

SIIA HAZE OUTLOOK

FOR SOUTHERN ASEAN

PHASE ONE

Summary Report

May 2019



ABOUT THE SUMMARY REPORT

The haze in Southern ASEAN – an annual occurrence since the 1997 crisis – sometimes shrouds much of Peninsular Malaysia, Singapore, and parts of Indonesia with hazardous air pollution during the mid-year dry season. The 2015 fires in Indonesia are now widely considered to be the worst incidence of haze.

The Singapore Institute of International Affairs (SIIA) since 1997 has been taking an active role in engaging stakeholders from the public, private, and people sectors. From working with NGOs to construct canal blocks and distribute N95 masks in Indonesia, to holding dialogues with key decision makers, the SIIA has helped efforts to proactively manage fires and haze in the region. This Report complements SIIA's overall efforts – moving from active engagement to helping stakeholders better anticipate the incidence of haze in the region.

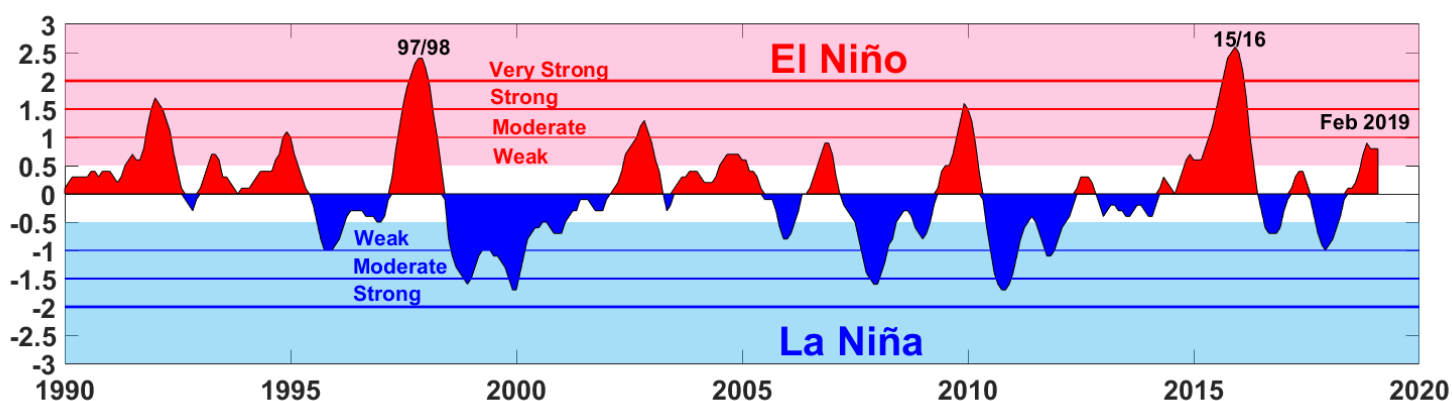
The SIIA Haze Outlook for Southern ASEAN is a risk assessment framework and predictive tool to determine the incidence and severity of transboundary haze in Southeast Asia. In Phase One, the risk assessment is primarily based on current meteorological data, taking into account the various efforts by government, NGO, and private sector actors to mitigate the risk of haze. Going forward, the SIIA hopes to gather more input from stakeholders in the region for future installments of the SIIA Haze Outlook, to present a more complete assessment of the recurrence of fires and haze.

This is the Summary Report for Phase One of the SIIA Haze Outlook for Southern ASEAN. The full text, with bibliography and appendices, will be available for download in May at <http://www.siiainline.org/reports>.

SIIA Haze Outlook For Southern ASEAN: Risk Factors And Indicators

Since the 2015 haze crisis, some 100 studies have been conducted on fires and haze in the region, as well as related issues such as peatland management. Approaches vary, but there are three clusters of risk factors that are common across the literature:

- **Weather:** The severe fires and haze in 1997 and 2015 were exacerbated by an intense El Niño event that brought prolonged dry conditions. What are the expected El Niño and rainfall conditions in 2019, going into Indonesia's dry season?
- **Peat:** Degraded peatland poses fire risk due to the loss of wet conditions that provide resistance to fire. How much peat has been restored, and how effective have restoration efforts been?
- **People:** Fire prevention and management initiatives are crucial, though they must be adapted to local contexts. What is being done to engage with communities and respond to fires?



