

**Developing an ecological corridor in the Katingan Kahayan
landscape:
A social science-based contribution to the project's baseline
diagnostic**

A collective report written by

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Foreword and acknowledgements

Foreword

This report is the result of a collective internship carried out in March 2019 by 12 students from AgroParisTech's advanced Master in "Forest, Nature and Society, International Management". AgroParisTech, also known as the Paris Institute of Technology for Life, Food and Environmental Science, is a higher education and research institute ("Grande Ecole"). The study we conducted is part of a partnership between AgroParisTech and the Indonesian branch of the international non-governmental organization WWF (World Wide Fund for Nature).

The main objective of our work was to conduct a social science-based strategic diagnostic in support of WWF-Indonesia's project to develop an ecological corridor in the Katingan Kahayan landscape that sits between two national parks. The Katingan Kahayan Landscape is located in the province of Central Kalimantan, on the Indonesian part of the island of Borneo. In order to conduct this study, we allocated five weeks which included one week of preparatory work, three weeks of field work in the area of the prospective ecological corridor as well as workshops with WWF teams in Jakarta and Palangkaraya.

The partnership comes at a time of recent change in WWF-Indonesia's organizational structure with the recent creation of a Conservation Science Unit (CSU) team, which goal is to address the gaps in knowledge and capacity in multiple disciplines to deliver conservation interventions and meet targets set in the 2016-2018 strategic plan (WWF-INDONESIA, 2018).

The collaboration between WWF-Indonesia and AgroParisTech aims at developing scientific and pedagogic exchanges around the use of social science knowledge, methods and tools for conservation. This collaboration offers a great opportunity mutual enrichment between the Advanced Master's students and their supervisors, and WWF-Indonesia CSU as well as local landscape teams.

About the authors of this report

We are a group of 12 students from the executive Master programme "Forest, Nature and Society, International Management (FNS-MI)" delivered by AgroParisTech in collaboration with HEC Paris, coming from various backgrounds (landscape architect; industrial engineering; political science; geography and urban planning; chemistry; heritage and landscape; international law; alternative management; biophysics).

We were supervised by two lecturers, Dr. Clément Feger (Associate professor in Management science applied to conservation strategies at AgroParisTech) and Dr. Alexandre Gaudin (Senior lecturer in Socio-anthropology applied to natural resources management at AgroParisTech). The purpose of this master is to train students how to sustainably manage various ecosystems while taking into account major social dynamics.

The advanced master's programme includes separate courses over the year taking place in various locations, starting in French Guiana (South America), pursuing in Nancy and Paris, and ending in Montpellier where special attention is paid to social sciences and strategic environmental management analysis. Each year, the students of the advanced master finally follow the module "Evaluation of an environmental project in an international context" which includes a three weeks fieldwork in a foreign country. This year, thanks to the partnership established with WWF-Indonesia, we had the opportunity to work on the Katingan Kahayan ecological corridor in March 2019, which gave rise to this report.

Acknowledgments

We are very grateful for the trust WWF teams in Jakarta and Palangkaraya placed in us. We thank in particular Thomas BARANO and Nara WISESA as well as all the members of the Conservation Science Unit (CSU) team for their time and for the constructive exchanges we had in Jakarta. We thank Rosenda CHANDRA KASIH and Didiek SURJANTO from the Palangkaraya team, for their hospitality, efforts and time as well as the whole Palangkaraya team, translators and drivers with whom we worked once in Kalimantan.

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Finally, we would like to thank Alexandre GAUDIN and Clément FEGER who developed the partnership organised the mission, and supervised our work prior, during and after our travel to Indonesia, as well as Jérémy VENDE, Murielle SALAS, Maya LEROY from AGROPARISTECH FNS-MI pedagogic team for their support throughout the project.

Structure of the report

The report is divided into five parts. First of all, the introduction presents the context of the study, WWF's general strategy for the ecological corridor, our main approach and the research question. The second part is focused on the method of our study, including the program that we followed during our project with the main missions and feedbacks. Then, we present the results of our study: first, the empirical field-based study of social dynamics at the corridor scale; the conceptual application of an ecosystem accountability framework, illustrated on specific field cases. **The reader should note that these two result sections can be read separately, as they are of a different nature and fulfil a different purpose (respectively contributing to the social baseline diagnostic of the ecological corridor project; introducing an original framework to assist WWF teams in their strategy and negotiation approaches).** In a conclusive part, we raise the perspectives i.e the interrogations or possible following studies.



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1. GENERAL CONTEXT OF THE STUDY AREA

Our subject of study is an ecological corridor that is still at the state of project, located in the Katingan Kahayan landscape. The general context of the study area as well as the challenges and threats to the forest and biodiversity in the Katingan Kahayan landscape will be presented. The WWF activities and general strategy (at the time of study) for the development of an ecological corridor in this landscape will be presented. We will first expose the importance of the island of Borneo regarding biodiversity, then the challenges and threats it faces, and finally present the main traits of the WWF ecological corridor project in the Katingan Kahayan area.

1.1 Deforestation: a major threat to biodiversity in Borneo Island

Borneo, in Southeast Asia, is the fourth largest island in the world, with an area of 736,000 km². It is administered by three different countries: Indonesia (Kalimantan), covering 73% of the surface area, Malaysia (26%, Sabah and Sarawak States) and the Sultanate of Brunei (1%). It represents 1% of the world's land, but holds about 6% of the world's biodiversity in its incredibly rich tropical forests (WWF, 2018).

