

Urgent Action Needed as El Niño and Climate Change Ramp Up the Risk of Peat Fires Across Indonesia



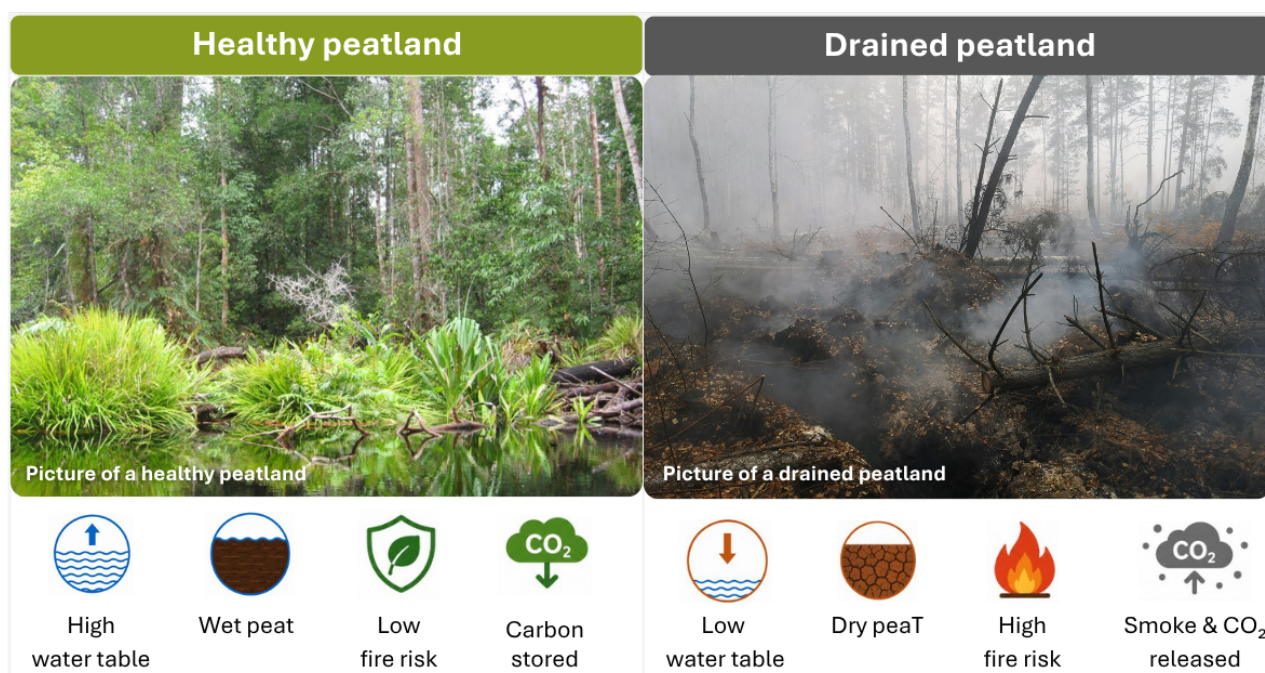
Wetlands
INTERNATIONAL

Why urgent action is needed to mitigate risk of devastating peat fires in Indonesia

Indonesia is facing the growing threat of severe peat fires in the coming months as a new El Niño combines with higher temperatures, increased fertiliser prices and ongoing degradation of peatlands. Another wave of vast peat fires would threaten people in local communities and distant cities as well as economies, biodiversity and climate action.

Wetlands International is calling for urgent action to reduce short-term risks while also outlining medium-to-long-term solutions to strengthen peatland resilience. All the signs are pointing towards another potentially devastating peat fire season in Indonesia. Governments, land managers, civil society organisations, companies and donors in Indonesia and beyond have a small window of opportunity to invest in effective measures to mitigate the risks to people, nature and climate – before it is too late.

