



Musim Mas:
**Fire Management
and Prevention**

What Causes Fires in Tropical Rainforests?

Due to the moist environment in lowland tropical rainforests, they are typically free of natural fires.¹ Human activity, including climate change that results in extreme drought, contributes to the increased risk, frequency, and intensity of forest and peat fires.

Human activity can directly cause forest fires for a variety of reasons. Here, we explore the two common causes of forest fires: Slashing and burning; and waste disposal. Slashing and burning is a common tradition in agriculture to clear land throughout the tropics. Many who practice slashing and burning believe that burning can eliminate diseases that have affected crops and keep the soil fertile. A Stanford-led study that examined collective fire events over 65 years found that frequent fires conversely reduced soil fertility and slowed the plant regrowth². Slashing and burning is prohibited in many countries due to the risk of uncontrolled fires, air pollution, habitat degradation, and poorer water quality, among other impacts.

Open burning of waste is practiced in some countries as a quick and cheap method for waste disposal. If these fires are not controlled, they can quickly spread to adjacent areas. In addition, cigarette butts are often disposed of improperly, posing as a fire hazard.

Land acquisition of burned land with no formal claim or deliberate blurring of concession boundaries is also one of the motivations for fire^{3,4}.



Human activity has also contributed to the increased risk, frequency, and intensity of forest fires through draining of peat, deforestation, and activities that contribute to extreme drought. Peat, a carbon sink found globally, is often drained of its water for agriculture or peat extraction. Due to its high content of organic matter, dry peat can be highly combustible. Peat fires are difficult to extinguish as they burn underground and spread rapidly.

Deforestation results in higher temperatures and lower humidity levels, which leads to drier and flammable plant litter and lower rainfall, respectively.

Climate change has also affected rainfall, resulting in drier conditions, droughts, and delayed wet seasons. Climate warming tends to magnify natural phenomena like the El Niño, which creates drier, warmer conditions in Southeast Asia.

¹ <http://www.fao.org/3/ac798e/ac798e0a.htm>

² <https://www.nature.com/articles/nature24668>

³ <http://pubdocs.worldbank.org/en/643781465442350600/Indonesia-forest-fire-notes.pdf>

⁴ <http://www.equilibriumresearch.com/upload/document/theyeartheworldcaughtfire.pdf>

Indonesia's efforts in preventing and managing fires

Forest fires in Indonesia are cyclical, typically from July till October. The 2015 fires led to a haze crisis that spread from Indonesia to Southeast Asia. The World Bank estimated a total of USD 8.8 billion (IDR 120 trillion) of losses and damages sustained by the agriculture and forestry industry in 2015⁵. However, other economic sectors were adversely affected as well, and there were substantial increases in fatalities and pulmonary disease⁶.

Indonesia has since swiftly tightened and strengthened its forest and agriculture policies to prevent and deter forest fires. In October 2015, President Joko Widodo called for a moratorium on new peatland concessions and a cancellation of existing concessions that have not been developed. The Peatland Restoration Agency (BRG) was also set up to facilitate peatland restoration.

The Indonesian government has set up the Indonesian Oil Palm Estate Fund Agency (BPDPKS) to assist smallholders with sustainable replanting costs, as a way to improve productivity on their older farms and to avoid slashing and burning. Major palm oil corporations and brands have pledged to commit to No Deforestation, No Peat, and No Exploitation (NDPE) within their supply chain, complementing governmental policies.

The government has enlisted the help of military and police officers to fight forest fires and rolled out educational campaigns on the impact of forest fires. Criminal charges would and have since been filed against certain plantation companies and individual farmers for illegal burning⁷.

However, thorough enforcement of the governmental policies to prevent and stop fires can be challenging due to limitations on resources, fire-fighting equipment, local water sources, and access to some remote regions⁸. Inconsistent data on concession boundaries and land legality makes it difficult for the government to hold actors accountable.

While it may be premature to establish COVID-19's impact on fire prevention and mitigation, these are a few impacts that have emerged: Experts caution that fire prevention efforts and resources may be diverted or put on hold to tackle the pandemic, despite continued prevention and mitigation efforts by the government on the ground⁹. Furthermore, individual companies' no-travel policies to safeguard the health of staff and local communities may present a challenge to engaging local communities and patrolling remote areas. The Singapore Institute of International Affairs (SIIA) reports that actors across the palm oil supply chain may experience an economic shock that could see the reemergence of unsustainable practices by smallholders and mid-sized companies¹⁰.