The tropical forests and climate of Borneo provide the ideal conditions for a wide variety of species to thrive. At the bend of swamps, mangroves, plain and mountain forests, more than 15,000 plants, including 6,000 endemic plants, can be found. Borneo is estimated to be home to around 222 mammals (including 44 endemic – meaning they are not found anywhere else in the world), 420 birds (37 endemic), 100 amphibians and 394 fish (19 endemic) (WWF, 2018). The Bornean orangutan (*Pongo pygmaeus*) is a species of orangutan native to the island of Borneo in particular, which is Critically Endangered according to the International Union for Conservation of Nature (IUCN). The Bornean orangutan will occupy an important place in the report since the ecological corridor aims essentially to allow this species to migrate from the Sebangau national park to the north.

The "heart of Borneo" is the main part of the island where the forests have remained intact. Covering an area the size of England and Scotland combined and spanning several countries (Brunei, Indonesia and Malaysia), this area forms one of the largest transboundary tropical forests still observable in the world.

But the "heart of Borneo" is not only a treasure of biodiversity, it is also a source of life and livelihood for the indigenous people, a real ecological treasure for the approximately 11 million Borneans, including one million indigenous Dayak people living in these forests.

The island of Borneo is also known for significant deforestation over the past 30 years. As we can see on the map of the *United Nations Environment Programme* (UNEP), deforestation is significant in Borneo and its evolution has been accelerating in recent years.

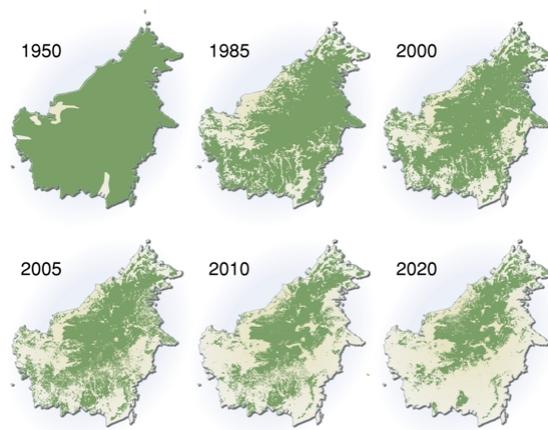


Figure 1: Deforestation in Borneo island from 1950 to 2020, Source : UNEP

75.7% (558,060 km²) of Borneo's area (737,188 km²) was forested around 1973. Based upon a forest cover map for 2010, researchers estimate that the 1973 forest area had declined by 168,493 km² (30.2%) in 2010. Kalimantan, the Indonesian part of Borneo, has one of the highest rates of deforestation (30.7%) (Gaveau et al., 2014).

We can see on the maps below the most important forest clearance in red (map on the left). The second map on the right illustrates two of the main causes of this deforestation: logging (remaining logged forest in light green) and intensive agriculture (industrial oil palm and timber plantations in Black).

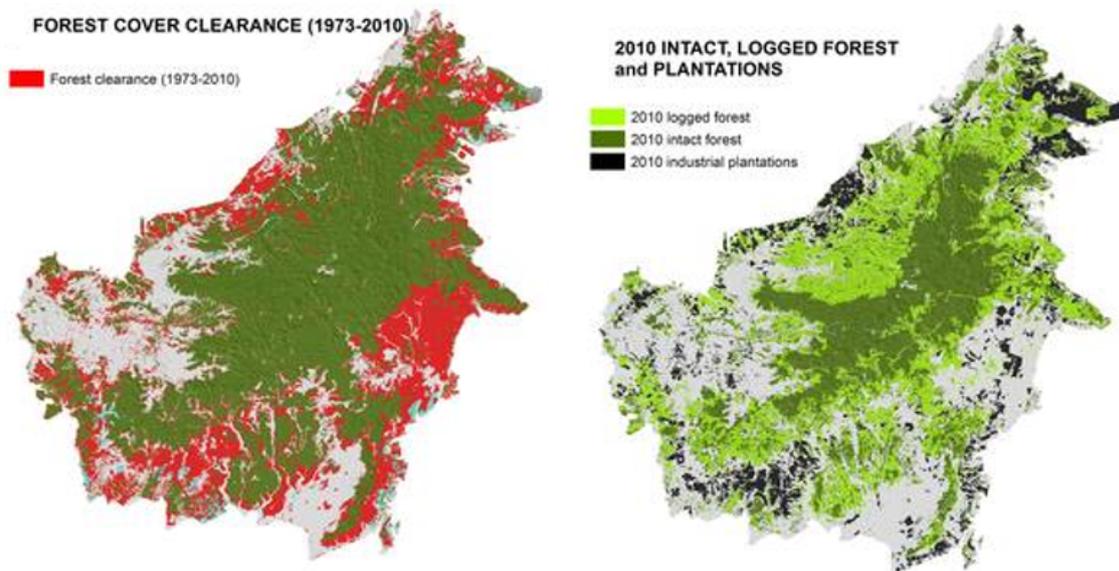


Figure 2: Forest cover clearance from 1973 to 2010 (left) | Logged forest and plantations (right) (Gaveau and al., 2014)

Based on the results of researches on the link between deforestation and plantation between 2000 and 2017 (Gaveau and al., 2018), it appears that annual plantation expansion is positively correlated with annual forest loss in both countries : "In 17 years, forest area declined by 14% (6.04 Mha), including 3.06 Mha of forest ultimately converted into industrial plantations. Plantations expanded by 170% (6.20

Mha: 88% oil palm; 12% pulpwood). Most forests converted to plantations were cleared and planted in the same year (92%; 2.83 Mha).”

1.2 The Katingan Kahayan Landscape: homeland of a large orangutan population

The Katingan Kahayan Landscape is an operational landscape defined by WWF located in the South West of the Indonesian part of Borneo Island. These boundaries correspond to the assembly of the Katingan and Kahayan River watersheds. The landscape includes the Sabangau National Park at the south and the Bukit Baya Bukit Raya National Park at the north of the landscape. In this study, we will more specifically focus on the Katingan Kahayan landscape, where the ecological corridor is to be implemented, located between the two rivers of the same name.