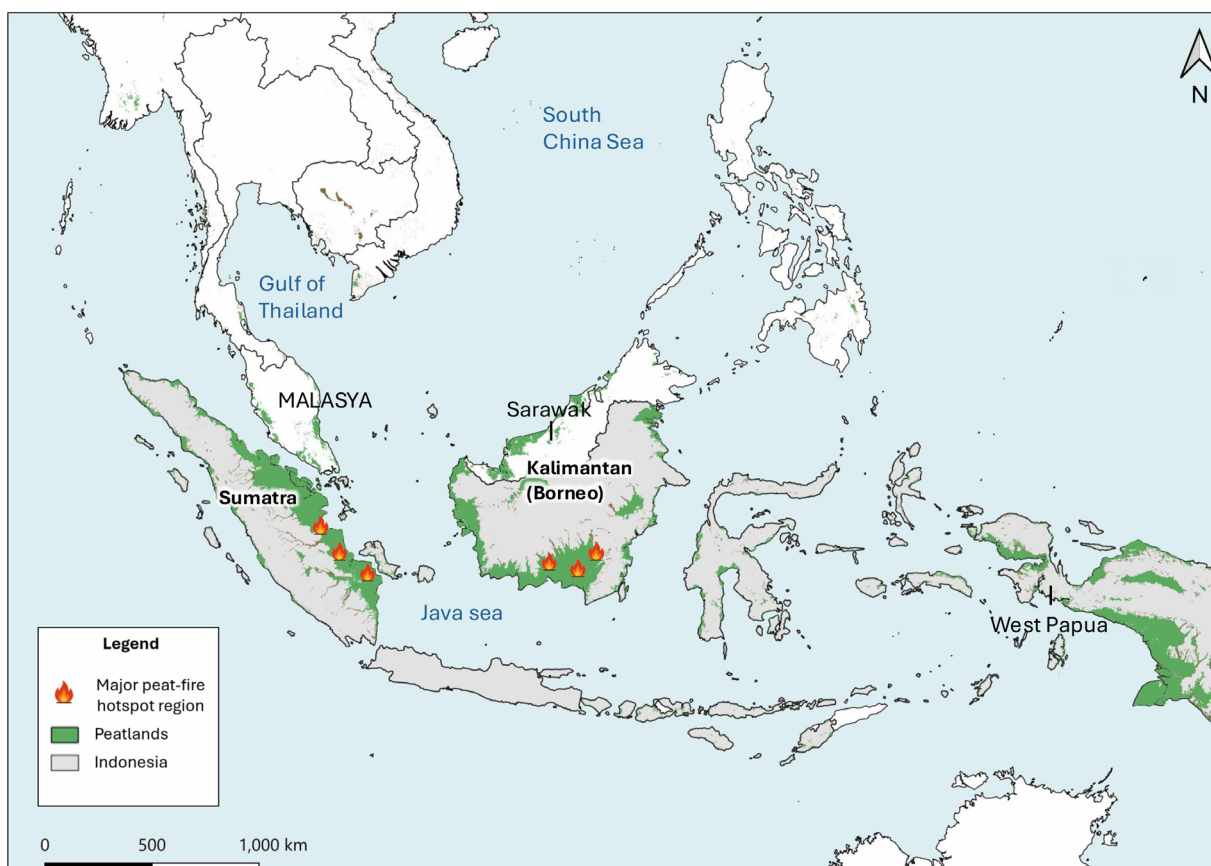
Extensive tropical peatlands occur across Indonesia and Malaysia, including Kalimantan (Borneo), Sumatra, West Papua, and Peninsular Malaysia. Peat fires are particularly destructive in Indonesia, where decades of peatland drainage and plantation development have left vast areas vulnerable to drying and recurrent fires. Kalimantan and southern parts of Sumatra are major fire hotspots, especially during El Niño-inspired droughts and increasingly intense heatwaves.



Concerns are now growing that the Indonesia and the wider region could face another peat fire disaster, such as in late 1990-ties¹ (see Box 1). Indonesia contains an estimated 13.4 million hectares of peatlands, representing one of the largest tropical peatland areas in the world. Between 4-6 million hectares of these have been drained and degraded, making them substantially more vulnerable to fires².

A severe fire season in 2026-2027 is now a realistic risk due to:

- **Super El Niño** - A new El Niño has been declared and there is a high probability (above 85%) of it becoming a very strong El Niño event this year, although its peak severity remains uncertain. It is expected to bring hotter temperatures and below-average rainfall in June-October and continuing until end of the year, significantly increasing the risk of drought – and the threat of peat fires and smoke haze³.



