Singapore Institute of International Affairs

HAZE OUTLOOK 2023

June 2023

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About the Haze Outlook 2023

The Haze Outlook 2023 report provides a risk assessment of the probability of a severe transboundary haze incident affecting Indonesia, Malaysia, and Singapore for the year ahead. This is based on research conducted by the Singapore Institute of International Affairs (SIIA), a leading think tank in the region. Our research takes into account quantitative information about weather and other key variables and also assesses policies by governments and corporations. These assessments are based on the SIIA's engagement with sustainability stakeholders in the region, including government bodies, businesses, NGOs, and academics.

This is the 5th edition of the Haze Outlook, and it has emerged as a leading report on this important issue. The Haze Outlook 2023 was directed by Simon Tay, Chairman, SIIA and Associate Professor, Faculty of Law, National University of Singapore. The authors are Aaron Choo, Khor Yu-Leng, and Ivan Wong, who are respectively Senior Assistant Director (Special Projects and Sustainability), Associate Director (Sustainability) at the SIIA, and Research Associate at Segi Enam Advisors. All views expressed in the report are those of the authors, unless otherwise credited.

The work has drawn on the contribution of many. In particular, the authors would like to thank the following for their assistance and insights (in alphabetical order): Mr. Arif Sugandi (Senior Agronomist/Director at PT Applied Agricultural Resources Indonesia), Asia Pulp and Paper (APP), the Centre for Remote Imaging, Sensing and Processing (CRISP) of the National University of Singapore, DBS Bank, Golden Agri-Resources (GAR), Dr. Julian McGill (Head of South East Asia at LMC International), Programme for the Endorsement of Forest Certification (PEFC), Rainforest Action Network, PT Rimba Makmur Utama (RMU), Standard Chartered Bank, Dr. Helena Varkkey (Associate Professor of Environmental Politics at Universiti Putri Malaya), World Resources Institute (WRI) Indonesia, and World Wide Fund for Nature (WWF) Singapore. We also are grateful to government officials of the region who have engaged with the SIIA on the Outlook and our sustainability programme.

Established in 1962, the SIIA is a non-profit and independent think tank committed to fostering in-depth dialogues around politics, economic policy, and sustainability in ASEAN and the wider region. In the field of sustainability and especially on the haze, the SIIA has been an early analyst and advocate. The SIIA has championed the fight against the transboundary haze since 1997, when our Chairman organised Singapore's first haze dialogue in partnership with the Singapore Environment Council. Following the severe transboundary haze in 2013, the SIIA established the Singapore Dialogue on Sustainable World Resources (SWR) in 2014. The dialogue is now into its 10th year. In 2017, the SIIA authored the first study on sustainable finance in Singapore and how to move green investment forward. The SIIA's Sustainability Programme continues to work on the plantation and forestry sector, looking particularly at the use of green finance and carbon financing. Our commitment is to help drive Southeast Asia's green recovery from the COVID-19 pandemic and transition to carbon neutrality and climate action.

1. Foreword

Forest and land fires and the resulting heavy haze pollution across our region have been a recurring problem since 1997. For the past three years, skies across ASEAN have remained relatively haze-free. This has been due to a combination of effective policy and action by the Indonesian government and larger corporations, and also unusually wet weather which has made it easier to keep fires in check.

However, there is a real risk in the year ahead that the situation will change, and for the worse. If there is severe dry weather resulting from El Niño, there is a danger that severe transboundary haze will impact us.

We hope that this assessment from our Haze Outlook 2023 report can help inform regional governments, businesses, and the public about the factors contributing to haze risk in order to draw attention to the problem and galvanise action in the months ahead.

The Haze Outlook is based on the work carried out by the Singapore Institute of International Affairs (SIIA) on a year-round basis and summarised in the following pages. Our work analyses the risk of a severe transboundary haze crisis affecting Indonesia, Malaysia, Singapore, and the surrounding region.

Our risk assessment is based on a combination of three main factors: weather, policies, and markets. While many haze warnings are based on weather forecasts, we believe it is essential to also analyse and factor in the actions being taken by governments and by corporations, both in response to regulations as well as to the markets for the products and commodities produced, sold, and exported from the plantation and forestry sectors. For that reason, in addition to weather, our assessment is based on our research and interviews with a wide range of stakeholders, including governments, agribusinesses, banks, consultancies, think tanks, and NGOs. This is both specifically for the Haze Outlook as well as part of the wider sustainability work of the SIIA.

The Haze Outlook summarises our analysis on these factors and then seeks to focus and report our assessment on a scale of Green, Amber, and Red — with Red being the highest risk.

Our rating for 2023 is Red, given predictions there will be a severe dry spell resulting from El Niño.

This is the first time we have given a Red rating since the Haze Outlook began five years ago. In previous years, our assessments have been three Amber ratings and once for Green. These ratings reflect our generally positive evaluation of the improving sustainability efforts across our region.

Over the past few years, the Indonesian and Malaysian governments, as well as major plantation sector companies, have made great strides in improving forest management, fire prevention, and fire suppression. It is our assessment that these policies and practices remain in place.

However, every prediction indicates the weather in 2023 will be hotter and drier, with the return of El Niño. At the time of publication, the region has already been feeling the effects of a heatwave. There remain questions about how severe the El Niño will be. The US National Ocean and Atmospheric Administration (NOAA) predicts an 84 per cent chance that this year's El Niño will go beyond the moderate range into a strong event, with a 25 per cent chance of a "super El Niño". Specific predictions vary among meteorological services agencies, but all point in the same direction.

Our assessment of the risk also reflects what governments in our region are already saying and doing. Already in the early months of 2023, the authorities in Indonesia, Malaysia and Singapore have warned about the danger of a heatwave and fires this year, with calls to take precautions against rising temperatures and the eventuality of haze.

Our Haze Outlook also considers another factor: market trends. The price for key agricultural commodities surged and hit record levels in the past year. They remain elevated, as compared to multi-year averages. This can spur planting and replanting activity to rise and this comes with the danger that slash-and-burn techniques will be used to clear land, raising the risk of severe haze. While the use of fires is illegal in Indonesia, there can be lapses as there have been in the past, especially among plantation operators that are able to sell their products into grey markets, without any certification of sustainability.

These are the main factors, especially the El Niño, that have led to our 2023 assessment that the risk of severe transboundary haze has risen to Red. What of the longer-term?

Our Haze Outlook also looks ahead at some key opportunities that encourage sustainable development and responsible land management in ASEAN. Much of this relates to the close connections between the regional phenomena of the fires and haze with global issues concerning climate, carbon and deforestation. We are positive about efforts to decarbonise within the plantation sector, and believe that the growth of nature-based carbon projects in the region can contribute to solutions for the broader climate agenda.

Indonesia and other ASEAN countries have greatly improved their systems to manage land and resources, as well as to prevent fires and deforestation. As of 2022, Indonesia's deforestation rate was the lowest in 20 years. Indonesia has set a target of making its forestry and other land use (FOLU) sector a net carbon sink by 2030 as a key component of its Paris Agreement commitments. Such efforts, new and still growing, will be a further and critical lever to deal with the risk of haze pollution and to move the conversation forward, towards opportunities and cooperation.

