SINGAPORE INSTITUTE OF INTERNATIONAL AFFAIRS

HAZE OUTLOOK 2022

June 2022

Contents

About the Haze Outlook 2022

The Haze Outlook 2022 Report provides a risk assessment of the probability of a severe transboundary haze incident affecting Indonesia, Malaysia, and Singapore in 2022. This is the fourth annual edition of the Haze Outlook. Our inaugural report was launched at the 6th Singapore Dialogue on Sustainable World Resources (SDSWR), organised in May 2019 by the Singapore Institute of International Affairs (SIIA).

The Haze Outlook 2022 Report comprises not only research and analysis but also builds on the SIIA's ongoing engagement with sustainability stakeholders in the region. A total of 24 stakeholders were interviewed and consulted for this report, representing a cross-section of government bodies, businesses, NGOs and academics.

This report was released at the 9th SDSWR on 28 June 2022.

The report was directed by Simon Tay, Chairman, SIIA and Associate Professor, Faculty of Law, National University of Singapore. The authors are Aaron Choo, Senior Assistant Director (Special Projects and Sustainability), SIIA, Khor Yu Leng, Senior Fellow (Sustainability), SIIA, Siti Bazilah, Senior Executive (Sustainability), SIIA, and Nadirah Sharif, Research Associate, Segi Enam Advisors, with input from Lim Choon Leng, Director (Policy Programmes), SIIA. All views expressed in the report are those of the authors, unless otherwise credited.

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, the SIIA has championed the fight against the transboundary haze since 1997, when it organised Singapore's first haze dialogue with the Singapore Environment Council. In 2017, the SIIA authored the first study on sustainable finance in Singapore and how to move green investment forward. Our current sustainability initiatives include exploring the intersections between the green economy and digital economy, and how ASEAN can move towards becoming a climate community with common approaches to carbon and other policy areas, achieving scale and competitiveness.

1. Foreword

The transboundary haze caused by forest and land fires has been a long-standing problem for Southeast Asia. 2022 marks the 25-year anniversary of the 1997 haze crisis that brought the issue into the regional spotlight. For the past two years, skies across the region have remained haze-free.

This is in large part due to positive and forward-looking efforts by the administration of Indonesian President Joko Widodo, known as Jokowi, to improve forest and land management in the country. In November 2021, President Jokowi set a legally-binding target for Indonesia to transform its forest and other land use sector into a net carbon sink by 2030. This is a major step, as the sector currently accounts for almost half of Indonesia's emissions in a normal year, and even more during a severe haze crisis.

However, there may be some risks that cloud the horizon.

Our Haze Outlook 2022 report assesses that there is a medium or Amber risk of transboundary haze in 2022, on a scale of Green, Amber, and Red. The region may experience some fires with the probability of some haze in 2022 though the situation is unlikely to reach the extent seen in previous major haze incidents in 1997-98, 2013, 2015, and 2019. This is a more cautionary assessment compared to our 2021 Haze Outlook, which was green. The shift in colour and our assessment does not reflect a weakening of sustainability policy in Indonesia and the region. The caution arises instead from an increasing tension between market forces and climate action in sectors that impact the risk of haze.

Market Forces Driving Haze Risk

The haze is largely caused by the use of fire in agriculture, for clearing land for planting or replanting. If left unchecked, fires can burn out of control, damaging forests and peatlands. Historically, a contributing factor to past haze incidents has been the world's insatiable demand for agricultural commodities. Sectors such as palm oil and pulp and paper have previously been implicated in past haze episodes. Spikes in commodity prices have frequently been followed by an increase in deforestation in subsequent years, as growers respond to price signals by stepping up their activity.

Currently prices for many commodities are at a record high. While this can bring benefits to Indonesia and industry players, high prices may also be a warning sign of haze and deforestation to come. The price of palm oil, a major export from the region, has been trending sharply upwards over the past two years due to the COVID-19 pandemic, as lockdowns have reduced supply while demand has increased. In recent months, the price of palm oil has been driven up even further due to global factors influencing the supply of other vegetable oils, such as the outbreak of the Russia-Ukraine war and poor harvests in South America.

Indonesian authorities have implemented a number of measures to rein in the price of palm oil within Indonesia's domestic market, culminating in an export ban between April and May 2022 and increased regulatory scrutiny on the industry. Recent corruption allegations in Indonesia have also brought controversy over the conduct of some companies in palm oil sector. Indonesian policymakers are aware that their export controls and the export ban between April and May 2022 have had an impact on global markets and Indonesia's trade relations, but their concerns are – quite understandably – to address the problem of high palm oil prices as a domestic issue, first and foremost.

While these policies might have had some cooling effect on agribusiness activity in the very short term, experts interviewed suggest that these policies are unlikely to dampen plantation expansion and replanting in the medium to long term. The global factors driving high commodity prices are still in effect.

Industry experts suggest that multinational corporations and the largest companies in Indonesia's plantation industry are unlikely to engage in burning, especially as the sector is now in the spotlight. However, there remains potential for abuse from smaller growers and even medium-sized or "national-level" companies that operate without as much visibility, selling to the leakage market. There is still a need to increase monitoring of forests and take action against the illegal use of fire by entities seeking to maximise profit.

From Climate Risk to Climate Opportunities

Fortunately, the weather in 2022 is expected to be normal or wetter-than-average. If higher rainfall persists into the rest of this year, it will limit the degree to which fires and haze can spread. But the region cannot continue to depend on favourable weather to prevent the haze. Permanent solutions are needed.

It is important to note that Indonesia is not the only country in the region that produces haze from agricultural burning. Over the past few years, transboundary haze has also affected Thailand and the Mekong region. This report focuses on the recurring haze that affects Indonesia, Malaysia, Singapore, and others in the southern part of ASEAN such as Brunei, but concerted effort and cross-border cooperation is required to break the causal link between economic pressures and environmental degradation that casts a shadow over the entire ASEAN region.

One promising model for responsible forest stewardship in the region is the generation and sale of carbon credits from nature-based solutions (NBS), also termed natural climate solutions. The Haze Outlook 2022 report contains a section examining current efforts to provide market incentives to keep natural landscapes intact. It remains to be seen how the nascent carbon project sector will develop in the ASEAN region, but for the moment the signals are promising. Ideally, natural ecosystems will be seen as valuable carbon sinks and sources of biodiversity, rather than merely land that can be converted into plantations.

Interest in carbon trading is growing, especially as consensus is building on Article 6 of the Paris Agreement after COP26 in Glasgow. Carbon trading mechanisms will encourage the development of nature-based projects, providing economic incentives to conserve and restore ecosystems. As these develop, they will provide incentives and more opportunities to link growth to conservation and fire-prevention efforts.

The Road Ahead

Our region is still at an inflection point in the aftermath of the COVID-19 pandemic, and the tension between the competing demands of economic growth and environmental sustainability has been further exacerbated by concerns over food prices and expected increases in the cost of financing for companies. Cooperation and policy coordination will be critical to address these tensions so that there can be not only a return to growth, but for growth that is green and inclusive. Such cooperation is needed not only within and between governments but also across supply chains.

Our Haze Outlook for this year is Amber, and care must be taken in the months and years ahead.

Simon Tay
Chairman, Singapore Institute of International Affairs

2. Executive Summary

Risk of a Transboundary Haze Event in 2022:

Amber*

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

The annual Haze Outlook report provides an assessment of the likelihood of a transboundary haze incident affecting Indonesia, Malaysia, and Singapore. There is **some** risk of haze in 2022, rated Amber on a scale of Green, Amber, and Red. While it is probable that the region will experience some haze pollution, it is unlikely to be on the same degree as transboundary haze incidents in 1997-1998, 2013, 2015, and 2019. Our risk assessment is based on three factors: weather (projected rainfall and temperature), people (human behaviour), and policies (climate and land management directions). Based on weather factors alone, there is no elevated risk of haze. Notwithstanding this, the current record high palm oil and other forest commodity prices may drive growers to expand or intensify their plantation operations with land clearing through the illegal use of fire, increasing the potential for haze.