Tropical peatlands and major peat-fire hotspot regions in Southeast Asia. Green areas indicate tropical peatland extent; fire icons mark broad hotspot regions in Sumatra and Kalimantan (Borneo). Source of peatland extent: Global Peatland Map 2.0 Greifswald Mire Centre (2024)

Similar El Niño events preceded the devastating fires of 1982–83 and 1997–98, which affected over 200 million people in Indonesia, Malaysia, Singapore, Brunei and beyond. The Indonesian Government has recognised⁴ that the strength of this year’s El Niño combined with a positive Indian Ocean Dipole (July–Nov 2026) could result in major fires, as already happened in the past⁵.

The Forest Fires in Indonesia 1997-98

We should learn from the past. In 1997–98, roughly 9–10 million hectares of vegetation and peat burned. According to CIFOR-ICRAF, about 6.5 million hectares burned in Kalimantan – around 30% of its peatlands. Regionally, smoke formed a blanket over Southeast Asia, reaching major cities such as Kuala Lumpur and Singapore, while also affecting air, sea, and land traffic¹. The scale of fires was so large that firefighters were unable to cope with the catastrophe. Not even 4,000 military personnel and 30,000 volunteers with help from the Indonesian air force and navy working jointly with Malaysian and Singaporean air forces were sufficient to control it, especially the smoldering (underground) peat fires. The disaster eventually ended when the fires were subdued by rainfall in June 1998, after burning for almost a year².

¹ <https://www.cifor-icraf.org/knowledge/publication/32565/> ; <https://www.fao.org/4/Y1997E/y1997e0d.htm>

² <https://www.jstor.org/stable/40573309?>

- **Increase in fertilizer prices:** The Indonesian Palm Oil Association reported that fertilizer prices have increased by around 30% since the war in the Middle East escalated⁶, which is likely to seriously impact smallholder farmers. Economic pressures may drive a return to slash-and-burn practices⁷ to boost soil fertility, particularly in Sumatra and Kalimantan. In drought-stricken peatlands, this could rapidly escalate into large-scale fires.
- **Natural resilience of much of Indonesia's peatlands has been impacted by drainage, degradation and fires:** The Government of Indonesia recognises⁸ that intact tropical peatlands are naturally resilient to climate variability because their high, stable water tables keep peat wet and fire-resistant. Healthy peat domes regulate the water cycle across entire landscapes. But drainage and degradation disrupt these self-regulating mechanisms. Close to 50% of all peatlands in Indonesia (excluding Papua⁹) have been impacted, undermining the resilience of the country's peatlands to climatic impacts and fire events. Once large peatlands have been drained and experienced fire events, they become vulnerable to new and re-occurring peat fires¹⁰.
- **Indonesia's climate and peatland policy:** The government has adopted peatland restoration, which is necessary to restore landscape-scale hydrological resilience, and the Forestry and Other Land Use (FOLU) Net Sink 2030 agenda as central to its climate strategy¹¹. However, there is a room for improvement, especially when balancing policy on climate and food security. The political narrative has shifted toward food security, food production, and energy self-sufficiency, including large-scale 'food and energy estate' plans¹². There is a risk that peatlands under natural swamp forest will be treated as development reserves rather than carbon-rich ecosystems, especially as land allocations expand in West Papua and Kalimantan. Meanwhile, the dissolution of BRGM in 2024 – the government agency specifically responsible for peatland and mangrove restoration – reduced the dedicated institutional focus on peatland restoration, although restoration activities continue under other government bodies¹³.



What would be the costs of a severe fire season?

There is an evident risk that in the second half of 2026 and early 2027, Indonesia may experience another extreme fire event with potentially serious social, economic and environmental consequences – for local communities, for Indonesia as a country and for the entire planet.

