Independent Peatland Expert Working Group

IPEWG

Summary Report

Time/Location: Nov 6 – 9, 2018 – Pangkalan Kerinci, Indonesia

Participants

IPEWG: Prof. Dr. Supiandi Sabiham, Prof. Ari Lauren, Prof. Susan Page, Prof. Chris Evans, Dr. Ruth Nussbaum

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Secretariat: Tim Fenton, Addriyanus Tantra (APRIL)

Objectives:

- Relationship of actual GHG emissions to actual subsidence; and Water Table (WT) to % Moisture Content (MC)
- Using Digital Elevation Models (DEMs) to identify high risk flood areas; using MIKESHE to model peatland water capacities and timeframes until drainability management issues arise
- Developing Native Species silviculture requirements – planting and natural regeneration, including the RER area.
- Updates on ongoing work-streams on data collection / analysis and resource mapping with a strong focus on applying the results to forecast models and field practices.

Field Day: Pelalawan Sector viewing R&D and operational planting of Native Species (NS), the High WT trial and NS Nursery

IPEWG Work plan Progress Updates

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Component 1 – Building a Science-based Understanding and Minimizing Impacts
1.1 Subsidence and carbon balance **a) Analysis of existing subsidence data** - the subsidence data analysis paper is currently under the scientific research journal review process by GEODERMA. A second paper on the same subject (and dataset) will include temporal variations of subsidence in greater detail. Analysis has already started and the completion of the first draft awaits the feedback of the first paper. **b) GHG flux monitoring** - the GHG flux tower update provided 14 -20 months of data for both CO_2 and CH_4 net exchange from the 3 tower sites. Current trends indicate the Mixed Land Use and Native Forest sites as net emitters of CO_2 and the Acacia plantation site has attained neutral-to-low sequestration of CO_2 by age 10 months. The CH_4 data illustrates a strong relationship to ground water level and peat soil water content; all 3 flux sites are net exchange emitters of CH_4. IPEWG noted that native peat swamp forests emitting $C0_2$ on a net exchange basis is an indication of natural or anthropogenic disturbance and requires further research to confirm the probable explanations. IPEWG requests a review next meeting of how the subsidence data set links to the flux results. A review of the GHG flux tower data processing, quality control and gap filling confirmed there were no technical issues with the procedures being implemented. The IPEWG members confirmed and accepted the quality control procedures. APRIL is sharing the data trends at the American Geophysical Union (AGU) meeting in December 2018 having already presented at the European Geophysical Union conference hosted in Vienna, April 2018. IPEWG encourages publishing

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the results of the net CH_4 exchange.

1.2 Water table management and hydrology for improved understanding of options for and impacts of managing water tables

a) High water table trial – established with a newly planted crop of Acacia at time of the IPEWG meeting. The gross trial area including buffers is 34.4 ha; the net trial area is 16.3ha. Instrumentation has not yet been fully installed. The experimental design was confirmed during the in-field visit with a request for 2 additional treatments to be considered – Mechanical Land Preparation (MLP) strips along the 60 cm water table trial zone and to monitor the root development during the few years of tree growth (in the buffer areas) to determine if root development is restricted by the WT and ultimately plantation yield. It was noted the WT needs to be measured weekly in the plots.

b) Lysimeter trial – the installation of the subsurface boundary sheeting is installed for the 2 plots (30 m x 20 m x 4 m deep). One plot will have the WT set at 40 cm and other at 80 cm. The heavy plastic walls are driven 50 cm into the mineral soil base below the peat soil with the purpose of excluding water intrusion from the surrounding peatland. Data measurement equipment has been tested during a staff training program for monitoring equipment while the trial sites were being prepared. Instrumentation and planting is scheduled to be installed by year end 2018. The IPEWG ask what information is available from other companies and whether CO_2 measurements can be included.

c) Emission Ground Chambers – the data analysis was reviewed from a previous trial measuring the relationship between CO_2, water table, soil moisture, soil temperature and tree growth after almost 2 years following establishment. Two treatments consisted of MLP and control. MLP is the process of leveling the peat soil site, burying coarse woody debris and lowering the peat soil surface elevation by ~20 cm prior to planting with Acacia. There was no significant difference in emissions between the treatments however there was a significant difference in CO_2 emissions between high and low bulk density peat soil sites – likely to be driven not only by peat density, as a single factor, but also by water table variability and peat moisture content.

1.3 Growing trees on wetter peat

a) R&D Native Species trials - a 10-month old native species (NS) research trial was reviewed on-site, containing 11 different NS, using Acacia as the 'control' for growth comparison. The trial site follows an Acacia plantation regime because the site is within a plantation water management zone. This trial illustrates the gaps in understanding on successful establishment of native species in cleared areas with a 40cm water table. IPEWG requests continued monitoring of survival, growth and WT depth for comparison between NS and other trials in-progress at the next on-site review, including one trial site with a high water table to compare Acacia growth to NS.

b) Operational Planting of Native Species - the IPEWG visited a fiber plantation compartment that was allowed to regenerate naturally to Acacia, and then treated by strip-thinning (2m width) and line planting of 9 different NS along the cleared paths. The WT was 30cm at time of visit and NS varied between 60 – 100cm in height, surrounded by 2 - 4m tall Acacia regeneration. This project will contribute to the understanding of growth performance between different NS in addition to providing a comparison of NS performance established in a sheltered system to an open, full-exposure plantation system. IPEWG requests monitoring for and documenting ofNS that may regenerate naturally under the heavily regenerated Acacia.

c) NS Nursery - APRIL continues to operate the NS production nursery in conjunction with an Acacia-based nursery, sharing infrastructure, resources, people and housing. A proposal for the upgrade to the NS Nursery was reviewed

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on-site. The IPEWG pointed out that documentation of source material for NS is vital for the ability to improve planting stock over time; and to involve others for knowledge sharing, including experimenting with shading and mycorrhizae.