Weather: Previous major haze incidents have occurred during severe drought periods. The El Niño–Southern Oscillation (ENSO), the collective name for the El Niño and La Niña phenomena that can affect rainfall, is expected to be neutral or La Niña in the latter half of 2022. The Indian Ocean Dipole (IOD), the other influential climate phenomenon in the region, is projected to be negative. The region will therefore experience an average or wetter-than-average dry season from June to September, not a severe one.

People: Fires contributing to haze are largely attributed to the use of fire to clear forest and peat area so they can be converted into plantations, or to dispose of agricultural waste. The COVID-19 pandemic over the past two years has served as a powerful dampener on economic activity. However, the economic situation has since changed sharply.

- **Palm Oil Prices:** This year, palm oil prices have risen to unprecedented levels amidst a commodity price boom, further exacerbated by the Russia-Ukraine war impacting vegetable oil supply. The benchmark Malaysia futures monthly price for crude palm oil (CPO) has soared in the first half of 2022, at one point exceeding MYR8,540 or US$1,940 per tonne.

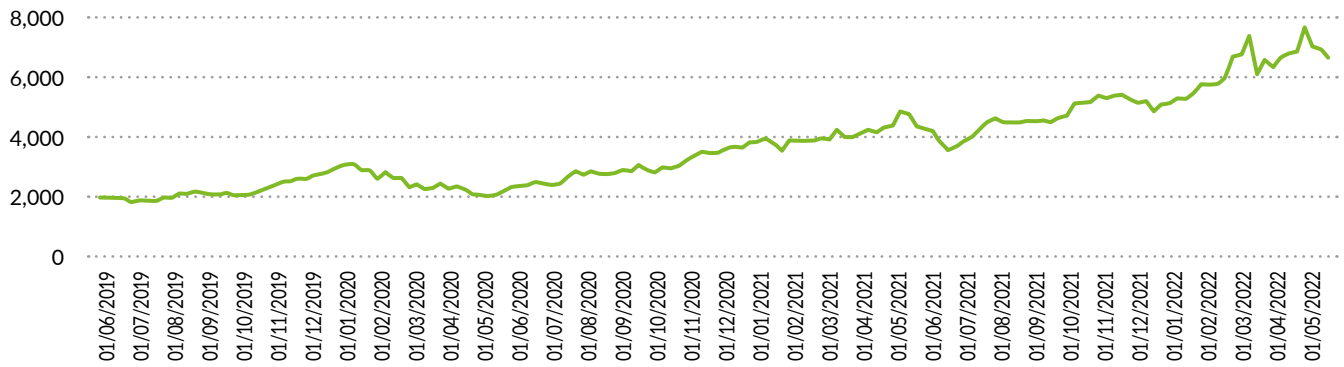
- **Oil Palm Seed Sales:** In 2021, oil palm growers bought double the amount of oil palm seeds than they did in 2018 when palm oil prices were at a historic low.

These trends suggest that there will be more planting of oil palm in the near term, increasing the risk of haze if fire is used to open up new land for planting or to prepare land for replanting.

Policies: The government of President Joko Widodo (Jokowi) has undertaken and consolidated many policies that lower the risk of fire, including issuing a permanent moratorium on the granting of new concession permits in primary forest and peatland areas in August 2019, preventing these areas from being logged or converted to plantations. In February 2022, the Ministry of Environment and Forestry issued a ministerial decree committing Indonesia to achieving net carbon sink for the forest and other land use sector by 2030. Over the past three years, fire prevention and suppression efforts have also been strengthened at both the central government and provincial levels.

There is, however, uncertainty relating to the sharp rise in palm oil prices, which may have a potential impact on land clearance and planting by growers. Unless closely and strictly policed, some may resort to the illegal use of fire for land clearing, and may illegally encroach on forest and peatland areas, in order to maximise profit. There is also controversy surrounding the policy response to the rise in palm oil prices. The Indonesian government has implemented measures to bring down palm oil prices domestically to alleviate inflation in food prices and tackle cooking oil shortages, including a ban on palm oil exports from late April and May 2022. However, experts interviewed for this report agreed that these policies are unlikely to dampen planting activities as the global factors that are driving high palm oil prices are still in effect.

Figure 1: Crude Palm Oil Futures (MYR/tonne, weekly prices)



Source: Based on data from Bursa Malaysia

Conclusion

While high commodity prices have some positive economic effects, they also increase the risk of haze. Industry experts suggest that multinational corporations and the largest companies in Indonesia's plantation industry are unlikely to engage in burning, especially as scrutiny on the sector has increased sharply over the past few months. However, there remains potential for abuse from smaller growers and even medium-sized or "national-level" companies that operate without as much visibility. There is still a need to increase monitoring of forests and take action against the illegal use of fire by entities seeking to maximise profit.

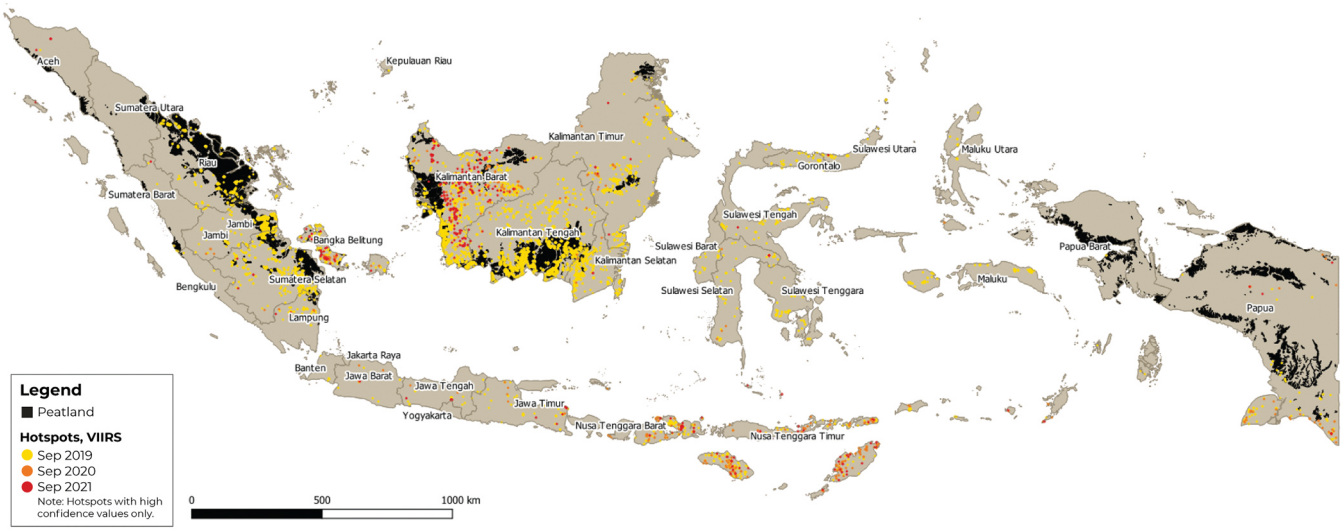
Efforts to strengthen governance of the forest and other land use sector, matching the key commitments that the Jokowi administration has undertaken, can add to the sense of trust that Indonesia is implementing sound climate policies. Indonesia is moving swiftly to achieve climate and emissions reduction targets, including implementing regulations to promote the generation of carbon offsets from ecosystem restoration projects. There are also promising carbon market developments underway in Malaysia. If or when these efforts come to fruition, the region can turn its forest ecosystems from a climate risk into a climate opportunity. In this context, the avoidance of fires and haze will be further evidence of the positive sustainability trends that are emerging in Indonesia and across the agribusiness industry.