⁵ <http://pubdocs.worldbank.org/en/643781465442350600/Indonesia-forest-fire-notes.pdf>

⁶ https://www.researchgate.net/publication/308338864_Public_health_impacts_of_the_severe_haze_in_Equatorial_Asia_in_September-October_2015_Demonstration_of_a_new_framework_for_informing_fire_management_strategies_to_reduce_downwind_smoke_exposure/link/57e186d008ae9e25307d3e16/download, <https://www.worldbank.org/en/news/feature/2015/12/01/indonesias-fire-and-haze-crisis>

⁷ <https://www.bloomberg.com/news/articles/2019-09-19/why-it-s-another-bad-year-for-indonesia-forest-fires-quicktake#:~:text=What%20causes%20the%20fires%3F,oil%2C%20pulpwood%20and%20rubber%20trees.>

⁸ <https://www.reuters.com/article/us-southeastasia-haze-firefighters-wider/wide-image-indonesias-ragtag-firefighters-on-frontline-of-borneos-forest-blazes-idUSKBN1W50MV#:~:text=Indonesia's%20ragtag%20firefighters%20on%20frontline%20of%20Borneo's%20forest%20blazes,-Willy%20Kurniawan&text=Indonesia%20has%20sent%20more%20than,its%20disaster%20agency%20has%20said.> <http://www.fao.org/3/ac798e/ac798e0a.htm>

⁹ <https://www.thejakartapost.com/news/2020/05/27/covid-19-presents-new-challenges-in-forest-fire-control.html>

¹⁰ <http://www.siiainline.org/wp-content/uploads/2020/06/SIIA-Haze-Outlook-2020.pdf>



What is Musim Mas doing to prevent, monitor, and manage fires?

Our efforts and approach towards preventing, monitoring, and managing fires are guided by our supply base, split across three domains: Our operations (Section A), third-party suppliers (Section B), and independent smallholders (Section C).

Within these three domains, we analyze and manage fire risk, monitor fires, and conduct assessments according to the elements in Figure 1 below. Our integrated fire prevention and management strategy addresses the factors that cause fires, listed in Section 1.



Figure 1: Musim Mas' integrated fire prevention and management strategy

A. Own Operations

Zero-Burning Policies

Across our plantations and mills, we adhere to a strict zero-burning policy. This includes all operations as well as waste management. Biomass waste from old oil palms and other organic materials is composted or used to decompose and nurture the soil.

Our zero-burning policy is also accompanied by policies that reduce the risk of fires, such as our NDPE (No Deforestation, No Peat, No Exploitation) policy. We also communicate these policies to our suppliers (more in Section 3B). For plantations that currently exist on peat, we ensure that we apply best peat management practices per local regulations, and follow requirements set out in the sustainability standards (RSPO, POIG) that we have adopted. This includes putting into place a network of water control structures to regulate water levels and maintaining water tables according to best practices to reduce the risk of fires.

We construct ponds and maintain water sources within our plantations to ensure access to water sources for firefighting. These are separate from the boreholes we have constructed to provide access to clean water for the workers who live on our operations. In some areas we have installed fire breaks such as ditches, to slow the spread, should fires occur.



Images 1 and 2: Musim Mas fire-fighters demonstrate the use of a water pump from a water source within the plantation



Image 3: A pond within a Musim Mas plantation.

Monitoring

Our Sustainability and Traceability teams conduct daily hotspot monitoring of our concession and its surrounding area. We also work closely with the neighboring communities to detect and prevent forest fires (see Section 'Behavioral Change in Communities').

As hotspots do not necessarily correspond to a land fire, an on-site investigation and verification have to be conducted by foot or via drone for remote areas. More [here](#).



Image 4: Our GIS team verifies satellite hotspots using a drone.

The areas that we monitor daily are categorized according to their level of fire risk (see Figure 2), updated with data from our colleagues who conduct on-site verification of hotspots.




	Fire Risk	Land Covered
	Low	Well maintained; communities' farms or settlement are in mineral areas
	Medium	Poorly maintained; communities' farms or settlement are in mineral areas
	High	Presence of forest or shrublands on river banks in peat and mineral areas; Poorly maintained; communities' farms or settlement are in peat or mineral areas

Figure 2: Fire Risk Analysis

Fire Management

We maintain teams of highly-trained fire-fighters at each of our plantations, and they assist district and provincial governments with their fire management and prevention efforts. We provide all operations with fire-fighting equipment, ensure all factories are equipped with early warning and fire-fighting systems, and work with local government fire safety centers to carry out regular training for our workers.

