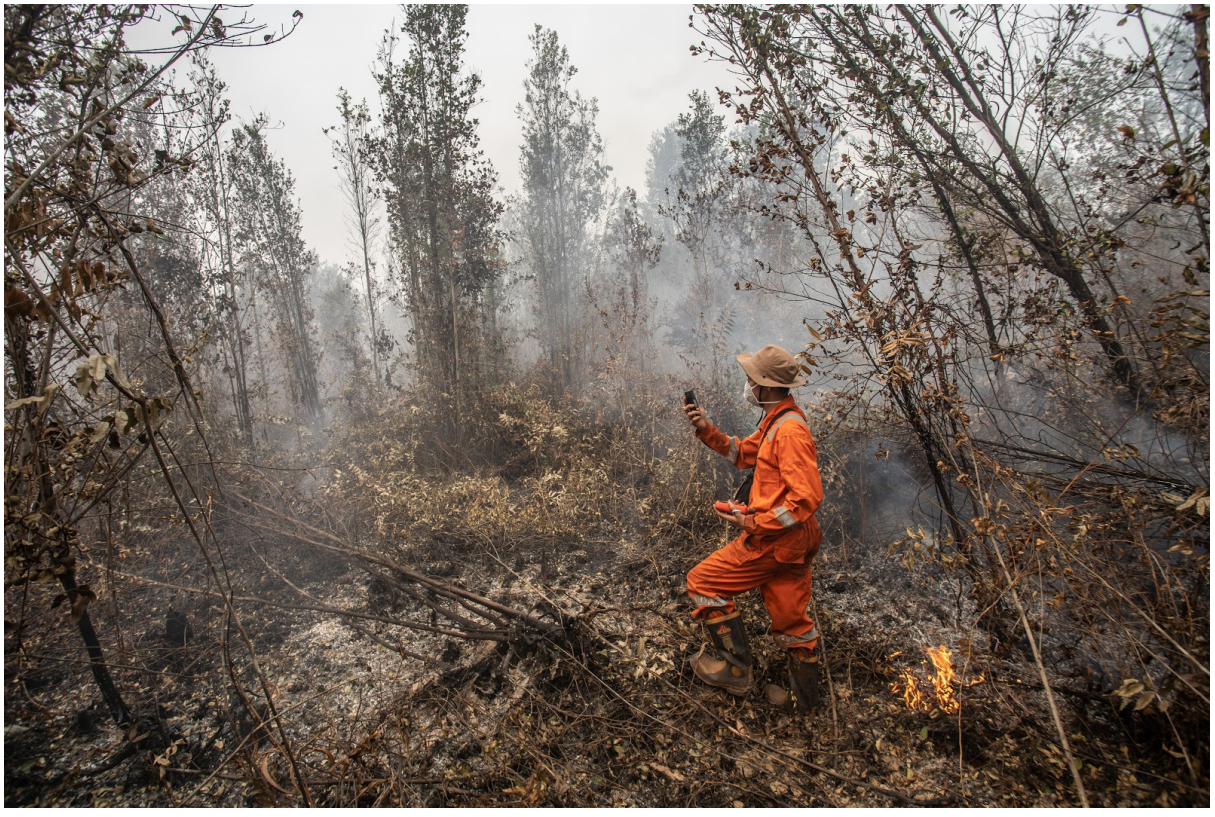
# The true cost of palm oil and wood pulp

## The terrible climate cost of global brands' addiction to commodities linked to ongoing deforestation, peatland drainage and fires in Indonesia



2 September 2019, PT Globalindo Agung Lestari, 2°28'54.079" S 114°34'58.08" E: Greenpeace Southeast Asia team takes temperature measurements inside an oil palm concession owned by the Malaysian company Genting Plantations Berhad that has been sealed by the Ministry of Environment and Forestry (KLHK) for investigation. All of the consumer companies and traders reviewed for this report are supplied by Genting. ©Sukarno/Greenpeace

# Executive summary

Peatlands, though covering just 3% of Earth's land surface, store twice as much carbon as the world's forests[1] and are thus massively important to the regulation of the global climate. But around the world they are being burned and degraded, accounting for almost 6% of global anthropogenic $CO_2$ emissions.[2]

Indonesia is at the heart of this crisis. The country's peatlands are thought to cover about 21 million hectares (ha)[3] – an area smaller than the United Kingdom[4] – yet they store 57 gigatonnes (Gt) of carbon,[5] equivalent to more than four years' worth of global greenhouse gas (GHG) emissions.[6] And this carbon is being released into the atmosphere at a shocking rate: according to Greenpeace International's[7] analysis of Indonesian government data, between 1.1 and 2 million ha of the country's peatland burned between 2015 and 2018 alone, releasing as much as 1.87 $GtCO_2$ – a quantity equivalent to the annual emissions of Russia.[8]

A large proportion of these emissions are attributable to the production of globally traded commodities. At a conservative estimate, the analysis shows that Indonesia's plantation industries – principally the palm oil and pulp sectors – were responsible for fires covering 462,000 ha of peatland during 2015–2018, accounting for 41.5% of the country's peatland fire emissions over this period. The plantation sectors' peatland fire emissions for the four years amounted to some 427 megatonnes (Mt) of $CO_2$ – a total equivalent to the average annual emissions of 110 coal-fired power plants or 91 million cars,[9] and more than half the annual emissions of Germany.[10]

To illustrate how deeply international palm oil traders and consumer goods companies are implicated in these emissions, Greenpeace has assessed the supply chains of four leading traders and four leading consumer goods companies – the makers of Kit Kats, Oreos, Dove soap and Head & Shoulders shampoo – for exposure to the palm oil producer groups most

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[1] See United Nations Environment Programme (2019) and International Union for Conservation of Nature website 'Peatlands and climate change'.
[2] United Nations Environment Programme (2019) and International Union for Conservation of Nature website 'Peatlands and climate change'
[3] Wahyunto et al (2006)
[4] 24.4 million ha. Source: CIA website 'The World Factbook'.
[5] Page S et al (2011)
[6] In 2014 (the most recent year for which data are available) global emissions including land use, land-use change and forestry (LULUCF) totalled 48.9 $GtCO_2e$, equivalent to 13.3 GtC. Source: CAIT Climate Data Explorer 'Historical emissions: Country GHG emissions'.
[7] In this briefing, mentions of Greenpeace should be read as references to Greenpeace International unless otherwise indicated.
[8] 2.03 $GtCO_2e$ in 2014, including LULUCF. Source: CAIT Climate Data Explorer 'Historical emissions: Country GHG emissions'.
[9] US Environmental Protection Agency website 'Greenhouse gas equivalencies calculator'
[10] 816.7 $MtCO_2e$ in 2014, including LULUCF. Source: CAIT Climate Data Explorer 'Historical emissions: Country GHG emissions'.

strongly linked to Indonesia's fires crisis.[11] Although issues with supply chain transparency mean that the resulting figures (shown in Table 1) give an incomplete picture of these companies' exposure, they raise key questions concerning both the lack of transparency and the liability of the global palm oil market for GHG emissions. In particular, the fact that companies known as global sustainability leaders, in most cases based or active in countries with a similar reputation, continue to purchase from producer groups responsible for significant emissions underlines a stark conclusion: governments and downstream companies are failing to drive reform in the palm oil sector.

