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Historical and Future Role of Wilmar Palm Oil in Deforestation of Indonesian Borneo

Sam Coroniti III
University of South Carolina - Columbia

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By

Sam Coroniti III

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Carol Boggs

Dr. Carol Boggs, Thesis Director

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Dr. Erin Meyer-Gutbrod Second Reader

Steve Lynn, Dean of South Carolina Honors College

Table of Contents

Political History……..…….**3**

Palm Oil……..……..**6**

Wilmar "Sustainability"……..**7**

Conflicting Policy and Action…….**12**

Federal Regulation……..…**16**

Failure of Federal Policy……**18**

Direct Federal Management……..……**19**

Turning a Greener Leaf?.....**24**

Ecosystems, Organisms, and Why to Save them…….**27**

Local and Global Ramifications……..…….**32**

A Forested Future……..**35**

Ecotourism…….……**36**

Outside Help……..……**39**

Conclusion……**40**

Works Cited……..**43**

Political History

At the intersection of 1º N, 114º E, there lies the third largest island on Earth, almost directly in line with the equator, and saturated with biodiversity: Borneo. It is jointly occupied by the nations of Indonesia, Malaysia, and Brunei, and is uniquely the only island on Earth to be inhabited by three nations simultaneously. Prior to the establishment of the independence of each nation here, the territories and colonies were occupied and subjected to many transitions of power and resulting conflict by Dutch, British, Japanese, and Muslim groups throughout history. The competition for the island was centered around its utility for fostering trade, especially for spices and other goods from Asia. Its central location amongst the four seas – the South China Sea, Sulu Sea, Celebes Sea, and Java Sea – made it one of the most coveted port locations of the 16th and 17th centuries. The final power transition came about at the conclusion of World War II, when Japanese control was removed and Dutch and British government attempted to reinstate control of the colonies, resulting in a surge of desire for independence from occupation by the inhabitants of the island. The freedom of governance was granted to the separate groups of inhabitants, with the northern states of Sarawak and Sabah becoming part of Malaysia, miniscule Brunei maintaining its separate status, and the largest area, southern based Kalimantan, joining Indonesia. Kalimantan is the largest of the three regions, containing

approximately 72% of the islands area, and contains the greatest amounts of yet untouched rainforest (Butler 2020). This region under Indonesian rule will be the focus of this study due to its size, biodiversity, and primary rainforest cover.

Since full control and independence was returned to the inhabitants of the island and national interest was directed away from the trade priorities of the previous colonizing nations, the focus transitioned to creating economic self-sufficiency without European directives. As with many developing nations and economies, one of the primary drivers for creating self-sufficiency is to secure steady food access and availability. This resulted in large scale agricultural expansion across the island, where crops such as rice, tobacco, pepper, sugarcane, and many others were planted in areas where forest had been clear cut or burned out of existence. One of the more notable efforts in this regard was the Mega Rice Project (MRP) of the mid 1990s, during which over 1 million hectares of the carbon-rich forests were drained and cleared (Heisman 2016). The freshly cleared acidic soils of the forests, termed “keranagas,” or “land which will not grow rice,” proved to be inadequate for the large-scale growing practices that were desired. Without soils that could sustain monoculture crop growth for successive years without depleting them of nutrients, clearing fresh space for crops became necessary for continued production. While clearing was ongoing, there was the further realization that the nutrients released from burning for clearing provided a better basis for crop growth than simply clearing the areas. Together, these forces eventually caused Borneo to become the most rapidly deforested area in history, and the amounts of carbon released from the primary rainforest and peat forests totaled millions of metric tons (Butler 2020). Additionally, these patterns of land use began steering the nations of Borneo into extractive and severely depletive practices for bolstering the economy similar to the concerning path adopted by Brazil (Dean et al. 2012). At

the current usage rates and considering the finite nature of popular exports such as natural ores, minerals, timber products, and fossil fuels throughout the forested hills of Borneo, depletion resulting in economic collapse can be expected in decades.

Palm Oil

The devastation of these expanding unsustainable land conversion and growing practices culminated with the successful establishment of palm oil plantations on Borneo in the early and mid-1800s. This was extremely significant for the economy, since palm oil is by far the most productive seed in terms of useful oil produced. Bornean rainforest was thereafter cleared for palm oil monocultures with more fervor than the country had seen during the early stages of economic rise. Land clearing reached a point of such great intensity in 1997, 2003, 2015 and 2019 that the Southeast Asian Haze was attributed primarily to the slash and burn being utilized on the island (Butler 2020). This choked countries throughout the area in thick smoke that had negative implications for both the global climate as well as public health. (Voiland 2019).

Palm oil is highly sought after because of the multitude of profitable characteristics it possesses. Palm oil has the greatest yield of oils harvested from its fruits and seeds of all oil producing vegetation, producing an average of 4.7 times more oil than the next closest contenders (Taylor 2022, Berwyn 2018). Additionally, the shape of the plants themselves is economically preferable, as their significant vertical growth allows many more to be planted per acre than sprawling or low growing oil sources such as soy. Combine these aspects with the lowest market price and a guarantee that it won’t expire at room temperature and you have all the reasons why it is the greatest constituent of vegetable oils today. Beyond the kitchen, palm oil is added to many other products such as shampoo, gasoline, and cosmetics. As of 2015, palm oil was found in over 40% of shelved products in countries such as the U.S. and Australia

(Greenpeace 2015). Outside of common foods and goods, palm oil has even made its way into items such as plywood, car bodies, and fiberboard; its versatility as a single plant is truly unmatched, which has enabled the expansion of palm oil plantations to occur with a similarly unmatched rate and destructive wake (Tillis 2019).

The first palm tree plantation can be tracked all the way back to British occupation of Indonesia, where the oils harvested gained mild popularity as an export in the 1800s. From that point until 1995, global demand remained moderate, with the peak tons of oil produced in 1995 being just 15.2 million (Tillis 2019). Singapore-based Wilmar International Limited joined the palm oil producing community in 1991 with a 7,000-hectare (70 square kilometer) plantation, which has grown by nearly 40 times since then in terms of planted hectares of palm oil. During Wilmar's expansion over the next 24 years, they rose to the top of the palm oil producing community as the annual tons of oil produced quadrupled, reaching over 62.6 million tons in 2015. In 2021, it rose to exceed 75.5 million tons, which comes out to around 2.4 billion gallons, or enough palm oil to fill 3,362 Olympic swimming pools (Wilmar 2021). During their growth, the expansion of the industry showed no signs of slowing down as the applications of palm oil continued to expand alongside the attraction to its inexpensiveness. If these trends of increasing demand continue without a sustainable means of meeting them being established, the rainforests of Borneo will continue to face destruction of coveted primary forest that could reduce the cover to under 30% in just a few decades (Gaveau et al. 2018).

Wilmar "Sustainability"

For decades, Wilmar focused on expanding the scale of their operations before any reconciliation of environmental impact began. By 2013, over 300 subsidiary companies and a total of over 241,000 hectares of palm oil plantations were established with little to no evidence

of sustainable practices. As a result, the world's largest sovereign wealth fund, The Norwegian Government Pension Fund Global (GPFG), excluded Wilmar International from their listing of compliant companies (Statista 2022, Mongabay 2013). The exact cause that was cited for dropping Wilmar was their unsustainable sourcing of palm oil, which forced Wilmar onto a path of greater environmental concern as they continued to develop (Butler 2013). This action was taken as global recognition of the environmental damage caused by Wilmar began to grow, and consumer pressure demanded the fund distance themselves from unsustainable companies. Norway and Indonesian Borneo had previously operated under a partnership established in 2010 that pledged 1 billion USD for the funding of "positive results based on Reduced Emissions from Deforestation and Degradation" (REDD+), which was centered around the moratorium for plantation development in primary forest areas (Groom et al. 2022). Since 2009, the fund has embraced initiatives to reduce deforestation, pledging 522 million US dollars to the cause annually (Mongabay 2013)

Wilmar expressed their newfound environmentalism in their NDPE policy implementation on December 5th of 2013, which stands for "No Deforestation, No Peat, No Exploitation". The name aptly describes the 2020 goals they set forth, with the first two components relating to the environment and the third concerning their exploitation and frequent abuse of power towards indigenous peoples as well as their own workers. In order to make their policy effective, they simultaneously embraced the HCV-HCS (High Conservation Value- High Carbon Stock) assessment methods for evaluating areas of conservation and climatic value. The objective of the HCV-HCS evaluation methods was to start with the bare minimum of environmental and climatic progress by identifying the areas of greatest value in the respective regards so that development of any kind could be avoided there. This does contrast with the 'No

Deforestation' bit of the former pledge, as the goal of not further deforesting would indicate that even areas that don't fall into prioritized zoning based on the HCV-HCS assessment should be safe from further development.