Simon Tay
Chairman
Singapore Institute of International Affairs

2. Executive Summary

Risk of a Transboundary Haze Event in 2023:

Red*

* **Green:** Low risk **Amber:** Medium risk **Red:** High risk

The annual Haze Outlook report provides an assessment of the likelihood of a severe transboundary haze incident affecting Indonesia, Malaysia, and Singapore in the latter half of 2023. **There is a Red or high risk of haze in 2023 in the event of a strong El Niño.**

Our risk assessment is based on three factors: weather, policies and markets. The heightened risk of severe transboundary haze in 2023 is primarily driven by hotter and drier weather, with many global meteorological services predicting a strong El Niño event. If this does not eventuate, then fire suppression systems and law enforcement are in place within Indonesia and Malaysia and can be effective in keeping fires and haze in check.

Our Haze Outlook is based on our analysis of key quantitative factors as well as our research and interviews with a wide range of stakeholders, including governments, agribusinesses, banks, consultancies, think tanks, and NGOs. Our views of the three factors of weather, policies, and markets are as follows:

Weather: Past severe haze incidents have mostly occurred during intense drought periods corresponding to El Niño or positive Indian Ocean Dipole (IOD). Predictions are that both these dry weather phenomena are returning in 2023. There is a 84 per cent chance that this year's El Niño will have a strong effect, and a 25 per cent chance of a "super El Niño". There is also a high likelihood of additional drying effects from the IOD. This change comes on the back of three years of unusually wet weather and the pendulum is now swinging in the other direction. The first half of 2023 has already seen fires and haze affecting ASEAN countries in the Mekong region.

Policies: Indonesian and Malaysian officials have highlighted the need for action to prevent fires and haze and reiterated these priorities in 2023. In addition to commitments to fight haze, countries are keen to meet long term climate goals. Indonesia has committed to turning its forest and other land use (FOLU) sector into a net carbon sink by 2030 as part of its Paris Agreement targets. Malaysia is similarly keen to promote carbon credit generation from forest projects. The right policies are in place at the central government level to prevent fires and haze.

It is to be noted however that Indonesia is heading into General Elections due by February 2024. NGOs claim that past years have seen electioneering affect the consistency of law enforcement against illegal land clearing, especially at the local level.

Markets: Most forest fires in our region are linked to land clearing for agricultural purposes. The price of many agricultural commodities surged in 2022, with palm oil futures hitting record levels. Prices have since stabilised but remain higher than before the pandemic. There are indications that growers are actively planting or replanting, with oil palm seed sales also surging in parallel with higher prices. In 2022, oil palm seed sales hit their highest level in nearly a decade.

Major businesses have emphasised their continued commitment to sustainability and are aiming to intensify the use of existing land rather than opening new plantations. They are also on guard against fires, with one firm reporting that they doubled their expenditure on fire prevention and firefighting between 2022 and 2023. There is less clarity and confidence about the preparedness among smaller plantation operators. Many of these operators sell to the "grey" or leakage market and have been irresponsible with their expansion, leading to fires and haze.

Strong Sustainability Commitments in Place

Even if a strong El Niño and positive IOD do eventuate, the outcomes can be ameliorated, as compared to the record haze incidents seen in 1997 and 2015. Over the past few years, Indonesia and other ASEAN economies have greatly improved their governance systems to respond as well as to prevent fires and avoid deforestation. As of 2022, Indonesia's deforestation rate was the lowest in 20 years.

Indonesian authorities are taking the threat of fires and haze in 2023 seriously. The need for stronger law enforcement and firefighting has been emphasised this year by Indonesian President Joko Widodo, Coordinating Minister for Maritime and Investment Affairs Luhut Binsar Pandjaitan, and Minister for Environment and Forestry Siti Nurbaya Bakar. In Malaysia, the Minister of Natural Resources, Environment and Climate Change Nik Nazmi has similarly introduced nationwide measures to prevent open burning in Malaysia.

High Prices and Deforestation Risk

Cooperation with the private sector is crucial in fighting the haze. Historically, spikes in the price of agricultural commodities have been followed in subsequent years by increased deforestation in Southeast Asia as growers move to meet global demand. In recent years the region has managed to break this linkage. Deforestation has continued to decline even as prices have risen.

However, commodity prices have been on a rollercoaster since the start of the COVID-19 pandemic. Prices have stabilised somewhat in 2023, which media reports have mischaracterised as a fall in prices. In multi-year terms prices remain elevated for palm oil. Thus far, these price shifts have not resulted in a surge in deforestation, but there is some evidence that planting and replanting is on the rise. Efforts must be made to ensure this does not illegally encroach into forest areas and that all planting and replanting is legal and fire-free.

Sustainable Business and Investment Opportunities

Steps are being taken to increase opportunities for companies that are sustainable and avoid irresponsible actions such as clearing land with the use of fire. Many financial institutions are actively applying environmental benchmarking as part of business and overall risk assessment when they finance companies in this sector. Increasingly those who are do not act sustainability will face pressure from their lenders and investors.

Additionally, and to the positive, banks in the region are also assisting the plantation industry in green transition, via sustainability-linked loans and bonds.

ASEAN economies are likewise continuing to make progress on carbon trading, which is a potential avenue to fund ecosystem conservation and restoration. Indonesia has introduced implementing regulations for its national carbon trading system, and Malaysia has started a voluntary offset market under Bursa Malaysia.

The biofuel and biomass industries are also taking off in ASEAN. There are concerns from NGOs that this growth may inadvertently drive deforestation if it is not properly managed. But if these challenges can be met, the commodities sector can play an even larger role in helping ASEAN economies move beyond haze risks towards green growth opportunities.

3. What to Watch in 2023

The Red risk assessment of our Haze Outlook is based on three factors: weather, policy, and markets, referring to meteorological forecasts, the actions being taken by governments, and price signals that may drive deforestation. For 2023, our Red rating is driven primarily by the weather and predictions of an El Niño. There are other factors to be considered including market price signals.

3.1 Weather: Hot and Dry Weather Expected

There are two meteorological phenomena that may influence weather in the ASEAN region, the El Niño–Southern Oscillation (ENSO) and the IOD. ENSO is measured via the Oceanic Niño Index (ONI) which tracks temperature anomalies in the Pacific Ocean, while IOD is measured with the Dipole Mode Index (DMI) which tracks similar changes in the Indian Ocean. Changes in surface sea temperature affect atmospheric pressure above the ocean, and this in turn ultimately influences rainfall.

The effects of ENSO and IOD differ from region to region. Low or negative readings mean wetter weather in ASEAN and drier weather in some parts of the world, while a high or positive reading on both scales means less rainfall for ASEAN countries but wetter weather elsewhere.

