RSPO | Roundtable on Sustainable Palm Oil

A REPORT BY BORNEO FUTURES FOR RSPO

BIODIVERSITY IMPACT OF RSPO CERTIFICATION – AN ASSESSMENT OF GOOD PRACTICES

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Summary

The Roundtable on Sustainable Palm Oil (RSPO) has developed a set of environmental criteria which companies must comply with in order to produce Certified Sustainable Palm Oil (CSPO). The thinking in RSPO is that when these criteria are properly applied, they can help minimize the negative impacts of palm oil cultivation on the environment. These links are pretty well established for the benefits of certification on reducing deforestation or fires, but the impacts of certification on biodiversity remain poorly understood. Even if RSPO certification reduced loss of natural habitats, other effects, such as hunting, unsustainable harvest of animals and plants and loss of key resources that sustain wildlife, could still decrease the abundance and diversity of wildlife. To better understand how RSPO certification has impacted biodiversity, the RSPO requested a study to determine whether its certification processes had benefited tropical wildlife and especially species of conservation importance.

Table 1. Summary data for the five companies assessed for determining the impact of RSPO certification on biodiversity, and the main characteristics of these companies with regard to biodiversity management.

Company	Agropalma	Austindo Nusantara Jaya (PT KAL)	United Plantations (PT SSS)	REA Holdings (Rea KalTim)	Wilmar
Country of head office	Brazil	Indonesia	Malaysia	United Kingdom	Singapore
Year of RSPO membership	2004	2007	2004	2007	2005
Size of company (total landbank and market capitalization) (SPOTT 2019)	120,800 ha Private company	157,700 ha $194,900,000	59,400 ha $1,225,800,000	64,500 ha $86,000,000	327,000 ha $17,162,100,000
Biodiversity management structure	Under Sustainability Division	Under Sustainability Division	Biodiversity Division	Stand-alone organization	Managed nationally with coordination from Sustainability Division
Total area HCV in visited estates (ha)	64,000	3,844	7,000	6,000	8,469
Percentage of visited estates protected	60%	23%	40%	20%	11%

Company	Agropalma	Austindo Nusantara Jaya (PT KAL)	United Plantations (PT SSS)	REA Holdings (Rea KalTim)	Wilmar
Number of biodiversity staff in visited estates	27	7 + regional manager	14	17	7 full-time staff, 7 part-time staff
Number of hectares of HCV per biodiversity staff	2,370	549	500	353	NA
Focus of biodiversity team	Research and patrolling	Enforcement and HCV management	Research and reforestation	Research, conservation education, and reforestation	HCV management, reforestation and silvicultural treatment

Determining impact requires knowledge of the counterfactual – what would have happened without the intervention – in this case RSPO certification. Thus a statistically robust impact assessment would need data on the baseline (i.e., what was the status of biodiversity in an area before it received RSPO certification) and the counterfactual (i.e., what is the status of biodiversity in an oil palm area without RSPO certification, but otherwise similar to the RSPO certified plantation). Such biodiversity data do not exist, and proper impact evaluation of RSPO certification on biodiversity therefore remains impossible.

For the current assignment we addressed this question as follows. Rather than trying to obtain a statistically robust insight into the benefits of RSPO certification for biodiversity, we selected five companies that have been objectively assessed for their high-quality oil palm management through the Sustainability Policy Transparency Toolkit (SPOTT). The selected companies were Agropalma in Brazil; PT Kayung Agro Lestari (KAL) under the PT Austindo Nusantara Jaya Tbk (ANJ) Group, United Plantations, and REA Kaltim in Indonesia; and Wilmar in Malaysia (Table 1). We assessed estates in each of these companies to determine how their management had addressed biodiversity conservation with regard to RSPO requirements.

One of the key findings from our study of the five companies is that each of them had distinctly different approaches to biodiversity management despite the fact that all estates that we assessed were RSPO certified, and therefore required that identified High Conservation Values (HCV) were maintained. Each estate or group of estates, except for one, had a dedicated biodiversity unit, but the organizational placement of that unit varied from being situated within the company's sustainable division to being a fully independent organization with direct reporting lines to the company owner. Interviews with estate managers indicated that strong support from company owners or majority shareholders was an important factor in driving the biodiversity objective within a company. Company spending on biodiversity varied from USD 6.3/ha of HCV area per year to about USD 60/ha of HCV area per year. The amount of spending depends of the total size of the HCV being managed, this amount being smaller per surface unit with an increasing HCV size, because threats are relatively lower in larger forest areas. We note that this spending range is more than what government allocates to national park management; e.g., annual Kalimantan national park budgets varied between USD 1.7 to 9.9/ha (KSDAE 2019).

While it is clear that species diversity and abundance in oil palm monocultures are lower than in protected natural forests, we noticed nevertheless that the five companies retained important biodiversity. This was most obvious in Agropalma, which has set aside 60% of its landholdings for conservation, and where these forests have a unique high local value for biodiversity conservation. A more accurate description of the

Agropalma conservation context would be “a well-protected area financed by palm oil”. But also in Borneo there were significant conservation benefits from oil palm plantations that were assessed, with ANJ’s PT KAL protecting a breeding population of orangutans (Figure 1), Wilmar’s estates retaining populations of popular cage birds that are in decline elsewhere, REA KON managing a population of the Critically Endangered *Crocodylus siamensis* and orangutans, and United Plantations maintaining populations of orangutans and elsewhere overhunted bird species such as Crested Fireback (*Lophura ignita*), which are also abundant in REA’s concessions. While such conservation benefits are clear and originate from well-established biodiversity management interests, it is not clear whether they were achieved because of RSPO certification *per se*. It appeared that in most cases company owners and senior management simply supported the conservation programs irrespective of RSPO, and ensured that these were well-funded and well-implemented by competent internal staff supported by external experts. In other cases, legally unplantable areas (e.g., too steep) in older plantations were automatically identified as HCV when the first RSPO Principles and Criteria were published in 2007.

We noted that, while the main focus of RSPO with regard to biodiversity conservation is on the identification, management and monitoring of HCVs, the HCV concept did not appear to be used much beyond ensuring compliance with RSPO requirements. Interviews indicated that the individual HCV categories (e.g., HCV 1.2 on the presence of rare, threatened or endangered species) were rarely used to inform management of the conservation areas. The HCV assessments were generally conducted by external ecological specialists and not by wildlife managers, resulting in reports with maps of recommended forest set asides and long lists of species that needed to be protected but without providing much practical guidance to do so. But internally very few people in the company knew how to meaningfully translate this information into species or species threat management that ensured that the individual conservation values were maintained (as required by RSPO Principles and Criteria). None of the companies have the resources or capacity to manage populations of every species of high conservation value in their plantation, so the HCV assessments largely become paper exercises. Instead the companies focused on broader goals of retaining forests and reducing general threats to biodiversity. We note, that this is not unlike most government-gazetted protected areas in the tropical region.

The companies’ attitude to HCV management is understandable. The HCV categories are complex, and monitoring for several hundred rare, threatened, or endangered, endemic or migratory species, or for the size, fragmentation and connectivity of remaining forest areas is far beyond the capacity of most palm oil growers, including their in-house biodiversity experts. As a result, companies resort to more basic principles of 1) protecting and enhancing the forest areas that were identified of having high conservation value; and 2) reducing any direct threats to wildlife, such as poaching or illegal collecting. Some companies, recognizing that the HCV-specific monitoring and management was beyond their capabilities had fully outsourced this role to outside experts or set up independent organizations to fulfil this task. This discrepancy between the highly technical upfront identification requirements for HCVs and the reality of on-the-ground implementation of management and monitoring raises the question as to whether the HCV concept fulfils its objectives of protecting conservation values.

Our rapid assessments indicated that the current situation is preventing the development of an integrated approach to biodiversity management throughout the estates (and not just in the conservation areas). One example is the significant bird diversity we encountered in the pond treatment systems for palm oil mill effluent (POME) in each of the estates, including migratory species and wandering ducks. These species had not been noticed in any of the HCV assessments which had focused mostly on forest species. Similarly, we found populations of species that have been collected to near-extinction in many parts of Indonesia, such as White-rumped Shama (*Copsychus malabaricus*), in good numbers within oil palm plantations in Borneo, but again this had not been noticed, nor adequately documented, in the HCV assessments.

Our findings indicate that good biodiversity management in RSPO-certified oil palm requires a few key elements:

- High-level management support for conservation and clear communication throughout the company that biodiversity conservation matters. Linking management that benefits conservation to Key Performance Indicators of staff (including non-biodiversity staff) is helpful;
- The more natural areas that are set aside (forests, wetlands, riparian areas) the higher the overall value of the estate for biodiversity conservation. As much as possible, the design of these set-asides needs to consider the larger landscape that extends beyond the estate boundaries, instead of the current focus on forest patches within the estate only.
- The need to recognize the value of conservation set-asides not only for biodiversity but for the long-term prosperity of the company itself. There was increasing recognition among senior estate staff that these natural areas were not just benefiting biodiversity, but they also had financial value for the company through delivery of ecosystem services (e.g., dry season water supply from protected peat forest; increased rainfall in planted areas surrounded by forests; fire buffering). These financial benefits remain poorly known or quantified and are not yet (but should be) reflected as assets in the general ledger of companies;
- Conservation investments depend on company ambitions, severity of local threats (e.g., hunting), and size of protected areas (economy of scale), but companies should invest at least USD 6 per ha per year in low-threat, relatively pristine conservation areas and up to USD 50 per ha per year in more degraded and threatened conservation areas;
- Four out of five companies we assessed used external advisors to inform their biodiversity management and monitoring, and used that external capacity to increase the capacity of their local staff. This may indicate that good biodiversity management is beyond the capacity of most palm oil companies, and that qualified local talent cannot easily be hired. Further capacity building appears crucial for improving the role the palm oil industry can play in biodiversity conservation.

In conclusion, the estates that we surveyed are important for biodiversity conservation, especially in terms of supporting certain migratory bird species and cage-bird species. However, due to the lack of data from any counterfactual non-certified estates for comparison, there is insufficient information to attribute the observed biodiversity benefits solely to RSPO certification. Furthermore, it is also not possible to conclude whether non-certified estates may or may not be just as important for biodiversity conservation. The key attribute to ensuring positive biodiversity outcomes in oil palm settings appears to be the commitment from owners and senior managers, as well as the governance system under which a company was developed (e.g., compare Agropalma in Brazil and Wilmar in Malaysia).

It appears that RSPO Principles and Criteria and procedures for assessing, managing and monitoring High Conservation Values are too complex, relative to the 'simple' RSPO requirement to 'maintain' HCVs. Currently the RSPO framework does not easily translate into management plans that estate managers can understand and effectively integrate in the overall, longer term planning for their estate.

We recommend the following:

- A simpler system for managing biodiversity in oil palm that mostly focuses on the delineation of forests and other important set-asides for conservation. This requires an unambiguous definition of what defines these set asides. For forest areas (as opposed to other biodiversity-rich ecosystems, such as savannas), the High Carbon Stock method could be used, although there needs to be recognition that low-carbon degraded forests and forest regrowth can also have biodiversity value, and forest set asides shouldn't consist of monocultural plantations (e.g., acacia or other fast-growing plantation trees). The requirement for companies would then be to retain those natural forests and other set-asides through the development of simple management plans that ensure that conservation management becomes an integrated part of overall estate management (and not the 'oil palm step child').

- We suggest adopting more of a landscape scale approach rather than the biodiversity management that is currently focused on HCVs. Several migratory species and cage-bird species recorded in this study were not restricted to HCVs but, rather, were found in POME treatment ponds and other parts of oil palm estates. A citizen-science approach, such as that adopted by Kayung Agro Lestari, could provide a cheap and effective method to collect wildlife data throughout the estates, as well as generate greater involvement of all plantation staff in biodiversity management.
- We recommend lowering the costs of engaging expensive HCV assessors and auditors by simplifying the system, potentially making RSPO certification a more attractive option for non-certified or non-member companies. Companies could then focus on the management of a few Rare, Threatened and Endangered species rather than any possible High Conservation Value identified in an estate.
- RSPO could focus more on the potential financial benefits of good environmental management (the value of water, fire buffer, pollination, pest control services, etc. from conservation set-asides), for example through targeted studies in these services. This requires a proper economic analysis of these services through natural capital accounting at the oil palm landscape scale to internalise these values in very real financial and non-financial (e.g., intangible assets) terms for the oil palm companies (Box 1). This could generate greater uptake of the objectives of RSPO certification in oil palm management, and create more buy-in from estate management that currently feels limited responsibility for biodiversity conservation management, as the values for the company are unclear.

Box 1. New accounting methods. Palm oil company accounts of the future could contain information not only on assets, such as cash, inventories and plantation assets, but also on the financial value of ecosystem services (e.g., carbon value of a forest set aside, yield value for water in a forested swamp used for dry-season irrigation, flood buffering). Furthermore, the intangible values of assets such as the number of protected orangutans (Figure 1) in one concession could benefit brand value and contribute to global biodiversity goals.

Companies report on a range of environmental issues. In practice, the necessary information is often collected, prepared and communicated several times over by various company employees. Systematic corporate ecological accounting can, therefore, decrease the costs of measurement, data keeping, reporting and co-ordination as well as promote corporate self-regulation (Schaltegger and Burritt 2017). Considering the public scrutiny of the palm oil sector it could fulfil a leading role in the required innovation in accountancy. The field of ecological or environmental accounting is still new but the United Nations' System of Environmental-Economic Accounting provides key elements of this thinking.

Figure 1. Orangutan baby encountered with its mother in one of PT KAL's conservation areas during the surveys. Photo by Nardiyono.

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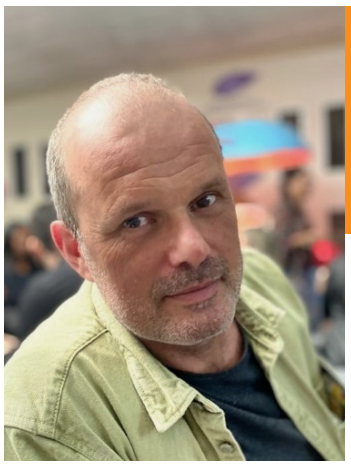


Dr Erik Meijaard

Dr Erik Meijaard is conservation practitioner and scientist with 28 years of experience working in the Asian tropics. He is Director of Borneo Futures Sdn Bhd in Brunei Darussalam, Adjunct Professor at the University of Queensland and Honorary Professor at the University of Kent. Erik chairs the IUCN Oil Palm Task Force.

Dr Marc Ancrenaz

Dr Marc Ancrenaz is the scientific director of HUTAN, a community-based conservation initiative established in the Lower Kinabatangan since 1998. With more than 30 years of field experience in Africa, Middle East and South East Asia, he specializes in wildlife research, monitoring and management, capacity building and policies writing. He is a member of the IUCN SSC Great Ape, Asian Elephant and Wildlife Health Specialist Groups, as well as the IUCN Palm Oil task Force.

Dr Sebastianus (Bas) van Balen

Dr Sebastianus (Bas) van Balen is an ornithologist with 40 years of experience working in Indonesia and other tropical areas. He specializes on bird taxonomy, identification, ecology and conservation, and has worked in many different professional settings, including environmental impact assessments for companies in the mining, timber and palm oil industries.

Introduction

Voluntary certification schemes have become the dominant strategy for making tropical commodity supply chains more sustainable, reflecting a shift towards private-sector sustainability governance (Meijaard et al. 2018). In voluntary certifications, biodiversity conservation can be addressed both directly, through the creation of conservation set-asides and riparian protection zones, or indirectly, through implementation of better practices, including improved agronomic (e.g., reduced pesticide use) or more effective threat management (e.g., hunting control).

In oil palm estates certified by the Roundtable on Sustainable Palm Oil (RSPO), the focus appears to be on both approaches, with an emphasis on direct approaches, especially the protection of High Conservation Value (HCV) areas, which deems areas ecologically valuable if they contain viable populations of rare, threatened, or endangered (RTE) species (HCV 1), contain habitat fragments that are rare or critical to the larger landscape (HCV 2 & 3), or provide ecosystem services (HCV 4). Management goals are to "maintain or enhance" HCVs over time and companies are expected to translate recommendations from HCV reports into management prescriptions— specific objectives, targets, and strategies.

Evaluation of the RSPO-HCV approach, however, indicates that this approach has not resulted in significant avoidance of deforestation and effective protection of conservation set asides (Carlson et al. 2018, Morgans et al. 2018). Indeed, most RSPO certified companies have been established in areas that were deforested a long time ago; these companies therefore generally operate in landscapes with small forest fragments and low values for biodiversity conservation. However, some oil palm estates retain significant areas of forest that could potentially contribute to the protection of tropical species in predominantly agricultural landscapes (Meijaard et al. 2018). In addition to setting aside forests for protection of wildlife and ecosystem services, oil palm estates can directly enhance species habitat value by increasing the connectivity between forest patches and maintaining forest corridors between them, by ensuring that riparian (river-side) areas are covered with natural trees, or by creating connectors across roads and other non-forest obstacles. Also, increasing the heterogeneity of the vegetation within oil palm blocks can increase the ecological value of these areas, for example, by protecting epiphytes on palms, maintaining a diverse ground cover vegetation, and potentially by intercropping oil palm with other crops or natural trees (in particular old trees reported to be intensively used by birds and other animals for feeding, roosting or nesting), although the latter is rarely done yet.

In addition to direct measures, RSPO certification also requires implementation of indirect measures to retain High Conservation Values. Preventing fires, illegal logging, snaring and hunting, reducing use and avoiding particularly harmful pesticides and herbicides, treatment of palm oil mill effluent and others, can all contribute to the maintenance of a higher abundance and diversity of a range of species in oil palm areas. Which measures a company can or should implement is, however, not specified under RSPO's Principles & Criteria, and the main indicator of compliance is that the High Conservation Values are maintained or enhanced. The exact meaning of "maintaining" these values also remains unspecified – does it require a few individuals of a threatened species, or a viable population? No one seems to know. Few companies therefore have a thorough understanding about how the goals of maintaining or enhancing conservation values relates to the many potential threats that are present in oil palm areas. The capacity for detailed causal chain analyses is generally lacking in oil palm estates, and with limited ability to estimate relative contributions of individual threats to conservation objectives it becomes very difficult for companies to design effective threat management strategies that ensure that HCVs are maintained or enhanced.

The situation is exacerbated because monitoring of conservation values is difficult and adaptive management that uses feedback from field data to change management approaches is therefore rarely, if ever, implemented. This issue relates to methodology. Firstly, the indicators of species diversity and abundance are difficult to measure and require significant effort, knowledge, skills and investment. Unlike

data on deforestation and fires, for example, which can be indirectly estimated from remote sensing sources, and can be obtained for large temporal and spatial scales, data on species diversity and abundance can only be collected through direct (and often challenging) on-the-ground study. Secondly, understanding impact of conservation management on conservation goals requires that the counterfactual is known, i.e., what would have happened to conservation goals if the management had not been implemented? Although such counterfactual thinking is increasingly demanded in reliable impact assessments, data are generally lacking.