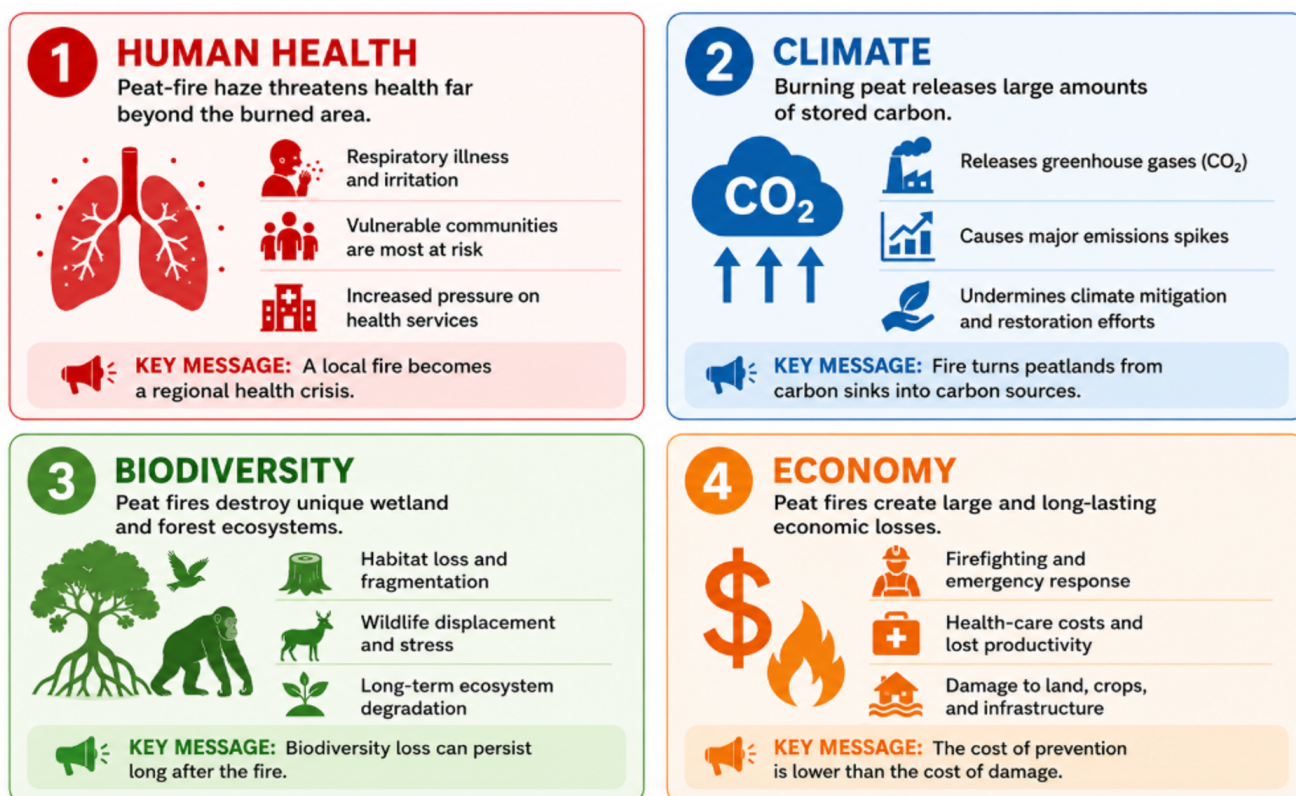
- **Danger to human life, health and wellbeing:** Along with the direct threat to local communities from another wave of peat fires, the smoke haze they produce will pose a major health hazard. Haze is a heavy air pollutant, containing cancerogenic substances and causing respiratory problems – resulting in health complications and extra deaths. After the 1997-98 fires, about 20 million people in Indonesia suffered respiratory problems, including more than 90% of people in heavily affected areas¹⁴. Between 20,000-48,000 premature deaths in Indonesia were attributed to smoke exposure¹⁰, while the disaster also resulted in an estimated 15,600 'missing children' due to fetal, infant, and child deaths¹⁵. Regionally, as many as 70 million people across Southeast Asia had their health jeopardized by the haze¹⁶. In some cases, pollution levels exceeded 2,000 µg/m³ of total suspended particles - over 130 times the level that is considered safe. Needless to say, the broader costs to society due to early deaths and widespread health issues are large and long lasting¹⁷. Ecosystem-based solutions for Disaster Risk Reduction (DRR), were developed and implemented in Indonesia (WI in partnerships), with successes¹⁸, but at small scale, not yet sufficient to fully function.
- **Contribute to global warming through massive CO₂ emissions:** Another severe peat fire would cause another huge spike in CO₂ emissions³, adding to the regular emissions and contributing to additional global warming¹⁹. Indonesia's 1997-98 fires released 3–9.4 Gt CO₂ into the atmosphere - equivalent to 13–40% of mean annual global fossil-fuel carbon emissions at the time²⁰ or several times Indonesia's current annual national GHG emissions²¹.
- **Catastrophic loss of biodiversity:** Repeated fires undermine the ecological foundation of peatland forests – the very web of life. They degrade microbial communities, devastate insect populations, and disrupt interactions among species. This trigger cascading biodiversity loss across the Sundaland Biodiversity Hotspot – one of the world's richest centers of biodiversity, where many of Indonesia's peatlands are located²². Peat and forest fires exterminate life from the affected areas, and since most species cannot

