Assessing potential of - and challenges in - developing a REDD+ Result Based Payment scheme: Insight from the Pematang Gadung Peat Swamp Forest in West Kalimantan

Executive Summary

Ministry of Environment and Forestry Regulation No. 70/2017 stipulates the procedures for implementation of Reducing Emission from Deforestation and Forest Degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stock, commonly known as REDD+. REDD+ is one of the pillars of the national forestry sector's policy framework, which complies with the Conference of The Parties-United Nations Framework Convention on Climate Change (COP-UNFCCC). The regulation provides opportunities for eligible parties to contribute to reducing national emissions, achieving NDC (Nationally Determined Contribution) targets and access to funds through Result Based-Payment (RBP) schemes. However, progress on developing RBPs and actual implementation of these, has thus far been limited.

To encourage the realization of RBP-REDD+, Tropenbos Indonesia and Wetlands International Indonesia conducted a case study on the Pematang Gadung peat swamp forest (PGPSF) in Ketapang district, West Kalimantan, which provides valuable insights on opportunities for - and development of - a RBP scheme. This study highlights methods to determine carbon stock in above ground biomass as well as in the peat soils in the PGPSF which is estimated at 40 million tC. The study estimates that a properly implemented REDD+ project can lead to avoided carbon emissions totaling nearly 14 million tCO2-e between 2019-2041 compared to a Business as Usual (BaU) scenario. This infobrief is a summary of the Tropenbos and Wetlands International Indonesia report (see Wibisono and Dipa, 2019). It provides a brief overview on the relevant policy framework, the methodology used for carbon stock assessment, a SWOT analysis that highlights relevant issues for achieving successful implementation of a RBP-REDD+ scheme in the PGPSF and provides a way forward for relevant stakeholders.

Tropenbos Indonesia, through its Green Livelihood Alliances program, encourages the government (central, provincial, district and village level), the private sector, civil society organizations and academia, all to take part in implementation of a RBP-REDD+ scheme in the PGPSF forest. This project can provide an example on how a community based REDD+ scheme can be implemented in Indonesia. A well-developed example may inspire other REDD+ projects and thereby contribute to environmental protection, local livelihood improvements and achieving the national targets on reducing carbon emissions.

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Background

The Government of Indonesia (GoI) has repeatedly demonstrated its commitment to environmental protection and fighting climate change. At the 2009 G-20 meeting in Pittsburg, Indonesia voluntarily committed to reduce Green House Gas (GHG) emissions by 26-41% in 2020, compared to a BaU scenario and depending on the level of international support. To achieve this the president of Indonesia issued Presidential Regulation (PerPres) no. 61/2011 on the National Action Plan for Reducing GHG Emissions (RAN-GRK) and PerPres no. 71/2011 on the GHG inventory. In 2015, at the Paris Climate Change Summit, these ambitious emission reduction commitments were renewed, targeting at 29-41% by 2030. These commitments became part of Indonesia's Nationally Determined Contribution (NDC) plan and have been submitted to the Secretariat of United Nation Framework Convention on Climate Change (UNFCCC) in 2016. To achieve these targets the Indonesian forestry sector is expected to reduce its carbon emissions somewhere between 17-23%. However, the postponement in the timeframe highlights that there are considerable challenges to be dealt with.

A core component in the implementation of the RAN-GRK and REDD+ framework is reducing emissions from deforestation and forest degradation. The procedures for implementing REDD+ projects are stipulated in Ministry of Environment and Forestry (MoEF) regulation no. 70/2017. This regulation also provides opportunities for eligible parties to contribute to reducing national emissions and achieving the NDC target. Parties can access REDD+ funding by registering their mitigation activities to the Directorate General of Climate Change Control, under the MoEF. Article 18 in MoEF regulation no. 17 provides details on the Result Based-Payment (RBP) scheme and supporting activities as institutional capacity and

human resources building, strengthening policies and REDD+ instruments, research and development, and other enabling conditions.

To support the implementation of REDD+, the MoEF also issued Regulation no. 71/2017 on the National Registration System of Climate Change Control, Regulation no. 72/2017 on Monitoring, Reporting and Verification and Regulation no. 73/2017 on the GHG Inventory. The president then issued Regulation no. 77/2018 on the management of the Indonesia Environmental Trust Fund (Badan Pengelola Lingkungan Hidup/ BPDLH), which is classified as the government's main body for channeling carbon trading under the REDD+ scheme.