All this leaves the RSPO in a difficult situation to assess its impact on biodiversity. RSPO is under international pressure to show that its members and certified plantations are having a positive impact on the environment in general and more specifically on species diversity and abundance, compared to non-RSPO members or non-certified plantations. It is therefore important that scientifically robust ways are found to both indicate the impact that RSPO has had on biodiversity (either positive, negative or none at all), and the processes that need to be put in place to improve RSPO's record on facilitating biodiversity conservation.

The current study aims to assist the RSPO to achieve both targets of demonstrating impact on species diversity and abundance in member plantations, and to identify gaps in current approaches to identifying, maintaining and enhancing high conservation values. We do this by highlighting cases of good practice with the objective to look for commonalities and differences between company and provide recommendations to other companies aspiring to better biodiversity management.

Approach

Our approach is based on the recognition that a formal replicated study for measuring impact from RSPO certification or membership on species diversity and abundance in member plantation is not currently possible. There will be 1) too much noise in biodiversity data; 2) insufficient replication to demonstrate impact versus the counterfactual of non-RSPO management; and 3) insufficient forest in many RSPO certified and member plantations (which were cleared prior to RSPO certification and therefore have little forest to protect). We thus focus on examples of good practice in biodiversity conservation management in RSPO certified plantations to (1) better understand what this can achieve for biodiversity and (2) what are the different approaches and strategies used by selected companies to do this.

COMPANY SELECTION

We selected 10 palm oil companies for which the SPOTT rating system indicated that good quality management and monitoring of species diversity and abundance was performed. Our initial selection of these 10 companies was reduced to five based on discussion with their management, the practicality of assessing the plantation area given our budget and time restrictions, and availability of key staff to meet us. The five selected companies were:

- Agropalma, Pará, Brazil
- Kayung Agro Lestari (KAL), a subsidiary of PT Austindo Nusantara Jaya Tbk (ANJ), West Kalimantan, Indonesia
- United Plantations, Central Kalimantan, Indonesia
- REA KalTim, East Kalimantan, Indonesia
- Rekahalus and Ribobonus Estates, Wilmar, Sabah, Malaysia

UNDERSTANDING MANAGEMENT IMPACTS ON BIODIVERSITY MANAGEMENT AND MONITORING

A team of three (Dr Erik Meijaard, Dr Marc Ancrenaz and Dr Bas van Balen) visited these five companies between 4 February 2020 and 14 March 2020, for 2 to 4-day visits. Depending on availability, interviews were arranged with company staff involved in biodiversity management (e.g., Director of Sustainability, Conservation Manager, monitoring staff, patrolling staff). In each company we asked the following questions in semi-structured interviews:

- How much of the landscape has been set aside for biodiversity conservation as HCV?
- Are these areas connected or isolated?
- What is the size of the team responsible for monitoring and managing biodiversity, and how is it organized?
- What is the budget of the team responsible for monitoring and managing biodiversity?
- What training of the biodiversity team has been or is provided?
- What external assistance does the company use to guide or implement its biodiversity management and monitoring?
- If there is external assistance, what role do they play in management and monitoring?
- Does the conservation team keep record of biodiversity monitoring by means of periodical reports, data base etc.
- How is monitoring used to influence management (i.e., presence of adaptive management)?
- Why had the company decided to invest significantly more in biodiversity management and monitoring than required by legal regulations or certification criteria?
- What problems have they encountered with relation to biodiversity?
- What are the major threats to biodiversity in the area where the company operates?
- How do they manage biodiversity in dependent smallholdings (plasma or else)?
- What do they do to solve the problems?
- How did the company gain support from different levels of management (owner/shareholders; directors/CEO; estate managers; field staff)?
- Does the company use biodiversity management in their public relations or marketing?
- Have the biodiversity investments paid off? Was it worth it?
- How does the company manage biodiversity in the smallholder supply chain?
- What could RSPO do to help these companies?

BUDGET CALCULATIONS

We estimated the budget allocations to biodiversity conservation for each of the five companies we visited. We included annual operational budgets for: HCV maintenance and monitoring and salaries of staff directly involved in HCV maintenance and monitoring. We did not include the salaries of external advisors and for senior company staff part-time involved in biodiversity management in a particular estate, we only included the proportional part of the annual salary. We excluded other external costs such as research funding to external groups or HCV reporting done through the company headquarters. We excluded major capital expenditures such as new vehicles or office buildings, which were funded in addition to the regular operational budget.

QUANTIFYING BIODIVERSITY IMPACTS

We studied published and unpublished reports for each company that allowed us to determine whether High Conservation Values (HCV) that had originally been identified in the HCV studies had been maintained. For this we focused on bird species as they are relatively easy to survey. We conducted rapid bird surveys in

both protected forest and oil palm areas to get a general feeling for the species richness of the area, identify any HCV species, and use the presence (or absence) of particular game birds (e.g., popular game birds or birds that are susceptible to snaring) as an indicator of the extent to which hunting is controlled in the company's area. Birds are among the more suitable taxa for monitoring and evaluating ecological consequences of habitat change, as they are relatively easy to survey using call recognition, relatively abundant and useful indicators of habitat type and quality. HCV assessment primarily focus on globally threatened species, restricted range and endemic species and species protected under national law, but we also included more common species in our assessments.

Another category of bird species we focused on are migratory species, i.e., species that are seasonal visitors during their non-breeding period of year, and which may come from regions in the northern hemisphere as far as northern Asia (and a few from Australia) to Borneo where we conducted most surveys.

A category not widely used for HCV assessments are birds that are not threatened by habitat destruction, but that in contrary may actually benefit from the conversion of primary to secondary forest or even monocultures such as oil palm plantations, but are heavily trapped for the pet trade, e.g., the Magpie Robin (*Copsychus saularis*), or for their meat, e.g., the White-breasted Waterhen (*Amaurornis phoenicurus*). Thus, well protected oil palm estates may act as effective conservation areas for increasingly rare species in their HCV areas, but also serve as refugia for birds that are not receiving any protection outside the estate and/or conservation areas. Because of this we also included these ecologically more versatile bird species in our assessment.

Because of time constraints, we carried out only limited surveys along single transects in each visited oil palm estate, and as far as possible accessible, along transects in representative HCV areas in the estates. We conducted the following transects:

- Agropalma (Brazil). Single transect in oil palm plantation (twice) and HCV forest trails
- PT Kayung Agro Lestari (ANJ, West Kalimantan). Oil palm plantation and HCV forest transect.
- PT SSS (Central Kalimantan). Oil palm plantation and peat swamp forest edge transect
- PT REA (East Kalimantan). Oil palm plantation and HCV forest transect
- Wilmar (Sabah). Two oil palm plantation transects in the Rekahalus and Ribubonus estates

Transects of 1km length were chosen in the following habitats, i.e., (1) pure oil palm plantation, at least 200m away from HCV set asides or other natural forests; (2) edge habitat, between oil palm plantation and HCV habitat and; (3) HCV forest habitat. Along each transect we used counting stations at 200m intervals, at which during 10 minutes all birds that showed affinity with the habitat (feeding, territorial behaviour etc) and present within ca. 100m from the observer were recorded. We used the resulting data to construct species diversity indices, and to show the proportions of birds of different habitat preference classes that constitute the various bird communities.

We used a Zoom H5 solid-state recorder to record bird calls and songs. These recordings were made especially for taxa needing confirmation for species identification (e.g. unknown calls, rare and/or confusing species). Such recordings are useful for documentation, identification, and, in some occasions, for play-back to lure secretive, skulking species. Tape recordings for the Bornean sites will be deposited with the xeno-canto website for Asian bird calls (www.xeno-canto.org/asia/).

In ecology, species richness – the number of species (S) in a sample – is the most elementary index of diversity. A large number of more sophisticated indices are available to quantify the biodiversity of an area, and which possess different strengths and limitations for measuring and comparing species diversity among communities. In this report, we use one of the most commonly used indices, the Shannon Index, which takes into account the number of species present, as well as the abundance of each species: $H' = -\Sigma p_i . \ln p_i$, where p_i is the proportion of the total sample represented by species i. Basically, the higher the index, the higher species richness.

REPORTING

Because Erik Meijaard has a conflict of interest with regard to Austindo Nusantara Jaya (ANJ) through the company's contract with Borneo Futures (see Disclaimer below), he did not participate in the staff interviews in ANJ's PT KAL plantation, and the chapter on PT KAL was written by Marc Ancrenaz. Similarly, Marc Ancrenaz has worked for Wilmar through contracts with HUTAN and he did not participate in the write up for Wilmar.

We report findings about biodiversity management in each company in the chronological order of our visits to their estates.

Insights about avian biodiversity in oil palm and forest

We recorded 76 bird species along the forest and plantation transects we conducted in the different estates across Borneo (Appendix 1), and 190 species in total (Appendix 2), the latter including records in wetlands and records outside the formal transects, including nocturnal species. The number found along the single oil palm transect in Brazil totalled 26 species.

Table 2 gives the different diversity values (Shannon index and Species Richness). It is clear that bird species diversity is highest in the HCV areas, although some of the oil palm transect (notably in Sabah) come close, and the Brazilian oil palm transect scores even higher than two of the Bornean transects.

Table 2. Species diversity and richness (number of species) along transects in oil palm plantation and High Conservation Value forest set asides within oil palm estates in 5 areas in Brazil and Borneo

	Transect number	Bird Species Diversity (H')	Species Richness	Sample size (= N individual birds)	Region
PT KAL plantation	1	1.47	10	94	West Kalimantan
PT SSS plantation	2	1.79	9	62	Central Kalimantan
PT REA plantation	3	2.26	14	69	East Kalimantan
Wilmar Rekahalus plantation	4	2.59	19	74	Sabah
Wilmar Ribubonus plantation	5	2.55	18	85	Sabah
PT KAL HCV forest	6	3.20	28	47	West Kalimantan
PT SSS HCV forest	7	2.72	22	74	Central Kalimantan
PT REA HCV forest	8	2.77	22	59	East Kalimantan
Agropalma plantation		2.80	26	63	Brazil

Dividing the encountered bird species into classes of habitat preference gives a totally different picture compared to the numbers in

Table 2 (Figure 2). It is evident that in plantations, by far, the largest part of the bird fauna is composed of secondary growth, disturbance-tolerant species, which are of lower conservation value in terms of rarity and extinction risk. The oil palm plantations do not offer habitat for real forest bird species, but certainly do so for a number of species that are common elsewhere in disturbed habitat, cultivation and open woodlands.

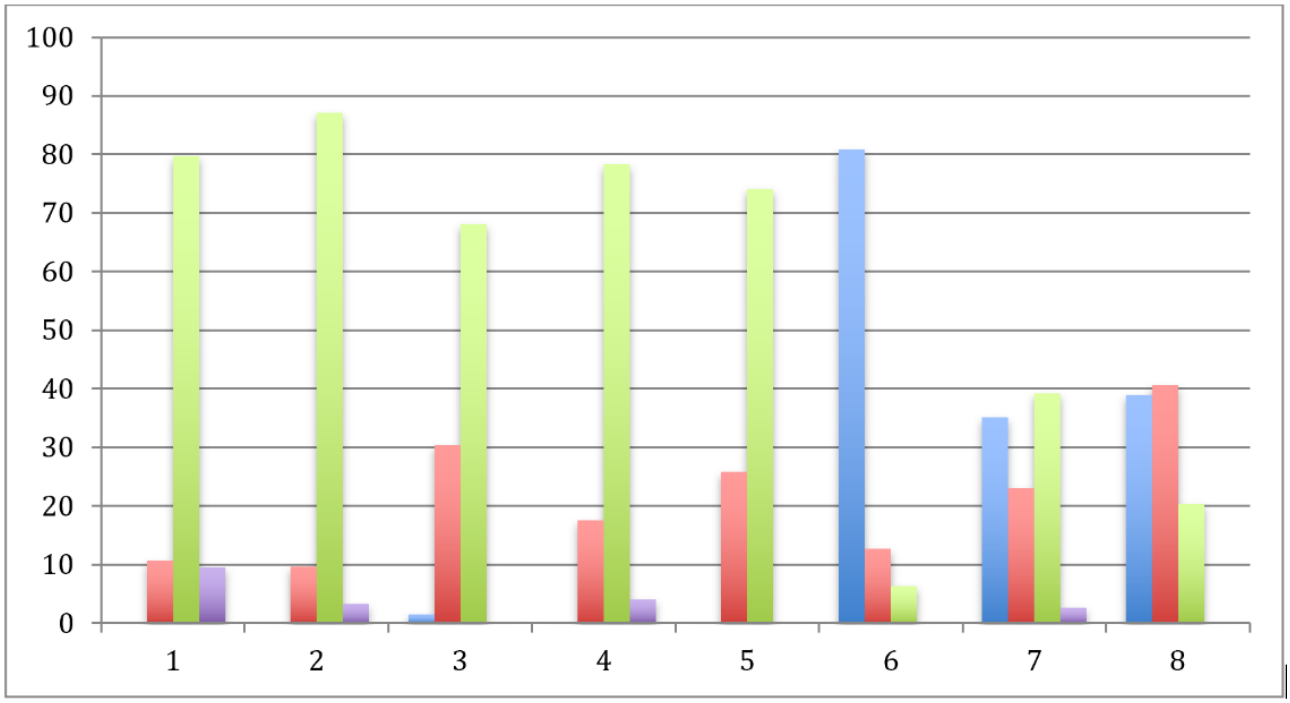


Figure 2. Distribution (in %) of birds of different habitat preference classes across the eight transects in 2020 (blue: forest species; red: forest edge species; green: open area species, purple: wetland/riverine species). Transect number correspond to numbers in Table 1: 1-5 oil palm plantation transects in PT KAL, PT SSS, PT REA, Wilmar Rekahalus and Wilmar Ribubonus; 6-8 HCV transects in PT KAL, PT SSS and PT REA.

The relatively high species biodiversity in the Wilmar oil palm plots may be partly due to the virtual absence of bird trapping. Popular cage birds as the Magpie Robin thrive throughout the plantations, as does its relative the White-rumped Shama (*Copsychus malabaricus*) which was found to be common in even the smallest near-HCV patches. Such birds are heavily collected in Indonesia for the cage bird trade and they have disappeared from many forests of ecologically high quality (Eaton et al. 2015). Also, the hilly character of Wilmar's plantations has prevented cultivation of all space and numerous more or less sparsely vegetated patches have been left untouched. On the other hand, the actual HCV patches in the Wilmar estates were much disturbed, and were mainly inhabited by disturbance tolerant bird species.

Figure 3. POME treatment ponds in Wilmar's Sapi 1 estate where we encountered good numbers of migratory and other birds, including stilts, egrets, terns and tree ducks.

In all five companies we noted that the sedimentation ponds which are found near the palm oil mills for treating the palm oil mill effluent, offered good habitat for local waterbirds (e.g., Wandering Whistling Duck *Dendrocygna arcuata*), but also numbers of migratory waders, notably Wood Sandpipers (*Tringa glareola*), Common Greenshanks (*Tringa nebularia*), Pacific Golden Plover (*Pluvialis fulva*), Little Ringed Plover (*Charadrius dubius*) and Black-winged Stilts (*Himantopus himantopus*) (Figure 3). Also, the swampy shrub and grass area adjacent to the ponds were favourite haunts of rails (e.g., Buff-banded Rail *Hypotaenidia philippensis* and White-browed Crake *Porzana cinerea*) and (migratory and resident) reed-warblers. We noted that none of the biodiversity people in the estates that we visited had paid much attention to the monitoring of these waterbirds, nor had they been noticed during the HCV assessments. This may be because HCV assessments focus on natural habitats, and the ponds are artificial (and smelly). Nevertheless, these nutrient-rich ponds might provide increasingly important waterbird and migratory wader habitat, with coastal wetlands being drained and developed. **We therefore recommend managing these ponds more actively for wildlife, monitoring the species that appear (and noting when they appear), and minimizing disturbance (e.g., clearing of vegetation on banks). This could significantly increase the value of these ponds for local bird diversity.**

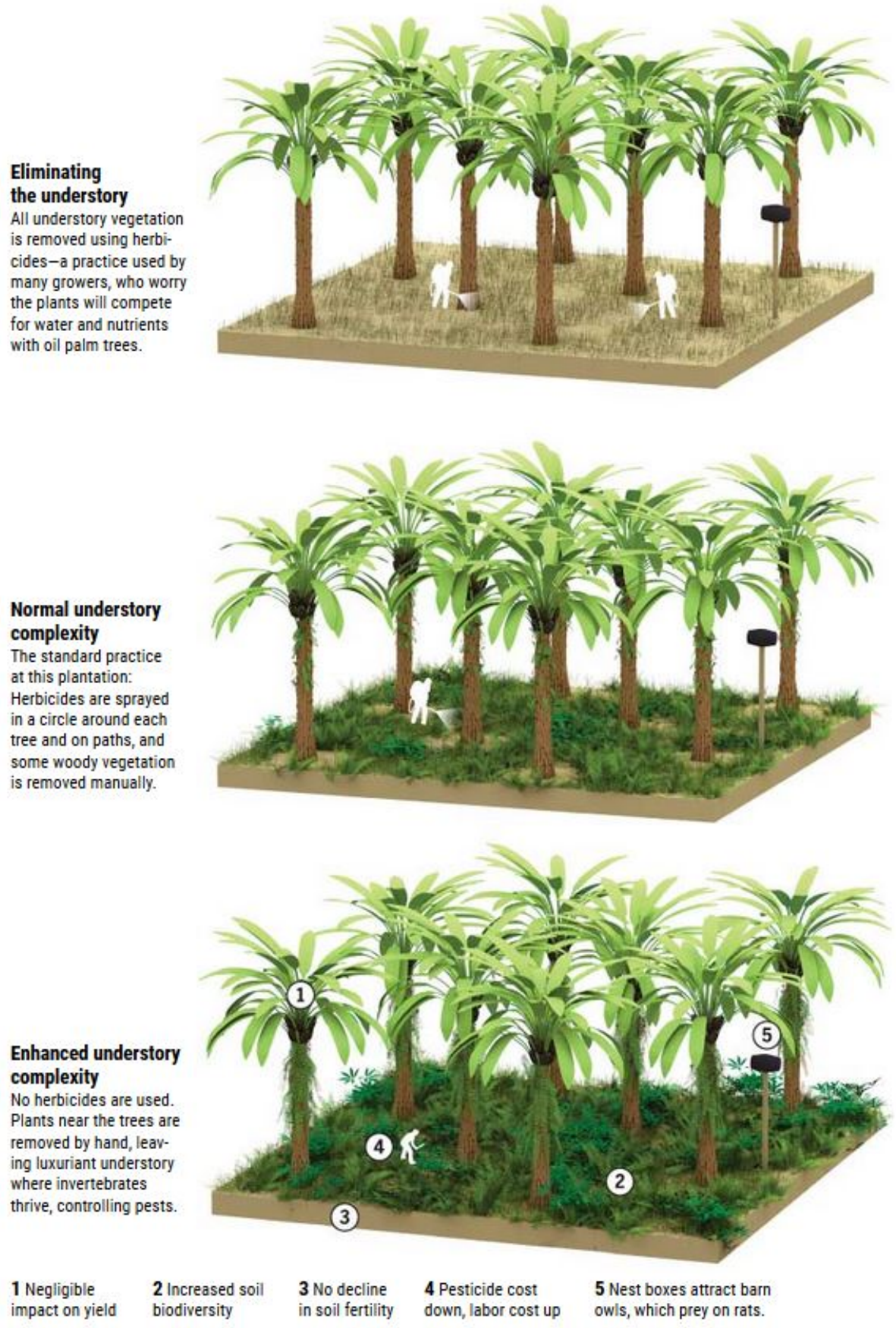


Figure 4. A more natural plantation. A large-scale ecological experiment on a plantation in Indonesia tested three different understory treatments. It suggests reducing herbicide use can lead to a more diverse understory without affecting yield. From "Courting controversy, scientists team with industry to tackle one of the world's most destructive crops" by Dyna Rochmyaningsih, 2019 (doi:10.1126/science.aay6967). Reprinted with permission from American Association for the Advancement of Science (AAAS).

