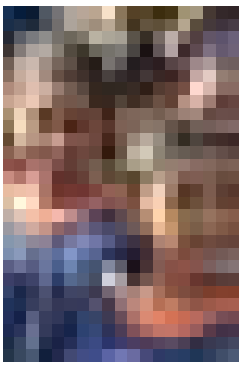
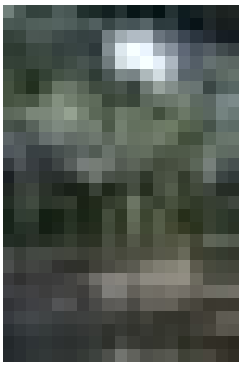
Sustainability Report 2023





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About This Report

United Plantations has always taken pride in its sustainable approach to all aspects of its operations and we are therefore pleased to present our 2023 Sustainability Report to interested stakeholders.

This Report covers our pursuit of sustainable value creation through good governance, and strong commitment towards environmental, economic, and social performance across all our operational and management activities within the UP Group including Subsidiaries in the form of our Refineries (Unitata and UniFuji), as well as our plantations and mills in Malaysia and Indonesia. This report, which represents a further step towards an integrated report, focuses primarily on updates and activities carried out within the financial year ended 31 December 2023, with comparable prior year statistics, where available and relevant. The Sustainability Report for 2023 will remain as part of our Annual Report.

There is no structural change in our Annual Report 2023. The structure and content for this report draws upon guidance from the enhanced sustainability requirements in the Main Market Listing Requirements, Bursa Malaysia's Sustainability Reporting Framework and Guides and the GRI Sustainability Reporting Guidelines. Our internal Sustainability Committee is responsible for officially coordinating with the various departments and subsidiaries in assessing and covering all key material sustainability matters within our Group.

As recommended by the enhanced sustainability requirements in the Main Market Listing Requirements, we have included in our Annual Report our Sustainability Framework which is aligned with the Group's philosophy and our focus areas which are in alignment with the United Nations Sustainability Development Goals (UN SDG). In preparation of this report, we have again engaged and considered the responses from both internal and external stakeholders and performed a thorough internal review and assessment of key sustainability aspects and impacts which represents the most critical areas of our Group's business and operations and in this connection, we would like to thank all stakeholders for their valuable participation. This exercise resulted in arriving at 23 material sustainability matters at various significant levels. These are reflected in the materiality matrix included in this report.

As part of our sustainability processes and activities we will continue to strengthen our performance and disclosures to various stakeholders by monitoring our specific targets and key performance indicators, fostering close relationship with our stakeholders as well as harmonising material sustainability risks across the Group. We hope to provide our stakeholders with an overview of our approach and continuous progress in meeting our sustainability commitments. We have reported the information cited in this GRI Content Index for the period of 1st January 2023- 31st December 2023 with reference to the GRI Universal Standards 2021.

For more information on the GRI Content Index, please refer to pages 114- 116.

External Assurance

Bursa Malaysia's Sustainability Reporting Guides and GRI recommends the use of external assurance, and we believe external assurance adds credibility and transparency to our sustainability reporting.

In this connection, we are pleased to inform our stakeholders that BSI has provided limited assurance over 10 selected Key Performance Indicators (KPI's) reported in our 2023 Sustainability Report thereby bringing additional value and credibility to our disclosure. Their opinion statement report is available on pages 112 - 113.

Good water management practices are essential towards achieving high yields.

Message From The CED

YBhg. Dato' Carl Bek-Nielsen, Chief Executive Director of UP.

I am pleased to present UP's 2023 Sustainability Report, in which we describe our Group's sustainability policies and how we are pursuing these in practice. UP continues to view sustainability as a key pillar of our Group's Strategy and we recognise its importance to our long-term success and well-being.

For generations, Environmental Responsibility, Social Awareness, Sustainability Governance and Economic Viability have been intertwined into the way we conduct business.

Nonetheless, we must not forget that our pledge to the highest sustainability standards is an ongoing commitment with no finishing line. We will therefore continue to align our business values, purpose and strategy with sustainability principles divided into four main areas, namely Environment, Social, Sustainability Governance and Marketplace.

Environment

As the world continues to face challenges relating to global warming, we are becoming increasingly aware that our presence on this earth has an impact on the environment. Over the past few years, we have closely followed and reported on the evolving narrative of global climate action, focusing particularly on the outcomes of the annual COP climate conferences.

The most recent, COP28, held in Dubai, marked what some would deem as progress towards a world attempting to transition away from fossil fuels. However, the agreement nevertheless fell short of a full phase-out of fossil fuels, thereby deflating the goal that many had hoped to achieve.

Furthermore, the world's first ever Global Stocktake, a comprehensive assessment of global climate action, revealed that current national commitments are insufficient to meet the Paris Agreement's goal of limiting the temperature rise to 1.5°C above pre-industrial levels. To achieve this target, global emissions need to be cut by 43% by 2030 compared to 2019 levels, which will not happen as current nationally determined contributions are projected to deliver less than a third of that.

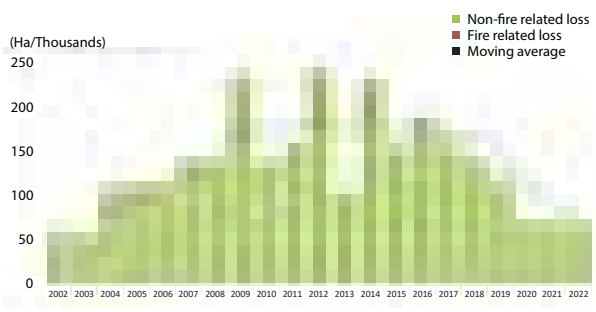
The agreement reached may therefore seem surprising, especially considering that about 70% of global CO2 (-eq) emissions continue to come from the burning of fossil fuels. Palm oil on the other hand, accounts for some 0.6% of global CO2 (-eq) emissions, (more than 20 times less than the livestock sector) yet continues from time to time to be singled out as the lightning rod for the public's anger on issues concerning deforestation and climate change.

While palm oil production has and still contributes to certain environmental concerns (and there are instances where environmental laws are disregarded by a few rogue industry players), it is important to approach these accusations with a comprehensive and objective lens. Sweeping statements based on the actions of a few is not a fair representation of the industry and the concerted efforts to make sustainable palm oil the norm by a very considerate portion of the producers today. Each of us must therefore sharpen our ability to distinguish factual data from the often sensational narrative, failing which we run the risk of being swayed by tales and scaremongering that do not align with the factual data.

Forests have indeed been cleared. Over the last 110 years, Malaysia has established close to 6 million hectares of oil palm plantations, but this contrasts significantly with the agricultural expansion in Brazil and Argentina, where over 15 million hectares have been dedicated to soy cultivation in just 10 years, and close to 3 million hectares of forest cleared globally every year for cattle farming.

In this context, Washington-based Global Forest Watch recently published a study showing that global tropical forest loss accelerated in 2022, less than 2 years after world leaders committed to end deforestation by 2030 at the COP26 climate talks in Glasgow. This is primarily caused by significant increases in primary forest loss within Brazil and the Democratic Republic of Congo, which are home to the world's most extensive tropical forests. Indonesia and Malaysia, on the other hand, both reversed the trend, with deforestation rates falling to near record-lows. In fact, primary forest loss fell by 64% between 2015-2017 and 2020-2022 in Indonesia, whilst Malaysia also saw rates falling by 57% over the same time frame.

Malaysia primary forest loss, 2002 - 2022



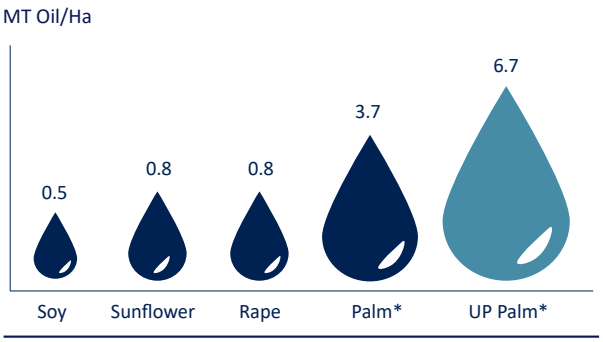
Source: World Resource Institute

The newly commissioned Green Electricity Plant, further displacing the use of fossil fuels.

This is a testimony to Government policies, corrective actions and stern corporate commitments to industry regulations such as the RSPO, MSPO and ISPO through which No Deforestation, No New Planting on Peat and No Exploitation (NDPE) pledges now cover most of the palm oil sector. Policymakers, particularly in the EU, should recognize such positive and proactive efforts taken by many different stakeholders to curtail forest loss and focus on the primary causes of deforestation while crafting new laws like the EU Deforestation Regulation (EUDR), to ensure that such policies effectively target the main contributors to global deforestation.

In this connection, it is important to once again be reminded that the palm oil industry today takes up approximately 0.5% of the world's total agricultural area, yet accounts for about 35% of the global oils and fats production thereby cementing the oil palm's unequalled efficiency in terms of producing large quantities of edible oils and fats. Indeed, leading conservationist and NGOs have on several accounts acknowledged that alternate crops will require up to 8-10 times more land compared to the oil palm to produce the same quantity of oils and fats.

The Oil Palm - A Highly Efficient Crop



Source: Oil World, 2024
** Includes Crude Palm Oil and Palm Kernel Oil*

Producing more with less is a key aspect within the realm of sustainability as we confront a future marked by increasing populations resource scarcity. In UP, we strive to take ownership and believe in the importance of all stakeholders supporting certification standards like the RSPO, or other credible initiatives, to make sustainable palm oil the aspiration if not the ultimate-goal. This above all else should be our shared objective within the industry, be this in Southeast Asia, Africa, or Latin America to make a positive difference and achieve a more sustainable future for generations.

To that end, we must also acknowledge that in terms of sustainability vs. other crops and commodities, RSPO certified palm oil continues to take the lead and is today recognised for setting the highest agricultural standards internationally, well ahead of beef, soy, rapeseed, pulp and paper to name but a few.

Reducing our Carbon Footprint

The outcomes of COP28, though a step in the right direction, underline the immense challenges and vested interests that nations and businesses alike face in transitioning away from fossil fuels. To address the climate crisis effectively, it is therefore imperative that countries, businesses, and individuals now take ownership and work together to turn these agreements into concrete actions.

In line with our Group's commitment to environmental leadership, mitigation of our carbon footprint and Greenhouse Gas (GHG) emissions remain a top priority for UP, to which new initiatives and investments continue to be made. Since 2005, our company has been working closely with 2.0-LCA consultants from Denmark on developing comprehensive Life Cycle Assessment (LCA) studies, the first of which was finalised in 2008 thereby becoming the first LCA on palm oil ever. This pioneering study was fully compliant with and critically reviewed according to the international ISO 14040 and ISO 14044 standards for LCA. The latest update was finalized during February 2024 building on top of our previous studies.

In this connection, I am pleased to report that the summary of the LCA clearly demonstrates that UP has shown a 63% reduction in its GHG emissions per kg of palm oil produced from 2004 to 2023 when including indirect land use change (iLUC) and nature conservation, as well as scope 1, 2 and 3 emissions.

We have thereby already reached our latest goal of a 60% reduction (including iLUC and nature conservation) of the GHG emissions by 2025. In line with the spirit of taking ownership to accelerate the action in mitigating GHG emissions, the Board of UP remains committed to its target of reaching 66% reduction per kg of palm oil by 2030. This shall relentlessly be pursued through new innovations inspired by our strong collaboration and network in Scandinavia. Please refer to page 66 for more information on our carbon reducing initiatives.

To that end, new investments were made during 2023 to further expand our light railway network, which uses 1/10th of the fossil fuels compared to tractor/ lorry transportation when transporting one unit of Fresh Fruit Bunches from the fields to our 4 mills in Malaysia. The total length of our light railway network has expanded from 479km in 2015 to 600km as of 31 December 2023, thereby contributing significantly to reducing the use of fossil fuels and GHG emissions. In addition, considerable funds have also been invested in other environmental-friendly technologies during 2023, not least our new biogas electrification plant.

Collaboration with Copenhagen Zoo

The COP28 conference also underscored the importance of linking climate action with nature conservation and the need to consider ecosystems, biodiversity, and carbon stores in climate action plans. In relation to this, conservation of jungle reserves and promoting biodiversity remain of vital importance to the UP Group, and it continues to be our view that conservation means development as much as it does conservation. All growers should strive towards reaching this balance, while also endeavouring to meet the objectives outlined in the United Nations Sustainable Development Goals (SDGs). This is the only sustainable and holistic approach that will help ensure that positive changes take place.

Herein, I am delighted that our partnership with Copenhagen Zoo, which was initiated in 2007 and officially established in 2010, continues to develop positively with many success stories arising from the hard work, dedicated efforts, research, and fascinating studies undertaken to date.

The commitment and skills introduced by Copenhagen Zoo have been extremely valuable, not least from a conservation point of view. This has helped our Group operationalise one of the vital components of sustainability, namely building an in-house capacity, through our Biodiversity team, to manage conservation and nurture the approximately 8,290 Ha of jungle reserves under our Group's landbank.

Today, the team's responsibility extends beyond the establishment of wildlife sanctuaries, green corridors, and many other initiatives, as they play a pivotal role in operationalising conservation into sustainable agricultural practices implemented throughout our Group. Nevertheless, more can be done and there are still areas in need of greater attention, which will be a primary focus in 2024.

Social Responsibility & Human Rights

Within the evolving narrative of sustainable palm oil, the focus of discussions and media coverage has expanded beyond just environmental concerns and deforestation. Growing concerns and risks pertaining to migrant workers and human rights continue to rock several industries in Malaysia, most notably the rubber glove industry, but also service, manufacturing and the palm oil sector who all rely on migrant workers. This is indeed a serious issue for Malaysia, and despite much talk, it is evident that more must be done to safeguard migrant workers during recruitment to prevent middlemen from abusing their inherent vulnerability through deception, thereby driving them into debt bondage.

In UP, Human Rights and Sustainability are non-negotiable principles, and we remain totally committed to our partnership with "Dignity in Work for All", a social rights NGO formerly known as Verité South East Asia, with whom we have been working closely since 2020 together with our customers Mars and Fuji Oil to identify and address any weaknesses within our operations.

Today, all recruitment is guided by our strengthened Ethical Recruitment Procedures, which are regularly witnessed and assessed by Dignity in Work for All as well as other NGOs and Human Rights Activists, and includes the Employer Pays Principle stating that no Guest Worker should pay for a job in UP. During the past year, much focus and efforts have been invested in operationalising and galvanizing this commitment, thereby further reducing human rights risks in our supply chain, specifically risks related to recruitment of Guest Workers.

At the end of the day, addressing forced labour and minimising recruitment risks is also about recognising and tackling the systemic issues that enable abuses. We therefore decided several years ago to cut out third-parties in both the sending and receiving countries, such as sub-agents and recruiting agencies in Malaysia, and instead invested in our own call-centre, which spread information to new candidates in their villages before they may be deceived by unscrupulous middlemen.

Whilst strengthening our processes going forward, we also acknowledge that reasonable remediation of past recruitment practices plays an additional role in alleviating the risk of forced labour in our operations. In addition to the more than 2,650 Guest Workers who have already been reimbursed for the recruitment fees paid to third parties in the past, we have also provided a goodwill payment to 235 of our locally recruited Guest Workers towards the hardship faced in relation to their previous recruitment journey and employer. Finally, we continue to invest time and resources in identifying eligible ex-Guest Workers, for whom reimbursement funds have been set aside in a sinking fund.

Strengthening human rights is about continuous improvement, and though we are not perfect, we are trying to do our part by taking ownership. However, despite our sincere efforts and investments, our internal and external verification audits still detect isolated incidences of exploitation by third-parties during the recruitment process of new Guest Workers. This tells us that strengthening human rights standards is a journey with no finishing line. We therefore remain open for constructive criticism and will continue to pursue further improvements through close collaboration with Dignity in Work for All, other independent human rights assessors and activists, as well as our customers in the spirit of shared responsibility.

Safety

Since the emergence of COVID-19, we have highlighted this as a predominant safety concern to our Group, and extensively deliberated on our efforts to mitigate its impact and ensure the safety and well-being of our workers and their families.

As we move into 2024, the shadow of the pandemic has considerably receded in both Malaysia and Indonesia, although new cases did start to flare up towards the end of 2023. However, this increase in cases has not led to a significant rise in hospital admissions, as most cases have reportedly shown only mild symptoms.

Our focus therefore remains on adapting to the evolving nature of the pandemic by continuing to uphold rigorous health standards and being prepared to respond to any potential outbreaks. In this connection, all our hospital assistants from our Group Hospitals and clinics throughout our estates remain well-equipped and trained, ensuring prompt action if needed without any major disruptions or forced shutdowns to our operations.

Our employees have and will always be our core assets and a key pillar for the success and continued growth of our Group, and their welfare and rights as well as a safe and healthy workplace throughout our operations are of key importance.

Whilst it is pleasing that there have been no fatalities during 2023, I am compelled to place on record my disappointment with the fact that the number of accidents in our Group has gone up vis-à-vis 2022, one of the main reasons being the large number of new employees who have joined us since the borders re-opened.

Safety leadership and strategies targeting risk reduction continue to be a top priority for the Group, as we value the lives and well-being of our employees and their families, contractors, visitors, and local communities throughout our operations. A higher degree of vigilance, coupled with a more systematic and disciplined approach, will therefore be galvanised through training programmes, "Reach and Teach" and "Reach and Remind" sessions and HIRARC programmes, and the frequency of impromptu safety audits across our mills, estates, and refineries be intensified as an integral part of our ongoing safety procedures. This is particularly important in relation to the many new inexperienced Guest Workers who have recently joined our Group.

In addition, we will also pursue new avenues for improvement to reduce the accident rate, as our common goal on safety must be, "one accident is one too many." This will have management's undivided attention until stern improvements are made, as we remain focused on our vision to be recognized as "second to none".

To that end, our Safety Division, now totalling 5 safety officers, is briefing the Company's Executive Committee Members on a regular basis providing an unfiltered status on the progress made, as well as any shortcomings encountered, which are addressed punctually.

Community

UP is committed to doing our part for the global community and bringing about positive change to the lives of our employees, their families, and the surrounding communities, which have given so much to our Company over the last 118 years.

Amongst our initiatives, we engage and work closely with local communities to uplift their living standards and to offer business and employment opportunities to interested parties wherever possible, thereby contributing to the wealth, resources, and expertise of local economies. We are committed to taking ownership and striving to remediate any problems that may arise, both in and around the locations in which we operate. In this connection, we have continued to financially support numerous deserving cases and organisations throughout the year.

Furthermore, we will continue our various engagements with the smallholder societies in 2024, conducting smallholder field days, with the overall objective of knowledge sharing, so that the smallholder farmers can improve their yields, enhance sustainable agricultural practices, safety awareness, conservation, and thereby their livelihoods.

In Indonesia, we remain fully committed to the Plasma scheme and continue our positive progress in establishing additional areas that benefit farmers, families, and the neighbouring communities. Through respect and engagement with local communities and community leaders in Indonesia, we have seen positive developments in alleviating conflicts relating to land rights, which are handled in an amicable and transparent manner through proper grievance procedures, and in line with the spirit of the RSPO.