For the past three years between 2020 and 2022, ENSO has been negative, resulting in cooler and wetter weather for ASEAN. This is referred to as La Niña. It is unusual for such wet conditions to last this long. ENSO shifted from its La Niña phase to neutral in early 2023, signalling a return to normal conditions.[1]

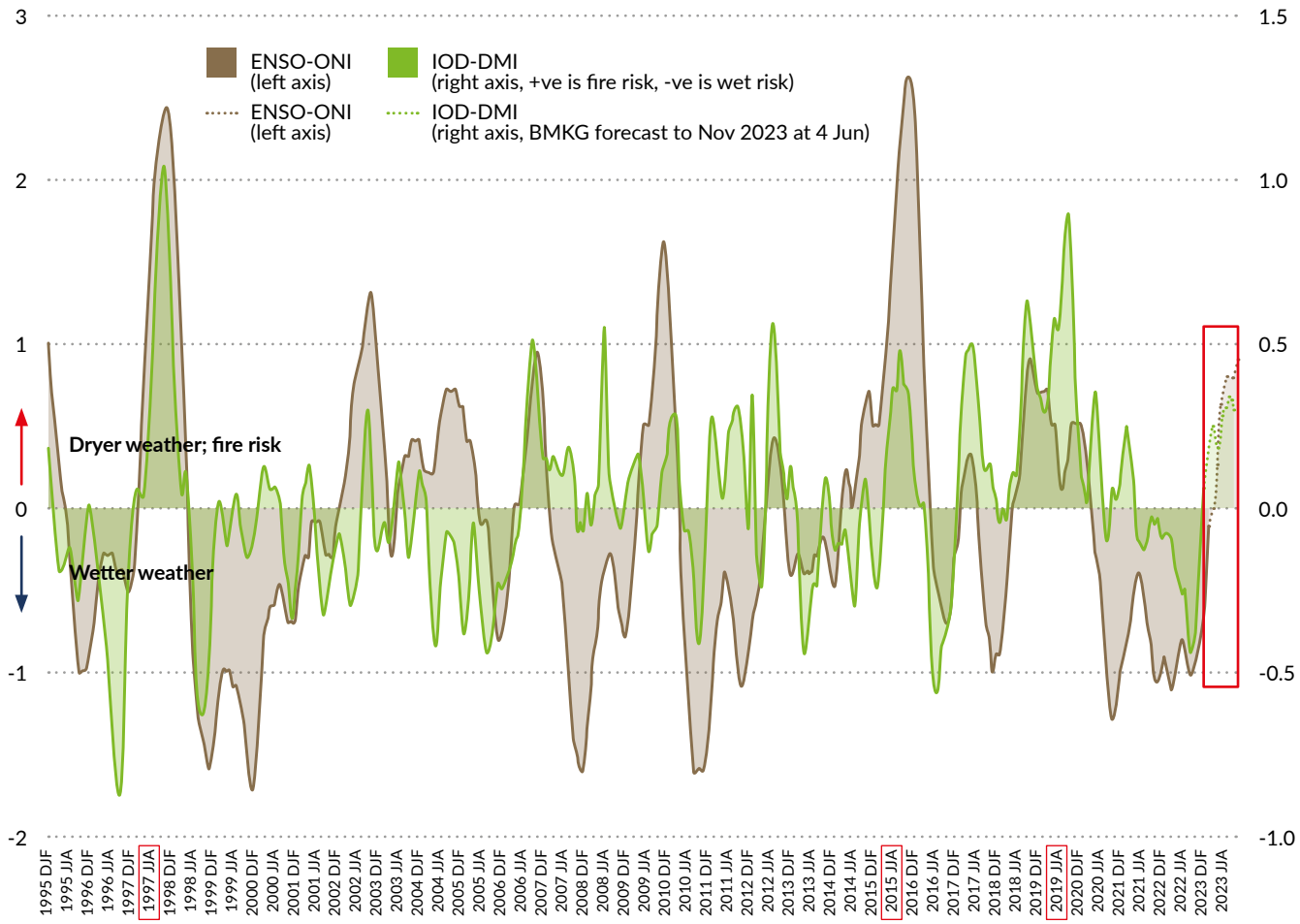
As of early June 2023, the US National Oceanic and Atmospheric Administration (NOAA) has confirmed the start of El Niño. Currently the El Niño conditions are weak, but there is an 84 per cent chance of the event exceeding moderate strength by the end of 2023, with a 25 per cent chance of a "super El Niño" occurring. If this happens, there is a chance that 2024 will break records as the world's hottest year.[2] This year will likely see a positive IOD as well. The IOD alone can cause a heatwave. Historically, extreme peaks in El Niño and IOD have corresponded to haze incidents in ASEAN.[i]

The data in Figure 1 tracks both ENSO and IOD from the 1990s to the present day, based on readings taken in December, January, and February (DJF) and June, July, August (JJA). The area on the extreme right of the graph shows forecasts for the 2023 JJA period by Indonesia's Meteorological, Climatological, and Geophysical Agency (*Badan Meteorologi, Klimatologi, dan Geofisika* or BMKG).

The JJA periods for the years 1997, 2015, and 2019 are also marked in Figure 1, indicating years when a high ENSO or IOD has corresponded to a severe haze episode. In 1997 there was both a strong El Niño and strong IOD. In 2015 there was a very strong El Niño and moderate IOD. During the 2019 haze incident, El Niño was relatively muted but the IOD that year was the highest since 1997.

[i] *Meteorological agency forecasts referenced for this report include the ASEAN Specialised Meteorological Centre (ASMC), Australia's Bureau of Meteorology (BOM), Indonesia's Meteorology, Climatology, and Geophysical Agency (BMKG), the Malaysian Meteorology Department (MetMalaysia), the USA's National Oceanic and Atmospheric Administration (NOAA), and the World Meteorological Organisation (WMO).*

Figure 1: El Niño-Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD)



Source: Khor Reports - Segi Enam Advisors (2023), based on data from the US National Oceanic and Atmospheric Administration (NOAA) for 1995 to March 2023 and Indonesia's Meteorological, Climatological, and Geophysical Agency (BMKG) for data for April 2023 onwards and forecasts to October 2023

The change to hotter and drier conditions is the main factor behind the high risk of haze in 2023. The first half of 2023 has already seen heatwaves in northern ASEAN countries around the Mekong.[3] Some areas in Thailand experienced temperatures higher than 50°C.[4] There have been reports of fires and haze across eastern Myanmar, northern Thailand, and across Laos to central Vietnam. Some experts and private sector businesses in Indonesia and Malaysia take cues regarding fire risk from watching the Mekong situation earlier in the year, with this year's fires being a cause for concern.

If there is a moderate to strong El Niño combined with IOD, the risk of haze affecting Indonesia, Malaysia, Singapore, and neighbouring countries is Red. If there is a weaker El Niño and IOD, then the risk is only Amber. Otherwise, if there is a weaker El Niño and IOD, Indonesia and Malaysia have implemented fire prevention and fire suppression policies that can be effective in keeping fires in check.

Protocols to guide and safeguard citizens in the event of a severe heatwave should be established. Speaking at the SIIA's 10th Singapore Dialogue on Sustainable World Resources (SWR) on 9 June 2023, Singapore's Minister for Sustainability and Environment Grace Fu announced that Singapore will be releasing a Heat Stress Advisory framework to detail what protective actions people need to take according to predicted weather conditions.[5]

Preparedness is needed to ensure there are sufficient N95 masks and other supplies in the event of a severe transboundary haze incident, to avoid shortages. Consistency is necessary and such preparedness should be in place not only for 2023, but kept current.

If there is a moderate to strong El Niño combined with IOD, the risk of haze is Red. Otherwise Indonesia and Malaysia have implemented fire prevention and fire suppression policies that can be effective in keeping fires in check.

3.2 Policies: Strong Sustainability Commitments in Place

The last three years have benefited from wetter weather and Indonesia, Malaysia, and others in ASEAN have made significant progress. In forest and fire management, good policy implementation has been in place to keep the haze under control.

Efforts to stop the haze have also benefited from greater recognition of the links between fires in the ASEAN region with wider issues of deforestation and greenhouse gas (GHG) emissions, now widely recognised as global priority concerns. Indonesia has acknowledged that forest and peat fires have historically made up a large proportion of the country's emissions.

