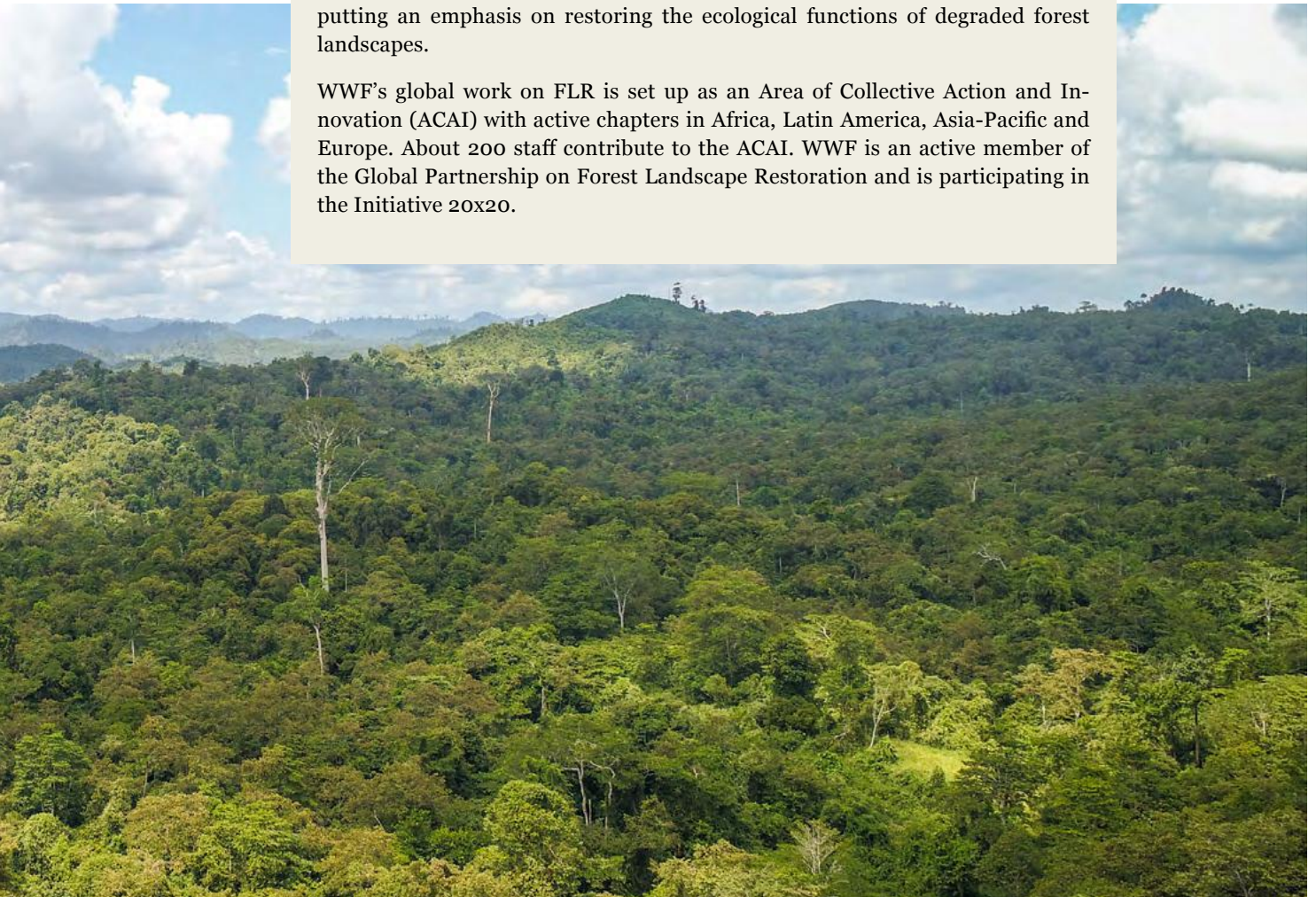
Forest landscape restoration was defined “*a planned process that aims to regain ecological integrity and enhance human wellbeing in deforested or degraded landscapes*” (WWF and IUCN, 2000).

WWF's 'Forests for Life' programme during the period 2001-2006 centred around three global targets: protected areas, sustainable forest management and FLR. The FLR target was “to undertake at least twenty FLR initiatives in the world's threatened, deforested or degraded forest regions to enhance ecological integrity and human well-being by 2005”. WWF contributed specific steps along the way to this global target, including leading the implementation of 10 long-term FLR initiatives.

Outside the WWF network, much has been achieved at an international level to raise the political profile of FLR and to advance technical understanding through implementation in key landscapes (Mansourian and Vallauri, 2014).

Today, WWF's Global Forest Strategy includes as one of its ambitions to contribute to the international effort to restore “350 million hectares of forest landscapes” by 2030 (New York Declaration on Forests and Bonn Challenge on FLR). These global efforts aim to reverse the trend of forest loss and degradation by putting an emphasis on restoring the ecological functions of degraded forest landscapes.

WWF's global work on FLR is set up as an Area of Collective Action and Innovation (ACAI) with active chapters in Africa, Latin America, Asia-Pacific and Europe. About 200 staff contribute to the ACAI. WWF is an active member of the Global Partnership on Forest Landscape Restoration and is participating in the Initiative 20x20.



PRESENTATION OF THE LANDSCAPE

The Ulu Segama-Malua (USM) landscape (approximately 240,000 ha) lies in the district of Lahad Datu in central Sabah. Situated close to the Danum Valley Conservation Area and Deramakot forest reserve, this lowland rainforest sustains one of the largest orangutan populations in Sabah with about 3,400 individuals (Simon *et al.*, 2019). Recognising the importance of this area for orangutan conservation, in 2007, the Sabah State government imposed a 10-year logging ban in USM (Ancrenaz *et al.*,

2010). In 2012, the State government gazetted the 12,000 ha of North Ulu Segama Forest Reserve from Class II-commercial forest to a Class I - Protection Forest and changed its name to Bukit Piton Forest Reserve. By 2013, the whole landscape was protected as a Class I Protection Forest. The USM obtained an FSC certificate in 2011 for being a well-managed forest but with no timber harvesting allowed.

An initial survey of orangutans helped to prioritise five key areas for restoration in the USM landscape. These were: (i) Malua Forest Reserve, (ii) North Ulu Segama (now referred to as Bukit Piton), (iii) Kawang Gibong Forest Reserve, (iv) the southern part of Ulu Sungai Segama and (v) the western part of Ulu Sungai Danum (located west of Danum Valley Conservation Area) (Alfred *et al.*, 2010).

Bukit Piton was identified as one of the high conservation value areas within the wider USM because of its importance for orangutans. However, given the condition of the forest, restoration was prioritised as a management intervention. Within Bukit Piton, WWF-Malaysia selected a 2,400 ha area as a pilot site for forest restoration, while restoration for the rest of Bukit Piton was taken up by the Sabah Forestry Department (SFD) and the Sabah Foundation (Yayasan Sabah).