escape or move elsewhere, the losses in these globally important biodiversity hotspots can be catastrophic. Even more so as globally only 36% of historical peat swamp forest remain, with only 9% protected²³. In Indonesia, biodiversity losses due to 1997–98 fires were called an “unprecedented ecological disaster”. The fires destroyed vast areas of lowland peat swamp forest, including habitat for mammals, birds, reptiles, insects, freshwater fish and flora. Orangutans were among the most visible



victims: fires destroyed and fragmented their habitat, while smoke and the loss of food trees pushed some animals into villages and plantations, increasing the risks of human–wildlife conflict, capture, and poaching. In Central Kalimantan, exposure to peat-fire smoke caused wild Bornean orangutans to rest more, travel less, and changed their metabolism²⁴.

- **Large economic costs:** The direct and indirect costs to economies from another severe fire event are enormous. A conservative estimate of the economic losses from the 1997-98 peat fires in Indonesia came to US\$4–6.3 billion, although it is incomplete since some business, health and biodiversity costs were not fully counted²⁵. A broader study, including losses from damage to plantations, crops and environmental goods, such as tropical rainforest²⁶, resulted in a much higher figure of US\$20.1 billion (upper end estimation), which in today money value would be comparable to annual GDP of Mongolia.
- **Irreversible loss of productive peatland:** More major peat fires will accelerate peat subsidence and increase the risk of peatland becoming unsuitable for agriculture and/or permanently unproductive – which might lead to them being abandoned by the communities that depend on them. Repeated peat fires accelerate peat subsidence, causing the land surface to sink by 4–18 cm per year in burned areas²⁷. Continued peat loss turns peatlands into areas increasingly prone to flooding (once they fall below the Free Drainage Limit)²⁸, hampering any productive use of such areas, or as the underlying mineral subsoil is exposed. In many Indonesian peatlands, the subsoil consists of marine sediments containing pyrite²⁹, which transforms into sulfuric acid when exposed to oxygen, creating highly acidic soils that cannot be farmed. Indirectly, peat subsidence after fires also means shortening the period during which peatlands can be superficially drained (indicated in drainability criteria). This limits opportunities to transition towards lower-impact land uses, as promoted by the RSPO³⁰, and further undermines the economic feasibility of implementing more sustainable peatland management practices. After a fire, even natural peat-swamp forest does not recover easily and turns into a fire-prone scrub or grassland for long periods of time. Environmental impacts mostly affect local communities and are costly to mitigate, much more than the cost of prevention.



THE FOUR MAJOR IMPACTS OF PEAT FIRES

Urgent action to reduce the risk of disaster needed

There is still time to improve preparedness and lower risk of crisis and catastrophic peat fire season in Indonesia. But immediate steps must be taken now to reduce the risk as well as longer term investment in resilience. Below we recommend what the local and regional authorities, and land managers could do to mitigate the risks.

SHORT TERM SOLUTIONS:

Act now to ensure existing systems and infrastructure are operational, identify high risk areas, and increase water levels, at least temporarily.