3. Building on 2021

Our Haze Outlook 2021 report gave a Green rating about the likelihood of haze in our region for the year, based on favourable weather forecasts, the impact of the COVID-19 pandemic on agricultural activity, and the continued effectiveness of fire prevention and suppression initiatives. Globally, 2021 was a hot year, the sixth warmest on record since 1880, and taken with 2020 and 2019 were the three hottest years on record.[1] Yet the year proved to be a wet one for Indonesia and the region owing to La Niña climatic conditions that increased rainfall, while the Indian Ocean Dipole (IOD), the other major meteorological phenomenon that can affect rainfall, remained muted for most of the year.

Indonesia experienced a low number of fire alerts in 2021. Only 364 high-confidence fire alerts were recorded by NASA's Fire Information for Resource Management System (FIRMS) in September 2021 at the peak of the dry season, compared to the 427 and 8,698 hotspots recorded by satellites for the same months in 2020 and 2019 respectively.[2]

Figure 2: High-confidence fire alerts in Indonesia for the month of September (2019–2021)



Note: This map shows high-confidence fire alerts in Indonesia for 2019 (yellow dots), 2020 (orange dots), and 2021 (red dots), with the location of peatland ecosystems indicated in black. Peatlands sequester a high amount of carbon but also release a high amount of carbon when drained and burnt. 2021 saw considerably fewer fires than previous years. However, some 2021 fires appear to be "repeat" burning, with fires occurring in the same places as the past two years, particularly in West Kalimantan and the Bangka-Belitung Islands, which have extensive oil palm plantations.

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

Indonesia's Ministry of Environment and Forestry (*Kementerian Lingkungan Hidup dan Kehutanan* or KLHK) reported that some 160,104 hectares of forest and peatland were damaged by fires in 2021, an area approximately twice the size of Singapore. While large, this represents a significant drop from the 296,942 hectares of burnt area recorded in 2020 and the 1.6 million hectares recorded in 2019.[3] KLHK also reported that Indonesia's forest and land fires released close to 30 million tonnes of CO_2 equivalent emissions in 2021, compared to over 40 million tonnes in 2020 and 624 million tonnes in 2019.[4] Tree cover loss and primary forest loss data from Global Forest Watch (GFW) showed a similar improvement in 2021 compared to the previous years.[5]

Table 1: Deforestation indicators in Indonesia (2019-2021)

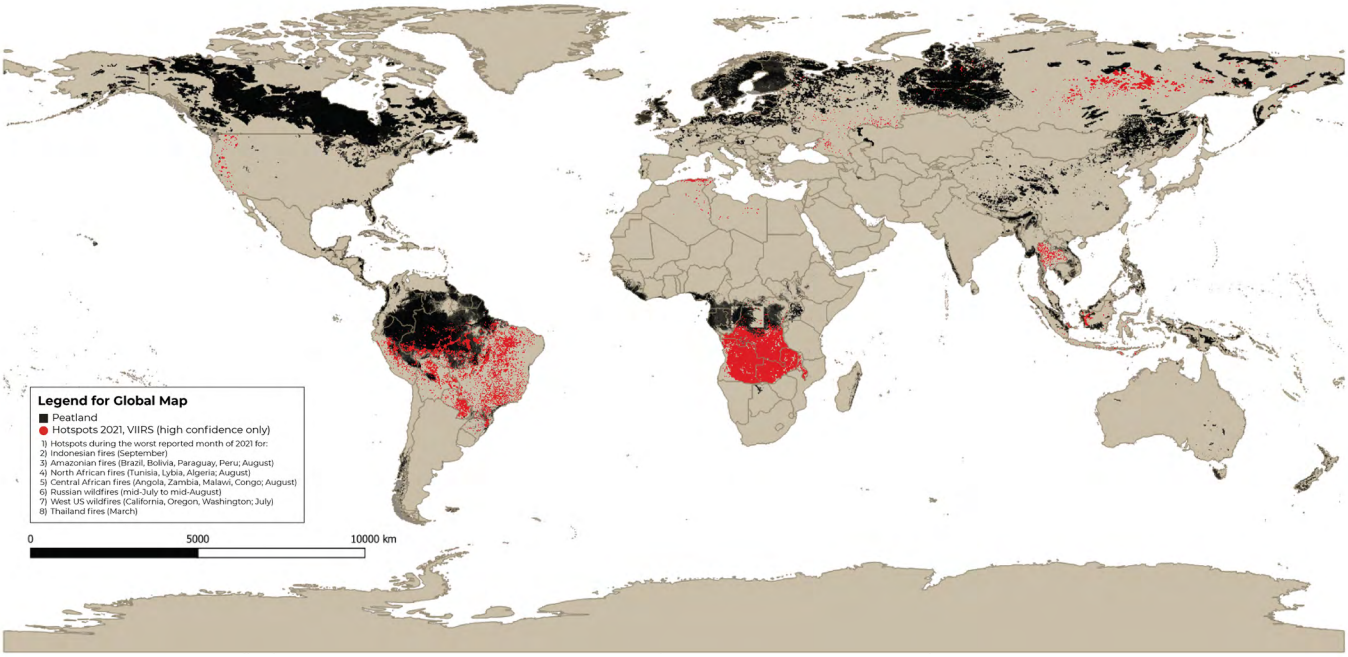
Deforestation Indicators	2019	2020	2021
Tree cover loss (ha)	1,176,884	961,587	841,391
Primary forest loss (ha)	323,646	270,057	202,905
High-confidence fire alerts in September	8,698	427	364
Burnt area (ha)	1,649,258	296,942	160,104
Emissions from fires (tonne CO_2e)	624,113,986	40,204,855	29,638,239

Source: Based on tree cover and primary forest data from GFW, fire alerts from FIRMS, burnt area and emissions data from KLHK, with official data in grey

Taken together, the data indicates that Indonesia made substantial progress in achieving fire prevention and suppression targets over the course of 2021. This is notable, as other economies and regions around the world still experienced severe fire events in 2021, and have suffered an increase in tree cover and primary forest loss compared to the trend in Indonesia.

However, as business activity returns to normal following the closures imposed by the COVID-19 pandemic, and amid soaring commodity prices exacerbated by the Russia-Ukraine war, Indonesia's authorities, private sector, and NGOs will face a greater challenge in managing the situation in 2022 and beyond.

Figure 3: Selected global fire events



Note: The map shows fire alerts from satellite data (red dots) during the worst reported months of the year for selected major wildfires: (1) Indonesian fires (Sep 2021); (2) Amazonian fires (Dec 2021); (3) North African fires (Tunisia, Libya, Algeria; Aug 2021); (4) Central African fires (Angola, Zambia, Malawi, and Congo; Aug 2021); (5) Siberian wildfires (mid-Jul to mid-Aug 2021); (6) California wildfires (California, Oregon, Washington; Jul 2021); and (7) Thailand fires (Mar 2021). The black areas are peatlands.

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

4. Issues to Watch in 2022

Based on weather factors alone, the risk of haze would be low. The southern portion of the ASEAN region, including Indonesia, Malaysia, and Singapore, is expected to experience a regular or relatively wetter dry season this year – not a severe dry season. But the current unprecedented surge in commodity prices creates an element of uncertainty. Historically, peaks in agricultural commodity prices have frequently been followed by a spike in deforestation due to the expansion of plantations in the following years, resulting in haze incidents when this agricultural activity coincides with severe drought seasons. There are some signs that planting activity is set to increase, such as a rise in oil palm seed sales, which is why the Haze Outlook 2022 report gives an **Amber** rating for this year.

> ***"Based on weather factors alone, the risk of haze would be low. But the current unprecedented surge in commodity prices creates an element of uncertainty."***

4.1 Weather: Wetter Weather, But Precautionary Measures Still Needed

The southern part of ASEAN experiences a dry season between June to September every year, but the amount of rainfall during the dry season can vary significantly. The fires that cause the haze are man-made, but wetter weather will help in preventing and suppressing fires, while drier weather increases the chance that fires might burn out of control. Major transboundary haze events have often coincided with severe drought conditions.