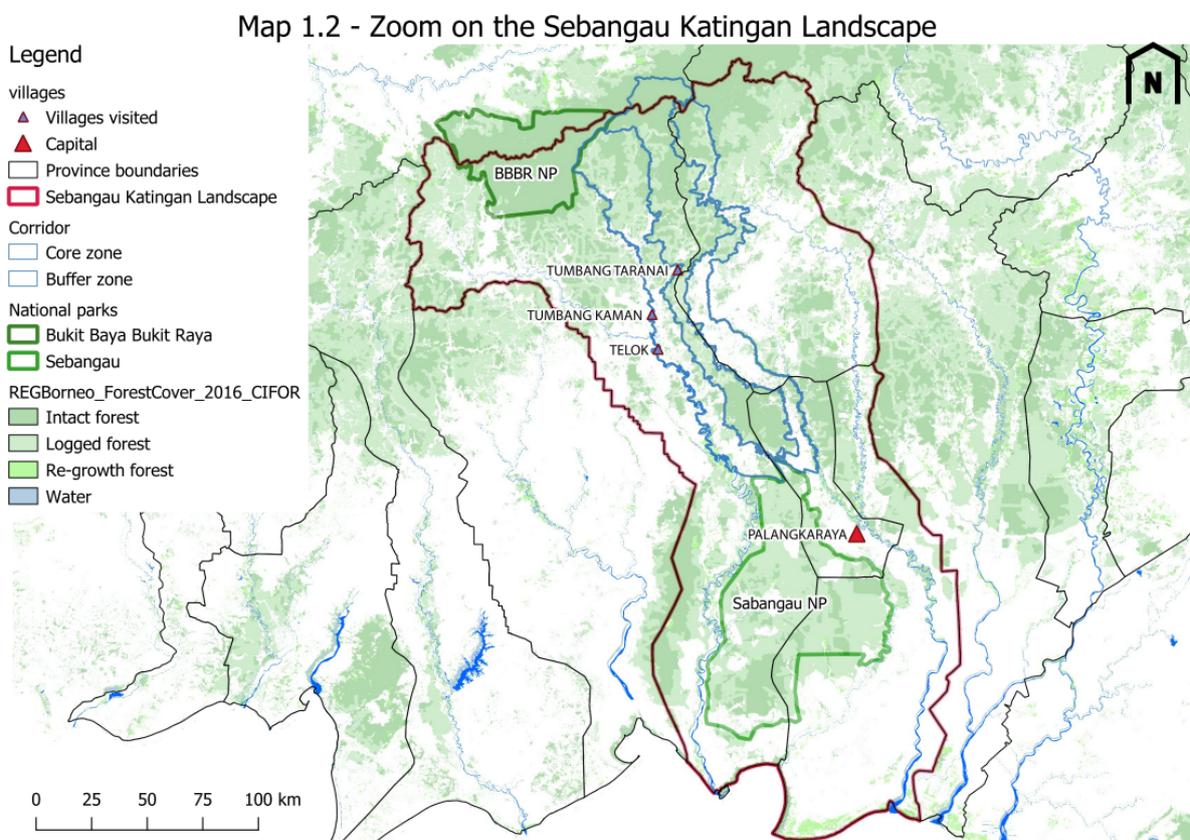


Figure 3 : Map of the Sebangau Katingan Landscape, Source : Gaëtan Jestin from the data of WWF and CIFOR

A forested landscape bounded by two national parks

The operational landscape is defined by Katingan, Pulang Pisau, and Gunung Mas Districts as well as Palangkaraya municipality. Most of the landscape is covered with primary and secondary dryland forest, while 31% of the landscape is covered in carbon-rich peatland. Unsustainable peatland management, including extensive draining that causes peat to dry out during the droughts, has left the region highly vulnerable to land and forest fires. In 2015, peatland and forest fires were disastrous and particularly difficult to extinguish. This has resulted in devastating impacts to the health and well being of communities. Forest fires also crippled local economies, destroyed significant areas of forest and

endangered biodiversity, while significantly exacerbating climate change on a global scale (source: USAID-Lestari Project documentation).

Sebangau National Park, in the South of the landscape, sometimes spelled **Sebangau**, is a national park established in 2004. Between 1980 and 1995 the site was a massive logging concessions area. After 1995, the park became a site for illegal logging, which resulted in up to 85 % of the 568,700-hectare total park area being destroyed. By 2012, less than 1 % of the park's total area has been reforested and several centuries is needed to restore it to its pre-logged state. This location is the remaining of peat swamp forest in Central Kalimantan after the central government initiated the agricultural peatland project for an adjacent area, where the Mega Rice Project - one million hectares area - was implemented in 1995. The protected area of Sebangau is the habitat of orangutan and many other endangered species such as the Malayan sun bear, gibbons, horn bills, the clouded leopard, and many more. The activities of WWF in Sebangau National park are presented in the following sections of the report.

In the North, the Bukit Baya Bukit raya National Park was created in 1994 mainly for watershed protection reasons. It is named after the mountains of Bukit Baka (1,620 metres) and Bukit Raya (2,278 metres), part of the Schwaner mountain range at the border of Central and West Kalimantan. The national park forms part of the Heart of Borneo conservation project (detailed after).

Other dominant features of the landscape are the Katingan and Kahayan Rivers, which give the landscape its name and provide connectivity between the two national parks.