The palm oil producer groups Greenpeace has identified as being most implicated in the fires crisis were collectively responsible for peat fires between 2015 and 2018 covering some 68,300 ha,[12] an area nearly the size of Singapore.[13] The accumulated $CO_2$ emissions associated with these peat fires over that four-year period amounted to some 63 Mt – equivalent to 28% of the 2015 emissions for Indonesia's entire energy sector[14] or the annual emissions of 13.4 million cars[15] (about three times the number of cars in Jakarta as of 2015[16] ). As these figures make clear, in addition to undermining Indonesia's emissions reductions commitments, these companies are not being held to account for the true environmental cost of the palm oil they produce.

To prevent the impending climate catastrophe, as well as the threatened dramatic loss of plant and animal species,[17] companies that use or trade in palm oil and other similarly carbon-intensive commodities, such as Unilever, Wilmar and Sinar Mas, need to change their business models fundamentally. This means either limiting their sourcing of such commodities to what they can publicly demonstrate does not come from producer groups responsible for fires, deforestation or ecosystem destruction, or – if they are unable to do this – avoiding such commodities entirely.

Governments in producer countries have a role to play through radically increasing the transparency of carbon-intensive commodity sectors, ensuring that landholdings and ultimate ownership and control of operations are fully disclosed and that sector efforts towards specific emissions reduction targets are clearly presented to the public. They must also monitor land-use change and related emissions, and produce comprehensive national emissions reporting. Financial measures such as carbon taxation and/or fiscal incentives have a role to play in both producer and consumer countries to curb land-use emissions and support a transition to ecological agriculture, as well as incentivising ecosystem conservation and restoration. At the same time, governments should introduce measures aimed at

[11] Traders: Cargill, GAR, Musim Mas and Wilmar. Consumer goods companies: Mondelez, Nestlé, Procter & Gamble, Uniliever. Producer groups as identified in Greenpeace (2019a).
[12] Analysis by Greenpeace of official Government of Indonesia burn scar data. This represents approximately 32% of the peatland burned within oil palm concessions (216,300 ha) and 15% of the total area of peatland burned during the four-year period.
[13] 71,900 ha. Source: CIA website 'The World Factbook'.
[14] Total energy emissions for Indonesia in 2015 amounted to 226.3 $MtCO_2e$. Source: Republic of Indonesia (2018) Table 2-5 p2-15.
[15] US Environmental Protection Agency website 'Greenhouse gas equivalencies calculator'
[16] There were an estimated 4.4 million cars in Jakarta in 2015. Source: Sidiq F (2018), citing the Greater Jakarta Transportation Body (BPTJ).
[17] UN (2019)

reducing demand for carbon-intensive commodities. Finally, they should deny companies directly or indirectly responsible for significant GHG emissions the opportunity to shape climate policy, both nationally and at the level of the UN Framework Convention on Climate Change (UNFCCC).

**Table 1: Trader and consumer goods company supply chain exposure[18] to peat fire emissions in Indonesian palm oil concessions, 2015–2018**

| Company | Burned area on peat (ha) | Emissions from peat fires ($tCO_2$) | Equivalence in annual emissions of number of coal-fired power plants[19] | Equivalence in national annual emissions[20] |
|---|---|---|---|---|
| **Traders** | | | | |
| **Cargill** | 53,500 | 49,403,000 | 13 | More than Denmark (48.3 Mt) |
| **GAR** | 32,700 | 30,214,000 | 8 | More than Laos (29.6 Mt) |
| **Musim Mas** | 42,900 | 39,608,000 | 10 | Over 75% of Singapore (52 Mt) |
| **Wilmar** | 46,600 | 43,006,000 | 11 | Over 80% of Singapore (52 Mt) |
| **Consumer goods companies** | | | | |
| **Mondelēz** | 66,300 | 61,242,000 | 16 | More than New Zealand (60.3 Mt) |
| **Nestlé** | 62,000 | 57,237,000 | 15 | Significantly more than Switzerland (46.2 Mt) |
| **P&G** | 54,000 | 49,822,000 | 13 | Twice as much as Norway (24.9 Mt) |
| **Unilever** | 55,500 | 51,252,300 | 13 | More than a quarter of the Netherlands (181.3 Mt) |

[18] 'Exposure' here refers to the total burned area and related emissions across a trader's or consumer goods company's supply chain. Note that there is substantial overlap in the supply chains of traders and consumer goods companies.
[19] US Environmental Protection Agency website 'Greenhouse gas equivalencies calculator'
[20] Data for 2014, including LULUCF. Source: CAIT Climate Data Explorer 'Historical emissions: Country GHG emissions'.

## Climate emissions from palm oil: a burning issue

In December 2015, at the 21st United Nations Climate Change Conference in Paris (COP 21), world leaders set an ambitious but vital objective of limiting global warming to 1.5 °C above pre-industrial levels.[21] This week, policymakers are gathered in Madrid to take forward implementation of the Paris Agreement and build ambition ahead of the 2020 COP, to be hosted by the UK in Glasgow, when countries have committed to submitting new national climate action plans.

This year's global climate summit takes place in the context of a devastating year for forest fires around the world. While media and political attention has focused on fires in the Brazilian Amazon, those in Indonesia have released almost double the climate-changing emissions, largely as a result of fires on carbon-rich peatlands and one of the most intense fire seasons in nearly two decades.[22] Indonesia's peatland fires are particularly significant in emissions terms because fires on drained peatland tend to burn not just the above-ground vegetation but also the peat itself – partially decayed vegetation (carbon-rich biomass) that accumulates over hundreds of years in wetland conditions where low oxygen levels inhibit decomposition. In this respect burning peatland is much like burning coal or any other fossil fuel.