At the same time that these practices were adopted, Wilmar entered into the Roundtable on Sustainable Palm Oil (RSPO) to further their veneer of environmentalism. This certification affords those included a label of sustainability, transparent supply chains, and ethical, socially beneficial production (RSPO 2004). While the goals outlined are desirable, the diligence in ensuring that companies applying for it have met the standards is shortsighted and inadequate (Jong 2018). Corporations and their subsidiaries can secure what is considered the highest level of sustainable certification for palm oil without any investigation into the history of the plantations in question. This creates a loophole such that if thousands of hectares of primary forest are removed and replaced with a plantation today, as long as the deforestation is not ongoing at the time of application for the label, it can and likely will be approved. Thus, a history of unsustainable practice goes unconsidered when gaining the privileges of RSPO recognition. Through this loophole, consumers can be misled into buying products that came from areas once occupied by primary forest, and new plantations that clear primary forest can argue that the land was cleared when they began to develop it (Jong 2018).

By practicing minimally investigative, surface level inspection of these plantations, they will always appear to be in areas of already degraded forest, even if the development of the plantation was the cause. Studies such as the Gaveua et al. (2018) assessment insufficiently consider the scale of unsustainable expansion due to a lack of knowledge about the formation of degraded rainforest that is considered suitable for plantations. Digging further into the lack of effective enforcement surrounding the label makes it clear that Wilmar and many of the other

companies certified under this label are abusing the false environmental advertising it provides while changing their development schemes a negligible amount, resulting in the appearance of green practices without the action. An investigation by Mongabay found that up to 41% of certified producers today are historical participants of primary forest removal for plantations, and 38.3% of primary forest loss from 2001 to 2016 is attributed directly to certification-carrying members of the RSPO (Jong 2020).

The act of creating the image of sustainable practices and advertising eco-centric operations without putting it into practice is termed “greenwashing”, and it is an effective tool used by corporations to mislead consumers across the world. Greenwashing usually takes the form of false labels and certifications, irrelevant or deceptive images of nature relating to the company, or through hidden trade offs or outsourcing of the environmental issues (Faizmal 2021). Not only is this practice deemed unethical, but nations such as the US have recognized it as illegal false advertising, with the Federal Trade Commission (FTC) establishing “Green Guides” to regulate this behavior (Federal Trade Commission 2021). Since the formation of the guides in 1992, they have gone through continuous revisions and improvements to help stay ahead of those trying to take advantage of unsuspecting consumers, but catching companies on their lies and being able to exact punishment has proved to be a challenging task (Stover 2020).

After facing pressure to up their standards and being called out for enabling greenwashing, the RSPO reevaluated their standards and goals in 2018 and subsequently added conditions that prohibited any further clearing of HCS or peat areas for palm oil. In actuality, their ability to monitor and enforce stayed steady, and because of this Wilmar has maintained their membership status despite a general lack of compliance with the updated parameters (Jong 2018). However, a second group that Wilmar belonged to, known as the High Carbon Stock

Approach (HCSA), began to scrutinize Wilmar more carefully. This group focuses on preserving forests of greatest climate and environmental value, and is a core pillar of RSPO certification (Jong 2020).

Unsurprisingly, as the closer examination began to hinder the palm oil giant's ability to operate without care, the enterprise elected to withdraw from the HCSA. The company officially released a statement citing governmental issues, mismanagement of funds within the organization, and a specific dissatisfaction with the handling of an objection filed by Greenpeace as their cause for departure (Wilmar 2018). Greenpeace's objection toward the HCSA cited Wilmar as failing to achieve any of its goals to reduce and eliminate deforestation or see other environmentally oriented practices implemented in its supply chain in accordance with the NDPE policy (Jong 2020). The contents of the claim were not what they took issue with, however, as the concern from Wilmar came from the process in which the objection was raised, which they thought needed to be lodged as a grievance. Wilmar's declarations of fiscal irresponsibility and governmental disagreements toward the HCSA were refuted by executive director Judy Rodrigues, who demonstrated that the Greenpeace disagreement was handled in accordance with the due processes outlined in their guidelines and shed light on a governmental structure meeting that was forthcoming. According to Rodrigues, the timing of their exit, April 2nd, just 5 days before the scheduled meeting, coincides with deadlines to provide membership fees and forest data such as HCS and HSV assessments related to Wilmar's operation (Jong 2020).

These bold and lofty commitments ended up being just that, as deforestation throughout Borneo and Indonesia on the whole continued to expand outward into previously untouched swaths of rainforest. Between 2015 and 2018, another 130,000 hectares of rainforest were

cleared for palm oil plantations, with 18 of the 25 companies participating coming from under Wilmar's roof (Gosetti 2018). The clearing over that span brought the total rainforest area cleared for palm oil plantations to over 14 million hectares according to the Indonesian government, with significant portions not only violating Wilmar's pledges, but Indonesian law as well (Human Rights Network 2019). Additionally, over this span the HSV-HCS approach to regulating the areas cleared for palm oil was determined to be a farce as Wilmar utilized it.

By adopting the HSV-HCS method for evaluating the carbon and conservation value of segments of rainforest, Wilmar was able to dump the responsibility of assessing the rainforest quality onto third party assessors that have no feasible way to keep up with Wilmar's continued high rate of expansion. The assessment of swaths of forest comparable to the acreage plantations use can take months to fully evaluate, in which time Wilmar and their subsidiaries act under the assumption that they have the green light to begin removal. They've even resorted to deceptive attempts to create the mirage of diligence by sending in evaluators after the area has been cleared, as they did with one particular case concerning their Medcopapaua Hijua Selaras (MPHS) subsidiary, which cleared 732 hectares of primary forest while Wilmar delayed evaluation of the site (Jong 2020).

Conflicting Policy and Action

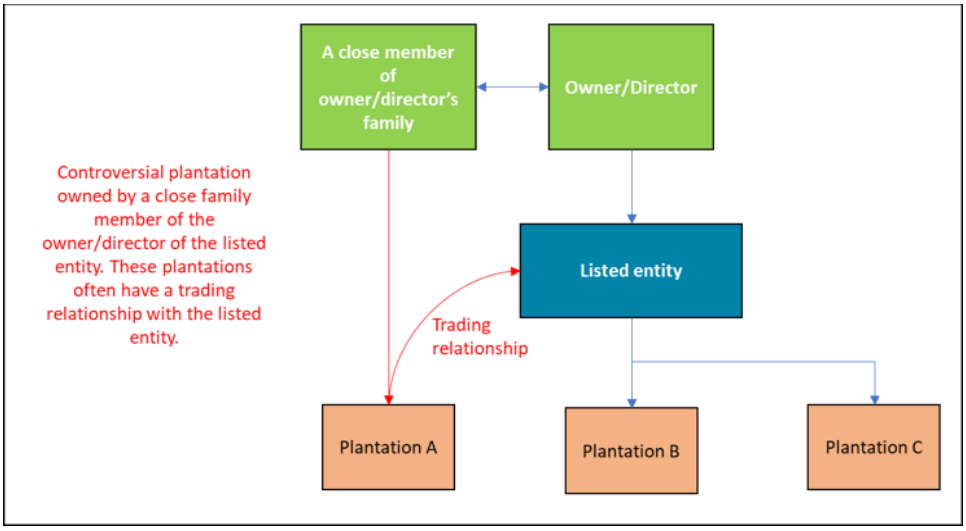
This particular case gained significant notoriety following Wilmar's attempt at a rebuttal to the Mongabay article. In attempting to address the grievances of the environmental community, Wilmar emailed a response to the author of the original article, Hans Jong, as an endeavor to clear their name from the crimes committed. The contents of the email, however, did not achieve this. Their enclosed claims supporting their amnesty made the company look disinterested in resolving the matter and fully unwilling to accept their role in deforestation. The

primary way that this occurred throughout the email was through prolific attempts to redirect the blame to almost any other group imaginable, including their own subsidiary. Further blame goes out to the local communities, who they cite as the drivers of the deforestation due to "continuous pressure", even though it is Wilmar's contracted machines that enact the destruction. The final and most outlandish shift in blame is redirected to the HCV-HCS method of assessment, which they cite as being inadequate and inconsistent in its criteria despite willingly embracing it only a few years prior (Wilmar 2018). As a final declaration of indignation, the company purports their commitment to fix the issue through "committing to plant 30,000 trees as part of the rehabilitation plan," when the estimated number of trees lost ranges in the millions (Wilmar 2018, Ismail 2020).