Whereas government policies regarding the implementation of REDD+ and the RBP scheme appear clear, the readiness of executing organizations like the BPDLH, the custodian bank and the national and local institutions that actually manages the REDD+ fund are still being established. Subsequently there is no example of RBP implementation in Indonesia. Also MoEF Regulation 70/2017 has yet to be disseminated to local governments and other relevant actors. Without examples, action plans and improved guidance on methodologies it will be difficult for stakeholders to actually implement RBP schemes.

This infobrief provides a case study from the PGPSF in Ketapang District, West Kalimantan province. The case study demonstrates methodologies for assessing carbon stock and estimating avoidable carbon emissions. Also it provides a Strengths, Weaknesses, Opportunities and Threats analysis regarding the implementation of RBP-REDD+ scheme in the PGPSF. Tropenbos Indonesia proposes to conduct a full scale pilot project for RBP-REDD+ in the Sungai Besar, Sungai Pelang and Pematang Gadung villages, which cover the PGPSF, as; 1). this can demonstrate the role of communities in forest carbon conservation and GHG emission reductions/ avoidance; 2). Provide an example of a RBP-REDD+ scheme and highlight implementation issues. These outcomes can thereby provide valuable lessons for the implementation of future RBP-REDD+ schemes, achieving the NDC targets and countering global climate change.

Assessing carbon stock in the Pematang Gadung peat swamp forest

The PGPSF covers 20,966 ha of which 17,749 ha consists of peat, which can be up to 10 meters deep. From Landsat imagery seven types of land cover were identified in the area, being medium density forest, low density forest, shrubs, plantations, mixed agricultural lands, open area, and mining area (see Figure 1). A first step in developing proper Measurement, Reporting and Verification mechanisms is assessing carbon stock in the project area. For carbon assessments of above ground- and peat biomass, methods as stated in the Indonesian National Standard on forest carbon accounting, ISN 7724, were used (see BSN, 2011). Whereas determining above ground carbon stock is relatively easy, determining carbon stock in peat swamp forests is far more complex and requires specific assessment tools. Existing official maps are only available at a small scale and usually do not capture conditions on the ground accurately. Therefore reliable maps peat depth and distribution with a scale of 1:50,000 were developed for this study. Whereas a report by Tropenbos Indonesia and Wetlands International Indonesia provides much more details on the methodology (see Wibisono and Dipa, 2019), a brief summary is provided below.

Above ground biomass assessment

Above ground biomass (AGB) assessment started with land cover stratification based on Landsat 2017 satellite imagery, using visual interpretation. Based on the land cover map, 26 Permanent Sampling Plots (PSP) were established. Population and diameter of seedlings, saplings, poles and trees found in the PSPs were recorded and used for the calculation of AGB (see Figure 1 for above ground biomass map).

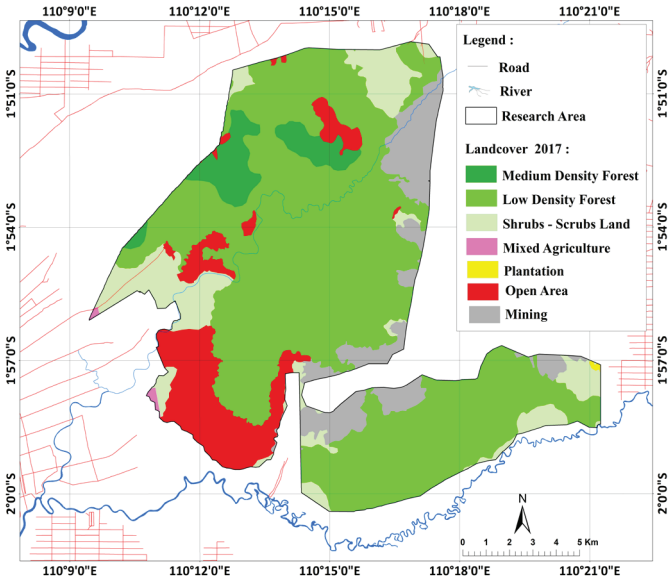

Figure 1. Above Ground Biomass (AGB) map of project area based on visual interpretation of Landsat data.

The calculation of AGB was carried out for all forest classes. The calculation applied non-destructive method with allometric equations suitable for the forest types in project area. The results of this calculation are in dried weight biomass and were multiplied by carbon fraction to generate carbon stock. The value of carbon stock per hectare is calculated by converting carbon stock in PSP Whilst the total forest carbon stock is calculated by multiplying the extent of each forest class (Ha) and carbon stock (tC/Ha).