We noted significant variation in the extent to which plantations practice the removal of ferns and other epiphytes from the palm trunks, and also cleared undergrowth below and among the palms (Figure 4). Some of the estates that we visited had very limited plant growth on the ground or on the palm trunks, because of company policies to keep trunks clear (for safety reasons, so that harvested fruits can be seen and would not bounce off epiphytes and injure harvesters), and clear ground vegetation so that these plants do not compete with palms for nutrients. Other estates, however, mostly left undergrowth (except immediately around the palm trunk) and epiphytes because removing these was labour intensive and thus expensive. Scientific studies of the impact of the removal of epiphytes on bird populations are inconclusive (Koh 2008, Prescott et al. 2015), but we suspect that in the long term epiphyte removal will reduce the diversity and abundance of species that prefer to build their nests, or like to rummage in search for food in such plants. Importantly, leaving epiphytes does not seem to reduce yields (Prescott et al. 2015). Similarly, leaving undergrowth is boosting insect diversity and which will likely increase the diversity and abundance of insectivorous bird species, but appears to have no negative impact on yield (Savilaakso et al. 2014, Rochmyaningsih 2019).

Finally, we made some specific notes regarding birds of prey. We were told that the introduction of Barn Owls (*Tyto alba*), a non-native species on Borneo, was practiced with different success. After a failed attempt, PT SSS decided to leave the idea of introducing an exotic species and resort to native predators. This may relate to poor breeding performance for Barn Owls in areas where rodenticides are also used (Hasber et al. 2014). Furthermore, owls also do better in older plantations where better perching opportunities and openness of habitat facilitate hunting (Yahya et al. 2016). Formerly a scarce resident, the Black-winged Kite (*Elanus caeruleus*) has been spreading with cultivation, in particular the expansion of oil palm (Smythies and Davison 1999). Local declines in numbers, however, have been reported since the 1990s (Mann 2008) and they were surprisingly rare in the estates, and even totally absent in some. The presence of Bay Owls (*Phodilus badius*) in the PT REA estate offered hope for another effective native predator, for which it might prove useful to find out more about its ecological demands (e.g., breeding habitat). Densely vegetated patches along rivers or at steep slopes, and tall trees saved from felling will undoubtedly improve breeding chances for the two above-mentioned birds of prey. Any attempt to boost their numbers in the estates should be closely coordinated with existing rat poisoning schemes, as these would very likely have adverse effects on these and other natural predators (Salim et al. 2016).

AGROPALMA, BRAZIL

Agropalma is an agricultural commodity company first established in 1982 and privately owned by one of the largest financial conglomerates in Brazil. Their palm oil company in east Pará State in the northern Amazon is a 107,000 ha landholding, of which 39,000 ha has been planted with oil palm, 64,000 ha (60%) set aside as conservation forest, while the rest is used by five extraction mills, roads (1,600 km), villages and other human settlements. The company is also operating two refineries, with a capacity of 320 tons/day. An additional 12,000 ha of oil palm is on land from family farmers and integrated outgrowers, who in turn manage 13,090 ha of forest reserves.

Agropalma is RSPO member, and their estate became RSPO certified in 2011. Furthermore, ten percent of the planted oil palm is for certified organic palm oil production. The conservation forest consists of nine large blocks of High Conservation Value and High Carbon Stock forest, with an average size of 7,932 ha, and connected by riparian forest corridors within the planted oil palm areas. Two eastern forest blocks are isolated from the main forest area (Figure 5). According to their 2013 Sustainability Report, Agropalma considers itself an important player in Amazonian biodiversity conservation: “We have also taken on a leading role in the protection of the Amazon forest by implementing biodiversity monitoring in production areas, indicating that palm plantations managed by Agropalma might play an important role in the maintenance of relevant species of fauna.”

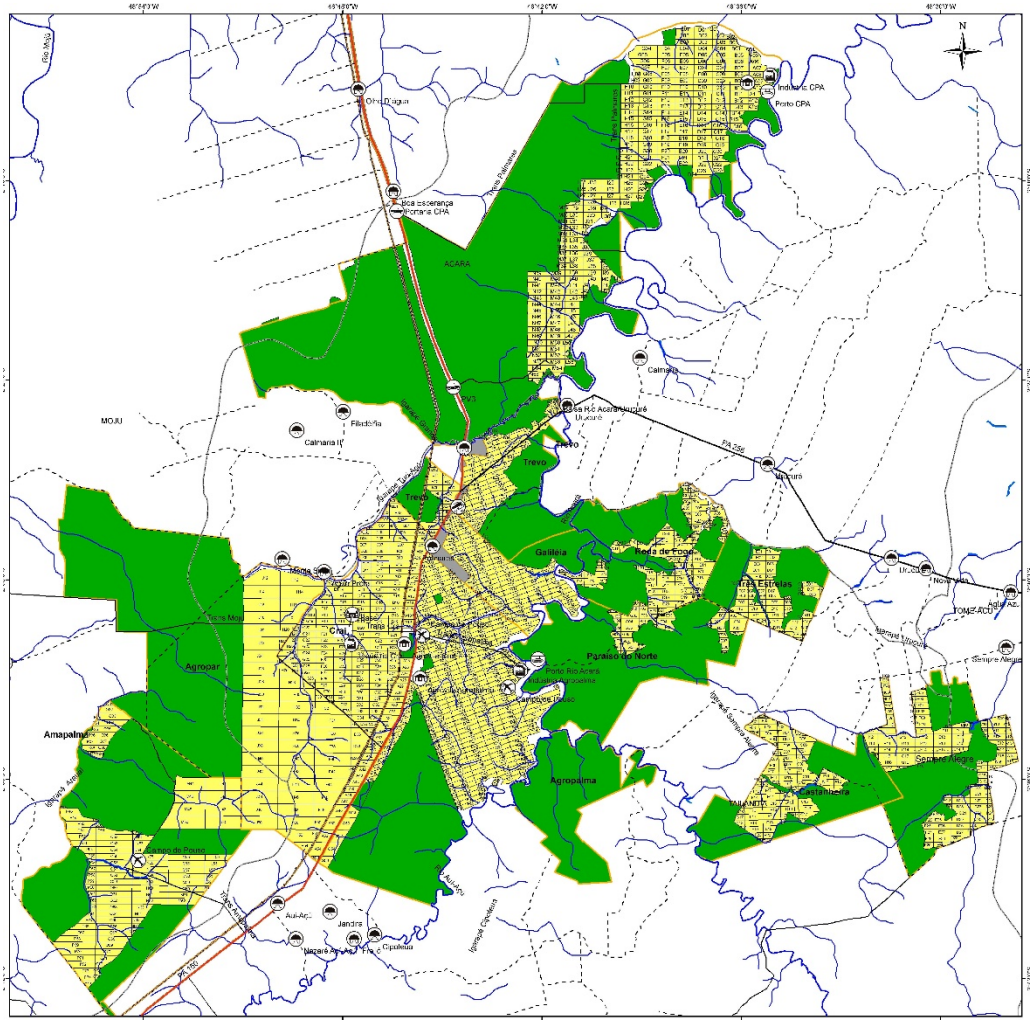


Figure 5. Map showing in green the protected forest areas of Agropalma and in yellow the planted oil palm.

The large percentage of forest set asides in the Agropalma area relate to policies from the Brazilian government that required that 50% of each land holding was set aside for forest protection. This was later increased to 80%. Legal compliance thus required that Agropalma maintained large forest areas when the estate was first developed. Support from the company's majority shareholder, also makes sure that not only forests were not cleared but also that investments were made to ensure that remaining forests were well protected.

The Agropalma area has high biodiversity, most of which occurring in the protected forest. To describe and monitor this biodiversity, Agropalma has been working closely with the non-government organization Conservation International and scientists from a range of universities, especially Universidade Federal do Pará in Belém. One study, for example, recorded 248 bird species, including 185 species in the forested habitat, 116 in riparian forests and 58 in the oil palm plantations during one survey period (Almeida et al. 2016). The total bird count for the Agropalma is currently 449 species, six of which are listed as Endangered on the IUCN Red List, while 62 mammal species have been identified (six of which Endangered), 57 species of reptile, and 49 amphibian species. One bird species, the Dark-winged Trumpeter (*Psophia viridis*) may now only occur in the Agropalma area, and its survival is strongly dependent on protective management of its habitat and anti-poaching measures. Another critically endangered species, the Golden Parakeet (*Guaruba guarouba*), used to breed in an HCV within Agropalma. The birds are still encountered on a regular basis within the company's forests but are possibly extinct outside.

Monitoring of biodiversity started in 2004 and is done twice a year through the above-mentioned groups of external experts from Conservation International and the local university under a five-year contractual agreement with Agropalma. The objectives of this agreement are to 1) continue biodiversity monitoring; 2) use systematic monitoring in applied conservation management; 3) strengthening community engagement; 4) promoting forest connectivity; 5) strategic engagement with external parties; and 6) communication strategies on sustainability.

Monitoring surveys include a wide range of vertebrate and invertebrate species (e.g., Cunha and Juen 2017). Point counts along transects are used for quantitative monitoring of species abundance, while mistnetting is used for further species identification. Additional applied studies are conducted, for example, of the importance of riparian forest corridors for the dispersal of bird species between forest areas (Knowlton et al. 2017). The monitoring involves four people working on birds for 20 days, four people working on mammals, and two on insects and fish. This translates into ~400 person-days for the twice-a-year monitoring and an additional 100-200 days for analysis, resulting in a total effort of 500–600-man days per year.

Monitoring indicates that certain high conservation values, such as the presence of rare, threatened and endangered species (HCV 1.2), are maintained. Of the six threatened bird species listed in the initial HCV study, five were listed in the 2019 monitoring report by Conservation International; it is not clear whether the 6th species is now absent. Overall, 89% of the Center of Endemism Belem species are recorded inside Agropalma.

Results show that there is a positive correlation between the size of the fragments and number of species. Size does, however, not explain all variation in biodiversity. In a nearby non-RSPO palm oil company which less stringent management, a survey indicated that only one endemic species was found in a 1,670 ha fragment, and that only 50% of the species identified in Agropalma were found in the other company, mostly because of a much higher prevalence of illegal logging, hunting and poaching, and smaller forest areas (average 600 ha) in the other company (Marcos Persio, pers. comm.). **Therefore, while the preservation of fragments across the landscape contributes to maintaining biodiversity and animal dispersal, management of threats in these fragments is required to ensure that vulnerable wildlife can persist**.

Key factors to Agropalma's success in maintaining biodiversity area are thus:

- the large size of the protected forests,
- connectivity between these forests;
- quality of the protective management (Marcos Persio, pers. comm.).

Patrolling in Agropalma's forest areas is done by the company's 27 forest rangers. These rangers and their 5 supervisors translate approximately into one person per 2,560 ha. The team has 1 pickup truck, 8 motor cycles, 21 bikes, 3 speed boats, 7 small boats, and 2 canoes. These guards patrol the forests and rivers by teams of two on a daily basis according to pre-established "patrolling divisions", primarily to look for hunters and illegal loggers. They usually avoid direct encounters with encroachers to prevent any direct altercation. The 503 km of borders of Agropalma make it difficult to fully prevent hunters from entering, and hunters are rarely encountered. Animal traps, including wire-triggered shot guns, are more frequently found than poachers. From their own experience, most poachers are not from local communities but outsiders who are active in the bushmeat trade.

Figure 6. Planted areas in Agropalma with dead palm leaves indicating reduced leaf pruning and grasses and shrubs underneath the palms indicating reduced undergrowth clearing.

All hunting in Brazil is prohibited (unless it is done by indigenous people for subsistence). The patrol teams, however, have no legal enforcement rights and carry no guns, and a soft approach is generally favoured to avoid conflict. If needed, police can be involved to arrest poachers, but usually only to seize the equipment and there is no prosecution. In 2018, the forest rangers had 35 law enforcement events, confiscating 83 fire arms, and 81 traps. In 2018, there were five occurrences of illegal logging (five trees taken). The 2018 budget for forest protection is R$ 1,427,459, translating to USD 6.3 per hectare of HCV forest, with additional funding of R$ 250,000 being allocated to external partners such as Conservation International.

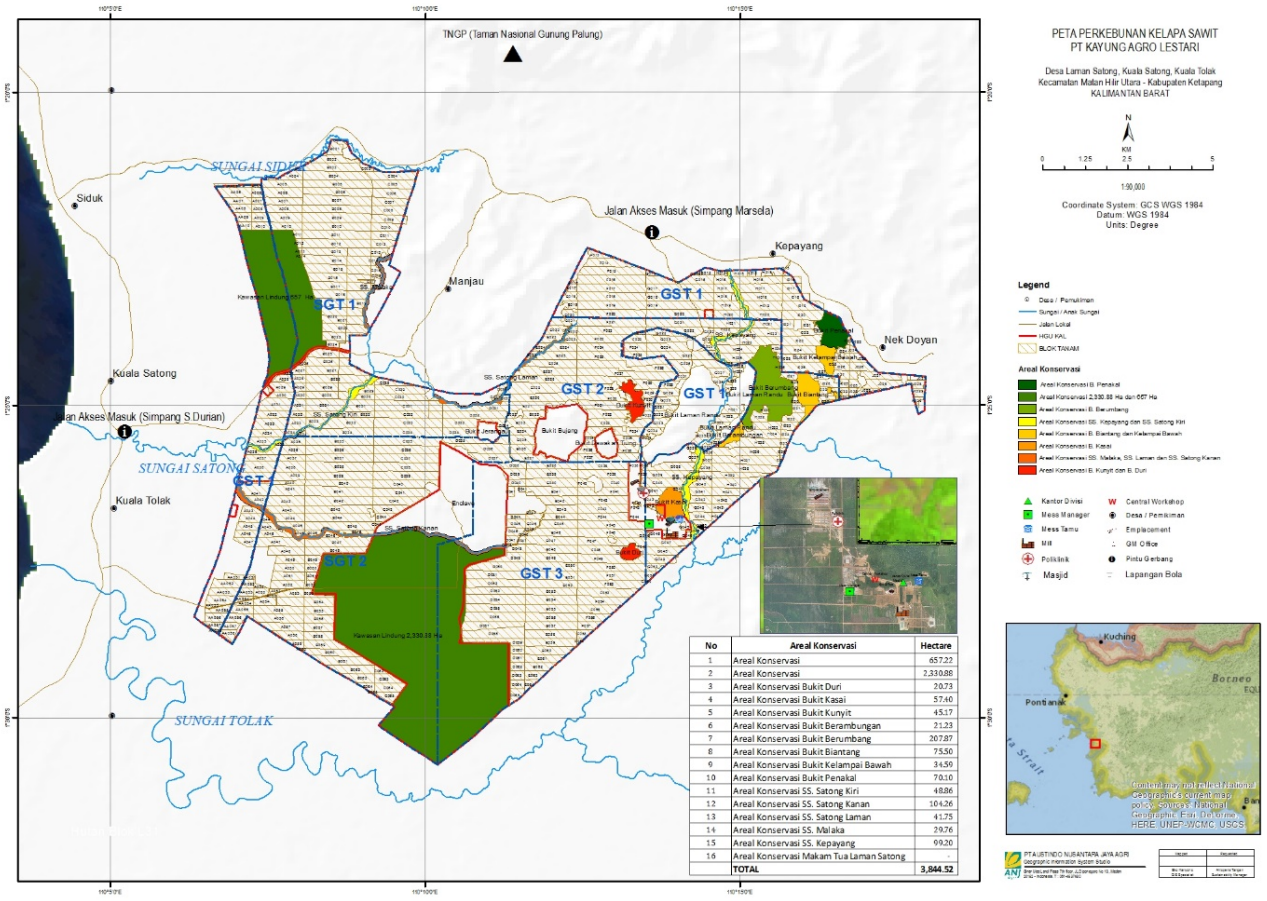
The forest guards are not in charge of environmental awareness and socialization programs; usually these activities are conducted in collaboration with local NGOs. However, being from the communities

themselves, the forest guards also contribute to raising awareness about wildlife conservation. The team has a plan that is constrained by budget. They follow yearly activity plan with their own KPI.

Finally, Agropalma practices reduced leaf pruning (once a year), underground clearing, and epiphyte clearing in planted areas (Figure 6), as this is labour intensive and labour is expensive. We spent insufficient time to determine whether this has a positive impact on bird diversity, although we recorded a relatively high number of species along the transects we conducted within their oil palm areas.

KAYUNG AGRO LESTARI

PT Kayung Agro Lestari (or PT KAL) is a company operating under the diversified agribusiness of the PT Austindo Nusantara Jaya (ANJ) group. The five PT KAL estates are located in the Ketapang District of West Kalimantan, Indonesia. Altogether, they cover 16,620 ha, of which about 12,000 ha are planted with oil palms and 3,845 ha (or 23% of the total company area) is set aside for conservation, with the remainder being used for roads, settlements, one mill and other infrastructures. To the north of the estate lies the Gunung Palung National Park (108,000 ha) and to the south the Sungai Putri peatswamp (54,000 ha). The concession lease of Sungai Putri was recently acquired by the Yayasan Inisiasi Alam Rehabilitasi Indonesia (YIARI) – the Indonesian branch of International Animal Rescue (IAR), which allows the protection and management of the large orangutan population found there. PT KAL therefore provides a potential corridor function between the two large protected orangutan populations of Gunung Palung and Sungai Putri.



No	Areal Konservasi	Hectare
1	Areal Konservasi	657.22
2	Areal Konservasi	2,330.86
3	Areal Konservasi Bukit Duri	20.73
4	Areal Konservasi Bukit Kasai	57.40
5	Areal Konservasi Bukit Kunyit	45.17
6	Areal Konservasi Bukit Berambungan	21.23
7	Areal Konservasi Bukit Berumbang	207.87
8	Areal Konservasi Bukit Biantang	75.50
9	Areal Konservasi Bukit Kelampai Bawah	34.59
10	Areal Konservasi Bukit Penakal	70.10
11	Areal Konservasi SS. Satong Kiri	48.86
12	Areal Konservasi SS. Satong Kanan	104.26
13	Areal Konservasi SS. Satong Laman	41.75
14	Areal Konservasi SS. Malaka	29.76
15	Areal Konservasi SS. Kepayang	99.26
16	Areal Konservasi Makam Tua Laman Satong	-
	TOTAL	3,844.52

Figure 7. Map of PT KAL, showing, in green, the conservation areas and riparian buffers protected by PT KAL and, in white, enclaves, either managed by Laman Mining or local communities.