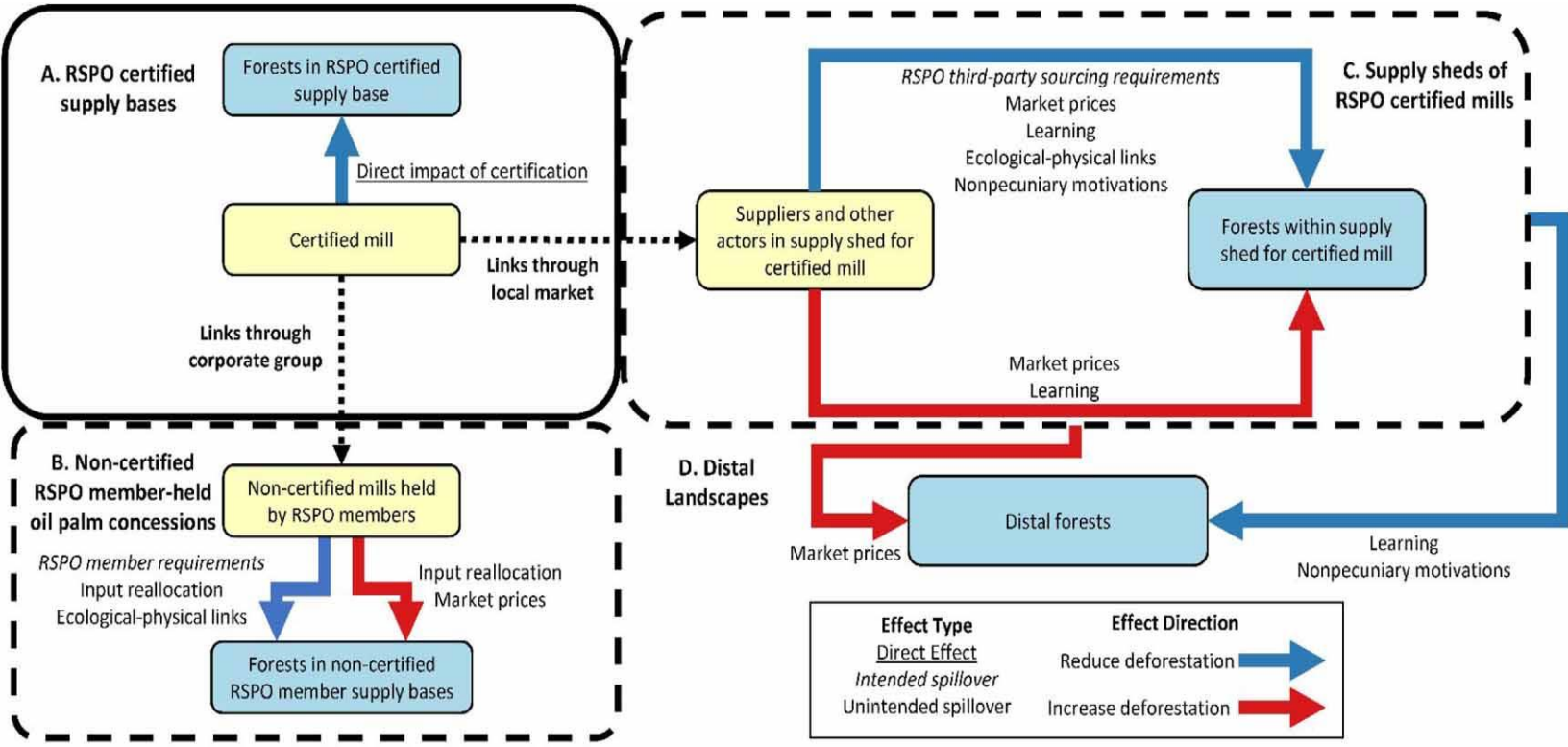
In 2018, with an ever-growing rainforest graveyard trailing Wilmar's economic advance, public outcry from watchdogs and NGOs such as Mongabay and Greenpeace again forced Wilmar to up their environmental practices. The original 2015 deadline for full integration of sustainability in the supply chain was not achieved, prompting concerned groups to determine what was causing the shortcomings (Wilmar 2019). As investigation into their supposedly transparent supply chain concluded that sustainability consistently remained absent (Butler 2021, Jong 2018, Jong 2021), Wilmar was pressured to use their position and commitments to make their suppliers and subsidiaries follow the same NDPE path they embarked on years ago to feasibly achieve their commitments by the new deadline of 2020. In addition to requiring that the smallholders operate based on that policy, they announced that they would require recovery plans for heavily deforested areas so that some of the damage could be addressed. Even in taking this restitutive action, Wilmar again tried to remove themselves from any guilt of prior failure,

this time by suggesting the national governments need to play a larger role than themselves in making sustainable harvest the norm (Jong 2020).

To further themselves from scrutiny during this period, the company had to cut ties with one of their co-founders and non-executive chairman, Martua Sitorus, because he was found to be guilty of practicing exactly what they were claiming to be in the process of eliminating. Behind the scenes, it was discovered that Sitorus was operating a second firm that practiced blatant deforestation exceeding 20,000 hectares while supplying the main body, Wilmar, with 'RSPO Certified' palm oil (The Chain 2018). This is similar to the issue of "shadow companies" contained within palm oil companies that conceal destructive practices and feed unsustainable palm into the sustainably certified supply (Pye 2018). As a non-executive member, Sitorous would advise the company on its directives without the responsibility of finalizing decisions or ensuring that initiatives are fulfilled. There is no legal distinction between an executive and non-executive, but non-executives are generally not expected to participate in the business as much. The system is found in many plantation operations around rainforests, particularly where an executive position is held by a family member (*The Chain 2018*). The graphic contained in the article, shown above, demonstrates the simple relationship.



A further look into the issues surrounding RSPO certification was carried out in 2020 to gain a better understanding of how 'spillover' was caused by location restrictions imposed in the policy. 'Spillover' was defined as "the movement of actors, processes, or knowledge to other locations," as they relate to environmental policies contained within the RSPO (Heilmayr et al



2020). The results from the paper show that HCV/HCA evaluation component is effective at protecting the most valuable tracts of forest that have been identified, but allows for substantial deforestation to continue nonetheless (Heilmayr et al 2020). The visual depiction of these processes provided in the article shows the various impacts of spillover on deforestation.

Gatti et al. (2016) found further evidence that certification does not align with net gain for the environment, stating "We conclude that certified productions of palm oil still lead to severe deforestation and may be no more sustainable than non-certified programs" (Gatti et al. 2019, pp. 45).

Federal Regulation

While certification groups, environmental watchdogs, and the general public have made strides to combat the destructive path of palm oil production in Borneo, national level policy efforts from the government have not reciprocated the effort. The Indonesian government is structured similarly to that of the United States, with the same three-branch system that we employ. The two bodies of the legislative branch, the Regional Representative Council and the Peoples Representative Council, serve 5-year terms in office during which they are charged with the responsibility of amending and removing components of the Indonesian Constitution. The President in Indonesia similarly serves a 5-year term after winning a majority vote in an election; the country is currently headed by Joko Widodo, who was reelected for a second term in 2019. Like in the US, the president may appoint their own cabinet to manage the departments within the government, including the Ministry of Environment and Forestry, leadership of which he gave to Siti Nurbaya Bakar. Since its foundation, the legislative branch has ratified 14 international environmentally oriented treaties, with notable treaties relating to tropical deforestation including the Paris Climate Agreement, Biodiversity treaty, and Tropical Timber 2006 agreement (CIA 2022).

A noteworthy component of Indonesia's legal framework is the idea of legal pluralism that was adopted from aspects of Islamic law (Salim 2013). Legal pluralism indicates the "recognition of the nation-state of the existence of multiple sources of law within its own jurisdiction," such as religious or customary laws, international treaties, and more (Wang 2001). Furthermore, there is the legal argument that pluralism gives primary legal right to pre-existing institutions over the governmental authority, which would dictate that indigenous groups and villages would be in the right to protect their lands however their customs dictate (Wang 2001).