Source: US National Oceanic and Atmospheric Administration (NOAA), April 2019

Oceanic Niño Index (ONI) - Weak El Niño or Strong El Niño?

This graph shows Sea Surface Temperature (SST) anomalies in degrees Celsius (°C) in the east-central tropical Pacific, commonly used as an indicator of El Niño conditions. Current SST anomalies for 2019 are above average, but not as high as 1997-1998 and 2015-2016, the years with strong El Niño events.

HAZE OUTLOOK: Risk of a Transboundary Haze Event in 2019

AMBER

The risk of a transboundary haze event, similar to 1997 and 2015, is Amber for 2019 (on a scale of Green, Amber, and Red, with Green indicating low-risk, Amber moderate-risk, and Red high-risk).

- **Weather:** As of April 2019, the ASEAN Specialised Meteorological Centre (ASMC) forecasts that El Niño Southern Oscillation (ENSO) conditions are likely to develop in 2Q2019 and persist into 3Q2019, leading to a moderate chance of haze. But while the intensity of the El Niño effect remains uncertain, data suggests a weak effect that will not be strong as the incidents in 1997 and 2015 - there is some risk of dry conditions exacerbating fires, but not as much as in those years. However, models vary, and actual temperature and rainfall will need to be carefully watched closer to the dry season in June.
- **Peat:** In 2016, Indonesia issued a moratorium on cultivation on peatland until a zoning system for the protection of peatland is in place, and established a national peatland restoration agency, Badan Restorasi Gambut (BRG). As of 2018, some 679,000 ha of peatlands have been restored, 60% of its 1.1 million ha goal on public land, with another 1.4 million ha to be restored by companies within concessions. In the past three years, the number of hotspots within priority restoration areas compared to 2015 has fallen sharply. However, periods of low rainfall may still cause rewetted peatland to dry out and become vulnerable to fire.
- **People:** Since 2015, agroforestry companies in Indonesia have intensified engagement with village communities and strengthened their fire prevention, detection, and suppression capabilities. For example, the Fire Free Alliance (FFA), formed in 2016, now includes six major companies and three NGOs. From 2016 to 2017, FFA members increased the number of villages engaged by their fire-free programmes from 416 to 468. While these efforts do mitigate the risk of haze, there is still a danger of fires breaking out and spreading beyond control due to the geography of Sumatra and Kalimantan and the difficulty in reaching some areas.

 GREEN: Low-Risk  AMBER: Moderate-Risk  RED: High-Risk

Assessing the Risks of Haze: Methodology and Interventions

To identify complex risk factors that influence the occurrence of fire and transboundary haze in Southern ASEAN, the SIIA engaged with a total of nine organisations, including ASEAN intergovernmental agencies, academic research bodies, NGOs, and agroforestry companies, and conducted a review of literature as well as selected company reports and websites.

In Phase One of the SIIA Haze Outlook for Southern ASEAN, an integrated framework has been developed to assess the risks and likelihood of haze returning to the region. The framework consists of three pillars, namely, **Weather**, **Peat** and **People**. Meteorological and geographical indicators from our literature review were compiled into the **Weather** risk assessment, including the occurrence and severity of El Niño, sustained low rainfall, and prevailing winds during the dry season. The framework also includes consideration of **Peat** – the geographical location of fires and whether fires recur, with a special focus on peatlands in Sumatra and Kalimantan. Finally, the framework examines **People** or human factors, namely government and private sector policies, with an emphasis on fire prevention, detection, and suppression.

RISK ASSESSMENT FRAMEWORK AND FINDINGS

HAZE OUTLOOK

AMBER

Risk of a transboundary haze event in 2019 is Amber (on a scale of Green, Amber, and Red). Even if El Niño conditions develop during the dry season, the effect is likely to be weak compared to 1997 and 2015.



WEATHER

EL NIÑO (ENSO)

Severe El Niño exacerbates dry season and increases risk of fires

- ASMC and NOAA forecasts say El Niño is expected in 2Q2019, persisting to 3Q2019, coinciding with the dry season in Southern ASEAN. However, the El Niño effect is likely to be weak.

PRECIPITATION

Persistent low rainfall could result in fires

- ASMC forecasts drier than usual conditions over Peninsular Malaysia and neutral to drier conditions for Indonesia for 2Q2019 onwards.