Peat biomass assessment

Measurement of peat depth and land surface elevation were carried out in three transects. Peat depth is measured using a peat auger and land surface elevation is measured applying the water pass principle. The data generated served as a basis for conducting stratification of three important elements in the peat biomass assessment, which are:

1. Land surface elevation stratification using a Digital Elevator Model (DEM)

The elevation data measured in the field needs to be calibrated to the average elevation of the water level in the nearest river. The calibration data is then converted into a datum standard (m-dpl), and its correlation with SRTM 30 from NASA is determined. Based on this correlation analysis, a canopy height model on forest and non-forest areas was developed.

The DEM mapping process began with developing 30,000 estimated elevation points, which are a combination of elevation data from SRTM 30 and field-measured elevation data. The estimated elevation points were then inputted in the geostatistical analysis, and produced a Digital Elevation Model (DEM) for the project area (see Figure 2)

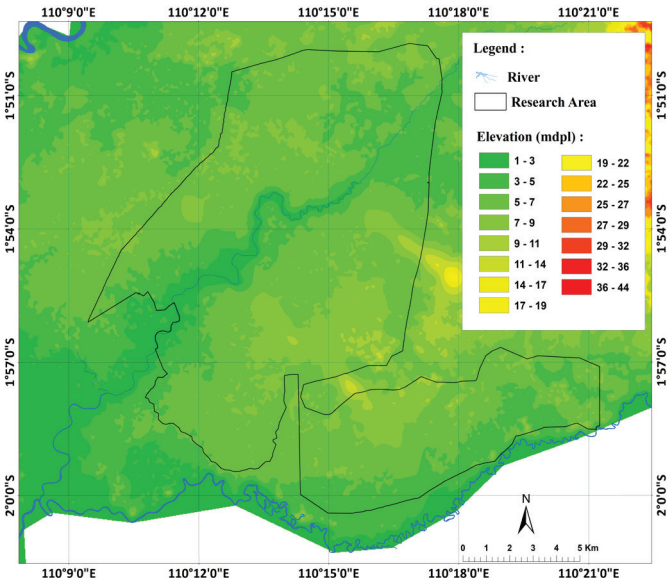

Figure 2. Elevation map of the project area

2. Peat Depth Stratification

Peat depth was modelled by taking a geomorphological correlation approach, using land elevation surface as a free variable. The correlation between peat depth and land elevation surface was modelled by four-degree polynomial, and used an algorithm to develop a peat depth raster.

Also the peat depth raster mapping began with developing 30,000 estimation points. In each point, peat depth was estimated based on calculations and data was compared to field measurements. These estimated points were then inputted in geostatistical analysis (Kriging). The map produced (see Figure 3) was used to estimate carbon stocks on peat by multiplying peat volume with bulk density and carbon fraction.

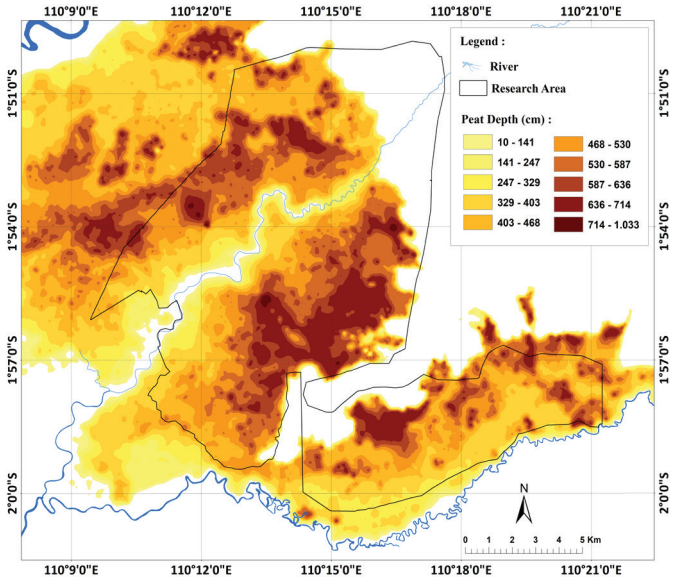

Figure 3. Peat depth raster map of the project area

3. Drainage Base Elevation

Drainage based elevation refers to the average elevation of water level in the nearest water body, which is taken from SRTM 30 data. The average of water level in the nearest water body are developed through statistical equations. This average water level is combined with the land surface elevation map to produce a drainage base elevation map (See Figure 4).