In the past, communities have leveraged this power against the government to gain all of the rights provided by components of the law outside of federally enacted policies such as the 2004 Plantation act. The group used provisions from the UN Convention for the Elimination of Racial Discrimination (CERD) against the state legal system to gain rights in their customary system (Johnstone 2010). In practice, however, the Indonesian government has ignored this component of their legal system when it interferes with plantation expansion, resulting in few wins for afflicted communities (*Human Rights Watch 2019*).

As a developing nation, the governmental and legislative priorities of Indonesia have been economically focused, much as Wilmar's growth as a company was. The first record of environmental protection in Indonesia is written in the constitution, which states that "Land and water and the natural resources contained therein shall be controlled by the state and be utilized for the greatest welfare of the people" (Nurjaya 2007). This original statement lacks details about protecting or conserving the environment, and thus the policies implemented over the last quarter century have not prioritized sustainability and biological preservation, leaving intentional room for exploitation of the natural world for the profit and uplifting of the standard of living of citizens and economy. From 1960 to 2004, 10 major environmental laws were written and put into practice to guide the relationship between man and the environment in Indonesia:

1. Basic Agrarian Act No. 5/1960
2. Basic Mining Act No. 11/1967
3. Industrial Act No. 5/1983
4. Water Resources Act No. 7/2004
5. Exclusive Economic Zone Act No. 5/1983
6. Fishery Act No. 31/2004
7. 7. Biological Diversity Conservation Act No. 5/1990
8. Spatial Use Act No. 24/1992
9. Human Environment Management Act No. 23/1997

10. Forestry Act No. 41/1999

(Modified from Nurjaya 2007)

Six of these ten continued to support direct exploitation of the environment, and the relationship remained degrading and unsustainable. It wasn't until the Basic Living Environment Act of 1982 that the nation sought to develop greater care and protection for the natural environment on a policy level. This legislature was the first instance of legislature that specifically called for the upholding of the provisions in the constitution (Nurjaya 2007). Even with the creation of the 1982 Act, the policies in place remained highly exploitative in nature and required further revision following the 1992 United Nations Earth Summit. Introduced at the convention were principles 4 and 11, regarding sustainability and policy implementation, respectively, which necessitated that the 1982 legislation be updated to fit the modern standard. Principle 4 dictates that "environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it," while principle 11 clarifies that "States shall enact effective environmental legislation. Environmental standards, management objectives, and priorities should reflect the environmental and developmental context to which they apply" (United Nations 1992). The resulting law in Indonesia was labeled the Human Environment Management Act No. 23/1997, which completely replaced the previously used Basic Living Environment Act of 1982.

Failure of Federal Policy

Despite Indonesia's continuous progress in regulating the environment in a sustainable manner and meeting international standards for environmental management, many challenges persist for efforts to create positive change for the environment and the way that it is treated. The policies remain exploitative in nature primarily because Indonesia was in a state of significant

development as a nation at the time the legislation was adopted, which article 11 of the UN Earth Summit (2019) grants greater leeway for. As a result, the ecological and cultural values of the environment are second priority to effective economic management of resources. Due to the desire to maximize economic gains from the natural environment, big businesses have the edge over small ones because the government knows greater revenue is generated when natural resource based operations are industrially scaled. This issue is further worsened by corruption within the Ministry of Environment and Forestry, which has had dozens of convictions against members of the department (Schütte 2020). This process firstly makes the natural resource economy inaccessible, but recently it has been found that the Indigenous and local interests and rights to the land are then completely ignored, resulting even in the death of some community members that defended their land (Jong 2021, *Human Rights Watch 2019*). Local and indigenous rights and interests can be ignored with even greater ease because of Indonesia's pluralism ideology of the law, which allows for multiple sources of effective law to be presented for a legal argument. While this sounds like it should be more inclusive and respect the rights of those practicing traditional law, in practice it is a way for the government to present their own documents that discredit the claims of other groups. The final issue surrounding the current environmental policies in Indonesia stems from disorganized management structure for resources, which has different resources such as minerals, timber, water, and air managed separate from conservation and environmental protection, which allows for serious conflict between resources and protection needs (Nurjaya 2007).

Direct Federal Management

Outside of the general outlining policies for environmental management in Indonesia, there have been a few direct attempts to use legislature to slow down deforestation and

environmental exploitation in the palm oil sector. In 2011, then-president Susilo Yudhuyono announced that they were banning forest clearing of peatland and primary forests and advertised it as a successful operation; however, in 2018 , satellite imagery of areas protected by this law were found to have 141% greater forest loss since 2011 relative to the same span before the policy (Jong 2019). Another angle to curb deforestation occurred in 2018 when President Widodo enacted a 3-year moratorium on the approval of new palm oil plantation permits to try to curb the rate of land conversion and forest loss once again. The Indonesian government advertised that there was a 75% decrease in deforestation following implementation, however, government operated land clearing persisted during this time for their PTPN I palm oil company (Rainforest Action Network 2018). Government palm holding subsidiaries PTPN I – PTPN XIV hold palm oil land and assets worth over 5.7 billion, with over 1 million hectares of plantations under PTPN III alone (Butler, Hilton 2014).

Thus, the road of conflicting policy and action from the Indonesian government continues, as they attempt to manage private palm oil companies through restrictive policies despite leveling primary forest at will. The economic interests of the nation took the forefront of recent policy once again with the passing of the 2020 Omnibus law. The design of the law, which was hastily passed, is to loosen economic restrictions and increase economic mobility of citizens by facilitating greater and easier access to investment from foreign markets. Environmentalists and foreign investors, however, quickly recognized that by making the nation much more open to foreign investment, investors with little to no care for the consequences of environmental degradation would be able to enter the market without need for great concern (Jong 2020). One of the primary ways that watchdogs such as the International Monetary Fund (IMF) envision such degradation occurring is through restrictions on the effective ability for the

public to challenge and contend the environmental and social consequences of economic activity that are brought in. The Minister of Environment and Forestry, Siti Nurbaya Bakar, stated that "the interests of directly impacted local communities have often been diluted by indirect outside interests," with regard to the change in opportunity to convey grievances. Concerned groups around the world, such as a group of 35 investors worth over US $4 trillion that includes the IMF and Baker Mackenzie global law firm, do not necessarily believe the true motive is to limit the influence of Non-Governmental Organizations (NGOs) that are further removed from the situation as they government advertises, but to limit pushback from the communities that have a genuine case to make. Furthermore, there are direct provisions within the law that conflate previous environmental interests that were passed into law, such as ending a requirement for environmental permits that were previously required before business permits could be attained, enabling greater ease of deforestation than was previously permitted (Jong 2020).

Specific environmental provisions eliminated by the passing of the Omnibus Law include a requirement to maintain 30% of watershed and/or island area as forested area, despite knowing that land clearing accounts for over 40% of Indonesia's greenhouse gas (GHG) emissions (Jong 2020). Coal operations also received greater leniency with their environmental requirements, with royalties being granted for expanded coal mining and refining facilities, allowing consequences of environmental impact to be expunged so long as a report on environmental conditions is presented (Jong 2020). Muhamad Ramdan Andri Gunawan Wibisana of the University of Indonesia reviewed an explanatory academic paper published by the government, in which he found unsubstantiated evidence supported by the government that he would not have supported. He goes on to state that the study makes the suspicion of the government toward their own people's ability to manage the environment evident, adding that "If the people are

suspicious of the government, that's normal. But the government being suspicious of their own people? I'm confused," (Jong 2020).

Further concerns about the Omnibus law derive from the distance created between the environmental issues and the assessment teams tasked with monitoring them. The policies enacted by the Indonesian government are already significantly removed from the island of Borneo by distance, making it hard to respond quickly to the policy needs of the island. This problem is expected to increase under the provisions of the Omnibus Law, which would transfer the control of environmental assessments out of the hands of local governments and into the possession of central and provincial governments that do not have as strong of a gauge of the conditions on the ground (Jong 2020). This disrupts the amdal process, which is the method used to review impacts of business plans on the environment and which was previously centered around community participation (Gokkon 2018). The law was found to be unconstitutional due to the proceedings that put it into place, however, it will remain in effect over the two years that it is reviewed and the policy aspects that alarmed environmentalists around the globe will not be subject to change (Aditya 2021).