In 2019, GHG emissions from forest and peat fires accounted for 25 per cent of Indonesia's total emissions, comparable to those of its energy sector. In 2020, emissions from fires dropped to just 12 per cent of Indonesia's total.[6] In order for Indonesia to meet the emissions reduction and net zero targets set out under the country's Nationally Determined Contribution (NDC) to the Paris Agreement, fires need to be kept in check.

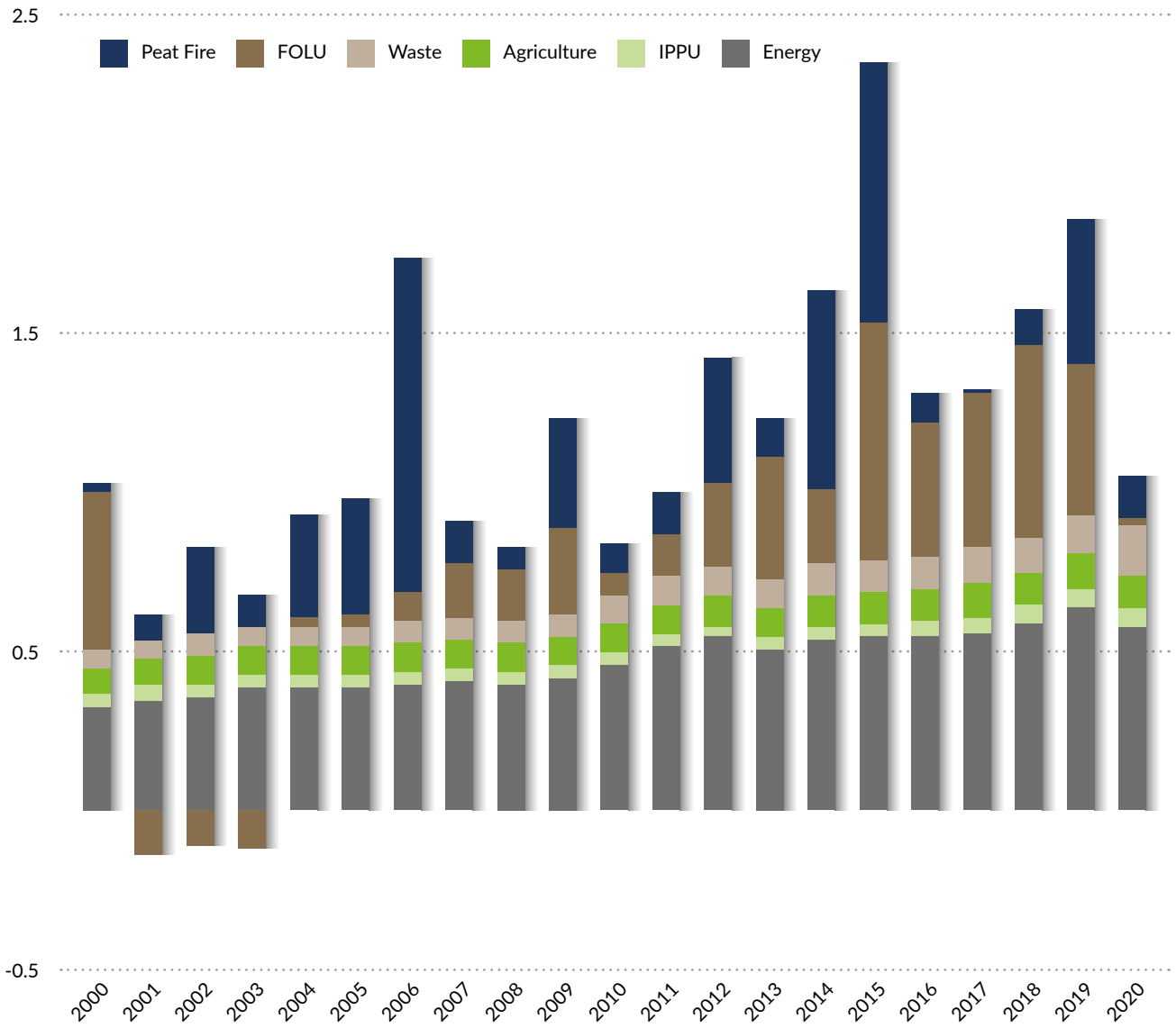
Indonesia has set an unconditional target of achieving 32 per cent emissions reduction by 2030, compared to business as usual. Most of this will come from the country's forestry and other land use (FOLU) sector, with FOLU set to become a net carbon sink rather than a source of emissions by 2030.[7]

Speaking at an industry conference in Germany in April 2023, Indonesian President Joko Widodo (Jokowi) said that under his administration Indonesia has brought its deforestation rate down to the lowest in 20 years, with an 88 per cent decrease in forest fires. In 2016, President Jokowi initiated a nationwide peatland restoration initiative, and in 2021 this effort was expanded to include mangrove forests. The rehabilitation of 600,000 hectares of mangrove forests will be completed by 2024.[8]

Under President Joko Widodo's administration, Indonesia has brought its deforestation rate down to the lowest in 20 years.

International partners have pledged support for Indonesia's plans. In October 2022, Norway renewed its Contribution Agreement with Indonesia for a second period, including some US$56 million to support Indonesia's FOLU net carbon sink efforts in recognition of the emissions reduction that the country has already accomplished in previous years.[9]

Figure 2: Official GHG Emissions from Indonesia (CO_2e, million tonnes)



Note: The chart shows Indonesia's official emissions reporting, including emissions from forest and peat fires. Other categories in the chart are Forestry and Other Land Use (FOLU), Waste, Agriculture, Industrial Processes and Product Use (IPPU), and Agriculture. Agriculture is technically a subset of FOLU but is tracked separately for the purposes of UN Paris Agreement reporting.

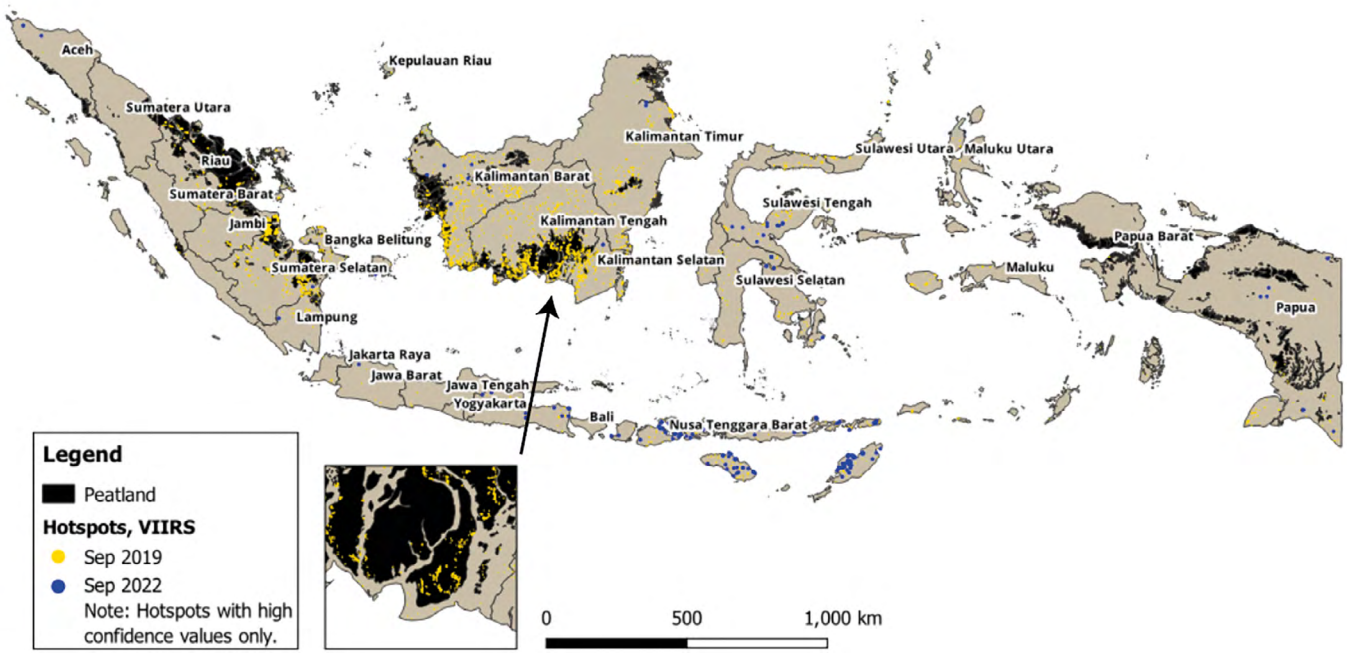
Source: Khor Reports - Segi Enam Advisors (2023), based on official GHG emission data from Indonesia's Ministry of Environment and Forestry (KLHK) (2022)