In 2014 – the most recent year for which global figures are available, but which saw only the third-highest Indonesian peat fire emissions of the millennium to date[23] – these emissions helped to make Indonesia the world's fourth-ranked direct contributor to the global climate emergency.[24]

Many of Indonesia's fires are lit deliberately to clear land for planting, including for palm oil and pulpwood plantations, and many occur on land controlled by companies that supply the global market. Under Indonesian law companies are legally responsible for any fires on their land, regardless of the ignition source.[25] By sourcing palm oil from producer groups[26]

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[21] See UNFCC website 'The Paris Agreement'.

[22] Fire-related emissions in Indonesia as of mid-November 2019 are estimated at 708 $MtCO_2e$, as opposed to 366 $MtCO_2e$ in the Brazilian Amazon. After 2015, this is the second-worst fire season Indonesia has experienced this century. Source: Jong HN (2019) citing data from the Copernicus Atmosphere Monitoring Service (CAMS) (see CAMS (2019)).

[23] Republic of Indonesia (2018) p2-27, Table 2-13

[24] Including LULUCF. See CAIT Climate Data Explorer 'Historical emissions: Country GHG emissions'.

[25] The Forestry Law (49/1999) stipulates that 'Title or permit holders shall be responsible for any forest fire occurring in their working areas' (clause 49) and the Environment Law (32/2009) more generally provides for strict liability (*tanggung jawab mutlak*) without burden of proof (clause 88) and liability for negligence resulting in environmental damage (clause 99).

[26] A large segment of the plantation industry, especially in Southeast Asia, has always been controlled by complex conglomerates owned by individuals and families. In many cases, a group has no single ultimate parent company and may consist largely of privately held companies. The resulting group structures are often complicated, informal and opaque. The concept of a producer group as used by Greenpeace in this and other reports reflects this complexity: it goes beyond formal parent–subsidiary company relationships and takes into account indicators such as shared financial, managerial and operational control.The compositions of many of these groups, and the rationale behind Greenpeace's interpretation of them (in general terms and individually), are set out in Greenpeace (2018b) and Greenpeace (2019a).

associated with Indonesia's fires, global consumer goods companies such as Mondelēz, Nestlé, Procter & Gamble and Unilever bear indirect responsibility for these fires and their climate impact.

## Indonesia's fires: a burning issue

According to Greenpeace's analysis of official government burn scar data for 2015 to 2018:[27]

- Between 2015 and 2018, a total of some 3.4 million ha of land burned across Indonesia – counting repeated burns on the same land in different years takes the total area burned to over 3.7 million ha.[28]
- In 2015 alone more than 2.6 million ha burned.

Burned area mapping for 2019 was not available at the time of writing, but early indications are that the year is likely to be a bad one, with over 1.64 million ha having burned by the end of October according to the Center for International Forestry Research (CIFOR).[29] The European Union's Copernicus Atmosphere Monitoring Service (CAMS) estimated the 2019 fire emissions to have reached 708 $MtCO_2e$ by mid-November,[30] the worst level since 2015[31] and more than the combined annual emissions of the UK and the Netherlands.[32]

## Peatland fires: Indonesia's climate emergency

Peatlands, although they cover just 3% of Earth's total land surface, store twice as much carbon as the world's forests[33] and are thus hugely important to the regulation of the global climate. Yet around the world peatlands are being burned and degraded, accounting for almost 6% of global anthropogenic $CO_2$ emissions.[34]

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[27] 2015 was the first year in which the Indonesian Ministry of Environment and Forestry (KLHK) published official annual burn scar maps, and 2018 is the most recent year for which they are available. Burn scar is a term that refers to areas of visibly burned land after a fire event. These are usually visible on satellite imagery as blackened or charred areas. With images captured on a regular basis it is possible to identify and map burn scars by looking for changes in the landscape over time. Government burn scar data is presented in map form. Greenpeace has calculated the figures in this briefing using this government mapping data, available at http://geoportal.menlhk.go.id/arcgis/rest/services/KLHK/.

[28] See Greenpeace (2019a) for a description of the methodology.

[29] Jakarta Post (2019)

[30] Jong HN (2019) citing CAMS (2019)

[31] Fire-related emissions in Indonesia are estimated to have totalled 1,385 $MtCO_2e$ in 2015. See Jong HN (2019).

[32] 493.90 $MtCO_2e$ and 181.33 $MtCO_2e$, respectively. Emissions for 2014, including LULUCF. Source: CAIT Climate Data Explorer 'Historical emissions: Country GHG emissions'.

[33] See United Nations Environment Programme (2019) and International Union for Conservation of Nature website 'Peatlands and climate change'.

[34] United Nations Environment Programme (2019) and International Union for Conservation of Nature website 'Peatlands and climate change'

Indonesia is at the heart of this crisis. The country's peatlands cover an area smaller than the UK[35] – an estimated 21 million ha[36] – but store some 57 Gt of carbon,[37] equivalent to more than four years' worth of global GHG emissions.[38]

Fires on peat can result in much greater GHG emissions per hectare than fires in forests on non-peat soils.[39] According to Indonesia's 2018 Second Biennial Update Report under the United Nations Framework Convention on Climate Change (UNFCCC), peatland fires accounted for just over a third of the country's total emissions in 2015 – the worst year for fires so far this millennium.[40]

The task of determining the area of peat burned and the resulting emissions is complicated by the lack of reliable and comprehensive mapping of Indonesia's peatlands (see 'Methodology' below for a discussion of this issue and the different map sets that are available). Depending on the mapping used, the estimated area of peat burned between 2015 and 2018 falls between 1.12 million ha (based on the map set the Indonesian government uses,[41] which shows the least peatland area as it omits areas of shallow peat) and 2.03 million ha (based on amalgamated mapping that integrates all three available map sets, representing a precautionary approach). During the first 10 months of 2019, CIFOR estimates that 670,000 ha of peatland burned.[42]

Accordingly, the total emissions from peatland fires between 2015 and 2018 are estimated to be in the range of 1.03 to 1.87 $GtCO_2$ – at the upper end, this is comparable to Russia's total emissions in 2014.[43] On the basis of CIFOR's area estimate, this year's peat fires have been responsible for a further 618.5 Mt of $CO_2$ emissions.