WIND

Winds determine direction and rate of haze dispersion

- Winds blowing from the south, southwest, or west may bring smoke from Sumatra to Singapore. For severe haze episodes, persistent southeasterly or easterly winds can bring haze from Kalimantan. Wind direction for the latter months of the year is uncertain at this time.



PEAT

RECENT FIRE OCCURRENCE

Prior fire occurrence areas have higher risk of fire season and increases risk of fires

- Riau and West Kalimantan appear to have some degree of hotspots all year round, meaning there is always some degree of fire risk, but fires in Jambi and South Sumatra appear closely linked to the severity of the dry season and El Niño conditions.

PEAT RESTORATION

Degraded peatlands pose higher fire risk

- Degraded peatlands were primary fire locations in 1997 and 2015. BRG says 679,000 ha of peatlands have been restored in priority areas. Companies have launched forest conservation and peat restoration programmes under the direction of Indonesia's government.
- BRG data for 2016, 2017 and 2018 shows peatland restoration is effective in countering the occurrence of fires, but it is still possible for rewetted areas to dry out if there is a prolonged period of low rainfall, e.g. 4 weeks.

PEOPLE

POLICIES AND STRATEGIES

Government and company policies are key to fighting fires and haze

- As of 2014, all parties have ratified the ASEAN Agreement on Transboundary Haze Pollution (AATHP). ASEAN has also adopted a Haze-free Roadmap (2016-2020), showing regional commitment to addressing the issue.
- Indonesia issued a moratorium on cultivation on peatland in 2016. Indonesia also created BRG in 2016, and in 2017 the Ministry of Environment and Forestry established four regulations on the management of peatland and industrial plantation forest.
- Singapore passed its Transboundary Haze Pollution Act (THPA) in 2014, and has served legal notices and pursued court action under the act in 2015 and 2016. Singapore also introduced the enhanced Singapore Green Labelling Scheme (SGLS+) in 2017.

FIRE PREVENTION

Community engagement is necessary to reduce the risk of fires breaking out

- Companies and NGOs have formed a Fire Free Alliance (FFA), which now involves six major firms and 468 villages as of 2017. Other firms have implemented similar initiatives.
- Fire-free village schemes provide “no burn” rewards and sustainable agriculture assistance, a more sophisticated approach versus earlier community engagement, that further reduces the risk of burning.

FIRE DETECTION

Early warning systems are needed to detect fires

- Companies have invested in fire risk mapping and regular patrols, supplemented by satellite images, drones, and observation towers to detect and pinpoint fires as early as possible. Detection is key; the ability of firefighters to extinguish blazes is limited if they cannot reach the fires in time.

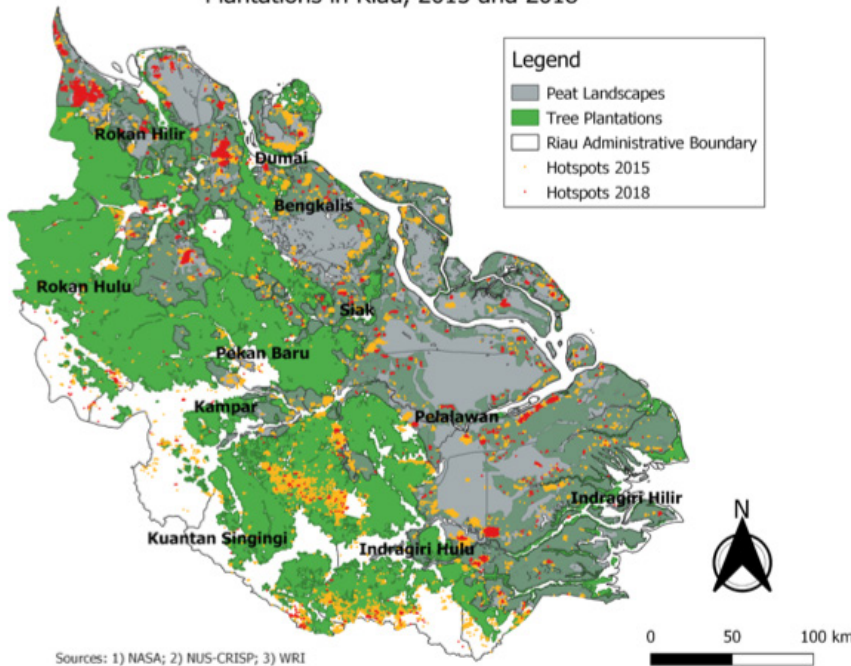
FIRE SUPPRESSION

Rapid fire suppression is necessary when fires occur

- Companies have increased the capacity and ability of fire suppression teams, e.g. investing in training, equipment, manpower, and creating rapid-response teams. One company reports training some 2,600 community firefighters from local villages since 2015, nearly equal to its own 2,700-strong full-time firefighting force.

