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Enhancing Engagement of Private Sector and Local Communities on Peatland Management

Innovative Policies and Monitoring System in Indonesia

| PROJECT FULL NAME | COUNTRY & REGION | IMPACT AREAS | IMPLEMENTING AGENCY |
|---|---|--|---|
| Sustainable Management of Peatland Ecosystems in Indonesia (SMPEI) | Indonesia  | <ul style="list-style-type: none"> Climate Change Mitigation Land Degradation Sustainable Forest Management Poverty Reduction Food Security Socio-economic Benefits Education | International Fund for Agricultural Development (IFAD) |
| GEF PROJECT ID: 5764 | | | EXECUTING AGENCY |
| PROJECT TYPE: FSP | FOCAL AREAS | | Ministry of the Environment and Forestry (MOEF), Center for International Forestry Research (CIFOR) |
| GEF PERIOD: GEF-5 | <ul style="list-style-type: none"> Multi Focal Area | GEF Project Grant \$ 4,766,756 | Co-financing Total \$ 21,745,000 |

Summary

Indonesia has approximately 20 million ha of peatlands, which provide unique ecosystem services and a source of livelihood to rural populations. Peatlands in Indonesia store an estimated 46 gigatons of carbon equivalent to approximately 8-14 percent of all global soil carbon. Despite the local and global importance of these ecosystems, they face a growing number of threats, including logging; agricultural conversion by smallholder farmers and large private sector plantations; fires; and drainage. The project is promoting sustainable peatland management, secure carbon stocks, and conservation of biodiversity, while improving the living standards of local communities. Key features are i) strong government commitment to policy development and implementation; ii) an innovative

monitoring system developed with the private sector; and iii) community-based peatland action with multi-stakeholder partnership.

As a result, the government has developed 12 regulations for sustainable use of peatland ecosystems, as well as 10 technical guides on peatland management. Furthermore, in collaboration with plantations, it has established an innovative early warning system to protect against peatland fire. In addition to policy development at the national level, oil palm and forest plantations in the target landscape in Riau province improved agricultural practices on 300,000 ha. Moreover, 14 villages have developed Community-based Peatland Action Plans, constructing 313 units of canal blocks.



Field monitoring and evaluation for SMPEI – Community Self-Sustaining Program@ SMPEI

The GEF has supported the continuous efforts of Indonesia for sustainable peatland management from GEF-3 (2002) to GEF-7 (2021), building on successes and learning along the way.¹ The GEF-5 project generated several key lessons. First, strengthening food security and local socio-economic benefits was critical for active community engagement in peatland management, including women and youth. Second, sharing national and local levels of experience with others to initiate and strengthen sustainable tropical peatland management on a global level was critical.

Results and benefits

The project's key results to date are below.

- Reduction of greenhouse gas (GHG) emission: **19,270,183 tCO₂e** (140 percent beyond the target goal of 14 million tCO₂e)
- Oil palm and forest plantations in the landscape area under improved agricultural practices: **300,000 ha**

- Water levels in the village land raised by 313 units of canal blocks constructed in 14 villages: estimated at **9,200 ha²**
- Development of new national policy/regulation: finalization and approval of **12 government regulations** and subregulations for the sustainable use of peatland ecosystems (400 percent beyond target goal of 3 subregulations)
- Development of technical guidance: **10 technical guides** on peatland management
- Development of innovative and integrated peatland monitoring system as an early warning system of peatland fire
- Number of direct beneficiaries: **7,326** (including 6,486 with improved drinking water supply and 840 directly benefiting from livelihood demonstration plots)
- Number of indirect beneficiaries: **22,000** (from 313 units of canal blocks, which provide water for agriculture and reduce exposure of local communities to peatland degradation and fires)

¹ Continuous GEF investments include the Integrated Management of Peatlands for Biodiversity and Climate Change (GEF-3, GEF ID 1769), ASEAN Peatland Forests Project (GEF-4, GEF ID 2751), Integrated Management of Peatland Landscapes in Indonesia (GEF-6, GEF ID 9239), and Strengthened Systems for Community-based Conservation of Forests and Peatland Landscapes in Indonesia (GEF-7, GEF ID 10731).

² This figure is based on 30 ha per canal block multiplied by 313 unit of canal blocks constructed.

- Increase in income generation: 76 percent of the 152 respondents earning additional monthly income of more than 500,000 Indonesian Rupiah (IDR) with demonstration plot activities
- Knowledge products/sharing: **videos introducing project activities, books**, and the Directorate of Peatland Degradation Control's (DPDC) **website** <http://pkgppkl.menlhk.go.id> (in both Bahasa Indonesia and English) to compile all relevant knowledge products related to peatlands.