Land clearing operations in PT KAL started in 2010, and until December 2013 when land clearing ceased, ca. 3,000 ha of degraded forests was replaced with palms, while the rest of the plantation was established on burnt-over grasslands on sandy soils. Local communities are also entitled to use four enclaves totalling about 1,500 ha to grow rice, corn, cassava and other crops, mostly on hills that remain at least partly forested. Although the enclaves are located within the concession's boundary, PT KAL is not involved in their management. An area of 680 ha that is located in the middle of the concession area was excised a few years ago by the government to allow for bauxite exploitation by Laman Mining, who hold mining rights over most of PT KAL's concession area. This has caused additional deforestation, albeit outside PT KAL's control.

ANJ vision is to develop a model agribusiness that balances between economic development, social benefits and environmental conservation. Support from the ANJ Group's majority shareholder, Mr George Tahija, was instrumental for the company to develop and implement these values. All PT KAL's operations were certified by RSPO in 2019. The general manager of PT KAL confirmed that ANJ biodiversity vision originated from the owner. This vision trickled down to top management and then to the other lower levels of the company. Monitoring the impact of ANJ activities is needed to achieve the long-term vision of ANJ of taking care of people and the environment. Impact monitoring is also needed to improve the reputation of the palm oil industry in general and to change the market's perception towards palm oil. From his own experience, the ANJ manager recognizes the ecological values of HCV areas, such as the water retention in protected peat lands, which is profitable during the dry season as it sustains higher yields, and provides water for fire-fighting. The general manager explained that the excision of half of the HCV by Laman Mining had a negative impact on palm oil in planted areas close to the mining operations, especially during a drought, because of significant clearance of peat forest by the mine and the use of water to wash the bauxite deposits.

A first HCV assessment was conducted in 2011. This report identified the presence of a significant orangutan population and one of the recommendations made in the report was to not clear any more forest harbouring orangutans. At this time, less than 1,000 ha of forests had been cleared. However, a second and final assessment was produced in 2013. This second report identified HCV forest areas that needed to be set aside for orangutan conservation and areas that could be cleared for oil palm planting.

Figure 8. PT KAL's Tanjung Sekuting 657 ha conservation area on the left and Gunung Palung National Park in the distance. At least 20 orangutans are estimated to occur in the conservation area.

Today, the conservation area combines 16 different HCV areas, with Bukit Kiras (2,331 ha) and Tanjung Sekuting (657 ha) (Figure 8) the two largest ones, both with significant orangutan populations that were most recently surveyed by International Animal Rescue in 2018 (IAR Indonesia 2019). Other conservation areas include several hills and riparian areas. In 2017, the local government assigned the status of "Essential Ecosystem Areas" (or KEE in Indonesian) to these conservation areas, as part of a larger landscape designation to maintain forest connectivity in the region.

In addition to the HCV assessment, the company requested the input of an external international orangutan expert to guide their operations, providing regular strategic input between 2011 and 2020 about conservation management and study of the orangutan populations. These recommendations also resulted in the creation of PT KAL's Conservation Department in 2012, which is part of the ANJ's Sustainability Division.

The priority of the conservation team in 2012 was to tackle illegal logging and land clearing by community members that were rampant in all HCV areas and forest patches within and outside PT KAL. For example, a road survey in 2013 along the 3 km Laman Mining road, built by the mining company through the conservation forest area, revealed 54 illegal logging trails and 11 active illegal logging camps (Meijaard 2013). Addressing illegal logging and land clearing was mostly done through patrolling, with the aim to locate the encroachment areas and to engage a discussion on site with the offender. The team would explain to the logger that logging was illegal given the legal status of the area, and a discussion would ensue about the financial benefits and limitations of such illegal activity. Eventually more than 80% of the illegal loggers became ANJ employees and consequently illegal logging within the company boundaries decreased and has finally stopped. Today, illegal logging is nearly absent from the concession, a contrasting situation with other forests located outside of ANJ's conservation areas where illegal logging remains rampant, and which in the years from 2013 to 2020 have been completely cut down and burnt over, primarily by local farmers.

Initially, core conservation team conducted the patrolling, assisted, when needed, by workers from other divisions. However, tackling illegal logging requested more manpower and in 2014 one additional full-time position was added to the conservation team. Over the years, this team has grown in size and today nine staff are hired full-time (although two positions have not been replaced yet following the retirement of two staff), led by a Jakarta-based Conservation Manager who is also responsible for 3 other estates elsewhere in Indonesia. The team has received in-house training and capacity building and additional training by external consultants when necessary. Staff turn-over is not an issue, and most conservation team staff have been with the team for at least several years.

Biodiversity conservation efforts are integrated in the management of the plantation by creating Key Performance Indicators that need to be achieved every year. Regular communication is maintained between the conservation team and higher company and plantation management via regular reporting through various communication channels, including WhatsApp. Management decisions that may impact the environment are taken following consultation and discussion with the conservation team, for example creation of drains, water usage, etc. Decisions are based on data collected in the field and the local knowledge of the situation.

For field activities, the PT KAL team uses a car and six motorbikes. They also own some basic field equipment requested for biodiversity monitoring, such as GPSs, binoculars and ten camera traps. From the discussion with the team members, an additional three staff would be needed to conduct all the range of field activities properly. On average, the PT KAL Conservation Team is allocating 1 staff for 400 ha of HCV and spends 11.4 USD/ha of forest per year, not including the salary of ANJ Conservation Manager. However, the low CPO price in 2019 resulted in a reduction of the team's budget by half, making it difficult to meet the team's strategic objectives.

Today, patrolling remains the core activity of the team. Between July and December 2019, the team conducted 149 patrols covering 961 km of forest trails and plantation roads (ANJ 2019). If the team comes across an illegal case, it will request the support of the security team. Three teams of two people equipped

with SMART technology conduct patrols and collect data. Then the GIS Officer of the conservation team processes these data.

A major threat in the area is the risk of fire. On average, fire (including prevention, fighting and mitigation) costs PT KAL about 250 USD/ha of forest per fire year. As the result of strong collaboration between the PT KAL firefighting unit and its conservation team, no HCV inside PT KAL has recently burnt, although this risk remains real. In 2019, a patch of forest adjoining to Tanjung Sekuting burnt and many orangutans took refuge in Tanjung Sekuting, inflating its resident population (see below).

Other activities undertaken by the conservation team include awareness and socialization of the conservation concept (including HCV and status of protected species) with surrounding communities. On average, two programs are organized every year in each of the three villages targeted by the conservation team. These events are often organized in collaboration with other partners, such as local NGOs and government departments. Additional programs include school visits and on-site visits for kids and students conducted in the HCV (especially in Tanjung Sekuting to see wild orangutans).

Table 3. Area of forest in PT KAL's Bukit Kiras and Tanjung Sekuting conservation areas compared with adjacent areas managed by Laman Mining and communities. For locations of HCVs see Figure 2 (IAR Indonesia 2019, CIFOR 2020)

	Bukit Kiras	Outside PT KAL	Tg Sekuting	Outside PT KAL
2012	600	1242	2097	1838
2015 (pre-fire)	600	1158	2200	1806
2016 (post fire)	574	271	1851	1785
2018	573	251	1842	1748
2019 (post fire)	573	ca. 0	1842	ca. 0
Decline (%)	**5%**	**100%**	**12%**	**100%**

As a result of the patrolling and "socialization" efforts, the team has recorded a significant decrease of poaching activities within the area. In 2019, the team retrieved only three snares and encountered five poachers in the conservation areas. The relative effectiveness of conservation efforts is also shown in the forest loss data within and outside PT KAL's conservation areas (Table 3). Recent satellite analysis of forest cover in PT KAL and surrounding areas can be used to compare forest condition between HCVs located within PT KAL and non-HCV forests adjoining to the concession area (IAR Indonesia 2019, CIFOR 2020).

Results of wildlife monitoring indicate the presence of 36 mammal species, 151 bird species, 19 reptile species, 3 amphibian species and 14 fish species within the conservation area (note that amphibian and fish haven't been surveyed by a specialist, explaining the low number of species). This list is updated on a yearly basis. Wildlife monitoring is primarily done via direct sightings and usage of camera traps (10 units available). There is not a strong focus on biodiversity and ecological research, apart from orangutan behaviour studies.

In 2019, the team initiated the PENDAKI program ("Care for Biodiversity"), a citizen-science program developed by Borneo Futures. If PT KAL employees see a species of interest, they try to take a picture and report it to their manager who feeds the information to the conservation team. Every month, two PENDAKI participants are awarded with a token of appreciation (tee shirt or mug) for their efforts. This program has been very successful, as indicated by the increasing number of reports received by the conservation team. To date, a total of 23 species of animals and 4 plant species that had not initially been listed within PT KAL have now been recorded through this program. Importantly it is also creating a sense among all company

staff – security guards, cooks, managers etc. – that biodiversity conservation is everyone's responsibility not just that of the conservation team.

During four years, the conservation team has habituated and followed several wild orangutans living in the 657 ha HCV area. Data collection included location of the focal individual, movements, time budget and behaviour following the focal scan methodology, diet and ad libitum observations. The team also monitored the monthly phenological status of 536 trees located in the larger 2,331 ha HCV to document seasonal fluctuations of food productivity in the forest. The team is also taking part in regular line transect nest surveys to monitor the orangutan population size within the two larger HCVs. This work is part of an MoU signed with the local NGO YIARI. YIARI is supposed to use its expertise to analyse the data collected by the conservation team, although much data analysis remains pending. Information gathered by the conservation team and discussed with YIARI provides guidance for managing the orangutan habitat.

The orangutan populations within the two HCVs are currently estimated to range between 200 and 250 individuals, a stable estimate since 2012 (IAR Indonesia 2019). However, the size of the forest area used by this population (within and outside the area protected by PT KAL) has decreased by half during the same period, both through forest clearing on company land and on surrounding community land, resulting in a drastic increase of density (Table 3). For example, in the smaller HCV area, the density has increased from 2.5 to 9.9 ind./km^2 (IAR Indonesia 2019). Such a high density may result in food competition and social stress within this sub-population, and the conservation team is closely monitoring the current situation. Particular attention is given to the health status of the individuals and potential orangutan dispersion within the larger PT KAL landscape, and until now no animals have been encountered that were obviously malnourished, indicating that despite the high densities the resident orangutans find sufficient food.

To increase the dispersal opportunities for orangutan, a 25 m wide corridor was established in an area newly planted with palms in 2013 to link the 657 ha HCV area with the Manjau community enclave forest (Figure 9). This 1.7 km corridor has grown back to secondary scrub and forest and is already used by orangutans, as shown by the regular records of nests in this corridor.

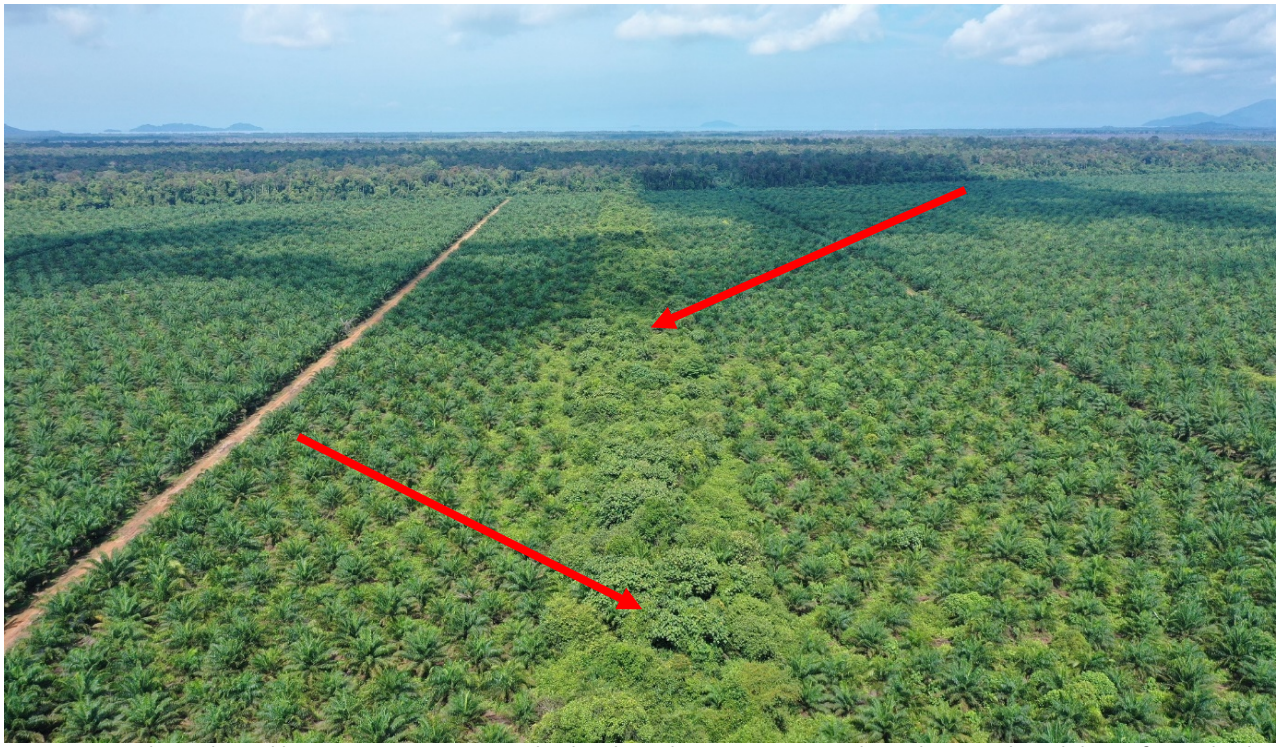


Figure 9. Corridor, indicated by arrows, regrowing in oil palm planted in 2011 in PT KAL, but subsequently withdrawn from oil palm management and left to regenerate naturally. The regrowing vegetation is used by species such as orangutans to move between two forest blocks.

UNITED PLANTATIONS, MALAYSIA AND INDONESIA

United Plantations Berhad is a Malaysia-based company with oil palm and coconut estates in Peninsular Malaysia and Central Kalimantan, Indonesia. We visited the PT Surya Sawit Sejati (PT SSS) company in the West Kotawaringin District in Central Kalimantan Province. The company owns 4 estates (Figure 10), with a total planted area (including their community Plasma area) of over 9,000 ha and more than 7,000 ha of set-aside HCV and conservation areas (about 40% of total land holdings in PT SSS). Lada Estate was planted in 2007, followed by Runtu Estate in 2008 and Plasma Kumai Estate in 2014. Not all HCV areas are forested, however, and some wetlands and riparian areas are in the process of being reforested. United Plantations received the world's first RSPO certificate in 2008, and PT SSS became RSPO certified in 2018 for the initial business license area of 713 ha (land cultivation rights certificates), and subsequently, in 2019, PT SSS successfully obtained the RSPO certificate for the entire area of 6718 ha.

There is strong support for biodiversity monitoring and conservation management, especially through United Plantation's owners, the Bek-Nielsen family, as well as the collaboration between the owner and Copenhagen Zoo, which have provided technical and managerial guidance to setting up and implementing biodiversity management and monitoring since the creation of the Biodiversity Division in 2011. The owner has always ensured that the Biodiversity Division had sufficient funding, technical skilled staff, and the support from senior and middle managers working on other aspects of oil palm. The ability of the Head of the Biodiversity Division to communicate directly with the company owner through regular face-to-face meetings and reporting (bi-annual reports), emails or what's app texts, indicating the interest of the owner in the details of biodiversity management.

According to PT SSS' 2018 Conservation Management Report, the Biodiversity Division has so far identified 285 plants species, 22 amphibians, 46 reptiles, 67 mammals, 78 fish, 179 birds, 52 phytoplankton and 23 zooplankton. The number of discovered species in PT SSS is still increasing (Figure 10). Wildlife includes a range of species of global conservation concern, such as Bornean Orangutan (*Pongo pygmaeus wurmbii*) (Critically Endangered), Storm's Stork (*Ciconia stormi*) (Endangered), Malayan Sun Bear (*Helarctos malayanus*) (Vulnerable), King Cobra (*Ophiophagus hannah*) (Vulnerable), Pangolin (Manis javanica) (Critically Endangered), Flat-headed Cat (*Pionailuris planiceps*), and False Gharials (*Tomistoma schlegelii*) (an Endangered crocodile). According to the HCV study conducted in 2014, several Bornean endemics have also been identified as present, including the Bornean Bristlehead (*Pityriasis gymnocephala*) and the Bornean Crestless Fireback (*Lophura pyronota*).

Forest types range from mangrove and peat swamp to freshwater swamp and lowland Dipterocarp forest on mineral soils. Orangutans occur in nearly all the protected forest patches, but they can also be found in the plantation outside of forested areas. Based on the many camera trap pictures taken of them, animals appear to be in good health and they breed regularly. This indicates that orangutans are using the wider landscape of natural forests and palm areas. No quantitative estimate of the orangutan population was available.

Biodiversity management in PT SSS is done by a team of 7 office staff (all of them with a BSc or MSc university degree (most if not all from the Andalas University in Padang), 6 field staff (or rangers) and 8 additional part-time staff from other divisions who assist in a range of activities but can also work on other jobs in the plantation. Office staff have all their own expertise and are specialized in a specific field (birds; reptiles; botanic and forest restoration and so on). While not all office staff originate from the region, all rangers are from local communities. Their knowledge of the local situation helps to socialize conservation ideas and awareness with local community members. The Division is following the five-years plans that they designed. They do not rely on external consultants for their activities, except for the support of the Copenhagen Zoo, but they cooperate closely with the biology department of the Andalas University in their scientific activities. According to the team leader, turnover among the staff is pretty low, except for the GIS Officer's position, for which the team has had five different persons since 2011.