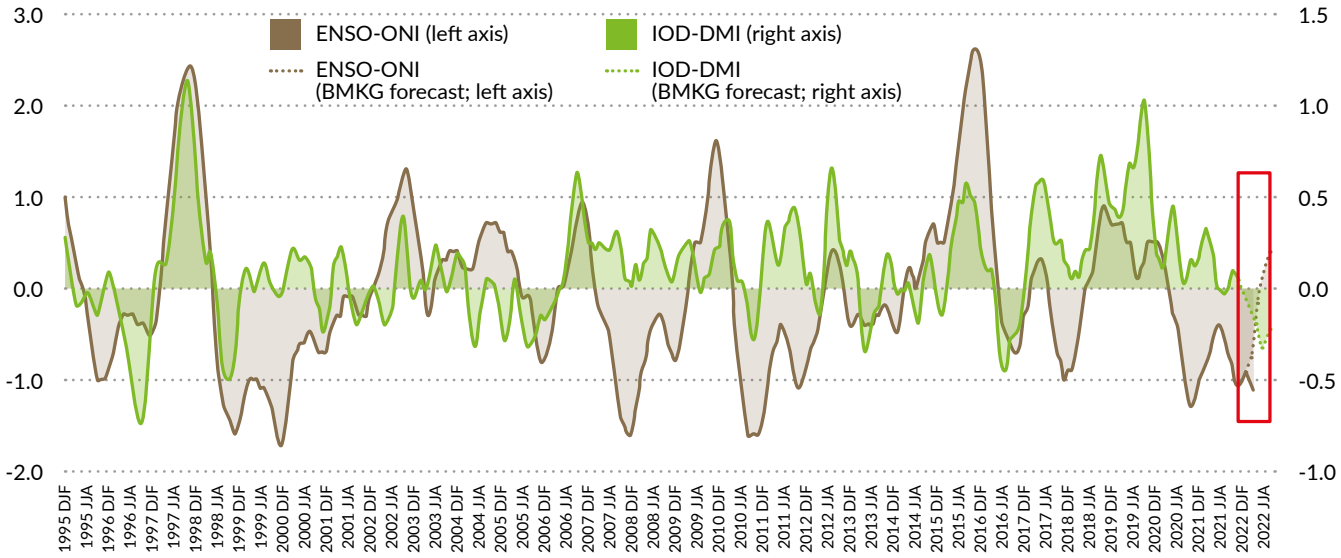
Normal or Wetter-than-average Weather Ahead

Based on current forecasts as of June 2022, the ASEAN Specialised Meteorological Centre (ASMC) believes that we will see normal or above-normal rainfall for the rest of 2022. There are two main climate phenomena that indicate how severe the dry season will be, the El Niño–Southern Oscillation (ENSO), the collective name for both El Niño and La Niña, and the Indian Ocean Dipole (IOD).[6] The models for both suggest that this year's dry season will be wetter-than-average.

The first half of 2022 has seen La Niña conditions, which correspond to above-normal rainfall in Southeast Asia. Indonesia's Meteorology, Climatology, and Geophysical Agency (*Badan Meteorologi, Klimatologi, dan Geofisika* or BMKG) has reported that La Niña conditions strengthened somewhat between April to May 2022, compared to previous months. There is disagreement between models as to whether some La Niña conditions will persist through the rest of the year or if ENSO will return to neutral. As of late June 2022, the Malaysian Meteorological Department (MetMalaysia) expects mild La Niña conditions to continue in the latter half of 2022, adding that even if La Niña weakens, rainfall should still be at normal levels.

IOD is expected to be negative between June to August, and some models predict the negative IOD conditions to be quite strong this year. A negative IOD is also typically an indicator that the region will see more rainfall.[7]

Figure 4: ENSO - Oceanic Niño Index (ONI) and IOD - Dipole Mole Index (DMI)



Note: Graph is based on readings for December, January, February (DJF). Positive or higher areas indicate drier weather, while negative or lower areas indicate wetter weather.

Source: Khor Reports - Segi Enam Advisors, based on data from National Oceanic and Atmospheric Administration (NOAA) and Meteorology, Climatology, and Geophysical Agency (BMKG)

Precautionary Measures Still Needed

However, meteorological forecasts can vary. An earlier analysis by BMKG in March 2022 warned that the 2022 dry season might still be drier than the weather seen in 2021, and therefore the risk of forest and land fires might be higher compared to 2021, meaning that government, private sector, and NGO firefighting and fire prevention groups should be prepared.[8]

One NGO told the authors of the report that they see some potential for transboundary haze in 2022 from fires in degraded peatland areas that remain in critical condition. Fires in Riau, Jambi, and South Sumatra might reach Singapore and Peninsula Malaysia, while fires in West Kalimantan might affect air quality in East Malaysia. However, the NGO noted that this haze would be "short and limited" compared to previous haze years.

It is important to note that although the higher rainfall corresponding to La Niña and negative IOD conditions is good in terms of suppressing fires and preventing the haze, it is not necessarily good in other ways. In 2021, northern Sumatra, parts of Kalimantan, and Peninsular Malaysia experienced notable disruptions due to higher rainfall across the year, with the rain causing flood episodes and damage to infrastructure.

Industry and NGO experts that the authors spoke to for this report had mixed sentiments about the weather and the risk of haze in 2022. Some were optimistic about wetter-than-average conditions helping to keep fires under control. But one NGO said that, in their view, there is too much reliance on rainy weather to mitigate fires and haze instead of fire prevention on the ground; Indonesian authorities have often conducted cloud seeding to increase rainfall and counter the spread of fires.

While the weather is a factor in determining whether the haze will return, ultimately the haze is driven mostly by human action – it is people who set most fires, and the presence or absence of rainfall only influences how far they may spread. As such, there is a need to be on alert as economic activity is returning to normal in the aftermath of COVID-19 disruptions, and commodity prices remain at elevated levels.

4.2 People: High Commodity Prices and Deforestation

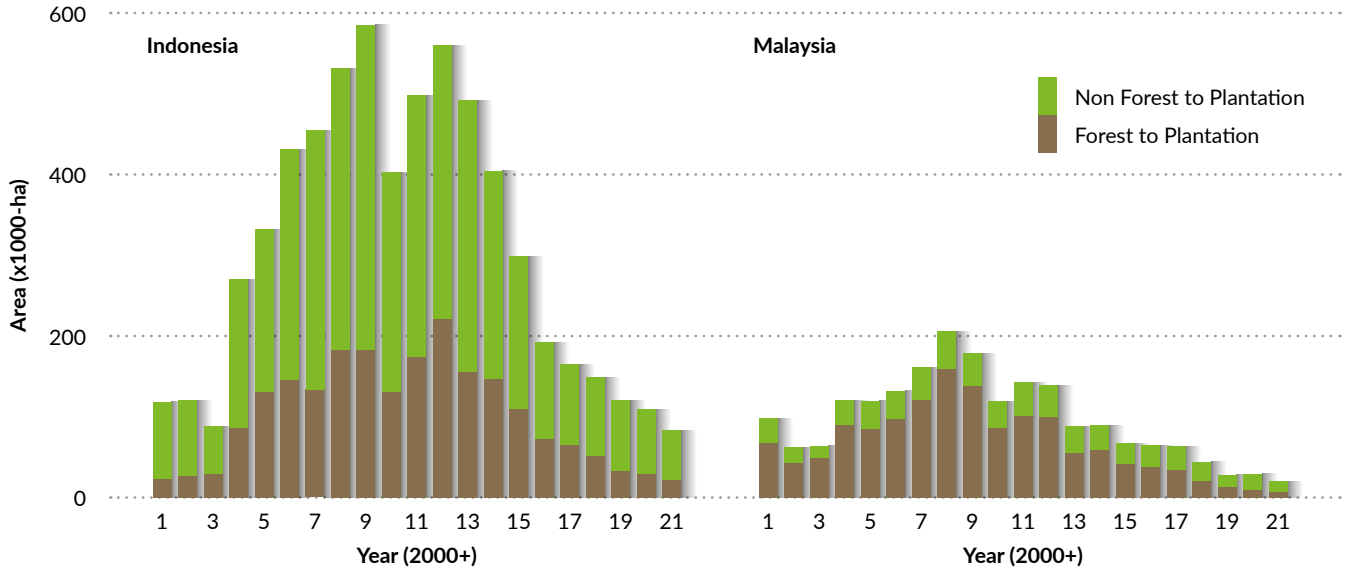
The Haze Outlook 2022 report assesses that there is some risk of haze in 2022, albeit not to the extent of the major transboundary haze crises seen in years such as 1997-98, 2013, 2015, and 2019. The elevated haze risk comes from the current situation of record high commodity prices, especially the price of palm oil. Palm oil is the world's most widely consumed vegetable oil, and Indonesia and Malaysia produce most of the world's supply. Due to the current high prices, growers may expand their plantation areas, resorting to clearing land through fires that might burn out of control. Some bad actors may also illegally encroach on forest areas, turning natural ecosystems into plantations.