Environmental challenge

Peatland forests in Indonesia provide unique ecosystem services and are a source of livelihood to rural populations, and peatland ecosystems are rich in biodiversity, containing many endemic, rare and endangered species. These ecosystems represent an important source of goods and services that benefit both local and international communities, including flood and fire prevention, carbon sequestration and storage, provision of timber and non-timber forest products, and cultural and spiritual well-being. Peatlands in Indonesia store an estimated 46 gigatons of carbon equivalent, the largest in tropical peatlands, which is about 8-14 percent of all global soil carbon. Thus, Indonesian peatlands are critical "irrecoverable carbon" that remains within human capacity to manage. If lost, the carbon could not be recovered by mid-century, the deadline for reaching net-zero emissions to avoid the worst climate impacts.³

Despite the local and global importance of these ecosystems, they face growing threats. These include logging; agricultural conversion by smallholder farmers and large private sector plantations; fires; and drainage of peatlands. Between 2015-19, around 1.9 million ha of peatland in the country have been burned. The expansion of plantations for oil palm and pulp and paper, and the associated drainage of peatlands, has been the primary cause of deforestation, biodiversity loss, and peatland subsidence. The drying out of peatlands due to drainage has made peat forests extremely susceptible to fire; this is further exacerbated by drought effects from El Nino. The ensuing fires have led to massive loss of biodiversity, depletion of carbon stocks, and premature deaths from respiratory diseases,

among other negative impacts. Thus, it is important to transition to fire-free sustainable peatland management in both large plantations and smallholder farms.

Integrated approach and key features

Government commitment to policy development and implementation

Supported by a strong commitment by the Indonesian government, the project has developed and implemented 12 government regulations and subregulations for the sustainable use of peatland ecosystems and an additional 10 regulations and/or technical guides on peatland management. This supported the roll out of Regulation for the Protection and Management of Peatland Ecosystem (PP71/2014 amended as PP57/2016), an innovative national policy on sustainable peatland management and restoration. It focuses more on establishing peatland degradation characteristics, criteria, and standards requirements and guidelines for protecting and managing the peatland ecosystem. Under Regulation PP57/2016, the private sector must develop workplans for rehabilitation and restoration of peatland in its concession areas. In the project area, 11 companies with total areas of 295,703 ha have enhanced water management of oil palm and forest plantations.⁴ Furthermore, a specific guidance on protection and management of peat doom was also established based on a corrected map at a scale of 1:250,000 using Peatland Hydrological Unit (PHU) demarcation.⁵

Most importantly, the Ministry of the Environment and Forestry (MOEF) enacted a new National Peatland Strategy in 2020: the National Peatland Ecosystems Protection and Management Plan (RPPEG) 2020-2049 (SK 246/2020). This decree is the first national peatland strategy to cover such a long period in the world. With another regulation,⁶ the decree provides guidance to local governments in establishing RPPEGs at provincial and district/city level. These plans identify the entire process — from preparation, stipulation, and amendment, to monitoring, evaluation, and financing. Copies of the National RPPEG have been distributed to 154 districts and cities throughout Indonesia.⁷ To fully implement peatland management

³ Indonesian peatlands are critically important to "irrecoverable carbon" worldwide (Noon et al. 2021), <https://www.nature.com/articles/s41893-021-00803-6.pdf>.

⁴ A technical guide on peatland ecosystem recovery function for government at the national/provincial/local level, business units, and community was also developed.

⁵ The regulation is a breakthrough policy to protect peat doom areas as the areas dictated as a conserved and protected areas for water reservoir in the Peatland Hydrological Unit (PHU) (P10/2019).

⁶ The other regulation is the Procedures for Preparation, Determination and Amendment of Peatland Ecosystem Protection and Management Plan (P60/2019).