With the Omnibus Law in effect and natural resource exploitation ramping up again, the government made the source of the intended resources apparent by announcing and passing a bill to relocate the capital from Jakarta on the mainland to the middle of the jungle in East Kalimantan in the North Penajam Paser (Da Costa,

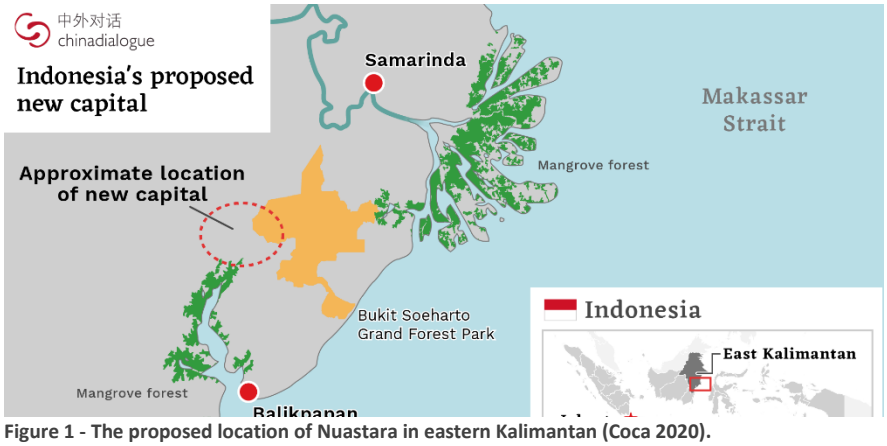


Figure 1 - The proposed location of Nuastara in eastern Kalimantan (Coca 2020).

Lamb 2022). The location of the city, set to be called Nusantara, is in the middle of recovering forest areas and next to Bukit Soeharto Grand Forest Park and Samboja Lestari, the orangutan sanctuary of the Borneo Orangutan Survival Foundation (Cambell-Smith 2012).

The move is expected to take two decades, but when complete, more than 1.5 million people are expected to move into the 256,000-hectare site, which will require substantial land conversion for human processes and institutions for survival as well as contribute serious polluting and anthropocentric influence on the surrounding habitat (Theissen 2022). The move is being forced into action because of extreme overpopulation and environmental degradation in the current capital of Jakarta, which was home to just under 11 million people in 2021 (*FirstPost 2022*). The government has consistently iterated that the city will be green in design, and all steps to mitigate the environmental impact to the area will be taken, but the 32-billion-dollar project has many thinking that the cost and lofty goals will inhibit the greenness of implementation and function. Additionally, creating access to the area by plane and automobile will require severely disturbing airports and roads, with particular concern for highways such as the Trans-Kalimantan Highway that will bulldoze through tracts of previously untouched primary forest (Gaveau 2022). The project and concerns are still only in the stage of being assessed and reviewed, and the true devastation to the area remains to be seen.

The most recent environment related action from the government comes from a long overdue land permit reevaluation, revoking 3.1 million hectares of land covered by permits for development for logging, plantation, and mining concessions, with a great many coming from the palm oil sector (Jong 2022). Of the 3 million plus hectares, at least 2.4 million hectares currently stand as rainforest, marking a significant opportunity to designate forest for protection into the future; whether the government will follow through with claims to achieve this or not is

heavily debated. There is concern within the government that the permits will be redistributed primarily to other companies to extract the resources faster where previous permit holders were not operating as efficiently as desired (Jong 2022). There are diverse preferences for the outcome of the revocation of the permits, with the president hoping to more efficiently manage the revenue from natural resources while groups such as the Consortium for Agrarian Reform, Greenpeace Indonesia, and the Ministry of Environment and Forestry have all expressed that these areas are conservation targets that should be returned to the indigenous people around them to manage and protect them (Jong 2022) . Even amongst these environmental groups there is disagreement, as Forestry Minister Siti Bakar has remained pro-conservation regarding these lands, even as the department's director general of forest planning, Ruandha Sugardiman, announced plans to give the permits to new exploitative businesses coming in (CNBC Indonesia 2022).

Turning a Greener Leaf?

The conflicting goals within the government can be hailed as a positive sign, even if the permits are mostly reassigned to new businesses that degrade the environment. Indonesia has prioritized the uplifting of social and economic status of citizens, which has allowed the natural world to be trammeled without significant penalties to perpetrators. Previously, groups were unable to or had minimal success when challenging economic operations that violated the environment. The current disagreement and advocacy on the side of the environment indicate strong shifts in ideology that may result in greater integration of eco-centric policy into the framework of environmental legislation. Even as the action of the nation remains exploitative, they are clearly thinking about the future of the country's natural resource use, with planned land

concessions of over 12.7 million hectares of forest to be returned to local people announced in 2015 (WRI 2021).

While the legislative bodies and president manage national policy of Indonesia, it is the responsibility of the Jakarta-based Ministry of Forestry and Environment to manage the health of the natural world in Indonesia. The department is the product of a 2014 merge between what were previously two separate ministries: the Ministry of Environment and the Ministry of Forestry. Since combining, their responsibilities have expanded to include action against climate change, and three important positions withing the ministry were created: the Climate Change Oversight Director (Nur Masripatin), the Environmental and Forestry Spatial Planning Director General (San Afri Awang) and Social Forestry and Environmental Partnerships Director-General (Hadi Darayanto). Each of these leaders was appointed based on a previous position held in the department of forestry. One notable outcome of this combination of departments was the resulting nullification of the Reducing Emissions from Deforestation and Degradation+ (REDD+) Task Force that previously used a comprehensive REDD+ strategy established in 2012. This plan was in place to mitigate impacts to climate change and create economic incentive for sustainable management of natural resources, nearly exactly as the department seeks to operate, and the reasons for its discontinuation were unclear (Sapariah 2015). Altogether, the ministry is now responsible for more than 70 percent of the land owned by Indonesia, which is concerning since the ministry is considered one of the most corrupt and powerful bodies in the Indonesian government (Berthelsen, Bowring 2014). Furthermore, despite having the rights to control of 70% of Indonesia's land, the ministry has only gazetted, or legalized its claim to, about 10% of the land over the span of decades. Overall, the economically incentivized framework of the government and a lack of coordinated conservation practices have

made the Ministry of Forestry and Environment unreliable when attempting to mitigate the destruction of natural habitats and primary forest.

Accountability isn't the only concern within the department, for they are also stretched very thin when attempting to enforce protections for the many millions of specifically denoted hectares of rainforest under conservation status. In some Indonesian parks, they can only staff one person per 7,000 hectares of rainforest, making full surveillance of the region impossible (Rahayu-Faida 2020). At the end of 2019, the Indonesian government withdrew from their contract with the World Wildlife Fund (WWF), exacerbating the lack of enforcement in parks where many WWF officials had operated conservation projects while monitoring for violations of environmental policy in their jurisdiction (Jong 2020). Recent efforts to preserve the jungle have worked to incorporate local and indigenous communities more, similar to the notion of returning national parks to native tribes in the United States proposed by David Treuer in April of 2021 (Treuer 2021). The department recognizes three types of designations for forested areas: conservation forests (18%), protection forests (25%), or production forests (57%), which are further divided into limited and permanent production forests (*Timber Trade Portal 2020*). The designations decide how the land is treated, with three main purposes of land use in the department being conservation, rehabilitation, and resource utilization (Ministry of Forestry 2017). To alleviate the pressure from disgruntled communities impacted by conservation areas of forest, such as with the establishment of Kelimutu National Park of East Nusa Tanggara province, the Ministry of Environment and Forestry adopted what they call the Conservation Partnership scheme (Rahayu-Faida 2020). According to the Statista Research Department (SRD), these strategies are more inclusive of locals and even help produce non-timber forest products that the communities regularly collect, such as durian fruits, of which Indonesia is one of the

largest exporters on earth (SRD 2020). By incorporating the interests of the local people, greater willingness to accommodate habitat conservation can be achieved while also preserving cultural traditions and customs. If educational components about conservation and the local culture can be implemented, these efforts will meet the criteria needed for ecotourism status, according to the criteria outlined by Stronza et al. (2019).