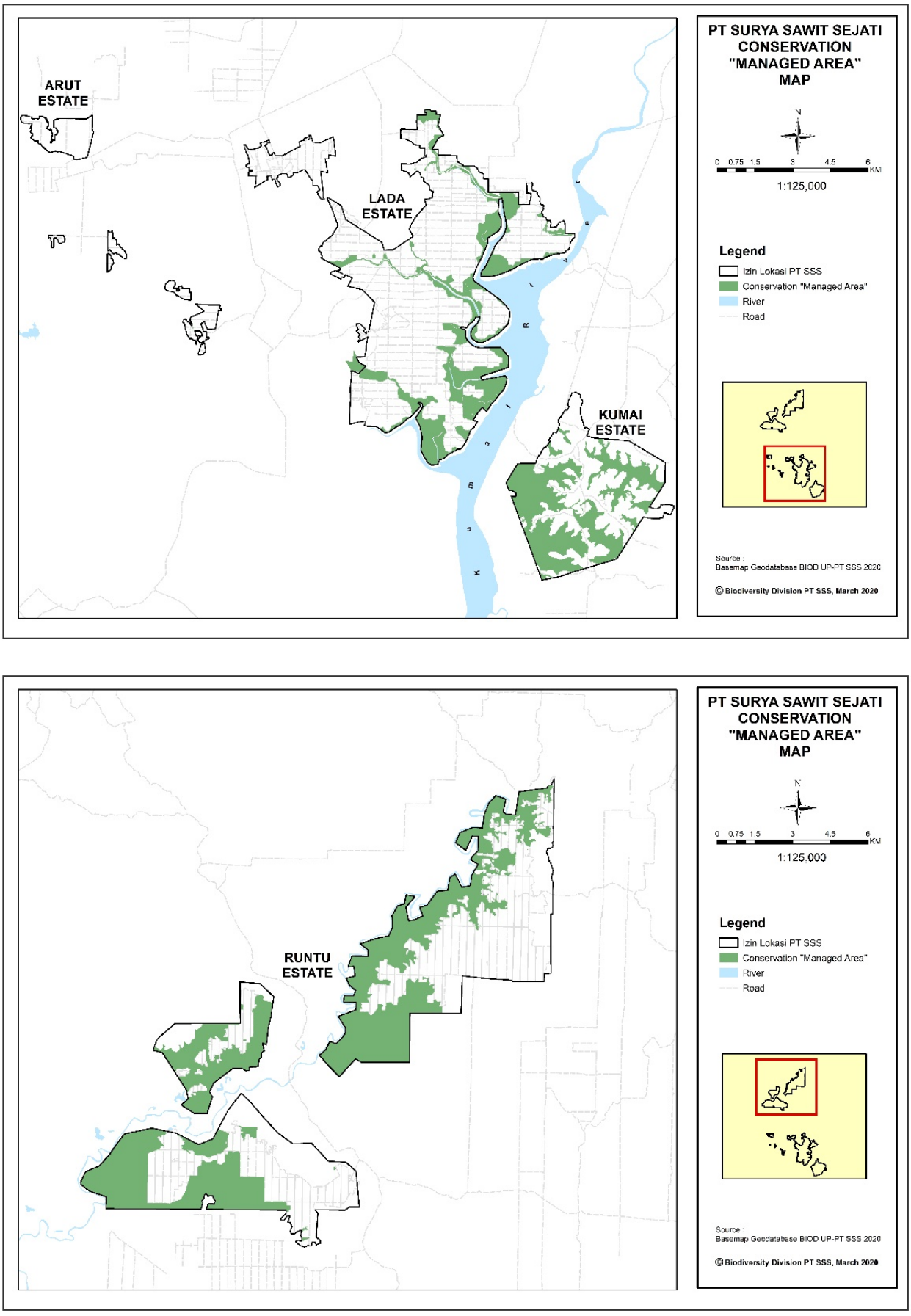


Figure 10. Four estates owned by United Plantations in Central Kalimantan.

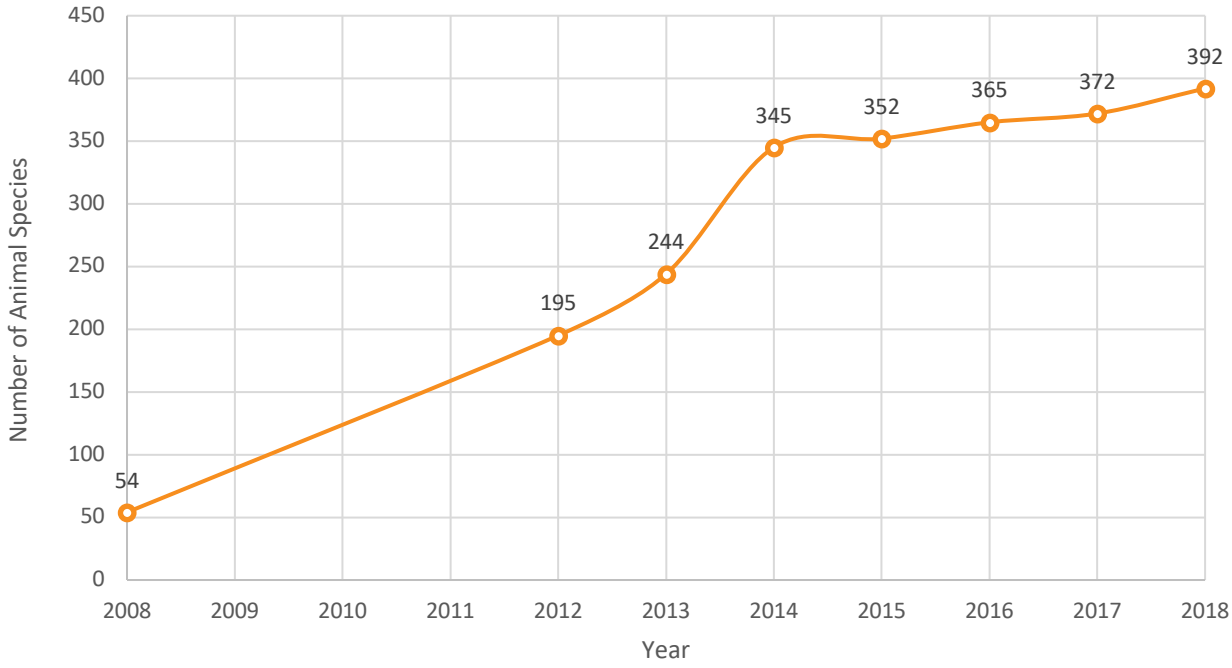


Figure 11. Cumulative number of animal species in PT Surya Sawit Sejati discovered by year.

Key tasks of the Biodiversity Division include demarcation of conservation areas and cultural conservation sites (e.g., sacred grave sites), patrolling for illegal logging, hunting, poaching and fire, community awareness in 14 villages, and network development and data sharing. The Biodiversity Division has three cars, 10 motorbikes, one 15 horsepower speed boat, one motorized canoe, one sampan, and three drones (for aerial surveys). They currently have 125 camera traps. The annual budget of the Biodiversity Division is IDR 1.7 billion (excluding consultancy fees for international advisers), or about USD 110.000, which translates in USD 15.7 per ha HCV per year. This budget is maintained consistently irrespective of the price of Crude Palm Oil and the financial position of the company. It increases at a rate of about 5% each year and there are additional allocations for major purchases such as new cars.

Most HCV areas are easily accessible from the river by outsiders. Major threats include some level of hunting for birds and mammals, illegal logging and fishing. Fishermen are a particular concern because of the risk of fire associated with their activities. Upon detection, encroachment activities are reported to the Sustainability Division for further action. PT SSS uses SMART Patrolling methods for planning patrols and collecting data during patrols. These methods are GPS-based and allow forest rangers to enter data on species or illegal activities they encounter during patrols. This information is then downloaded when they return to the office and information automatically stored in a geographic information system and database under the responsibility of a GIS officer. Regular patrolling in and around UP HCVF has resulted in a significant decline of cases of illegal encroachment.

Wildlife monitoring also uses other methods (besides forest patrols), including the use of mist nets for catching birds, camera traps, harp traps (for bats), and life traps. Over the years, the regular use of camera traps in the same areas has identified individual orangutans, especially resident females with their young. For example, a series of pictures taken from 2012 to 2018 shows a female with her young going through various development stages, from a few months old baby to young adolescence. Staff from the Biodiversity Division are conducting a number of scientific studies, among others on the ranging and diet of Leopard Cats *(Prionailurus bengalensis*) with telemetry (a total of 11 cats have been equipped with a radio collar so far), ranging of King Cobra (also using telemetry), and species diversity studies. Staff are encouraged to write up their biodiversity research findings in scientific publications, and present results in national and international conferences. This helps to disseminate the research findings, promote the conservation management work of United Plantations, and build up staff capacity.

The forest rehabilitation team is also part of this Biodiversity Division. A patch of 389 ha of former oil palm areas was frequently flooded; the biodiversity unit convinced company directors and management to remove the palms from this wetland and replant the area with natural forest trees. An additional 250 ha is part of a remediation scheme with 75 ha located in the Lada estate and 175 ha in the Runtu estate, in which natural trees are planted among productive oil palm trees. The palm trees receive half the amount of fertilizer, and will then be phased out towards the end of the first planting cycle (ca. in 2030). Growth of natural trees is favored over growth of palms. Up until the end of 2018, a total of 131,629 trees of 108 naturally occurring species had been planted in PT SSS. Species that grow well in wetlands include Rengas (Gluta sp.) and Belangeran (Shorea sp.). Seedlings are used from a local nursery operated by the Biodiversity Division team. Total tree mortality is around 50%, but much lower (~20%) on mineral soils, and higher in frequently flooded areas. The team is currently experimenting a two-phased planting approach, with fruit-producing Ficus trees planted after the seedlings from the first planting wave are already tall enough to produce a closed canopy. Monitoring shows that the number of bird species in rehabilitated areas starts to increase after about 6 or 7 years when trees are starting to provide cover (Figure 12).

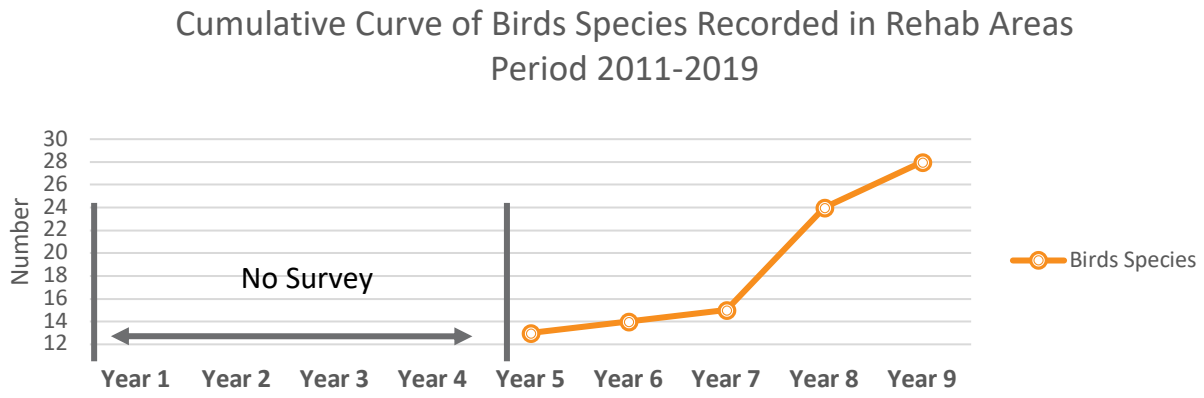


Figure 12. Understory bird diversity in rehabilitation areas in PT SSS using mist-net methods.

From the interviews conducted in United Plantations, it appears that estate managers don't necessarily understand the needs for conservation and landscape rehabilitation. Often, conservation goes against their practices and knowledge. However, they follow orders from the company owners and there is no major conflict between the Biodiversity Division and the estate management, except sometimes when additional workers are requested by the Biodiversity Division from other Divisions. **It appears very strongly that the best way to convince estate managers about the value of biodiversity management is to work from the inside and spend time with them. External consultants cannot achieve this result.**

The owner sees biodiversity monitoring and proper management of the environment as an important added-value to the company through public relation and as a promotion tool. In addition, the company upholds its mantra "Reach and Teach as well as Reach and Remind" where the importance of sustainability is cascading from top to bottom and it is considered of utmost important for all level of the workforce to internalize the concept of sustainability rather than a set of boxes that need to be ticked to comply to standards.

REA

R.E.A. Holdings plc, established in 1906, is a United Kingdom public company listed on the London Stock Exchange and, through its subsidiaries, is engaged in the operation of oil palm plantations in East Kalimantan, Indonesia. REA began planting in 1994 within the upper Belayan area in the Kutai Kartanegara District, a landscape with low lying and often flat topography, a high water table and substantial wetland areas. Most of the Belayan area was extensively logged in the late 1970s to early 1980s but logging operations stopped following the widespread and fierce fires of 1982-1983 and 1997-1998. These fires destroyed most trees where oil palms were not planted yet, explaining the intense degradation of remaining natural forests in the region. Today local communities are using forests that are still standing around REA for traditional subsistence use, logging and small-scale agriculture.

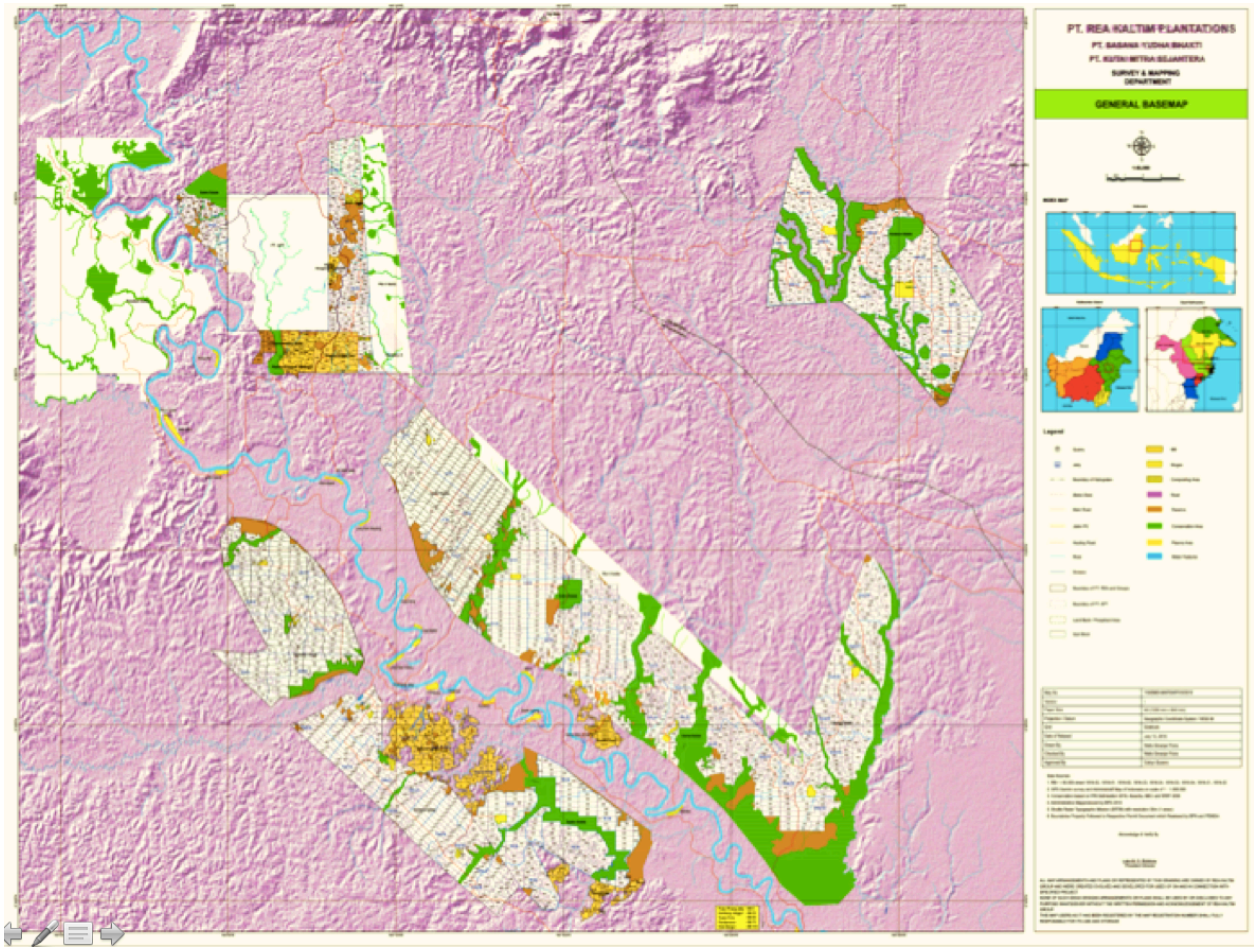


Figure 13. Map of REA Kaltim's estates in the Belayan area in East Kalimantan, with HCV areas shown in green.

REA has currently planted about 30,000 ha with palms and is managing about 6,000 ha of conservation areas, or ca. 20% of the total landholdings (Figure 13). The company operates three oil mills and a palm kernel crushing facility. The company became a member of RSPO in 2007, and REA received RSPO certification in 2011.

In January 2008, REA established its own separate Conservation Department (REA KON). REA KON was directly placed under the authority of the president director in Indonesia and ultimately the group board of the company. REA KON is not directly connected to plantation operations or production, because REA KON believes that when there is a conflict between operations and conservation, conservation is often subservient to increasing palm oil production, and the current management structure avoids these conflicts.

REA KON's goals are: 1) to maintain or enhance the original landscape level biodiversity; 2) to reduce or eliminate negative human impacts; and 3) to ensure that long-term benefits are shared by all.

The overall objective of REA KON is to conserve biodiversity outside of Protected Areas. This idea is clearly expressed in a 2019 paper by Dr Rob Stuebing, Technical Advisor to the Conservation Department: "Why conservation? Plantations expand and natural areas shrink. Conservation reserves (not just national parks) are important REFUGIA for wild species that can survive, but must be managed PERMANENTLY. Conservation integrated with plantation management is SUSTAINABLE. Conservation is not a hobby, not a luxury but a DISCIPLINE good for ALL. Conservation is a result, and not a procedure; this is the sum of Science (inventory, monitoring and assessment) AND Management (protection and use). Inventories and empirical information, not theories nor assumptions must provide the solid foundation for management decisions".

From 2008, REA KON has long held the view that:

- REA Conservation never touts its plans for conservation, but only what has actually been accomplished whether a lot or a little;
- REA prefers the participation of scientists over consultants for empirical research, who then will be the ones who publish the results on which the quality REA KON's work can be evaluated;
- REA welcomes visits by anyone is interested to verify what we do, and seriously weighs outside advice on areas needing improvement.

REA KON has three subdivisions: 1) Biodiversity management; 2) Plantation ecology (environmental quality and ecological services); and 3) Communities and forests. REA KON's first responsibility was to create and maintain an exhaustive permanent database based on long-term surveys and monitoring of the status of floral and faunal communities. The Biodiversity Management team is in charge of species inventory, monitoring, assessment and management. The team is using a range of techniques to assess wildlife presence/absence, such as camera traps, transects and point counts, capture (harps, traps, pitfalls, nets), and other. They collect photographic records, voucher specimens, record incidental sightings, vocalizations, tracks and other signs of animal presence within and outside conservation areas.

The first five years of REA KON's efforts (2008-2012) produced encouraging results, listing approximately 180 species of birds, more than 100 species of freshwater fishes (of which at least four were new to science), and numerous rare or endemic plants (including up to 20 new species). Data accumulated over the years allow for prioritizing species according to the need for active management (this process is also called "triage"). Conservation areas are home to several protected and endangered species, such as the Clouded Leopard (*Neofelis diardii borneensis*) and Flat-headed Cat (*Prionailurus planiceps*), Bornean Gibbon (*Hylobates muelleri*), False Gharial and Siamese Crocodile (*Crocodylus siamensis*), hornbills, Storm's Stork (*Ciconia stormi*) and others. REA is also home to a small breeding population of orangutans. This orangutan population has been monitored over the years and regular pictures of adult females and their young captured by camera-traps provide evidence of breeding in this population. Non-resident individuals (especially males) move back and forth between the conservation areas and patches and corridors of degraded forest located outside of the concession. However, the total number of animals is estimated to have declined by maybe half between 2011 and 2016, following the destruction of part of their habitat outside of REA's boundaries.