**WWF-MALAYSIA
SELECTED A 2,400 HA
AREA AS A PILOT SITE
FOR RESTORATION.**

Orangutan nest in the forest canopy



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**HERE, LOWLAND
DIPTEROCARP FOREST,
MUCH OF IT HIGHLY
DEGRADED, REMAINS
A CRITICAL HABITAT
FOR ENDANGERED
ORANGUTANS.**

The vegetation in Bukit Piton consists of mixed lowland dipterocarp forest, much of it highly degraded (Ancrenaz *et al.*, 2010). A total of 1,195 tree species have been recorded comprising 145 species in 43 families, dominated by *Pterosternum elongatum* (Bayor), *Neolamarckia cadamba* (Laran) and *Homalanthus populneus* (Ludai Susu) (Alfred *et al.*, 2010). It is bordered by oil palm plantations to the north and east (Kobayashi *et al.*, 2016). In the south, the Segama River acts as a barrier isolating the orangutan population present in Bukit Piton from the larger population in USM (Kobayashi *et al.*, 2016). Isolated pockets of forest also lead to isolated populations of orangutans and other wildlife, with the associated risk of inbreeding. West of the landscape lies Sabah's largest remaining pristine forest, Danum Valley Conservation Area, gazetted as both a Class I Forest Reserve (1995) and a Cultural Heritage (1999).

Historically, threats to the forest of Bukit Piton have included timber extraction, encroachment and fire. Similarly to other parts of Borneo, forests here were widely logged between the 1980s and 2007. Two major fires in 1983 and 1997-98 further degraded the remaining forest (Kobayashi *et al.*, 2016).

Nevertheless, the landscape remains a critical habitat for orangutans, Sunda clouded leopards, Sumatran rhinos and Bornean elephants (Borneo Project). Despite conservation efforts, the last rhino in Sabah died in November 2019 and is now considered extinct in Sabah.

Interpreting the landscape

The term landscape may not necessarily be defined by its size, as it has ecological, political and socio-cultural dimensions. Thus, a landscape can be defined as “*a socio-ecological system that consists of natural and/or human-modified ecosystems, and which is influenced by distinct ecological, historical, economic and socio-cultural processes and activities*” (Chatterton *et al.*, 2016). A landscape contains heterogeneous characteristics and land-uses but the main drivers influencing its overall functioning contribute to its practical delineation.

In the context of this report, the USM was delimited as a landscape for priority intervention because of its importance for the target species: the orangutan and also because of its strategic position as a linkage with other forested protected areas. Specifically, within the USM, WWF has been focusing on reforestation of a section of the Bukit Piton Forest Reserve (Figures 1 and 2). A 2,400 ha pilot area was identified as a priority for restoration where WWF-Malaysia was carrying out active and passive restoration (Figure 4). Figure 3 illustrates the landscape in a few images.

The landscape

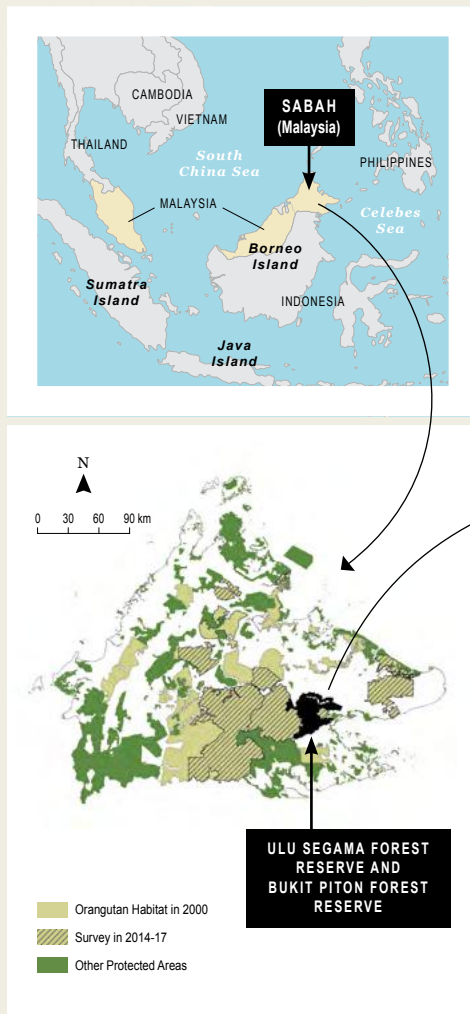


Figure 1. Location of the landscape

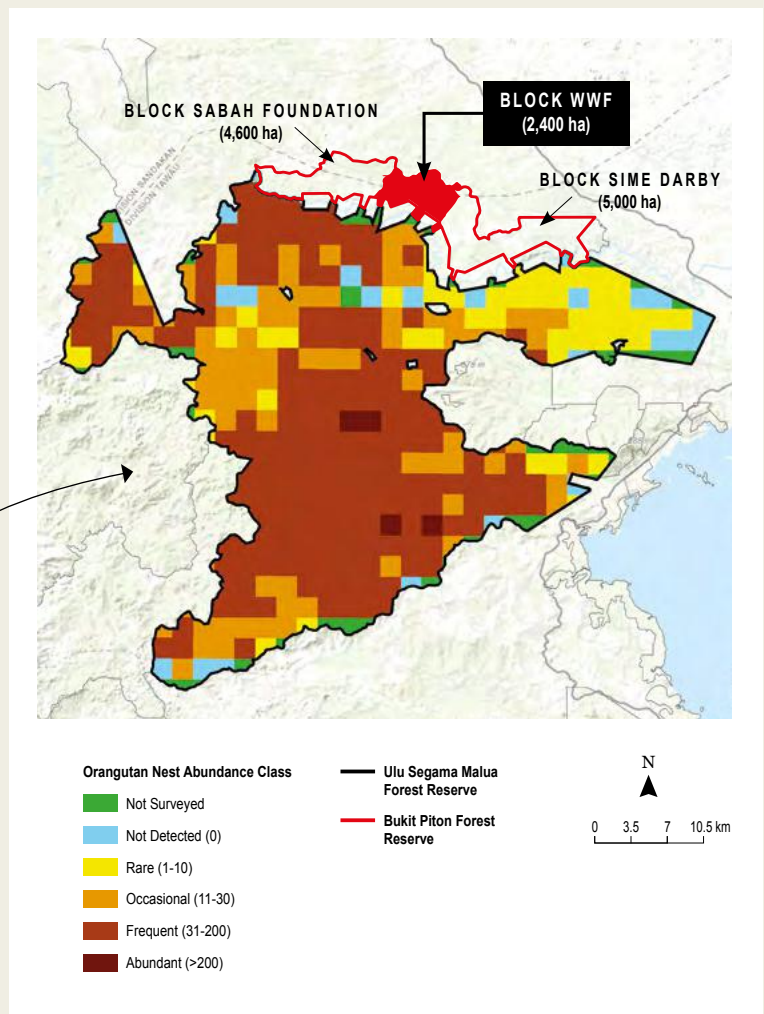


Figure 2. The landscape: Ulu Segama Malua Forest Reserve and Bukit Piton Forest Reserve

↓ Natural



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↓ Highly degraded



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↓ On-going restoration



© Mazzi And Ghani



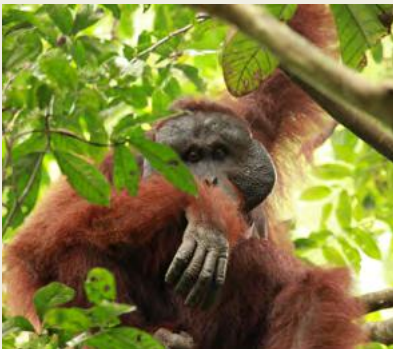
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Figure 3. The landscape in a few images

PROJECT PHASES

The objective driving the restoration work has been the needs of the endangered orangutan. Three broad phases can be identified for WWF's restoration work in USM, starting with a pilot phase in 2007 (Table 1).