Improvements to maintain the highest possible welfare standards for our workforce and to ensure high standards of educational facilities provided for their children also continued throughout 2023. This includes the continuous upgrading of our housing facilities provided to our employees, be they

guest workers or local employees. To that end, a total revamp of the infrastructure has now been fully implemented on our newly acquired Tanarata Estate. With this construction of new, modern, and spacious houses with proper facilities, along with new sundry shops and other social amenities, Tanarata Estate thereby mirrors the standards present on our other Estates. We have also taken proactive measures to create conditions whereby Guest Workers can feel comfortable keeping their passports in newly provided safes within their own homes. This approach replaces the previous system of individual passport lockers in centralized locations with free access at all times.

Governance & Certification

At UP, we believe in the core principle of good corporate citizenship, robust governance, and risk management. All our sustainability commitments are transparently operationalised and monitored through our governance structures and risk management policies, and we continue to strengthen this important focus area based on third party independent assessments, feedback from customers, partnerships, and other stakeholders. This commitment is evidenced by the fact that UP became the world's very first Roundtable on Sustainable Palm Oil (RSPO) certified oil palm producer back in 2008. Our commitment was further reinforced by obtaining the Malaysian Sustainable Palm Oil (MSPO) certification in 2018 and Indonesian Sustainable Palm Oil (ISPO) certification in 2019.

Today, we remain 100% committed to the RSPO, MSPO and ISPO certification standards, which are among the most robust agricultural standards globally, with clear commitments to No Deforestation, No New Planting on Peat, and No Exploitation (NDPE). Furthermore, reinforced protection of human and labour rights, gender equality, stronger alignment with the Core International Human Rights Treaties and relevant ILO Conventions are also key criteria in the evolving standards, and we continue to support further advancements that are reasonable, pragmatic, and based on a multi-stakeholder approach, in the spirit of shared responsibility.

We firmly believe in the importance of initiatives aimed at operationalising sustainability on the ground and thereby enable the industry to meet the ever-increasing consumer requirements shaping the landscape for tomorrow's demands. This is a necessary commitment to ensure that the industry remains relevant and credible, and something which compels Management to keep stimulating new progressive ideas, failing which, the positive momentum created by so many individuals in our Group over the last 118 years will diminish.

In connection with these evolving standards, we are pleased that all UP Mills and Estates are successfully certified against the latest RSPO P&C 2018.

On behalf of Management, I nevertheless want to acknowledge that more can and must be done. We therefore intend to continue working hard at further integrating and operationalizing sustainability into our DNA, so that it remains "built-in" and not "bolted-on".

To achieve this, the materiality assessment has once again been carried out in 2023, in close collaboration with our stakeholders, to gauge their views and expectations on various topics, thereby enabling us to identify and map the most relevant issues pertaining to our economic, environmental, and social risks and opportunities. This rewarding exercise is fundamental to ensuring that expectations throughout the supply chain are aligned, thereby pushing in the same direction, as we continue on this shared sustainability journey.

Marketplace

In UP, we are committed to the world's highest standards of sustainability, quality, food safety, and product traceability. This is key to open up market opportunities amongst reputable brand manufacturers and retailers globally who more than ever demand full traceability to ensure that the supply of palm oil they receive is safe as well as produced ethically.

We welcome this level of transparency and acknowledge that the trust between a brand and a consumer can only be built through actions and not through greenwashing or glossy brochures. Ultimately, our Group's behaviour is our brand and our licence to operate therefore depends on behaving well.

With UP being one of the most sustainable, efficient, and integrated medium sized plantation companies in the world, our two refineries, Unitata Bhd and UniFuji Sdn Bhd, are uniquely positioned to live up to this. By controlling all areas of the production, we can offer certified sustainable high- quality products with the lowest GHG footprints and contaminant levels in the world based on full transparency, traceability and the principle of responsible sourcing.

For our downstream operations, all our palm oil can be traced back to the various palm oil mills and plantations, whereas for palm kernel oil – a notoriously challenging area - we are now able to trace more than 90% of the oil which we use back to not only the palm kernel crushing plants and palm oil mills, but all the way to the plantation level. This is particularly important in relation to the implementation of the EU Deforestation Regulation, effective 1 January 2025, requiring full traceability and verification that no deforestation has taken place anywhere along the supply chain.

Whilst we believe that we have come a long way on our sustainability journey, we also acknowledge the many challenges ahead which we will have to meet as we continue our strive towards building long-term relationships with our customers, suppliers, business partners and other stakeholders in the global marketplace, in the spirit of shared responsibility. The points I have touched on above serve only as highlights to this report and will be further elaborated upon in the following pages (pages 34 to 118). Furthermore, additional information can be found under the sustainability section on our website, https://www. unitedplantations.com/sustainability/.

Finally, I would like to thank you for your interest in our sustainability efforts and hope that you will find our journey interesting. I would also like to thank our Board of Directors for their continuous support, guidance, and interest in this report as well as all our partners and stakeholders including NGOs for their active and valuable participation and input that continue to be of much value to our Group. With the continuous commitment by our Group and an active participation by all our stakeholders, I am confident that we will be able to face most challenges ahead of us as we keep moving forward with our sustainability commitments.

Dato' Carl Bek-Nielsen
Chief Executive Director (CED)

A dedicated tall palm harvester on Jendarata Estate walking between fields during the early morning sunrise.

Materiality

This report addresses key sustainability matters which have been identified after taking into consideration both the Group's view on significant environmental, economic, and social aspects, impacts, risks and opportunities which are vital to the success and continued growth of the Group, and the views and responses from our stakeholders on pressing material issues.

In identifying the material sustainability matters, and opportunities, we have drawn information from various internal and external sources of information which include the views of the Group Sustainability Reporting Team within our organisation, stakeholders, industry groups, standards recommended by global and industry specific reporting bodies, such as the Roundtable for Sustainable Palm Oil (RSPO) and the Global Reporting Initiative (GRI) and existing peer literature.

As a result of the abovementioned exercise and evaluation of the Group's Sustainability Risks and Opportunities, we have this year identified 23 key sustainability issues under four main headers, namely Environment, Social (Employees, Community), Sustainability Governance and Marketplace, which we have assessed as being of high concern to stakeholders and of high significance for our Group in 2023.

Data collected from various stakeholders are then analysed and used to create a materiality matrix which also includes the assessment on the significance of the identified key sustainability matters and the prioritisation of stakeholders to the organisation.

The resulting Materiality Matrix is as shown on the following page. Material issues which have been identified are then assessed by the Sustainability Reporting Team to establish if there are policies and procedures in place to address and manage these issues, and if none, to ensure implementation plans are drawn up and presented to the management for follow up as part of the Group's sustainability commitment.

Quantifiable indicator data and targets are assigned where relevant and are communicated to our stakeholders via this Sustainability Report. The materiality assessment has been reviewed and endorsed by Executive Committee (EXCOM) of UP.

United Nations Sustainable Development Goals (UN SDGs)

UP respects and recognises the importance of its role in this global initiative. As such, the Group has mapped the relevant SDGs with each materiality topic and identified seventeen (17) UN SDGs with their specific targets that are most relevant to its business operations as well as key concerned materiality topic highlighted by the stakeholders.

For more information, please refer to our website, *www.unitedplantations.com/sustainability/*.

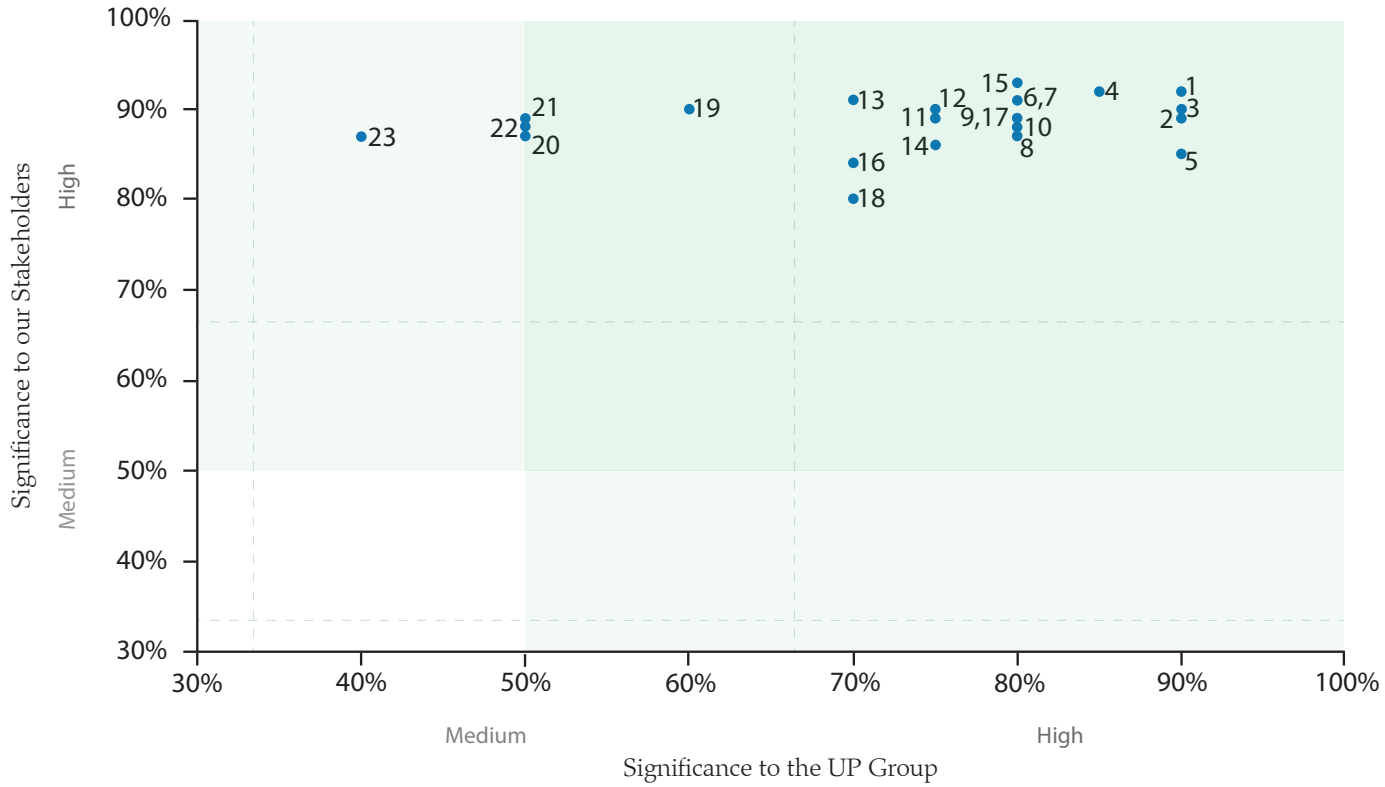
The Iversen-Jeremy Diamond jungle reserve kept in a pristine condition in line with UP's commitment to environmental care.

Summary of Materiality Matters

23 Key Sustainability Issues	Relevant UN SDGs*	UP supports UN SDGs
1. Human rights protection, child labour and fair & decent wages	1,8	
2. Precautionary measures on COVID-19	3,9	
3. Product Quality	12	
4. Occupational Safety & Health	3,9	
5. Commodity Prices	12	
6. Social commitments and Amenities	2,4,8	
7. Certifications for Food Safety, Sustainability and Others	12	
8. Biodiversity & Conservation	14,15,16,17	
9. Deforestation/ High Carbon Stock	13	
10. No Exploitation-Free, Prior and Informed Consent	16	
11. Climate Change, GHG emissions, Discharges & Waste Management	7,9,13,16,17	
12. Fire and Haze	13	
13. Code of Conduct, Governance and Anti-Corruption	8,16	
14. Community Development and Welfare	3,4,8	
15. Business Ethics and Compliance	16	
16. Smallholder and Plasma Development	2,12	
17. Talent retention, Development and Training	4,5,8	
18. Currency Fluctuation	-	
19. Grievance Resolution	16	
20. Peat Development	13	
21. Water Impacts	6,9	
22. UP's Evaluation of Suppliers/ Contractors' Sustainability Commitment	12	
23. Pesticides and Chemical usage	12	

**Stakeholder groups consist of shareholders, employees, customers/consumers, local communities/smallholders, government agencies/regulators, non-governmental organisations (NGO), palm oil industry group and suppliers/contractors.*

Materiality Matrix



Stakeholders Engagement

At United Plantations, we recognise that stakeholder engagement, assessment and feedback are an integral part of our sustainability strategy and initiatives.

The stakeholder groups which are key to our operations and have significant influence over the impacts of our business are carefully identified and engaged at various platforms and intervals throughout the year. The stakeholder engagement process which includes a proactive and both formal and informal approach, is carried out to fully understand their sustainability concerns and issues with a view to ensure that their key interests are aligned with that of our Group.

We are continuously improving our stakeholder engagement approach which is now evolving into more tailored and targeted engagement sessions with our stakeholders. In this context, the following pages provide an overview of the efforts involved in our Group's focus on stakeholder engagement.

Overview of Stakeholder Engagement

Stakeholders Groups	Specific stakeholders addressed	Type of engagement	Frequency	Areas of interest	Outcomes	Addressed by specific Material Sustainability Matters
Shareholders & Investors	Shareholders both in Malaysia and in Denmark	• Engagement surveys • Annual General Meetings • Analysts briefings	• At least once a year • Once a year • Twice a year	Deforestation, pesticides & chemical usage, Occupational Safety & Health (OSH), free, prior & informed consent (FPIC) and product quality	Good relationship with shareholders and positive reputation amongst investors constructive feedback	3, 7, 10, 14 &17
Customers/ Consumers	Major consumer goods manufacturers, Refineries, and end consumers	• Engagement survey • One-to-one meetings • Visits to Estates, Mills and our Refineries	• At least once a year • Periodically • Periodically	GHG emissions, discharges & waste management, deforestation, high carbon stock, peat development, human & workers' rights, social welfare, OSH, product quality, food safety & sustainability certifications and supply chain	Better awareness of our Group's commitment to sustainability, and better understanding of our policies, culture and values	2, 3, 4, 8, 9, 10, 17, 18 &19
Employees	Executives, staffs and workers	• Annual employee survey • Group Sustainability Committee meetings • Gender committee meetings • Guest Workers Welfare Committee • Occupational Safety & Health Committee • Internal trainings	• Once a year • Once a year • Twice a year • Six times a year • Four times a year • Periodically	Human & workers' rights, social welfare, OSH, equal treatment, grievance resolution, product quality, food safety & sustainability certifications	Improved understanding of company policies and efforts taken to date inclusiveness in the management decision making	8, 9, 10, 11, 15, 17 & 18
Smallholders & Local Communities	Smallholders surrounding and near our operations in Malaysia and Indonesia	• Annual Smallholders' Field Day • One-to-one communications	• Once a year • Periodically	Biodiversity & conservation, pesticides & chemical usage, workers' rights. OSH, product quality and food safety & sustainability certifications	An opportunity to sustainably enhance the agricultural practices of smallholders, amicable solutions to grievances, better social relations with our Group	1, 7, 8, 10, 19 & 20
Government Agencies	DOSH, Labour Department, Indonesian Local Government, Indian High Commission	• Engagement Surveys • One-to-one meetings	• Periodically • As and when necessary	Pesticides & chemical usage, human & workers' rights social welfare, OSH, equal treatment. Code of ethics & governance, product quality, supply chain and evaluation of supplier/contractors' sustainability commitment	An opportunity to share our Group's commitment, and policies and procedures to sustainable operations	7, 8, 9, 10, 11, 12, 17, 19 & 20
Non-governmental organisations	SUHAKAM, TENAGANITA, AMESU, MAPA, NUPW	• One-on-one meetings • Engagement surveys • Direct correspondences via email and telephone conversation	• As and when necessary • Once a year • As and when necessary	Biodiversity & conservation, water impacts, pesticides & chemical usage, workers' rights, social welfare, code of ethics & governance, grievance resolution and product quality	Better understanding of NGO concerns and improved awareness of UP's sustainability commitments by the NGOs	1, 6, 7, 8, 9, 12, 15 & 17
Palm Oil Industry Groups	Neighbouring plantations and, MPOA, MPOC, MPOCC, RSPO	• Engagement surveys	• Once a year	GHG emissions, fire & haze, discharges & waste management, pesticides & chemical usage, human & workers' rights, OSH, product quality, food safety & sustainability certifications and commodity prices	Good relationship with the industry groups and knowledge sharing to enhance the sustainability of the industry	2, 5, 7, ,8, 9, 10, 17, 18 & 21
Suppliers and Contractors	Suppliers of various inputs and key contractors within the Group	• Engagement surveys • One-to-one meetings	• Once a year • Periodically	Biodiversity & conservation, GHG emissions, discharges & waste management deforestation, high carbon stock, peat development, workers' rights, social welfare. OSH and product quality	Raised awareness of UP's sustainability commitments and business	1, 2, 3, 4, 8, 9 & 17

Sustainability Framework

Since our foundation in 1906, United Plantations has been focusing on economic development combined with social and environmental care. Identifying and managing UP´s risks and opportunities are fundamental to our continued success and the core principles of our business activities, namely doing business sustainably combined with committing ourselves to a long- term perspective.

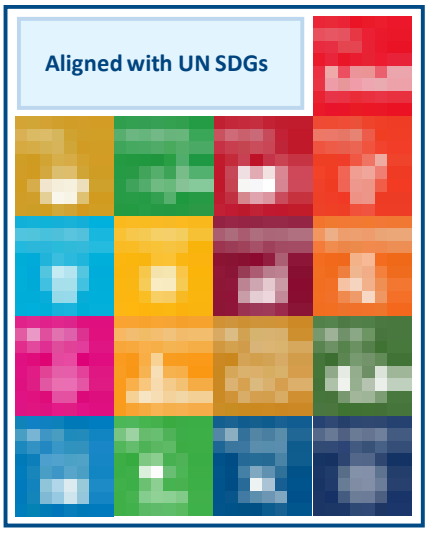
Our Philosophy

We strive towards being recognized as second to none within the plantation industry, producing high quality products, always focusing on the sustainability of our practices and our employees' welfare whilst attaining acceptable returns for our shareholders.

Focus Areas

As an important step towards improving our sustainability profile within the economic, environmental and social areas of our business, we ensure that our various target groups of stakeholders are actively and effectively participating in our communication and consultation processes.