Analysis of satellite data from the past three years corroborates Indonesia's reports about its emissions from forest and peat fires, and its reports that fires have been kept under control in recent years.

Peat ecosystems are particularly important in discussions about the haze as they make up a large proportion of land area in Southeast Asia. Peatlands are wet and fire-resistant in their natural state but are vulnerable to fire when drained for agricultural purposes. They release a large amount of GHG and air pollution when burnt.

During the last severe haze incident in 2019, which occurred during an extremely strong period of IOD, satellites detected large clusters of hotspots in peatland areas within South Sumatra, Central Kalimantan, and West Kalimantan.

Figure 3: High-confidence fire alerts in Indonesia (Sep 2019 and Sep 2022)



Note: The map displays the locations of hotspots in Indonesia in September 2019 (yellow dots) and September 2022 (blue dots), during the peak of the dry season. The location of peatlands is indicated in black.

Source: Khor Reports - Segi Enam Advisors (2023), based on hotspot data from FIRMS, peatland locations from Jiren Xu et al. (2018)

Hotspots refer to concentrations of heat under satellite imaging. Although hotspots do not always equate to actual fire locations, as false positives are possible, they give a sense of the fire situation on the ground.

Figure 2 compares hotspots in 2019 with those in 2022, the last year on record. There were very few hotspots in 2022. The isolated hotspots that were detected were mostly not on peatland but rather on mineral soil, and they were located in East Kalimantan, Sulawesi, Java, and Papua, not the problem areas affected by fire in previous haze years.

Indonesia's Ministry of Environment and Forestry (*Kementrian Lingkungan Hidup dan Kehutanan* or KLHK) reported that 204,894 hectares of forest and peatland were damaged by fires in 2022, representing a reduction of 43 per cent from the previous year.[10]

A key narrative for Indonesia's sustainability initiatives is that deforestation has been decreasing in the past few years. Indonesian authorities are therefore taking the threat of fires and haze in 2023 very seriously.

In February 2023, Indonesian President Jokowi told a meeting of law enforcement officials that police chiefs would be removed from their posts if they do not do enough to handle fires in their areas – a promise that he first made in 2016 and has carried out before.[11] Indonesia's Minister for Environment and Forestry Siti Nurbaya Bakar has made similar comments about taking action against any companies caught starting fires.[12] Coordinating Minister for Maritime and Investment Affairs Luhut Binsar Pandjaitan has posted on social media urging Indonesian agencies to be vigilant.[13]

There is some concern that Indonesia's upcoming general elections, due by February 2024, will consume institutional bandwidth that might otherwise be directed towards haze prevention. NGOs and experts that were interviewed for this report have also warned that some local authorities may be tempted to turn a blind eye towards illegal land clearing and forest encroachment during this period, either

willingly or because many are not expecting to stay in office. At the central government and provincial level, Indonesian officials have sent strong signals about their commitment to fire and haze prevention. There will also be some push from senior officials to prevent any incidents while politicians are on the campaign trail.

A similar emphasis has been given to the issue by Malaysia's Minister of Natural Resources, Environment and Climate Change Nik Nazmi. From early in 2023, the Malaysian minister has been vocal on the haze, responding to reports of open burning in Malaysia by implementing national no-burning plans and underscoring the importance of talks at the ASEAN level on a new haze-free roadmap.[14]

Indonesia and Malaysia are key countries in managing the haze, and it is important that officials continue efforts to closely watch the situation on the ground as the weather conditions turn. Preventive actions and proactive responses are critical. Communication with regional neighbours and global stakeholders is also valuable for information-sharing and in fostering greater understanding of the changing situation.

Table 1: Progress Achieved under ASEAN's First Haze-Free Roadmap (2016-2020)

Measure of Progress	Completion Rate
Implementation of preventive measures	High
Laws and regulations developed	High
Communication to raise public awareness about haze pollution, health, and environmental risks	High
Number of activities undertaken (in enhancing cooperation, exchange of information and tech)	High
Institutionalisation of early international haze assistance	Low
Number of regulations and/or incentives for zero burning practice	Low
Number of projects with cross-sectoral and/or multi-stakeholder participation	Low
Assessment and monitoring of the health, economic, social, and environmental impacts of haze	Low

Source: Singapore Institute of International Affairs (2023), summarised from "Executive Summary of the Final Review of the Roadmap on ASEAN Cooperation towards Transboundary Haze Pollution Control with Means of Implementation" (2022)

Regional Cooperation on the Haze

ASEAN and sub-regional efforts on transboundary haze issues can be strengthened. ASEAN member states are in the process of reviewing the Roadmap on ASEAN Cooperation towards Transboundary Haze Pollution Control with Means of Implementation and formulating a new roadmap for the region. The original roadmap was agreed in 2016 and ran until 2020. An independent review commissioned by the ASEAN Secretariat found that while the first roadmap had achieved many of its objectives, progress was low in some action areas. The results of the review are summarised in Table 1.[15]

ASEAN member states have an opportunity to build on the first roadmap and address these gaps. The original plan lacked details or specific metrics for operationalisation in several areas. Some measures called for in the first roadmap also proved difficult for the grouping to implement in practice due to resource constraints and technical difficulties. There is some low-hanging fruit that ASEAN countries can implement under the new roadmap that would help in preventing or responding to future haze incidents. Examples include agreeing on common indicators to track air quality in the region and fostering greater cooperation with private sector stakeholders on land management.[16] Zero-burning incentives and assistance for communities to remain fire-free should be explored. Cooperation between policymakers and the private sector is crucial to fighting the haze.