The Plantation Ecology team is in charge of documenting environmental quality, ecological services and forest regeneration processes. This team has established permanent forest plots for long-term forest monitoring. The team is also operating a small tree nursery and undertaking small scale reforestation activities in the most degraded HCVs. Every year, the team is planting between 2000 and 2500 seedlings of various species depending on local soil conditions and composition: *Dillenia* sp. (wet areas); *Eusideroxylon zwagerii* (dry areas), Dipterocarpaceae, etc. Monthly weeding and maintenance of the seedlings is done until the seedlings reach a height of about 6 feet or more. A recent study showed that the mean average tree girth, stand basal area and density were higher in the conservation area forests than in forests located outside of the concession, although the difference was not statistically significant.

The Community team is in charge of education, awareness and community management for sustainable use. REA KON is favouring the sustainable use of conservation area by local communities rather than strict protection. They are using satellite images and drones to assess any possible encroachment of their HCVs. Patrolling is more for monitoring than enforcement purposes Consequently, the Community team doesn't do patrolling, and most of the efforts are about socializing and raising awareness with local communities. The various team members spend a lot of time with local villagers, discussing the concept of sustainable use of natural resources, and explaining what can be done or not within the conservation areas. When the conservation area was established, the company financially compensated the local villagers who owned land inside the conservation area and these pieces of land were left unplanted. Interestingly, REA is permitting a certain level of sustainable use for community members in the conservation areas. For example, the team has negotiated with the communities to stop forest burning and regulations for hunting or logging. REA KON closely monitors controlled hunting activities of non-protected species that were agreed upon between the company and the communities following intense discussion between REA KON and villagers. Over the years, the number of harvested species has declined, and today hunters target only game species and pythons. However, an orangutan and a sun bear were killed in two separate events a few years ago, although it is not clear whether this happened within or outside the REA estate boundaries. The Community team also succeeded in convincing the villagers to stop the use of non-selective cable snares by designing a different type of trap that targets only wild boar and deer. REA KON is also engaged in education events like the "Conservation EduCamps" with local schools. The REA KON approach results in rather peaceful relationships with the villages surrounding the plantation, and no open conflict between the company and the local villages has erupted over the past few years.

A strong component of REA KON activities is to create strong partnerships with local and international research organizations, such as the Indonesian Institute of Science (LIPI), the Mulawarman University (Samarinda) or the National University (Jakarta), Singapore Herbarium and many other institutions. REA KON welcomes and supervises students from local universities during the course of their studies. REA is covering all the costs, from traveling to accommodation and food. This strong collaboration with Indonesian scientists results in many locally produced reports and theses.

REA KON has two field research stations used for staff and invited students and researchers. The main station, Loa Buluh, was built in 2010 in Hulu Belayan while a small floating station is located in Danau Mesangat. Altogether, REA KON has 17 staff hired full-time (5 of them having a BSc). Their annual budget is about IDR 4.2 Billion, translating into an average investment per hectare HCV of USD 50 per year. They own three 4WD cars and five motorbikes for their field work, as well as field equipment (computer, camera traps, GPS, binoculars, etc.).

Today, the Sustainability team of REA is a separate entity of 5 staff. In 2012, REA KON was experimentally reallocated under the Sustainability team of REA. For the next few years, the team focused most of its efforts on patrolling and HCV protection. Results of this reorganization were negative, and possibly resulted in the increased burning of forest patches outside and inside the concession. This, in turn, induced a drastic decline of the orangutan population and other species. In 2018, REA decided to return to their original model and to separate REA KON and the Sustainability unit. Today the Sustainability unit is in charge of reporting to RSPO.

The Biodiversity team shares the results of field activities that are contributing to HCV management in monthly reports, which are reported directly to the REA senior management level. This includes:

- HCV 1: Management of the Triage database, with continuous taxonomic inventories by REA KON and invited scientists;
- HCV 2: Boundary marking of all conservation areas and HCV; characterization of ecosystems from satellite images, field studies;
- HCV 3: Assessment of ecosystem characteristics via satellite imagery and taxonomic/ecological inventories and assessments of flora and fauna distribution in the landscape;
- HCV 4: Daily weather data and relevant environmental parameters from automated weather stations and data loggers;

- HCV 5: Routine, scheduled dialogue sessions with local villages on forest use and conservation education.

Overall, REA KON activities have resulted in the lowering of encroachment, the improvement of habitat connectivity via forest regeneration and restoration activities, and the maintenance of a diverse fauna and flora. The monitoring of biological control also shows good results for pest control.

One of REA's ambitions is to demonstrate that plantations can contribute to conservation. Indeed, concessions are stable entities with stable boundaries established for 25 to 75 years. Companies have human and financial resources, equipment and skills that can support conservation. REA is convinced that conservation activities must be undertaken by professional staff, with the additional support of volunteers or consultants from time to time. These activities should also be used as umbrella structure to support long-term studies and support capacity building of national biologists.

WILMAR

The Wilmar International group is one of the largest producers and refiners of palm oil in the world, with a total planted area of 230,409 ha as of 31 December 2018. Wilmar International's head office is in Singapore.

For Wilmar, we visited 2 HCV sites in Sabah. However, our analysis is based on data covering Wilmar's conservation and HCV programme for Malaysia. Because Wilmar's conservation programme is managed under individual country operations, the information used is based on the site visits to specific conservation areas in Sabah as well as data from Wilmar's 22 estates in Malaysia.

HCV management in Wilmar is managed by country level estate operations and coordinated with the conservation programme of Wilmar's Sustainability function. Unlike the other companies we visited, Wilmar does not have a specific team responsible for biodiversity management in Sabah, as staff is shared with estate operations. In Sabah, biodiversity monitoring is organized regionally through an HCV and Conservation coordinator, who works with the staff responsible for Environment, Safety, Health and Social (ESHS) implementation in each estate. At each regional level, Wilmar estate operations have an Eco Management Unit (EMU) which is a full-time technical team that supports and assists all estates in implementing sustainability, research and development and Geographic Information System and survey work. In Malaysia there are 2 EMUs, one in Sarawak and one in Sabah.

Across Malaysia, Wilmar has 78,274 ha of land holdings. Of this 49,968 ha is in Sabah, where 6,744 ha of HCV areas or 13% is protected. In Sarawak, the total landholding is 28,307 ha, where 1,725 ha of HCV areas or 6% is protected. Overall in Malaysia, 11% of landholding is protected as HCV areas. One estate, Sekar Imej, which we were unable to visit has the largest percentage of its land set aside for conservation; 2,469 ha of HCV on 3,642 ha of its estate (i.e. 67%). Most other estates have relatively small areas set aside for conservation because the development of these estates was completed in the 1980s and 1990s when oil palm was first being established in Sabah. This development in Sabah (under the Sabah Land Development Board's policies) resulted in deforestation of most flat areas, riparian areas and hills, leaving little natural forest.

Figure 14. Wilmar's Ribobonus is located in a landscape of oil palm surrounded by government owned Forest Reserves and community-owned forests.

The three estates we visited, Sapi 1 (total area 3,689 ha), Rekahalus (total area 5,347 ha) and Ribobonus (total area 3,262 ha) (Figure 14), have 19 ha, 331 ha, and 258 ha of HCV set asides and riparian buffer areas, respectively, mostly allocated to these riparian buffers and with some forest remaining on hills. Depending on the forest and site condition, Wilmar is primarily focusing on silviculture treatment of these forest areas, especially by clearing invasive vines that smother regrowing trees in many secondary forest areas. Silviculture treatment is conducted by external companies after each estate sets aside a budget for this type of activities.

Replanting of riparian areas is also taking place throughout the Wilmar estates in Malaysia with varying levels of intensity per estate. Intensity of tree planting is determined by the landscape and the need for enrichment planting for that particular area. It was observed that tree planting rates are relatively low in Rekahalus, where about 1,000 seedlings are planted every year to restore about 100 ha of riparian. This work was initiated in 2017 and is about 35% done to date. This contrasts with tree planting in Sapi estate with a higher intensity, where 10,000 seedlings are planted every year over a total area of 110 ha.

Biodiversity monitoring is conducted according to RSPO requirements, but with relatively low efforts in the estates that we visited. Wilmar reports that the perceived importance of the HCV area impacts the allocation of resources. For example, some estates with small patches of HCV areas that are not linked to wider landscape conservation areas (like in Rekahalus) may only having one camera trap to operate. As of the end of 2019, Wilmar's Malaysian HCV areas had in place 28 operational camera traps. WILMAR has engaged various external collaborations in their HCV areas, including international research groups, such as SEARRP and EcoHealth Alliance, or national research institutions such as University Malaysia Sabah in Sabah or UNIMAS in Sarawak. Other biodiversity-relevant management includes training and awareness-raising for estate staff and workers, patrolling that ensures that no encroachment occurs in the HCV areas and that no clearing, no fertilizer and no spraying practices are implemented.

Despite the small size of the remaining forest patches in the estates visited (Sapi 1, Ribubonus, and Rekahalus), our rapid bird surveys and previous biodiversity surveys indicate relatively high diversity of certain species. Mammals tend to be rare because they generally have large ranging requirements, but we encountered a number of bird species that are rare in Indonesian Borneo, likely because of high poaching and trapping rates in Kalimantan. Nevertheless, Wilmar is trying to increase the conservation value of the forest areas, with a particular focus on two estates: Sapi 1, where Wilmar is implementing a large riparian rehabilitation project (funded at MYR 1 million over 5 years) and Sabahmas, which also has a riparian rehabilitation project designed to improve the habitat quality for a Proboscis Monkeys (*Nasalis larvatus*) population (funded at MYR 2.2 million over 5 years).

Understanding the biodiversity investments by Wilmar is not as straightforward as for the previous four companies discussed in this study. As HCV and conservation management are part of Wilmar's estate operations, the operational budgets for HCV and Conservation are allocated by each of the 22 estates, and varies with local needs. In this work, the estates are supported by 14 full-time Honorary Wildlife Wardens (all based in the Sabahmas estate) and 70 part-time ones in total for both Sabah and Sarawak. HWWs are community members who are trained to patrol HCV areas and are licensed to enforce wildlife laws; they are funded through the individual estate budgets. In addition to this, salaries for the HCV coordinator and the staff time allocated for conservation management of each estate's ESHS staff need to be added. Based on lengthy discussions with relevant Wilmar staff and study of budgets for individual estates, the budget is approximately USD 60/ha/year. This cost includes HCV maintenance and monitoring, wildlife wardens and rangers programme (which encompasses 49% of total budget), HCV management, and staff time. It excludes reporting on HCV and external engagement, such as research collaborations.

Wilmar conducted internal HCV assessments for many of its estates between 2008 and 2010. These are relatively simple assessments, and Wilmar is currently planning to reassess their HCVs using their own Wilmar staff members who are HCV-RN licensed assessors. In each estate, these HCV plans have been translated into short and simple HCV Management and Action Plans. These are simple plans that estate management can understand, as they are not overly focused on individual HCVs or species. They focus on broader management interventions that contribute to the RSPO objective of maintaining or rehabilitating natural ecosystems within the planted areas, and ensuring that Rare, Threatened and Endangered species are not hunted or caught. In the two estates which we visited HCV 5 (Community Needs) and HCV 6 (Cultural Values) were not present so no specific management interventions were developed for these.

From our discussion with several managers, it appears that they start to better understand the need for improved environmental management by the company. Communication between the various levels of management and the Conservation team members has improved. The key to operate this change resides in the quality and the constant discussion happening between the managers and the Eco Management Unit team members, and the fact that the management is involved in the decision-making process (including the budget). Finally, it is also acknowledged that the Conservation team makes life easier to the managers during the auditing process!

Wilmar, unlike other companies we visited, has developed a clear and comprehensive Management Plan for all their HCV areas. These Plans list the current conditions of the HCV, objectives and targets to be achieved, activities to be undertaken to reach the overall objectives, indicators to be used for monitoring and KPI to assess the results of biodiversity management. However, there is a sense that the RSPO P&C requirements for HCV management, and the new requirements for HCS assessments are not clear enough and require more guidelines to enable better implementation. Without clearer guidelines from the RSPO the general sense is that it is difficult to understand what is required for implementation.

Discussion

WELL MANAGED OIL PALM PLANTATIONS CAN PLAY A ROLE IN BIODIVERSITY CONSERVATION

Oil palm companies can play a role in biodiversity conservation if forest set asides are large enough and threats to biodiversity and habitat are managed effectively. The 190 bird species encountered during our brief surveys indicate that there are ecological values in protected forest areas retained within oil palm plantations. This is nothing new; the value of forests and riparian areas in oil palm landscapes has been well demonstrated in many scientific studies, and this makes ecological sense.

Of course, primary tropical forests are ecologically a lot more complex than degraded forest, which are more complex than forest regrowth, and in turn these are more complex than oil palm plantations. Our surveys showed that more bird species were found along the forest transects than along the palm transects, which is not surprising. Our site visits indicated that forest conservation areas protected by committed and competent palm oil companies can retain high biodiversity, especially if poaching and unsustainable collecting is effectively controlled. This included populations of orangutans, gibbons, Malayan Sun Bear (*Helarctos malayanus*), and a range of bird, reptile, amphibian and plant species (mentioned in HCV assessments and other biodiversity studies but not covered in the current situation analysis). The more ecological diversity that is protected in these plantations (e.g., by leaving epiphytes on palm trunks or allowing natural plants to grow beneath palms), the richer the diversity will be; and the more forest and wetlands are protected, the more species will be able to survive in oil palm-dominated areas.

Furthermore, in the plantations we visited, the presence of many species of bird that are elsewhere hunted for meat or caught for the cage bird trade is noteworthy. Even though many of the HCV areas consisted of degraded forest these offer important refuges for species like Rufous-tailed Shama, Magpie Robin, Lesser Green Leafbird (*Chloropsis cyanopogon*), Hill Myna (*Gracula religiosa*), Green Imperial Pigeon (*Ducula aenea*), and Pink-necked Green Pigeon (*Treron vernans*). None of these species are of particularly high conservation concern, and neither are they specialists of primary forests. However, oil palm plantations can provide ‘safe havens’ for such species in agriculture-dominated landscapes if hunting and collecting is effectively controlled through law enforcement and community collaboration. It is interesting to note that this topic has not been studied much, with most biodiversity studies in oil palm plantations focusing on the ecological context (e.g., comparing species diversity between natural forest and planted areas), and much less on hunting and unsustainable collecting of wildlife.

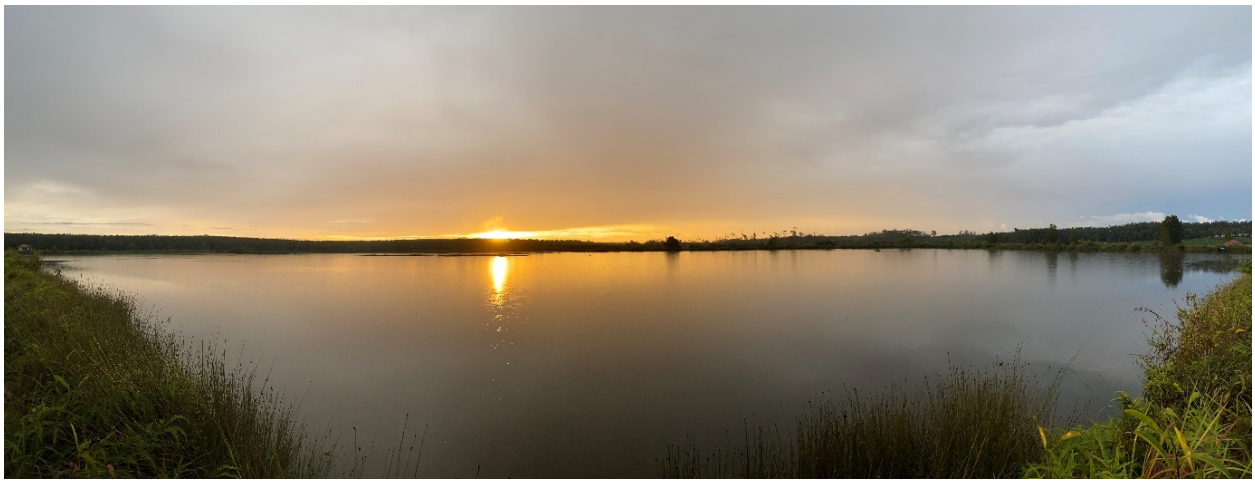


Figure 15. Water reservoirs and palm effluent ponds can provide important wetland habitats in oil palm areas and more survey effort needs to be directed at these potential conservation values. Photo in United Plantations.

Our rapid assessments also indicated that oil palm plantations offer wetland habitats of which the conservation value has been largely overlooked, as this centres around the nutrient-rich POME treatment ponds and nearby wetland and scrub areas (Figure 15). These areas appear to be important for migratory species, such as, on Borneo, Black-winged Stilts, Common Greenshank, Little Ringed Plover, and also resident species like Buff-banded Rail and White-browed Crake (Appendix 2). We noted that HCV assessments had often overlooked these man-made habitats, and that also the biodiversity teams in the estates we visited rarely paid attention to these wetlands. With wetland areas being increasingly drained and converted in many parts of the tropics, these artificial but relatively undisturbed and highly nutrient-rich wetlands near palm oil mills could provide refuge habitat for many waterbirds. Minimizing human disturbance by fencing off sedimentation ponds (as was done, for example, in PT SSS) would increase the wildlife value for these wetlands. Maintaining vegetation around the ponds and on the margins (e.g., reeds) like seen in Wilmar would also increase the value of these landscape features for biodiversity.

SIZE MATTERS BUT MANAGEMENT MAY SOMETIMES MATTER MORE

Our rapid assessments were unable to differentiate between the different drivers of biodiversity values in conservation areas in oil palm. Obviously, the larger a forest area, the more species it can contain. But the level of threats such as hunting or illegal logging and the effectiveness with which a company addresses these threats might in the long-term be at least as important as fragment size. Not effectively addressing illegal logging, for example, would degrade a forest area, making it more susceptible to fire, and could ultimately lead to the disappearance of the forest area. This was clear in PT KAL, where the company's conservation forest areas were once part of much larger forests claimed by surrounding communities, but while the conservation forests managed by the company remain largely unaffected, all remaining "unmanaged" forest disappeared over time, with all wildlife of the larger region now compressed into the company's conservation forests.

The importance of active forest management in the face of threats indicates that a hands-off approach will rarely if ever achieve its conservation objectives. It is not enough to simply identify an area as having high conservation value and demarcating it as such, and then not developing and implementing effective forest management.

We noted a lack of established and clear forest and wildlife conservation plans in the estates that we visited, which indicates that planning for biodiversity conservation is rather ad hoc and could be improved easily. This could reduce involvement from estate management in integrated planning at the estate level that addresses and finances both the oil palm and conservation components of the estate. The simple, 5-year HCV Management and Action Plans of Wilmar were an exception, and are a good example of documents that estate management will understand and can effectively incorporate into their overall estate planning and budgeting. But the emphasis needs to be on actual management, not management on paper and with sign boards only, which requires the allocation of sufficient budgets to hire competent staff for patrolling, silvicultural management, monitoring and other relevant activities, and give these staff the tools and knowledge to do this well. Because conservation management is implemented over multiple years, it is important that long-term funding is committed to conservation, independent of the financial condition of the company or, for example, the price of Crude Palm Oil.