"The elevated haze risk comes from the current situation of record high commodity prices, especially the price of palm oil."

Constraints on Supply amid Rising Demand

Over the past decade, the expansion of oil palm plantations has declined dramatically, due to government policy measures such as Indonesia's moratorium on the conversion of primary natural forests and peatlands into plantations and logging concessions, as well as sustainability commitments from major business groups in the palm oil industry.

Figure 5: Industrial oil palm expansion in Indonesia and Malaysia



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

Researchers and NGOs believe that deforestation due to plantation expansion is still occurring despite these measures, but deforestation has slowed. In 2021, some 19,000 hectares of forest areas were cleared for oil palm plantation development in Malaysia, Indonesia, and Papua New Guinea according to a report by Chain Reaction Research, a drop compared to the 38,000 ha and 90,000 ha of deforestation in 2020 and 2019 respectively.[9] A separate analysis by TheTreeMap was less optimistic, estimating that in Indonesia alone some 22,000 hectares of primary forest were converted into oil palm plantations in 2021, and that oil palm plantations in Indonesia expanded by a total of 82,000 hectares including expansion on non-forest land.[10] However, even this estimate reflects the same overall trend.

"The expansion of oil palm plantations has declined dramatically due to government policy measures and sustainability commitments from major business groups."

In Malaysia, palm oil production in the 2021/22 marketing year stands at 18.7 million tonnes, as reported by the US Department of Agriculture. While this represents an increase over the previous year, production levels are still three per cent lower than Malaysia's five-year average output. The cause of the decrease is attributed to acute labour shortages arising from the COVID-19 pandemic, as much of Malaysia's plantation industry depends on migrant workers from the region, and the cross-border flow of labour has not yet recovered.[11]

In contrast, Indonesia's palm oil sector has made it through the pandemic relatively well, with its 2021/22 production coming in at 44.5 million tonnes, and production expected to reach 46 million tonnes in 2022/23. However, Indonesia's palm oil exports have moderated over the past few months due to increased domestic market obligations and other price control measures, including a temporary export freeze from April to May 2022.[12]

Surging Palm Oil Prices

Global vegetable oil and palm oil prices were already on the rise at the start of 2022, due to existing supply trends and the effects of the COVID-19 pandemic on labour mobility and logistics. Although the supply of palm oil was adversely impacted by the pandemic, demand for the commodity remained stable or increased. In early 2022, the global supply of vegetable oils was further affected by poor harvests of soybeans and maize in parts of Argentina, Brazil, and Paraguay, due to bad weather. Finally, the outbreak of the Russia-Ukraine war in February 2022 sent additional shocks through global markets. Russia and Ukraine are both major producers of sunflower oil, as well as fertilisers used for agriculture.

The price of Crude Palm Oil (CPO) futures, traded on the Bursa Malaysia Derivatives, rose from average monthly levels of around MYR2,081 or US$475 per tonne between June 2018 and September 2019 to MYR7,130 or US$1,627 per tonne on the eve of Russia's invasion of Ukraine. The price briefly spiked to an unprecedented MYR8,510 or US$1,942 per tonne at the start of March, before stabilising to around MYR7195 or US$1,642 per tonne in mid-March. In context, the previous peak was around MYR5,609 or US$1,280 in 2011.[13]

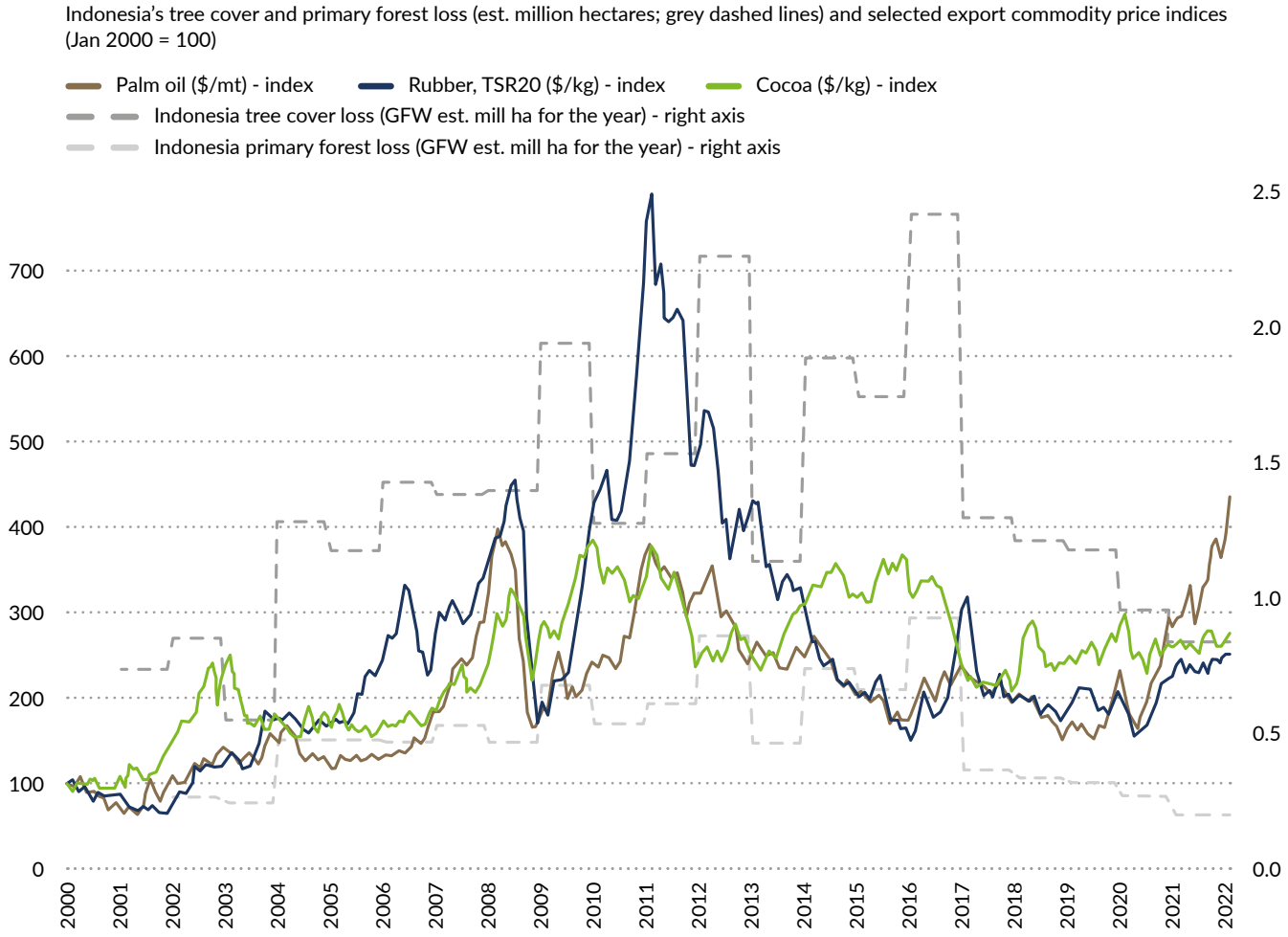
Greening the Industry

The largest business groups in the palm oil industry have adopted voluntary sustainability commitments over the past decade, including Roundtable on Sustainable on Palm Oil (RSPO) initiatives in 2004 which helped to reduce both upstream greenfield expansions and corporate deals.[14] The major palm traders and processors, which are estimated to control up to three-quarters of the palm oil trade by volume, have also adopted "No Deforestation, No Peat, No Exploitation" (NDPE) pledges and traceability programmes.