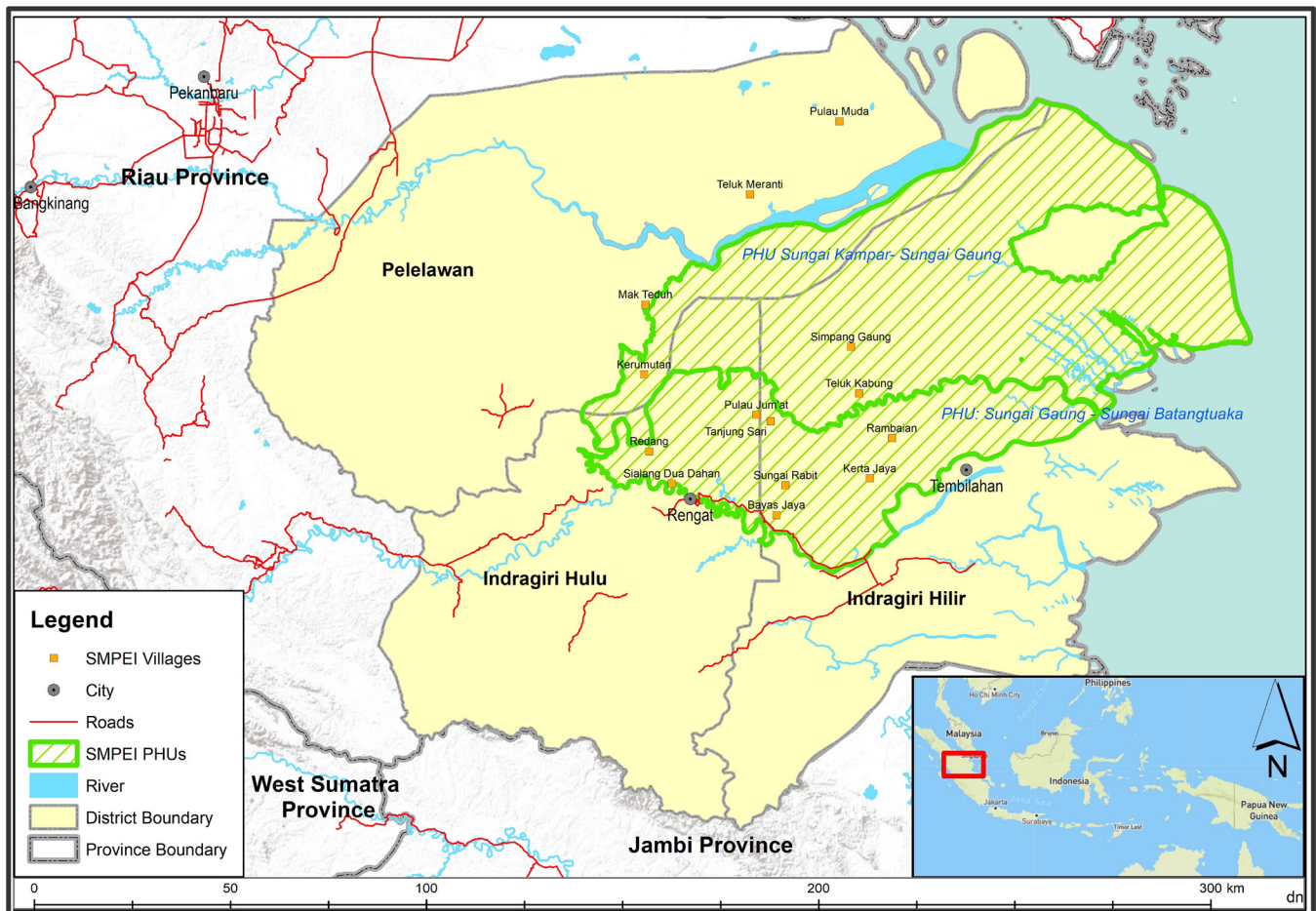
⁷ A Provincial RPPEG of Central Kalimantan has been stipulated by the Governor of Central Kalimantan, and the Provincial RPPEG of Riau Province and the RPPEG for Pelalawan District are under development.

regulations, the government has developed, approved, and implemented a series of subregulations and technical guidelines. These included the Procedures for Inventory and Determination of Peat Ecosystem Functions (P14/2017), Procedures for Measuring Groundwater Levels in Peat Ecosystem at Designated Monitoring Points (P15/2017), and Technical Guidelines for Functions Recovery of Peat Ecosystem (P16/2017).⁸ The project pioneered application of landscape-level approaches, such as Peatland Hydrological Units (PHU), in the national regulatory and planning frameworks. As a key unit for planning and management, PHU is critical to ensure long-term sustainability of peatlands for a proper ecosystem approach to prevent fire and minimize degradation. Under the new regulations, the Determination of National Peatland Hydrological Units (PHU) Map (SK129/2017) and Determination of Map of

National Peatland Ecosystem Functions (SK130/2017), 214 PHUs have been mapped at 1:50,000 scale since the project started.

Innovative monitoring system developed with private sector

Based on an inventory and determination of peatland ecosystem function, procedures for measuring groundwater levels in peat ecosystem, and PHU maps developed under the regulations, the project has developed innovative national peatland monitoring systems with a combination of remote-sensing data and ground-level data collection. This monitoring system established Indonesia's first National Media Control Room for fire prevention. With this monitoring data on peatland ecosystem and groundwater level, MOEF has established a new web-based Peatland



Project area in Riau Province, Sumatra⁹ @ IFAD

⁸ This technical guideline (P16/2017) emphasizes peat-related matters, including definitions and additional requirements to protect/conservate peatland areas within plantation concessions.