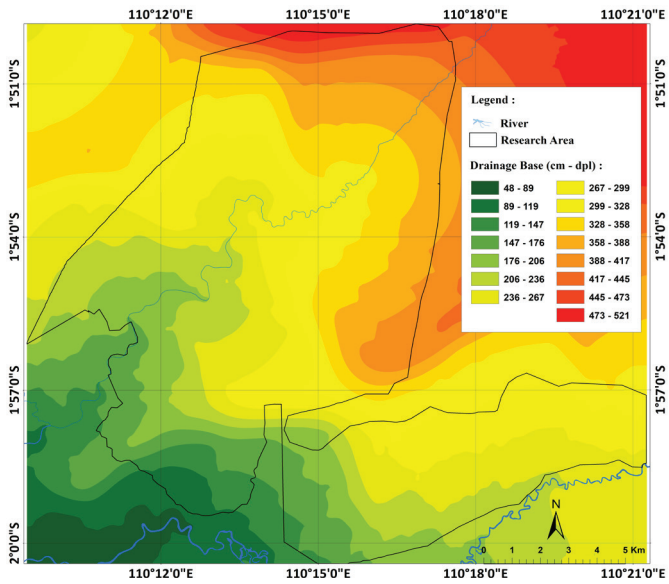

Figure 4: Drainage Base Elevation map of the project area.

Based on the above ground biomass and peat assessments, the carbon stocks in the PGPSF are estimated at 40,044,204 tC, of which 96% stored in peat soils and the remaining 4% is stored in ABG (see Figure 5).

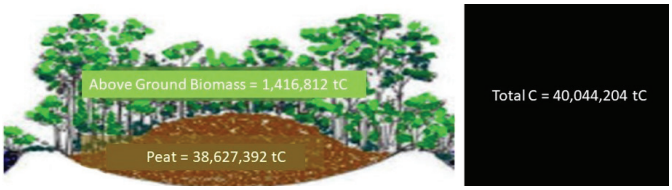

Figure 5. Carbon stock in Above Ground Biomass and in Peat Biomass in Pematang Gadung peat swamp forest

Determining potential emission reductions and associated financial opportunities for local development

Verra's Verified Carbon Standard (VCS) tool was used for determining a BaU scenario and determining additionality of carbon emission reductions (see Verra, 2012). The methodology requires the identification of different sources of land use change and land use change patterns, assessment of legal frameworks and how these may impact future land use change, development of several scenarios on land use change and provide a justification for applying the most likely scenario.

Landsat satellite imagery was used to visually interpret land use changes over the last 30 years and in combination with field visits and interviews a detailed overview of land use change was developed. Whereas the area nearly completely consisted of forests in 1990, significand deforestation started in 1995. In the late 1990s fires burned considerable areas in the eastern part of the PGPSF and after some years of forest recovery, gold mining expanded rapidly there from 2005 onward. From 2007 onward there has been considerable expansion of mixed agriculture systems by local communities. To make the peatlands suitable for agriculture, canals were dug to lower the water level. In 2015 large fire events took place again, now primarily in the western part of the PGPSF. In short, fire, gold mining and expanding mixed agriculture systems have been the most important sources of deforestation, land use change and associated carbon emissions in the area.

Scenarios involving expansion of industrial land use activities as logging, paper pulp or company oil palm plantations were discarded as a considerable section of the PGPSF has already been declared Village Forest (Hutan Desa, HD) in 2017 and the remaining part is expected to be declared HD in 2021. Mining and expansion of mixed agricultural systems can therefore be assumed to be leading in a BaU scenario. In order to avoid double counting, logged forests were not classified as a separate scenario but included in the mixed agriculture systems scenario as logged forests are assumed to eventually transform into agricultural lands. The BaU scenario is based on previous expansion patterns, rates, landscape characteristics and associated carbon stock. Unavoidable carbon emissions due to decomposition of drained peatlands that have already been converted to agricultural production systems have been included in calculations. It is assumed that gold mining expansion will not take place on peat. Whereas Wibisono and Dipa (2019) provides extensive details on the calculations and assumptions, Figure 6 provides an overview of the results.