Ecosystems, Organisms, and Why to Save them

All of the above policy and the coinciding lack of a sustainable relationship with the environment in Borneo is a product of the extraordinary intrinsic and extrinsic worth of the ecosystems the island contains. Indonesia is extraordinarily rich in diversity, both cultural and biological; it ranks 2nd on earth in terms of biodiversity and is highly regarded for its cultural diversity, with 300+ unique ethnic groups (Curran 1997). The range of ecosystems within Borneo include montane rainforests, peat forests and swamps, mangrove forests, and dipterocarp forests, which together are able to sustain a collection of organisms replicated nowhere else on earth (WWF 2006). An average of 12 new species have been discovered annually in Borneo since 1994, and the forests are known to be home to over 15,000 plant species, 1,400+ vertebrate species, and an untold

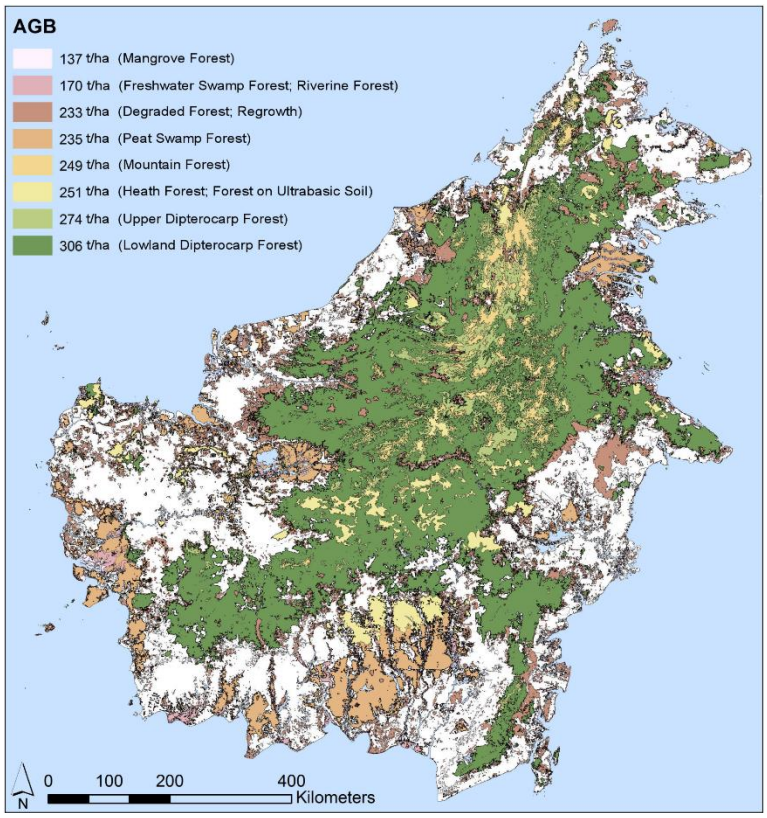


Figure 2 - Range of ecosystems across Borneo in 2015 (Langner et al. 2015)

number of insects, with over 6,000 plants and over 100 animals being endemic to the area (Shoumatoff 2017). The forests, which are more than twice as old as the amazon system, contain great value beyond the other species that they give home to, both environmentally and economically (*Earth Island Institute)*.

The dipterocarp forests of Borneo are the greatest of anywhere on earth, where the 250 endemic species, including the tallest tropical tree in existence, *Shorea faguetana*, earn Borneo the title of world capital of this towering, fruit bearing tree species (Shoumatoff 2017). These trees are unique, as they employ a synchronized reproduction strategy known as 'mast fruiting' during El Nino-Southern Oscillations (ENSO) that is unmatched in terms of fruit volume produced (Krishnapillay 2004). These events provide much needed nutrients to the species that depend on them as well as to the entire system, and the species is recognized as the backbone of primary forest ecosystems in Borneo because of its status as a climax species (*In Defense of Plants*, 2017). The massive members of the species play an important role in succession by blocking sunlight from the forest floor until they eventually fall and create light gaps for the growth of other species as well as some of their shorter species members. The ability for these trees to provide for the environment have been hindered by logging and fires, which have landed over 60% of endemic species on the endangered list and caused seed mass per acre to decrease from 175 pounds per acre to just 16.5 pounds per acre over a span of 7 years (Shoumatoff 2017).

Economically, these trees are of equal or greater value than they are environmentally to many, as they are the leading tropical timber export of any tree species on the planet (Dopico 2019). The value of the timber comes from the size of the trees, with some exceeding 300 feet in height, coupled with the high quality and durability of the wood. In Kalimantan alone, these trees are logged and sold for 9.2 billion dollars annually where the wood is used for furniture and

construction (Butler 2005). Dipterocarps are also known to provide valuable resins and gurjun balsam, which are used for medicines (*Encyclopedia Britannica*). Other potential profits lie in the cancer and disease treatment sectors of medicine, where many compounds from Borneo's forests have successfully been applied (Cumbers 2019). Additional profits from dipterocarp forests are reaped once the towering trees are removed as buried minerals and fossil fuels such as coal are then mined and sold in international markets, accounting for just under 42% of all gross domestic product (GDP) in 2020 (Statista).

The peat swamps forests of Borneo are the most prolific forest cover in the lowest regions of the island, where dead organic matter remains wet and does not decompose, trapping enormous volumes of carbon in the form of peat (Butler 2020). The unique conditions of these saturated jungles provide habitat necessary for the endemic and endangered proboscis monkey, as well as the most coveted aquarium fish on earth, the arowana (Loucks). These wet areas can only prevent the carbon from being released while in the submerged anoxic conditions of the swamp, and thus draining these areas enables carbon dioxide-releasing decomposition processes to begin. The imbalance created by draining these swamps makes them susceptible to fires and burning, which is exacerbated by the dry conditions of el Nino. During ENSO periods, thousands of fires have been observed in drained peat swamp forests, where some may burn underground for weeks or months. The results of these uncontrolled fires can affect the environment and humans on a

Figure 3 - An orangutan standing over the charred remains of burned peatland forest (Handoko 2019).

continental scale as the 1997, 2003, and 2015 peat fires did, which freed over 4 billion tons of carbon that was stored underground, hospitalized thousands across southeast Asia, and directly lead to the starvation and death of thousands of critically endangered orangutans (Shoumatoff 2017).

Peat forests are not valued as greatly for their timber and forest products relative to the dipterocarp forests that are much easier to navigate and profit from. As a result, the primary use for peat forests comes from the nutrients released when they are burned and then converted into agricultural plantations. The 1997 peat fires cleared nearly 8 million hectares of what was previously primary peat swamp forests, opening the door for many development permits over the scorched but fertile sources (Butler 2015).

A third biodiverse region that is distinguished from other jungle forms are the montane forests, more popularly known as cloud forests, which occur from 1,000-4,095 meters above sea level throughout the mountains of Borneo. These cloud forests are similar to island archipelagos or “sky islands” such as the Madrean Sky Islands transecting the US-Mexico border, which are recognized for having distinct ecosystems at higher elevations above a matrix of distinctly different ecosystems (*US Forest Service*). In Borneo, the first transition from the dipterocarps of the lowland area includes oak, beech, and chestnut, which only occur around 300-500 meters above the dipterocarp range before giving way to Ericaceae-dominated landscapes. These trees continue up to 3,000-3,400 meters until they give way to the shrubbier, shorter, extreme-weather-tolerant alpine vegetation, including 30+ uniquely adapted species of pitcher plants or 800+ species of orchids (Wikramanayake). The vertebrate animals of the region are primarily smaller mammals and birds that have a more difficult time navigating and competing amongst

the larger species of the lowland areas, although species such as the Bornean bay cat, considered to be one of the rarest wild felines on earth, depend on this region to persist (Benito et al. 2016).

Thankfully, destruction of these forests has been limited because of their general inaccessibility and lack of fertile soils, but concern for the species contained within remains. As the changing global climate continues to shift ecosystem and species distributions, the stratified layers of the montane forest composition will be encroached upon from below, forcing above layers to reduce their size or cease to exist (Remington 2018). Additionally, the fires set for land clearing in lowland areas can climb up through the forests during dryer seasons, unintentionally destroying primary habitat without any use for the land that is cleared.