Environment	Social	Governance	Marketplace
We commit to being a leader within sustainable agricultural practices, and therefore strive towards reducing variables that impact the environment negatively.	We adhere to the fundamental Conventions of the ILO and the UN Declaration on Human Rights, the Rights of Indigenous Peoples and other core values, ratified by the countries in which we operate.	Strong risk management policies and procedures operationalised through effective sustainability governance in line with our core values are key for achieving long term success.	We are committed to providing high quality certified sustainable and traceable Palm Oil products and services to customers worldwide.
Biodiversity and Conservation	**Human rights protection, child labour and fair & decent wages**	**Commodity Prices**	**Product Quality**
Deforestation/ High Carbon Stock	**Occupational Safety & Health**	**Code of Conduct, Governance and Anti-Corruption**	**Certifications for Food Safety, Sustainability and Others**
Climate Change, GHG emissions, Discharges & Waste Management	**Social commitments and Amenities**	**Business Ethics and Compliance**	**UP's Evaluation of Suppliers/ Contractors' Sustainability Commitment**
Fire and Haze	**No Exploitation, Free, Prior and Informed Consent (FPIC)**	**Currency Fluctuation**	
Peat Development	**Talent retention, Development**		
Water Impacts	**Grievance Resolution**		
Pesticides and Chemical usage	**Community Development and Welfare**		
	Smallholder and Plasma Development		



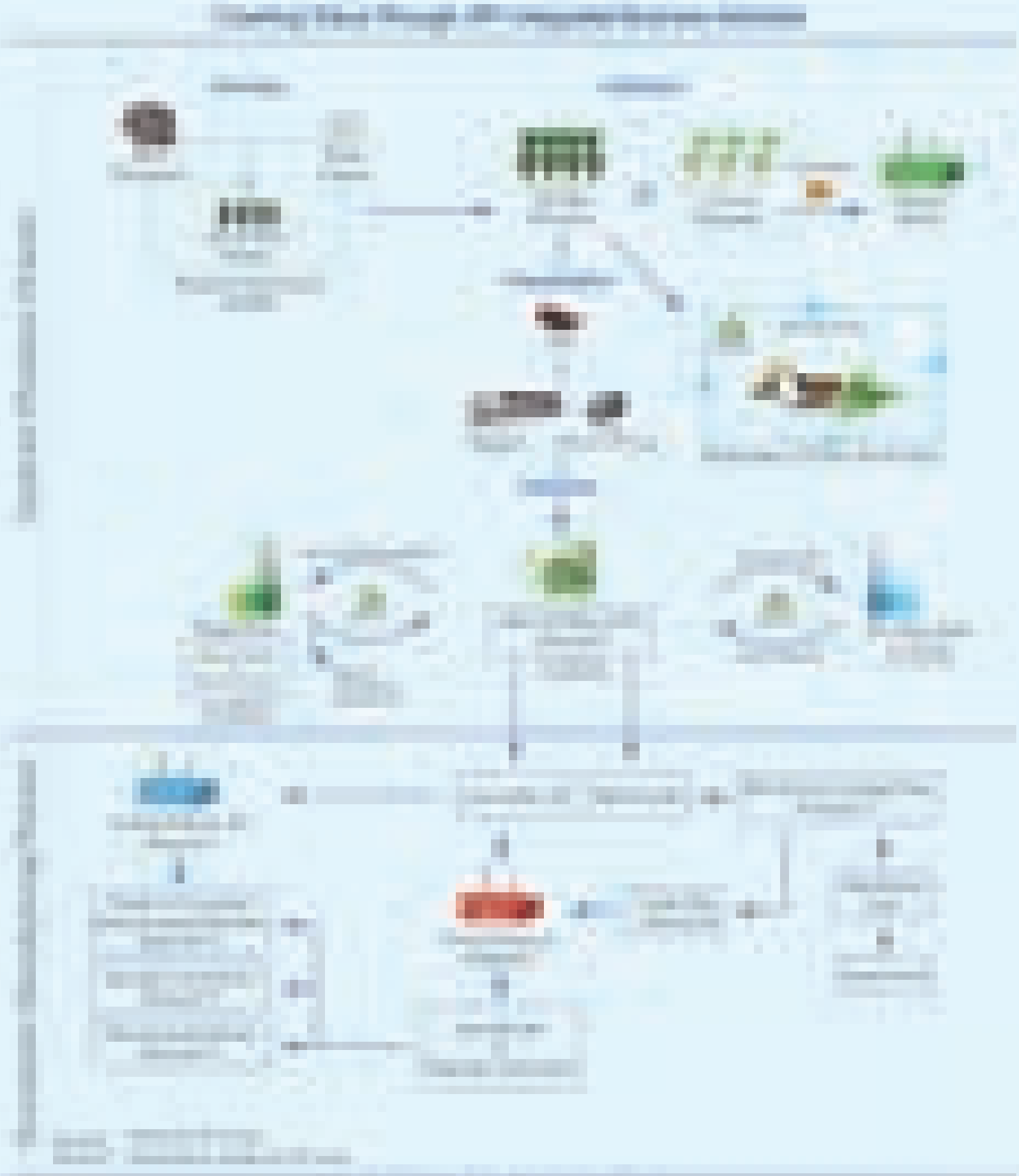
Performance Scorecard

Our targets and commitments are what drives us to continuously improve. We subscribe to the mantra "what we measure, we can manage" and provide information on our progress of targets and achievements. Below are our key targets and progress to date:

Focus Areas	Targets	Current Status as of 2023	Material Matters
No forced of trafficked labour in our operations	We have evaluated the risks related to the payment of recruitment costs in our past practices. All Guest Workers as of 31 December 2021 have been reimbursed for the past recruitment costs.	We are collaborating with "Dignity in Work For All"(Verite) to conduct human rights due diligence annually. All gaps are addressed with an action plan submitted to "Dignity in Work For All" for verification.	Human & Workers' Rights
Live up to the UN Guiding Principles on Business And Human Rights & ILO Fair Recruitment Principles	No workers shall pay any cost related to recruitment to come and work in UP	Since 31 December 2021, we ensure that no Guest Worker shall pay any cost related to recruitment to come and work in UP. Independent verification is carried out within 4 months upon the arrival of new Guest Workers. This is ongoing and thorough investigation will be carried out if any red flags are detected.	Human & Workers' Rights
Retention of our Guest Workers' personal identity documents	Personal identity documents of all Guest Workers shall be kept at the Guest Workers' own accommodation.	We are in the midst of installing individual safe deposit boxes in the Guest Workers' own homes. Upon completion their passport will be kept here with free and full access.	Human & Workers' Rights
No work-related fatalities	Zero fatalities	Target achieved. Zero fatalities	Occupational Safety & Health
Reduce Lost Time Injury Frequency Rate (LTIFR) below 2014 levels i.e 12.27.	Introduce a behavioural safety approach (4.0)	Continuous Improvement (LTIFR 5.38). The effectiveness of safety trainings and monitoring will be strengthened in 2024.	Occupational Safety & Health
Measuring of GHG emissions for all palm oil operations.	Original target of 60% reduction from 2004 to 2025 achieved in 2021. New target for total GHG emissions (Scope 1,2 & 3): 66 % reduction by 2030 when compared to 2004 levels (with iLUC and nature conservation)	Total GHG emissions (Scope 1, 2 & 3): 1.36 kg CO_2 -eq/kg NBD Oil (63% lower compared to 2004 levels including iLUC and nature conservation)	Climate Change, GHG Emissions, Discharge & Waste Management
To supply electricity to the National Grid derived from the biogas plant at UIE Palm Oil Mill which began operations in 2010.	Increase the amount of electricity generated. Target: 8,000MWh by 2025.	In 2023, a total of 7,585MWh of electricity was generated from the biogas plant and sold to the grid which is similar to the quantum supplied in the previous year.	Climate Change, GHG Emissions, Discharge & Waste Management
Monitoring of deforestation and fire hot spots in our area as well as suppliers' concession.	Engage palmoil.io for monitoring of indirect suppliers' concessions i.e origin of our conventional CPKO.	Target achieved. We now subscribe to palmoil.io database for all direct and indirect suppliers in line with the EUDR requirements. In addition, we subscribe to Global Forest Watch and GeoRSPO as the monitoring tools.	Climate Change, GHG Emissions, Discharge & Waste Management
Water Footprint (domestic water consumption)	Reduction of 10% by 2025 from the average of 80 Gallons per capita per day.	Malaysian Operations: 79 gallons/capita /day Indonesian Operations: 77 gallons/capita/day	Climate Change, GHG Emissions, Discharge & Waste Management
Water Footprint (Mill water consumption for processing)	Reduction of 10% by 2025 from the average of 1.6 MT water/ MT FFB.	Malaysian Operations: 1.7 MT water/MT FFB Indonesian Operations: 1.2 MT water/MT FFB	Climate Change, GHG Emissions, Discharge & Waste Management
Traceability to Plantations (TTP) enable tracing of palm products to its origin i.e plantations, smallholders and dealers with indirect smallholders.	90% TTP by end of 2023; 95% TTP by mid of 2024 and a minimum of 98% TTP by end of 2024	The average TTP scores for the 85 mills (supply of conventional CPKO via KCP) is 90.84% as of 31 December 2023.	UP Evaluation of Suppliers' Sustainability Commitments
Malaysia & Indonesia FFB Yield Per Hectare Oil Extraction Rate CPO Yield Per Hectare	 28.00 MT FFB/Ha 23.00% 6.50 MT CPO/Ha	 27.99 MT FFB/Ha (Target achieved) 21.82% (Target achieved) 6.11 MT CPO/Ha (Target achieved)	Product Quality

Legend: Progressing
Achieved

Vigorous oil palm seedlings in a well maintained main-nursery.



Environmental, Social and Sustainability Governance

The prominence of the Environmental, Social and Governance (ESG) methodology to identify industry leaders and laggards according to their exposure to risks is fast gaining support, requiring companies to provide a clear and concise position on how they demonstrate stewardship and create value for their stakeholders at all levels, both now and in the future.

At the same time, there is a growing demand for international businesses to move from a profit maximisation lens to a value optimisation lens, and from a short-term profit focus to a longer-term consideration of profits and impact to customers, employees, communities, and the environment.

At United Plantations, we welcome these developments and believe they align well with our philosophy of "striving towards being recognised as second to none within the plantation industry, producing high quality products, always focusing on the sustainability of our practices and our employees' welfare, whilst attaining acceptable returns for our shareholders."

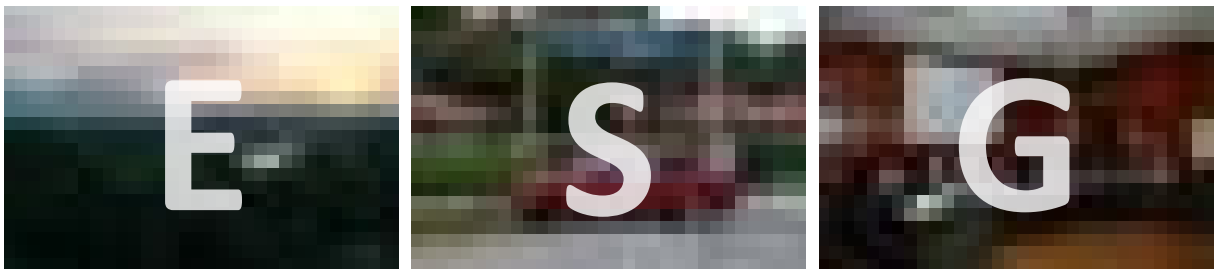
To achieve this goal, mitigating ESG risks through dedicated sustainability governance is an integrated part of our pursuit of long-term value creation and is of utmost importance to ensure we remain relevant in sustainable global supply chains and thereby continue to catalyse positive developments.

In this respect, whilst we have always sought to lead by example and set the highest standards within the conditions of the day, we recognise that we can deliver even greater impact by partnering with subject matter experts and like-minded customers on this sustainability journey, in the spirit of shared responsibility. In the following sections, we first highlight our ongoing commitment to mitigating environmental risk through sustainable agricultural practices focused on responsible growth, reduced carbon footprints, and striking the right balance between conservation and development.

Secondly, we delve into the social and human rights aspects concerning our employees, communities, and the implementation of sustainable labour practices – a topic that has taken up much space in Malaysia as well as international news over the last few years.

Lastly, we gauge the relative importance of various sustainability issues for our stakeholder groups through our materiality assessment and discuss other matters pertaining to governance, such as governance structure, certifications, targets, and initiatives, as well as internal and external reporting standards. Off the back of the ESG framework, we then look towards the marketplace as the closing piece of our Sustainability Report, where we highlight our commitment to quality, traceability, food safety, and certification across our downstream refinery operations.

Environmental, Social & Governance factors are an integrated part of UP's pursuit of sustainable value creation



ENVIRONMENT

- No Deforestation, No New Peat Development & No Exploitation
- Integrated biodiversity department and 8,290 Ha. jungle conservation
- GHG carbon footprints reduced by 63% per kg. palm oil since 2004

SOCIAL

- Setting the highest standards for employees and their families
- Free housing, utilities and schools
- Partnering for human rights leadership and strong labour practices in line with emerging global standards

GOVERNANCE

- Strong governance structures and robust risk management policies
- The World's First RSPO certified palm oil producer in 2008
- Independent external verification of targets and achievements

Environment

UP is committed to being a leader in sustainable agricultural practices and is aware of the footprint it leaves on the environment and our Group therefore constantly strives towards reducing variables that negatively impact the environment. Since 2010, we have strictly adhered to No Deforestation and No New Development on Peat soils regardless of its depth and have focused on the reduction of GHG emissions, energy, water, and waste in line with the concept of the circular economy as a vital part of our environmental strategy..

No Deforestation and No New Planting on Peat

Global plantation development has contributed significantly to economic development and prosperity. However, deforestation and other unsustainable practices have many negative consequences for people and the environment, thus, our Group is therefore fully committed to protect forests, peatlands, and human and community rights.

As an important part of our sustainability journey, we work closely with other growers, suppliers, contractors, processors, NGOs, brand manufacturers and industry stakeholders to take part in transforming the industry, as well as creating further awareness on the importance of sustainable palm oil production.

In addition to our focus on continuous improvement to minimise waste and our overall carbon footprint we are committed to the Principles and Criteria of the RSPO, MSPO and ISPO. Our Group has through investments and a dedicated Group Sustainability Committee introduced policies to break the link between palm oil and deforestation.

Furthermore, we have strengthened our High Conservation Value (HCV) assessment by combining it with a High Carbon Stock (HCS) assessment and Land Use Change Analysis (LUCA) for new plantings in 2014. With this we strive to maintain an open and dynamic approach towards continuous improvements for the protection of peat soils, HCV, HCS and other fragile areas.

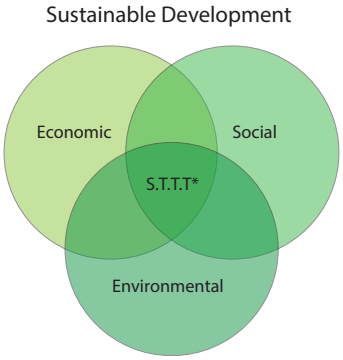
We conduct our operations under the best principles of agriculture and are committed through our more than 8,290Ha of conservation areas to promote biodiversity and protection of the natural environment within our Group's land banks.

Key milestones of our Environment and Biodiversity Policy are summarised below and we expect our employees, contractors, suppliers, trading partners and stakeholders to adhere to this policy too, thereby further enhancing sustainability within our supply chain based on transparency, traceability, and trust.

For more information, please see the sustainability section on our website.

Key environmental milestones achieved are as follows:

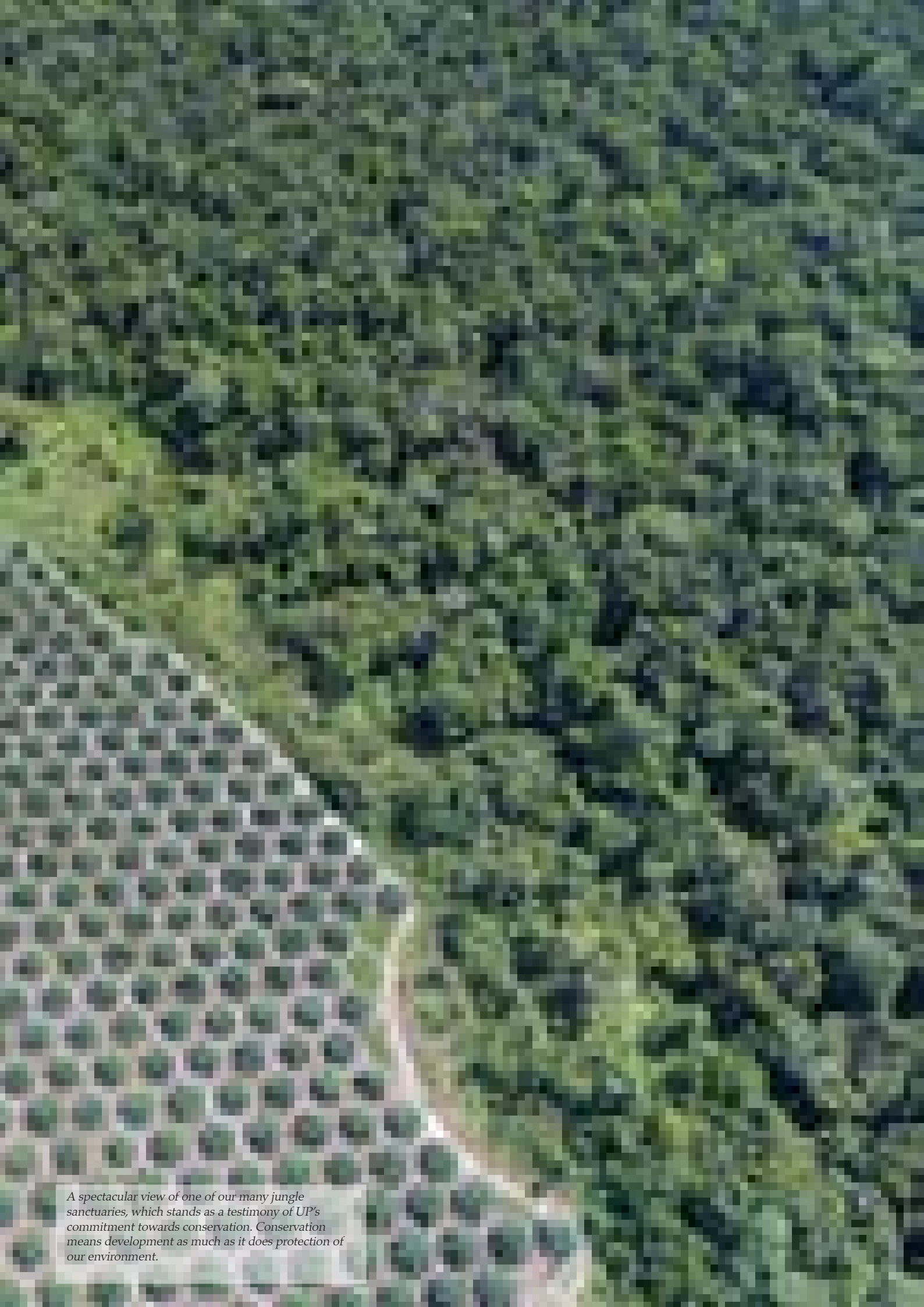
- Zero-burn policy (1989)
- No primary forest clearing policy (1990)
- No biodiesel production/supply policy (2003)
- Methane capturing facilities introduced (2006) and all mills equipped with methane capturing facilities (2018)
- HCV assessment introduced (2007)
- LCA on Palm Oil production completed in 2008 with annual updates since then
- No Deforestation, No new development on High Conservation Value (HCV) areas and No new development on peat soils regardless of its depth (2010)
- Total phase-out of Paraquat (2010)
- HCV combined with HCS assessments and LUCA for new plantings (2014)
- Total phase-out of Class 1A/1B chemicals (Monocrotophos/Methamidophos) (2020)



*Sustainability through Transparency, Traceability & Trust

Environmental Commitments of the Group

	2023 (RM)	2022 (RM)	2021 (RM)	Grand Total (RM)
Environmentally Friendly Operational Activities	4,387,799	7,877,945	6,144,925	18,410,669
Environmentally Friendly Projects (Biogas, Biomass, others)	610,152	3,936,559	429,207	4,975,918
Biodiversity & Conservation (Forest reserve, Endangered Tree Species Projects, Collaboration with Copenhagen Zoo)	1,151,188	900,097	927,143	2,978,428
Total	6,149,140	12,714,601	7,501,275	26,365,016



A spectacular view of one of our many jungle sanctuaries, which stands as a testimony of UP's commitment towards conservation. Conservation means development as much as it does protection of our environment.