Elsewhere in this briefing, Greenpeace has based calculations on the peat maps the Indonesian government uses, in order to maintain compatibility with official data. However, it is useful to bear in mind the higher ranges when considering the area that should be taken into account in order to assess the true climate impacts of peatland fires, so figures based on the amalgamated map set are sometimes included for comparison.

## Cooking the climate: companies are driving global emissions

A large proportion of peatland fires occur on land belonging to plantation companies, most of which has been drained to permit plantation establishment, making it more susceptible to fire. Greenpeace analysis shows that:

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[35] 24.4 million ha. Source: CIA website 'The World Factbook'.
[36] Wahyunto et al (2006)
[37] Page S et al (2011)
[38] 2014 global emissions including LULUCF totalled 48.9 $GtCO_2e$, equivalent to 13.3 GtC. Source: CAIT Climate Data Explorer 'Historical emissions: Country GHG emissions'.
[39] See eg Ministry of Environment and Forestry (nd) p4, Figure 3.
[40] Republic of Indonesia (2018) p2-25, Figure 2-14
[41] Ritung S et al (2011)
[42] Jakarta Post (2019). This represents approximately 41% of the total reported area burned during this period.
[43] 2.03 $GtCO_2e$, including LULUCF. Source: CAIT Climate Data Explorer 'Historical emissions: Country GHG emissions'.

- Indonesia's plantation sectors, predominantly palm oil and wood pulp, were responsible for fires covering at least 462,000 ha of peatland during the 2015–2018 period – around 40% of the total area of peatland burned.
- The plantation sectors' peatland fire emissions for the four years totalled at least 427 $MtCO_2$ – equivalent to the annual emissions of 110 coal-fired power plants or 91 million cars,[44] and more than half the total annual emissions of Germany.[45]
- Of this total, 200 $MtCO_2$ came from oil palm concessions (216,300 ha of peatland burned) and 227 $MtCO_2$ from pulpwood concessions (246,100 ha of peatland burned).
- The pulp sector producer group that saw the largest area of peatland burn within its concessions was Sinar Mas/Asia Pulp & Paper (APP), followed by Royal Golden Eagle (RGE)/APRIL: together the two groups accounted for over 90% of the pulp sector's total, with 223,200 ha of peatland in their concessions burning during the four-year period. The accumulated emissions from these fires are estimated at 206 $MtCO_2$ – equivalent to the annual emissions of 52 coal-fired power plants, or the combined annual emissions of the Netherlands and Norway.[46]
- The Sinar Mas group, which covers both pulp (APP) and palm oil (Golden Agri-Resources), was responsible for more than 40% of the emissions associated with the plantation sector. It was responsible for 193,500 ha of peatland burning in its own pulp and palm oil operations during the four-year period. The accumulated emissions from these fires is estimated at 178.6 $MtCO_2$ – equivalent to nearly three-and-a-half times the annual emissions of Singapore.[47] Sinar Mas was exposed to an additional 30.2 $MtCO_2$ over the period through its third-party palm oil suppliers.

Individual palm oil producer groups' responsibility for peat fires is covered in detail below. Collectively, the palm oil producers Greenpeace has identified as being most implicated in the fires crisis were responsible for peat fires between 2015 and 2018 covering some 68,300 ha,[48] an area nearly the size of Singapore.[49] The accumulated $CO_2$ emissions associated with these peat fires over that four-year period amounted to some 63 Mt – 28% of the 2015

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[44] Source: US Environmental Protection Agency website 'Greenhouse gas equivalencies calculator'.
[45] 816.7 $MtCO_2e$ including LULUCF in 2014. Source: CAIT Climate Data Explorer 'Historical emissions: Country GHG emissions'.
[46] APP was responsible for 192,800 ha of burned peatland with associated emissions of 178 $MtCO_2$ over the four-year period – equivalent to the annual emissions of 45 coal-fired power plants and almost equalling the total annual emissions of the Netherlands in 2014 (181 $MtCO_2$). RGE was responsible for 30,400 ha of burned peatland with associated emissions of 28 $MtCO_2$ over the four-year period – equivalent to the annual emissions of seven coal-fired power plants and surpassing the annual emissions of Norway in 2014 (24.9 $MtCO_2$). Sources: Greenpeace analysis of official Government of Indonesia burn scar data, US Environmental Protection Agency website 'Greenhouse gas equivalencies calculator' and CAIT Climate Data Explorer 'Historical emissions: Country GHG emissions'.
[47] 52.4 $MtCO_2e$ including LULUCF in 2014. Source: CAIT Climate Data Explorer 'Historical emissions: Country GHG emissions'.
[48] Analysis by Greenpeace of official Government of Indonesia burn scar data. This represents approximately 32% of the peatland burned within oil palm concessions (216,300 ha) and 15% of the total area of peatland burned during the four-year period.
[49] 71,900 ha. Source: CIA website 'The World Factbook'.

emissions for Indonesia's entire energy sector,[50] and equivalent to the annual emissions of 13.4 million cars[51] (about three times the number of cars in Jakarta as of 2015).[52] As these figures make clear, in addition to undermining Indonesia's emissions reductions commitments, these companies are not being held to account for the true environmental cost of their palm oil.

In addition to the impact it has through its role in Indonesia's fires, the plantation industry also contributes to the country's GHG emissions via deforestation and the decomposition of drained peatland through oxidation. The government's 2018 Biennial Update Report shows the forestry and other land-use sector contributing a steadily increasing level of annual emissions as a result of peatland decomposition: in both 2015 and 2016 the figure exceeded 350 $MtCO_2e$,[53] greater than the total annual emissions of France.[54]

## Global brands: exposed to forest and peatland fire emissions

In December 2010, at the 16th UN Climate Change Conference in Cancun, the world's leading consumer goods companies committed to ending deforestation for palm oil and other commodities by 2020. However, as recent Greenpeace investigations have shown, leading consumer goods companies remain linked to significant deforestation and many thousands of hectares of burning, thanks to their purchasing of palm oil originating with producer groups implicated in both.[55]

In October 2019, Greenpeace identified the 30 palm oil producer groups most closely linked to the ongoing fires crisis in Indonesia, on the basis of a combination of total burned area between 2015 and 2018 and fire hotspots[56] detected in 2019. We then tracked trade links from these groups to major palm oil traders Cargill, GAR, Musim Mas and Wilmar, and leading consumer goods companies Mondelēz, Nestlé, Procter & Gamble and Unilever. The results were published in *Burning down the house: How Unilever and other global brands continue to fuel Indonesia's fires*.[57] For the current briefing we have analysed the same 30 producer groups' responsibility for fires on peat, and the traders' and consumer goods companies' supply chain exposure to those fires and their associated emissions.

