



Peatland fire burning in the Pawan-Kepulu-Pesaguan landscape, Ketapang District, Indonesia. Photo: Irpan Lamago

Integrated landscape approaches for reducing peatland fires in Ketapang District, Indonesia

Atiek Widayati, Lisa Tanika, Kasuma Wijaya, Ali Yansyah Abdurrahim, Edi Purwanto, and Roderick Zagt.

“Multistakeholder participation and the use of inclusive processes, especially in water management and promoting peatland-adaptive practices, are seen as key to reducing fires in peatlands.”

Introduction

During years with frequent fires in Indonesia, such as 2015 and 2019, Ketapang District in southwestern West Kalimantan Province received national and international attention. West Kalimantan has about 1.7 million ha of peatlands, the fourth largest in Indonesia, and 253,000 ha of which are in Ketapang District. Most have been cleared or heavily degraded. Global Forest Watch reported that between May 2019 and May 2020, Ketapang had the highest number of active fires in the province. Most were in peatland areas; some were in upstream areas where traditional shifting cultivation is still practised.

This article presents initial findings and lessons learned from Tropenbos Indonesia’s implementation of the Fire-smart landscape governance programme. The project area is the Pawan-Kepulu-Pesaguan landscape in Matan Hilir Selatan sub-district of Ketapang, which covers almost 80,000

ha (Figure 1). The landscape consists of two peatland hydrological units (PHUs): Pawan-Kepulu (64,000 ha) and Kepulu-Pesaguan (13,000 ha). These have approximately 50,000 ha of peatlands in their core areas; their peripheries, close to rivers, have non-peat (mineral) soils. The area has 20 villages, including those outside of the peatland ecosystems; e.g., along rivers and in coastal areas. Of these, five to six villages are in peatlands that have been affected by fires.

Peatland fires in the Pawan-Kepulu-Pesaguan landscape

Large fires have been burning in the landscape since 1997, a year when the El Niño-Southern Oscillation caused severe and extended droughts. Some fires were started intentionally in degraded areas, where canals have been built to drain peat for agricultural development and to transport logs from the forest. Land clearance by burning is common when native forests and peatland vegetation is converted to oil palm plantations and agricultural land. Oil palm development in this landscape began in the early 2000s with large-scale plantations, followed by independent smallholders.

Deep-peat ‘peat domes’ (>3m depth) cover 27,000 ha in Pawan Kepulu PHU (KLHK, 2015), but canal were also constructed in these areas, that should be protected by law. The deepest peat found from a survey by Tropenbos Indonesia was 9.8 m. It is dominated by fibric

(slightly decomposed) peat and hemic (moderately decomposed) peat, which indicate high water retention capacity. However, when canals are built, this capacity is disturbed, resulting in highly flammable dry peat (Paul et al. 2018).

After large areas of the landscape were converted to oil palm, fire frequency and severity increased. Since 2013, fires have been set every year during the dry months of August and September, especially in 2015 and 2019. Peatland fires create prolonged small flames with thick and persistent smoke, causing extreme pollution, low visibility and haze. Peatland fires in Ketapang drew concerns at district, provincial and national levels as their impacts were widespread, severely affecting human health and air traffic at the nearby international airport in Pontianak, and with negative impacts on agricultural crops and ecosystems.

Most of the landscape (70%), including most deep peat areas, is classified as non-forest land (i.e., land allocated for other uses, also called private land). The remaining 30% is forest land, classified as production forest or convertible production forest. Peat swamp forests are found in production forest areas managed by three villages: Pematang Gadung, Sungai Besar and Sungai Pelang. In the early 2000s, secondary peat swamp forests covered 26,000 ha, but this had declined to only 9,000 ha by 2019.