Peat Developments

Since 2010, the Group has strictly adhered to No New Development on peatland, regardless of depth, whilst carefully managing pre-existing oil palm plantings on peat.

In Malaysia, the total peat area is 4,130Ha out of a total planted oil palm land bank of 37,507Ha, whereas in Indonesia, the total peat area is 280Ha, out of a total planted land bank of 8,720Ha. In total, peat therefore makes up approximately 9.54% of the total area planted with oil palms throughout our Group.

Our Research Team reassessed the peat area in our Indonesian estates, where significant areas of peat subsided over the years, and as a result, some of the peat area with high water table has been set-aside as peat rehabilitation area. This is in line with the latest peat inventory, which has been submitted to the RSPO Secretariat.

New Planting Procedure (NPP) and Responsible Land Use Planning

The RSPO New Planting Procedure (NPP) consists of a set of assessments and verification activities to be conducted by growers and certification bodies (CB) prior to new oil palm development.

The intention is that new oil palm plantings must not negatively impact primary forest, HCV, HCS, fragile and marginal soils or local people's lands. UP subscribes to and supports this stance. It is not enough to set aside areas for conservation.

Conservation areas need to be patrolled in order to protect these areas from intruders and fires, so that the biodiversity can be is truly conserved. In this regard, our BioD utilises the SMART system which is the world's most comprehensive and user-friendly conservation monitoring system.

The added advantage of using SMART is its statistical power that allows the BioD to compile and develop trendlines and other forms of analyses pertaining to the management and protection of conservation areas and species.

For more information on our HCV and HCS assessments, please refer to our website, *www.unitedplantations.com/sustainability/*.

New EU Legislation on Deforestation

The European Union Deforestation Regulation (EUDR) was passed in June 2023 and comes into full effect from 30 December 2024. This regulation focuses on bringing more traceability and accountability to producers who are exporting goods to the European Union and will hold companies liable for any human rights infringements, environmental issues and forced labour concerns in their supply chain.

This is done by enforcing 3 main portions of legislation via a cut off date for Deforestation (2021), compliance with national legislations, prerequisite of traceability, risk assessment and contingency plans as well as severe fines of up to 10% of the turnover in EU, with management being liable in person.

In Malaysia, forest cover now makes up 50% of the country's landbank whilst deforestation rates have gradually fallen to near record-lows over the last many years.

For the palm oil sector specifically, the landbank under cultivation remains stable in line with the cap on land allocation introduced by the Government, which is effectively helping prevent further expansions. Instead, focus has been shifted towards raising the industry's production by means of increasing yields and introducing new technologies.

With this, we firmly believe that Malaysia should be categorized as a low-risk country under the EUDR, and whilst there are still many unanswered questions in relation to the implementation of this new legislation, we welcome initiatives that aim to tackle the global challenge of deforestation.

However, such initiatives must be based on a balanced approach to ensure smallholder farmers are not excluded from global supply chains and that developing countries also have the right to meet their basic needs, and to have the opportunity to lead richer, more fulfilling lives.

In addition, any such initiatives must ensure that all agriculture related commodities are subject to the same rules, thereby operating on a level playing field without any form of discrimination.

In any case, we shall relentlessly continue our pursuit of sustainable value creation, by always aiming to set the highest sustainability standards within the conditions of the day.

To do so, we subscribe to not only Global Forest Watch and GeoRSPO for monitoring of deforestation in our own concessions, but also the internationally recognized real time satellite monitoring database, palmoil.io, with whom we have been collaborating since the 3rd quarter of 2023 to monitor our indirect suppliers.

This enables us to monitor deforestation activities in established plantations, at smallholders and at dealers with indirect supply from smallholders within a radius/proximity of 10km.

A family of leopard cats captured on one of our camera traps on a rendezvous. Leopard cats are a natural component of biological control against rodents.

Partnership, Biodiversity and Conservation

Conservation of jungle reserves and wildlife sanctuaries as well as promoting green corridors are examples of our commitment to the environment. To date, United Plantations has set aside 8,290Ha of land for conservation purposes representing approximately 13% of our total planted area in order to encourage biodiversity and wildlife on our estates. In Indonesia, UP has set approximately 44% of its land concession for the purpose of conservation.

Riparian reserves are maintained to preserve flora and fauna, provide wildlife corridors, ensure water quality and prevent erosion. In order to develop effective conservation strategies, we have established a series of collaborations and partnerships with experts within this field. One such partnership was initiated in 2007 with Copenhagen Zoo (CPH Zoo) and officially established on 1 October 2010, through a Memorandum of Understanding (MOU). It marked an important milestone for our target of producing certified sustainable palm oil in Indonesia and being able to document the environmental integrity of our Indonesian operations.

Biodiversity Department

In order to better manage our large conservation areas, UP set up its Biodiversity Department (BioD) in 2011 under the purview of Dr. Carl Traeholt, our Group's Chief Environmental Advisor.

The Biodiversity team consists of a Division Manager with solid natural resources management experiences, supported by five subject specialists and five field staff. This is supplemented by additional contract-workers when needed. The team is responsible for mainstreaming environmental concerns into standard operational procedures and focus on activities primarily within the following areas:

- Biodiversity (Fauna and Flora)
- Habitat and Ecosystem
- Forestry and rehabilitation
- Hydrology and Limnology
- GIS and Mapping
- Integrated Pest Management
- RSPO and ISPO
- Protection and Monitoring
- Community Outreach

One of the key components in making the BioD a success was to develop the internal capacity to manage and conserve UP's ecological resources, and to make first-hand information about biodiversity assets easily available.

This is possible with the current BioD headed by Dr. Carl Traeholt, our Group's Chief Environmental Advisor and Mr. Muhd Silmi, Manager BioD and their team including essential topic specialists, such as a limnologist, a forester/botanist, zoologist, herpetologist and database officer. These subject specialists are supported by two chief rangers and a number of ranger assistants, as well as a native tree nursery manager.

Biodiversity Department's activities

Since 2011, the BioD has undertaken an impressive amount of activities in support of the company's commitment of producing sustainable palm oil and

conserving the natural environment. For example, the BioD has worked with leopard cats, *Prionailurus bengalensis*, as predator of rats to replace the environmentally detrimental chemical control.

The work with the Sumatra cobra (*Naja Sumatrana*) and king cobra (*Ophiophagus Hannah*), the world's largest venomous snake has not only produced some amazing results, it has also attracted one of the world's best known and respected herpetologists, Romolus Whitaker, who continues to grace UP/PT SSS and offer support and capacity building.

The BioD has also undertaken numerous camera trap surveys, bird and tree surveys to document the biodiversity within the company's conservation areas.

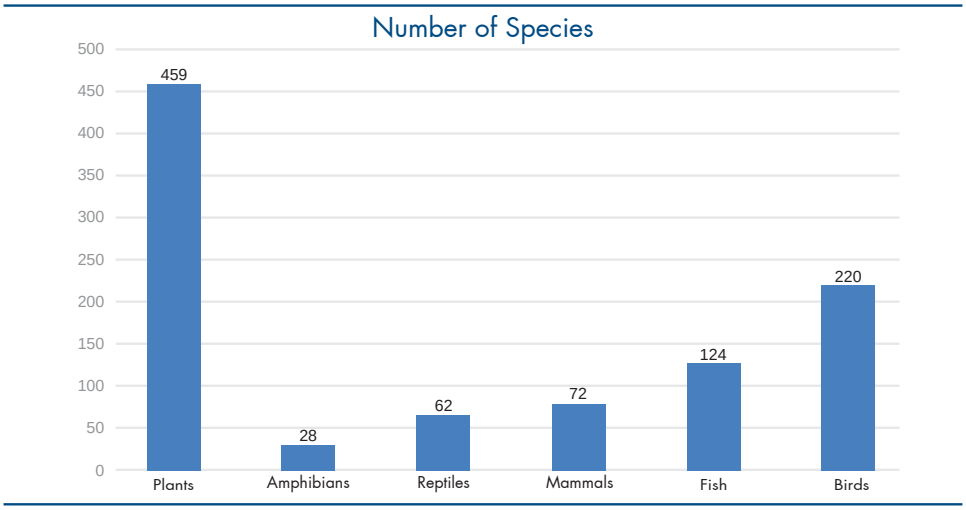
In addition, the BioD has recorded many of Borneo's endangered species to date, among them Asia's only great ape, the orangutan, *Pongo pygmaeus*.

While these are exciting and inspiring stories about exotic species, the BioD is far more than that. An entire host of other activities commenced right from the modest beginning in 2011, including developing a GIS database that incorporates literally all the team's recorded data, be it from camera trap pictures, radio-tracking locations, number of tree seeds collected, time and place of illegal logging or recovery of aquatic fauna. Most of these stories can be found on our website.

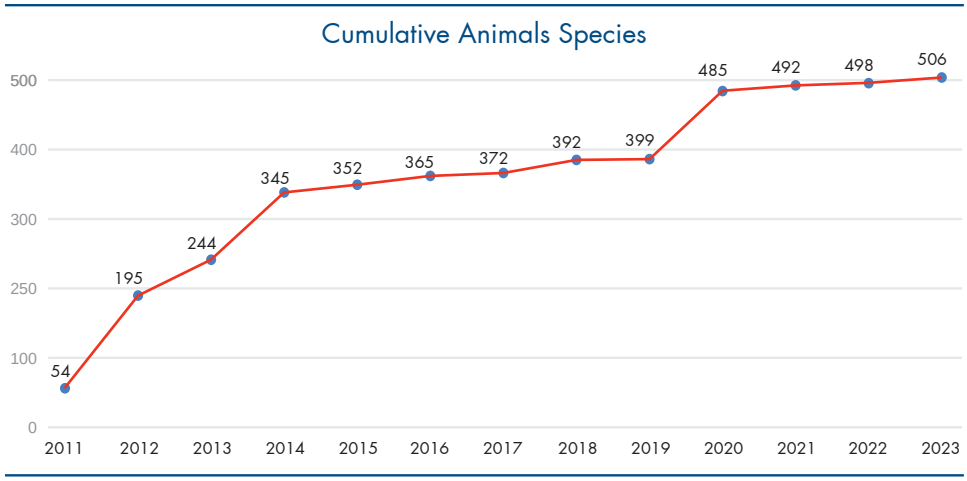
Biodiversity activities during 2023 in PT SSS

In 2023, all biodiversity activities were back on target after two years of COVID-19 limitations, and the BioD continued to work at normal capacity throughout the year. The team also attended national and international seminars and workshops that formed part of ongoing capacity building and knowledge sharing with the conservation community, academician, practitioners and government. This was also made possible due to uplifting travel restrictions from the COVID-19 outbreak.

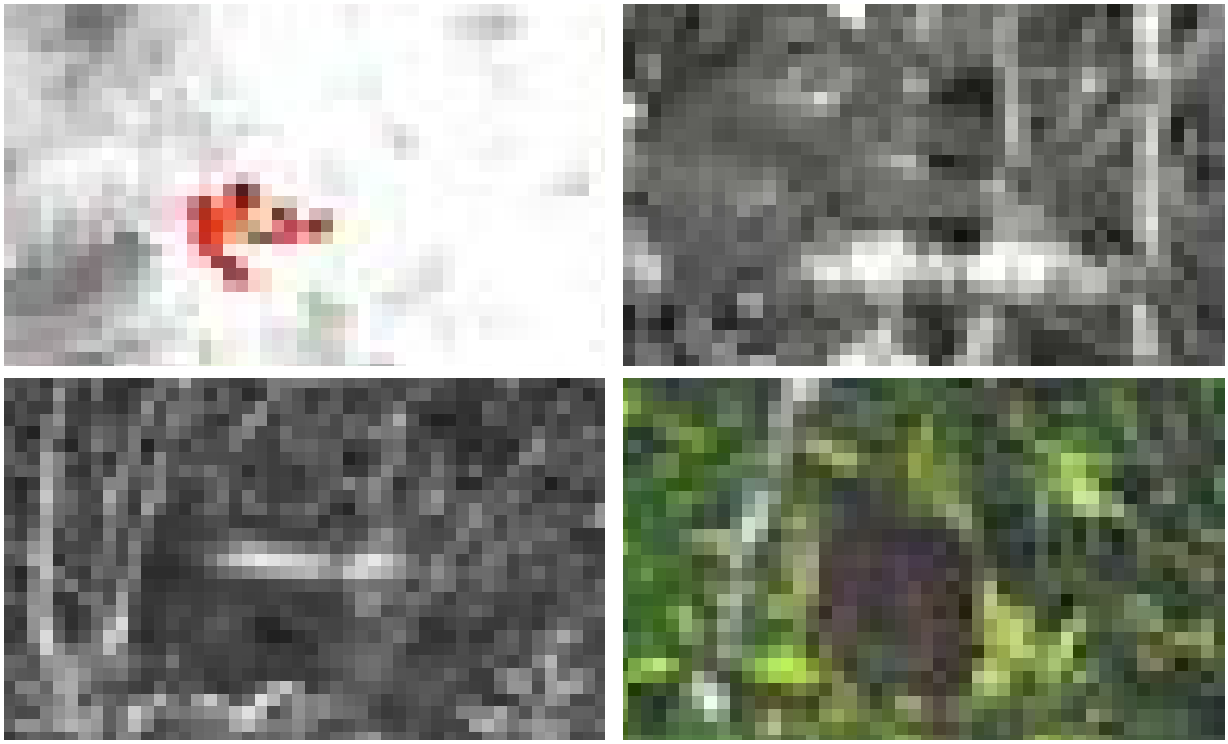
In 2023, the team added eight new species to PT SSS' species list, consisting of one reptile and seven bird species. To date, the BioD has recorded a total of 506 different vertebrate species of which 72 are mammals, 220 birds, 62 reptiles, 28 amphibians and 124 fish. In addition, 459 tree species have been recorded in PTSSS' conservation areas. The total number of species is expected to increase significantly in the future when more surveys are completed, and rehabilitation areas mature.



Vertebrate and plant species that have been recorded in PT SSS' conservation areas.



Cumulative number of vertebrates recorded in PT SSS' conservation areas.



Silvered leaf monkey (Trachypithecus cristatus) and Orangutan identified by thermal camera fitted to a drone in Kumai Estate, PT. Surya Sawit Sejati.

The World's First Orangutan Survey Using Drone Fitted With Thermal Camera

The BioD team have already recorded baseline data regarding the distribution of orangutan. This has been undertaken through nest counts, camera trapping, and interviews of local residents. The past four years, the BioD team has also explored the opportunity of conducting orangutan survey using drone fitted with thermal camera.

The survey was carried out in Kumai Estate from January 29th to February 10th 2023. The survey was first of its kind and a representative of TNI Air Force Sutan Iskandar military airport, Pangkalan Bun, the Head of BKSDA Kalimantan Tengah and Head Section II of BKSDA participated in the survey to learn about new technology and, potentially, a more cost effective survey method. The survey was conducted in the evening when the orangutans are usually in nests. The BioD team successfully identified five orangutan including female, baby and juvenile, and adult male. In addition, the BioD team gained new insights into orangutan behaviour at night, and the method will be applied in all future orangutan population surveys and monitoring, in addition to line transects and camera trapping. The survey also detected other protected species such as long tailed macaque, langur, and southern pig tailed macaque.

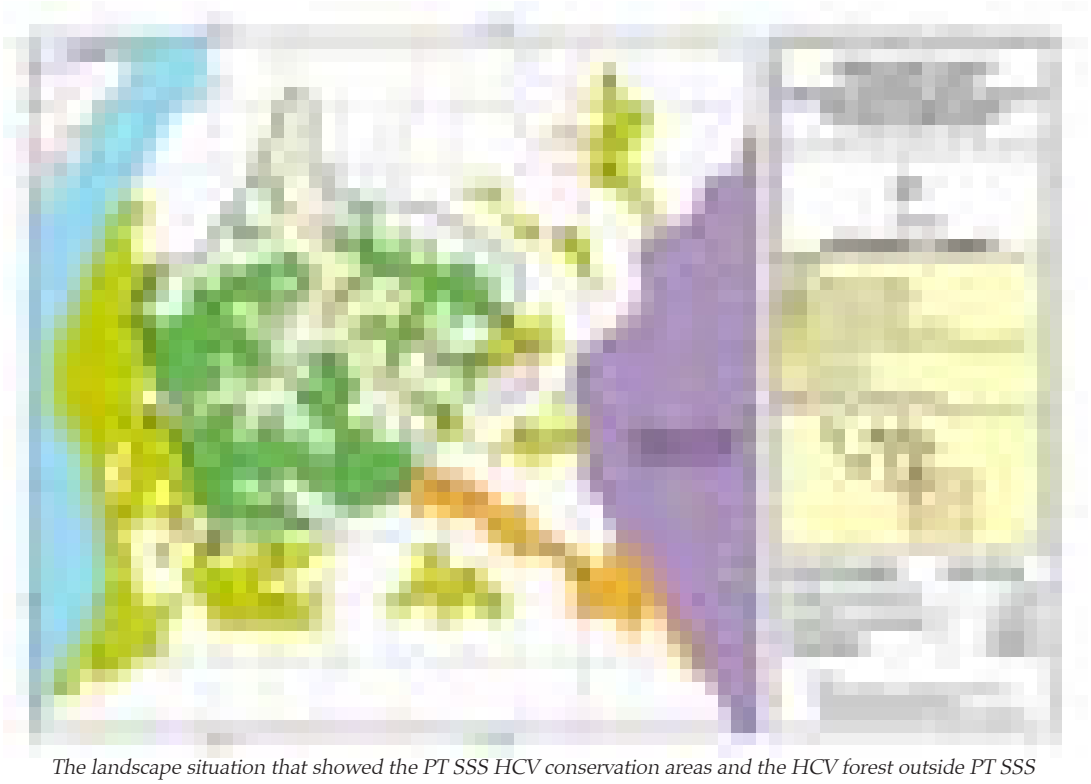
The second drone survey was conducted from 6th to 12th November 2023, also in Kumai Estate. During the five-nights survey a total of 49 photos of orangutan were recorded that represented at least ten individual orangutans. This included four females and three babies

This survey proved very useful and enabled the BioD team to survey the entire Kumai Estate in one night. The spotting and identification of individual orangutans in their nests, as well as other protected species opens- up opportunities for a number of exciting future conservation activities. The survey also demonstrates that orangutans can live in relatively small forest patches in a landscape dominated by oil palms. The BioD team will strive towards enriching PT SSS' forest patches with additional food plants, and continue to collaborate with and advise the government to develop new policies and plans regarding orangutan conservation in fragmented landscapes dominated by oil palm and other plantations.

In addition, the BioD will work towards preserving a forest corridor that connects Kumai Estate with Tanjung Puting National Park, the largest orangutan park in the world, to allow a natural geneflow between PT SSS' conservation landscape and the national park.

Wildlife Survey In The Forest Corridor Between Tanjung Puting National Park And Kumai Estate

The forest habitat connecting PT SSS' conservation areas with Tanjung Puting National Park (TPNP) forms the last existing ecological corridor preventing these two landscapes from being isolated from each other. Once this connection is severed, non-volant wildlife populations will be genetically isolated from each other, and become increasingly vulnerable to inbreeding depression. Therefore, it is critical that this forest tract be protected to allow for natural dispersal of genes across both TPNP and PT SSS. In a joint effort, the BioD team and BKSDA Central Kalimantan undertook a camera trap survey of the forest corridor which produced 398 pictures of animals belonging to 22 species. These include Sunda pangolin (*Manis javanica*), Orangutan (*Pongo pygmaeus*), Bornean sun bear (*Helarctos malayanus*), Pigtail macaque (*Macaca nemestrina*), Bornean Bearded Pig (*Sus barbatus*) and Bornean crestless fireback (*Lophura pyronota*). The survey revealed that this is indeed an important remaining forest that the company could try to protect permanently.