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[50] Total energy emissions for Indonesia in 2015 amounted to 226.3 $MtCO_2e$. Source: Republic of Indonesia (2018) Table 2-5 p2-15.
[51] US Environmental Protection Agency website 'Greenhouse gas equivalencies calculator'
[52] There were an estimated 4.4 million cars in Jakarta in 2015. Source: Sidiq F (2018), citing the Greater Jakarta Transportation Body (BPTJ).
[53] Republic of Indonesia (2018) p2-25, Figure 2-14
[54] 334 $MtCO_2e$ including LULUCF in 2014. Source: CAIT Climate Data Explorer 'Historical emissions: Country GHG emissions'.
[55] See Greenpeace (2018a,b,c,d) and Greenpeace (2019a,b).
[56] A fire hotspot is a time-specific possible fire location identified from satellite imagery. Fire hotspot alerts as derived from satellite sensors provide spatial and temporal information on the possible locations of a fire during the moment of overpass by the satellites Terra, Aqua and SNPP. For details of the fire detection systems used see Earthdata website 'Firms FAQ' and Deputi Bidang Penginderaan Jauh Lembaga Penerbangan dan Antariksa Nasional - LAPAN (2016).
[57] Greenpeace (2019a)

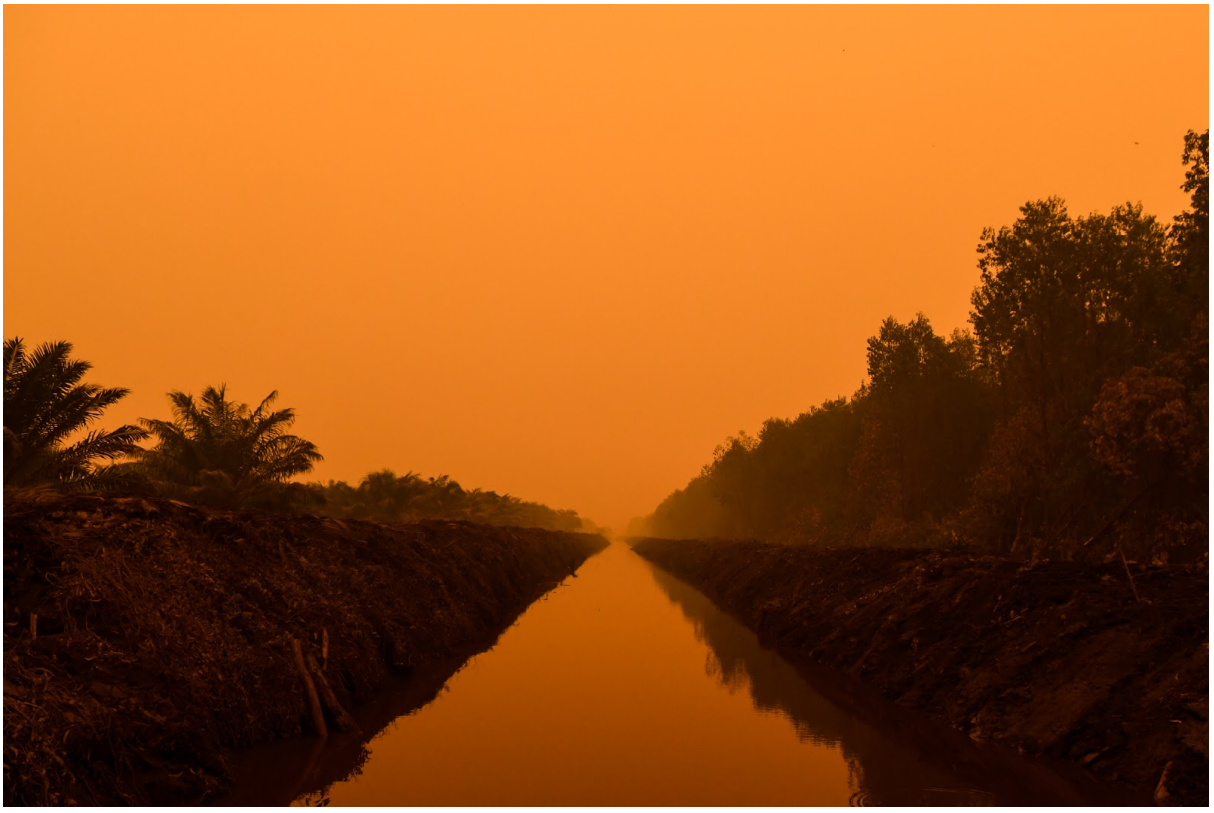
The included tables present estimates of producer groups' liability (Table 2) and traders' and consumer goods companies' exposure[58] (Table 1) based on the 2011 map set[59] used by the Indonesian government for its climate accounting to the UNFCCC. There are considerable uncertainties due to a lack of transparency in the sector, and individual companies' liability or exposure may be higher or lower than reported here. Conversely, taken collectively, the real emissions figures from peatland fires are likely to be higher (see 'Methodology' below), with best practice risk assessment suggesting that they may be double the numbers indicated in the tables. Table 2 leaves out four groups from the original 30 which had no or negligible fires on peat within their concessions.[60] Many other producer groups besides those assessed in *Burning down the house* had fires on peat during the same period; while beyond the scope of this briefing, tracing their supply chain links would increase the assessed level of traders' and consumer goods companies' exposure to peat fires and resultant emissions.