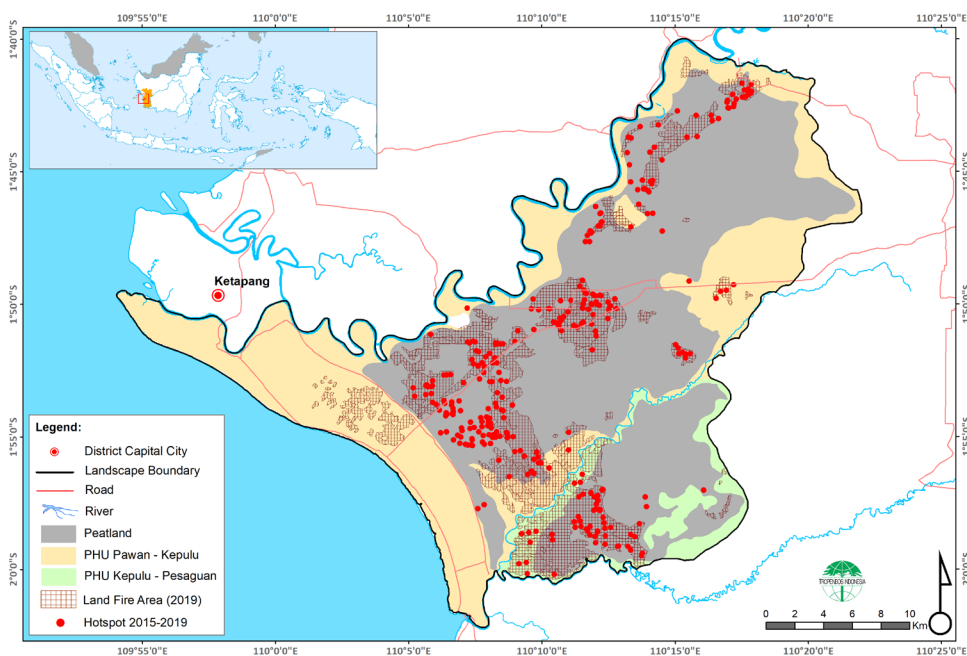


Figure 1. The Pawan-Kepulu-Pesaguan landscape in Ketapang district, West Kalimantan Province, Indonesia, with locations of satellite-detected active fires between 2015 and 2019



Burned forest in peatlands in Pawan-Kepulu-Pesaguan, Ketapang District, Indonesia. Photo: Irpan Lamago

Policy responses at national and sub-national levels

In response to the large fires of 2015, the Indonesian government developed policies and regulations. Peatland restoration was high on the agenda, marked by the establishment of the Peatland Restoration Agency by a Presidential decree in 2016. That same year, the Ministry of Environment and Forestry enacted a Forest and Land Fire Prevention and Suppression regulation to be applied at district, provincial and national levels.

Following the establishment of the agency, between 2016 and 2021, the national government enacted numerous regulatory instruments and technical guidelines on peatland ecosystem protection, management of peat domes, and restoration of peatland ecosystems, among other matters. It also issued regulations to address land and forest fires. A key regulation enacted by the Ministry of Environment and Forestry in 2021 emphasized integrating fire prevention and mitigation in disaster management action plans.

West Kalimantan and Ketapang governments responded with provincial and district regulations and other instruments. As mandated by the national regulation, Ketapang District established the Forest, Plantation and Land Fire Prevention and Suppression Taskforce. This coordinating hub involves government offices and non-government actors and is led by the district head. The district reinforced fire prevention regulations through campaigns and appeals to local communities and other actors not to start fires. The district government also

articulated the need to protect deep peat areas in its spatial planning document issued in 2015.

Addressing fires in production landscapes

Landscape approaches

Indonesia's peatlands are largely designated for productive allocation and use. However, with increasing risks of land-use fires getting out of control and resulting in wildfire disasters, in addition to greenhouse gas emissions, biodiversity loss and other environmental issues, it is necessary to address multiple objectives in their management. In response, landscape approaches have brought concepts and tools to achieve diverse social, economic and environmental goals; this requires reconciliation between multiple stakeholders in landscape governance (Zagt and Chavez-Tafur 2014).

Implementing landscape management approaches requires a set of principles. Sayer et al. (2013) proposed ten elements: continual learning and adaptive management, common entry point, multiple scales, multifunctionality, multiple stakeholders, negotiated and transparent changes, clear rights and responsibilities, participatory monitoring, resilience, and strengthened stakeholder capacity. Similarly, Scherr et al. (2013) emphasized that integrated landscape management must include shared or agreed management for multiple objectives; practices that provide multiple benefits; interactions of landscape actors that maximize synergies; collaborative, community-based processes; and supporting policies and markets.