The landscape situation that showed the PT SSS HCV conservation areas and the HCV forest outside PT SSS concession that functions as a forest corridor.

Wildlife Species Recorded In The Forest Patches Surrounding Kumai Estate, PT Surya Sawit Sejati

Common name	Scientific name	IUCN status	PP 106/2018	Independent photo	Relative abundance (%)
Lesser mouse-deer	*Tragulus kanchil*	LC	V	112	28.14
Orangutan	*Pongo pygmaeus*	CR	V	53	13.32
Southern pig-tailed macaque	*Macaca nemestrina*	EN		52	13.07
Bearded pig	*Sus barbatus*	VU		38	9.55
Plantain squirrel	*Callosciurus notatus*	LC		36	9.05
Long-footed treeshrew	*Tupaia longipes*	LC		32	8.04
The three-striped ground squirrel	*Lariscus insignis*	LC		18	4.52
Sun bear	*Helarctos malayanus*	VU	V	14	3.52
Long-tailed Macaque	*Macaca fascicularis*	EN		8	2.01
Bornean Crestless Fireback	*Lophura pyronota*	EN		8	2.01
Sambar deer	*Rusa unicolor*	VU	V	6	1.51
Sunda scops owl	*Otus lempiji*	LC		3	0.75
Leopard cat	*Prionailurus bengalensis*	LC	V	3	0.75
Monitor lizard	*Varanus salvator*	LC		3	0.75
Malayan civet	*Viverra tangalunga*	LC		3	0.75
Sunda pangolin	*Manis javanica*	CR	V	2	0.50
Large treeshrew	*Tupaia tana*	LC		2	0.50
Short-toed coucal	*Centropus rectunguis*	LC	V	1	0.25
Common emerald dove	*Chalcophaps indica*	LC		1	0.25
Maroon leaf monkey	*Presbytis rubicunda*	VU	V	1	0.25
Crested serpent eagle	*Spilornis cheela*	LC		1	0.25
Silvered leaf monkey	*Trachypithecus cristatus*	VU	V	1	0.25

EN= Endangered, CR = Critically endangered, LC = Least concern, VU= Vulnerable, NT= Near threatened, DD= Data deficient

Whereas PTSSS has begun to encourage the government in protecting this remaining corridor, it remains a difficult challenge to obtain the necessary permits to assume management and conservation rights of the area. The forest corridor is located outside the PT SSS concession with a legal status of HPK and APL, which needs to go through a tedious process to convert into protection status. In 2023, the BioD team continued to encourage the BKSDA Central Kalimantan to raise attention at the Head of and find a strategic way to conserve the forest corridor. On the 8th September 2023 the Head of BKSDA Central Kalimantan issued a letter No: S568/K.15/TU/KSA/09/2023 requesting BKSDA Central Kalimantan to support the protection of the corridor. The letter also recommended to all stakeholders to join in the

Photos from a tree climbing course in Sukau, Sabah, Malaysia.

Setup of camera trap in the field.

effort to protect the remaining forest fragments and refrain from activities like mining and palm oil plantation that can destroy the forest.

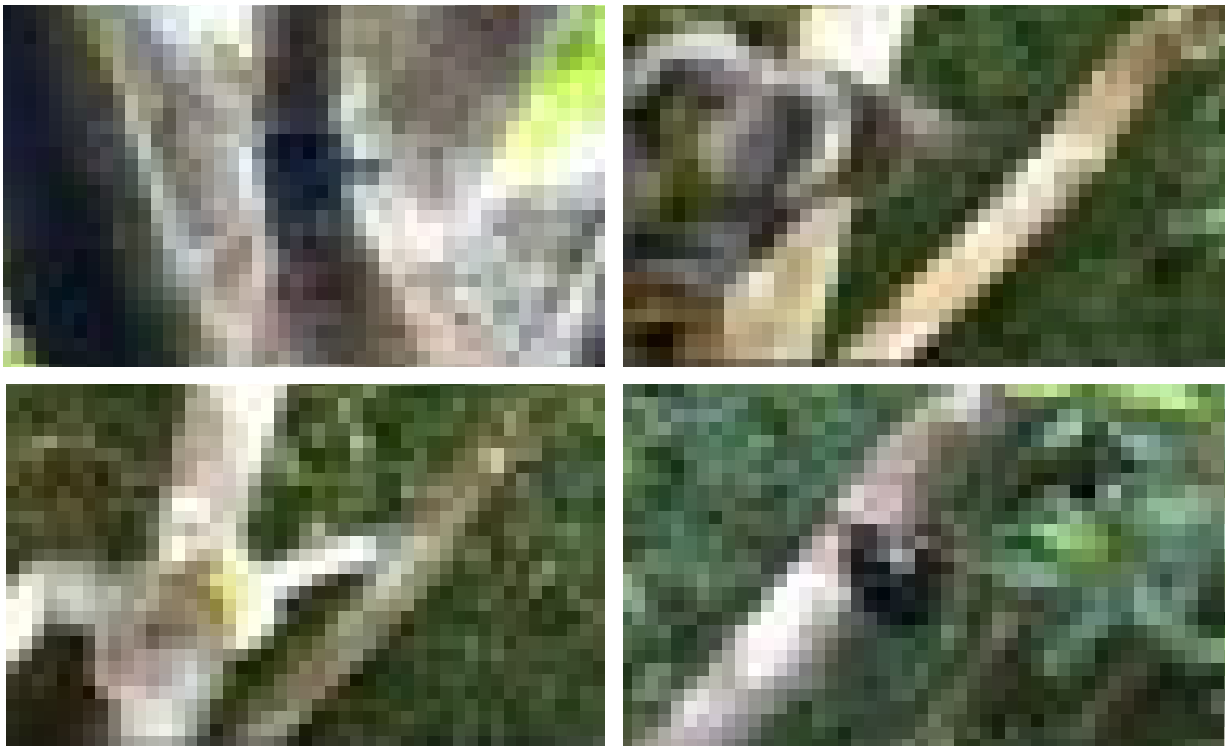
The letter from BKSDA is of critical importance to PTSSS, because the BioD team will effectively have the government support to do more work on the ground to ensure the forest corridor can be protected. In the process, PTSSS will scale up communication with the community who own the land in the forest corridor and try to convince them to maintain the land intact for biodiversity. The work will also require intensive communication and coordination with the government to pursue a long-term legal solution to the land status.

Tree Climbing Course In Sukau, Sabah, Malaysia

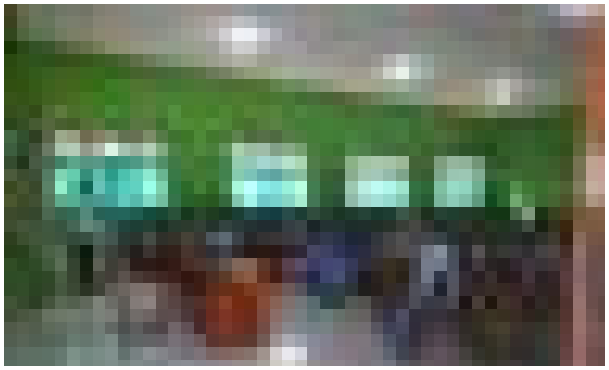
To increase team capacity to safely conducting biodiversity surveys in canopies, four staff from the BioD team, Mr. Silmi, Mr. Mahfud, Mr Suryadi and Mr. Luthfi participated in a tree climbing course in Sukau, Sabah Malaysia, from 15th to 18th February 2023. The training was led by the experienced, Mr. Jamiluddin Jami from Borneo Tree Climbing Academy (BTCA). All four BioD team members successfully passed the training and examination for both level 1 and level 2 and were presented with tree climbing certificate, authorised by an accredited trainer from BTCA. In the future, using this training, the BioD team will begin to explore the secrets of biodiversity and wildlife ecology of arboreal species. The knowledge of understanding canopy biodiversity is critical for developing effective conservation management strategies.

Camera Trap Survey Of Wildlife In The Forest Canopy

Immediately after becoming certified tree-climbers, the BioD team setup several camera traps in the tree canopy in Pulai Cempedak, Lada Estate, to test the equipment and their newly acquired skills, as well as to prepare for a more extensive systematic canopy survey in Kumai Estate in 2024. The results turned out some positive surprises, including photos of orangutan feeding on wild Borneo mangoes. These photos of orangutans are also the first ever captured in Lada Estate using camera traps, despite the on-the-ground camara trap surveys which have been undertaken since 2014. In contrast to Runtu, Umpang and Kumai estates where the team has obtained many photos of orangutan, the species have remained elusive until this latest canopy survey.



A selection of photos captured from camera traps deployed in the canopy at Pulau Cempedak, Lada Estate.



The BioD team and teachers from junior high school conducted a joint education programme to encourage "Gen Z" students to care more about environment and conservation.

Apart from the positive survey outcome, the team was also satisfied that the capacity to climb large trees and deploy camera traps in the canopy has already revealed promising and interesting information.

Conservation Communication With "Gen Z"

Apart from research and protecting conservation areas from illegal intruders and activities, it is important to share the common goals for conservation with the community surrounding the area.

The BioD team deliberately focused on "Generation Z" or colloquially known as Zoomers, because they constitute a new generation that will safeguard the environment and biodiversity in the near future.

It is critical that this generation understands the purpose of conservation and how proper management of biodiversity and ecological processes is critical to their own present and future livelihoods.

For the Gen Z programme, the BioD team collaborated with the Junior High School in SMP Negeri 2 Pangkalan Lada. Joint meetings with the school principal resulted in a conservation syllabus covering several topics critical to future practices:

- Environment and wildlife conservation
- Borneo jungle seed propagation and nursery
- Habitat rehabilitation and restoration,
- Impact of rehabilitation on biodiversity
- Wildlife survey and monitoring

In this important programme staff from PT SSS BioD team served as teachers or mentors for the students during the period from September-November 2023. This programme included both indoor and outdoor sessions, where a site visit to PT SSS conservation areas was used to demonstrate critical processes such as rehabilitation and wildlife monitoring. This programme was successful and may be replicated for new students in the future.

Smart Patrolling

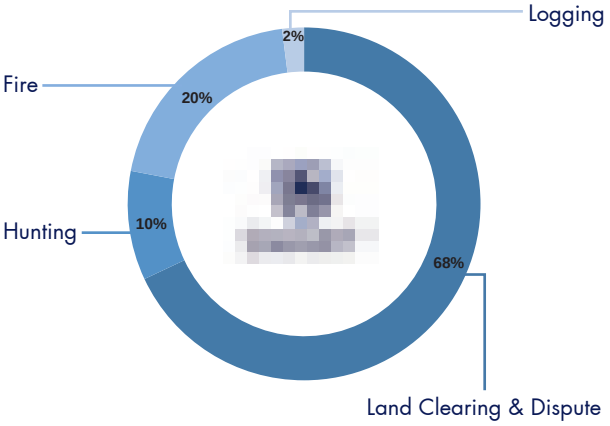
Protecting conservation areas is one of the BioD's core activities. The aim is to prevent possible negative impact from illegal activities such as logging, hunting, fire, over fishing and land clearing. BioD continues to use the SMART system to store all records in a digital format that is also integrated with the team's GIS-database. This means that monitoring activities and evaluating the effect of them is easy to access to improve quality of patrols. In 2023, the El Nino effect impacted most of the region. This caused extended dry seasons at PT SSS areas, and increasing wildfire risk. A total of eight fires were recorded in PT SSS in 2023, and some affected conservation areas.

All fires recorded started outside PT SSS concessions before it reached PT SSS. The BioD, estate and fire patrol teams worked together for extended hours, often into the night, to contain the fires. A combination of observation from estate towers and aerial observations by drone provided an effective combination as early warning to detect fires.

This teamwork resulted in controlling all fire outbreaks in PT SSS to the extent that none of the outbreaks caused significant negative impact to the PT SSS concessions.

SMART Patrol Report

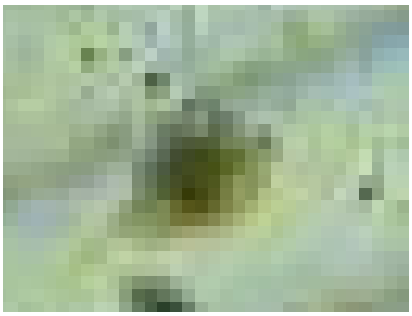
(THREAT HCV REPORT 2023)



Threat	Activities
Logging	1
Land Clearing	35
Hunting	4
Fire	8
Fishing	0
Others	0
	n=48

Diatoma sp

Frustulia rhomboides



Lecane papuana

Plankton forms an important part of the food web in river ecosystems. The three species illustrated above are collected from a stream in Kumai Estate.

Water Quality Monitoring And The Plankton Diversity

Water is the most important natural resource on Earth that all known living organisms are dependent on. Therefore, the BioD Team affords water the highest priority and focuses on protecting watersheds and maintaining good water quality to support aquatic life as well as provide clean water to communities.

The BioD Team has continuously monitored the water quality in PT SSS' property to ensure actual water conditions in the water bodies across the estates remain as pristine as possible.

For this, the BioD Team focuses on aquatic micro organisms as indicators of water quality. Aquatic invertebrate samples are collected from streams and ponds located in the planted and conservation areas in Lada, Runtu, and Kumai estates. Sampling sites are fixed points and to date the BioD Team has recorded 104 Phytoplankton and 35 Zooplankton species.

Based on the plankton diversity from sampling in Kumai, Lada and Runtu estates the water condition in the rivers in and surrounding the estates fall into the "medium condition" category.

This means that the water is slightly polluted but showing signs of improving. The rehabilitation of riparian forest along the streams in PTSSS is showing positive effects by minimising organic and inorganic pollution washout in all three estates.

Bird Diversity In A Rehabilitation Area

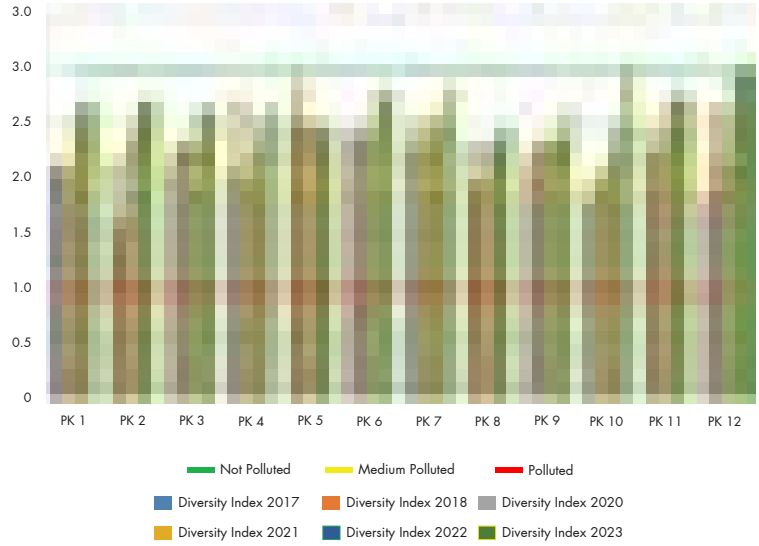
Rehabilitation activities in Lada Estate has been ongoing since 2011. The first phase of habitat rehabilitation was to plant as many native trees in degraded areas as possible to recreate a natural canopy cover. The BioD Team assumed that a good tree diversity with extensive canopy cover will attract many wildlife species, since it provides shelter and foraging areas, particularly for understory birds and microbats.

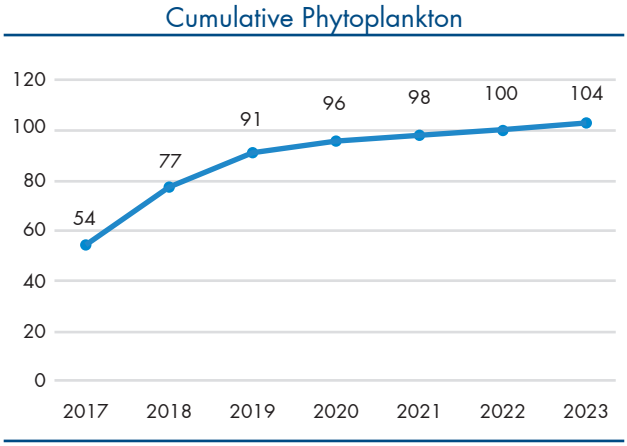
To date, approximately 300 ha have undergone rehabilitation activities during which the BioD Team has planted ±192.110 native tree seedlings from 130 different tree species. Despite difficult conditions, an estimated 65% seedlings have survived and grow well today.

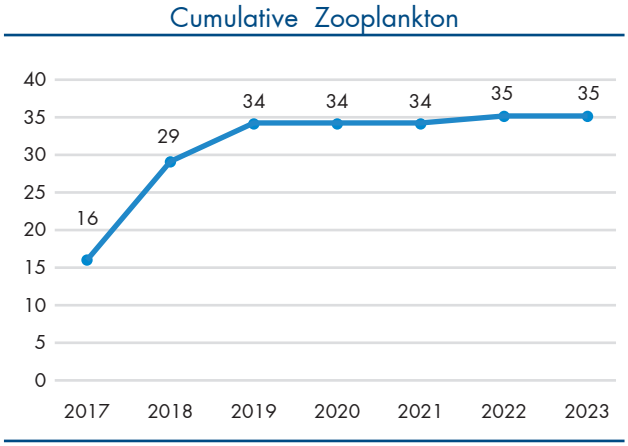
Concurrently with planting new trees, the BioD Team monitors biodiversity in the rehabilitation areas, and Lada Field 86, Div 2 is mainly used as a large experimental site. The understory bird diversity is a good indicator of habitat condition that also reflects the condition of the forest canopy. They prefer habitat with dense canopy cover and are often cryptic in nature and difficult to see, even when using binoculars. Therefore, mist-netting

Diversity Index in Kumai Estate

Plankton diversity index used to evaluate the quality of water bodies.