NO SILVER BULLET SOLUTIONS TO BIODIVERSITY MANAGEMENT IN OIL PALM

Our review of five palm oil companies that are objectively judged to have good management practices through their SPOTT rating revealed that each had very distinct approaches to biodiversity management. Effectively protecting Agropalma's large, relatively unthreatened forest set asides required fairly low-level patrolling and law enforcement efforts, whereas PT KAL's forest areas which are highly threatened by fire, poaching and mining required high-intensity management (note, the budgets for fire-fighting are not included in KAL's conservation expenditures). Each company operated in its own specific context and there appear to be few generalities in how they approached biodiversity management. "Best management"

practices may not exist, as each context requires its own specific interventions and solutions for management and monitoring. What most companies did have in common though is that there was high-level support for biodiversity conservation from either the company owner(s) or top management. This ensured that management decisions that supported biodiversity conservation could be pushed through from the top, even though at middle-level management it was felt that the decision could undermine palm oil production. **Given this considerable variation in approaches and strategies between companies, it wouldn't make sense for RSPO to be very prescriptive about what companies need to do in terms of management strategies. It would be best to let companies decide themselves what to do, but to hold them accountable for achieving broader objectives, such as the protection of forest areas that can be remotely monitored.**

Our assessment did not clearly reveal that there were direct benefits from RSPO certification for biodiversity conservation, and certainly RSPO certification is not a panacea for improving conservation outcomes in oil palm. The companies which had good biodiversity outcomes (compared to the counterfactual of no biodiversity management at all) primarily achieved this because the company owners demanded it. RSPO certification seemed more of a parallel process, also supported by owners but more for reasons of branding and market access. This disconnect may derive from the considerable complexity of the RSPO biodiversity requirements. Oil palm comes in many shapes and flavours. The starting landscape configuration determines the extent to which oil palm cultivation can be reconciled with biodiversity conservation (e.g., large forest set asides in Brazil and near complete clear-cutting when oil palm was developed in the 1980s in Malaysia), but this is a governance issue that companies cannot easily influence. RSPO P&Cs can provide guidance on how to maintain what is there, but if it is not there in the first place, RSPO certification does not guarantee high biodiversity values in oil palm. Also, the biodiversity aspects of RSPO are technical and complicated, and because addressing them (e.g., through HCV assessments) requires external expertise, they are costly. The assessments, however, primarily inform companies about which ecological, environmental, and social values need to be protected, but not how to do this. Companies have to allocate significant resources to compliance on monitoring, sign-posting, reporting etc., but this may have very little to do with achieving the objective of maintaining the high conservation values. As we noted elsewhere, demands for maintaining high conservation values but without the guidance on how to do this, is often counterproductive in that they alienate those who might otherwise be willing to improve. Given the finite resources available for achieving conservation outcomes, we need to trade off data collection against other costs. To encourage adoption and implementation of conservation friendly practices requires incentives, not technical and financial obstacles (Meijaard and Sheil 2012).

RECOMMENDATIONS TO IMPROVE BIODIVERSITY MANAGEMENT IN OIL PALM

If existing or aspiring RSPO members want to improve the quality of their biodiversity management, one way to get started would be to ensure there is top-level management support. This can come from private owner or majority shareholders. In publicly listed companies it can also come from a majority of the common shareholders but this requires that these shareholders do not prioritize maximizing profits over investments in conservation. Once this support is present, the implications of this need to be communicated to lower management levels. A communication strategy based on information about the importance of biodiversity and ecosystem services management needs to be shared throughout the company. Increasing management adherence to the company's biodiversity objectives can be achieved by linking specific responsibilities of staff throughout the company (not just in the biodiversity team) to Key Performance Indicators that relate to salary payments and bonuses. After all, money talks.

Increasing the involvement of all company staff in biodiversity management and monitoring can be done by programs based on citizen science principles, such as those implemented by ANJ through their PENDAKI program. Not only has this resulted in free data gathering for the company – as it is done by company staff during their normal work routines – but also it has created a system where all staff (drivers, harvesters, cooks, security guards, managers, etc.) feel they have a role to play in the company's biodiversity management. Such programs need to be tailor-made for each company based on their specific organization

structures, operational and reporting procedures, staff capacity etc. Such data gathering would best be focused on Rare, Threatened and Endangered species rather than the very broad concept of "biodiversity", which could potentially cover millions of species from large vertebrates to soil bacteria, and which no company could potentially identify let alone manage (Meijaard and Sheil 2012).

Our surveys indicate that biodiversity occurs throughout the oil palm estates, but is highest in the most natural areas (forests, wetlands). One step for aspiring companies would thus be to ensure that all remaining natural habitats are protected in the long-term. As we explained above, this requires long-term management plans for these areas, which do not need to be complicated and should focus on the ecosystems and reduction of local threats, rather than the management of specific species. If the company wants to do something for particular species, e.g., boosting the local hornbill populations by installing artificial next boxes, this can always be done as an additional activity budgeted on an ad hoc basis.

Our review of the five companies has indicated a range of investment needs for conservation. The higher the threats, the more companies would need to invest to ensure that the threats are reduced. But overall, annual spending in the range of USD 10-50 per hectare should be sufficient to address the main threats to forests and wildlife, demarcate the boundaries of conservation areas, increase awareness about biodiversity conservation, and implement silvicultural management to increase the ecological integrity of conservation areas (for example, by removing invasive climbers from regrowing trees).

Staffing requirements also varied between companies, but a reasonable average on Borneo and similar contexts, would be at least one trained biodiversity staff member for every 400 ha of conservation area. This is a minimum requirement to halt all hunting and poaching in an estate (although we note that REA Kaltim has chosen not to implement such strict policies), and ensure that there is no illegal logging and encroachment. As usual the quality of the staff might be of more importance than the quantity.

RECOMMENDATIONS REGARDING RSPO

The lack of a logical translation of the results of HCV assessments into the implementation of biodiversity management noticed in our study indicates that currently the system developed by the RSPO is not working well. One reason might be that the current system is too complicated. It appears to be too focused on species identification and species monitoring, requiring technical skills that few companies have, especially if the focus is on the very broad concept of biodiversity (Meijaard and Sheil 2012). HCV assessments primarily inform companies about which ecological, environmental and social values need to be protected, but not how to do this. Companies feel that they have to allocate significant resources to compliance on monitoring, sign-posting, reporting etc., because that's what the RSPO audits focus on, but this may have very little to do with achieving the objective of maintaining the high conservation values.

Given RSPO's commitment to zero deforestation, a simpler (and cheaper) approach for the ecological aspects of HCV assessments would be to focus on the presence of forests, for example, using the High Carbon Stock approach, and other natural habitats. All natural forests above a certain HCS cut-off would be High Conservation Value by definition, and the primary objective of the companies would be to develop and implement a forest management plan that ensures that the forest areas are not reduced in size and that their functionality is enhanced via restoration if necessary. In addition, companies could develop some specific management plans for Rare, Threatened or Endangered species in their area, which would broadly cover the threat management needs of many other species. The resulting simpler plans would cover much of the basic objectives of an initial conservation value assessment in the tropics, leaving companies with enough creative room to best deal with their local forest management challenges. The monitoring could then simply focus on forest cover (or other natural ecosystems such as savannas), the severity of threats (e.g., poaching) and possible population trends for one or two target species. The choice of indicator species could be left to the company, depending on which species they wish to highlight (e.g., an iconic species such as orangutan or rare bird like the Golden Parakeet), but also the ecological indicator role these species have in the plantations (e.g., a fish species indicative for clean water, or hornbills that require large trees for nesting), or ease of monitoring (species that vocalize regularly such as gibbons and can be easily monitored). The key is that company staff support the choice of species. Companies that want to could go

beyond basic compliance, for example, by developing special programs on hunting or non-forest management (e.g., wetlands), or on specific species programs.

All conservation areas would then need to have a Forest Management Plan and one or a few species management plans covering at least 5 years, including targets and Key Performance Indicators that are quantified, can be monitored on a yearly basis, and link to the performance evaluation of company staff. RSPO could then be less prescriptive about management activities but should provide an overall framework to develop such a management plan.

Furthermore, in various discussions with senior estate managers, it appeared that there is increasing awareness among these managers that good environmental management is not just a cost to the company for has financial benefits too. Examples are the realization that maintaining forest cover ensures more stable access to clean water for irrigation, mills and other water uses. Quantification of these services should be part of a forest management plan, as it would increase buy-in from other company staff and increase the integration of conservation and HCV management into the overall management of the estates. It would be good if RSPO could pay more attention to these often-unrecognized values, for example, by requesting specific studies that quantify the monetary values of these service benefits, in addition to the intangible value of maintaining biodiversity.

Disclaimer

Borneo Futures has an ongoing contract with Austindo Nusantara Jaya for advising on conservation management. To avoid a conflict of interest, Erik Meijaard, Borneo Futures' Director, did not participate in the management discussion during the field visits to PT KAL, Austindo Nusantara Jaya's plantation in West Kalimantan. Similarly, Marc Ancrenaz has done paid work through his organization Hutan for Wilmar, and thus did not contribute to the write up of the Wilmar report section.

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Appendix 1

List of bird species encountered in Borneo according to ecological characteristics.

		Oil Palm plantation transects					Forest transects		
		PT KAL	PT SSS	PT REA	Wilmar	Wilmar	PT KAL	PT SSS	PT REA
Forest species		1	2	3	4	5	6	7	8
Treron capellei	Large Green Pigeon						1		
Treron curvirostra	Thick-billed Green Pigeon						1		
Ducula aenea	Green Imperial Pigeon								1
Chrysococcyx xanthorhynchus	Violet Cuckoo							1	2
Harpactes kasumba	Red-naped Trogon						1		
Harpactes diardii	Diard's Trogon						1		
Anthracoceros malayanus	Black Hornbill							1	1
Megalaima rafflesii	Red-crowned Barbet							2	3
Megalaima australis	Blue-eared Barbet							6	
Sasia abnormis	Rufous Piculet								1
Picus puniceus	Crimson-winged Yellownape								1
Eurylaimus ochromalus	Black-and-yellow Broadbill						2		
Coracina fimbriata	Lesser Cuckoo-shrike								1
Pycnonotus brunneus	Red-eyed Bulbul						1	3	
Setornis criniger	Hook-billed Bulbul						1		
Irena puella	Asian Fairy Bluebird							1	
Copsychus pyrropygus	Rufous-tailed Shama						1		
Pellorneum capistratum	Black-capped Babbler						2		
Trichastoma malaccense	Short-tailed Babbler						1	2	2
Trichastoma rostratum	White-chested Babbler								5
Malacopteron affine	Sooty-capped Babbler						2		

		Oil Palm plantation transects					Forest transects		
		PT KAL	PT SSS	PT REA	Wilmar	Wilmar	PT KAL	PT SSS	PT REA
Stachyris maculata	Chestnut-rumped Babbler						3		
Stachyris erythroptera	Chestnut-winged Babbler						4	1	
Stachyris nigricollis	Black-throated Babbler						1		
Macronous ptilosus	Fluffy-backed Tit-babbler						3	2	
Hypothymis azurea	Black-naped Monarch								2
Philentoma velata	Maroon-breasted Philentoma						2		
Prionochilus maculatus	Yellow-breasted Flowerpecker						1		
Nectarinia brasiliana	Van Hasselt's Sunbird						2		
Arachnothera longirostra	Little Spiderhunter			1			3	2	2
Pachycephala cinerea	Mangrove Whistler						1		
Gracula religiosa	Hill Myna							5	
Dicrurus paradiseus	Greater Racquet-tailed Drongo						2		2
Pityriasis gymnocephala	Bornean Bristlehead						1		
Corvus enca	Sunda (Slender-billed) Crow						1		
Forest-edge Species									
Spilornis cheela	Crested Serpent-eagle					1			
Gallus gallus	Red Junglefowl				1				
Treron vernans	Pink-headed Green Pigeon		1						
Psittacula longicauda	Long-tailed Parakeet							2	
Centropus sinensis	Greater Coucal	10	5	2	4	7	1		5
Pycnonotus plumosus	Olive-winged Bulbul			1		1		12	9
Trichastoma abbotti	Abbott's Babbler								3
Orthotomus atrogularis	Dark-necked Tailorbird			4					3
Orthotomus sericeus	Rufous-tailed Tailorbird			12	8	12	1	3	1
Dicaeum trigonostigma	Orange-bellied Flowerpecker			2			4		2
Anthreptes singalensis	Ruby-cheeked Sunbird								1
Aplonis panayensis	Asian Glossy Starling					1			
Open woodland/cultivation species									
Elanus caeruleus	Black-winged Kite	1							
Streptopelia chinensis	Spotted Dove	6	18	8	12	8			
Geopelia striata	Zebra Dove					1			
Cacomantis merulinus	Plaintive Cuckoo			1			2	2	1
Centropus bengalensis	Lesser Coucal	1							
Aerodramus fuciphagus	Edible-nest Swiftlet	55	18	4	5				
Halcyon smyrnensis	White-breasted Kingfisher		1						
Todiramphus chloris	Collared Kingfisher				1	1			
Merops viridis	Blue-throated Bee-eater					1			

		Oil Palm plantation transects					Forest transects		
		PT KAL	PT SSS	PT REA	Wilmar	Wilmar	PT KAL	PT SSS	PT REA
Hirundo rustica	Barn Swallow	9			3				
Hirundo tahitica	Pacific Swallow							1	
Pycnonotus aurigaster	Sooty-headed Bulbul		7					2	
Pycnonotus goiavier	Yellow-vented Bulbul	3	8	12	5	10		12	
Copsychus saularis	Oriental Magpie-robin				3	8			
Macronous gularis	Striped Tit-babbler			14	9	5		9	10
Prinia flaviventris	Yellow-bellied Prinia				11	11			
Orthotomus ruficeps	Ashy Tailorbird					3			
Megalurus palustris	Striated Grassbird				1				
Rhipidura javanica	Pied Fantail			5	3	7			
Aethopyga siparaja	Crimson Sunbird			2	1	2	1	1	1
Cinnyris ornatus	Olive-backed Sunbird				1	1			
Lonchura fuscans	Dusky Munia			1	1				
Lonchura maja	White-headed Munia								
Acridotheres javanicus	Javan Myna		2		2	5		2	
Wetlands/riverine species									
Egretta garzetta	Little Egret	5							
Ixobrychus cinnamomeus	Cinnamon Bittern				1				
Dupetor flavicollis	Black Bittern	1							
Amaurornis phoenicurus	White-breasted Waterhen	3	2		2				
Pelargopsis capensis	Stork-billed Kingfisher							2	

Appendix 2

List of all bird species encountered in the four palm oil companies visited in Indonesian and Malaysian Borneo

		PT KAL guesthouse	HCV corridor satwaliar	HCV Satong Kanon	PT KAL plantation	PT KAL Sekuting HCV	PT KAL sedimentation ponds	PT SSS guesthouse	PT SSS mangrove	PT SSS rehab	PT SSS ponds GH	PT SSS HCV transect & edge	PT SSS plantation	PT REA HQ/mess	PT REA HCV Loa Buluh	PT REA plantation	Wilmar Sapi HQ	Wilma rSapi HQ ponds	Wilmar Reka Halus HQ	Wilmar Rekahalus HCV	Wilmar Rekahalus plantation	Wilmar Rekahalus ponds	Wilmar Rekahalus water catchment	Wilmar RibuBonus HQ	Wilmar RibuBonus HCV pond	Wilmar RibuBonus HCV lake	Wilmar RibuBonus HCV hill	Wilmar RibuBonus HCV edge	Wilmar Ribubonus plantation
SPECIES NAME	SCIENTIFIC NAME	PT KAL Total Species = 94						PT SSS Total Species = 78						REA Total Species = 78			Wilmar Total Species = 84													
Dendrocygna javanica	Lesser Whistling Duck			2																									
Dendrocygna arcuata	Wandering Whistling Duck																10	10 +											
Egretta garzetta	Little Egret				11		1						1			1	3		40		1	40	1	1					1
Ardea intermedia	Intermediate Egret										2						1	1			1	1	1						
Bubulcus ibis	Cattle Egret						6				7					1	55				5	2				3			10s
Butorides striata	Little Heron				1				1		2																		
Ardeola speciosa	Javan Pond Heron						4											3											
Ardea alba	Great Egret																1												
Ardea purpurea	Purple Heron	3		1			4				1						2				1								
Ixobrychus cinnamomeus	Cinnamon Bittern			1			1				1						1				1								
Ixobrychus sinensis	Yellow Bittern																	2											

		PT KAL guesthouse	HCV corridor satwaliar	HCV Satong Kanon	PT KAL plantation	PT KAL Sekuting HCV	PT KAL sedimentation ponds	PT SSS guesthouse	PT SSS mangrove	PT SSS rehab	PT SSS ponds GH	PT SSS HCV transect & edge	PT SSS plantation	PT REA HQ/mess	PT REA HCV Loa Buluh	PT REA plantation	Wilmar Sapi HQ	Wilma rSapi HQ ponds	Wilmar Reka Halus HQ	Wilmar Rekahalus HCV	Wilmar Rekahalus plantation	Wilmar Rekahalus ponds	Wilmar Rekahalus water catchment	Wilmar RibuBonus HQ	Wilmar RibuBonus HCV pond	Wilmar RibuBonus HCV lake	Wilmar RibuBonus HCV hill	Wilmar RibuBonus HCV edge	Wilmar Ribubonus plantation
SPECIES NAME	SCIENTIFIC NAME	PT KAL Total Species = 94						PT SSS Total Species = 78						REA Total Species = 78			Wilmar Total Species = 84												
Dupetor flavicollis	Black Bittern														1														
Gorsachius melanolophus	Malay Night-heron												1																
Anhinga melanogaster	Oriental Darter																			1									
Pernis ptilorhynchus	Crested Honey-buzzard	1																											
Elanus caeruleus	Black-shouldered Kite				2		3						1																
Accipiter trivirgatus	Crested Goshawk														1									1					
Accipiter soloensis	Chinese Goshawk																			1									
Spilornis cheela	Crested Serpent-eagle																				[1]		1	1			1	1	1
Nisaetus limnaeetus	Changeable Hawk-eagle													1						1									
Haliastur indus	Brahminy Kite									1																			
Nisaetus nanus	Wallace's Hawk-eagle																						1						
Microhierax fringillarius	Black-thighed Falconet	6																											
Gallus gallus	Red Junglefowl																				1								
Argusianus argus	Great Argus																												
Amaurornis phoenicurus	White-breasted Waterhen				5		2	1	1				3		1	1	6	6		1	4		1	1	1	2			