Status and characteristics of the Bornean orangutan living in the Katingan Kahayan landscape

The orangutan is a globally valued species which plays a vital role in contributing to the biodiversity of the forest. Unfortunately, with forests under continual threat from fires and land clearing activities, the native habitats of the orangutan are being degraded. It is estimated that during the past 20 years, the habitat of the Borneo orangutan has declined at least of 55% (Ruysschaert, 2013). More than 70% of the Bornean orangutan population is estimated to be outside the protected areas, while the majority lives in concession areas (Ruysschaert, 2013). The Bornean orangutan (*Pongo pygmeus*) is one of the two orangutans species, and is classified as endangered by IUCN. The total population of Bornean orangutans is estimated at around 54000 individuals in 2013 (Ruysschaert, 2013).

Based on the map below which shows the orangutan distribution in Borneo, the Katingan Kahayan Landscape is an important zone of habitat for the orangutans (Abram et al., 2017).

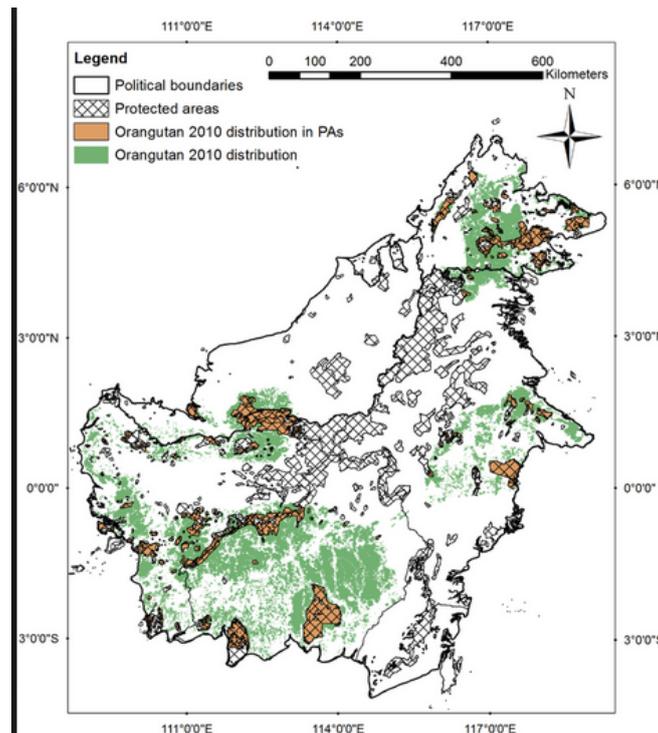


Figure 4:Orangutan distribution on the island of Borneo, Source : Abram et al., 2017

According to the WWF surveys, the number of orangutans in the Sebangau national Park is estimated around 6000 individuals (Workshop with Palangka Raya WWF team, 2019). It is estimated at 700 individuals in the remaining parts of the Katingan Kayahan landscape. The peatland forests in the South thus concentrate the highest density of population. Moreover, this part of the forest is highly threatened by the rise of sea level.

Diet and role in biodiversity regulation - Orangutans mostly feed on fruits, more particularly on ficus fruits, but as well on leafs, bark, flowers, insects (Ruyschaert, 2013). Due to their diet and the long distance they travel, orangutans have an important role in biodiversity, as they contribute to the seeds dispersion and to the general biodiversity flow. Moreover, the trees producing the biggest fruits are often the biggest ones and therefore store the largest amount of carbon (Ibid). The orangutans nests are often reused by other animals as shelters. During their travels and due to their weight and displacement methods, they bring down trees, which foster natural regeneration. Being at the top of the food chain, the presence of orangutans is the proof of an ecosystem in good health, with a high biodiversity index.

Habitat, nesting and reproduction – Orangutan need to live in large expenses of forest: ideally, a population would need an area of 500km². Indeed, though females are quite territorial and only need 1km² to live, males on the contrary extend their territory up to 100 km² (Ruyschaert, 2013). Both live mostly in low forests, which are the main target of plantations. These forests have a low canopy and high cover density. The mean density of orangutans is about 1 individual per square kilometer km². (Wich et al. 2008). It's important to note here, than even though orangutans are not meant to live on palm oil plantations, it is quite common to see orangutans settling in such habitats on condition that some natural forest patches are accessible (Ancrenaz et al., 2015).

Orangutans have a very low rate of reproduction, as females give birth only once every seven to nine years, and spend at least six years with their baby to teach them how to recognize the 250 fruit-trees