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3.3 Markets: High Prices and Deforestation Risk

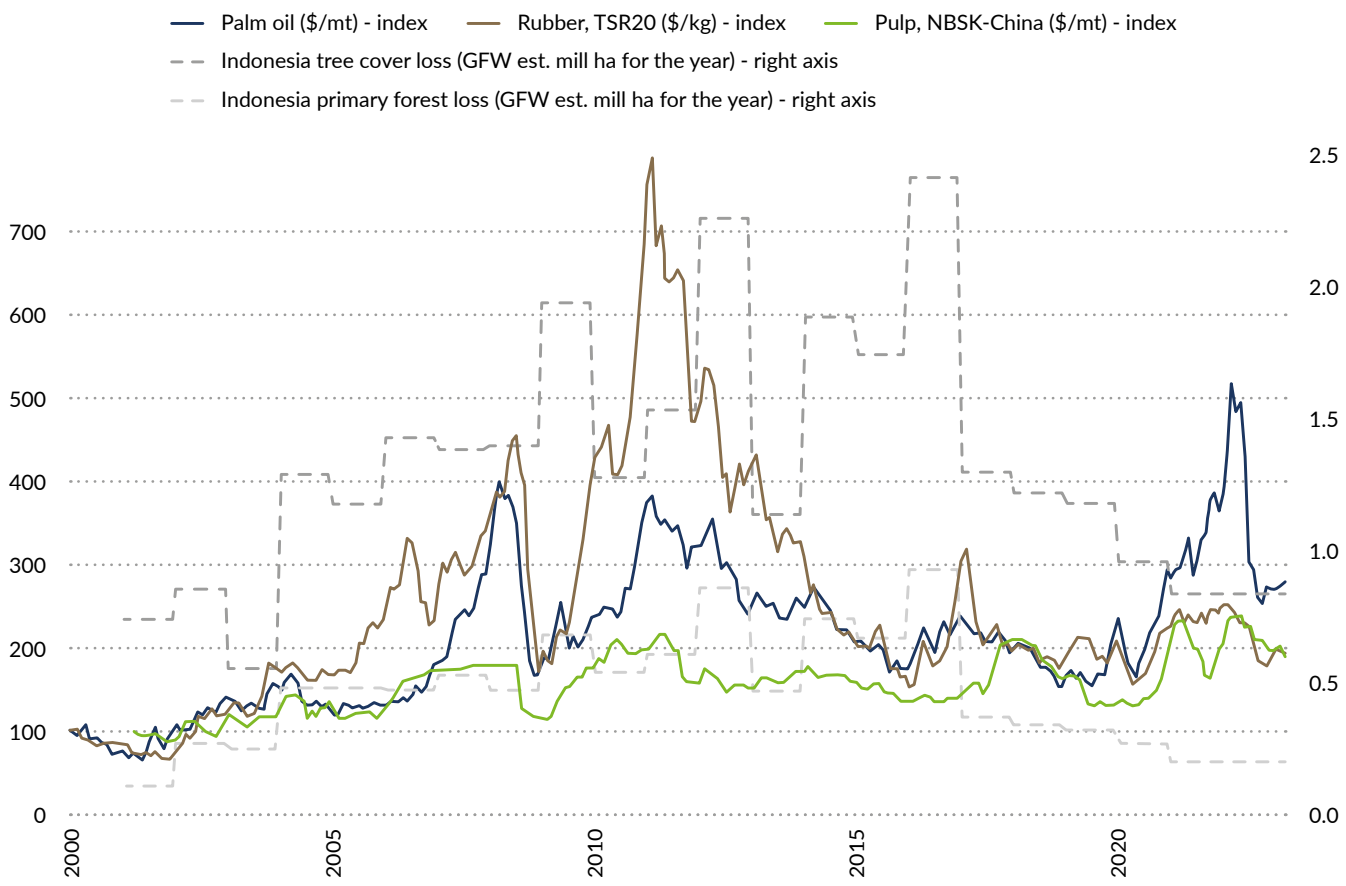
Companies in the forestry and plantation sectors respond not only to government regulations but also to markets and prices. Over the past two decades, deforestation has been linked to rises in agricultural commodity prices. In more recent years, however, ASEAN countries have managed to reduce this correlation. It is to be noted however that commodity prices have been on the rise since the start of the COVID-19 pandemic. The price of palm oil and other commodities spiked further in 2022 due to the Russia-Ukraine war.

Prices have since stabilised and corrected in 2023. Though media reports have mischaracterised this as a fall in commodity prices, the price of palm oil remains elevated in historical multi-year terms. Given this, there is some concern that the current elevated prices might increase the risk of deforestation and therefore the risk of haze.

However, it should be noted that higher palm oil prices are not detrimental in and of themselves. Indeed, good prices are necessary to support livelihoods in palm oil producing countries. Pre-pandemic prices were barely above the break-even rate for producers and might have encouraged some growers to cut corners, including on sustainability and fire prevention efforts.

Ideally palm oil and other commodity prices should be high enough to support livelihoods, but not so high that they instead incentivise unsustainable and illegal expansion. In Indonesia, the government has implemented policies to keep domestic prices of palm oil under control, such as export duty and tax measures.

Figure 4: Commodity prices vs. deforestation in Indonesia



Note: Deforestation rates in dashed lines (millions of hectares), compared to commodity futures price indices (relative to January 2000 as 100)

Source: Khor Reports – Segi Enam Advisors (2023), based on data from the World Bank for palm oil and rubber futures, FastMarkets for pulp, and Global Forest Watch for primary forest and tree cover loss estimates

Figure 4 shows the change in deforestation rate in Indonesia over the past 20 years, plotted against the futures prices for three export commodities – palm oil, rubber, and wood pulp. Deforestation is measured in terms of both tree cover and primary forest loss, with total tree cover including both managed forests and natural ecosystems. The benchmark price data used is for Refined, Bleached and Deodorised (RBD) palm olein traded on Bursa Malaysia, Technically Specified Rubber (TSR), and Northern Bleached Softwood Kraft (NBSK) prices for China.

Prior to 2015, spikes in commodity futures prices were typically followed in subsequent years by increases in deforestation. The severe transboundary haze in 2015 was a wake-up call for sustainability. Since then, deforestation rates have continued to fall despite price spikes. The last few years following the COVID-19 pandemic have seen dramatic surges in prices, but deforestation has remained on the decline. However, the outlook for the coming years is unclear. Final data for late 2022 to the present is not yet available and experts interviewed for this report suggest that there has only been a temporary pause in the recent downtrend. This will change, and not for the better, if there is a haze incident in 2023. In Figure 4 this concern is reflected in a flat line for 2022 onwards.

There is some evidence that there has been an uptick in oil palm planting and replanting activity in 2022. Data from LMC International, a leading global agribusiness consultancy, shows that some 130 million oil palm seeds or seedlings were sold in 2022, up by 30 per cent compared to 2021. This was the highest level of sales in nearly a decade.

This raises questions about where the seeds are being planted, and whether this planting will contribute to deforestation in ASEAN. A portion of these sales are likely in India, which has been trying to strengthen its own domestic palm oil industry. But most sales are thought to be in Indonesia.

Industry experts noted that many plantation businesses in the palm oil industry held off on replanting during the COVID-19 pandemic. Now that prices are higher and the global situation is improving, there is a push to replant aging trees.

Replanting is not a concern for deforestation as such activities take place on existing oil palm plantation areas. Similarly, where businesses are converting land used for other agricultural products over to oil palm, this is neutral from the perspective of deforestation. Indeed, the concern is when new plantations are opened up, especially when this involves illegal encroachment onto primary forest.

The largest businesses in the plantation sector affirm that their expansion efforts are limited and that their operations are now transparent. There is much less scrutiny for community and smallholder farmers, however. This is also true even for medium-sized companies, even when they are operating on an industrial level. Transparency is also limited as ownership of such plantations is often hard to track, even for Indonesian authorities. While categorised as smallholders or as small and medium-sized companies, they are a significant player in the industry and use considerable amounts of land, in toto. Smallholders are estimated to account for some 40 per cent of Indonesia's palm oil industry and a single Indonesian smallholder might be responsible for an area the size of over 100 football fields.