Remaining forests, drainage canal and degraded peatland in Pawan-Kepulu-Pesaguan, Indonesia. Photo: Irpan Lamago

Fires-smart territories

The fire-smart territory (FST) approach integrates economic and social activities. It aims to reduce risk and conserve natural values and ecosystem services by empowered communities who are able to determine objectives and practices for the prevention, control and use of fire (Tedim et al. 2016). Adapting this approach to Indonesian peatlands must focus on the adoption and practice of collaborative governance and adaptive management. Tedim et al. (2016) listed eight principles of the FST approach: heterogeneity, adaptability and flexibility, cooperation, complementarity, empowerment, attenuation, scaling, and modularity.

Addressing peatland flammability

Addressing fire risk in highly degraded peatlands must reduce flammability. To achieve this, Indonesia's Peatland and Mangrove Restoration Agency (the successor to the Peatland Restoration Agency since 2021) developed the "three Rs" strategy: rewetting, revegetation and revitalization. Rewetting is the key stage and is usually undertaken through the construction of canal blocks. This is followed by revegetation. Revitalization strengthens economic development and livelihoods and supports the sustainability of the restored peatlands.

Agricultural production on peatlands is sometimes a priority, as in the Pawan-Kepulu-Pesaguan landscape. Combining productive and protective functions can be achieved through adaptive practices, either as a long-term goal or as an intermediate phase prior to full restoration (Widayati et al. 2016); see Figure 2. Where

rewetting cannot be optimally carried out, managing peatlands for productive purposes must focus on minimal drainage, crops that tolerate high soil moisture (paludiculture), no tillage, and planting dense tree crops to reduce surface temperatures (Joosten et al. 2012).

The three R's strategy and support for production-protection functions must both consider landscape variations and complexities. In some areas, it may be feasible to fully restore peatlands; in others, it might be only partly feasible; e.g., by improving agricultural productivity through various measures, no-burn policies and water-level patrols.

Gaps and barriers

In Pawan-Kepulu-Pesaguan, unsuitable land designation and land-use planning are long established, including the building of transmigration settlements and a major provincial road network by governments. In addition, deep-peat areas are designated as private land and are not protected. This allows them to be converted for oil palm and agriculture, which leads to frequent fires during long dry seasons.

The national government faces a dilemma: support economic development or shift to protection measures that compromise such development, with few initiatives that address the factors that underlie the need for protection. Despite the mandate to protect deep-peat areas in district spatial planning, operational action plans were not developed and most resources are allocated to fire suppression and disaster management. In addition,