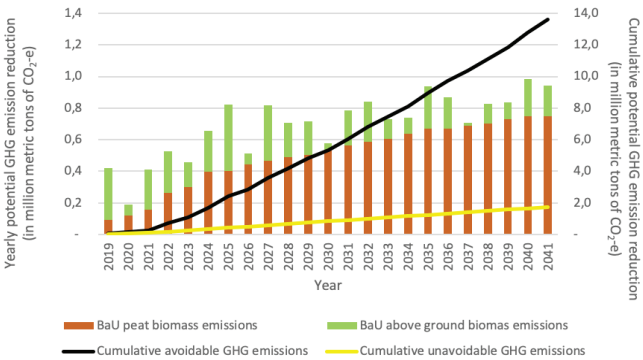

Figure 6. Overview of potential GHG reductions from the Business As Usual scenario

The intervention scenario of a REDD+ program and associated land conversion has the potential to avoid 13,6 million tCO2-e emissions from 2019 to 2041, or nearly 600,000 tCO2-e per year on average. Based on a price of 1 USD per tCO2-e, the potential RBP incentive could be USD 600,000 USD on average per year from 2020 till 2041. Although 1 USD per tCO2-e already demonstrates avoiding GHG can be profitable, it is argued that the value of carbon credits should be between 40-80 USD per tCO2-e (World Bank, 2017). This shows that carbon emission reduction projects provide huge income opportunities for communities and governments.

Strengths, Weaknesses, Opportunities and Threats to RBP-REDD+ Program implementation

TI has worked on multiple projects in the PGPSF for many years. In collaboration with several NGOs and government institutions, TI achieved transforming the PGPSF legal status from production forest to village forests, thereby increasing ownership with local populations (see eg. Purwanto and Kusters, 2019). The extensive experience in the area allows TI and WI to conduct a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of a potential RBP-REDD+ scheme in the area (Figure 7).

Our findings show that a RBP REDD+ program in PGPSF has great potential for delivering financial flows to local communities who subsequently are incentivized to foster conservation and peatland management. The high potential emission reduction in the PGPSF meets Performance Monitoring Area (Wilayah Pemantauan Kinerja, WPK) criteria, a MoEF necessity for supporting

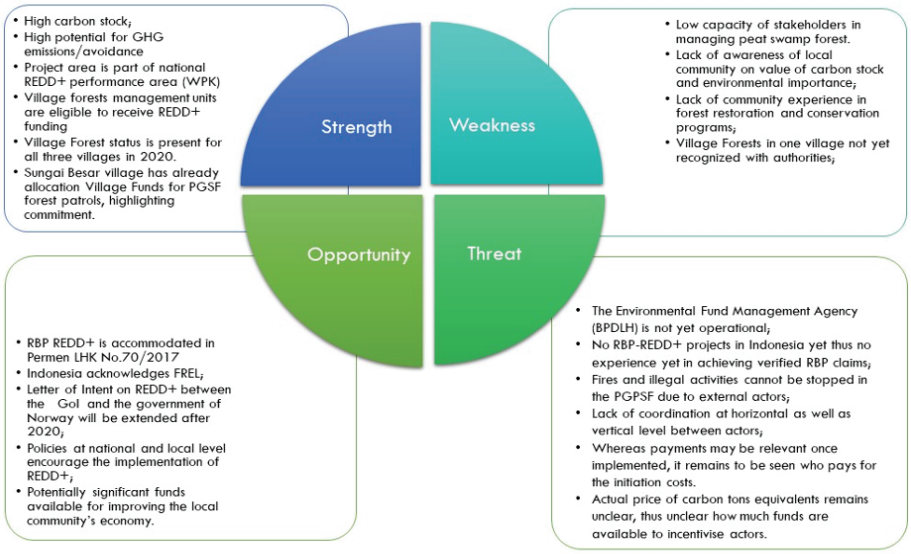

Figure 7. SWOT analysis of implementing REDD+ program in PGPSF

RBP schemes. With two of the three villages having their Village Forest Management Units (Lembaga Pengelola Hutan Desa, LPHD) and the third one expected to be ready in 2021, there are local entities in place that can take on the role as REDD+ implementers. There appears momentum with national as well as international stakeholders to fund such schemes and implementing this case could provide valuable lessons for future schemes that allow local populations to benefit from RBP-REDD+ schemes.

Nevertheless, the SWOT analysis also highlights weaknesses and challenges that require interventions to avoid failure in actual RBP-REDD+ program implementation. It is clear that avoiding a BaU considerable efforts are required. Activities that can be carried out to reduce this include: improving capacity and awareness of stakeholders at the provincial and district level in the management of PGPSF, strengthening institutional capacity of Village Forest Management Units (LPHD), forest fire prevention and combating illegal logging and illegal gold mining. In short, there will be a need for considerable capacity building and negotiation amongst stakeholders about how benefits and costs will be distributed.