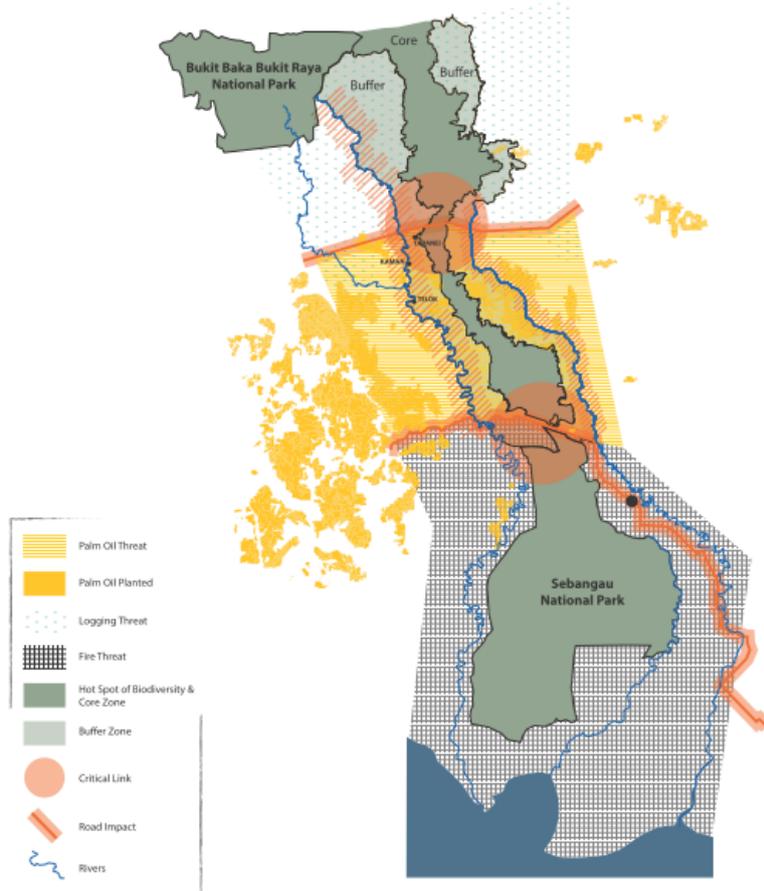
necessary for their diet (Malone, 2011). The loss of 1% of female every year could lead to an irreversible extinction of the species (Ruysschaert 2013). Orangutans learn to build nests in trees very young, but manage to build a solid nest within 30 minutes at the age of three. They use either one tree or they lock branches of different trees together, a process called “tree-tying”. It seems that they favor particular tree species to build their nest: a study led by the Orangutan Tropical Peatland Research Project (OuTrop) in Sebangau National Park and Kalampangan shows that 7 species are significantly more used than others trees, and they are often located in larger, healthier (with more leafs) trees. Quite often, trees bearing a lot of fruits are avoided in order to keep away from disturbance due to other orangutans (Malone, 2011).

1.3 General description of the major impact dynamics on the Katingan Kahayan Landscape

In the perspective of Strategic Environmental Management Analysis (SEMA) (Mermet et al., 2011, Mermet, 2018, see below in the methodology section for a brief overview of the theoretical framework), we identified the main pressures on the landscape through our preparatory work as well as the workshops we organized with WWF teams. We illustrated these main pressures on the map below. The Strategic Environmental Management Analysis framework prompted us to characterize the impact dynamics on the landscape and attribute them to precise actors and activity sectors (such as logging; agriculture; urban planning, etc.) which can then be targeted by specific strategies by the WWF.

We worked at the scale of the ecological corridor WWF plans to implement on the Katingan Kahayan landscape (see next section). The corridor is divided into two kinds of areas: the core zone, and the buffer zone. Each of these two landscape categories are characterized both by their respective rates of remaining forests as well as with different impact dynamics at stake. In the core zone, oil palm and logging concessions have for the most part been allocated, but not necessarily developed to their full possible extent, and the main remaining challenges relate to negotiating the protection of the remaining primary forested areas. In the buffer zones, there are other levels of issues at stake, especially with the now already well-developed industrial oil palm plantations. The buffer zone involves also many villages and urban development, thus coordination will be crucial with both companies and local communities.

Figure 5: Main impacts on the Katingan landscape. Source : authors



On the map (Figure 5) we identified in orange the first major ecological connectivity issue, named here and following WWF terminology “critical linkage”, around the existing road at the North of the Sebangau National park. There is another critical linkage issue in the area where the Transkalimantan highway is planned to be built in the northern part of the landscape. In yellow, we represented the impact of the oil palm concessions, which causes important damages in the middle of the corridor. The area in green dots near Bukit Baka Bukit Raya National Park

represents the impacts of the logging concession which are located both in the buffer zone and in the core zone of the corridor. We also identify the impact of other types of agricultural practices along the two rivers, around the villages located in the corridor.

As mentioned by (WWF, 2019), “there are around 19 concessions with the permit for logging activities (8 companies are located in priority area), 26 palm oil plantations (10 plantations are located in priority landscape), and around 64 mining companies with 23 are existed in priority area.”

Road development and “critical linkages”

Existing road

The first “critical linkage” (areas where ecological connectivity is critically damaged) identified is the existing road at the north of the Sebangau park, in the southern part of the landscape. The road contributes to the fragmentation of the remaining forest, making the passage almost impossible for orangutans. What’s more, the presence of a road implied historically the development of economic and agricultural activities along the road, along with the arrival of newcomers, resulting in an increase of the population and of the impacts on ecosystems, accelerating logging, mining, agricultural expansion and oil palm plantations.

Project of Transkalimantan highway

This project is part of the Indonesian economic development plan for 2011-2025 : the planned section of road, that will cross the Kalimantan entire region in order to move goods more easily to ports on the south coast, meets the goal of creating the Kalimantan economic corridor, consisting in large scale infrastructure projects. This project is led by the government of Indonesia with the Ministry of Public

Works and Public Housing, and the Ministry of Economy and the Ministry of Environment and Forestry are also stakeholders. Located in the North of the Central Kalimantan province, the road will link Keragaan to Tewah. It is expected to cross the ecological corridor-Katingan Kahayan area (Alamgir et al., 2018).