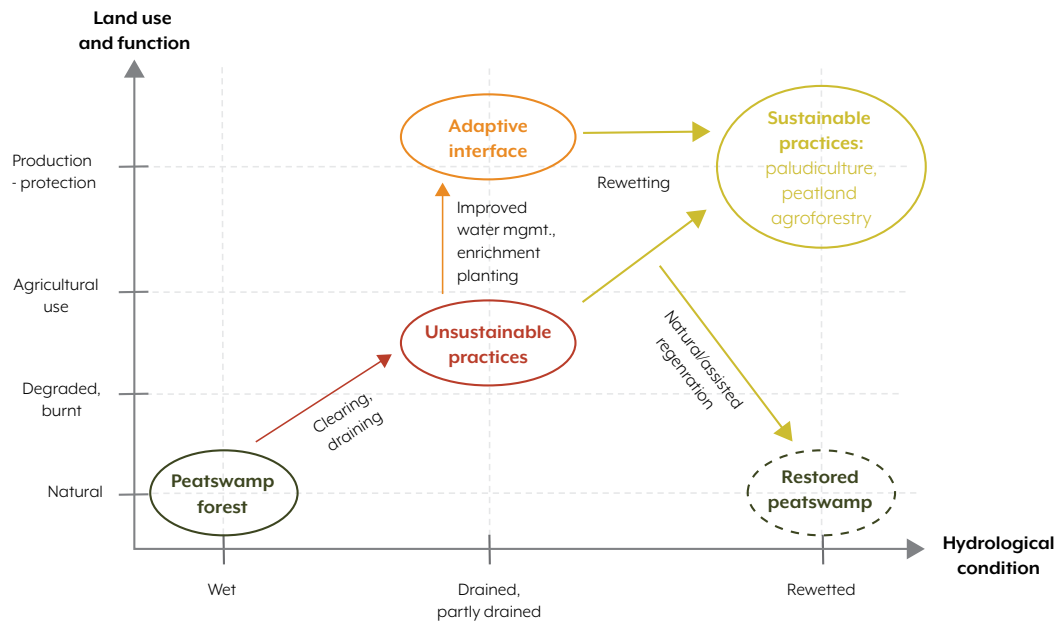


Figure 2. Options for promoting productive-protection peatland functions (adapted from Widayati et al. 2016)

the effectiveness of efforts is reduced due to overlapping land claims and tensions over land rights. Lack of capacity and lack of knowledge on the part of communities and local government are other significant barriers.

Burning continues to be perceived as the cheapest way to clear land and improve soil fertility. In addition, the common preference of oil palm companies and smallholders is to keep water tables low using drainage canals, and they tend to be reticent to consider an increase in water levels. There is also a well established market for palm oil, making it difficult for smallholders to find equally profitable alternative, let alone any that are based on the productive use of wet and rewetted peatlands (Wichtmann et al. 2016).

Multiple approaches

To address peatland fires and the interconnected issues in Pawan-Kepulu-Pesaguan, the project aims to improve governance and management of the landscape in order to support adaptive practices and sustainable use. A variety of approaches were explored to achieve collaborative efforts by diverse stakeholders under an integrated landscape approach. A jurisdictional approach was incorporated, especially at the district level, by developing planning, regulatory instruments and implementation tools. Partnership with the private sector by means of responsible financing schemes was also explored.

The means to implementing multiple approaches include: (i) improving understanding through diagnostic steps

and knowledge development; (ii) developing a theory of change for target actors; and (iii) developing integrated and scalable intervention strategies at various levels (Figure 3). The pathways work as a feedback loop and involve iterative processes throughout.

Through a theory of change, Tropenbos Indonesia envisioned that processes, actions and targeted changes are carried out by the target actors: governments in relevant sectors, private actors (mostly in the oil palm sector), smallholders and communities. The programme established multistakeholder working groups at district and sub-district landscape levels to identify common issues and build shared visions through consultation and negotiation. Landscape-level outcomes and outputs were targeted for collaborative efforts with external stakeholders (Figure 3):

- **Planning and regulatory instruments at landscape and village levels** were developed to implement enabling conditions at the village level, such as village regulations (*Peraturan Desa-PerDes*) and inclusion in village development planning.
- **Landscape and village institutions** were strengthened through multistakeholder working groups at the sub-district level, followed by the strengthening of village governments and other local institutions such as village forest management units (*Lembaga Pengelola Hutan Desa*), business units in villages (*Badan Usaha Milik Desa*) and village forests (*Kelompok Usaha Perhutanan Sosial*).