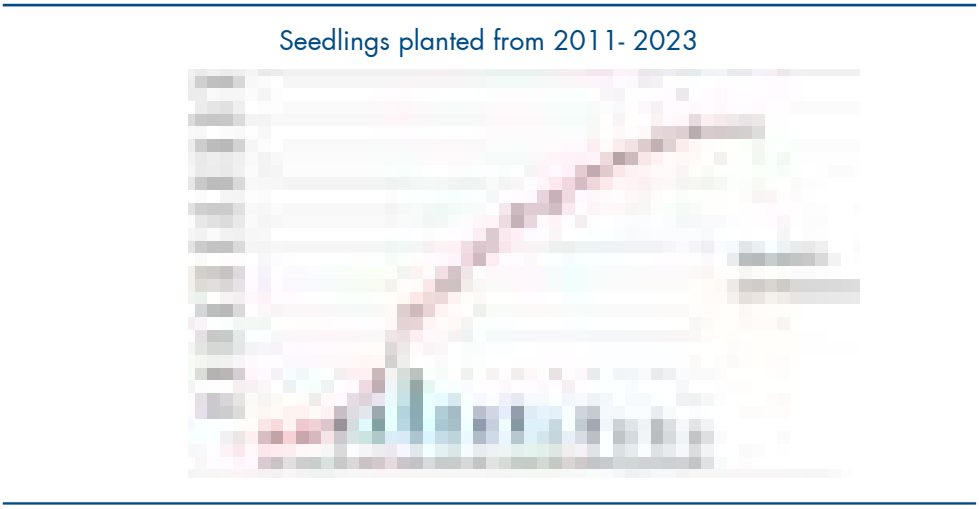




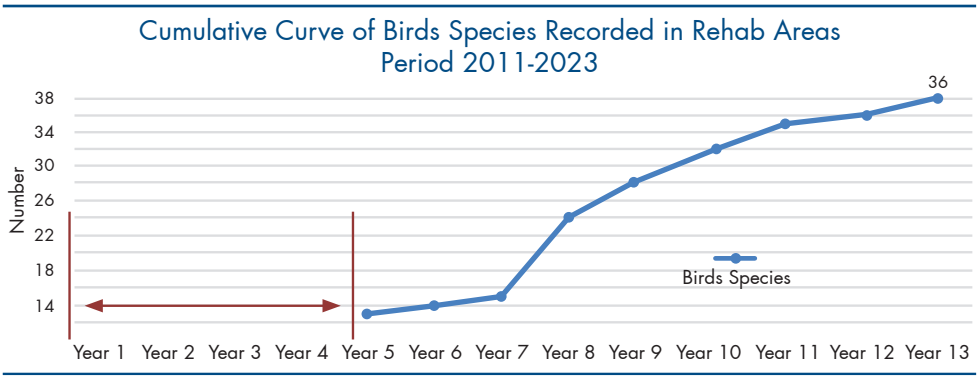


Base line data of plankton diversity in stream/river in Kumai, Lada and Runtu estate concession.

were used to capture birds in the area, in addition to direct observation. The bird monitoring began 4 years into the rehabilitation process, when the first planting activities were initiated. Subsequent monitoring reveals an increasing number of bird species throughout the years. From merely 13 species in 2015, the BioD Team recorded 38 bird species in 2023. This is another testament to a successful rehabilitation process. It is expected that the bird diversity will continue to increase in tune with the increasing canopy height of Field 86. The next big milestone is when endangered and critically endangered birds begin to return to the area in the future.



The number of tree seedlings planted in UP/PTSSS' rehabilitation areas between 2011 and 2023.



The number of bird species has increased every year in Field 86 after rehabilitation. This is clear evidence that the rehabilitation process is having positive effect.

An impressive False Gharial basking on a mud bank in Arut River, Central Kalimantan.

False Gharial Survey in Arut River

False Gharial, Tomistoma schlegelii, is a freshwater, mound nesting crocodilian with a distinctively long, narrow snout. This reptile native to Indonesia, Brunei, and Malaysia.

The false gharial is threatened with extinction throughout most of its range due to habitat loss arising from human activities like drainage of freshwater swamplands and clearance of surrounding rainforests or riparian zones. The species is also hunted for its skin and meat, and the eggs are often harvested for human consumption.

IUCN currently lists the False Gharial as Endangered (EN) on the IUCN Red List, because of the continued population decline across its range.

Therefore BioD, PTSSS has taken the initiative to undertake a comprehensive population survey of the species in the Arut River that forms the western boundary of PT SSS conservation areas in Runtu and Umpang estates, as well as in the swampy lakes that form part of the estates.

BioD have established permanent transect lines along a 32 km stretch of the Arut River that forms the boundary of PT SSS' conservation area.

Surveys are conducted at night using torches to spot for crocodile eyeshine in the water. The crocodiles' eyes reflect light that hits their eyes, making it relatively easy to identify them for a trained observer. Surveys were undertaken every fifteen days from a wooden boat.

To limit noise as a possible deterrent, the BioD team float or paddle gentle downriver while spotting for crocodiles.

The surveys conducted from August to December 2023 revealed promising results with a total of 42 records of crocodile eyeshine and 11 records of direct sighting --- that is, when a team member could see parts or the full body of a False Gharial.

The information gathered from the 2023 survey will form part of our annual monitoring and future ecological research about the False Gharial.

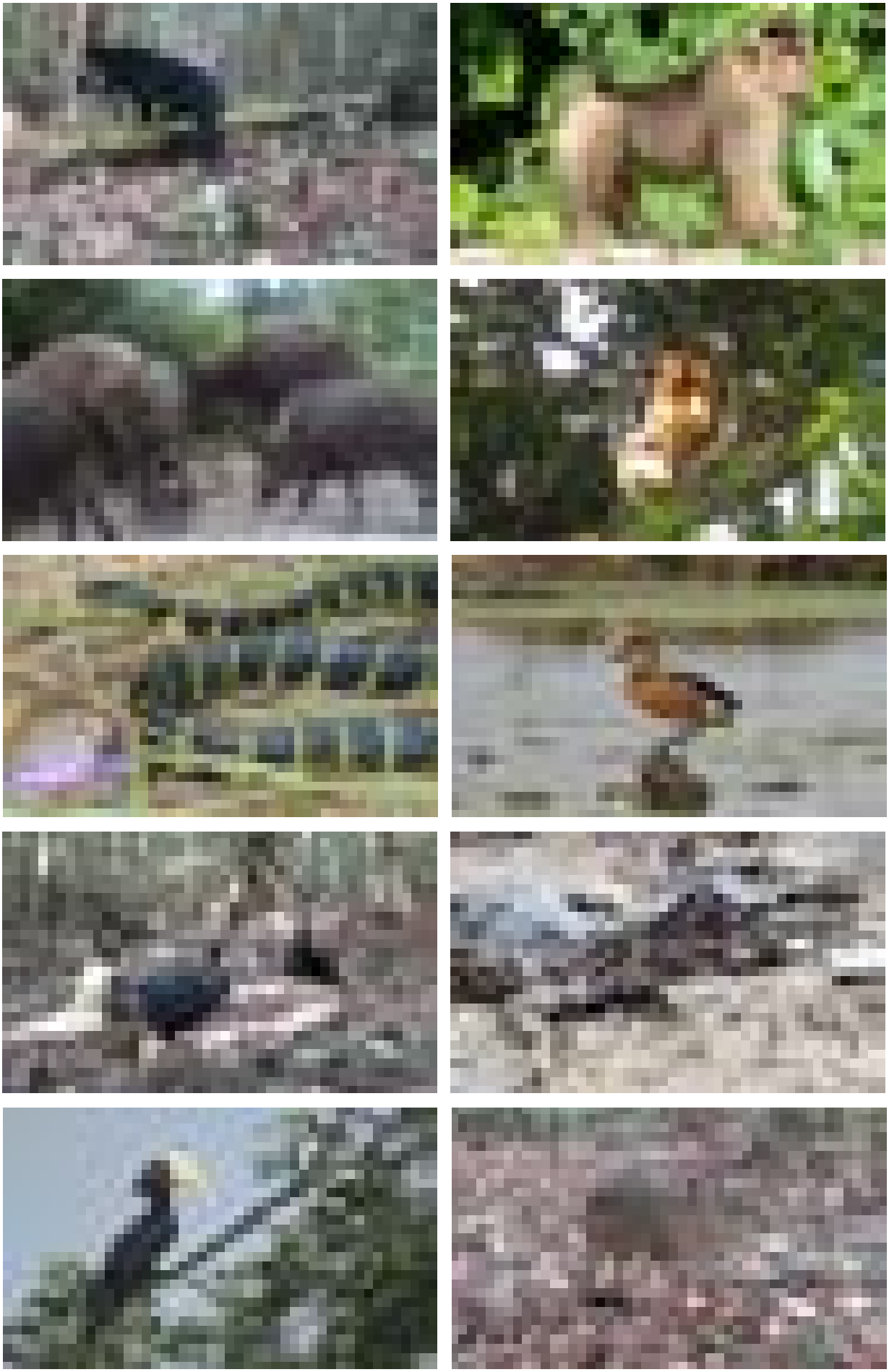
Furthermore, it will eventually form a critical part to the development of a conservation management plan together with BKSDA Kalimantan Tengah.

The BioD Team aims for greater success in the survey, hoping to provide further insights into the crocodile population on the Arut River.

Dr. Carl Traeholt
UP Group Chief Environmental Advisor

and

Mr. Muhd Silmi
Manager Biodiversity Division



Various types of wildlife photographed by our BioD Department.

UIE's Kingham-Cooper tree reserve is a flagship reserve holding more than 250 species and 12,500 indigenous trees, today stands as a natural sanctuary for birds and other wildlife as well as provides a seed garden for future plantings.

Kingham-Cooper Lagoon Tree Reserve

Since 2008 UIE Estate has become an indigenous tree seed-garden pioneer which holds one of Malaysia's finest diverse collections of native jungle tree species.

The Kingham-Cooper Lagoon Tree Reserve was established in 2008 and is the flagship reserve holding over 250 species and 12,500 indigenous trees becoming the main gene bank (mother trees) for seed collection, propagation and distribution of saplings to other estates within our group.

This evolving sanctuary which surrounds the lagoon is stocked with varieties of fish, attracting fish eagles, Malayan Otter, Monitor Lizards, King Fishers, bee-eaters as well as a wide variety of smaller mammals. It has also become colonized by species of monkey namely the short and long tailed Macaques, and the spectacled leaf monkey. Our successful establishment of the various reserves, which are our precious gene bank of mother trees, have enabled us to collect a wide variety of seeds for further propagation at our UIE tree nursery.

During 2023 a total of 1,235 trees across 33 diverse family species were delivered from UIE for plantings by Sri Pelangi Estate, Alpha Bernam, and Jendarata Engineering Department which will add a wider biodiversity for landscaping. We are indebted to the memory of the late James Kingham (Malaysia's Tree Guru) for the generous contributions and encouragement in assisting the Group establish a legacy for future generations.

The Sungei Anak Macang Riparian Reserve

This 5.85-kilometre strip of land along the narrow boundary river covering an area of 11 hectares. It was planted up in 2020 and has been established with a wide variety of rare and endangered jungle trees sourced from the Kingham-Cooper Lagoon Tree Reserve.

The Iversen-Jeremy Diamond Jungle Reserve

With the acquisition of Lima Blas Estate from Socfin in 2004, UP also inherited a beautiful jungle reserve of almost 100 hectares, which has since been enriched with native jungle tree seedlings from the Kingham-Cooper Tree Reserve.

The estate's first manager during the establishment in 1928, Mr. Werner M. Iversen, played an instrumental role in safeguarding the jungle sanctuary and was known for setting new standards for social responsibility within the industry. Atypical of that time, he described effective management as working together under conditions of mutual trust and respect with the local workforce.

Many years later, the baton of preserving the jungle reserve was eventually passed on to Dato' Jeremy Derek Campbell Diamond, who retired from the UP Board of Directors in April 2023, after 22 years of loyal and dedicated service.

During his tenure as the Executive General Manager of Socfin, where he worked for 38 years prior to joining the UP Board, he also played a pivotal role in preserving the pristine jungle reserve, thereby allowing the natural habitat to thrive undisturbed. As he put it: "*Over the more than 20 years I visited Lima Blas with Comte de Ribes (Chairman of Socfin), I was asked each year if the jungle could be planted with oil palms. I always responded that the terrain was too steep and rocky. Gladly, this was always accepted*".

More than 90 years after the establishment of UP's first jungle sanctuary, the Grut Sanctuary, in 1930, the renaming of the Lima Blas Jungle Reserve to the Iversen-Jeremy Diamond Jungle Reserve serves as a lasting tribute to their conservation efforts, in line with UP's commitment to social and environmental care.

A majestic jungle tree, Kelumpang (Sterculia macrophylla), at the Kingham-Cooper tree reserve, UIE.

Carbon Footprint Initiatives and Climate Action

In UP, we respect and recognise the importance of global initiatives to protect fragile ecosystems and combat climate change. Since 2005, UP has actively been pursuing means of identifying ways to reduce its Greenhouse Gas (GHG) emissions and with that its reliance on fossil fuels. At a global level, however, much more attention must be directed towards the adverse impacts of fossil fuel usage and minimising this as about 70% of all CO_2 (-eq) emissions continue to come from the burning of fossil fuels.

Palm oil, on the other hand, accounts for about 0.6% of the global CO_2 (-eq) emissions, which is much less than for instance the production of milk, pigs, and poultry, and about 22 times less than the livestock sector overall. Positive change can be made through individual accountability and collective action, and it is therefore important that we focus on a balanced approach where we all have to help minimise the impact of deforestation and greenhouse gas emissions. There must be a commensurate effort in reaching this goal and therefore things should be put in perspective and acknowledgement given to the fact that palm oil production is not a main driver of the global GHG emissions. In this connection, ongoing initiatives must be intensified to minimise the impact of not just agriculture but all activities that in one way or the other contribute to deforestation and global warming.

Life Cycle Assessment (LCA)

In 2006, following the completion of the world's first peer reviewed Life Cycle Assessment (LCA) study on the "cradle to grave" production of 1 MT of refined palm oil, various areas were identified within our production chain, which could mitigate GHG emissions. Following that, UP finalised the world's first comprehensive LCA in accordance with ISO 14040 and 14044 International Standards on palm oil in 2008, which subsequently underwent a critical panel review.

Since then, annual updates to this LCA have been carried out by 2.0-LCA Consultants led by Professor Jannick Schmidt from Aalborg, Denmark including the latest update undertaken for year 2023. The updated 2023 LCA model is based on the new EXIOBASE background database and the contributions from indirect land use change, peat emissions and nature conservation have been reviewed in light of new the new data. These studies have indeed helped to identify additional areas in need of further improvement within our Group. It should be noted that the GHG emissions per kg palm oil calculated in this study cannot be compared with the results obtained with the GHG accounting tool PalmGHG, due to key methodological differences between the two models.

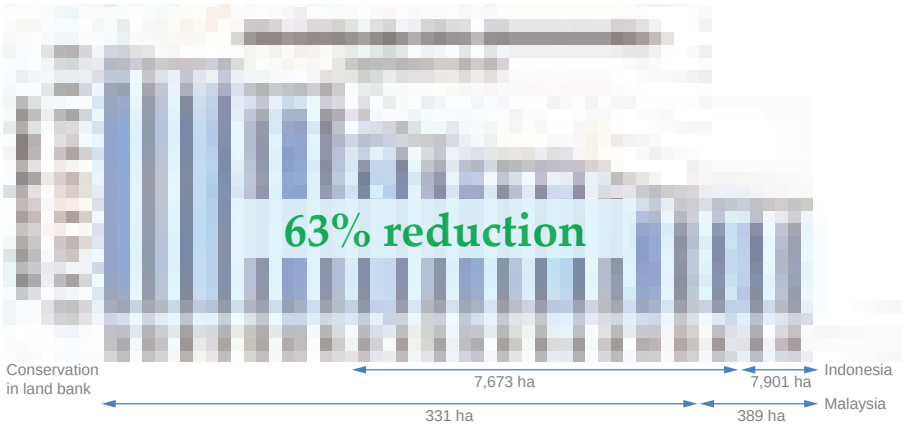
This effectively means that GHG emissions calculated in the LCA study are systematically higher compared to a similar calculation using the PalmGHG calculator, which adopts a different approach to deal with land use changes, nature conservation and the modelling of by-products. The PalmGHG calculator also ignores the emissions from the production of pesticides, and results are presented per kg crude oil, whereas the LCA results are presented per kg refined palm oil, and include scope 3 emissions.

Significant reduction in UP's GHG emissions since 2004

Looking at the below time series of GHG emissions from palm oil at UP, it is most pleasing that we have again managed to reduce our footprint from 1.44 kg CO_2-eq emissions per kg. NBD oil in 2022 to 1.36 kg CO_2-eq emissions per kg NBD oil in 2023 including indirect land use change (iLUC) and nature conservation. This is equivalent to a reduction of 6%, which can mainly be attributed our investments in green technology. Moreover, this represents a substantial reduction in our GHG emissions of 63% vis-à-vis 2004, galvanising the fact that UP's palm oil has a significantly lower carbon footprint when compared to average RSPO certified palm oil as well as Rapeseed and Sunflower oil produced in Europe as seen in the graph on the next page.

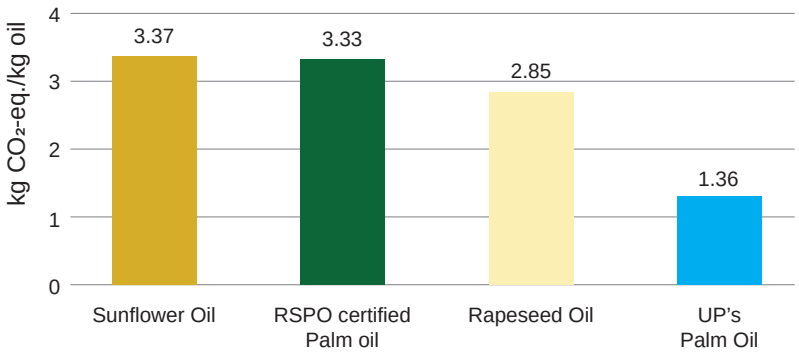
2030 Target

In 2021, we achieved our internal goal of reaching a 60% GHG emissions reduction per MT of refined palm oil produced by 2025 when compared to 2004 levels (with iLUC and nature conservation), four years ahead of time. However, in line with our Group's commitment to environmental leadership, we acknowledge that even more can be done and we therefore set a new target of reaching a 66% reduction by 2030 when compared to 2004 levels (with iLUC and nature conservation). We shall relentlessly pursue to reach and exceed this through more initiatives and further investments over the next 7 years.



Time-series for NBD palm oil at United Plantations Berhad 2004-2023. Results include contributions from iLUC and off-setting from nature conservation.

Comparison of Palm Oil Produced in United Plantations Against Average RSPO Certified Palm Oil and Other Oils



The 2023 GHG emissions from UP's palm oil production have been compared with industry averages of RSPO certified palm oil (Malaysia/ Indonesia), rapeseed oil (Europe) and sunflower oil (Ukraine). The industry averages are based on Schmidt and De Rosa (2020) and Schmidt (2015).

Emissions Reductions & Biogas Plants

As a necessary element in our pursuit to combat climate change, significant investments have been made in promoting green energy starting with the Biomass Reciprocating Boiler cum Power Plant and the first Biogas Plants built and commissioned in 2006. These projects combined have since helped to significantly reduce our emissions of CO_2 by 70% and CH_4 by 80% at the respective operating units thereby paving the way for additional green investments.

For more information on our LCA assessment, please refer to our website, *www.unitedplantations.com/sustainability/.*

Biogas to Grid

Today, all of our mills are equipped with biogas plants, and the biogas generated from the palm oil mill effluent is mainly used in our own operations as is or after being converted to electricity. If this is not possible, which is the case at our UIE mill, it is sold as electricity to the grid or used as a substitute fuel in the mill boiler. In 2023, a total of 7,585 MWh of green electricity was generated from the UIE biogas plant and sold to the grid, which represents an increase of 14% compared to 2022.

Photovoltaic Cell Pilot Project

A pilot project was initiated in 2020 to evaluate the feasibility of photovoltaic cells to produce green electricity from sunlight to offset electricity consumption from the grid. Located on the roof of the Tissue Culture Laboratory, these cells generate about 525 kW/ day for the Tissue Culture Laboratory, with the unutilised electricity channelled to other laboratories in the Research Department. A total of 201MWh of renewable electricity was generated from these cells in 2023. In May 2023 additional photovoltaic cells were installed at the Tractor Pool which generated a further 189MWh of electricity over an eight month period.