- **Re-assess all key services and ensure they are operational including** information sharing, early warning services, meteorological services, hydrological monitoring, fire prevention, detection and control, and local and regional communications channels;
- **Ensure fire detection readiness** by reactivating and strengthening local and provincial fire detection tools, the provincial network of fire control and detection, and local fire patrols and observation points (like wells with green-amber-red scale of water depth) maintained by village groups and communities;
- **Identify the most fire prone areas** based on analysis of existing studies as well as fire history, using information on water levels in recent years, drainage intensity, and recent land use and land use change³¹;
- **Update fire contingency plans** and define clear coordination mechanisms and roles among the authorities, services and communities
- **Ensure rewetting infrastructure is fully operational in the fire prone areas** for peatland rewetting. Some of this rewetting infrastructure (canals blocks etc) require fixing, which can be done easy and improve its effectiveness.
- **Request stewards of the land in the most fire prone areas to block drainage canals** to keep more water in peatland areas. Land managers, community groups and companies operating on (drained) concession areas should be urged to, at least partly and temporarily, block the canals with local materials to retain more water before the hot, dry weather fuelled by El Niño settles in. It is essential to act now when there is still enough water to keep the peatlands wet, which is crucial to resist fires and sustain peatland production. This is critically important in areas where water levels in the dry season often drop below the safe margin of 0.4m below the surface³². Below that point, the risk of fires rapidly escalates.
- **Explore flexible emergency financing mechanisms within existing regulatory frameworks** to ensure funding can be readily available to implement these essential actions, including legally reallocating funds from long-term development to these short-term measures to reduce fire disaster risk.



- **Request local authorities**, incl. forestry services **to re-activate simple community-based early warning systems**, (i.e. deep wells with green- amber – red scale of water depth and participatory patrols), which is a robust way for local people to monitor fire risk on the ground. Encourage communities to take measures and strengthen fire prevention awareness.
- **Establish fire task forces in fire-prone areas**, update fire contingency plans, define clear coordination mechanisms and roles (led by authorities, done and supported by communities and services), operate emergency command posts during high-risk periods, and conduct routine integrated patrols to strengthen early detection and rapid response. Also, establishing fire task forces, re-activating Community Fire Brigades, conducting refresher trainings and fire simulation exercises is recommended.

MEDIUM AND LONG-TERM ACTION

While it is imperative to take short term measures to reduce the risk of another wave of peat fires across Indonesia, it is also important to take a longer-term view and invest in protecting, restoring and sustainably using the country's vital peatlands to build resilience to future fires as well as enhance water and food security, reverse nature loss and accelerate climate action. These medium and long-term actions will also help Indonesia achieve its national targets under the Paris Climate Agreement (UNFCCC), the Global Biodiversity Framework (Convention on Biological Diversity) and the Sustainable Development Goals³³.

- **Scale up peatland rewetting and restoration** by blocking channels and reducing water escaping from the peatland areas and re-introducing native species by replanting on burn scars. Permanently increase water levels in peat in productive areas and promote sustainable peatland management standards.
- **Monitor and evaluate impacts of existing rewetting initiatives:** Indonesia has made significant progress, including 5.6 million hectares under restoration as of 2023 (3.9 million within concession areas and 1.7 million outside concession areas). However, further monitoring can ensure these initiatives are effective and adjust where necessary to maintain positive impacts.
- **Develop paludiculture and/or other peatland-friendly economic activities and markets** to stimulate alternative crops, products and livelihoods to enhance food security and sustainable development. Promote these approaches as climate-smart agriculture, with communities as active partners and direct beneficiaries. Critical to develop alternative livelihood activities during the transition from conventional 'peatland-conversion' economies to a sustainable, paludiculture-based economy.
- **Develop Ecosystem-based Disaster Risk Reduction initiatives** (nature-based solution models), that contribute to climate adaptation through community involvement, paludiculture, hydrological restoration, and ecological recovery. Many of these approaches have already been tested by Wetlands International Indonesia and other organisations and can be scaled up more widely.
- Promote and reinforce **implementation peatland management best practices** with **no peatland burning**, as part of community efforts.
- **Strengthen community preparedness** by establishing and training Community Fire Brigades (Masyarakat Peduli Api, MPA), conducting regular exercises, enhancing fire prevention awareness, and developing community-based early warning systems, peatland monitoring systems and participatory patrols, especially in fire prone areas.
- **Ensure dedicated and sustainable funding** for peatland restoration by encouraging the use of a broad set of funds and financial mechanisms, including regional government budgets, special allocation funds, corporate social responsibility, climate finance, blended finance, philanthropy, Payment for Ecosystem Services, village funds etc.