Heath forests once dominated the landscape of lowland Borneo, with base estimates for area coverage coming in around 7 million hectares; as of 2010, the forests were so diminished, the World Bank predicted full extinction of the ecosystem type by 2030 (Butler 2020). These regions, which are classified by nutrient poor, acidic “kerangas” soils and stunted plant growth, were decimated during plantation expansion across Borneo. This forest type is the least biodiverse of any on Borneo, although it still harbors a richness of species composition that dwarfs most other places on earth – in 12,600 square meters (1.26 hectares) of Bornean heath forests, 87 different tree species were identified (Butler 2020, Maimunah et al 2022). That is just three species shy of half of all the species in Canada, which is nearly 800 million times larger in terms of land area (*Tree Canada*). The few remaining hectares of heath forest no longer effectively serve their environmental purpose, now standing as a warning of what may come to the other systems of Borneo if expansion cannot be regulated.

The fifth and final distinct forests of Borneo are the mangrove forests surrounding the perimeter of the island. The intertwining, semi-submerged roots of the trees act as the first

barrier to the seismic and cyclone generated tidal activity that batters coasts along the Ring of Fire. These roots also act as a nursery for many juvenile fish and crustacean species that are not prepared to defend themselves in the open ocean, while the tops of the trees provide habitat for birds and the rarest wild cat on earth, the flat headed cat (Witling et al. 2017). Today, about half of all mangroves around Borneo have been levelled, with nearly 40% of the destruction stemming from palm oil and rice plantation land conversion projects on the island (Wikramanayake).

Local and Global Ramifications

The consequences of Bornean deforestation are not constrained by the boundaries of the island, and the issue of forest loss globally contributes more GHGs to the atmosphere than all of the transportation on Earth combined. Second only to the agriculture industry in terms of GHG's produced by a single industry, the tragedy of deforestation is that over 90% is thought to be done illegally, according to the UN (White 4:05). Climate change-driven processes propelled by these actions affect the entire planet, speeding the melting of permafrost and glaciers by trapping outgoing infrared radiation and disrupting the global radiation budget. Even worse, as melting increasingly exposes darker substrates below, more thermal radiation will be absorbed by the ground due to the diminished albedo effect (Schaefer 2016). This in turn comes back to harm tropical islands like Borneo in particular, as the increased sea surface temperatures (SST) give life to stronger storms amidst increased encroachment from rising oceans (Beradelli 2018). The devastation of anthropocentric climate change lurks below the surface of the ocean as well, as the carbon dioxide from greenhouse gasses simultaneously causes coral bleaching events and acidifies the water, preventing calcium carbonate formation and therefore survival for many reefs (Anthony et al. 2008). These environmental catastrophes range from the poles to the Great

Barrier Reef (GBR), and a significant amount of the gasses driving these effects can be traced directly back to Indonesian deforestation (Jong 2021).

The range of habitat provided by the 5 forest ecosystems creates the only place on earth where elephants, tigers, rhinos, and orangutans coexist, although for how much longer each of these species will persist is another matter (WWF 2022). Each of these charismatic species, along with an extensive list of rare and endemic species, are endangered or critically endangered according to the IUCN Red List of Threatened species (IUCN Red List). Without a full understanding of the complexities of the relationships between these organisms and other organisms in the environment, it can be extremely challenging to assess the full impact of species loss, but certain organisms such as the orangutan have been identified as keystone species on which many other organisms in the system depend for survival (*International Orangutan Foundation*).

As with any ecosystem, even if the exact manner of the interactions within it are unknown, it is known that the species within Borneo's diverse habitats exist in a web of interconnected relationships that uphold the functioning of the entire system. As habitat shrinks and is fragmented, negative consequences such as edge effects begin to alter remaining patches of suitable habitat from their typical state by enabling increased sun, wind, light, and noise penetration into the interior. These effects alter the plant composition of the area, as it favors more tolerant species, which in turn changes the faunal composition of the area (Laurance et al. 2007). In Borneo, forests within 500 meters of an edge created by deforestation had 25% less biomass than the interior (Qie et al. 2018). This process typically reduces the habitat area for specialist species and expands the range for exotic predatory species in particular, decreasing available resources for native species and making them more vulnerable to invasives (Aspen

2018). Specialists are more uniquely adapted organisms that have fewer or more directly dependent relationships within the ecosystem, such as the unique acoustic relationship shared by Hardwicke's wooly bat and Raffles' pitcher plant. The shape of this particular carnivorous pitcher plant reflects the call of the bat so that it may find it and safely rest there while simultaneously providing the pitcher with nutrients in the form of excreted guano (Schoner et al. 2015). There are hundreds of relationships like these that are found nowhere else on earth, and which will be found nowhere on earth if the primary forests that enable these interactions continue to be divided and destroyed.

Beyond the many unique species of Borneo that give it value in the environmental sense, the Bornean tropical forests provide substantial ecosystem services as carbon sequestering and storing entities. The peat swamp forests still standing in Borneo are estimated to contain over 6.4 gigatons of carbon (6.4 billion tons – nearly 20% of annual global carbon emissions released in 2020), which currently act as an important reservoir of carbon in the solid state (*WWF*). If these peat areas continue to be burned, the carbon released will have a profound impact on the global climate as it acts as a GHG in the atmosphere while tree cover and sequestering potential simultaneously decrease. Furthermore, as burning for land clearing continues to be rapidly followed by plantation establishment, the opportunity for fallow forests to develop and recapture some of the lost carbon is eliminated. Forest fallow is the time left between clearing of the area and establishment of the next cycle of plantation crops, which was found to reclaim 7.4% of carbon lost from clearing in Kalimantan (Hashimoto 2000). On the scale of deforestation in Borneo, allowing forest fallow to take root before beginning plantation operations could save huge volumes of carbon from aggregating in the atmosphere.

In order to further understand the worth of Borneo's forests, 2 million hectares of carbon-containing land were assessed by the WWF in 2005. The value of the carbon within had a maximum worth of a little over 7 billion dollars, which demonstrates some degree of value for the forests in their living state, but the worth of which pales in comparison to potential revenue from tropical timber sales or plantation development (WWF 2005). Deforestation globally accounts for 10-15% of global carbon emissions. Practices in Indonesia are much worse than the rest of the globe and have accounted for more than 50% of Indonesia's carbon emissions over a 16-year period and 6-8% of annual carbon emissions globally (*Rainforest Action Network*). When allowed to continue maturing, the dense plant populations of primary forest offset the carbon that is naturally released from metabolic processes and decomposing organic matter, continuously adding to the physical mass of carbon captured (Evans 2018). In Borneo, Groom (2022) found that overall biomass of old growth primary forests increased by an average of 430 kilograms (950 pounds) per hectare, per year. Considering that a third of Borneo's original primary forest was still standing as of 2020, which comes out to around 24.42 million hectares of land, there is the potential for the continuous growth of these forests to capture and assimilate an additional 10.5 million metric tons of carbon from the atmosphere each year (Butler 2020).

A Forested Future

With a long history of failed environmental measures and increasingly fragmented and unstable forests remaining, a new path of environmental stewardship must be adopted in Kalimantan. While Indonesia cannot regulate all of the degrading practices on the island, their control over the majority through Kalimantan means that they must play the largest role in conservation going forward. The current methods being employed, such as designating 45% of forests as conservation areas, moratoriums on land clearing, and lofty promises of reducing

carbon emissions, need to be subject to more rigorous enforcement (Aurora 2012). In addition to working to prevent further damage, violators must be properly reprimanded, as studies have shown the entire environmental penal system is ineffective in dealing out consequences proportional to the crimes committed (Ali, Setiawan 2021). Corruption, lack of enforcement and adequate penalties, mismanagement of resources, conflicting interests and policies, politically powerful corporations, and climate change have all impeded conservation and preservation attempts from those hoping to preserve the rainforests. As long as such a wide ranging and systematically ingrained list of oppressors stands against the forests or Borneo, a sustainable relationship with the biota will not be achieved.