In addition, a larger photovoltaic project was commissioned at the Unitata Refinery in May 2022, which generated 760 MWh of electricity throughout 2023. For the UP group a total of 1,150 MWh of renewable electricity was generated during the year.

Biomass Reciprocating Boilers

The first Biomass Reciprocating Boiler (BRB1) was successfully commissioned in 2006 to supply green steam to Jendarata Palm Oil Mill as well as the Unitata Refinery, thus playing a crucial role in reducing our fossil fuel consumption. Since then, the Company has built and commissioned another 7 biomass reciprocating boilers with the latest unit at UIE (M) installed in 2019.

Isokinetic Monitoring of Gaseous Emissions from the Palm Oil Mills

In conformance to the Department of Environment's stipulations as well as to monitor the quality of our gaseous emissions, flue gas compositions were regularly checked by certified assessors throughout 2023. In all Malaysian mills the average dust concentrations were below the limit of 0.15g/Nm^3 set by the Department of Environment as per the Environment Quality Act (Clean Air Regulations) 2014 and the Lada mill emissions is well within the 0.3g/Nm^3 set by the Peraturan Menteri Negara Lingkungan Hidup No 07 Tahun 2007 in Indonesia.

VORSEP Dust Collector System

The VORSEP dust collector system was first installed on our Biomass Reciprocating boiler at Ulu Basir Palm Oil Mill replacing the old conventional multi-cyclone dust collector system. The unit was commissioned in June 2015 followed by progressive installation of additional units in the rest of the mills. With the commissioning of the VORSEP system at UIE(M) mill in 2019 all of UP's palm oil mills are now fitted

Palm Oil Mill		Average Dust Concentration (g/Nm^3)
Jendarata	- BRB 1 & 2	0.117
Ulu Bernam	- Boiler 1	0.126
Ulu Basir	- Boiler 3	0.136
UIE	- Boiler 3 & 4	0.113
Lada	- Boiler 1 & 2	0.008

with the VORSEP dust collector system. These units were installed primarily to meet the DOE's Environmental Quality Act (Clean Air Regulation) 2014 which among others requires a cleaner emission standard from the boiler with the following conditions: -

i) The dust concentration emitted from the stack should not be more than 0.150g/Nm^3

ii) The smoke should not exceed shade No. 1 on the Ringlemann chart and should be less than 20% opacity

Palm Oil Mill Effluent (POME) and Palm Oil Refinery Effluent (PORE) Treatment

Palm oil mill effluent and palm oil refinery effluent are treated to reduce their BOD and COD contents before they are discharged or may be used to irrigate the oil palm fields.

The quality of effluent is monitored monthly as shown below and reported to the respective Government authorities. With the implementation of Biogas plant and other initiatives to reduce the BOD and COD of the effluent, we aim to reduce the BOD and COD by 10% from the respective average of 550 and 2200 mg/L in 2021, by 2025.

		Malaysian Operations			Indonesian Operations		
		2023	2022	2021	2023	2022	2021
Parameters (mg/L)	BOD	301	466	594	883	453	478
	COD	1513	2121	2615	2896	2068	2025

In addition, we are commissioning a polishing plant to treat POME from the Optimill with the objective of reaching a BOD of <25ppm.

Biomass utilisation and economic value

In 2023, a total of 789,113 MT of biomass residues were generated through UP's various field and mill operations in Malaysia.

Almost all of the total biomass generated (99.6%) or 785,934 MT were utilised as organic mulch in the nurseries and fields or as fuel source, thereby enriching our soils and displacing the use of fossil fuels whilst enhancing the value the biomass generated.

Our Indonesian operations generated a total of 154,735 MT of biomass dry matter in 2023. Here too, a very high proportion of the biomass (154,253 MT or 99.7%) was utilised through recycling in the fields or as a green energy source.

Biomass utilisation is an important part of our nutrient recycling programme and in line with our Environment and Biodiversity Policy which demonstrates our commitments to minimize the chemical use, pesticides as well as fertilizers in our operations.

Similar commitments apply to our FFB suppliers whom we educate on Best Management Practices during our annual Smallholders' Field Day.

Production and Level of Utilisation of Oil Palm Biomass Residues in UP in 2023

Malaysian Operations (Dry Matter Basis)	Quantity Produced (MT)	Quantity Utilised (MT)	% Utilisation	Method of Utilisation
Trunks and fronds at replanting	123,493	123,493	100	Mulch
Pruned fronds	362,124	362,124	100	Mulch
Spent male flowers	34,820	34,820	100	Organic matter recycled on land
Fibre	78,233	78,233	100	Fuel & mulch in nursery
Shell	48,529	48,529	100	Fuel & mulch for polybag seedlings
POME	42,390	39,210	93	Biogas generation, nutrient source, field irrigation and base for organic fertiliser production
EFB	99,525	99,525	100	Mulch and Fuel
Total	789,114	785,934	-	-
		Level of utilisation = 99.6%		

Indonesian Operations (Dry Matter Basis)	Quantity Produced (MT)	Quantity Utilised (MT)	% Utilisation	Method of Utilisation
Trunks and fronds at replanting	-	-	-	-
Pruned fronds	85,556	85,556	100	Mulch
Spent male flowers	8,227	8,227	100	Organic matter recycled on land
Fibre	19,286	19,286	100	Fuel & mulch in nursery
Shell	11,868	11,868	100	Fuel & mulch for polybag seedlings
POME	6,432	5,950	93	Biogas generation, nutrient source, field irrigation
EFB	23,366	23,366	100	Mulch and Fuel
Total	154,735	154,253	-	-
		Level of utilisation = 99.7%		

Fertilizer Equivalent and Monetary Value of Oil Palm Biomass Residues Recycled on Land in UP in 2023

Malaysia Operations

Biomass Residues	Method of Utilisation	Quantity Utilised on Dry Basis (MT)	Fertiliser Equivalent (MT)			
			Urea	Rock Phosphate	Muriate of Potash	Kieserite
Trunks & fronds at replanting	mulch	123,493	1,544	519	1,986	947
Pruned fronds	mulch	362,124	8,164	2,656	6,905	4,520
Spent male flowers	organic matter	34,820	1,120	742	2,060	1,069
EFB	mulch	43,079	749	316	2,082	479
Digested POME	biogas generation & irrigation	39,210	1,364	863	2,144	1,568
Total (MT)		602,726	12,941	5,096	15,177	8,583
Monetary value (RM)			37,203,986	3,184,027	41,735,311	7,252,451
Total monetary value (RM)			89,375,775			

Indonesia Operations - Lada and Runtu estates

Biomass Residues	Method of Utilisation	Quantity Utilised on Dry Basis (MT)	Fertiliser Equivalent (MT)			
			Urea	Rock Phosphate	Muriate of Potash	Kieserite
Trunks & fronds at replanting	mulch	-	-	-	-	-
Pruned fronds	mulch	85,556	1,929	627	1,631	1,068
Spent male flowers	organic matter	8,227	265	175	487	253
EFB	mulch	21,515	374	158	1,040	239
Digested POME	biogas generation & irrigation	5,950	207	131	325	238
Total (MT)		121,248	2,775	1,091	3,483	1,798
Monetary value (RM)			7,263,749	880,452	10,280,489	1,595,202
Total monetary value (RM)			20,019,892			

With our commitment to sustainability and good agricultural practices, the recycling of field and mill biomass residues back to the oil palm land remains a cornerstone in UP's field practices. These measures have been shown to maintain and even improve soil fertility in the long term beside enhancing palm growth and yield.

In 2023, the total organic matter recycled on land in UP amounted to 602,726 MT of dry matter which is equivalent to 349,581 MT of carbon. This corresponds to an annual recycling rate of 17 MT organic matter or 10 MT of carbon to each hectare of land, thereby replenishing the soil carbon stock which is a vital component of soil health.

Upon mineralisation, the organic residues release substantial quantities of previously locked plant nutrients to the soil which is available for palm uptake. The fertiliser equivalent of the material recycled on land is of the order of 41,797 MT of NPKMg fertiliser which in itself has a monetary value of RM89.4 million based on the fertiliser prices in 2023.

For our Indonesian operations, a total of 121,248 MT of biomass was recycled back onto our plantation land. This is equivalent to enriching our soils with 70,324 MT of organic matter which on a hectare basis is akin to returning 15 MT organic matter or over 9 MT organic carbon to the land.

On the more sandy soils in Indonesia such inputs will improve long term soil health significantly as the soil carbon status built up over the years enriches soil fertility. The nutrient content in the recycled biomass is equivalent to 9,147 MT of inorganic NPKMg fertilisers, with a value equivalent to RM20.0 million at prevailing 2023 prices.

Triple rinsed plastic pesticide containers (MT)

	2023	2022	2021
Malaysia operations	16.4	14.5	12.9
Indonesia operations	4.0	3.2	1.0

Used batteries (pieces)

	2023	2022	2021
Malaysia operations	183	142	68
Indonesia operations	0	0	0

Spent lubricants (lit)

	2023	2022	2021
Malaysia operations	47,691	45,801	38,712
Indonesia operations	5,415	2,900	5,060

Spent fuel filters (pieces)

	2023	2022	2021
Malaysia operations	5,666	5,086	3,934
Indonesia operations	160	96	204

Waste Management

To avoid contaminating the environment and prevent misuse of pesticide containers and other scheduled wastes we have been collecting and disposing of triple rinsed pesticide containers, spent lubricants, used batteries and spent fuel filters through certified waste managers.

The waste managers will either safely recycle these items or dispose of them in accordance with government regulations.

There is no deemed hazardous waste under the terms of Basel Convention Annex I, II, III and VIII, that were transported, imported, exported or treated.

Climate Risk Assessment

In UP, we recognise the threat of climate change and its effect on the planet and livelihoods. Unpredictable and extreme weather patterns directly impact agriculture operations and are a risk to food production. This may have substantial financial or strategic impact on our business too.

We have therefore conducted an assessment in line with the guidelines by the Task Force on Climate-Related Financial Disclosures (TCFD) to identify risks, opportunities, and challenges across all our operations in Malaysia and Indonesia to build resilience for our business and mitigate climate change.

Climate related transition risks, opportunities, challenges and processes to mitigate the risks

Types of transition risks	Risks	Opportunities	Challenges	Processes/Measures to Mitigate the Risks
Current and emerging regulations • Adhering to existing and new rules and regulations on emissions or climate change mitigations.	Higher compliance costs (additional costs associated with carbon pricing, taxes imposed on fossil fuels, etc) Failure to comply with new regulations which restrict emissions or promote climate-change adaptation.	Low carbon footprint operations will significantly reduce the operational costs arising from increasing carbon prices and the dependence on non-renewable fuels.	Significant investments needed to meet new requirements.	• Reducing dust emissions at palm oil mills to levels far below DOE requirements. • New effluent treatment plants to treat waste- water down to the lowest possible industry levels. • New polishing plant to further reduce the BOD of mill effluent after biogas capture to levels below and beyond current requirements.
Technology • Innovative technologies to optimise production efficiency.	New processing methods and technology lead to different waste output and environmental impact. Increasing costs associated with conventional systems that are energy inefficient.	New innovative technology and circular economy solutions could bring about efficiency in energy usage and resilience in the use of natural resources.	High costs associated with the advancement of new technologies to reduce carbon footprints. Availability of new proven technologies to continuously reduce carbon footprints.	• Investments in new steam- and biogas turbines, and solar panels to drastically reduce our consumption of fossil fuels. • Actuator valves to preserve energy throughout our refineries
Market • Increasing consumer awareness on climate change and expectations to manage climate-related impacts.	Failure to comply with increasing customer expectations and requirements insofar as low carbon products are concerned.	A lower footprint could give access to markets and customers with strict carbon emissions regulations and requirements.	Reduced pool of compliant suppliers. Reduced demand for commodities that fail to meet market expectations.	• Measuring our GHG footprint for refined palm oil incl. scope 3 emissions yearly, which in turn help our customers calculate their own scope 3 supply chain emissions.
Reputational • Increased scrutiny from non-governmental organisations (NGOs) and consumers.	Reputational risks as stakeholders are increasingly focusing on the companies' carbon footprint and plan to manage climate risks.	Improved environmental score and reputation could lead to new opportunities with conscious customers.	The industry as a whole must raise the bar or all companies risk being painted with the same brush regardless of individual efforts.	• Measuring our GHG footprint yearly through thorough all-encompassing LCA study factoring in both scope 1, 2 and 3 emissions.

Physical Risks

Types of physical risks	Risks	Opportunities	Challenges	Mitigation measures
Acute • Temperature change and increased frequency of extreme weather events such as floods and droughts.	All our properties are in areas with relatively low acute weather risks, meaning that operational disruption due to such event taking place is relatively low.	Safeguard operations by ensuring that emergency response teams are prepared to deal with fire and flood during drought and flood seasons.	Peat areas possess high risk of fire outbreaks during drought seasons and maintaining adequate water levels is therefore crucial.	• The fire drills are conducted periodically to ensure the readiness of firefighting equipment and Emergency Response Team. • Maintaining the water levels at 40-60cm from the ground level in the collection drains of peat areas.
Chronic • Rising sea levels.	We have some properties located close to the coast and there are risk related to the rising sea levels.	Develop mitigation plans to address the risk of rising levels, and identify alternative water sources and water retention facilities to increase operational resilience.	Significant cost associated with establishing additional water retention facilities.	• Rainwater capturing facilities available at all operational sites. • Ensuring proper drainages are constructed prior to the replanting.

Riparian reserves such as this mangrove forest on Lada Estate are important for flora and fauna conservation and the health of waterways.

UP is committed to continuously improve and operationalise the short-, medium- and long-term measures and strategies to minimise the identified climate risks. This goes hand in hand with our strategic focus on the "circular economy" concept of converting waste into renewable energy via innovations and investments in new technologies to reduce our GHG emissions.

The UP Group's GHG emissions intensity baseline and target covering plantations, milling, and refining operations are assessed and monitored annually, and in line with the TCFD's recommendations, we have also initiated our disclosure of GHG emissions for Scope 1, 2 and 3. For more information on our journey to reduce the company's carbon footprint vis-à-vis our baseline monitoring in 2004, reduction trends and targets, please refer to page 66.

All strategies, programmes and developments related to the climate risk assessment are headed by the Chief Executive Director of UP and any significant resources required for related projects are subject to approval by the UP Board. The climate risks will be deliberated and reviewed as deemed necessary during the Group Sustainability Committee (GSC) Meeting. Lastly, climate change is also listed as an important indicator under our materiality assessment and the level of prioritisation is assessed annually based on feedback from our stakeholders.

Water Management

Water management is particularly important on acid sulphate and peat soils. These soils are fragile and if over drained, they will rapidly deteriorate. On acid sulphate soils, the water level should be maintained up to the jarosite layer, thereby submerging the pyrite (FeS2) and preventing it from oxidising to sulphuric acid, which can cause a steep drop in the soil pH.

Weirs for Moisture Conservation

To conserve moisture during dry periods, a series of weirs are constructed across the collection drains to hold back water and raise the water-table to within 50-75 cm from the surface. To regulate the height of the water table, wooden planks are slotted into the desired level. The density of weirs varies with the soil type, slope, rainfall and cropping system.

On average, one weir is provided for every 40 to 60 hectares or every 600-1000 meters along the collection drain. Assisted by the water gates at the discharge ends of the main drains, the weirs are very effective in minimising the adverse effects of the moisture stress. Our Research team is undertaking a Drainability Assessment in our peat areas which are due for replants in the next 5 years in accordance with RSPO Peat Drainability Guidance. This will help us better understand the hydrological characteristics of our peat areas.

Monitoring of Meteorological Parameters

Weather stations have been set up at strategically important locations throughout our Group. These provide a large amount of micro-climate information critical to, particularly, make accurate fire-risk predictions. Being able to predict the risk of fire allows the management in each estate to implement proactive measures, to prevent and minimise the risk of fire, as well as to be on high alert with firefighting equipment, in case of fire outbreak.

Water Impacts

UP fully appreciates that more can be done to preserve and protect water ways and manage the use of water throughout our organisation. In order to maximise the available water resources, United Plantations has since 1913 gone to great lengths to construct an extensive system of water gates, bunds, weirs, canals and drains hereby enabling us to harvest and optimise the usage of rain water.

In addition, leguminous cover crops are established in all our immature plantings to conserve moisture in the relatively open environment of immature plantings. In this context, it is important to mention that except for the nursery areas, none of UP's planted areas under oil palms or coconuts are irrigated.

Indeed, all our areas are under rain-fed agriculture, thus making use of whatever water which comes naturally from above. We are continuously working to mitigate our water footprint related to mill waste, maintaining buffers along natural waterways, harvesting rainwater, frugal domestic water usage and judicious use of pesticides and weedicides.

The consumptive water use (evapotranspiration) ranges from 120-150 mm per month. To meet this requirement, the monthly rainfall should equal or preferably exceed this figure, failing which moisture stress would occur.

The rainfall in the UP Group ranges from 1,600 to 2,500 mm per year, with the average being 2,000 mm. Monthly distribution is reasonably uniform, but drought does occur when some estates receive less than 100 mm of rainfall over 2-4 months as experienced in past years. Weirs have been constructed across the collections drains to harvest rainfall and hold back water to raise the water table.

Hydrology and Limnology

Clean water is critical to sustain all kinds of life form on Earth. In rural Indonesia thousands of local residents are dependent on water supplies from lakes and rivers. Maintaining a clean and uninterrupted supply of water constitutes one of the most critical components in sustainable palm oil production.

The Biodiversity team has developed a "Hydrology map" and identified a number of permanent sites for sampling water quality. Using state-of-the-art equipment, the team measures and records organic, inorganic and physical pollution parameters in the field.

Potential trace elements and toxins are measured with a spectrophotometer in the laboratory. In the event of a sudden deterioration in water quality, the team will identify the source of pollution and initiate a process to rectify the problem.

This includes identifying any unusual organic contamination, usually due to empty fruit bunches that mistakenly have slid into a stream or if an unusual high level of inorganic contamination is detected, it is usually a result of excessive wash-out of fertilizer. Such information is communicated to the respective estate managers, allowing them to rectify a potential problem within a very short time period.

In our pursuit to conserve this depleting precious gift, every effort is being done to educate our residents to be frugal on water usage. Old water pipes, water tanks and faulty taps are being replaced from time to time to arrest leakages. In addition, by having various awareness programme on water and energy saving programmes, we aim to reduce our domestic water consumption by 10% from the average of 80 gallons per capita per day in 2025. The domestic water is sourced from either Government supply or our own treated water from river or reservoir.

In 2023, domestic water consumption in Malaysia has seen some reduction while in our Indonesian operations water consumption is still much lower than two years ago as seen from the table below.

Domestic Water Consumption (gallons per capita per day)	2023	2022	2021
Malaysian operations	79 (0.36m^3)	81 (0.37m^3)	77 (0.35m^3)
Indonesian operations	77 (0.35m^3)	75 (0.34m^3)	84 (0.38m^3)

Erosion Monitoring Plots

To better understand the dynamics of soil, water and nutrient loss that can occur on our property, several erosion monitoring plots measuring 6m x 20m were set up in one of our estates on slightly sloping land under mature oil palm.

Thereafter the amount of soil loss, surface runoff and nutrient losses in each of these fractions are being closely monitored to determine the major routes of soil, water and nutrient loss. Such studies illuminate the areas of major loss through which mitigating measure can be developed to minimise the depletion of these vital natural resources.