The 2,400 ha pilot area in which WWF-Malaysia was carrying out restoration (Figure 4) was subdivided into three compartments (compartments 109, 110 and 111). These compartments were further subdivided into 99 blocks, ranging from 1.5 to 65 ha in size. Over the 12-year period between 2008-2019, these blocks were systematically prioritised and restored under projects funded by different donors.

During the 2007 pilot phase, WWF identified the reference ecosystem and species composition, as well as the orangutan's food and habitat requirements, and then trialled on a small scale (200 ha) the restoration of these species before scaling up (Alfred *et al.*, 2010). Based on the results of this trial, after 2008, a more comprehensive restoration effort was carried out with a focus on prime orangutan habitat. This second phase lasted from 2008-2015 and focused on extensive tree planting in Bukit Piton. The aim was to re-establish the structure, productivity and species diversity. The last phase (which overlaps with the previous one because of funding delays and cycles) emphasised monitoring, consolidation, enrichment planting and the ongoing management of restoration sites.

While the emphasis has been on a 2,400 ha section of the Bukit Piton forest, the effect of the restoration is intended to have a positive impact on the rest of the USM landscape by connecting key patches of forest and thus improving habitat for the orangutan population – and other associated species – as well as providing this critically endangered species with more food sources.

OVER THE 12-YEAR PERIOD BETWEEN 2008-2019, RESTORATION WAS FUNDED BY DIFFERENT COMPANIES AND WWF OFFICES.

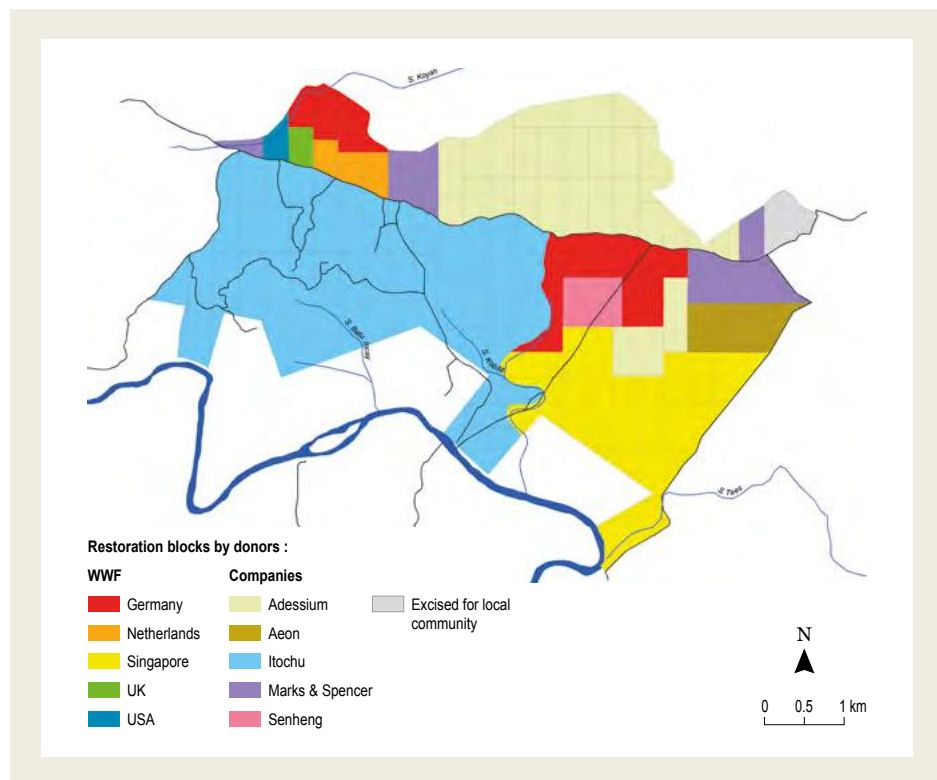


Figure 4. The restoration blocks in part of Bukit Piton Forest Reserve

Table 1. Programme phases

Date	Phases	Objectives	Related events
2007-2008	Phase I: Pilot restoration	About 200 ha were planted as a pilot reforestation project. These pilot areas were funded by seed money from the WWF network (WWF-NL, WWF-UK, WWF-DE and WWF-US).	2007. 10-year moratorium on logging declared for the whole of Sabah
2009-2015	Phase II: Restoration programme set up and beginning of implementation	A comprehensive restoration programme was developed including mapping restoration needs, controlling fire hazard, capacity building to conserve orangutans, planting, monitoring, institutional support and communication. This work was funded by private companies: Adessium (via WWF-NL), Itochu (via WWF-Japan), Marks & Spencer (via WWF UK) as well as WWF-DE.	2011. Bonn Challenge on FLR
2011-2019	Phase III: Finalising restoration plot by plot and consolidating results	Restoration work was completed and maintenance work carried out. Monitoring was carried out to measure restoration results and survey the orangutan population.	2014. New York Declaration on Forests 2018. Sabah new forest policy

IMPLEMENTATION: ACTIVITIES & RESULTS

Activities in the landscape were designed to reach two main objectives: 1) restoring forest cover and quality; and 2) monitoring the population of orangutans. Efforts have concentrated on a limited number of activities over the years: science and knowledge; active and passive restoration; monitoring and evaluation.

Activities

The main activities implemented are related to active restoration as well as monitoring of both the restoration work and the orangutan population in the project area.

The initial activities involved identifying priority areas for restoration, based notably on the presence of the orangutan, restoration needs and the extent of fragmentation.

This was done through an aerial mapping exercise, and confirmed through field assessments to corroborate the presence of orangutans and determine the specific restoration needs. The assessment involved identifying, insofar as possible, the reference forest type, determining the extent of disturbance and assessing orangutan food abundance (WWF, 2015).

Pioneer species were prioritised to speed up restoration and begin to provide cover for other species. Trees used by orangutans for nesting and for food were also prioritised. Enrichment planting was carried out (at a density of about 156 trees per ha) on the most heavily degraded sites while natural regeneration was promoted in other areas. A list of tree species was also established with planting to be divided as follows: 70% dipterocarp, 20% pioneer species and 10% orangutan food/fruit tree species. Fruit trees are not only important for orangutans but also for several other species, including the emblematic hornbill. Furthermore, these species play an important role in disseminating the seeds from the trees, thereby, multiplying the restoration effort. Depending on the site conditions, site preparation was necessary (e.g. removing invasive vines and demarcation of planting points).

In 2007, the first planting took place. Since then, regular planting interventions have taken place in different forest blocks. Contractors were employed to carry out this work which was divided into three stages: i) site preparation and line demarcation (8x8 metre planting points),

ii) planting of tree seedlings, and iii) maintenance work over the following two years (weeding). Open tenders were used to identify contractors to carry out the restoration work in each block. Several different contractors have been used over the years, and all have received the same standard protocol which was developed jointly by WWF and the SFD to carry out the work. While seedlings were bought from different tree nurseries, over time contractors were encouraged to establish their own nurseries to reduce costs and ensure a steady supply.



Monitoring forest cover with the use of drones



Checking on new plants

In 2013, an attempt was made to restore some form of connectivity for the orangutan across the Segama river by installing three rope 'bridges' enabling the population in Bukit Piton forest to travel across the river and inter-mix with the larger population south of the river in the wider landscape. However, camera traps showed that only long tail macaques were seen using the rope bridge to cross the river.

Annual helicopter surveys of orangutan nests were conducted between 2008 and 2017 to map their movement and distribution pattern in Bukit Piton Forest Reserve to assess progress towards the objective.