Ecotourism

With such a rich diversity across a wide breadth of categories, Borneo is fortunately equipped with the natural building blocks for a sustainable and profitable economic system that can benefit both humans and environment. One of the most popular methods for achieving this is through ecotourism in Kalimantan. Indonesia's tourism sector accounts for only 4.1% of overall GDP and 10.5% of overall employment, of which 35% is attributed to ecotourism (*OECD Tourism Statistics*). These numbers are low compared to world averages and even lower compared to averages seen across southeast Asia and in other profoundly biodiverse countries such as Brazil and Colombia (Hieu, Yen 2019). All five components of comprehensive ecotourism, which Stronza (2019) has found to be prevalent in most discussions of the term, do not appear together frequently on most areas on the island. Numerous studies that have found great potential for sustainable ecotourism in all of the habitats found there because of the significant natural beauty, local culture, and presence of charismatic species (Rhama 2019; Rhama 2017; Rudiastuti et al 2017). The first necessity of ecotourism comes easily, as it is the

mere presence of natural areas, of which there are still plenty, although fewer every day. The second and third components require that local culture is not only preserved but somehow benefitted by the presence of tourism. The fourth condition states that there must be educational programming for both tourists and local communities, and the fifth condition ordains that tourism activities must bring net benefits to conservation, primarily through sustainable practices and infrastructure.

Before striving for complete ecotourism, Indonesia must expand its tourist capacity in a sustainable manner that enables conservation. Since 2018, the World Bank has funded the expansion of tourism and ecotourism facilities in Indonesia through a 300 million USD program (*World Bank*). At the time of the April 2021 check in, a little over 3 years into the 5-year project, increases in number of hotel rooms, participation in tourism awareness raising, sanitation, quality ratings, improved water, non-motorized traffic paths, and new trainees and professionals in tourism were all less than half of the desired December 2023 outcomes. Even if all of the goals cannot be fully achieved, it is important that Indonesia continue to employ tourism expansion methods that match the inclusivity levels put forth by the World Bank. Other expansion projects, such as the plan backed by Asian Infrastructure Investment Bank (AIIB) to create "10 new Bali's" has been advocated against by the UN due to the inhumane and threatening actions directed toward locals around development areas for the project (*United Nations*). Embracing development plans like this one to increase tourism will make it impossible to achieve ecotourism and create positive relationships between the natural and man-made world.

As sustainable tourism industries are expanded throughout the natural of landscapes of Borneo, they must be to the liking and benefit of local people that the industry encroaches upon. Conservation partnerships, which keep possession of the land in the hands of the government, are

an existing method that has been used to promote better relationships between indigenous people, conservation efforts, and the national government. This system allows indigenous and local groups to harvest natural forest products from a sector of federally protected land so long as they act as a steward and protector to the natural ecosystem (Simangunsong 2022). This practice has only been applied to 177,000 hectares of land as of 2020, while the 5,800 plus villages in conservation areas span over 22 million hectares (Simangunsong 2022; Jong 2018). If this program can expand significantly, the groundwork for upholding the second and third elements of ecotourism will be in established in many areas, requiring only conservation and education practices thereafter. Recommitting to past agreements with NGOs and international environmental groups (such as the WWF conservation and rainforest contract that was dropped in 2019) as well as creating entirely new commitments will institute the necessary conservation aspect. Expanding their partnership with Rainforest Connection, a group that installs audio recording devices from recycled cellphones, would provide a greater network of ex-situ monitoring devices that would give enforcement groups a legitimate chance to respond to deforestation as it occurs (White 4:15).

With ample natural beauty and charismatic species, Indonesia can draw on ecotourism bolstering strategies used in many other biodiverse regions around the world. Maldives is the greatest example of successful ecotourism integration, where nearly 40% of annual GDP is derived directly from tourism, and ecotourism constitutes a significant portion (Frost 2019). They were able to achieve the ecological component primarily through the determination of one single private company - Secret Paradis Maldives - that was interested in preserving the natural beauty of Maldives so they could educate the world about their biota. This has allowed the environment and economy of Maldives to steadily improve alongside each other, as needs to

happen in Borneo. Other nations that have found strategies to increase their ecotourism appeal have tried strategies like banning trophy hunting as Botswana did in 2014, which has led to over a third of African elephant populations making their homes there (Burke 2019). Other cases, such as the Pasape et al. (2015) study of ecotourism development in Tanzania, offer valuable insight on major hurdles to consider when attempting to introduce a comprehensive plan. The study was able to identify 18 governance strategies that can be employed to reduce the negative results that they observed, such as unproductive planning, inefficiencies, and mismanaged resources (Pasape et al. 2015).

Outside Help

Ecotourism alone cannot save Borneo's forests from further destruction. Embracing the species and culture of the island is an effective way to profit from their existence but does not put enough emphasis on pure preservation. In combination with ecotourism improvements, the government must permanently extend moratoriums to deforestation in the most valuable tracts of rainforest throughout Kalimantan. The government must make it clear that destruction of primary forest is completely illegal, eliminating any confusion created by the cessation of palm oil permit administration (Nangoy 2021). This will aid them in eventually meeting their nationally determined contributions (NDCs) dictated by the Paris Agreement, which were not achieved by the 2020 deadline (Jong 2022; Groom et al. 2022). Only 4% of the promised 26% reductions in GHG emissions were achieved over an 8-year span in Indonesia, and lack of enforcement around the deforestation moratorium was to blame (Jong 2022). These findings indicate that an extension on the moratorium alone will not be sufficient to curb deforestation and the carbon emissions produced from it; improvements to the policing of protected areas is of equal necessity. Expanding on the conservations partnerships by establishing foot patrols through

protected rainforest has been demonstrated to be an effective way to reduce illegal activities such as logging and poaching while increasing wildlife surveillance (Gonedele Bi et al. 2019).

The economic value of preserved forests cannot be ignored when prohibiting their use, and a variety of ways to measure their worth have developed as a result. India has pioneered a strategy termed the "ecological fiscal transfer" scheme, which provides rewards and benefits to states that maintain valuable forest (Mumbunan & Davey 2019). This revolutionary system redistributes 7.5% of state-returned tax dollars based on their forest cover levels over 5-year intervals and rewards the states proportionate to the difference observed. This comes out to around $6 billion US distributed to governments solely for protecting forest, over 6x the amount distributed by the former international leader, Norway (Busch 2015). This method also notably enables government officials to consider forest preservation as an economic avenue that can be built upon through reforestation for profit beyond the tax returns. Further economic incentives for forest preservation include carbon credit systems, which would be an effective way for companies like Wilmar to pay off the economic equivalent of the environmental damage they have done to owners of protected rainforest (Reichle 2020). Cap and trade systems with carbon credits exist in over 40 nations across the world, providing ways for the most destructive industries to account for their damage to the environment and welfare of citizens (Plumer & Popovich, 2019). These systems estimate a dollar value per volumetric ton of carbon dioxide produced and force polluting companies to purchase the credits from other companies that have prevented GHG emissions for each ton of CO_2 in excess of the amount permitted (*Native 2021*).

Conclusion

While regulation is improved on the governmental end, responsibility is due from palm oil plantation owners like Wilmar. The policies that they have set forth and the green practices

they advertise are a glimpse of what needs to become an inherent component of operation as a business. The time and resources being expended to reduce the ecological and carbon footprints of the company will have been wasted if their enforcement is too slow to preserve the ecosystems before collapse begins. Sustainable forestry, and therefore palm oil production, has shown potential for greater economic return in multiple studies (Delgado 2020). The studies, including one in Malaysia, have found that return on investment yields over 90% in social, environmental, and financial return (*Global Impact Investing Network 2019;* European Investment Bank 2015).

Hundreds of thousands of hectares worth of rainforest and the tens of thousands of species that called them home have already been decimated for palm oil plantations since Wilmar began industrial scale production in 1991 (Wilmar 2021). Sun bears, probiscis monkeys, clouded leopards, the birds of paradise, pitcher plants, flying frogs, squirrels, and lemurs – all found only in Borneo, and all declining in population as a direct result of deforestation (Margarita 2021). To prevent further loss and eventual extinction of these unparalleled endemic species, Wilmar and Indonesia need to pledge themselves to ecosystem preservation with unprecedented zeal, and need to consistently demonstrate commitment to preservation of their natural resources rather than finding new ways to restate and recommit to environmentalism. Commitment to one or a handful of the policies and practices in place has been shown to be insufficient for Indonesia to get ahead of its deforestation problem in the past, requiring comprehensive, full-scale adherence to the recommendations in place for permanent change. Ecotourism presents the most feasible manner by which the Indonesian government, Wilmar, and the thousands of trammeled indigenous groups can reconcile a way to work together to protect and prosper from the rainforest. This is only possible if the conditions for ecotourism are upheld

through fidelity from the aforementioned groups along with a willingness to go beyond their previous efforts by building a sustainable, forested future alongside the natural and human communities they impose upon, rather than on top of them.

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