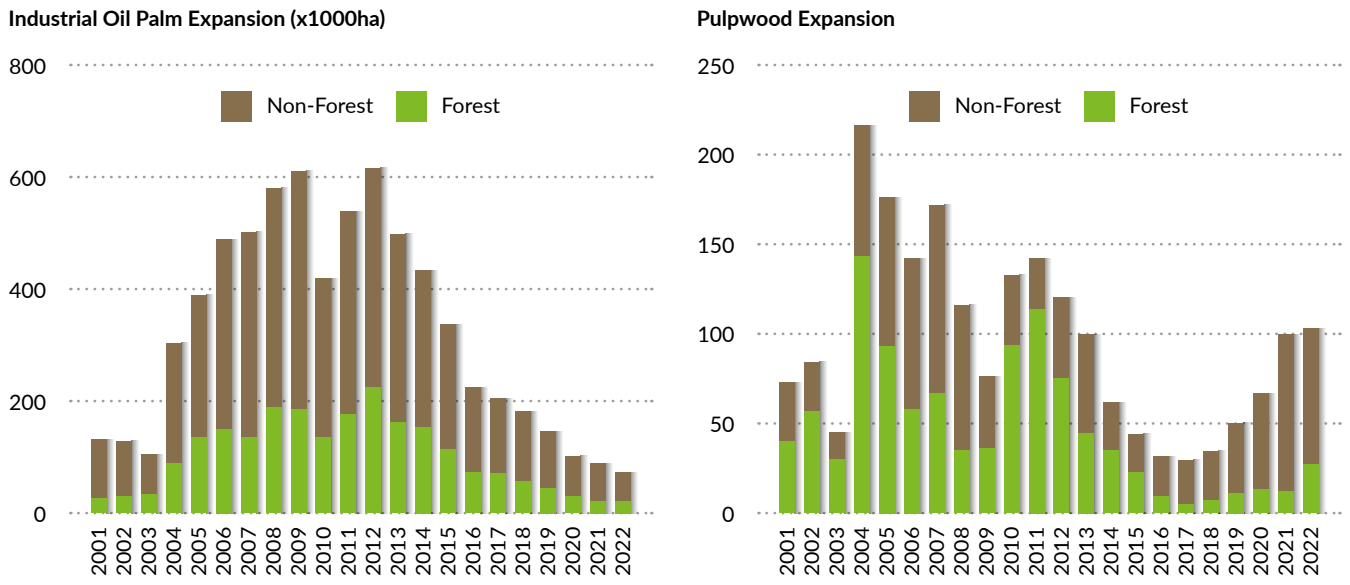
Indonesia's central and provincial authorities have been carrying out a review of the palm oil industry. An official audit in October 2022 and a follow-up audit in early 2023 found that there are some 16.8 million hectares of oil palm plantation area in Indonesia.[17] Currently issued permits allow for around 20.4 million hectares of plantation, suggesting that some businesses still technically have room for legal expansion.

Indonesia's government and private sector are working together to ensure that future development of palm oil and other estate crops involves increasing yield from existing land rather than the creation of new plantations. In October 2022 it was announced that Indonesia would be establishing a national DNA testing laboratory in Medan for oil palm. The lab will screen oil palm seeds and seedlings for large companies and smallholders alike, ensuring that Indonesian growers are able to plant higher-yielding materials and avoid contamination from lower-yielding strains.[18]

In addition to increases in oil palm planting and replanting, there has also been a reported increase in activity in the pulp and paper industry, another major commodity produced in the ASEAN region. Figure 5 compares expansion in oil palm and pulpwood plantations in Indonesia over the past 20 years, based on satellite data and estimates by TheTreeMap, an environmental consultancy. While oil palm expansion has been on a steady decline, there has been some increase in pulp and paper plantations, albeit mostly on non-forest areas.

The expansion in pulp plantations may be due to surges in wood pulp prices following the COVID-19 pandemic, illustrated in Figure 4.[19] Recent NGO reports have also pointed to planned expansion of mill operations by major pulp businesses in Indonesia as a warning sign.[20] Pulp businesses contend that their current plantations and suppliers are sufficient to meet the enlarged mill capacity, for instance due to increased yields. As such, the construction of new mills does not imply there will be more deforestation.

Figure 5: Industrial oil palm and pulpwood expansion in Indonesia



Note: Data does not include smallholder expansion

Source: TheTreeMap (2023), based on data from Landsat and Sentinel-2 Time-series

Greening Growth in the Private Sector

Businesses are aware of the need to strengthen sustainability in their operations and supply chains. One company is reported to have doubled their expenditure on fire prevention and fire suppression between 2022 and 2023, in anticipation of a severe dry season this year. Beyond firefighting, companies are aware of the need to be responsible in their plantation operations and avoid damage to natural ecosystems.

It is important for businesses to continue investing in sustainable practices. There is still a great need for green and transition finance to help drive transformation in the sector, including among small and medium companies as well as smallholder farmers. Action is needed to ensure that supply chains support sustainable products and suppliers, while keeping livelihoods as a focus.

Businesses are aware of the need to strengthen sustainability in their operations and supply chains.

Incentives and Opportunities

Global markets are increasingly requiring due diligence in supply chains. ASEAN economies have opportunities to meet this demand, securing global market access and sustainability premiums.

A major development for 2023 is the expected introduction of the European Union's deforestation regulation (EUDR), which is expected to enter into law sometime this year, potentially taking effect as soon as 2024.

Under the new regulation, companies must show due diligence in ensuring that any commodities being imported to the EU and exported out of the EU are free from deforestation, defined as them not being produced on any land deforested after 31 December 2020. The regulation will apply to palm oil, cocoa, coffee, soy, rubber, and timber, as well as beef and leather.

The regulation has been met with some consternation from Indonesian and Malaysian officials, who contend that smallholder farmers will have difficulty complying with the new law. However, private sector experts interviewed for this report were more sanguine, noting that many growers already have strong due diligence practices in place. Even smallholder farmers may benefit from technical assistance being offered by governments and industry bodies so they can meet the EU's auditing standards.

Talks are under way between Indonesia, Malaysia, and the EU on the EUDR. Although some friction is expected, it appears the EU does recognise the concerns of its trade partners, especially the impact on smallholders. It may be that some accommodation is possible.

Efforts are already in progress to increase transparency in supply chains and strengthen sustainable sourcing. Indonesia has for many years been working to build the jurisdictional approach in its districts, a type of integrated land management where local authorities work closely with all stakeholders in their area, such that the entire district can be considered sustainable. The Ministry of National Development Planning/National Development Planning Agency (*Kementerian Perencanaan Pembangunan Nasional/ Badan Perencanaan Pembangunan Nasional* or PPN/Bappenas) has been championing the jurisdictional approach, with the members of the Sustainable Districts Association (*Lingkar Temu Kabupaten Lestari* or LTKL) being early actors in this effort. Many of the measures being implemented in Indonesia align with the requirements of the EUDR.

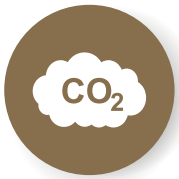
There are therefore opportunities for Indonesia and Malaysia to further strengthen action on traceability and the provision of auditable data, building on existing domestic initiatives. If producers in Indonesia and Malaysia can meet the EU's new standards, there is a chance for them to firmly secure EU market access and prove to international consumers that palm oil and other agricultural exports from ASEAN are indeed sustainable.