There is now a degree of confidence regarding the sustainability practices of plantations directly operated by major businesses. But there may still be issues with individual suppliers within the supply chains of business groups, and NGOs remain worried about deforestation and unfettered expansion by small to medium-sized plantation operators – companies that operate at the "national level" without any multinational presence – as well as smallholder and community farmers, which some estimates put at 40 per cent of palm oil plantations in Indonesia.

"There is now a degree of confidence regarding the sustainability practices of plantations directly operated by major businesses. But NGOs remain worried about deforestation by small to medium-sized plantation operators."

Figure 6: Commodity prices and tree cover loss



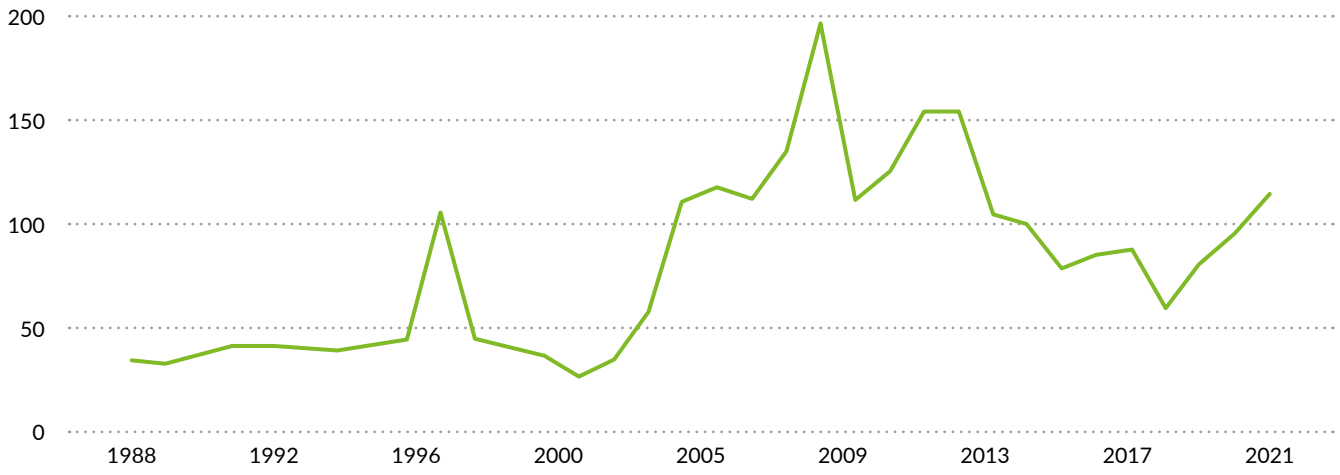
Source: Khor Reports – Segi Enam Advisors, based on data from the World Bank for commodity prices and Global Forest Watch for tree cover and primary forest loss

Deforestation and Planting in Response to Price Signals

In previous Haze Outlook reports, we have charted the post-2016 decline in the rate of Indonesia's tree cover and primary forest loss versus the rise in palm oil, rubber, and cocoa prices. This figure has been updated for 2022. The focus of this report's discussion is on the palm oil industry, but other commodities are included for comparison purposes as the issues surrounding commodity prices and deforestation are not confined to one industry. Historically, increases in commodity prices have been followed in subsequent years by a rise in deforestation. That said, there has been some evidence that Indonesia's commodities sector has been able to break this link to some extent, given that tree cover and primary forest loss has trended downwards while commodity prices have continued to climb.

However, the current surge in palm oil prices puts renewed pressure on this relationship. Even ordinary farmers are highly responsive to changes in commodity prices.[15] NGOs interviewed for this report said that their smallholder contacts saw the buying prices for their oil palm FFB jump by two or three times in the first quarter of this year. There is some lag time, measured in months, between spikes in palm oil prices and purchases of oil palm seeds by growers for planting – but there is a response.

Figure 7: Annual sales of oil palm seeds (sales in millions for selected years)



Source: Based on data from LMC International and interview conducted by Khor Reports - Segi Enam Advisors

Data from LMC International, a major agribusiness economic consultancy, shows a doubling of seed sales to over 100 million in 2021, up from around 60 million in 2018 when palm oil prices were at a historic low. This suggests that new planting of oil palm is occurring in response to price increases. It is thought that one third of seed purchases are for replanting of existing plantations, while two thirds are for new planting or land use change. However, current seed sale numbers are still below the numbers seen between 2004 and 2013. It is likely that the largest plantation companies are not expanding, and that most of this planting is being conducted by smaller, less visible, companies, as well as smallholder farmers.

"It is likely that most of this planting is being conducted by smaller, less visible, companies, as well as smallholder farmers."

Several industry representatives consulted for this report confirmed that there does not appear to be an increase in investment flowing into the plantation industry at the large business group level, likely due to the Indonesian government's strict moratorium on opening up forest and peatlands for plantation licenses, the continued labour shortages in Malaysia, and negative international perception of palm oil as a commodity.

Building Sustainability: Community and Smallholder Engagement

Although Indonesian government restrictions on corporate expansion in the plantation industry have tightened, smallholder farmers and communities face fewer restrictions. NGO reports have suggested that provincial and district politicians in Indonesia might even encourage farmers to expand during election years, as a way of gaining favour and votes.[16] With Indonesia heading into a general election and presidential election in 2024, this may also be a factor in determining the risk of haze in the medium term. Ideally, central government policymakers and local politicians will be able to steer farmers away from forest areas and ensure that agriculture is conducted sustainably, rather than through the use of fire.

In principle, Indonesia has banned the use of fire to clear land for agricultural purposes, but in practice the use of fire varies from jurisdiction to jurisdiction. In some areas, smallholder and community farmers have an exemption and are legally allowed to use fire to clear up to two hectares of land. Farmers conducting controlled burns are supposed to inform the authorities before proceeding – thus allowing for some oversight, and alerting firefighting teams to stand by. In previous Haze Outlook reports, we have noted that farmers might not necessarily be aware of this requirement. However, during our interview process for this year's report, one industry expert expressed the opinion that most communities should now be largely informed about the need to register their burning activities.

"It is difficult to convince communities to transition to greener methods of agriculture when they lack resources and experience. Government, private sector, and NGO initiatives have thus continued to focus on community engagement."

The use of fire for agriculture in any capacity, even a limited one, may seem unacceptable from the perspective of developed economies. However, it must be emphasised that the use of fire by communities occurs in areas where the practice is long-established. In rural areas, mechanical alternatives may be expensive and very limited. It is difficult to convince communities to transition to greener methods of agriculture when they lack resources and experience. Government, private sector, and NGO initiatives in Indonesia have thus continued to focus on community engagement, including providing financial support and training to villages. In this respect, several businesses and NGOs consulted for this report noted that the lifting of COVID-19 movement restrictions is a positive step, allowing organisations to ramp up face-to-face meetings with communities and conduct field visits.

One industry representative interviewed for this report noted that Indonesia's Omnibus Law reforms passed in October 2020 have allowed the legalisation of land ownership by smallholder farmers that have previously encroached on forest area, effectively bringing them into the fold and making sure that their activities are properly governed. However, this amnesty process will not continue indefinitely; the window is set to close in 2023, and it is not certain how the authorities may manage the situation going forward.