WWF has worked closely with the government, in particular the SFD, to ensure alignment in their respective activities in the Bukit Piton forest and more generally, to secure long term action for these forests.

Table 2. Some key activities undertaken (non-exhaustive selection)

Type of activity	Key activities
Restoration	<ul style="list-style-type: none"> • Mapping of degradation condition and restoration potential. • Appointment and management of reforestation contractors. • Ground verification/line and planting point demarcation. • Initiation of planting. • Ongoing maintenance and weeding. • Establishment of new tree nurseries.
Species conservation	<ul style="list-style-type: none"> • Convening of Sabah orangutan conservation dialogue in Kota Kinabalu in October 2012 to discuss the issues and challenges for orangutan conservation in the region and identify measures for furthering orangutan conservation. • Helicopter surveys of orangutan nests (annually). • Installation of 26 camera traps (2011-2012) to monitor the presence of orangutans and other wildlife. • Monitoring of orangutan behaviour i.e. use of planted trees, important tree species. • Documenting important orangutan food plants (trees and climbers) to include them in the selection of current and future forest restoration species. • General wildlife surveys through ground transects.
Forest management	<ul style="list-style-type: none"> • Provision of specific inputs to the forest management plans of five forest management units (FMUs) of importance for orangutans to improve in-situ conservation of orangutans in USM. • Preparation of a forest fire management plan. • Compliance with FSC certification of USM.

Results (Table 3)

Planting success

By 2019, a total of 2,218 ha had been planted with approximately 346,000 trees. Survival rates after two years were high (close to 90%), however, due to a lack of long-term maintenance after the two-year period, survival rates dropped significantly (see Figure 5). A census carried out between August and December 2016 showed that after seven years survival rates had dropped to between 10% (in open areas) and 38% (in shaded areas). Different species exhibited different survival rates, and open areas suffered from invasion of creepers (WWF, 2017). This indicates the need for long term management after planting.

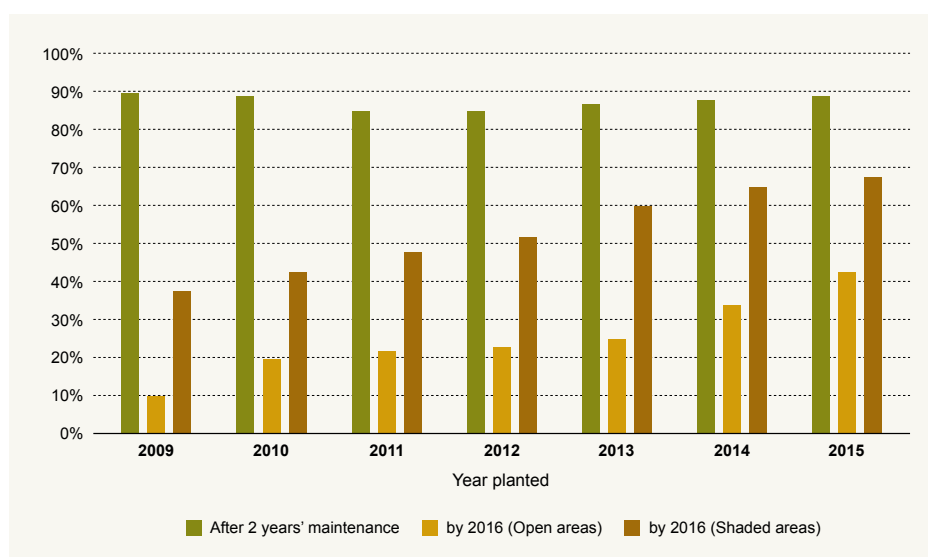
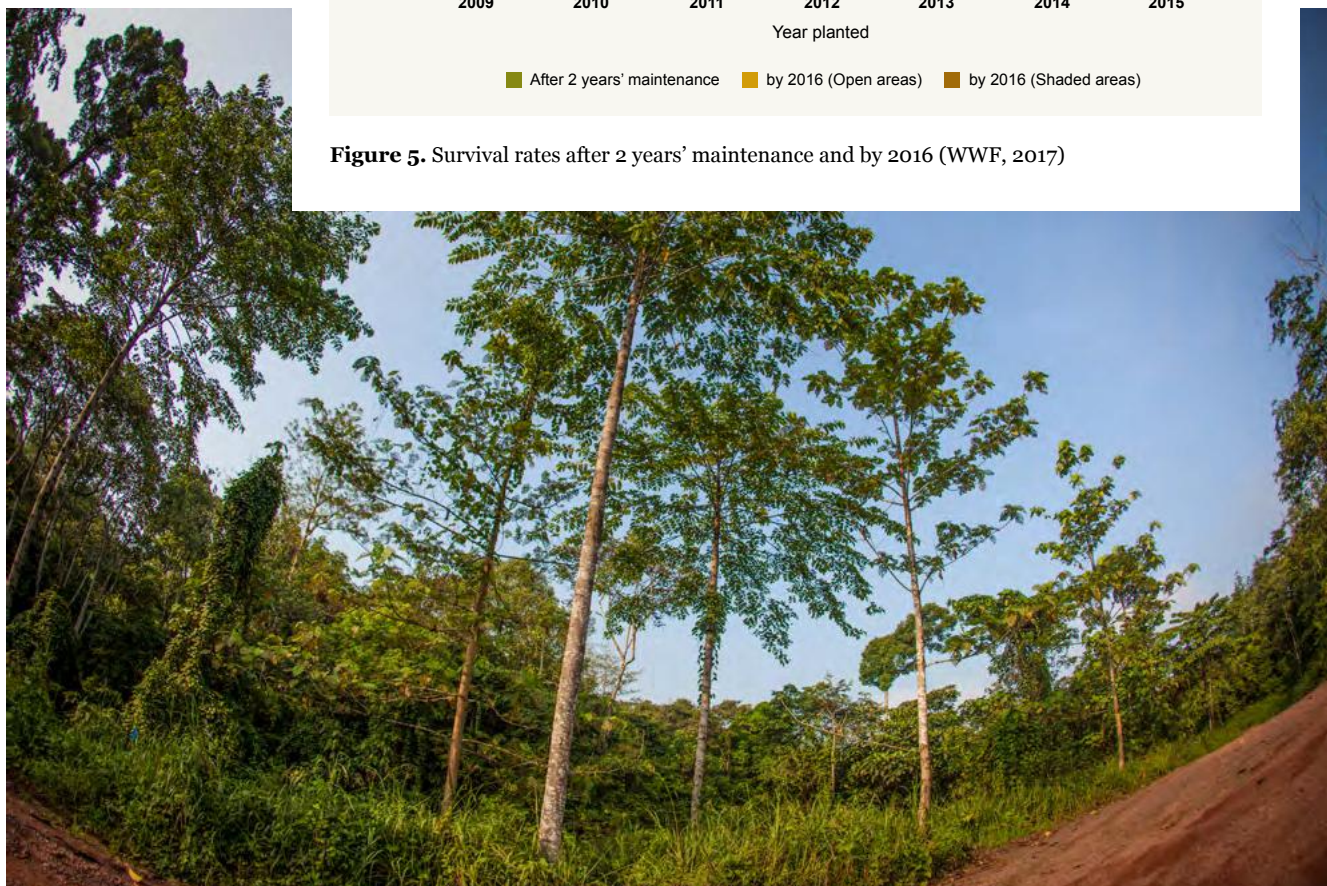


Figure 5. Survival rates after 2 years' maintenance and by 2016 (WWF, 2017)



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**FSC CERTIFICATION
ENSURES ADEQUATE
RESOURCE
ALLOCATION,
CAPACITY BUILDING
AND STAKEHOLDER
ENGAGEMENT.**

Impact on orangutan population

As of 2011, orangutans were seen using restored areas which was a positive sign as to the effectiveness of restoration. However, with low long term survival rates for these trees, the duration of maintenance and post-planting management needs to be addressed as a matter of urgency.