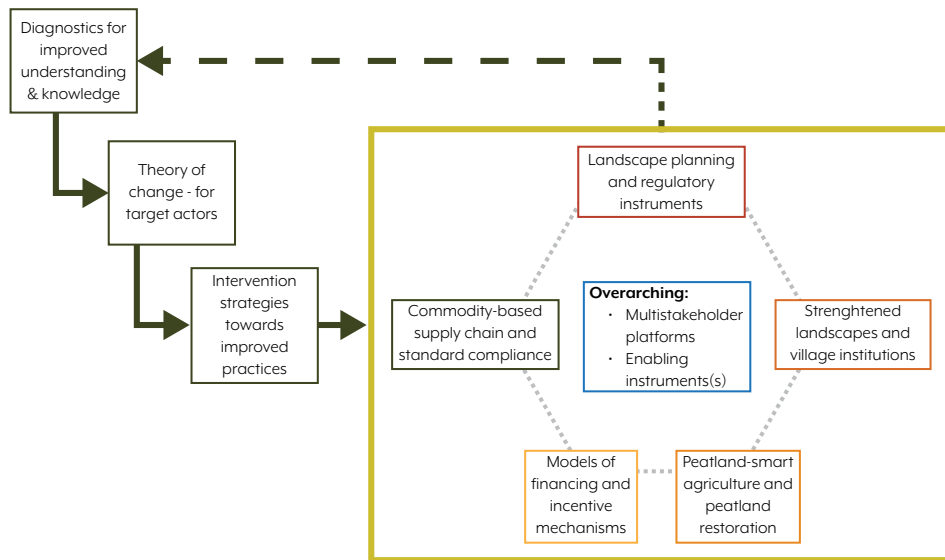


Figure 3. Pathways in implementing multiple approaches for fire-smart peatland landscapes

- **Peatland-smart agriculture and peatland restoration** were supported through capacity strengthening for peatland-adapted good practices, establishing demonstration plots, exploring alternative livelihoods, and support for restoring degraded forest areas.
- **Models of financing** were explored and developed for forest protection, fire prevention and peatland-smart practices through responsible financing schemes, jurisdictional, ecological-based fiscal transfers and village funds.
- **Commodity-based supply chains and standards** were connected to oil palm best

practices for independent smallholders and large-scale palm oil producers.

Landscape-fire typology and prioritization

Pawan-Kepulu-Pesaguan can be categorized according to five site types, from satellite-detected fire data (2015-2019), historical fire locations, peatland and hydrological characteristics, land status, actors involved, and land use/cover (see Table 1 and Figure 4). Based on the five landscape types and on targeted improvements, developing these landscape planning instruments should be a priority (Table 2).

Table 1. Site type, Pawan-Kepulu-Pesaguan, based on dominant characteristics

Type	Fire-prone areas	Peatland	Land status/actors	Land cover	Location
1	Fire areas are large and many	Dominant deep-peat areas (>3m), extensive canals	Private land, community and oil palm concessions, overlapping claims	Shrubs, cleared areas with young oil palm, oil palm plantations	Large parts of Sungai Pelang and Sungai Besar, oil palm concessions
2	Fire areas are large and many	Varied peat depths, fewer canals	State forest, production forest (community managed and village forests)	Shrubs and dry agriculture	Pematang Gadung village
3	Fire areas are smaller and fewer	Shallow peat and mineral soils, no canals	Private land, with unclear tenure	Shrubland and cleared land	Pawan River, bordering oil palm concessions
4	Fire areas are small and very few	Varied peat depths, few canals	Village forest schemes in production forests	Secondary peat swamp forests	Village forests of Sungai Besar and Pematang Gadung
5	Minor fire areas	Varied peat depths, many canals	Private land, oil palm concessions	Oil palm plantations	Oil palm concessions