		PT KAL guesthouse	HCV corridor satwaliar	HCV Satong Kanon	PT KAL plantation	PT KAL Sekuting HCV	PT KAL sedimentation ponds	PT SSS guesthouse	PT SSS mangrove	PT SSS rehab	PT SSS ponds GH	PT SSS HCV transect & edge	PT SSS plantation	PT REA HQ/mess	PT REA HCV Loa Buluh	PT REA plantation	Wilmar Sapi HQ	Wilma rSapi HQ ponds	Wilmar Reka Halus HQ	Wilmar Rekahalus HCV	Wilmar Rekahalus plantation	Wilmar Rekahalus ponds	Wilmar Rekahalus water catchment	Wilmar RibuBonus HQ	Wilmar RibuBonus HCV pond	Wilmar RibuBonus HCV lake	Wilmar RibuBonus HCV hill	Wilmar RibuBonus HCV edge	Wilmar Ribubonus plantation
SPECIES NAME	SCIENTIFIC NAME	PT KAL Total Species = 94						PT SSS Total Species = 78						REA Total Species = 78			Wilmar Total Species = 84													
Porzana cinerea	Whitebrowed Crake																1													
Gallinula chloropus	Common Moorhen																1	2												
Hypotaenidia philippensis	Buff-banded Rail										1						1	1												
Pluvialis fulva	Pacific Golden Plover						6										1													
Charadrius dubius	Little Ringed Plover																14													
Tringa glareola	Wood Sandpiper						23				15						14	10												
Tringa nebularia	Common Greenshank																3	4												
Gallinago sp	snipe																1	1												
Actitis hypoleucos	Common Sandpiper						5		1		19						4	2				3								
Himantopus himantopus	Black-winged Stilt						2				5						5	18												
Glareola maldivarum	Oriental Pratincole														1															
Chlidonias hybridus	Whiskered Tern																5	1												
Treron vernans	Pink-necked Green Pigeon						1		40				1		5		1	1		5										
Treron olax	Little Green Pigeon														2															

		PT KAL guesthouse	HCV corridor satwaliar	HCV Satong Kanon	PT KAL plantation	PT KAL Sekuting HCV	PT KAL sedimentation ponds	PT SSS guesthouse	PT SSS mangrove	PT SSS rehab	PT SSS ponds GH	PT SSS HCV transect & edge	PT SSS plantation	PT REA HQ/mess	PT REA HCV Loa Buluh	PT REA plantation	Wilmar Sapi HQ	Wilma rSapi HQ ponds	Wilmar Reka Halus HQ	Wilmar Rekahalus HCV	Wilmar Rekahalus plantation	Wilmar Rekahalus ponds	Wilmar Rekahalus water catchment	Wilmar RibuBonus HQ	Wilmar RibuBonus HCV pond	Wilmar RibuBonus HCV lake	Wilmar RibuBonus HCV hill	Wilmar RibuBonus HCV edge	Wilmar Ribubonus plantation
SPECIES NAME	SCIENTIFIC NAME	PT KAL Total Species = 94						PT SSS Total Species = 78						REA Total Species = 78			Wilmar Total Species = 84												
Treron capellei	Large Green Pigeon					1																							
Treron curvirostra	Thick-billed Green Pigeon					1																							
Ptilinopus jambu	Jambu Fruit-dove																												
Ducula aenea	Green Imperial Pigeon	2							2						2		3	1		1									
Ducula badia	Mountain Imperial Pigeon	3																											
Streptopelia chinensis	Spotted Dove	5	1	1	9			2	2				19		2	8	1	2		2	12				1	1			8
Geopelia striata	Zebra Dove																1				1	1		1			1		2
Chalcophaps indica	Emerald Dove																							1					
Psittacula longicauda	Long-tailed Parakeet								6			[25]	[2]			[1]				100			1						
Psittinus cyanurus	Blue-rumped Parrot								1																				
Loriculus galgulus	Blue-crowned Hanging-parrot	1							1							[1]		2		1									
Cuculus micropterus	Indian Cuckoo	3																											
Cacomantis sonneratii	Banded Bay Cuckoo								1						2														
Cacomantis merulinus	Plaintive Cuckoo	2				3						2		2	3	1	1	1		3			1				1		

		PT KAL guesthouse	HCV corridor satwaliar	HCV Satong Kanon	PT KAL plantation	PT KAL Sekuting HCV	PT KAL sedimentation ponds	PT SSS guesthouse	PT SSS mangrove	PT SSS rehab	PT SSS ponds GH	PT SSS HCV transect & edge	PT SSS plantation	PT REA HQ/mess	PT REA HCV Loa Buluh	PT REA plantation	Wilmar Sapi HQ	Wilma rSapi HQ ponds	Wilmar Reka Halus HQ	Wilmar Rekahalus HCV	Wilmar Rekahalus plantation	Wilmar Rekahalus ponds	Wilmar Rekahalus water catchment	Wilmar RibuBonus HQ	Wilmar RibuBonus HCV pond	Wilmar RibuBonus HCV lake	Wilmar RibuBonus HCV hill	Wilmar RibuBonus HCV edge	Wilmar Ribubonus plantation
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Chrysococcyx xanthorhynchus	Violet Cuckoo								1			1			2								1						
Surniculus lugubris	Drongo Cuckoo	2													2														
Rhinortha chlorophaeus	Raffles's Malkoha														2														
Rhamphococcyx curvirostris	Chestnut-breasted Malkoha														2								1						
Phaenicophaeus javanicus	Red-billed Malkoha	1																											
Centropus sinensis	Greater Coucal	3	1		11	1		2	2	1			6	1	8	5	1			1	4				1	2	1	3	9
Centropus bengalensis	Lesser Coucal	3			1	1		1										1		1									
Phodilus badius	Oriental Bay Owl													1															
Strix leptogrammica	Bornean Wood-owl	1																											
Otus lempiji	Collared Scopsowl													2															
Ninox scutulata	Brown Boobook													2															
Caprimulgus affinis	Savanna Nightjar	2					10				12		1																
Eurostopodus temminckii	Malaysian Eared-nightjar	3												1															

		PT KAL guesthouse	HCV corridor satwaliar	HCV Satong Kanon	PT KAL plantation	PT KAL Sekuting HCV	PT KAL sedimentation ponds	PT SSS guesthouse	PT SSS mangrove	PT SSS rehab	PT SSS ponds GH	PT SSS HCV transect & edge	PT SSS plantation	PT REA HQ/mess	PT REA HCV Loa Buluh	PT REA plantation	Wilmar Sapi HQ	Wilma rSapi HQ ponds	Wilmar Reka Halus HQ	Wilmar Rekahalus HCV	Wilmar Rekahalus plantation	Wilmar Rekahalus ponds	Wilmar Rekahalus water catchment	Wilmar RibuBonus HQ	Wilmar RibuBonus HCV pond	Wilmar RibuBonus HCV lake	Wilmar RibuBonus HCV hill	Wilmar RibuBonus HCV edge	Wilmar Ribubonus plantation
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Aerodramus fuciphagus	Edible-nest Swiftlet	5		10s	65				3				18		1	4				10+	5	1					1		
Cypsiurus balasiensis	Asian Palm Swift																1	2											
Hirundapus giganteus	Brown-backed Needletail														1														
Eurystomus orientalis	Dollarbird				2				2			1		1	40		1			1		2	3						
Harpactes kasumba	Red-naped Trogon					2																							
Harpactes diardii	Diard's Trogon					3																							
Alcedo atthis	Common Kingfisher																						1						
Alcedo meninting	Blue-eared Kingfisher	2			1								?		1														
Ceyx erithacus	Oriental Dwarf Kingfisher								1					1	2														
Halcyon smyrnensis	White-breasted Kingfisher	3			6			1	1			3	2																
Halcyon coromanda	Ruddy Kingfisher								?																				
Todiramphus chloris	Collared Kingfisher																3	2			4	1	1	1				1	2
Pelargopsis capensis	Stork-billed Kingfisher	1							2	1		2		1	1					1									
Actenoides concretus	Rufous-collared Kingfisher																												

		PT KAL guesthouse	HCV corridor satwaliar	HCV Satong Kanon	PT KAL plantation	PT KAL Sekuting HCV	PT KAL sedimentation ponds	PT SSS guesthouse	PT SSS mangrove	PT SSS rehab	PT SSS ponds GH	PT SSS HCV transect & edge	PT SSS plantation	PT REA HQ/mess	PT REA HCV Loa Buluh	PT REA plantation	Wilmar Sapi HQ	Wilma rSapi HQ ponds	Wilmar Reka Halus HQ	Wilmar Rekahalus HCV	Wilmar Rekahalus plantation	Wilmar Rekahalus ponds	Wilmar Rekahalus water catchment	Wilmar RibuBonus HQ	Wilmar RibuBonus HCV pond	Wilmar RibuBonus HCV lake	Wilmar RibuBonus HCV hill	Wilmar RibuBonus HCV edge	Wilmar Ribubonus plantation
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Merops viridis	Blue-throated Bee-eater	1		1		1			2					10 s	9		3	1			[1]								1
Anorrhinus galeritus	Bushy-crested Hornbill														1														
Anthracoceros albirostris	Asian Pied Hornbill	1							1									1											
Anthracoceros malayanus	Black Hornbill	1										1			4														
Buceros rhinoceros	Rhinoceros Hornbill	2																											
Megalaima rafflesii	Red-crowned Barbet					1						5		1	7														
Megalaima mystacophanos	Red-throated Barbet																										1		[1]
Megalaima australis	Blue-eared Barbet	3				1						10			3		1										1	1	[1]
Sasia abnormis	Rufous Piculet														1														
Celeus brachyurus	Rufous Woodpecker								1											1										
Picus puniceus	Crimson-winged Yellownape	2							1						1	[1]													
Dinopium javanense	Common Goldenback								4																				
Meiglyptes tristis	Buff-rumped Woodpecker								1					1	1														
Dryocopus javensis	White-bellied Woodpecker								1						1														

		PT KAL guesthouse	HCV corridor satwallar	HCV Satong Kanon	PT KAL plantation	PT KAL Sekuting HCV	PT KAL sedimentation ponds	PT SSS guesthouse	PT SSS mangrove	PT SSS rehab	PT SSS ponds GH	PT SSS HCV transect & edge	PT SSS plantation	PT REA HQ/mess	PT REA HCV Loa Buluh	PT REA plantation	Wilmar Sapi HQ	Wilma rSapi HQ ponds	Wilmar Reka Halus HQ	Wilmar Rekahalus HCV	Wilmar Rekahalus plantation	Wilmar Rekahalus ponds	Wilmar Rekahalus water catchment	Wilmar RibuBonus HQ	Wilmar RibuBonus HCV pond	Wilmar RibuBonus HCV lake	Wilmar RibuBonus HCV hill	Wilmar RibuBonus HCV edge	Wilmar Ribubonus plantation
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Hemicircus concretus	Grey-and-buff Woodpecker														1								1						
Blythipicus rubiginosus	Maroon Woodpecker																												
Dryocopus pulverulentus	Great Slaty Woodpecker	1				[1]																							
Corydon sumatranus	Dusky Broadbill																												
Cymbirhynchus macrorhynchos	Black-and-red Broadbill														2														
Eurylaimus ochromalus	Black-and-yellow Broadbill					2																							
Pitta sordida	Hooded Pitta														2														
Hirundo rustica	Barn Swallow	10s			100s		10s		1									10s	10s	20+	75	10+					10s		1
Hirundo tahitica	Pacific Swallow	5				1			2			1						1											
Pericrocotus flammeus	Scarlet Minivet																												
Pericrocotus igneus	Fiery Minivet																												
Hemipus hirundinaceus	Black-winged Hemipus					1			1																				
Lalage fimbriata	Lesser Cicadabird	1													3														
Coracina sumatrensisa	Roving Cuckoo-shrike														1														

		PT KAL guesthouse	HCV corridor satwaliar	HCV Satong Kanon	PT KAL plantation	PT KAL Sekuting HCV	PT KAL sedimentation ponds	PT SSS guesthouse	PT SSS mangrove	PT SSS rehab	PT SSS ponds GH	PT SSS HCV transect & edge	PT SSS plantation	PT REA HQ/mess	PT REA HCV Loa Buluh	PT REA plantation	Wilmar Sapi HQ	Wilma rSapi HQ ponds	Wilmar Reka Halus HQ	Wilmar Rekahalus HCV	Wilmar Rekahalus plantation	Wilmar Rekahalus ponds	Wilmar Rekahalus water catchment	Wilmar RibuBonus HQ	Wilmar RibuBonus HCV pond	Wilmar RibuBonus HCV lake	Wilmar RibuBonus HCV hill	Wilmar RibuBonus HCV edge	Wilmar Ribubonus plantation
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Pycnonotus aurigaster	Sooty-headed Bulbul							6	4	1		2	12	1															
Pycnonotus atriceps	Black-headed Bulbul	4													2													2	
Pycnonotus cyaniventris	Grey-bellied Bulbul	?																											
Pycnonotus eutilotus	Puff-backed Bulbul	1							?																				
Pycnonotus goiavier	Yellow-vented Bulbul	6	1		4	1			4	1		12	8	1	2	12	1	5		6	6			1		1		1	10
Pycnonotus plumosus	Olive-winged Bulbul				1	1			2			13		2	14	1	1			10					1	1			1
Pycnonotus simplex	Cream-vented Bulbul					?						3																	
Pycnonotus brunneus	Red-eyed Bulbul	1				2						3		?	3														
Pycnonotus erythropthalmos	Spectacled Bulbul	1																											
Setornis criniger	Hook-billed Bulbul					1																							
Hypsipetes charlottae	Buff-vented Bulbul																												
Aegithina tiphia	Common Iora								4						3			1						1					
Aegithina viridissima	Green Iora				1	1			1			3																	
Chloropsis cyanopogon	Lesser Green Leafbird					1																							

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Irena puella	Asian Fairy Bluebird	1										1																	
Lanius schach	Long-tailed Shrike	2			3			1	1				1				1	2			1								
Copsychus saularis	Oriental Magpie-robin													2	1	1	2	1	1	2	3				1	2		1	11
Copsychus malabaricus	White-rumped Shama																			1							1		[1]
Copsychus pyrropygus	Rufous-tailed Shama					1																							
Pellorneum capistratum	Black-capped Babbler					2									4														
Trichastoma malaccense	Short-tailed Babbler	1				1						2			2														
Trichastoma bicolor	Ferruginous Babbler														2														
Trichastoma rostratum	White-chested Babbler				1				2						8														
Trichastoma abbotti	Abbott's Babbler														5														
Malacopteron affine	Sooty-capped Babbler					1																							
Stachyris maculata	Chestnut-rumped Babbler					3																							
Stachyris erythroptera	Chestnut-winged Babbler					5						1																	
Stachyris nigricollis	Black-throated Babbler					1																							

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Macronous gularis	Striped Tit-babbler	1	1			1			3			10		2	15	14	1			3	10				3	3	1	2	5
Macronous ptilosus	Fluffy-backed Tit-babbler					3						2																	
Prinia flaviventris	Yellow-bellied Prinia	2		1	1		1								2		2	1		2	30	3	1	1		1	1		12
Orthotomus atrogularis	Dark-necked Tailorbird	1	1			2							1		6	4													
Orthotomus sericeus	Rufous-tailed Tailorbird	2	1		1	2			3			3	1		4	12				3	8		1	1	2	2	1	3	12
Orthotomus ruficeps	Ashy Tailorbird														1					1				1	1	1	1	1	4
Megalurus palustris	Striated Grassbird																1	1		2	5			1					
Acrocephalus australis	Australasian Reed Warbler						3										2					1							
Locustella certhiola	Pallas' Grasshopper Warbler																1												
Muscicapa dauurica	Asian Brown Flycatcher																												
Ficedula dumetoria	Rufous-chested Flycatcher																												
Cyornis unicolor	Pale Blue Flycatcher																												
Cyornis rufigastra	Mangrove Jungle-flycatcher								1																				

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Cyornis turcosus	Malaysian Jungle-flycatcher													1	?														
Cyornis superbus	Bornean Blue Flycatcher																												
Culicicapa ceylonensis	Grey-headed Flycatcher																												
Gerygone sulphurea	Flyeater																												
Hypothymis azurea	Black-naped Monarch					1									5														
Philentoma velatum	Maroon-breasted Philentoma					3																							
Philentoma pyrrhopterum	Rufous-winged Philentoma														1														
Rhipidura javanica	Pied Fantail							2	1			3		1	2	5	1	1	1	1	3			1	1	1		3	7
Prionochilus maculatus	Yellow-breasted Flowerpecker					2																							
Prionochilus percussus	Crimson-beasted Flowerpecker					?																							
Dicaeum trigonostigma	Orange-bellied Flowerpecker					4						1			5	2				2									
Anthreptes malacensis	Brown-throated Sunbird		1			1			2							1	2	1		1	1	1				1		1	1
Anthreptes singalensis	Ruby-cheeked Sunbird					?						?			1														

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Aethopyga siparaja	Crimson Sunbird					1			3					1	2	2				2	1			1	1	1	2	1	1
Nectarinia brasiliana	Van Hasselt's Sunbird					2						3																	
Nectarinia calcostetha	Copper-throated Sunbird								1																				
Cinnyris ornatus	Olive-backed Sunbird				1				1								1	2	1		1			1		1			
Arachnothera longirostra	Little Spiderhunter					2						1			4	1													
Pachycephala cinerea	Mangrove Whistler					1																							
Zosterops palpebrosus	Oriental White-eye																												
Lonchura fuscans	Dusky Munia	7											1		2	1				1	1		1						
Lonchura malacca	Chestnut Munia			40																	3					5			
Lonchura punctulata	Scaly-breasted Munia																												
Lonchura maja	White-headed Munia																			1									
Passer montanus	Tree Sparrow	10 s											1	1			1	1	1		1			1					
Ploceus philippinus	Baya Weaver																			2									
Gracula religiosa	Hill Myna	4					2		1			3			3		1									[1]			

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Aplonis panayensis	Asian Glossy Starling													1	7			10	##											1
Acridotheres javanicus	Javan Myna	3				25			1			2	3		2			1		7	3		1	1		1				5
Acridotheres cristatellus	Crested Mynah								2											3?										
Oriolus xanthonotus	Dark-throated Oriole																													
Dicrurus aeneus	Bronzed Drongo																													
Dicrurus paradiseus	Greater Racquet-tailed Drongo	1				2			2						5					1			1							
Artamus leucorynchus	White-breasted Wood-swallow	1			3		2								1		2		1											
Pityriasis gymnocephala	Bornean Bristlehead					1																								
Corvus enca	Sunda Crow	3				1		1						4	2		1						1							
Corvus macrorhynchos	Southern Jungle Crow																				2					[1]	[1]			
Platysmurus leucopterus	Black Magpie	2													2								1							
Motacilla flava	Yellow Wagtail																?													
Anthus ricardi	Richard's Pipit										2	2				2	2	3												
TOTAL SPECIES PER LOCATION		48	7	6	19	43	16	9	46	5	11	28	17	23	66	19	45	36	6	33	28	10	19	17	10	17	13	13	19

The RSPO is an international non-profit organisation formed in 2004 with the objective to promote the growth and use of sustainable oil palm products through credible global standards and engagement of stakeholders.

www.rspo.org

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