4.3 Policies: Price Controls, Climate Action, and the Road to 2024

The unprecedented surge in palm oil prices has created a dilemma for Indonesia. While the country's economy has received a boost from high commodity prices, given that palm oil accounts for approximately 15 per cent of Indonesia's total exports and around 4 to 5 per cent of its GDP, high palm oil prices have also increased the cost of cooking oil and food products and thus directly impacted household budgets and consumer spending. In response, Indonesian policymakers rolled out several measures over the course of 2022 aimed at reining in the domestic price of palm oil and alleviating shortages of cooking oil – to varying degrees of success.

Table 2: Indonesia's palm oil and cooking oil price control measures

12 Jan 2022	**One-price Cooking Oil:** Ministry of Trade fixes price for cooking oil at IDR14,000 per litre, regardless of packaging.
27 Jan 2022	**Domestic Market Obligation (DMO) and Domestic Price Obligation (DPO):** Palm oil producers must set aside 20% of their crude palm oil (CPO) for local buyers. Meanwhile, the price of CPO sold domestically is regulated at IDR9,300 per kilogram and refined, deodorised, and bleached (RDB) Palm Olein at IDR10,300 per kilogram.
1 Feb 2022	**Highest Retail Price (HET):** Ministry of Trade sets price of bulk cooking oil at IDR11,500 per litre, simple packaged cooking oil at IDR13,500 per litre, and packaged cooking oil at IDR14,000 per litre.
15 Feb 2022	**Expanded DMO:** All palm products must comply with the DMO before suppliers can get permits to export.
9 Mar 2022	**DMO Allocation Increased:** The DMO allocation is increased from 20% to 30%.
15 Mar 2022	**Revocation of HET, DMO, DPO:** HET, DMO, and DPO policies revoked due to limited effectiveness and pushback from farmers and businesses.
28 Apr 2022	**Export Ban:** President Jokowi introduces ban on exports of Indonesian palm oil, until the price of cooking oil in Indonesia falls below IDR14,000 per litre. Coordinating Ministry for Economic Affairs initially says export ban would only cover RDB Palm Olein, but it is later confirmed the ban would include CPO as well.
23 May 2022	**Export Ban Lifted, DMO and DPO Reinstated:** Indonesia lifts the ban on palm oil exports, but reinstates DMO and DPO policies. Exports do not immediately resume on May 23, as businesses await further official guidance.
5 Jun 2022	**Export Permits Issued:** Indonesia issues around 302,000 tonnes of palm oil export permits under the DMO, during a transition period following the resumption of exports.

Source: Compiled from media reports

The cooking oil price issue has become highly emotive and highly politicised within Indonesia. When the price caps on cooking oil were introduced, and panic buying first set in, there were allegations that warehouses were still full of cooking oil even though supermarket shelves were bare. Businesses were accused of hoarding cooking oil, waiting for the price cap to be lifted so they could sell at a higher price.

On 19 April 2022, Indonesian authorities opened a corruption case against four suspects, a director-general at the Ministry of Trade and senior executives from three palm oil companies, charging them with breaching DMO rules – investigators said there was evidence that export permits had been issued to the companies before they met the local supply requirements.[17] A prominent think tank economist and policy advisor was also later arrested, allegedly for serving as a "fixer" for the industry.[18] The Indonesian media has dubbed the group the "cooking oil mafia", and it is possible more arrests may follow as investigations continue.

"The palm oil industry has long held significant clout in Indonesia, but public opinion has turned against the industry amid price increases and supply shortages."

The palm oil industry has long held significant clout in Indonesia, but public opinion has turned against the industry amid price increases and supply shortages. The sector is seen as profiteering from the situation. Many Indonesians are also aware that some major business groups are receiving more in biofuel subsidies than they are paying in palm oil export levies. Industry and NGO observers also speculate that the palm oil controversy is also revealing party lines within President Jokowi's administration, with politicians potentially looking towards the 2024 election in their public statements and in their calibration of policies. Indonesian policymakers are aware that their export controls and the export ban between April and May 2022 have had an impact on global markets and Indonesia's trade relations, but their concerns are – quite understandably – to address the problem of high palm oil prices as a domestic issue, first and foremost.

Estimated Impacts of Indonesia's Palm Oil Export Ban (April to May 2022)

GLOBAL FOOD SECURITY

70% of India and Pakistan's edible oil comes from Indonesia

Indonesia's trade partners may seek other sources in the years ahead

ECONOMIC CONSEQUENCES

US$700m to US$1.4b

Estimated cost of the palm oil export ban from April to May, in total lost revenue

RURAL LIVELIHOODS

30% to 50% drop in oil palm FFB prices

US$23m loss felt by farmers

Source: Compiled from media reports

The Palm Oil Export Ban's Effect on Haze Risk

The Indonesian government's measures, particularly the export ban, have had a discernible impact. As of late May 2022, the price of CPO in Indonesia had reportedly fallen below US$1,000 per tonne, considerably below the international CPO futures price. However, it is not clear if the export ban has resulted in the lasting change to cooking oil prices and cooking oil supply within Indonesia that policymakers were seeking.

"The global factors driving up the price of palm oil are still in effect, and international prices remain at record levels. Planting and replanting activity will continue."

Although the palm oil export ban between April and May 2022 has technically been lifted, exports have been slow to resume as the industry is wary of running afoul of regulations. The fact that the price of palm oil products has fallen in Indonesia, alongside the slump in the price of oil palm FFB, may have at least some chilling effect on plantation expansion in the very near term. But the global factors driving up the price of palm oil are still in effect, and international prices remain at record levels. Industry and NGO experts consulted for this report believed planting and replanting activity will continue.

Climate Action and Ecosystem Restoration

Controversy over palm oil and cooking oil has dominated headlines. But from the point of view of Indonesian officials and sustainability professionals, the most important policy direction for management of the country's forests and plantations is the country's legally binding commitment to achieving net carbon sink for the forestry and other land use (FOLU) sector by 2030, first introduced in a presidential regulation in November 2021 ahead of COP26. FOLU currently accounts for nearly half of Indonesia's total emissions, and if Indonesia can make the sector into a carbon sink, it will instead contribute almost 60 per cent of Indonesia's targeted emissions reductions under its Paris Agreement commitments.[19]

"Indonesia has committed to achieving net carbon sink for the forestry and other land use sector by 2030 – contributing almost 60 per cent of Indonesia's targeted emissions reductions under the Paris Agreement."

Indonesia's deadline for achieving overall carbon neutrality for the economy is 2060 – or rather, Indonesian policymakers have set out a range of possible net zero scenarios, with 2060 being the most likely target unless Indonesia is able to attract more sustainable and transition financing. The 2060 net zero target has been characterised by NGOs and media reports as a modest one, given that many other countries are aiming to achieve net zero by 2050. But Indonesia's 2030 target for achieving net carbon sink in the FOLU sector is extremely ambitious, and it provides a clear signal regarding where Indonesia's climate priorities will lie in the coming years.

The major business groups in Indonesia's plantation sector appear largely aligned with this direction, with most having adopted emissions reduction roadmaps or net zero targets for their Scope 1 and Scope 2 emissions. Notably, the plantation companies interviewed for this report also highlighted their commitments to preserving biodiversity in the areas they are operating in, which marks a change from previous years where biodiversity was mentioned but did not feature as high up on corporate agendas.

In order to achieve the FOLU net sink by 2030 target, Indonesia will need to both redouble existing sustainability initiatives and embark on new directions. In 2020, President Jokowi renewed the operating mandate of the Peatland Restoration Agency (*Badan Restorasi Gambut* or BRG), a body he originally created in 2016, and extended its authority to cover mangrove areas as well, renaming it the Peatland and Mangrove Restoration Agency (*Badan Restorasi Gambut dan Mangrove* or BRGM). The agency is tasked with managing the restoration of some 2.6 million hectares of degraded peatlands and 600,000 hectares of mangroves.

BRGM is not a leading agency in Indonesia's carbon commitments as such, though it is involved in calculating the potential emissions reduction or carbon sequestration from peatland restoration efforts and reporting that data to the Ministry of Environment and Forestry (KLHK). But tropical peat restoration

in Southeast Asia is still a relatively new field of study, and there is not a lot of long-term data or reliable forecasting surrounding its effectiveness. It is not yet clear how long it takes peatland restoration to truly take effect and turn landscapes from a source of carbon emissions into a carbon sink.