Rain Harvesting

As part of our effort to conserve water resources and minimise wastage we have embarked on a programme to fit workers' housing with tanks to store harvested rain water which is especially beneficial during periods of prolonged dry weather.

Mill Water Consumption Rate

We also monitor the water consumption for processing of FFBs and ensure optimum water consumption without unnecessary wastage. Any leakage in water supply will be repaired immediately. With this, we aim to reduce our mill water consumption by 10% in 2025 compared with the average of 1.6 MT water/MT FFB in 2020.

Mill water consumption (MT water/MT FFB processed)	2023	2022	2021
Malaysia operations	1.7	1.5	1.5
Indonesia operations	1.2	1.2	1.2

Pesticides and Chemical Usage

Conducting our operations under the best principles of agricultural management is a key priority for the UP Group to reduce chemical and pesticides usage thereby minimising the impact to the natural environment.

Furthermore, our employees' safety is a top priority and in this connection all sprayers are trained extensively and are required to use full Personal Protective Equipment.

United Plantations Palm Oil (Malaysian Operations*)				Soybean**	Sunflower**	Rapeseed**
	2023	2022	2021			
Pesticides / Herbicides (kg per MT oil)	0.744	0.620	0.847	3.95	28	3.73

*Includes palm oil+palm kernel oil (UP, 2021-2023 - Malaysian operations)
**Data from FAO, 1996- Pesticide data for soybean and rapeseed updated in 2007/9 and 2010 respectively

United Plantations Palm Oil (Indonesian Operations*)				Soybean**	Sunflower**	Rapeseed**
	2023	2022	2021			
Pesticides / Herbicides (kg per MT oil)	0.336	0.273	0.257	3.95	28	3.73

*Includes palm oil+palm kernel oil (UP, 2021-2023 - Indonesian operations)
**Data from FAO, 1996- Pesticide data for soybean and rapeseed updated in 2007/9 and 2010 respectively

According to CropLIfe International, a global federation representing the plant science industry, 42% of crop production throughout the world is lost as a result of insects, plant diseases and weeds every year. Indeed, in the tropics crop losses can reach as high as 75%.

Careful use of pesticides can deliver substantial benefits for our society by increasing the availability of good quality and more affordably priced food products. However, pesticides are inherently dangerous and it is in everyone's interest to minimise the risk they pose to people and the environment.

Integrated Pest Management (IPM)

According to FAO, IPM means a pest management system that in the context of the associated environment and the population dynamics of the pest species, utilizes all suitable techniques and methods in as compatible a manner as possible and maintains the pest population at levels below those causing economically unacceptable damage or loss.

UP has a strong commitment to Integrated Pest Management (IPM), and in line with the Principles and Criteria of the RSPO we are continuously working on reducing the usage of pesticides. This commitment towards continuous improvements has resulted in minimising the usage of pesticides in relation to other major oil seed crops, primarily through Good Agricultural Practices and improvement in planting materials.

Today, UP's use of pesticide is 5-8 times lower per tonne of oil produced compared to Rapeseed and Soybean farmers and about 40-50 times lower compared to Sunflower growers.

Establishing Beneficial Flowering Plants

On the notion of IPM there has been a steady increase in the number of beneficial plants planted in our properties over the last few years to function as shelter and food source for the beneficial insects.

Flowering plants planted	*Malaysia*	*Indonesia*
Cassia cobanensis	*42,351 planted*	*14,782 planted*
Tunera subulata/ulmifolia	*103,059 planted*	*89,941 planted*
Antigonon leptosus	*14,904 planted*	*97 planted*
Carambola sp	*3,554 planted*	*10 planted*
Others	*5,458 planted*	*8,634 planted*
Total	*169,326 planted*	*113,464 planted*

Today a total of 282,790 broadleaf flowering plants have been planted in our Malaysian and Indonesian plantations to encourage parasite and predator activities which is a vital part of our IPM programme.

Surveillance and Monitoring of Pest Outbreaks

Regular surveillance and monitoring of pest outbreaks is key to minimising both the economic impact of pest and the environmental impacts from excessive use of pesticides. Treatment is therefore only carried out when the damage exceeds established critical thresholds.

Census gangs are deployed on each estate to survey the extent of pest infestation. This is coupled with regular aerial reconnaissance in order to track and pre-empt pest build-up thereby more effectively treating potential outbreaks.

Use of Biological Pesticides and Pheromones

First line treatment against leaf pests i.e. Nettle Caterpillar and Bagworm is biological treatment in the form of *Bacillus thuringiensis*. The use of pheromones to trap Rhinoceros Beetles and thereby reduce the dependency on chemical pesticides is also adopted on all estates.

Besides trapping out the beetles, pheromone traps also provide management with statistical information on the severity of the beetle problem and supplements the chemical spraying operations to minimise beetle damage.

Overpopulation of rats, beetles and various kinds of weeds can have profound negative impact on production yields. The UP Group attempts to minimise the usage of chemical control-agents where possible, and the BioD undertakes a number of research projects to maximise the usage of biological control agents where possible.

For example, the leopard cat (*Prionailurus bengalensis*) is one of the key-predators of rats and other small rodents, and preliminary studies on the effect of these cats as rat-controllers in a plantation landscape is ongoing.

The results have been very promising, and UP's biodiversity team is currently exploring ways to enrich the habitat conditions for leopard cats, to maximise the population density and thereby reduce rat damage.

Apart from leopard cats, the team also records ecological parameters along with the effect on rat populations of other predators such as barn owls (*Tyto alba*), Spitting cobras (*Naja sumatrana*) and water monitor lizards (*Varanus v. salvator*).

5-Step Integrated Pest Management Programme approach taken to contain and/or control Bagworm outbreak.

1) Integrated Pest Management
E.g. planting of beneficial plants to enhance the natural parasitic and predator activities against bagworm. A total of 282,790 beneficial broadleaf flowering plants have been planted in Malaysia and Indonesia.

2) On-going Monitoring
Census gangs deployed on each estate to take frond samples in a pre-determined pattern throughout the estate. These fronds are subjected to insect counts and damage assessments by trained personnel.

3) Aerial Surveillance
Regular aerial reconnaissance is carried out to better detect, pre-empt and treat potential outbreaks.

4) Use of biological control agents
E.g. Bacillus thuringiensis as the first line of treatment against an outbreak.

5) Final Resort
As a final resort and only when Steps 1 to 4 have proven to be futile in containing or controlling the natural equilibrium between pest and beneficial predator, our trained personnel intervene with the specific treatment through trunk injection.

Monocrotophos and Metamidophos phased out completely

In 2020, we successfully phased out monocrotophos and metamidophos, which was a key milestone for the UP Group. Concerted efforts to source and evaluate alternatives for the Class 1A insecticides, monocrotophos and metamidophos, have been ongoing since 2006 through our collaboration with several multinational chemical companies, amongst them Bayer and BASF (Germany), Syngenta (Switzerland), Cheminova (Denmark), Sumitomo (Japan), Rainbow Agrosciences (China) and UPL (India).

For years numerous insecticidal compounds were evaluated for bagworm control with our partners with no success in matching the efficacy of monocrotophos and metamidophos. However, more recently our Research Department was able to test new formulations of an existing insecticide that hitherto gave inconsistent bagworm control.

Through those years, it was established that with these new formulations of the existing insecticide we are able to have a commercially viable and effective alternative to monocrotophos and metamidophos with a Class II toxicity rating which is a much safer product.

As a result, we have since September 2020 successfully phased out the use of monocrotophos and metamidophos for trunk injection to control bagworm. This is a significant achievement as our plantations can thereby dispense with the use of WHO Class 1A or 1B pesticides for bagworm control and replace them with an equally effective but safer product.

Nonetheless, bagworm remains an endemic pest in Lower Perak and the Federal Government has gazetted this as a "Dangerous Pest" on 15 November 2013. It is an offence under the Plant Quarantine Act 1976 if this dangerous pest is left without any control and companies can be fined up to RM10,000. Outbreaks of bagworms continue to occur in the properties neighbouring UP in the State of Perak, West Malaysia. This is of great concern as it is important that collaborated effort by the government authorities, neighbouring smallholders and other plantations are put in place to eradicate this serious pest. UP is working closely together with its neighbours as well as the authorities in the form of the Malaysian Palm Oil Board (MPOB) to achieve positive progress on this concerning issue.

UP has also extended as a service to the neighbouring plantations the use of its airstrips for aerial bagworm control and taking the plantation managers for aerial reconnaissance flights to monitor the extent of bagworm infestations in the region.

Overall, as can be seen in the table on the next page, the quantity of agrochemicals (fertilizer nutrients and pesticides/herbicides) per tonne of palm oil produced in UP over the last three years remain substantially lower than annual oilseed crops such as soybean, sunflower and rapeseed, which reflects of the resource utilisation efficiency of the oil palm.

The Pesticide usage in 2023 was higher than the 2022 level in Malaysia with more herbicide used in the immature areas and due to an increased need to control leaf pests in mature plantings. In our Indonesia operations, the markedly higher herbicide usage in 2023 was needed to clean up the ground due to heavy rainfall received in the previous year. The direct fossil fuel energy consumption per tonne oil produced in 2023 remained similar to 2022.

Biological Control Agents to Substitute for Chemical Insecticides

Leaf eating pest outbreaks in immature oil palms will need to be treated with insecticides. The use of biological insecticides such as *Bacillus thuringiensis* is therefore encouraged at this young crop stage to minimise collateral damage on beneficial insects in the field as well as to reduce dependency on chemical insecticides.

Agrochemical and Energy Inputs in the Cultivation of Oil Palm and Other Oilseed Crops

Input	Per tonne oil basis					
	Oil Palm*			Soybean**	Sunflower**	Rapeseed**
	2023	2022	2021			
Fertiliser nutrients						
Nitrogen (N-kg)	18	19	15	315	96	99
Phosphate (P_2O_5-kg)	8	9	9	77	72	42
Potash (K_2O-kg)	43	45	43	NA	NA	NA
Magnesium (MgO-kg)	7	7	6	NA	NA	NA
Pesticides/Herbicides (kg)	0.744	0.620	0.847	3.95	28	3.73
Energy (GJ)	0.56	0.56	0.56	2.90	0.20	0.70

** includes palm oil + palm kernel oil (UP, 2021-2023 - Malaysian Operations)*
*** Data from FAO, 1996- Pesticide data for soybean and rapeseed updated in 2007/9 and 2010 respectively*

Fortunately, we have not had any severe infestation in neither our Malaysian operations nor in Indonesia over the last several years, hence there has been no use of *Bacillus thuringiensis*.

Quantity (kg) of Bacillus thuringiensis	2023	2022	2021
Malaysia operations	0	0	0
Indonesia operations	0	0	0

Mowing of Harvesters' Paths

Harvesters' paths are mowed to maintain a flora which is favourable to natural enemies of crop pests and to minimise erosion. For this reason, blanket weeding is discouraged, whereas soft weeds with shallow root system which do not grow to excessive heights are encouraged outside the weeded palm circles.

Harnessing advances in pesticide technology to reduce herbicide inputs in mature oil palm

In the wet tropics, weed species rapidly cover the ground and compete with the palms for nutrients and water and interfere with field operations.

Consequently, herbicides are an important tool to keep the palm circles weed free. Of the total pesticides used in a mature field, herbicides will therefore account for more than half of the total pesticide load.

Thus, any improvement in the length of control for weeds will contribute significantly to a reduction in pesticide use for mature palms. Over the years, UP has actively cooperated with leading agrochemical manufacturers to evaluate a range of novel herbicidal compounds.

Arising from the close collaboration with Bayer CropScience, a new compound, Indaziflam, with long lasting weed control was extensively tested in our fields and was found to be able to slash the number of herbicide applications from four rounds a year with the standard herbicide mix to two rounds a year with the Indaziflam combination. This confers the clear benefit of almost halving the herbicide input in a field and greatly improving labour productivity.

Whilst introduction of Indaziflam has contributed to reducing the overall herbicide usage per hectare in our Malaysian operations in 2023, the significantly higher 2023 rainfall in our Indonesian operations has necessitated an increase in herbicide spraying in the past year to manage ground conditions.

Herbicide usage (kg a.i/ha)	2023	2022	2021
Malaysia operations	3.85	3.27	4.68
Indonesia operations	1.85	1.46	1.33

Calibration for Pesticide Application Equipment

The Company engages the services of equipment suppliers to regularly monitor the calibration of our pesticide application equipment to avoid application error (under and over applications) and to ensure the safety of our operators.

Furthermore, regular training and refresher courses are implemented, all of which are audited by the MSPO/ ISPO/ RSPO accredited auditors every year.

Chemical Health Risk Assessment (CHRA)

In line with the Use and Standards of Exposure of Chemicals Hazardous to Health (USECHH) Regulations 2000, UP first appointed a certified assessor to conduct CHRA in 2004, for all chemicals utilized in the respective plantations, oil mills and refineries.

This is being reviewed every 5 years by the assessor as stipulated in the Regulations and annual medical health surveillance is conducted on all spray operators.

Rats eat both palm fruits and male flower in the oil palm fields and are considered one of the main pests in oil palm fields. Leopard cats (Prionailirus bengalensis) and Barn Owls (Tyto alba) significantly reduce rat population and usage of rodenticides.

Biological pest control of rats

Rats thrive in the oil palm ecosystem with an abundance of food sources (palm shoots, fruit mesocarp, kernels, weevil grubs etc.) as well as plentiful harborage amongst the cut frond heaps. The common rat species encountered in an oil palm field are the Malaysian wood rat (*Rattus tiomanicus*), the padi field rat (*Rattus argentiventer*) and the house rat (*Rattus rattus diardii*).

With its prolific reproductive rate, whereby a sexually mature female can conceive multiple times a year and produce an average of 8 pups in each litter, rat populations can mushroom if given the right condition resulting in high crop losses. Various researchers have estimated crop losses caused by rats feeding on fruit mesocarps to be able to reduce oil yields by 5 – 10% (Wood, 1976; Liau, 1990). Badly gnawed male and female inflorescences, as well as young palms killed by rat attacks further contribute to crop loss.

Barn owls

The Barn owl is a much-loved countryside bird by oil palm planters as it predates on rats, resulting in major reduction of rodent damage. This bird is the best partner to growers due to its ability to adapt well to oil palm plantations. It survives on a staple diet of 99% rats, and it is estimated that a pair of barn owls together with its chicks consume about 800 to 1,000 rats per year.

The barn owls are medium sized (34-36cm) with long legs that have feathers all the way down to their grey toes. The owls have large, round heads without ear tufts and pale heart-shaped facial discs. The owls ingest the rat whole and use their digestive juices to dissolve the nutrients of the fleshy parts. The tougher indigestible parts such as the bones and skulls are regurgitated out.

Barn owl populations in tandem with preys' availability can be expanded in the plantation by construction of nesting boxes at vantage points – about 5 meters from the ground and shaded by the palms' canopies.

A zinc baffle or collar should be placed on the pole to prevent snakes etc. from predation of the owl's eggs and new born chicks. These boxes should be inspected regularly and repaired where necessary in order to optimise their occupancy.

At United Plantations, the barn owl is the first line of defence against this serious pest. Where owls cannot cope with the high rat population, first generation rat baits such as warfarin are employed to selectively bring down the population.

Warfarin baits are preferred as they are relatively safer to barn owls than second generation rat baits. Based on the low usage of rodenticides in the past years, we can infer that the barn owl programme has been fairly successful in keeping rats under control, augmented with rodenticide baiting in selected areas.

Leopard cats

Since its formation in 2011, the Biodiversity Division in UP/PT SSS has recorded a surprising number of leopard cats, *Prionailurus bengalensis*, in the estates. The species is common throughout Southeast Asia in undisturbed as well as altered habitats.

They are common in some oil palm estates , however, little is understood about their role as rat predators in a plantation landscape although studies have shown that rats and mice constitute 93% of the leopard cat's mammalian diet (Rajaratnam et al.,2007). Field observations demonstrate a negative relationship between cat numbers and the rat population, with high abundance of cats associated with low rat numbers and vice versa (Silmi et al.,2013).

Barn Owl Data	2023	2022	2021
Total Boxes	2,785	2,765	2,707
Total Area Under Owl (Ha)	33,005	33,081	32,624
Box to land ratio in Scheme	11.85	11.96	12.05
% Occupancy in Scheme	42.55	46.65	45.33
Total Planted Area (Ha)	34,124	34,242	33,033
Box to land ratio over Total Planted Area	12.25	12.38	12.20
Rodenticide ai/planted Ha (kg/Ha)	0.0006	0.0002	0.006

Since 2015, nine individual leopard cats have been collared and continuously tracked for 23 months and aided by 40 camera traps set up in a 800m by 800m grid generated estimates of the cats' home-ranges and dispersal patterns. With at least 2-4 individuals/km² the leopard cat density in oil palm estates is much higher than in the conservation forest where the density is less than 1 individual/km².

The cats are strictly nocturnal and prefer to hide and rest in thick bush, primarily consisting of sword-fern (*Nephrolepis sp*) during day-time, but forage both on the ground and in the palm canopy at night.

Some preliminary results conclude that leopard cats can feed, reproduce and thrive in palm oil estates, with a mean home range (95% MCP) for male leopard cats of 1.39 km² (n = 5; SD = 1.40 km²) and a smaller mean home range of female cats of 1.26 km² (n = 4; SD = 0.36 km²).

In areas where rats constitute the main prey, leopard cats eat an average of 2-3 rats per day. Amphibians, snakes and birds are also on the menu.

With a body weight range of 2.5-4.0 kg leopard cats are expected to consume more food than the much lighter barn owl, a factor which may be favourable in its role as a rat control agent (Silmi et al.,2013). Our observations reveal that leopard cats can reproduce rapidly with some females giving birth to 4 cubs, with a reproduction cycle every five to six months.

Fighting the Haze and Preventing Fires

In UP, we do not use open burning/fire in new or ongoing operations for land preparation, land management, waste management, or for any other reason other than justified and documented cases of phytosanitary emergency.

Zero Burning Policy

In 2023, due to the prolonged drought season in Indonesia, we have encountered some fire incidents within the conservation area. It is most unfortunate that the fire spread fast into our planted area despite the various fire combat measures implemented. However, our Emergency Response Team (ERT) managed to put-off the fire on-time and patrolling was carried by our watchmen to ensure no fire outbreak in the area. Our ERT is well-trained and equipped with all necessary equipment, and periodic fire drills are conducted in all estates throughout our Group to ensure preparedness of the ERT. To further enhance the fire patrol in Indonesia where the areas are more prone to fire outbreak, four additional fire watch towers were constructed at strategic points and purchased additional six units of GPS devices.

On top of this, we are conducting a series of community workshops to educate our local communities about the environmental and social consequences of slash-and burn farming, as well as to promote alternative methods of land clearance. With this, our goal is total eradication of fire as a means to clear land by the local communities in the surrounding areas. This year thankfully there was no severe drought in Indonesia.

Hectares Burnt in Fires

	2023	2022	2021
Non Planted	25.74	0	0
Planted	0.05	0	0.05
Total	25.79	0	0.05

Outer Ring Range of ≤500 m

	2023	2022	2021
Outer ring ≤500 m (Ha)	0	0	0.004*

**Community oil palm area neighbouring Lada*

Fire patrols are conducted regularly in our Indonesian estates during the dry season.