The road will cross three rivers including an important catchment basin of 930 000 ha, thus generating important issues of ecological continuity between the upstream (located in the national park at an altitude of 1700 meters) and downstream parts of the landscape. The impacts on the environment will be multiplied as the road will imply the development of economic activities in this project of economical corridor (logging, mining, palm oil plantations). In addition, it is likely that no impact assessment for this project will be undertaken. Indeed, the Initial Environmental Examination conducted based on Asian Development Bank's Safeguard Policy Statement classified the project as category B (i.e « projects that could have some adverse environmental impacts, but of lesser degree or significance than those in category A » that would in turn require an environmental impact assessment). The Initial Environment Examination made by the Asian Development Bank estimates that « duration and nature [of adverse environmental impacts] are short-term, temporary, reversible, and could be managed by implementing mitigation measures » (Initial Environmental Examination, Regional roads development project, 2011)

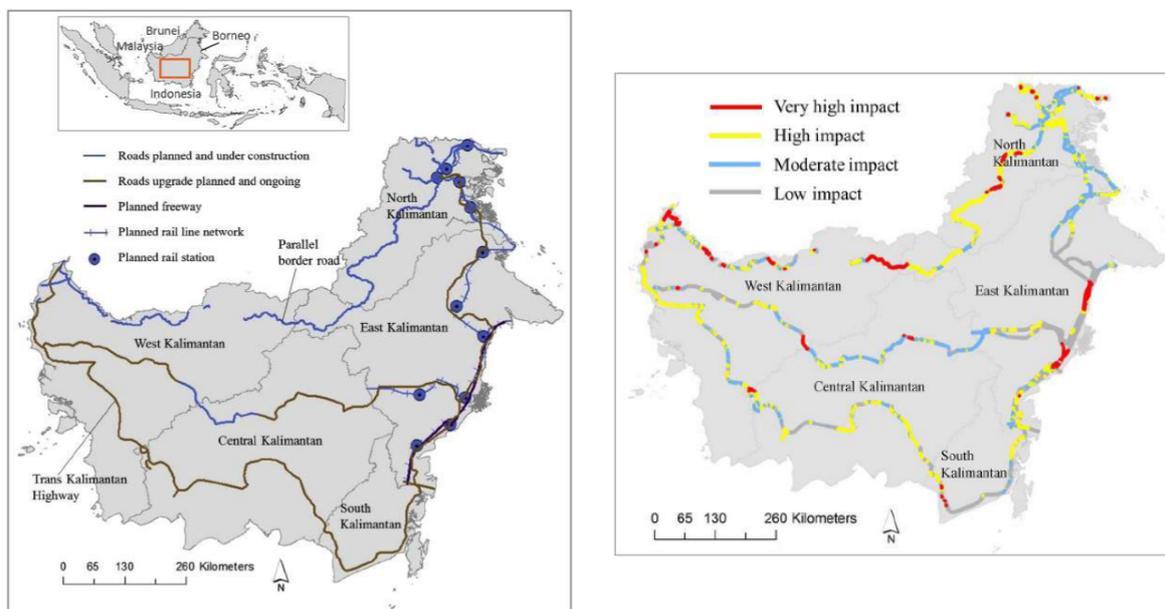


Figure 6: Left : Existing and project roads in Kalimantan / Right : Level of impact on biodiversity (Alamgir et al., 2018)

This economic development plan and infrastructure project will result in important environmental impacts on the corridor : increase in greenhouse gas emissions, significant deforestation, air and water pollution, intensification of threats to sensitive terrestrial habitats rich in biodiversity. It will impact the connectivity in the corridor by increasing forest fragmentation and prevent the orangutans from passing. Researchers found that landscape connectivity could decrease by 34% and 42 protected areas would be destroyed, threatening endangered species including orangutans and elephants (Alamgir et al. 2018).

Agricultural practices

Palm oil concessions

In the middle area of the corridor, from south of Tumbang Kaman to Sebangau National Park, the major impact dynamic is caused by palm oil concessions. In the Katingan Kahayan landscape where the corridor is planned to be developed, industrial palm oil plantations (IOPP) have progressively increased

within the last decade (see figure 17). It is important to point out that even though most of the core zone of the Katingan Kahayan landscape is covered by forest, adjacent zones present a very high industrial plantation rate; needless to say that the rate of forest conversion is likely to increase given the palm oil concessions that are ready in site or planned.

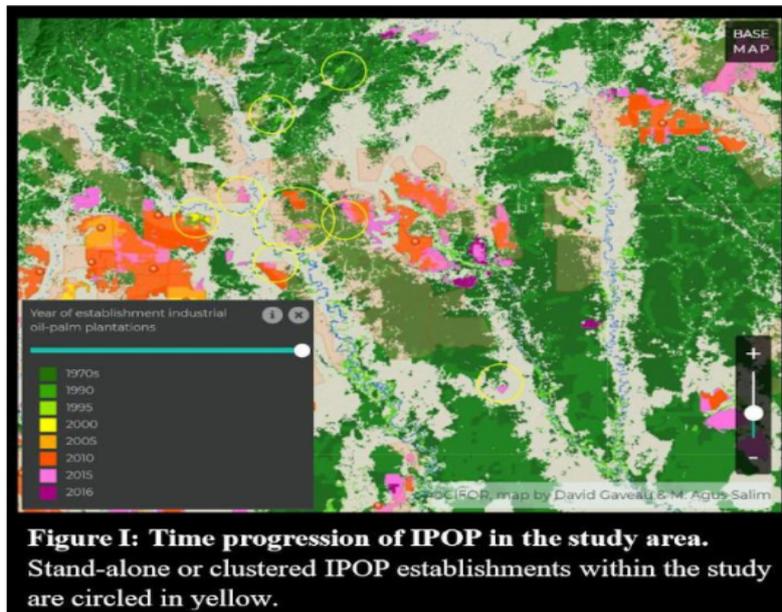


Figure 7: Time progression of IPOP in the study area. Stand-alone or clustered IPOP establishments within the study are circled in yellow

We also used the CIFOR atlas to understand the different land uses in the area and the dynamics of the concessions. We identified two important zones of oil palm plantations (in black) in the landscape and several palm oil concessions (in orange).