NGOs and academics interviewed for this report also raised questions about the long-term impact of BRGM's work, noting that BRGM's programmes have thus far concentrated on the construction of rewetting infrastructure such as canal blocks and deep wells. These efforts may indeed help maintain the water table in peat areas and prevent the spread of fire, but it is not clear that biodiversity objectives are also being achieved. Additionally, BRGM is only directly leading restoration work outside concession areas. Restoration work in areas within corporate plantations can only be undertaken by the companies that hold the concession permits, because there are legal issues involved in using government funding to perform infrastructure work on privately held land. Peat hydrological units are natural landscape features which do not correspond to human borders, and so even BRGM's efforts to maintain water levels are subject to constraints. However, Indonesian government officials are fully aware that ecosystem restoration is a long-term commitment and there are no quick and easy solutions.

Indonesia's Permit Revocation: Implications for Sustainability

2,306 permits for mining, logging, and plantation areas were revoked in Jan 2022 for inactivity or misuse

192 by the Ministry of Environment and Forestry (KLHK)
36 by the Ministry of Agrarian and Spatial Planning (ATR/BPN)
2,078 by the Ministry of Energy and Mineral Resources (ESDM)

The government took back over
3.13 million hectares of land
(total from the 192 permits revoked by KLHK)

What will be done with the land?

Officials say that it might be redistributed to
Indigenous peoples and local communities

NGOs hope that some land area might be used for
conservation and carbon projects

But questions are being raised
Critics say the move was **unilateral** and done **without consultation**
Some companies say their permits were **wrongfully revoked**

Source: Compiled from media reports

5. Carbon Markets: Conservation and Green Recovery in Indonesia and ASEAN

Interest continues to rise in carbon credit generation and NBS as a means of achieving net zero targets while simultaneously providing market incentives to keep ecosystems intact. In November 2021, Indonesia issued Presidential Regulation No. 98 of 2021 on carbon pricing and is currently moving swiftly to roll out ministerial decrees to implement the market mechanisms outlined in the presidential regulation. Indonesia is requiring carbon projects to register with the authorities, so that certified emissions reductions or carbon units will then be issued through a National Registry System on Climate Change Control (*Sistem Registri Nasional Pengendalian Perubahan Iklim* or SRN-PPI).

There have already been some growing pains in Indonesia's shift to a properly regulated carbon market framework. Indonesia is already home to several carbon credit producers that have been selling carbon credits on the international voluntary market, generated from both forest and renewable energy projects. These producers have had to freeze their sales in the interim, and some have been fined by the authorities for prematurely engaging in carbon trading, though the signals are that businesses are keen to comply with the new regulatory environment.

There are still questions that need to be resolved, such as to what extent carbon credit projects will be able to sell credits overseas. Officials have expressed interest in trading carbon offsets overseas to other economies in Asia and even further afield, if international recognition of Indonesian certified carbon units can be achieved. But it is also clear that Indonesia wants to meet its own Paris Agreement targets, and there will be a domestic market obligation for carbon credit producers. This means that the commercial viability of carbon projects, going forward, will depend significantly on Indonesia's domestic price for carbon. This in turn will be influenced by Indonesia's carbon tax policies. Indonesia is set to implement a carbon tax for the coal-fired power sector in 2022, starting at a relatively modest IDR30 per kilogram of CO_2-equivalent (CO_2e), or US$2.10 per tonne of CO_2e, though this is expected to increase over time and be extended to more sectors.

Dialogue between Indonesia and other countries in the region would be beneficial in building regional cooperation on carbon trading. In March 2022, Singapore and Indonesia signed a Memorandum of Understanding (MOU) Concerning Cooperation on Climate Change and Sustainability, including discussions on carbon markets. Beyond such bilateral exchanges, ASEAN as a region would also benefit from broader multilateral harmonisation of regulations, focusing especially on corresponding adjustment mechanisms to avoid double-counting of offsets when carbon credits are traded across borders. Collaboration is needed so that carbon markets can achieve scale across Southeast Asia, and so that mechanisms can be developed that make sense for our region – forging ASEAN together as an ASEAN Climate Community.

> ***"Collaboration is needed so that carbon markets can achieve scale across Southeast Asia, and so that mechanisms can be developed that make sense for our region."***

6. Conclusion and Acknowledgements

The Haze Outlook 2022 report is an assessment of the likelihood of the haze returning to ASEAN in 2022. Present conditions are uncertain due to the surge in commodity prices that may drive agricultural activity, leading to an **Amber** rating for this year on a scale of Green, Amber, to Red, where Red indicates the highest risk. While the Haze Outlook is cautionary for this year, we only believe that there will be some fires and haze in the region, rather than a severe haze crisis on the same scale as seen in 1997-98, 2013, 2015, or 2019. The region is likely to see normal or wetter-than-average rainfall in the coming months, meaning the dry season will be relatively mild, which will help to keep any haze under control. Additionally, while high commodity prices should result in some new plantation expansion and hence land clearing, the scale of land clearing is not projected to be as extreme as previous years.

Looking beyond 2022, there are other factors that may potentially affect the risk of haze in future years. The present situation of record high food and commodity prices underscores the fact that food security remains paramount. There will be increased pressure for countries to not only create carbon projects, but also rice paddies. Indonesia is also heading into general election and presidential election in 2024, and the political landscape in Southeast Asia's largest economy will become increasingly complex in the coming months. That said, with climate action having entered the mainstream, it is likely that any future Indonesian government will continue to include sustainability among their priorities.

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Appendix: Literature Review

Building on our past Haze Outlooks, the authors have reviewed about 100 pieces of recent literature associated with fires in Indonesia, forests, and peatlands. The trend observed in previous editions of the report has continued to hold true into 2022 – nearly half the papers reviewed were on peatland fires, though slightly more reports focused on carbon emissions calculations and particulate matter measurements. Approximately a third of reports looked at the best practices and management of peatlands, while the remainder examined the social, political, and economic impacts of the peatland combustion and the resulting haze. Some articles explored the mapping of peatland areas and the locations of fires, though the number of these studies was notably fewer compared to our literature review in 2020, which took place after the 2019 haze crisis.

Peatland and hotspot mapping as well as carbon emission calculations remain continually developing academic areas, although there appears to be slightly more attention given to evaluating the accuracy of existing models. Jessup et al. (2021) argued that recent carbon emission estimates from peatland fires are "based on extrapolation from a narrow base of empirical evidence" without taking into full account factors which influence peat combustibility and the heavy fuels used for surface fires to turn into peat fires, such as drainage and fire history.[20] Others such as Horton et al. (2021) and Rosadi et al. (2021) continue to make attempts to refine existing models by using machine learning tools.[21]

Academic pieces have also been published exploring public policy issues regarding peatland management and restoration. Miller et al. (2022) analysed transboundary environmental governance regimes.[22] Marlina et al. (2021) looked at gender roles in climate change adaptation on peatland ecosystems.[23] Purnomo et al. (2021) examined the bureaucratic reluctance of local and central government agencies in addressing forest fires.[24] On a more financial vein, Puspitaloka et al. (2021) attempted to quantify the costs of four peatland restoration projects in Central Kalimantan, including indirect ones such as the cost of engaging with local communities.[25] Applegate et al. (2022) proposed agroforestry business models aimed at both smallholders and commercial investors based on the idea that improving smallholders' livelihoods would sustain their interest in managing peatlands sustainably.[26]

Intriguingly, there seems to be an uptick of papers focusing on measuring air pollutants, with some conducting their investigations from specific locations around Southeast Asia (Inerb et al., 2022; Fujii et al., 2021; Phairuang et al., 2021).[27] While not all the studies focused on pollutants resulting solely from Indonesian peatland fires, most of these articles made heavy references to the said fires and provided empirical evidence of the impacts of forest and peat burning on human health.

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