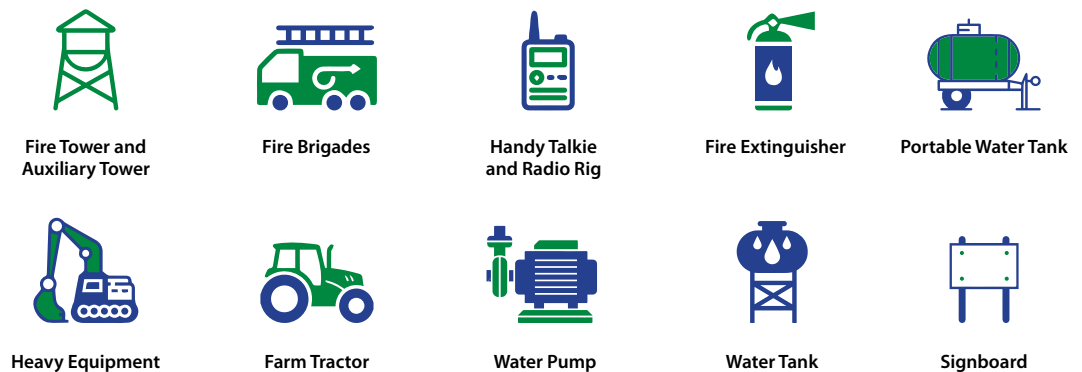


Figure 3: Fire-fighting equipment and infrastructure present in Musim Mas' operations, as of December 2019.

In provinces that are especially susceptible to fires, such as Central Kalimantan, we employ the use of aerial fire-fighting on top of the regular fire-fighting equipment and infrastructure in Figure 3. The aircraft (see Image 6) allows fire-fighters to reach areas with dangerously high temperatures and at a faster speed and can put out fires directly.



Images 5 and 6: A helicopter can carry up to 10,000 litres of water in its bucket (left) to extinguish a fire.

Our fire-fighting teams also patrol our concessions and a circumference around our concessions. In cases where surrounding communities are unable to manage or mitigate fires, we will extend our fire-fighting expertise and team to them. We also conduct fire prevention and mitigation training to neighboring communities (see Section 'Behavioral Change in Communities').



Images 7 and 8: Musim Mas' fire-fighting team assembles for a training session and simulation during the dry season in 2019. Training sessions, infrastructure and equipment inspection, and maintenance are intensified, leading up to dry seasons.

Behavioral Change in Communities

The role of the communities is paramount in preventing fires as they function as eyes and boots on the ground, especially in areas inaccessible to us. To effect and sustain positive behavioral change, we have nudged the communities to adopt and maintain fire-preventive behavior.

Through our Fire-Free Village program (Masyarakat Bebas Api) with villages and bi-annual training sessions extended to the local government, military, police, communities, and staff, we emphasize the need to stop burning and protect the surrounding land and forest. We also conduct simulations on how fires can start and how to manage them. We educate participants on the negative impacts of fires, beyond health and economic effects, such as school closures due to haze that affect their children's education or pulmonary disease. Signs warning communities of fire hazards in fire-prone areas are also put up. These signs use language that is easily understood and are placed in prominent areas where locals would pass by frequently. In these programs, a strong emphasis is placed on the role of the community as an agent of change.



Images 9, 10, 11, and 12: Musim Mas holds bi-annual training sessions on fire management and prevention to the local government, Manggala Agni (forest fire control brigade), regional disaster management agency (BPBD), and fire-fighting department (DAMKAR). This was a training session in 2019 in Central Kalimantan.

Additionally, we investigate the root causes of burning and help communities seek alternative behavior to reduce fire use. For example, our investigations found that communities often dispose of cigarette butts near plantations, which could lead to fires. To deter such behavior, we built bins in safe areas where they could dispose of their cigarette butts.

As fire is a common way to manage biomass waste, in 2017, we worked with the University of Riau (UNRI) on a composting model that can be adopted by nearby communities. Three villages near our concession in Riau participated in the project, and community members were taught how to compost organic waste such as leaf litter around farms and scrubland. The three-year research concluded that the local communities found it bothersome to compost organic waste, despite it being an alternative source of fertilizer. This serves to be insightful for us as we improve our community-centered programs.

To support and maintain positive behavior by communities in maintaining a fire-free zone, we give regular feedback to villages that participate in our Fire-Free Village program. Musim Mas awards villages with zero fires a prize equivalent to IDR 25 million (approx. USD 1750) per village. The reward will be provided in the form of village facilities if requested by the village officials, such as fire extinguishers and other fire-fighting equipment.