An analysis of the forest dynamic over the 1973-2015 period shows that only 15-16% of all deforestation in Kalimantan is associated with rapid conversion rate of forestland into industrial plantations. A rapid conversion rate means that the area where the plantation is developed is cleared after 5 years. This relatively low rate of rapid conversion when compared to the Malaysian Borneo (60% of the deforestation is associated with rapid conversion) can be explained by the fact that many palm oil plantations were implemented on already degraded or cleared lands (Gaveau et al. 2014). The forests of Kalimantan have indeed been degraded by drought, the phenomenon of El Niño and forest fires linked with slash and burn agriculture. However, a steep increase of rapid conversion to industrial plantation can be observed in Kalimantan since 2005. This increase is likely connected to the decentralization movement, which created new palm oil development opportunities for the local authorities and people.

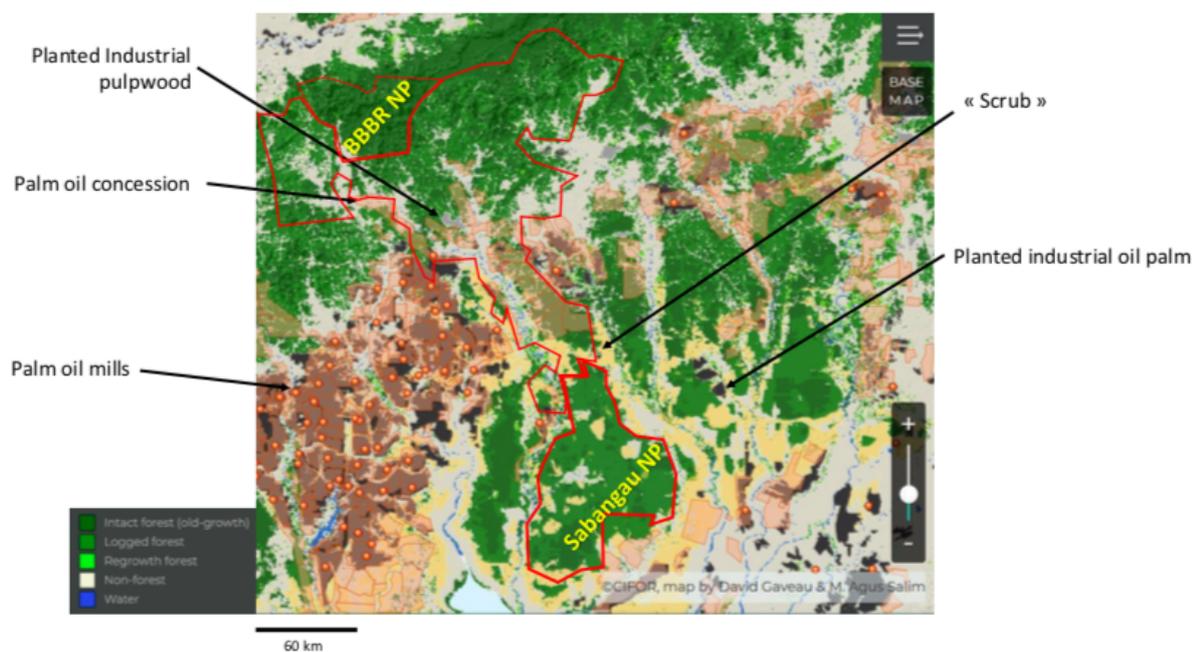


Figure 9: Map of palm oil concessions in the Katingan Kahayan landscape (source: CIFOR atlas and authors)

The impact of palm oil industry on the environment is well known and well documented : deforestation, greenhouse gases (GHG) emissions, biodiversity loss, dramatic decrease of fauna population, such as orangutans, tigers, elephants, conflicts between humans and fauna, invasion of pests in plantations, increase of illegal hunting of protected species, water pollution, local climate changes, and global climate change (UICN, 2018). Indonesia emitted 1,8 gigatons of carbons in 2005 (UNFCCC, 2010).

Regarding fauna, 280 wildlife species were observed in the Katingan Kahayan area, such as small deers and antelopes and wild boar and orangutans (15% each) and bears (8%) (KAP study, WWF, 2018). Orangutans especially can survive in palm oil plantations, only if they can have access to some patches of forest (Ibid). In west Kalimantan, at least one plantation preserves 150 Orangutans through its landscape management. One plantation is not enough, and this number needs to be increased. At least this case shows that it is possible to develop a plantation and to maintain the habitat of the orangutan (Meijaard et al., 2018).

A study was led in Central Kalimantan in 2012 about the effect on water resources of the palm oil industry. The villagers interviewed complained that the water was not drinkable anymore. They also underlined that the size of the fish they used to catch in the rivers was reduced (Larsen et al., 2014).

There are parts of remaining primary forest in the core zone of the Katingan Kahayan area. However, according to maps we could have access to during our interviews with authorities, the core zone of the

future ecological corridor is in fact covered with concessions plans that have already already been allocated (*hutan produksi*). According to the WWF team, this status is flexible and there are margins of negotiation with the companies and FMU to put aside some areas for forest protection. The concessions indeed threaten to break off the connectivity in the area and increase the negative impacts already described.

In the buffer zone, palm oil concessions are already exploited at an industrial level. This has consequences as well on the forest and on local communities which have activities for subsistence and sources of income from the forest (KAP study, WWF, 2018).

As a consequence of the multiplication of palm oil concessions, local communities develop individual strategies in the palm oil business. Smallholders aim at developing their own plantation. These logics result in an acceleration of deforestation and a decrease in biodiversity. This aspect will be further developed the field results part of this report.