⁹ The project area is part of the three administrative districts of Indragiri Hilir, Indragiri Hulu, and Pelalawan, including 14 target villages. The PHUs (highlighted yellow) cover about 850,000 ha and include about 5 percent of the nation's peatlands.

Water Level Information System (SiMATAG-0.4m) under national budget and further developed by the project.¹⁰ The system will also be able to cross-check validity of data from plantation companies on water levels. It was developed to provide information on the progress of peatland restoration through analysis of peatland water level monitoring data and rainfall in peatlands, development of rewetting infrastructure, and monitoring of vegetation rehabilitation results. SiMATAG-0.4m measures over 3.2 million ha of peatlands under management of private sector at more than 10,000 sites. In addition, each month it monitors information from the Peatland Restoration Agency (BRG) at 154 points outside of concessions in seven provinces. Thus, the private sector plays a pivotal role in strengthening the national peatland fire prediction, monitoring, and warning system. In partnership with the private sector (oil palm and forest plantations), an automatic data logger for water management sensors in peatlands within concession areas transmits groundwater-level information to the national monitoring system through live updates.

MOEF is developing a more comprehensive system — the Information System for the Protection and Management of Peat Ecosystems (SiPPEG) — under the project. The SiPPEG incorporates several systems: SiMATAG-0.4m; SiPALAGA (water-level monitoring data from community area provided by the Peatland and Mangrove Restoration Agency); Sekat Kanal Infrastructure (canal blocking); and other information on land cover, forest fire, and weather to generate peatland fire warning alerts, including FAO's earth observation data.¹¹ The SiPPEG aims to provide real time information and be a platform for 8 applications, namely IKEG (peat ecosystem quality index), Neraca Air (water balance/soil moisture), RPPEG, PROPER (Program for Pollution Control Evaluation and Rating), WASGAKKUM (law enforcement oversight), GHG emissions, early warning system, and TMAT (groundwater level). The system will also be able to generate information on changes in average water tables across peatland landscapes, which can more accurately estimate GHG emissions and reductions. MOEF is using this system to develop a new internationally recognized methodology for GHG emission prediction and monitoring for tropical peatlands and potentially enable the refinement of IPCC emission factors.

Community-based peatland action with multi-stakeholder partnerships

In addition to national regulations and monitoring systems, Community-based Peatland Action Plans (RKMs) have been developed through multi-stakeholder partnership for 14 villages within the three target districts. RKMs are used to develop and promote rewetting activities, revegetation, and revitalization of community economic activities/livelihood. District Project Management Coordinators and Village Facilitators guided participatory assessment and RKM in each village in 2019 and 2020. Community peatland management groups — the Working Team for Protection and Management of Peatland Ecosystem (TK-PPEG) — were also established to develop and implement the RKMs. They included members of different groups such as local fire brigades, farmers' groups, and the village committee. As a result, 313 units of canal blocks were constructed in the project area by the end of 2021, which restored the hydrology of the landscapes in the PHUs. Since the RKMs and TK-PPEG model worked well, the Directorate of Peatland Degradation Control (DPDC) has replicated a similar model in 53 villages in other peatland provinces.

Different multi-stakeholder partnerships among local governments, local communities, and companies collaborated to prevent fires and enhance water management in peatlands. For example, different community groups were established/re-activated for fire prevention and control measures through participatory assessment and the RKM development process. A WhatsApp group was established in 2018 to link government representatives from the Riau province, districts, villagers, and people involved in project implementation. This group is intended to support communication, coordination, and information and knowledge exchange related to peat ecosystem management. At the same time, it is used to share information and build links across the three districts and share good practices such as fish cultivation in canals. For members without access to mobile devices, face-to-face community forums and training for the three districts took place to share information and lessons learned. Coordination and partnership activities were also carried out in each village. Participants included village government, village heads, community fire brigade, TK-PPEG members, village consultative body, Bhayangkara Trustees of Community Security and

¹⁰ SiMATAG-0.4m ultimately informs peatland fire prevention based on the level of groundwater on peatlands, which also describes level of moisture in the peatland itself (soil moisture). The level of groundwater on peatlands (0.4m below the peatland surface) is one of the indicators to anticipate or prevent fires on peatlands.

