



Reducing Greenhouse Gas Emissions by Improving Peatland Management in South Sumatra

Summary

Draining and converting peatlands into agricultural lands can cause considerable and irreversible environmental, social, and economic damage.

Environmentally, such action in company and community owned land has resulted in recurring large-scale fires in South Sumatra that release significant amounts of carbon emissions – a potent and common form of greenhouse gas that causes global warming. Socially, the fires have produced massive and widespread pollution that causes severe health risks. Economically, peatland damage has threatened agricultural production that supports the livelihoods of many.

Land-clearing, pollutive fires and damaged peatlands will continue to be a fixture unless we can drive effective and responsible peatland management that resolves key challenges.

In South Sumatra, KELOLA Sendang (KS) focused on resolving three key challenges to peatland management: 1) a lack of tools that allow stakeholders to systematically monitor

peatlands for dry areas, and consequently develop an early warning system for fires; 2) gaps in local and provincial regulation that hamper coordination for managing peatlands; and 3) a lack of economically viable and environmentally sustainable livelihood options.

This brief looks at how KELOLA Sendang developed a peatland management model aimed at resolving the challenges.

First, KS created a peatland monitoring system consisting of a tool for analysing/evaluating water levels and teams of fire fighters. Second, KS worked with government agencies on enacting peatland management regulations. Third, KS expanded livelihood opportunities for communities involved in peatland conservation and restoration. These three solutions, when implemented alongside each other and consisting of the right mix of incentives and sanctions, should reduce greenhouse gas emissions in South Sumatra in the long-term.



Introduction

South Sumatra contains significant areas of peatlands (see Table 1) – it is second only to Riau in Sumatra – and much of them are vulnerable to accelerated rates of decomposition and catastrophic fires that have global consequences. This vulnerability is due to widespread landscape degradation brought on by extensive clearing and drainage in the development of large-scale industrial plantations of pulpwood (acacia) and oil palm (Miettinen et al. 2016).

Unsustainable peatland use will likely continue as long as stakeholders continue to ignore the devastating environmental impacts of draining and converting peatlands, and while financially profitable options for more sustainable use of peatlands remain limited. Also, the historic inability to properly monitor vast peatlands at scale and anticipate where and when fires happen prevent or hamper a full recovery of peatland damage.

KS found that focusing on an area of shared concern, such as stopping destructive peatland fires, provided an entry point for diverse stakeholders (governments, companies, and communities) to engage in dialogue and action for improving peatland management.

After securing such engagement, KS worked on three fronts to encourage sustainable peatland use that would put an end to recurring fires and correspondingly, the reduction of greenhouse gases in South Sumatra.

The first front involved working with stakeholders to improve effective peatland and fire management systems that can help stakeholders analyse and evaluate the appropriate water levels in canals and ground water tables in peatlands to prevent drying out and for fire-fighting. The second front involved working with relevant government agencies to formulate regulations that support peatland use while outlawing unsustainable practices. The third front involved creating economic incentives for communities working on peatland conservation and restoration.

Table 1: What are peatlands?

Peatlands are formed when plant materials fail to fully decay, leaving behind a layer of rich organic matter known as peat. This happens in swampy, low-lying regions, as water and wet conditions slow the rate of decay of vegetation. Over thousands of years, peat can build up to a depth of up to 30 metres.

Indonesia's peatlands are important as they can store up to 20 times more carbon than tropical rainforests, making them highly efficient carbon sinks. Totalling 22 million hectares, Indonesia has by far the largest area of tropical peatland in the world. Much of Indonesia's peatland carbon stock, around 90%, lies below ground (Olbrei 2013). This means peatlands can release toxic carbon emissions for decades if the underlying peat decomposes (from being drained) or is burnt.

Climate change is expected to produce more prolonged El Nino, or dry, periods in Indonesia. This can result in more intense fires, which in turn will cause further climate change. Peatlands provide a necessary service of storing and absorbing carbon when pristine, but when degraded can become highly flammable, running the risk of emitting enormous amounts of greenhouse gas. Protecting and restoring Earth's last remaining natural carbon stores is therefore key in combatting climate change.

First Front: Improving Peatland and Fire Management

- **Integrated Water Management System**

Ensuring peatland and fire management practices result in the reduction of greenhouse gas emissions involved developing a system that can be used to identify where to build canal blocks and monitor their effectiveness; increase water tables for improving yields; carry out flooding to fight fire or restore peatland; and monitor peatland subsidence and greenhouse gas emissions.