CASE STUDY: RIAU

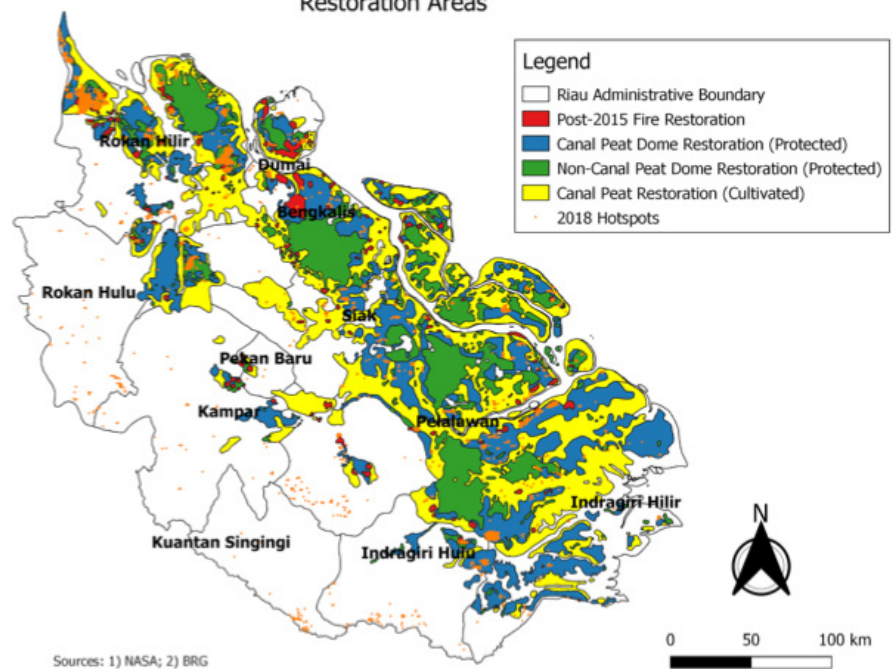
SIIA Haze Outlook Case Study: Hotspots, Peat Landscapes, and Tree Plantations in Riau, 2015 and 2018



To illustrate the risk factors identified in Phase One of the SIIA Haze Outlook for Southern ASEAN, the following visualisations were created, focusing on the province of Riau in Sumatra.

Of the 5 million hectares of plantations (green) in Riau, there is considerable overlap with peat landscapes (grey). In 2015, the majority of hotspots (orange) occurred in or near plantations on peatland. Hotspots in 2018 (red) generally occurred in areas previously burnt in 2015, suggesting that burnt or degraded areas do remain vulnerable to fire.

SIIA Haze Outlook Case Study: 2018 Hotspots and BRG Priority Restoration Areas



Since 2016, Indonesia's national peatland restoration agency (BRG) has initiated interventions to restore priority peat landscapes, especially those affected by fires in 2015, including in areas across Riau, Jambi, South Sumatra, Central Kalimantan, West Kalimantan, and South Kalimantan.

However, in 2018, some hotspots were still detected in parts of Riau included under BRG's priority restoration areas, though with much lower intensity.

	No. of Hotspots	Percentage of Hotspot Reduction within 2.5 million ha of Peat Restoration Priority Area (vs. 2015)		
		2015	2016	2017
Concession	17,115	98.57%	99.32%	97.98%
Non-Concession	23,736	98.60%	99.37%	91.39%

Source: BRG Peat Restoration Map and Indonesian National Institute of Aeronautics and Space (LAPAN) Hotspot Data

THE WAY FORWARD

In Phase One of the SIIA Haze Outlook for Southern ASEAN, we have cited El Niño as a meteorological indicator. El Niño is a Pacific Ocean phenomenon. However, one expert that the SIIA interviewed noted that Indian Ocean Dipole (IOD), sometimes known as the Indian Niño, also has a significant impact on rainfall and fire conditions in Riau province. The IOD is likely to have a dry phase this year. Temperature and rainfall data therefore need to be carefully watched as the region approaches the dry season in June.