**Table 2: Peat area burned and related $CO_2$ emissions (2015–2018) in concessions controlled by palm oil producer groups most closely linked with Indonesia's fires crisis**

| Palm oil producer group | Burned area on peat (ha) | Emissions from peat fires ($tCO_2$) | Equivalence in annual emissions of number of cars[61] |
|---|---|---|---|
| **Agro Inti Semesta** | 6,700 | 6,220,000 | 1,320,594 |
| **Astra Agro Lestari** | 1,800 | 1,624,000 | 344,798 |
| **Bakrie** | 5,400 | 4,965,000 | 1,054,140 |
| **Best Agro Plantation** | 4,400 | 4,060,000 | 861,996 |
| **Bumitama** | 390 | 362,000 | 76,858 |
| **Citra Borneo Indah** | 1,900 | 1,795,000 | 381,104 |
| **Fangiono Family (all)** | 5,300 | 4,868,000 | 1,033,546 |
| **Gama** | 5,300 | 4,920,000 | 1,044,586 |
| **Genting** | 4,200 | 3,851,000 | 817,622 |
| **IOI** | 600 | 552,000 | 117,197 |
| **Korindo** | 60 | 54,000 | 11,465 |

[58] 'Exposure' here refers to the total burned area and related emissions across a trader's or consumer goods company's supply chain. Note that there is substantial overlap in the supply chains of traders and consumer goods companies.
[59] Ritung S et al (2011)
[60] Namely Austindo Nusantara Jaya, Gagah Putera Satria, Jaya Agra Wattie and TSH Resources.
[61] US Environmental Protection Agency website 'Greenhouse gas equivalencies calculator'

| | | | |
|---|---|---|---|
| **Kuala Lumpur Kepong (KLK)** | 350 | 326,000 | 69,214 |
| **Matahari Kahuripan Indonesia (Makin)** | 6,000 | 5,501,000 | 1,167,941 |
| **Musim Mas** | 3,800 | 3,514,000 | 746,072 |
| **NPC Resources** | 120 | 112,000 | 23,779 |
| **Pasifik Agro Sentosa** | 1,400 | 1,318,000 | 279,830 |
| **Perkebunan Nusantara** | 1,800 | 1,679,000 | 356,476 |
| **Rachmat (Amara/Dharma Satya Nusantara/Triputra Agro Persada [including Union Sampoerna Triputra Persada])** | 150 | 138,000 | 29,299 |
| **Rajawali/Eagle High** | 940 | 867,000 | 184,076 |
| **Salim (all)** | 1,200 | 1,138,000 | 241,614 |
| **Sime Darby** | 1,200 | 1,113,000 | 236,306 |
| **Sinar Mas (GAR)** | 680 | 629,000 | 133,546 |
| **SIPEF** | 3,700 | 3,381,000 | 717,834 |
| **Sungai Budi/Tunas Baru Lampung** | 8,400 | 7,776,000 | 1,650,955 |
| **Tianjin Julong** | 1,900 | 1,745,000 | 370,488 |
| **Wilmar** | 630 | 581,000 | 123,355 |
| **TOTAL** | **68,320** | **63,089,000** | **13,394,691** |



21 September 2019, PT Wira Karya Sakti, 1°19'3.979" S 103°45'30.499" E: A thick red haze surrounds a canal in burned peatland in a Sinar Mas Forestry/APP pulpwood concession in Jambi, Sumatra. ©Adimaja/Greenpeace

## What needs to happen

The key barriers to ending deforestation and the use of fire to clear land are political, not scientific or technological. Transparency is key to ensuring that the international commodities trade plays its part in limiting the global temperature increase to 1.5 ºC above pre-industrial levels. For all their fine words at the 21st UN Climate Change Conference in Paris and subsequent summits, companies and governments continue to support the current opaque system of global commodities trading, which casts a veil over the destruction of the world's forests and peatlands – and their own role in that destruction. Governments could easily require plantation, agricultural and extractive companies based or operating in their territory to provide credible data on who ultimately owns or controls them and the exact locations of their landholdings. Similarly, downstream companies could make provision of concession maps and ultimate control or ownership data a precondition of the purchase of commodities from producers or traders. That governments and companies have failed to take these steps makes clear that their priority is ease of commodity trade, regardless of climate and environmental impact.

Governments in producer countries, including Indonesia, must show leadership and champion radical transparency in the land-use sector as central to a robust decarbonisation policy. Essential components of government-driven transparency include:

- Full disclosure of the locations and extent of plantation, agricultural and extractive industry producer groups' landholdings and the beneficial owners of those operations
- A national public reporting platform showing emissions reduction targets for each industry sector that enables stakeholders to monitor these sectors' efforts towards achieving these targets, in line with the Nationally Determined Contributions (NDCs)[62]
- Robust public monitoring of land-use change and emissions, along with comprehensive national gross emissions reporting that meets or exceeds all relevant global accounting standards for land sector emissions.

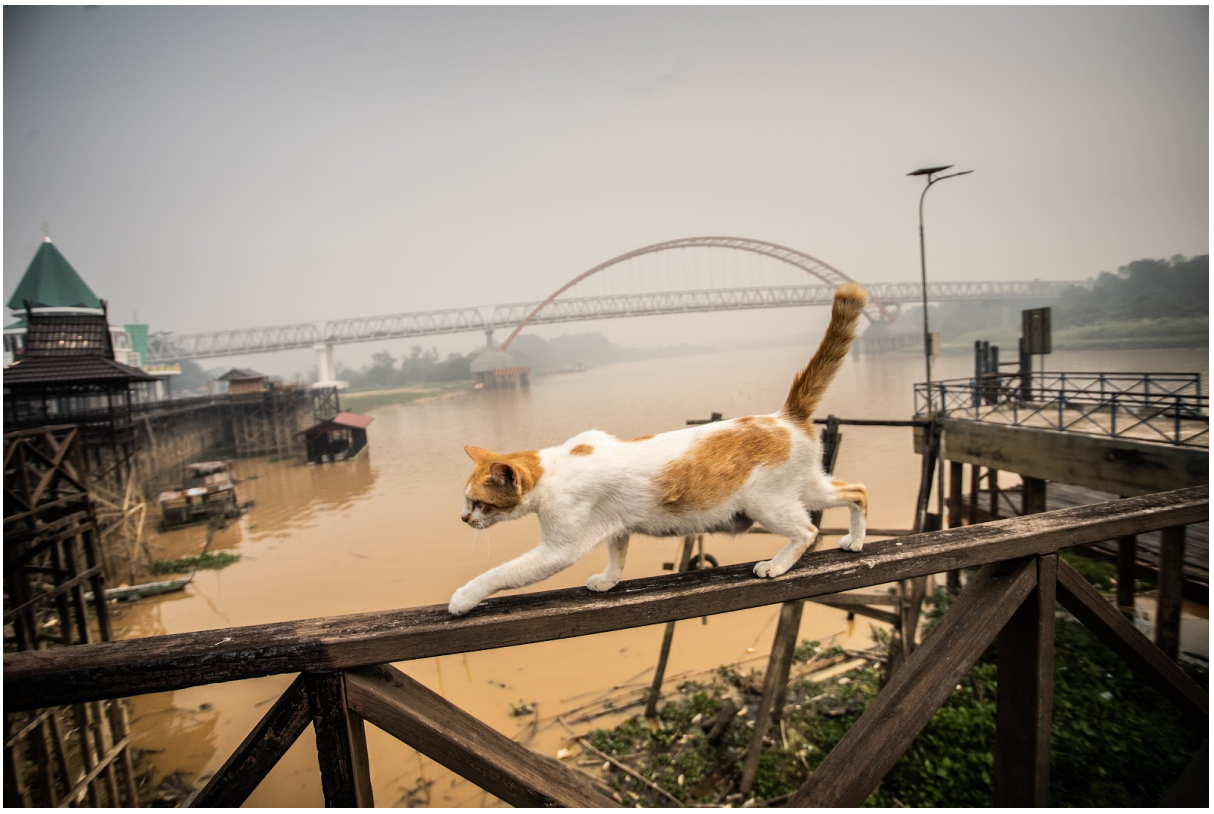
Financial measures such as carbon taxation and fiscal incentives at rates consistent with the target of limiting the global temperature rise to 1.5 ºC also have a key role to play in national approaches to reducing emissions from the land-use sector, in particular those from deforestation and agriculture. These measures must support a transition from industrial agriculture towards ecological agriculture (including promotion of plant-based diets) and provide financial incentives for forest, peatland and natural ecosystem conservation and restoration. Governments should also prioritise measures to reduce demand for industrial animal feed, bioenergy fuels, pulp and paper products and other carbon-intensive commodities.