- **Develop and implement a coherent policy on peatland management** and integrate different policy portfolios, including food security, water management, disaster risk management and health. Maintain a (spatial) knowledge base with up-to-date, site-level, empirical, and actionable information relevant to the different stakeholders and financing mechanisms operating in peatland landscapes. This is necessary to shift from assumption-based interventions towards data-driven planning and implementation.
- **Prevent further drainage of remaining close-to-natural peat-swamp forests** to preserve their natural hydrology and fire resilience. In peatlands, maintain groundwater levels close to the peat surface during periods of high fire risk to reduce the likelihood of surface and deep peat fires³⁴.
- **Strengthen accountability mechanisms in line with existing legal frameworks** so that land-use rights can be reviewed and, where warranted, revoked when concession holders fail to steward land effectively (such as enabling peat fires). Where appropriate, land could then be reassigned to community-led social forestry initiatives.
- **Invest in ecological restoration of permanently unproductive peatlands towards swamp forest ecosystems** in areas that are now too wet for production or severely impacted by fire (potentially 10-20% of the drained peatland area). Develop and test appropriate techniques and use them to establish firebreak zones, ideally taken up in climate adaptation and spatial plans. **Strengthen accountability mechanisms in line with existing legal frameworks** so that land-use rights can be reviewed and, where warranted, revoked when concession holders fail to steward land effectively (such as enabling peat fires). Where appropriate, land could then be reassigned to community-led social forestry initiatives.
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Why a peat fire is no ordinary forest fire

In tropical peatlands, a peat fire is the burning of ancient, carbon-rich organic soil after peat swamp forests have been drained, logged, dried out and replaced with plantations. Instead of flames racing above ground, peat fires often smoulder underground, slowly consuming the landscape from within, releasing a thick haze, greenhouse gases and toxic smoke³.

A wet peatland is a resilient, living sponge; a drained peatland is a hidden furnace waiting for a spark. In natural peat-swamp forests, peat accumulates over thousands of years, as dead and partially decomposed plant material builds up under waterlogged conditions. In many tropical lowlands, this process produces dome-shaped peat deposits that rise above surrounding river levels and can reach several metres in depth. These deposits are generally between 3,500 and 20,000 years old⁴. Their long-term accumulation stores substantial quantities of carbon, as long as peat remains waterlogged, and its natural hydrology is maintained. For this reason, intact tropical peatlands are generally fire-resistant⁵.

The depth of the water table and amount of soil moisture are major natural controls on peat fires in Indonesia⁵. Generally, if water levels in peatlands drop further than 40 cm below the surface, the risk of fire sharply increases⁶. When peat burns the surface layer is consumed and the surface level is lowered by 10-60 cm. In many cases, there are still layers of peat left below, which can also be drained and dried out – and end up burning. So that fires can occur in the same area over and over again, threatening whoever and whatever remained or returned after previous fires.

Peat fires are relatively recent phenomena, emerging only in the last 40 years as people have drained and degraded peatlands through large conversion schemes. Previously, fires happened locally and on small scale. Modern large fires began in the 1980s, especially 1982–1983, when severe El Niño drought and logging-linked degradation contributed to huge fires in East Kalimantan. FAO notes major fires in 1982/83, then 1991/92 and 1993/94, before the catastrophic 1997/98 event, which was the turning point for Indonesia's peat fire problem⁷.

Sadly, major peat fires have now become a "new normal" in many places due to unsustainable land management. But this is not set in stone. We can rebuild peatland resilience to benefit people, economies, nature and climate.

³ Crawford et al. (2024), *Nature Communications*, 15, 7363, <https://doi.org/10.1038/s41467-024-50916-7>; Graham et al. (2022), *Fire*, 5(3), 62, <https://doi.org/10.3390/fire5030062>.