Beyond meteorological data, our risk assessment framework includes the steps that governments, NGOs, and private sector firms have taken towards managing the drivers of the transboundary haze. In Phase One of the SIIA Haze Outlook for Southern ASEAN, we focused our efforts on creating the framework with input from a select number of experts and key stakeholders, offering some preliminary conclusions.

Based on our research to date, it appears that governments and companies have made good-faith efforts to combat fires and haze, with efforts intensifying since 2015. Indonesian President Joko Widodo has continued to extend the moratorium on awarding new commercial concessions on primary forest and peatland, while also issuing a further moratorium on agricultural development on peatland, and ordering a three-year moratorium on new palm oil licenses. Since 2016, Indonesia's BRG has been targeting the restoration of 2.5 million hectares of degraded peatlands in seven provinces by 2020, including rewetting, revegetation, and revitalising the livelihood of local communities. Under the Peat Villages Programme (Desa Peduli Gambut), BRG has engaged with 262 villages and identified 11,275 peat restoration "local champions". Since 2018, provincial governments have also been involved in peatland restoration actions with a financing mechanism directly managed by provincial authorities. BRG has created an online system to monitor the status of peat restoration activities, as well as to provide alerts if there is any new land clearing or canal development on peatland. The Indonesian government has scheduled an evaluation of nation-wide peat restoration efforts in 2019.

In March 2016, the Fire Free Alliance (FFA) was formed by companies and NGOs, bringing together APRIL, Asian Agri, Musim Mas, and Wilmar, with IDH, PM.Haze, and Rumah Pohon as NGOs, with Sime Darby and IOI Group joining in March 2017. Other companies in the plantation sector, such as Golden Agri Resources (GAR), its sister firm Asia Pulp & Paper (APP), and Cargill have launched similar schemes in Sumatra and Kalimantan.

In spite of this progress, significant challenges remain, including the need to adapt fire regimes for local conditions, the large size of at-risk areas, the complexity of national and sub-national relations, and the limited capacity of institutions. In theory, the above efforts should gradually reduce the likelihood of a severe transboundary haze crisis, but further research is necessary in order to evaluate the effectiveness of these interventions. For example, due to time limitations, our private sector consultations were primarily with pulp and paper firms, with information from the palm oil sector largely drawn from the literature and sustainability reports.

The SIIA hopes that future installments of the SIIA Haze Outlook for Southern ASEAN will include a greater degree of structured feedback from a wider range of experts and industry actors, allowing the framework to better rate the risk of haze in the months ahead.

About the Singapore Institute of International Affairs (SIIA)

The SIIA is an independent think tank dedicated to the research, analysis, and discussion of regional and international issues. Founded in 1962 and registered as a membership-based society, the institute is Singapore's oldest think tank, and aims to help Singapore become a more cosmopolitan and global society through public education and outreach on international affairs. The SIIA is also a founding member of the ASEAN Institutes of Strategic and International Studies (ASEAN-ISIS), a regional alliance of think tanks, and plays a key role in Track II diplomacy, supplementing official dialogue between governments. Since 2013, the SIIA has consistently ranked highly as one of the top think tanks in Southeast Asia and the Pacific, in the Global Go-To Think Tank Index by the University of Pennsylvania.

About the SIIA Sustainability Programme

The SIIA's sustainability programme focuses on haze caused by fires in Indonesia and on the sustainability of the plantation sector, both key issues for Singapore. The SIIA also works on climate change issues facing ASEAN and Asia. The SIIA's sustainability work goes back to 1997, when it organised Singapore's first haze dialogue with the Singapore Environment Council. Over the years, the SIIA has increasingly broadened its sustainability work from haze to related issues, such as forest governance and sustainable livelihoods. In 2014, the SIIA launched the annual Singapore Dialogue on Sustainable World Resources, now in its 6th year, to highlight best practices within the plantation industry.

Authorship and Acknowledgements

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All views expressed in the Report are those of the authors, unless otherwise credited.

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