If world leaders are serious about stabilising the global climate then they must not allow companies responsible for significant GHG emissions, such as those named in this briefing, to dictate the pace and scale of change. This means excluding them from the UNFCCC process as well as denying them the opportunity to shape climate policy at the national level.

Companies such as Unilever, Wilmar and Sinar Mas that trade and consume, without adequate safeguards, agricultural and plantation commodities linked to deforestation and the setting of disastrous forest and peatland fires have a level of moral responsibility for the climate emergency comparable with that of fossil fuel companies such as BP, Exxon and Shell. To prevent a climate catastrophe, such companies need to fundamentally change their business models.

This means limiting their sourcing of commodities such as palm oil to what they can publicly demonstrate does not come from groups responsible for fires, deforestation or ecosystem destruction, or – if they are unwilling or unable to do this – avoiding such commodities entirely. Additionally, in line with their public commitments to zero deforestation – and in recognition of the risk that carbon liability poses to their business – these companies must support government policies such as fiscal measures and trade regimes that reflect the true environmental costs of commodity production, and that seek to reduce demand for carbon-intensive commodities and incentivise the conservation and restoration of the world's remaining tropical forests and peatlands.

[62] NDCs describe the efforts that a country intends to take in response to the global threat of climate change, detailing emissions-related targets and any measures and policies to be enacted by the government to combat and address climate impacts.



23 September 2019, Palangkaraya, Central Kalimantan. ©Sukarno/Greenpeace

# Methodology

The analysis in this briefing builds on the findings of *Burning down the house* and on the data used in compiling that report, with the addition of data relating to fires in pulpwood concessions and on peat.

The sources for each of the types of data used in *Burning down the house* are described there. As that report spells out, most of the data sources exhibit unavoidable limitations, but they nevertheless provide the best picture available of sector involvement in Indonesia's fires crisis and its associated GHG emissions. Pulp concession data is derived from similar sources to those used for the palm oil concession data, as described in *Burning down the house*.

The following sections describe the core and additional data sources used for this analysis.

## Burned areas

Official Indonesian government information was used for burned area analysis. The Indonesian government, through the Ministry of Environment and Forestry (KLHK), has published official annual burn scar maps every year since 2015. Greenpeace analysed data for the years 2015 to 2018 (burn scar mapping for 2019 was not available at the time of writing).

### Limitations

While it is likely that these maps contain some inaccuracies, they are used here because they are the only official data source for burned area in Indonesia. Greenpeace takes the view that if companies identify inaccuracies in these maps, which are publicly accessible, it is their responsibility to discuss and resolve these issues directly with the government. It is the responsibility of the government to ensure that these maps are up-to-date and accurate.

Companies confronted with mapping evidence of burned areas within their concessions frequently argue that fires have been started not by them but by local communities or other third parties to clear land, or else have occurred spontaneously (eg as a result of lightning strike), and that they may have started outside their concessions and spread into them. Such explanations are undoubtedly correct in many cases. Often it may be impossible for an investigation to establish the cause of a fire with certainty. Nevertheless, given that Indonesian law clearly stipulates that plantation companies are legally responsible for any fires within their concessions, regardless of the ignition source,[63] Greenpeace maintains that it is entirely justifiable to present data for fires affecting a particular group's concessions, irrespective of their cause. Such data represents the best available picture of a producer group's contribution or downstream company's exposure to the Indonesian fires crisis, and of the responsibility of the plantation sector as a whole.

## Peatland mapping

Indonesia still lacks definitive maps of peatland areas. Three sets of maps have been produced in the past, all of which have shortcomings.[64]

As such, one option open to Greenpeace for the present analysis was to use the same map set as the Indonesian government uses,[65] henceforth referred to as the 2011 map set (which happens to be the one that shows the smallest peatland area), in order to ensure assessments compatible with official data.

Another option was to use an amalgamated map set that combined all three sets, with this being the best precautionary approach to quantifying the area that ought to be taken into account when assessing the climate and other risks of peatland fires, including those associated with the plantation industries.

In practice, the peatland mapping used by Greenpeace for the present analysis included both the amalgamated map set and the 2011 map set. The main analysis of peatland fires on concessions was based on the 2011 map set. As a result, the area of peatland fires

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[63] The Forestry Law (49/1999) stipulates that 'Title or permit holders shall be responsible for any forest fire occurring in their working areas' (clause 49) and the Environment Law (32/2009) more generally provides for strict liability (*tanggung jawab mutlak*) without burden of proof (clause 88) and liability for negligence resulting in environmental damage (clause 99).

[64] The three available map sets are: RePPProT (1988, 1990); Wahyunto et al (2006) and similar publications for Kalimantan and Papua in 2004 and 2006, collectively referred to as the Wetlands International Peat Atlas; and Ritung S et al (2011).