Methods above demonstrated the potential GHG reductions and financial benefits associated with proper management of the PGPSF. Whereas direct benefits pertain to maintaining carbon stock and delivering economic benefits to local communities, there are many indirect benefits to the implementation of a REDD+ project as well. Conservation efforts will also support the function of PGPSF as water regulator, maintain natural habitat for Orangutan *(Pongo pygmaeus)* and other wildlife and plants, and thereby maintain a role in providing NTFP for local communities and provide opportunities for tourism. The implementation of REDD+ is also likely to contribute to improving clarity about land tenure issues, and forest governance due to its increased importance and associated availability of funds. Clearly there are plenty opportunities, but the threats remain just as relevant. Key challenges relate to aligning interests of stakeholders, maintaining community involvement, managing cross-sectoral interests and ever changing global and national processes regarding REDD+ finance availability.

The way forward

Tropenbos Indonesia's strategy to pursue conservation, responsible management of the PGPSF and linking local stakeholders with Ecological Fiscal Transfer (EFT) includes the following activities:

- In collaboration with other NGOs, increase awareness and capacity building to village governments and key village champions that appear suitable for facilitating EFTs in Pematang Gadung, Sungai Pelang and Sungai Besar villages. These include the village administrations, sub-district administrations, regency administrations but certainly also the Village Forest Management Units (LPHD).
- Facilitate the establishment of a Multi Stakeholder Platform (MSP) for intervillage collaboration. This platform will also include members from the private sector/large scale oil palm plantations, government and NGOs. Enable institution to properly document progress of intervillage collaborations (develop institutional memory).
- Facilitate MSP in developing common understanding, commitment which lead to action plans to protect the PGPSF. These action plans could include making use of special monitoring and reporting tools[1] , citizen journalism, firefighting, law enforcement activities, etc.
- Leverage funds from government (all levels), private sector as well as NGOs to finance intervillage collaboration.

[1] See https://smartconservationtools.org/

- Share findings of Tropenbos Indonesia and Wetlands International Indonesia on carbon stock quantifications with MSP, capacitate MSP to understand calculations, discuss findings and determine to what extend the conservation efforts in the PGPSF can be included in Indonesia's GHG reduction commitments (Indonesia's National Determined Contribution) and *Forest Reference Emission Level* (FREL).
- Facilitate registration with the National Registration System (Sistem Registrasi Nasional/SRN) and facilitate SRN to conduct field verification.
- Facilitate EFT from the Indonesia Environmental Trust Fund (BPDLH) or/and Fiscal Policy Agency (Badan Kebijakan Fiskal, BKF) at the Ministry of Finance to relevant local stakeholders in PGPSF (presumably the Village Forest Management Units or the MSP).

Whereas TI main activities aim at linking the conservation efforts in the PGPSF with RBP-REDD+ schemes and government programs, it also engages with other stakeholders. Environmental service providers as Lestari Capital developed the Sustainable Commodity Conservation Mechanism/SCCM, a private-sector mechanism to finance high-impact conservation and restoration initiatives. LC provide long-term financing (25 years) to community-based conservation initiative and facilitate companies that, for example, are interested in RSPO's High Conservation Value (HCV) loss Remediation and Compensation Procedures (RaCP). Such initiatives may well link with conservation efforts as relevant in the PGPSF. Also there are alternative voluntary carbon markets, such as Verified Carbon Standard/VCS/VERRA, where community carbon certification can be obtained and sold. Funding via private sector initiatives can go in parallel with the NDC and EFT from BPDLH, and might be implemented faster than RBP-REDD+ schemes.

Conclusions

This Infobrief and the extensive report by Tropenbos Indonesia and Wetlands International Indonesia (see Wibisono and Dipa, 2019) demonstrate an interesting case to pioneer a RBP REDD+ scheme in Indonesia. However, this will not happen by itself and halting land conversion in the PGPSF will be a huge challenge. Tropenbos Indonesia's strategy, as provided in the previous section, highlights the next steps towards realizing financial support to maintain the carbon stocks in the PGPSF, and its other social and ecological functions. Thereby TI facilitates the GoI and related stakeholders are expected to create enabling conditions that allow for maintaining carbon stock and environmental protection, whilst at the same time contributing to linking national and international finance with local community development.

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Cover photo:
Aerial view of Pematang Gadung Peat Swamp Forest in Ketapang District

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