Monitoring of orangutan behaviour and distribution in the landscape has helped to identify 67 species from 61 genera and 36 families of food plants forming part of the orangutan diet in Bukit Piton Forest Reserve (Kobayashi *et al.*, 2016). This finding is important in terms of defining the choice of species to prioritise for restoration purposes.

The Sabah Forestry Department opted to certify USM under the Forest Stewardship Council (FSC) standards in 2011 despite it being a protected area. This signifies that the USM will be expected to comply with a high standard of forest management. FSC certificates were issued for a 5-year period in 2011 and then again in 2016. While there is no timber extraction, this certification ensures that the huge forest complex is managed efficiently with adequate resource allocation, capacity building and stakeholder engagement. Without sufficient investment and stakeholder engagement, protecting the orangutan in a forest reserve of such scale would be extremely challenging. Obtaining and retaining the FSC certification demonstrated the Sabah Forest Department's commitment towards ensuring that the conservation plan for USM is implemented.

Table 3. Major results

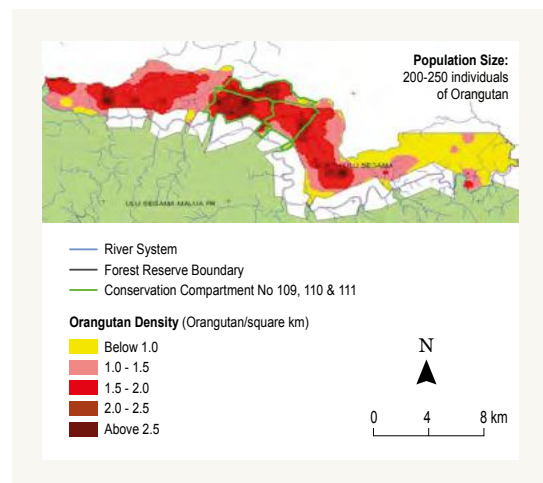
Type	Key performance indicators	Key activities
Species	Orangutan population stabilised (no. of individuals) in USM	3,403
	Presence of orangutans outside 'refuge areas', especially restored areas	Orangutan nests observed inside restored areas
Restoration	Total area planted by 2019 by WWF in Bukit Piton (ha)	2,218 ha
	Survival rates of planted trees (after 2 years) (%)	Over 88%
	Number of indigenous species used for restoration	55
	Area under natural regeneration (ha)	182 ha
Forest management	Increased protection status (reclassification of Bukit Piton in March 2012)	Class I forest reserve
	Area of Ulu-Segama-Malua Forest Reserve FSC certified (ha)	242,884 ha

Orangutan population distribution in Ulu-Segama-Malua (2003-2019)

The critically endangered Bornean orangutan remains confined to small patches of forests on which it relies for its survival. Orangutans are highly dependent on fruit in their diets and the removal of fruit trees and degradation of forest structure add further pressure on these critically endangered great apes.

Before the project: Orangutans under pressure

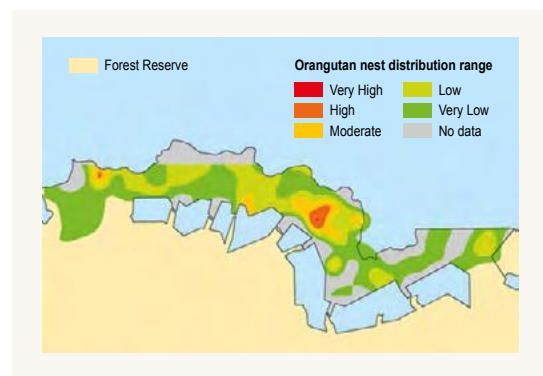
In 2002-2003 a comprehensive state-wide survey conducted using both aerial and ground nest surveys, identified 16 major orangutan populations and a total of 11,000 individuals. Ulu Segama's lowland rainforest presents one of the remaining tracts of habitat for the orangutan, despite being degraded. The Ulu Segama-Malua landscape was found to hold approximately 2,300 individuals (Ancrenaz *et al.*, 2010; Figure 2). A new survey carried out in 2006-2007, found that over half of the area surveyed was highly degraded with complete disruption of the original canopy (Ancrenaz *et al.*, 2010). Forest fragmentation, forced the orangutan population to spread into less suitable areas. Orangutans were estimated to number 2,580 in USM in 2007. In Bukit Piton specifically, the population went from 400 in 2002 to 200 by 2007 (Ancrenaz *et al.*, 2010).



Orangutan population was scattered and confined to small patches.

2012 -2017– Orangutans begin to move

A helicopter survey carried out between 2014 and 2017 covered 874 transects totalling 5,491km (Simon *et al.*, 2019). Orangutans were found to recolonise lightly logged over forests or forests that had been logged but abandoned and allowed to regenerate (Ancrenaz *et al.*, 2010). In this period, a total of 3,403 orangutans were counted in the USM landscape (Simon *et al.*, 2019). Individuals were found to move outside 'refuge centres' identified in secondary forest, to visit restored areas to seek food and shelter. Overall, the adjacent Deramakot and Segama regions were found to sustain the largest orangutan populations in Sabah (a total of about 6,000 individuals).



Orangutan population started moving to seek food and shelter in reforested area.

After the project – Future prospects

Given the orangutan's ability to survive in forest areas with reduced impact logging, or areas that are allowed to regenerate, continued emphasis on sustainable forest management with strict standards can help to stabilise the orangutan population, enable the populations to move around and inter-breed, and may even help it to recover. In contrast, habitat fragmentation, forest degradation and disturbances associated with conversion of forests, have a severe impact on this fragile great ape and should be avoided at all costs.



PARTNERS AND MAIN ACTORS

Each of the three compartments i.e., compartment 109, 110 and 111 in the landscape of Bukit Piton Forest Reserve was led by a different agency in collaboration with the Sabah Forestry Department (SFD):

- a) Yayasan Sabah (Sabah Foundation) - The Sabah Foundation or Yayasan Sabah Group (YSG) is a state-sanctioned organisation that was developed to promote educational and economic opportunities for the people in Sabah. It was founded by the late Tun Mustapha Harun and manages a diverse portfolio of resources and issues.
- b) Sime Darby Foundation - Sime Darby is one of the biggest oil palm companies in Malaysia. Sime Darby Foundation is a philanthropic arm of Sime Darby and one of its aims is to fund impactful conservation work including forest restoration in Bukit Piton.
- c) WWF- Malaysia.

Other key actors involved in the project are outlined below.

Sabah Forestry Department

The Sabah Forestry Department (SFD) is responsible for restoring forests in 4,800 ha of Bukit Piton. Beyond this, they are a lead agency in restoration work. The SFD have led on the formulation and implementation of the USM Forest Management Plan. They have been working with WWF-Malaysia, who were instrumental in planning the forest restoration work for orangutans and orangutan population monitoring in Bukit Piton. WWF-Malaysia has collaborated closely with the SFD, implementing for example, joint audits to verify that tree planting by contractors was being carried out according to the contracted agreements.