[65] Ritung S et al (2011)

between 2015 and 2018 is likely to have been underestimated, perhaps by as much as 45% overall.

### Limitations

Two of the three available map sets, the Wetlands International Peat Atlas and the 2011 map set, were produced on the authority of the Indonesian Ministry of Agriculture. The 2011 map set is largely derived from the Peat Atlas, with some errors corrected, but excludes much shallow peat (less than 50 cm deep) and does not distinguish among peat depths over 3 metres. None of the three map sets covers the full extent of peat in Indonesia and some peatland areas do not appear on any of the maps; equally, some areas of non-peatland have been misidentified as peatland.[66]

The Indonesian government has previously recognised the need for a new map set, even announcing in 2018 a prize for the best proposed mapping methodology.[67] However, its emissions accounting continues to be based on the 2011 map set – the least extensive of those available – and so inevitably underestimates the extent of peatland and the level of emissions due to peatland fires.

## Peatland fire emissions calculations

The methodology for calculating emissions from burned peat areas used by the KLHK employs a formula proposed by the IPCC,[68] according to which the emissions from a peat fire are obtained by multiplying the burned peat area by an emissions factor (measured in $tCO_2$/ha), itself based on mass of fuel available per hectare and carbon content of the fuel.[69] The emissions factor calculated for Indonesia is 923.1 $tCO_2$/ha, on the assumption that the area is burning for the first time.[70] Emissions from repeat burning of peatlands that have already burned are assumed to be lower than those from the first burning.

For the purpose of the present analysis, all peatland was assumed to have burned only once, meaning that some 300,000 ha of repeat burning were discounted; conversely, the entire burned area identified was assumed not to have burned before 2015. In line with government practice, all peat areas within plantation concessions were assumed to have been drained and thus to be susceptible to burning.[71]

### Limitations

The limitations of this approach include the lack of official burn scar data for years prior to 2015 that would identify any previous burns on peatland before the 2015–2018 study period. The pragmatic decision to simplify the calculation, both by omitting emissions from repeat

[66] See for further discussion section 2 of BAPPENAS, Ditjen Sumber Daya Air (Directorate of Water Resources) & Partners for Water Programme (2013).
[67] World Resources Institute (2018)
[68] IPCC (2014)
[69] See Ministry of Environment and Forestry (2016) pp26,92–93.
[70] Ministry of Environment and Forestry (2016) p86
[71] Republic of Indonesia (2018) pA-46

burns in the same area during the study period (and thus underestimating emissions during that period) and by assuming that none of the areas identified as having burned during 2015–2018 had already burned prior to 2015 (and thus potentially overestimating emissions during the study period), adds a significant margin of error.

Furthermore, considerable uncertainty comes from the formula used for estimating the emissions from a given area of burned peatland. This is based on the IPCC's default values, which according to Indonesia's 2018 Biennial Update Report have '50% uncertainties'.[72]

[72] Republic of Indonesia (2018) pA-47

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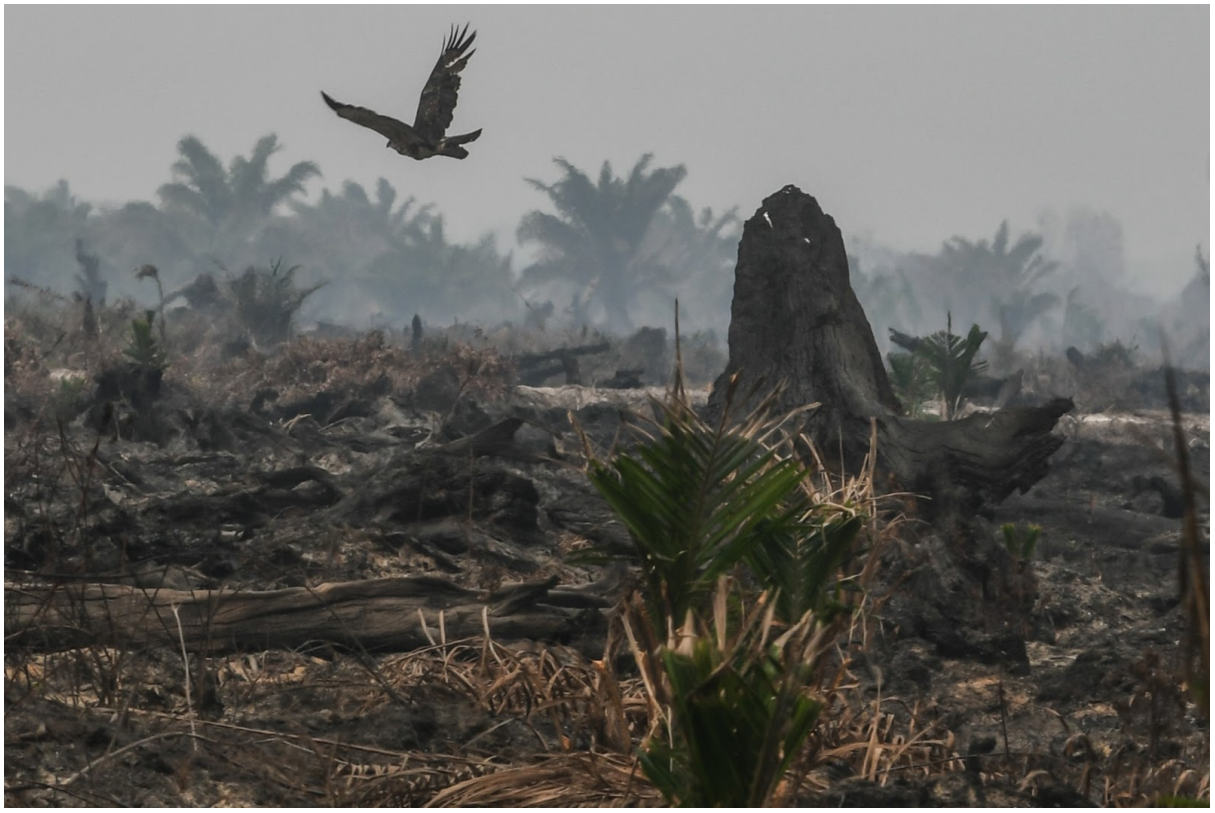

22 September 2019, PT Dyera Hutani Lestari, Jambi, Sumatra: An eagle (*Nisaetus cirrhatus*) flies over burned peatland. ©Adimaja/Greenpeace

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