As of December 2019, 74 villages have participated in this program, and Musim Mas has awarded up to IDR 3 billion (approx. USD 209,000) to the villages that have successfully prevented fire occurrences.



Image 13: Musim Mas rewarded participating villages with zero fires in 2019.

The Fire-Free Village program, launched in 2016, aims to motivate and engage local communities to protect their land and forests from fire. But the scope of is much broader: Training is carried out with communities on agronomic best practices and alternative methods of land clearance while highlighting the risks of using fire. Village heads and community members are regularly reminded to be vigilant in preventing fires. Villages are also provided with fire-fighting equipment, such as fire extinguishers, safety uniforms, and shoes. The commitment by villages to prevent fires is renewed every year through signing a Memorandum of Understanding (MoU).

COVID-19 has made traveling to villages and holding training sessions challenging due to safe-distancing measures. However, our colleagues have been engaging villages digitally via WhatsApp calls. We also hung banners in villages and sub-district offices to remind them to be extra vigilant in fire preventive measures, as the fire season approaches.



Images 14, 15, and 16: Banners and signs warning about fires can be found around the village and in sub-district offices.

Nonetheless, we recognize that fires know no boundaries. Our outreach to surrounding communities and our concession areas is limited in the fight against fires which are started elsewhere and spread into our concessions or neighboring villages. Therefore, we are involved in landscape programs that involve industries beyond palm oil and the government.

Research & Innovation

To improve our monitoring capabilities, we funded the development of a new, publicly available radar-based forest monitoring system known as Radar Alerts for Detecting Deforestation (RADD). The RADD system will augment existing publicly available monitoring tools that rely on optical-based satellite imagery, which can be delayed when clouds obstruct the view of forests. Through the use of radar waves, the new system can penetrate cloud cover and gather forest change information without being affected by clouds or sunlight. More [here](#).

We are also revising our sustainability policy to strengthen our approach towards improving the livelihoods of communities around our concessions and to independent smallholders. This will contribute towards a shift away from clearing new land or employing unsustainable and cheaper practices, such as slashing and burning or burning for waste management.

Partnerships

Musim Mas is a founding member of the Fire Free Alliance (FFA), a multi-stakeholder platform supporting the Indonesian government’s commitment to a haze-free ASEAN region. Within this platform, members, who constitute the agriculture and forestry sectors, share their fire-fighting expertise and conduct trainings.

Within our good agricultural practices curriculum in [our smallholder program](#), we emphasize the use of fire-free methods to manage biomass waste and replace old oil palms - more in Section 3C. We intend to integrate these fire-free, good agricultural practices into landscape programs.

B. Supplier

Research from SIIA has pointed to the need to enable smaller producers to mitigate the risk of fires, as they may not have the capacity or knowledge like Musim Mas does. In our engagement with our suppliers, we learned that many are interested in strengthening their ability to prevent and manage fires.



Image 17: Musim Mas actively conducts workshops for suppliers so that they are aware of our NDPE and sustainability policies.

Using our Supplier Assessment Tool (SAT), we conduct a needs assessment of our suppliers against our NDPE (No Deforestation, No Peat, and No Exploitation) and sustainability policies, which comprises of our no-burning policy. The SAT includes assessing the risk of fires in the suppliers' concessions.