Site visit from Sabah Forestry Department's Chief Conservator of Forest Datuk Mashor Mohd. Jaini



Yayasan Sabah (Sabah Foundation)

Yayasan Sabah (YS) is both a government-run social organisation and the largest timber concessionaire in Sabah. The entire area of USM falls under their concession and YS has set aside some of the concession for conservation and restoration actions. It has been carrying out restoration work with other international actors such as the company IKEA and the FACE (Forests Absorbing Carbon Dioxide Emissions) Foundation for a while and is responsible for restoration in other areas within Bukit Piton Forest.

Local community

Some local communities situated outside the forest have played a role as providers of seedlings. Specifically, over six families in Silam and four families in Kinabatangan have propagated tree seedlings that have been used by reforestation contractors in Bukit Piton. There are no communities living inside the area under restoration.

Reforestation contractors

A series of private contractors (and sub-contractors) have been hired to carry out the actual restoration work in the different forest blocks identified. For example, tree planting companies such as Kontraktor Malaysia, Segama Forest Heritage Enterprise, Sulai Sulaian Enterprise, Syarikat Juta Jaya and Kontraktor Fajar. They have been responsible for planting and follow up maintenance for a period of two years. Contracts between WWF-Malaysia and the contractors were established at the start of the restoration work to clarify the specific activities to be carried out according to a protocol defined by WWF and the SFD.

**THERE ARE NO
COMMUNITIES LIVING
INSIDE THE LANDSCAPE
UNDER RESTORATION.**



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GOVERNANCE

Referring to the broader context of decision-making, governance is an important dimension of forest landscape restoration. Different players and tools support (or hinder) governance for FLR. In Sabah, the role of the public and private sectors is key to decisions affecting forests.

Indigenous communities and property rights

There are no communities living inside the area under restoration. The ownership of the USM lies with the government, and while initially a 40 ha area in the landscape was claimed by the local community – a historic claim – this has been acknowledged and therefore, that area was excised from Bukit Piton (Figure 4). Such potential conflicts over land rights have implications for scaling up FLR in the region.

Thus, it is interesting to refer here to the broader context of Sabah, beyond USM and the restored landscape.

Parts of Sabah have been inhabited for an estimated 30,000 years (Ancrenaz *et al.*, 2010) and indigenous populations account for 58.6% of Sabah's population. Although there are 39 different ethnic groups in Sabah, four groups are predominant: the Dusun, Murut, Paitan and Bajau groups. Issues of land rights remain a principal preoccupation for these indigenous groups (IWGIA website).

In contrast, while many traditional and indigenous communities consider the forest their home, their role in maintaining, shaping and managing forests has been reduced as Sabah's forests have acquired greater strategic importance in recent decades.

Officially, Sabah's property rights fall under three categories: i) state property rights, which cover forest reserves; ii) private property rights, which cover land that has been alienated by the state for development, as well as individual indigenous titles; and iii) communal property rights, which include indigenous reserves and communal titles to customary land (Toh and Grace, 2005). However, traditional access to land has been diminished as forest concessions have been systematically granted to large industrial groups. With limited official documentation to prove their access to land and forests, indigenous communities have thus frequently been forced off their ancestral lands. While such a situation has not directly impacted on restoration in Bukit Piton, it places the entire land use sector and forest management in a precarious situation. Legally, the Land Ordinance provides for communities to request customary titles after three years or more of occupation. In practice, Sabah's Land Code favours agriculture and cash crops resulting in the concentration of titles in the hands of a few powerful groups. Furthermore, when communities practice traditional shifting cultivation and leave land fallow, they cannot claim this land as customary, thus forcing more intensive – and unsustainable – forms of land use (Dayang Norwana *et al.*, 2011).

Private sector

The private sector – particularly oil palm companies – plays a predominant role in Borneo. It has been a significant actor in shaping the landscape since the 1960s, stemming from the government's crop diversification strategy (to reduce dependence on rubber). Thus, forests have been cleared, first for their timber, and then to be replaced by large-scale plantations. Remaining forest landscapes are further fragmented by these large monoculture plantations. Pressure groups and the Roundtable on Sustainable

THE PALM OIL INDUSTRY MUST COMMIT TO RESTORE DAMAGED FORESTS.

Palm Oil (RSPO) have helped to improve the industry's practices, notably, promoting restoration areas and corridors, however, much more remains to be done. The Malaysian Sustainable Palm Oil (MSPO) certification was developed in 2013, aligned with relevant existing national laws and regulations, and the State government committed to implement this scheme by December 2019.

Given the public income generated from crude palm oil (through taxes and other levies), estimated at RM900 million (EUR 197 million) for Sabah for 2019 ([New Straits Times](#)), this industry cannot be ignored when tackling forest conservation and land use in Sabah. Furthermore, public funding (via subsidies) is used to maintain the industry competitive, notably subsidies to support the Malaysian Palm Oil Board (MPOB) to market Malaysian palm oil internationally.

Recently (July 2019), in a bid to remedy some of the damage inflicted on forests, the palm oil industry committed to planting a million trees in the coming 10 years in the USM zone ([Borneo Today](#)). This initiative promoted by the primary industries minister is also an attempt to make Malaysian palm oil more competitive for European buyers, as well as raising the profile of this Malaysian State for ecotourism. The minister has also been emphasising the need for all oil palm plantations to be certified under the MSPO ([FMT News](#)) and has capped at 6.5 million ha (up from 5.8 million ha) land for oil palm plantations ([The Star](#)).

Pressure from oil palm plantations on Bukit Piton is very real as the plantations lie along the northern and eastern borders of the landscape. Thus, the orangutan population is restricted to the landscape by the plantations on one side and the Segama river on the other. Seeking to include wildlife corridors between and within the plantations can help to provide some opportunities for movement for the orangutan population.

The private sector beyond the landscape - in this case companies such as Marks and Spencer's in the UK or Itochu Corporation in Japan - has also contributed to the restoration process by providing funds. This transfer of funds is akin to payments for ecosystem services, even if not explicitly termed as such. Indeed, through their financial contribution (via WWF) these companies have directly participated in the restoration of habitat for orangutans in Bukit Piton. In this case, the ecosystem service for which they have paid is the habitat for critically endangered wildlife such as the orangutan.

Palm oil monocultures are the primary threat to nature conservation outside the landscape.



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Forest Policy

Sabah launched its new forest policy in December 2018. It supports WWF’s FLR work by aiming to improve connectivity, to restore degraded forest while promoting the participation of local communities and civil society in forest management. The strategy promotes the maintenance of at least 50% of Sabah’s land mass under forest reserves and tree cover and also aims to ensure that 30% of Sabah’s land area is totally protected by 2025. Importantly, in order to improve potential revenue generation by forests, the policy seeks to expand the role of payments for ecosystem services, non-timber forest products and nature-based tourism. These are all alternatives which can generate value from standing forest and thus reduce deforestation and forest degradation.

THE USM HAS BEEN FSC CERTIFIED FROM 2011 TO 2021. ALTHOUGH NO HARVESTING OCCURS CERTIFICATION HELPS TO PROMOTE HCV, ECOSYSTEM SERVICES AND STAKEHOLDER ENGAGEMENT.

FSC certification confirms the sustainable management of the USM forest for its ecosystem services. Within FSC certification, high conservation values (HCVs) are to be identified and relevant parts of the forests set aside (FSC Principle 9). In the context of USM, several areas were identified for their conservation value, particularly for their value as orangutan habitat. The Bukit Piton forest is one of these areas important for orangutans but it was also identified as needing restoration to enhance this value. Importantly, although no harvesting occurs in USM, the whole certification process provided an opportunity to bring together different stakeholders: the Sabah Forest Department as the lead agency, Sabah Foundation, Sabah Wildlife Department, WWF-Malaysia, HUTAN, Sabah Society and community groups (NGPP, 2009). In the implementation of the HCV process, a consultation workshop was held with representatives of the various government departments, local communities and environmental groups in the area.