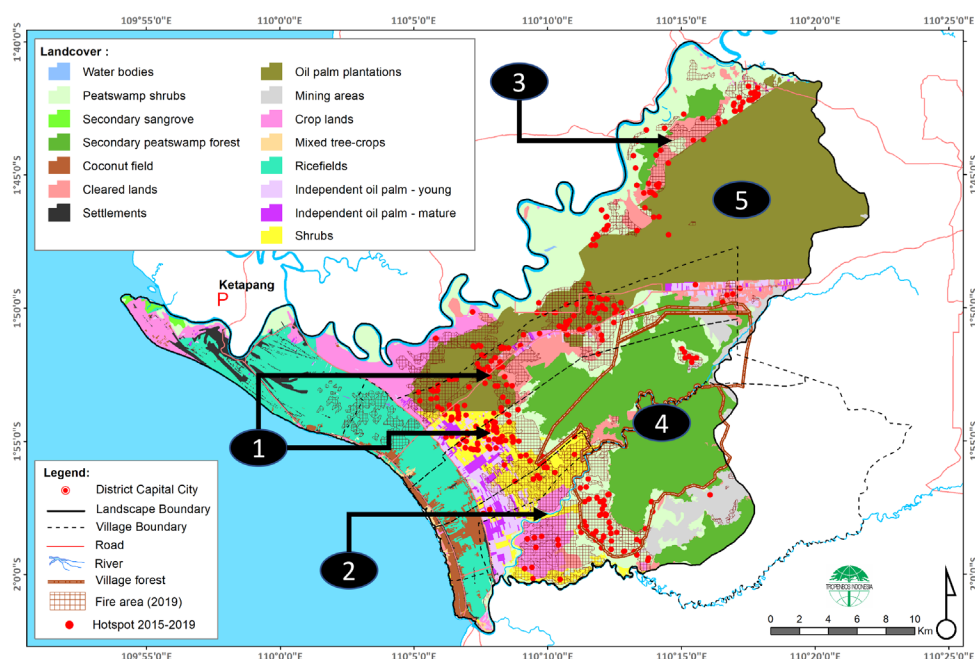


Figure 4. Divisions in Pawan-Kepulu-Pesaguan based on fire locations, peatland characteristics, land status and land use/cover (for description of numbered site types see Table 1)

Table 2. Proposed prioritization of activities for different peatland site types

Type no.	Characteristics	Priority
Type 1	Peat dome areas with frequent fires, and no restriction in land use	Peatland protection zoning, to be regulated at the district level. Considerations of whether to allow agricultural practices or production functions must be based on sustainable -peatland management.
Types 2 and 3	Various fire-affected areas and sites of varying peat depths	Integrated fire prevention and management that acknowledges complexities in land status, land use and actors involved, also aiming to incorporate productive agricultural practices and peatland protection functions.
Type 4	Areas with minor fires, varied peat depths, few canals, dominated by remaining peat swamp forests, with illegal mining as an imminent threat in neighbouring areas	Forest protection and restoration, and sustainable wet peatland practices. These should be supported by financing schemes to ensure protection, revegetation of degraded forests and provision of alternative livelihoods.
Type 5	Areas dominated by large-scale oil palm plantation with many canals, but only minor fires detected	Good agricultural practices, promoted in partnership with smallholder cooperatives, and with upscaling through sustainable oil palm supply chains.

Lessons learned

Various approaches to achieve a fire-smart landscape through peatland-adaptive practices have been explored in Pawan-Kepulu-Pesaguan at the district, landscape and village levels. Multistakeholder participation and inclusive processes are key, where trust has been built and collaborative actions are pursued across multiple scales. National to sub-national linkages have been made through the involvement of the Peatland and

Mangrove Restoration Agency. Capacity strengthening for good agricultural practices has included training of local champions to play important roles in sustaining and spreading their use. Financing has been introduced through a responsible financing scheme managed by organizations such as Lestari Capital. Other financial mechanisms, such as jurisdictional, ecologically based fiscal transfers require further investigation.

Work to date in Pawan-Kepulu-Pesaguan has shown the importance of collaboration and cooperation, and of empowering communities and local actors, and understanding the complementarity of their respective roles and responsibilities. Programme activities are ongoing, but have already demonstrated that a holistic approach is necessary due to the competing and conflicting interests that underlie fires in this production landscape. Land and tenure rights are also a major issue and one of the most intricate to resolve. Promoting multifunctionality and resilience through diverse agroforestry systems on restored peatlands remains challenging where monoculture oil palm dominates, and such landscape transformation requires enabling policies and supportive markets.

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Author affiliation

- Atiek Widayati**, Senior associate/researcher, Tropenbos Indonesia, Bogor, Indonesia (atiekwidayati@tropenbos-indonesia.org)
- Lisa Tanika**, PhD student, Forest Ecology and Forest Management Group, Wageningen University and Research, the Netherlands (lisa.tanika@wur.nl)
- Kasuma Wijaya**, HCV/HCS and GIS specialist, Tropenbos Indonesia, Bogor, Indonesia (kasumawijaya@tropenbos-indonesia.org)
- Ali Yansyah Abdurrahim**, Human Ecology researcher, Research Center for Population, Indonesia National Research and Innovation Agency, Jakarta, Indonesia (aliy001@brin.go.id)
- Edi Purwanto**, Director, Tropenbos Indonesia, Bogor, Indonesia (edipurwanto@tropenbos-indonesia.org)
- Roderick Zagt**, Head of programmes, Tropenbos International, Ede, the Netherlands (roderick.zagt@tropenbos.org)