KS facilitated the rolling out such a system, dubbed the Integrated Water Management System (IWMS), to 4 companies operating within KS's *Kesatuan Hidrologis Gambut*, or Peat Hydrological Unit, area. The system was developed by various academic departments at the Bogor Agricultural Institute (IPB) in collaboration with KS building upon two existing reporting tools SWAT and MODFLOW (Kim et al. 2018). This enables the integration of surface hydrology model SWAT (Soil & Water Assessment Tools) (Arnold et al. 2012) and groundwater flow model MODFLOW (Langevin et al. 2017). The companies operating in this area suffered considerable losses whenever fires tore through their concessions and were eager to find a way to stop the fires. KS started by commissioning surveys of the companies' areas to assess the amount of peat carbon stocks contained (so as to set a baseline for future use or conservation); measure peat depth (to ascertain which areas need restoration and protection); and identify what has been planted where (mapping areas can help identify growth/degradation patterns associated with the related crops/vegetation).

In future, with consistent data inputs from the companies, IWMS will be able to help stakeholders identify problem peatland/fire-prone areas that need rewetting, revegetation, and the revitalisation of livelihoods. IWMS has subsequently been plugged into provincial databases. In the future, IWMS can be integrated with national databases (as well as databases maintained by other companies) to provide analyses of other peatland areas.

- **Fire Preparedness Teams**

Communities living in and around peatlands are very likely to be the first responders when fires break out or land is cleared illegally. KS thus worked with communities to develop a long-term fire prevention action plan that included habitat restoration to improve the area's hydrology, training on fire prevention, and utilisation of fire-fighting infrastructure and equipment.

KS facilitated partnerships between the village of Muara Medak, whose residents live in and around peatlands, and government agencies like Lalan Mendis Forest Management Unit (FMU) and Manggala Agni (the Indonesian fire brigade) as well as research institutions. The government agencies provided the community with fire preparedness training while the research institutions helped them understand the hydrology of their surrounding peat areas so they can better monitor water tables and identify which areas to rewet and revegetate.

Such partnerships culminated in the formation of REPAIR (*Regu Peduli Air* or Water Management Squad) consisting of Muara Medak residents. REPAIR has additional value as a community-led firefighting team and they were one of the first on the scene to put out devastating fires that broke out in August 2019. The fires burnt through 8,000 hectares of land surrounding the village and in nearby concessions, but locals estimated the damage would have been much worse if REPAIR had not sprung into action so quickly.

Muara Medak’s REPAIR has since formed a partnership with pulp and paper supplier PT. Rimba Hutani Mas to aid in suppressing fires and conducting patrols for illegal land clearing and fire hotspots as additional tasks to their main duty of managing peatland water. This partnership was forged after both fought side-by-side to put out the 2019 fires that broke out in their neighbouring areas. In addition, Muara Medak’s dedication to its peatland management work (which includes rewetting and revegetating peatlands in addition to running patrols and fire suppression) has been rewarded with a IDR200 million boost from the Peatland Restoration Agency, a government body tasked with improving peatland care.

Second Front: Mainstreaming Peatland Management by Creating Legal Precedent

Providing a legal basis for activities related to sustainable peatland management by putting in place appropriate regulations can guarantee continuity of such activities. This can also allow stakeholders to tap into funding that is usually allocated for the implementation of such regulations.

To create a legal basis for South Sumatra’s peatland management activities, KS facilitated the provincial and local governments together with Peat Restoration Agency (BRG) to develop a legal framework of regulations that inform and steer peatland management and conservation. Table 2 lists the peatland regulations that KS facilitated. These regulations make clear the responsibilities of the provincial and local governments in carrying out peatland management activities and provide a pathway for relevant stakeholders to access funds for carrying out those activities.

Table 2: Peatland regulations in South Sumatra facilitated by KS
Local Government Regulation No. 1 of 2018: Allows for the integration of peat management into provincial planning and budgeting; provides for the creation and strengthening of cross-sectoral local peat teams to manage peatlands.
Governor Regulation No. 68 of 2018: Provides technical guidelines for local government agencies to organise, plan, and maintain budgets for managing peatlands.
District Regulation Perbup No. 88 of 2019: As a follow-up to the first two regulations, this provides Musi Banyuasin District with technical guidelines on the creation of peat teams for overseeing the protection and management of peatlands.

A significant impact of having a provincial legal framework covering peatland management is that South Sumatra now has a dedicated budget for implementing its peatland regulations. Communities that previously would not have been equipped or trained to monitor peatlands and fight fires can now be mobilised and funded to do so, like Muara Medak, thereby reducing the pressure on government agencies like FMUs and Manggala Agni to do so by themselves.

Also, having a legal framework that caters to local conditions means South Sumatra’s provincial and district governments can take swift and direct action in managing its peatlands, as opposed to waiting for policy changes or steering from the central government.

Third Front: Developing Sustainable Livelihoods

Putting in place an effective peatland management system and enacting a legal framework to support and finance such a system would still result in ineffectual peatland protection if sufficient and financially viable peatland-adapted livelihoods are not available.

This is because for companies and communities to change their behaviour from clearing peatlands to conserving them, they require clear financial incentives. Also, peatland management systems need continued investment if they are to stand up to rigorous challenges thrown up by climate change and large-scale human activities. Such investment can be encouraged by making sure sustainable peatland use generates incomes.