COMMUNICATIONS

Several communications materials have been produced and campaigns have been organised. They have focused on the orangutan with restoration being a tool to increase and improve habitat for this endangered species. For example, one video, entitled '[Bornean King of Swingers](#)' (13'), produced in 2012, presents the orangutan and the positive impact that forest restoration has had on it in the priority landscape. Several other films were produced during last 10 years (format from 3' to 8'), e.g. a testimonial from [some of its guardians](#) (6') in 2019.



ORANGUTANS WERE BOTH AMBASSADORS AND BENEFICIARIES OF RESTORATION, MAKING FOREST HABITAT RESTORATION EASIER TO UNDERSTAND AND TO MARKET.

Overall, a total of 17 awareness-raising programmes were conducted in the villages and oil palm plantations situated near forests harbouring orangutans. They were intended to raise awareness about the importance of this species, its current predicament and the need to halt its illegal killing. National TV (Astro) and national radio advertisements (on Hitz.fm, KKFM) have also been used to raise awareness.

On the 50th anniversary of the Sabah Orangutan Rehabilitation Centre (October 2014) WWF-Malaysia set up a booth featuring its conservation and reforestation work in Sabah. This was an opportunity for WWF-Malaysia to present its ongoing work in Bukit Piton.

Additional communications efforts have included internet campaigns on orangutans to raise awareness, and crowdfunding (via www.simplygiving.com) to support further orangutan research and related restoration efforts.

A number of reports have been produced over the years, as well as journal articles on the orangutan and restoration (e.g. Alfred *et al.*, 2010), including a publication in the peer reviewed journal Plos One in July 2019 entitled 'Changes to Sabah's orangutan population in recent times: 2002 - 2017' (Simon *et al.*, 2019).

Press coverage (e.g. in the local newspaper "The Star") also presented the results of the project to the wider public.

SUSTAINABILITY

The programme has relied on national and international donor funding through different projects which, in the long term, is not a financially viable model. Having said that, several factors may be said to contribute to the programme's sustainability. Three aspects of sustainability are explored here: 1. Financial sustainability; 2. Plantation costs; 3. WWF's position toward preparing a hand-over strategy.

Financial sustainability

Funding for restoration in Bukit Piton has all been external, largely by private companies and channelled via different WWF offices (see Table 4). Main donors have been: the Adessium Foundation (via WWF-Netherlands), Marks and Spencer (via WWF-UK), ITOCHU Corporation and ITOCHU Group (via WWF-Japan), Aeon Co. (Malaysia), Senheng Electric (KL) (via WWF-Malaysia). Additional funds have been provided by WWF-Netherlands, WWF-UK, WWF-Germany, WWF-United States and major donors via WWF-Singapore.

Increasingly, the role of private companies is growing with respect to planting trees (Faruqi *et al.*, 2018). This is frequently part of their corporate social responsibility or their carbon neutrality commitments. Such financing from companies can yield long term benefits and be more sustainable than funding from philanthropy or governments which is more likely to follow a project cycle phase of 3-5 years.

Approximate total funds for the overall programme over the 12-year period amounted to over EUR 5.4 million.

Plantation costs

Estimated costs for restoration (Table 5) were initially placed at RM 6,500 (~EUR 1,450) per ha based on an approximate number of 156 seedlings per ha (with enrichment planting along 8 x 8m grid). This signifies a cost of RM 41/tree (or EUR 9/tree) (WWF, 2015). In practice, due to many unforeseen circumstances (e.g. weather, access etc.) actual costs ended up being higher.

These costs were considered for the contracted work and included preparation, planting of tree seedlings and maintenance (weeding) (WWF, 2015). The net planting costs (excluding operational costs) totalled RM 4,400 per ha (EUR 980/ha) (Fung, 2014).

WWF handover strategy

The management of Bukit Piton will revert to the Sabah Forestry Department once the restoration work is completed as per the agreement between WWF-Malaysia and the SFD. The SFD is expected to maintain the reforested area as an important wildlife habitat, similar to the adjacent areas under restoration initiatives. It is not expected to be a major transition as the SFD is managing much bigger areas with ample experience in restoration projects. Similarly, wildlife protection and monitoring activities are already established in the larger USM forest complex. The handover means that the SFD will expand its active monitoring exercises to Bukit Piton. In addition, the SFD will now pay for the cost of road maintenance and possibly the upkeep of WWF's former field house which can be utilised as a new SFD checking station.

**PRIVATE COMPANIES
ARE KEEN TO PLANT
TREES, AS PART OF
THEIR CORPORATE
SOCIAL RESPONSIBILITY
OR CARBON
COMMITMENTS.**

Table 4. Funding by donor

	Donor	Total area funded (ha)	Financial year (FY)	Total funding (in original currency)	Approx. total in EUR*
Pilot testing plots	WWF-NL	42.63	FY 08	EUR 600,000	600,000
	WWF-UK (M&S)	66.09	FY 08	MYR 310,000	64,170
	WWF-DE	62.75	FY 08	EUR 110,000	110,000
	WWF-US	13.74	FY 08	USD 15,000	10,770
	WWF-UK	15.13	FY 08	MYR 1,340,000	277,380
Restoration plots	WWF-NL (Adessium)	460	Jul 08 - Dec 14	EUR 1,000,000	1,000,000
	WWF-Japan (Itochu)	967	Apr 09 - Dec 16	JPY 246,340,638	1,909,140
	WWF- Malaysia (Co-funded)			MYR 1,000,000.00	211,470.50
	WWF-UK (M & S)	90	Jul 10 - Jan 15	MYR 765,000	185,513
	WWF-DE	100	Jul 08 - Dec 15	EUR 175,000	175,000
	SenHeng (Malaysia)	46	Jan 11 - Dec 13	MYR 300,000	68,850
	AEON Jusco (Malaysia)	77	Jan 11 - Dec 15	MYR 500,000	113,000
	WWF-DE	50	Jun 11 - Jun 13	EUR 80,000	80,000
	WWF-SG (Phase 1)	25.30	Mar 15 - Feb 17	MYR 467,500.00	108,226
	WWF-SG (Phase 2)	134.56	Aug 17 - Nov 19	MYR 1,811,268.92	374,933
	WWF-MY Co-funding for phase 2			MYR 562,036.74	118,850.93
Total	2,218.2			5,407,302.43	

* Historical exchange rate averages were taken for the given periods

Table 5. Cost breakdown for restoration (MYR and EUR/ha) (WWF, 2015)

	Description	Cost (MYR)	Total (MYR)	Equiv. EUR	%
Planting	a. Site preparation	700	4,400	980	68%
	b. Planting (inclusive of seedlings)	800			
	c. Maintenance year 1 (5 times)	1,700			
	d. Maintenance year 2 (4 times)	1,200			
Operation	a. Staff costs	935	2,100	470	32%
	b. Operational costs				
	i. Office running	150			
	ii. Travel & meetings	300			
iii. Field running costs (fuel, maintenance etc.)	400				
c. Management fee (15%)	315				
Total			6,500	1,450	100%

OVERARCHING LESSONS LEARNT

The vast experience acquired in the restoration of Bukit Piton Forest Reserve is a valuable resource for practitioners. Today, it is useful for other degraded landscapes worldwide to reflect on the most significant lessons learnt. Several lessons have emerged over the last 12 years of forest landscape restoration. These are listed below.