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⁶ Wösten et al. (2008), "Peat–water inter-relationships in a tropical peatland ecosystem in South-east Asia," in *Proceedings of the 13th International Peat Congress*, pp. 285–288 <https://peatlands.org/assets/uploads/2019/06/ipc2008p285-288-wosten-peat-water-inter-relationships-in-a-tropical-peatland-ecosystem.pdf>

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- ³ Different scientific sources are agreeing on this: Copernicus Climate Change Service / ECMWF seasonal forecasts <https://climate.copernicus.eu/seasonal-forecasts>; multiple models point to those conclusions State of the climate: Strong El Niño puts 2026 on track for second-warmest year - Carbon Brief. While NOAA CPC predicts El Niño to extend to December 2026–February 2027, with less certainty about its strength. [Climate Prediction Center: ENSO Diagnostic Discussion](https://climatepredictioncenter.org/ENSO-Diagnostic-Discussion)
- ⁴ The official statement issued by Indonesia’s Meteorology, Climatology, and Geophysics Agency (BMKG) can be accessed here: <https://www.bmkg.go.id/siaran-pers/bmkg-puncak-musim-kemarau-agustus-2026-perkuat-kesiapan-hadapi-dampak-el-nino>
- ⁵ Sasmito, S. D., et al. (2025). Half of land use carbon emissions in Southeast Asia can be mitigated through peat swamp forest and mangrove conservation and restoration. *Nature Communications*, 16, 740. <https://doi.org/10.1038/s41467-025-55892-0>; Dafri, M., Nurdianti, S., & Sopaheluwakan, A. (2021). Quantifying ENSO and IOD impact to hotspot in Indonesia based on heterogeneous correlation map (HCM). *Journal of Physics: Conference Series*, 1869, 012150. <https://doi.org/10.1088/1742-6596/1869/1/012150>
- ⁶ Bernadette Christina, “Indonesia 2026 Crude Palm Oil Output to Fall Due to El Niño, High Fertiliser Prices, Association Says,” Reuters, April 29, 2026, republished by The Edge Malaysia, <https://theedgemaalaysia.com/node/801782>
- ⁷ Center for International Forestry Research (CIFOR), “Fire and Haze,” accessed July 14, 2026, <https://www.cifor.org/id/topic/fire-and-haze/>; Sofiyuddin, M., Suyanto, S., Kadir, S., & Dewi, S. (2021). Sustainable land preparation for farmer-managed lowland agriculture in Indonesia. *Forest Policy and Economics*, 130, 102534. <https://doi.org/10.1016/j.forpol.2021.102534>
- ⁸ There are several examples showing that the Government of Indonesia explicitly recognized that peatland restoration is necessary **to restore landscape-scale hydrological resilience**. Following the catastrophic 2015 fires, the Government of Indonesia fundamentally shifted peatland policy by recognizing that degraded peatlands had lost their natural hydrological resilience. Presidential Regulation No. 1/2016 established the Peatland Restoration Agency (BRG) with a mandate to restore the hydrological functions of peat ecosystems through landscape-scale management of Peat Hydrological Units (KHGs), rewetting, revegetation and sustainable livelihoods. This approach was reinforced by Government Regulation No. 57/2016 and later extended through the Peatland and Mangrove Restoration Agency (BRGM). See: [Presidential Regulation of the R.I. No. 1 of 2016 Concerning the Peatland Restoration Agency \(BRG\)](https://www.unep.org/peatland-restoration-agency-brg). | [UNEP Law and Environment Assistance Platform](https://www.unep.org/peatland-restoration-agency-brg)
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- ¹¹ Indonesia’s Second NDC: FOLU Net Sink 2030 and net-zero framing. [SECOND NDASDC](https://www.secdndc.go.id/)
- ¹² TanahAir. (2025). Government to open 20 million hectares of forest for food security. TanahAir. <https://tanahair.net/government-to-open-20-million-hectares-of-forest-for-food-security/>; Supriyanto, R., Maharani, A., & Alta, A. (2025). Indonesia’s food estate in context: Bridging past, present and future for national food security. Center for Indonesian Policy Studies.
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¹⁸ Up-scaling Ecosystem-based Disaster Risk Reduction: <https://www.wetlands.org/driving-investment-in-eco-drr-to-build-climate-resilient-communities-in-developing-countries/>; Partners for Resilience, "Up-scaling Ecosystem-based Disaster Risk Reduction," accessed July 21, 2026, <https://www.partnersforresilience.nl/en/programmes/up-scaling-eco-drr>

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Our vision is a world where wetlands are treasured and nurtured for their beauty, the life they support and the resources they provide. Our mission is to inspire and mobilise society to safeguard and restore wetlands for people and nature.



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