Other impact dynamics related to agriculture

The corridor also includes other intensive agricultural activities, such as rubber or pulp-wood plantations. The rubber plantations in particular are important in the area of the Katingan Kahayan landscape. As a monospecific cultivation activity, industrial rubber plantations imply a loss of biodiversity when compared to primary forest ; but at the same time, they ensure a certain level forest cover that plays an important part in preserving ecological connectivity. In this sense, both WWF and actors from the field agree to say that rubber is better than palm oil in terms of its biodiversity preservation potential. The logics of agricultural practice and their impact on the environment will be further developed in the analysis of the field results part of this report.

Extraction activities

Logging concessions

Logging concessions affect the corridor in the northern part of the landscape. The NGO Mongabay has notified widespread illegal logging activities in the Project area in 2013¹. The main impacts from logging are reduced vegetation cover and increasing in soil erosion, as well as destruction of biodiversity habitat. Furthermore, much of the remaining intact forests are under production forests and have been given as concessions to logging companies.

The logging roads map extracted from the CIFOR atlas datasets indicating the date of creation of each road allows us to see the extent of logging areas. The different colours emphasize the year of creation.

¹ Mongabay website, article published in 2013: <https://news.mongabay.com/2013/04/fighting-deforestation-and-corruption-in-indonesia/>

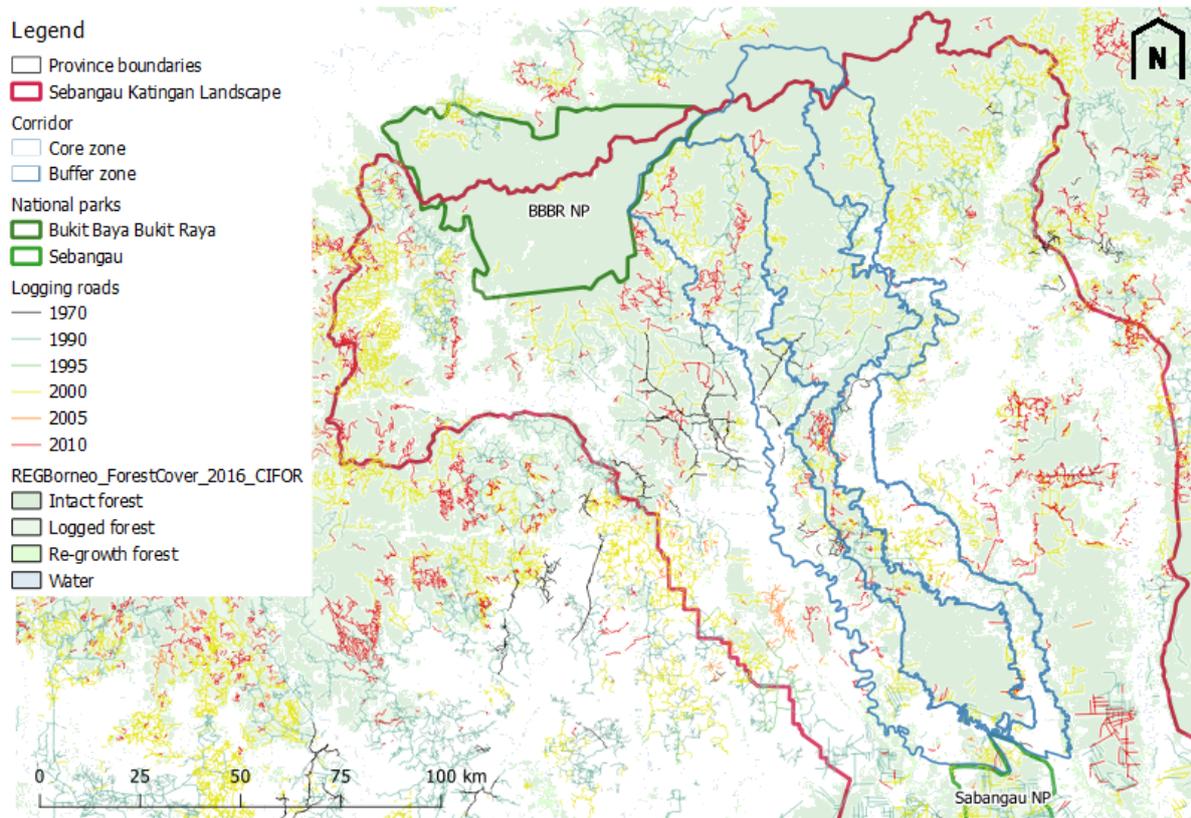


Figure 10: Logged roads in the ecological corridor, Source : author

Mining activities

Illegal mining in the corridor poses important environmental issues. Numerous mining companies operate in protected and conservation areas where such activities are prohibited (Contreras-Hermosilla and Fay, 2005). Also, an assessment ordered by the Ministry of Forestry in 2017 found that less than 1.5% of mining firms had the proper permits to operate in Central Kalimantan². Large-scale mining operations can result in important deforestation through forest cleaning and construction of roads opening remote forest areas, and cause important water pollution (mercury) and increased sediment loads, and soil destruction. There can also be troubles with wildlife hunting, land clearing and erosion³.

1.4 Mitigating the threats on forests and biodiversity: the development of an ecological corridor project by WWF

WWF-Indonesia and the Heart of Borneo Initiative

WWF Indonesia is governed by different boards: The Advisory Board, The Supervisory Board, and The Executive Board. Together, they design the policy orientation and the strategies of the organization. WWF has been formally present in Indonesia since 1998. There are 25 offices in Indonesia which implement field projects. In Indonesia, projects are run in 23 ecosystems and 16 provinces in these three

² Mongabay website, article published in 2011: <https://news.mongabay.com/2011/02/illegal-mining-plantation-development-rampant-in-indonesian-borneo-state-losses-top-17b/>

³ Mongabay website: article published in 2012: <https://rainforests.mongabay.com/0808.htm>