1 Pressures surrounding the landscape need to be monitored closely

While the focus for restoration may be the landscape, proximate pressures - notably from agriculture - can shift priorities and require a change in interventions within the landscape.

In USM, oil palm plantations surround the landscape, and maintaining a close watch on their evolution and activities is paramount to the long term health of USM.

2 Protection and restoration complement each other and can produce quick results for endangered species

Reducing threats by protecting land and improving habitat quality can provide a viable habitat for endangered species.

In USM, the orangutan population was stabilised by protecting key areas and orangutans were able to move very rapidly (in less than a decade) into areas where restoration activities were carried out.

3 Restoring habitat for a specific species can help to focus the interventions

Rather than exclusively restoring forest cover, focusing on the habitat and food of an endangered species helps to define the selection of tree species to use in restoration.

In Bukit Piton, efforts to restore forests for the orangutan signified that tree species selection was largely determined according to the habitat and food needs of the orangutan.

4 Unexpected challenges raise the cost of restoration and increase timeframes

While a schedule may be in place (including the months in which to carry out planting) unexpected circumstances (such as extreme weather events due to climate change) may cause delays which may lead to missed windows of opportunity.

In Bukit Piton, access to some restoration sites because of droughts or sudden rainfall, created unexpected increases in costs. Finding local labour was also an issue, leading to delays in the planned restoration activities.

5 Choosing both fast and slow growing tree species can be an effective means of reaching different objectives

The combination of pioneer species and slower growing species contributes to the creation of a diverse and functional forest as well as filling different ecological niches.

In Bukit Piton, in order to rapidly close the canopy (for the orangutans to be able to move in between patches of forest) fast growing species were used. At the same time, slower growing species were used in order to ensure a diversity of species (notably, fruit trees of importance for orangutans' diets).

6 Laws of supply and demand affect seedling availability for some native species

A large-scale restoration initiative may lead to significant demand for seeds and seedlings, with a subsequent impact on cost and supply.

Because of the large areas to be planted in Sabah, demand for tree seedlings increased (and in consequence, so did costs).

7 Maintenance after planting is crucial

A significant challenge with active restoration is to ensure long-term maintenance and management of the newly planted trees.

In Bukit Piton, maintenance was only carried out for two years (with planting contractors). Further monitoring beyond those two years showed poor long-term survival rates. A recommendation is to continue maintenance for at least five years.

8 Restoration contributes to the enhancement of high conservation values

Restoration complements the effort to comply with FSC certification.

Bukit Piton was identified as a high conservation value area in USM because it hosts endangered species. Restoration of the degraded areas is an exemplary demonstration of how restoration can enhance high conservation value.

9 Payments by companies can support long term restoration

These payments for ecosystem services may not be termed as such, but ultimately represent funding for the service of restoring a corridor or habitat.

In Bukit Piton, the value was identified via the study of orangutan populations and their ranges in 2003/2004. Subsequently, the restoration programme in Bukit Piton was initiated and funded by various donors including the WWF network and large companies. When large companies are effectively engaged in supporting ecosystem restoration, they may be able to provide long-term financial support for restoration.



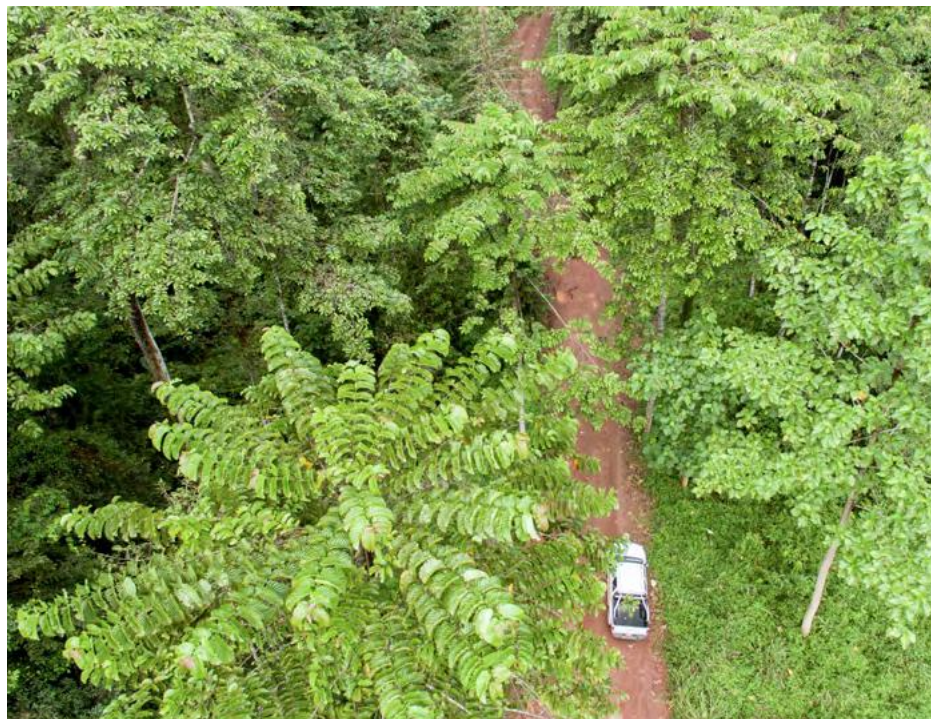
CONCLUSION AND FUTURE PROSPECTS

Despite this programme, and others like it, the plight of the orangutan in Sabah remains of concern. Its status on the IUCN Red List of Threatened Species was raised from ‘endangered’ in 2008 to ‘critically endangered’ in 2016. Particular populations continue to face the risk of extinction, and projections continue to show a radical decline in overall numbers.

Nevertheless, there is cause for some cautious optimism in some landscapes such as USM where the population appears to have stabilised. The focused and concerted effort applied in Bukit Piton demonstrates that within a 12-year period, significant changes can be made in forest cover, and in the size of populations of animal species that are dependent on them, in this case, the Bornean orangutan. This work has also demonstrated the importance of long-term management efforts to sustain the newly growing tree species.

While protecting some areas and halting the assault on forests are essential interventions, restoration is an important tool to reverse trends in Bukit Piton Forest, in Sabah and in Borneo. WWF’s long term FLR experience in Bukit Piton has been closely documented providing important lessons for future interventions. These lessons should be widely disseminated and used so that other restoration experiences can benefit and build on them in order to be more effective to accelerate the pace of restoration.

Restored forest area
after 10 years



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- Malaysian Palm Oil Certification Council - <https://www.mpoc.org.my/mspo-certification-scheme>
- New Straits Times - <https://www.nst.com.my/>
- Sabah Forest department - <http://www.forest.sabah.gov.my/usm/>
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- WWF website - <https://www.worldwildlife.org/ecoregions/im0102>

This report is part of a series that aims to share lessons learnt from WWF's long-term field programmes on Forest Landscape Restoration worldwide.

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IN BRIEF

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55

The number of indigenous tree species used for restoration.

12,000

In ha the area of Bukit Piton Forest Reserve, included in the Ulu Segama Malua area.

2,218

In ha, the area restored by 2019 through enrichment planting (over 346,000 trees planted).

3,403

The number of orangutans in the USM area. The population is now stabilised in the landscape and slowly recovering in the restored areas.



Why we are here

To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

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