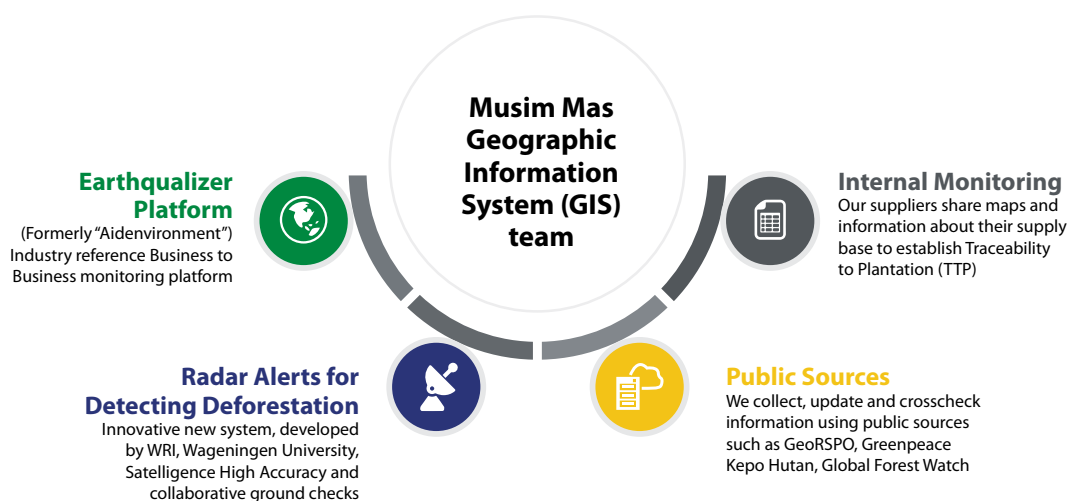


Figure 4: Musim Mas' Geographic Information System (GIS)

Since we launched our [sustainability policy](#) in 2014, we have developed an in-house database for monitoring deforestation and hotspots. Through our monitoring system (Figure 4), we analyze and prioritize high-risk and fire-prone areas. We engage suppliers who may have fires on their plantations or surrounding areas via our [Grievance system](#).

C. Independent Smallholders

Replanting periods for smallholders could present as a fire risk as slash and burn practices to clear old oil palm and land are cheaper. It is estimated that replanting costs amount to IDR 50-60 million (USD 3,400 - 4,100) per hectare¹¹, which could be a struggle for smallholders without financial assistance.

¹¹ <https://www.mdpi.com/2071-1050/11/18/4914>

Chain Reaction Research (CRR) has reported that independent smallholders could be a growing risk as they emerge as the backbone of palm oil¹². Currently independent smallholders managing over 40 percent of oil palm farmland in Indonesia, but this contribution is expected to rise to 60 percent by 2030.

Besides teaching about the dangers and impacts of fire, our smallholder program appreciates the need for better financial management by smallholders and includes modules on financial literacy. Our smallholder program was developed jointly with the International Finance Corporation (IFC), member of the World Bank. Smallholders are taught best management practices and the use of no-fire to replant their old oil palm. We also link smallholders to banks and the Palm Oil Fund Management Agency (BPDPKS), and provide administrative support in their financial assistance application. More [here](#). This financial assistance encourages smallholders to adopt more sustainable methods of replanting and improves their productivity per hectare.



Images 18 and 19: To celebrate the breakthrough in financial access for independent smallholders, Musim Mas held an inaugural replanting event on 16 May 2019 with a farmer association of independent smallholders, the Palm Oil Fund Management Agency (BPDPKS), the Indonesian government, BNI bank, and IFC.



Image 20: As a form of waste management, independent smallholders are encouraged to use leaves or biomass as compost or stacked in rows to reduce soil and nutrient erosion.

In our smallholder program, we encourage smallholders to use organic litter as a compost or a way to reduce soil and nutrient erosion instead of burning. We also ensure that smallholders are aware of the government's rules and regulations in relation to burning. Farmer group training sessions are used to highlight the dangers of fire. Our program also encourages smallholders to explore alternative livelihoods or income sources (such as cattle rearing or growing other crops). This is because they may face decreased income during the replanting period, as it takes two to three years for the young oil palms to bear fruit.

As one of the program's milestone is for smallholders to undergo sustainability certification, our modules are developed to mirror RSPO's (Roundtable on Sustainable Palm Oil) Principles and Criteria that have a strict no open-fire policy.

¹² <https://chainreactionresearch.com/report/future-smallholder-deforestation-possible-palm-oil-risk/>



Conclusion

As a leading palm oil company, we recognize our responsibility and influence in preventing and managing fires. We have set up programs specifically for our concessions, neighboring communities, and other actors within our supply chain.

While the impact of COVID-19 remains on fire prevention and management to be seen, more can be done to create an enabling environment to manage and prevent fires for different actors, including independent smallholders and companies that may not subscribe to sustainability standards. For example, the massive land titling and agrarian reform could ensure smallholder farmers that their land rights are secure, and allow local governments to provide support with setting up farmers groups and cooperatives. This could then set the path for companies to participate on a broader scale as legal plots would be identified. Consumers should be encouraged to choose sustainable palm oil, because it will incentivize producers to adopt sustainable practices, including zero-burning.

As fires know no boundaries, it is paramount that landscape activities integrate fire-free elements, with the support of various levels of government. Beyond the palm oil sector, commodities in the same fire-prone landscape can work closely together to prevent fires. FFA provides such a platform, and its potential can be maximized. Ultimately, preventing fires is a shared responsibility between communities, industry actors, governments of various countries, and consumers.





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