¹¹ To support development of the system, the project team negotiated with FAO to get technical support and access to its data from the System for Earth Observation Data Access, Processing, and Analysis for Land Monitoring (SEPAL). Large amounts of data from FAO have now been downloaded and integrated into the system.

Order, police representatives, and Natural Resources Conservation Agency.

Lessons learned

Strengthening food security and local socio-economic benefits

It was critical to ensure food security and socio-economic benefits for local communities to promote sustainable peatland management at the community level. To complement the dominance of cash crops (rubber and oil palm) in the target villages, the project interventions have enhanced the availability of fish in rewetted peatlands in some target villages. The project also adopted a series of intercropping systems of short-term crops (e.g. spinach, chili, water spinach), medium-term crops (e.g. pineapple, avocado) and long-term crops (e.g. jelutong, sago) in the demonstration plots to improve local communities' nutritional status. This has increased food and nutrition security, as well as climate resilience of local communities via diversification of subsistence and cash crops. The impact survey has shown local smallholder farmers have replicated these crops and cultivation methods in their own land, especially for vegetables (28 percent of respondents), pineapple (24 percent), ginger (12 percent), areca nut (4 percent), and others. In

addition, 43 livelihood activities have been undertaken since 2019 as a part of RKMs.

Aside from local food security, the project has provided other local socio-economic benefits. The impact survey during the Mid-term Review Mission (May-June 2021) revealed that 78 per cent of 152 respondents have benefited from the canal blocks. These provided a water source for agriculture and made the local communities less vulnerable to peatland degradation and fires. The survey also showed that both women and youth have benefited from project activities. The women especially engaged in the demonstration plot activities such as planting, monitoring, maintaining, and harvesting crops, as well as harvesting fish in canal blocks. Youth groups in the project villages have been helping build canal blocks, develop demonstration plots, and implement fire prevention and protection activities in fire-prone peatland areas. The participatory planning process of RKMs has considered all these aspects for each project village through TK-PPEG. These RKMs will be updated yearly. Furthermore, three drinking water treatment plants were developed to serve 6,400 people in three project villages. The plants have brought significant benefits by reducing the cost of clean water by 80 per cent and saving significant time spent to purchase/collect water from distant sources.



Discussion in a village @ SMPEI

South-South cooperation to initiate global tropical peatland management

The Government of Indonesia has widely shared its experience on peatland management strategy, innovative monitoring systems, and development and implementation of community peatland management action plans. It also actively engaged in other peatland management initiatives through the UNFCCC COPs, ASEAN Task Force on Peatlands, Global Peatland Initiative, and others. These examples of South-South cooperation are contributing to regional and global initiatives to strengthen tropical peatland management. By sharing its experience, Indonesia's National RPPEG will serve as an example to ASEAN neighbouring countries. Specifically, it will inform an update of the ASEAN Peatland Management Strategy and the ASEAN Haze-Free Roadmap for 2021–2030. This cooperation with ASEAN is key to advance sustainable peatland and a haze-free agenda in the region. The Government of Indonesia also founded the International Tropical Peatland Center with the Democratic Republic of Congo, Republic of Congo, and Peru. In addition, it sponsored and adopted the resolution on "Conservation and Sustainable Peatland Management" in the fourth United Nations Environment Assembly in March 2019.

References and multimedia

- **Corrective Action on Peatland Protection and Management in Indonesia - Towards Sustainable Peatlands Management 2019-2020 (2021)**, http://pkgppkl.menlhk.go.id/v0/wp-content/uploads/2022/01/CORRECTIVE-ACTION-ON-PEATLAND-PROTECTION-AND-MANAGEMENT-IN-INDONESIA-06des_.pdf
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- **Mid-term Review Final Aide Memoire (2021)**, <https://www.thegef.org/projects-operations/projects/5764>
- **Project design report**, <https://www.thegef.org/projects-operations/projects/5764>
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- **Video about the project**, <https://www.youtube.com/watch?app=desktop&v=q54j-RAMzRY&feature=youtu.be>





Participatory Monitoring Canal Blocking @ SMPEI

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The Global Environment Facility was established on the eve of the Rio Earth Summit to tackle our planet's most pressing environmental problems. Since then, it has provided more than **\$21.7 billion** in grants and mobilized an additional **\$119 billion** in co-financing for more than **5,000 projects** and programs. The GEF is the largest multilateral trust fund focused on enabling developing countries to invest in nature, and supports the implementation of major international environmental conventions including on biodiversity, climate change, chemicals, and desertification. It brings together 184 member governments in addition to civil society, international organizations, and private sector partners. Through its Small Grants Programme, the GEF has provided support to more than 26,000 civil society and community initiatives in 135 countries



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