Partnering FMUs with villages was the first step of KS's strategy for developing sustainable livelihoods for peatland communities. An FMU is a government body appointed to oversee forest areas and carry out forest management activities. They also oversee the day-to-day activities of villages with social forestry permits. Partnering FMUs with villages ensured that KS could hand over its work and activities to a permanent and government-linked entity at the end of its project tenure.

The next step was to secure social forestry permits for the villages. With this permit, communities can manage the land legally for 35 years, giving them the option to plan long-term and obtain legal security in reaping financial benefits from their work on the land.

KS helped Muara Medak, the village sitting on vast peatlands, secure a social forestry permit. Villages with such permits are not allowed to grow oil palm, a cash crop that Muara Medak residents favoured and had been growing but which also damaged their peatlands as they drained vast tracts to grow the crop. Faced with the choice of suffering recurring fires on their damaged peatlands or adopting more environmental-friendly livelihoods that can roll back the fires, the community agreed to participate in monitoring and restoring peatlands in exchange for KS developing for them financially viable livelihoods. This resulted in the adoption of a performance-based finance model dubbed Plan Vivo, developed together with the Plan Vivo Foundation, KS partners Daemeter, HAKI and the local community. Through this model land which is sustainably managed can be sold as carbon stocks through a certification process. Each certificate represents the reduction or avoidance of one metric tonne of carbon dioxide plus livelihood and ecosystem benefits.

Plan Vivo will start with the planting of agroforestry plots. This involves the planting of native species that enrich the peatlands but are also cash crops. Plan Vivo scheme is still in an ongoing process. In the future, Plan Vivo will also sell the carbon stocks contained in restored/conserved peatlands on the carbon trading market in the form of carbon credits or Plan Vivo certificates. Proceeds from the sale of the certificates will be used to fund peatland work in participating villages. KS has estimated that Plan Vivo can reduce CO₂ emissions by almost 4,000 tonnes over 10 years compared to business-as-usual projections (Berry et al. 2018). This amount of emissions is equivalent to those produced by burning almost 2,000 tonnes of coal.

If sufficient money can be generated through the sale of Plan Vivo certificates, or other sources of performance-based finance, this model can be scaled up and expanded to other villages and forest areas.

To further aid Plan Vivo's aim of trading carbon stocks, KS worked with companies with concessions in peat regions to identify which vegetation are the most resilient local species that can be grown on damaged peatlands.



KS together with consultants from Institute of Sciences (LIPI) and the University of Sriwijaya worked on concession land owned by the local company PT Global Alam Lestari to obtain data on plant growth, resilience, and carbon storage.

With another company, PT Hindoli, an oil palm concession, KS consultants also identified the best methods for restoring degraded areas. This resulted in the company replanting over 60 hectares with local species on previously burnt peatlands. This was followed up with KS's technical consultants, biological restoration experts from LIPI and Sriwijaya University, also conducting the research and monitoring in the companies' restoration plots which will provide the evidence base for future restoration work with the private sector in degraded concessions.

Conclusion

United by a shared goal to end the recurrence of devastating peatland fires in South Sumatra, diverse stakeholders (governments, companies, and communities) worked together to improve peatland management. However, the success of peatland management activities still requires constant and consistent investment of technical assistance (to implement and manage systems like IWMS and devise appropriate restoration methods such as the data collection and in-depth research to inform the private sector about the best methods for restoration) and financial resources (to pay for firefighting, peatland restoration/conservation work). Government regulations can go some way in ensuring the right resources are channelled to the appropriate activities, but private sector actors and communities must stay committed in shifting from business-as-usual and adopt environmentally sustainable methods for managing peatlands. This brief has provided a framework for putting in place win-win solutions for all relevant stakeholders but they will have to decide if the solutions are worth their commitment.

References

Berry N and Damayanti EK. 2018. Village Forest Protection and Restoration in Lalan Mendis Forest Management Unit, South Sumatra, Indonesia. South Sumatra, Indonesia.

What is KELOLA Sendang?

KS is a partnership of government, business, communities, and civil society aligned around common interests in conservation, supply chain sustainability, and sustainable economic development. The advantage of such a partnership, also known as a sustainable landscape management approach, is that it is focused at the political level, where land use decisions get made and enforced. It is also concerned with bringing together as many actors as possible rooted in or operating from a defined geographic area since any effort to meaningfully address sustainable land-use and climate change mitigation must first address the needs of local actors. By advancing careful land use planning of production and protection areas with geographically tailored interventions, the partnership can simultaneously address challenges like the conservation of endangered species, deforestation and rural poverty. The ultimate goal of this multi-stakeholder project is to create a government led blueprint for sustainable landscape management which can be upscaled and continued into the future, paving the way for the Government of South Sumatra to achieve its low emissions target and Green Growth Vision.

KS operates in the Sembilang-Dangku landscape of Musi Banyuasin and Banyuasin Districts in South Sumatra, an area that covers around 1.6 million hectares.