4. Sustainable Business and Investment Opportunities

Involvement of the private sector and private financing is crucial to effective stewardship of the region's ecosystems. The Haze Outlook 2023 has explored current sentiment regarding green and transition financing for the agribusiness sector, as well as new green opportunities emerging in the sector.

Green and Transition Financing for Agribusinesses

From our engagements for this report, financial institutions appear to have mixed sentiment about investment in plantation companies. Some in the sector are reluctant to directly finance individual upstream growers, preferring to invest in industry-wide or downstream sustainability platforms. It is possible that some banks are moving to clean up their loan and issue book and may be concerned about reputational risks from plantation firms. Others are more optimistic, indicating that many banks are still actively working with plantation firms in issuing sustainability-linked loans and bonds to assist them in their green transition.



Carbon Credits and Carbon Projects

Indonesia has introduced implementing regulations for its national carbon trading system, and its carbon registry has already begun working with Indonesia's existing carbon project. Thus far, the indication seems to be that Indonesia will allow international buyers to purchase credits and use them towards their own corporate net zero commitments, though for the purposes of Paris Agreement national targets the emissions reductions from forest projects will stay within Indonesia.

Malaysia has started a voluntary offset market under Bursa Malaysia and there are reports of several Malaysian carbon projects coming to market in the short to medium term.

Ultimately, the carbon price within ASEAN countries and across the region will be a determining factor in whether carbon trading can support forest conservation. There are industry efforts under way to promote harmonisation of carbon price and alignment of voluntary markets across the region.

Biofuels and Biomass

Net zero commitments around the world have led to increased attention being paid to the use of sustainable fuels for transport and biomass for electricity generation. At the same time, NGOs are warning that this push may unintentionally drive deforestation. Currently, most sustainable fuel projects use agricultural waste material as feedstock. There are concerns from both activists and the private sector that there is not enough waste to meet demand, which might lead to crude palm oil and other agriproducts being used for feedstock, putting further pressure on land use.

Similar considerations apply to the use of biomass for electricity generation, with biomass either being directly co-fired, or used to generate methane as a substitute for natural gas. The sector is taking off in Asia based on interest from Japan and South Korea, with Indonesia and Malaysia also keen to supply biomass. In Indonesia's case, biomass may also provide a solution to phasing down the use of coal without leaving existing power plants as stranded assets. This is a promising model, but care must be taken to ensure that biomass development does not result in forests being cut down to meet energy needs.

5. Conclusion

The Haze Outlook 2023 report is an assessment of the likelihood of a severe transboundary haze incident occurring in 2023. This year's Haze Outlook has a Red rating on a scale of Green, Amber, to Red, where Red indicates the highest risk.

For 2023, our Red rating is driven primarily by the weather and predictions of a strong El Niño event. The heatwave may be further worsened by a positive IOD event. There are other factors to be considered including market price signals. There is cause for concern.

However, this should not diminish our appreciation of the strides over the past few years taken by Indonesia and others in ASEAN in strengthening law enforcement and improving fire prevention and suppression. These efforts are borne out by the sharp fall in deforestation. Even in the event of a severe heatwave this year, outcomes can be ameliorated compared to the record haze incidents seen during the heatwaves of 1997 and 2015.

> ***There is cause for concern. However, this should not diminish an appreciation of the strides over the past few years taken by Indonesia and others in ASEAN.***

It is important for Indonesia and Malaysia as key countries to continue closely watching the situation on the ground as a strong El Niño beckons. Preventive actions and proactive responses are critical, along with communication with regional neighbours.

For ASEAN, the sub-regional efforts to address transboundary haze issues can be strengthened, for instance in the formulation of a new roadmap following up on ASEAN's previous 2016-2020 Haze-Free Roadmap.

Greater engagement between governments and the private sector on land management is needed. Plantation businesses must likewise continue investing in fire prevention, fire suppression, traceability, and other sustainable practices. Prevention must be emphasised.

Yet preparation is also needed in case of worse outcomes. Protocols to guide and safeguard citizens in the event of heatwaves and severe transboundary haze should be established or expanded. Preparedness is needed to ensure there are sufficient N95 masks and other supplies to avoid shortages.

There is much to be gained from moving the issue of fires and haze to one that emphasizes the incentives and benefits from sustainable and fire-free production. Global markets are increasingly requiring due diligence in supply chains, and ASEAN economies are well-placed to meet this demand. Opportunities in biofuels and biomass should also be explored.

Green and transition finance must help drive transformation in the sector. With effective policymaking and multi-stakeholder cooperation between governments and businesses, ASEAN can ensure that future growth remains both economically and environmentally sustainable.

Appendix: Literature Review

The authors reviewed about 100 pieces of recent literature on peatland and forest fires in Indonesia. Between 2022 and 2023, there were more papers focused on best practices and management of peatland, 44 compared to 20 in the same period reviewed for the Haze Outlook 2022 report.

We only found 17 papers on GHG emissions from fires on peatland, about half the number reviewed in 2022. Yokelson et al. (2022) examined ways to improve emissions estimations and found, on average, that fires in 2019 had lower overall GHG emissions than fires in 2015, but interestingly the emissions of methane did not differ significantly. Graham et al. (2022) studied how different choices of perimeters can produce wildly varying emissions estimates between studies - with differing estimates naturally being a long-standing point of contention between different parties studying the haze.

Papers on peatland management and restoration included Suharti et al. (2022) and Yuliani and Saputra (2022), which found that active involvement of local stakeholders was necessary for ecosystem restoration projects to succeed. Widyatmanti et al. (2022) proposed implementing digital soil mapping to assist in forming more effective policies. Horton et al. (2022) tested several scenarios to quantify the potential of different restoration methods in reducing fires on peatland. Tan et al. (2022) looked at the feasibility of using carbon credit sales as a funding source to offset peatland restoration costs.

A few papers explored supplementing existing weather and fire prediction systems with soil hydrology models (Taufik et al., 2022; Hayasaka and Putra, 2022). Sulaiman et al. (2023) recommended monitoring peatland groundwater levels in addition to ENSO and IOD data, indicating that levels fall before El Niño reaches its peak. Mezbahuddin et al. (2023) found that including soil moisture and water table data improved the accuracy of active fire forecasting models.

Our 2022 report noted an uptick in papers on air pollutants and health impacts, a trend that continued in 2023. Two papers found that long-term exposure to poor air quality increased the chances of developing respiratory problems and premature mortality (Hein et al., 2022; Yin, 2023). Hui Phung et al. (2022) reviewed three approaches (epidemiology, health burden estimation and health risk assessment) to address public health concerns related to haze and concluded that more studies should look into integrating these approaches to understand the effects of the haze.

We also looked at popular environmental news websites such as Mongabay, Chain Reaction Research (CRR), MightyEarth and Eco-Business. Eco-Business reported on the likelihood of drier weather in 2023 and quoted NGOs as saying 2023 would be a test of peat restoration and law enforcement efforts (Eco-Business, 28 Dec 2022). CRR provided coverage on deforestation, highlighting reports of land clearing for palm oil plantations in Indonesia in 2022 (CRR, 26 Sept 2022), with Mighty Earth similarly reporting on forest clearing by palm oil groups in Indonesia (Mighty Earth, Feb 2023). Mongabay published a report on Indonesia's food estate programme, suggesting that limited progress has been made (Mongabay, 11 Apr 2023; Mongabay, 26 Apr 2023).

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