IPEWG recommends APRIL develop an over-arching plan with strategies for establishing NS in restoration areas at scale, while clearly defining the research questions to ensure success. The plan for the Pulau Padang restoration needs to be integrated with the *Restorasi Ekosistem Riau* plans in advance of starting restoration work scheduled for 2020.

1.4 Natural forest condition and management update

APRIL's Conservation Forest management framework has been introduced to APRIL and Supply Partner operations in addition to 21 communities, year-to-date. Full community engagement is scheduled for 2019.

IPEWG advises building alliances with neighbouring companies, organizations, NGOs and local governments to develop approaches to address encroachment.

1.5 Resource Mapping

Review of LiDAR outputs

No further LiDAR surveys or development of tools from existing LiDAR data have taken place in 2018. The Pulau Padang LiDAR information has been used to develop Digital Elevation Models (DEMs) and applied to the MIKE-SHE modeling project to understand the water balance and field capacity of the study area (refer to 2.1b).

Techniques for topographical data gathering used by APRIL

Tested Source	Sensor type	Resolution
Field Topography Survey (requires repeated surveys for accuracy)	-	0.5 meter interval 25 x 800 m sampling
Airborne Digital Aerial Photo (fix wing aircraft)	Passive	0.3 m/ pixel
Airborne Digital Aerial Photo (UAV)	Passive	0.047 - 0.056 m/pixel
Airborne LiDAR (DTM, DSM)	Active	0.3 m interval
Airborne IFSAR (DTM)	Active	0.5 m interval
Satellite World DEM (DTM)	Active	10 m interval
Satellite DSM from ASTER	Active	30 m interval free
Satellite DSM SRTM	Active	30 - 90 m interval

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1.6 Clear Communications

The Phase 1 Progress Update by IPEWG was released in July, summarizing the Working Group's development and start of the implementation of the Peatland Roadmap and Workplan.

IPEWG encourages APRIL's engagement with emerging landscape initiatives in Siak and Pelalawan for understanding the perspectives of other stakeholders and co-development of solutions, in addition to providing support and information.

The IPEWG will schedule its next meeting early in 2019 to overlap with the SAC meeting in order to discuss any concerns or issues and re-confirm its links to the SAC.

Component 2 - Responsible Peatland Operations

2.1 Modeling plantations and landscapes to be used to predict the implications of different management strategies

a) Plantation Simulator -'modeling' is a decision support tool. The Plantation Simulator models operational water management impacts using precipitation, peat properties, plantation characteristics and plantation management

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treatments. Outputs include plantation growth and yield, carbon balance, peat subsidence, and nutrient balance. A simulator can forecast the impact on fiber yield relative to tree nutrition and CO_2 emissions by changing water tables.

Responsible peatland management strives to minimise carbon emissions from plantation land use while indicating the impact to **tree** nutrition, plantation productivity and harvest yield. Subsidence data allows quantification of what this looks like and the Plantation Simulator can model the time over which it occurs. Other data sources, such as the GHG flux towers and chamber measurements will help validate modelling results by comparing to field data.

A review of the Plantation Simulator and the GHG flux trends identify the majority of net CO_2 flux emissions occur during the first 10 months after planting when tree biomass is low. The IPEWG focus will therefore investigate management techniques to reduce emissions in the first year of plantation growth during the 5 year cycle whilst also being being mindful of approaches to reducing emissions during the rest of the plantation cycle.

The proposal submitted by the IPEWG requires review by APRIL to confirm availability of requested datasets.

The IPEWG recommends customizing the Plantation Simulator to forecast a series of scenarios for reducing peatland emissions which will require different plantation management treatments (e.g. MLP) to manipulate both emissions and plantation yield. Field trials are likely required to verify impacts.

b) Hydrological modelling - a case study of Pulau Padang (PPD) - APRIL presented its case study of PPD using the LiDAR data collected in 2017 with the MIKE-SHE software and inputs from IPEWG. The objectives include understanding the water balance, potential impacts of water management on the hydrological integrity of the peat dome and potential land use risks, such as flooding and subsidence. The model ran 2 main scenarios – with and without plantation forests looking 50 years into the future.

Conclusions: At the island-scale, there is a shift in the hydrological flow path in the future projection with the changing topography, as the overland flow increases and the groundwater flow decreases. However, the hydrological flow of the peat swamp forest in the central part of the island (RER area) remains intact. The plantation forestry practice doesn't significantly alter the hydrological flow path compared to the scenario without plantation forestry practice. There is no boundary impact under the current level of plantation development in wet or dry periods. This is also forecast in the long term (50-years) except during dry periods.

APRIL will present this case study at the poster session of the AGU hosted in the USA in December 2018. The IPEWG encourages the publishing of this case study and requests the next step is to identify high risk drainability areas on PPD.

Component 3 – Developing a Vision for Peatland Landscapes

APRIL GROUP
PEATLAND VISION

Our Vision is to realize responsibly managed peatland landscapes towards Indonesia's (climate goals and) sustainable development.

Indonesia's peatlands are a vital global carbon store and a critically important habitat for wildlife and an increasing number of endangered species. They are also a source of livelihood for local communities and have been a significant driver of economic development for the Indonesian natural resources industry over the last three decades.

Working with the Indonesian Government and other stakeholders, we aim to achieve biodiverse, flourishing, and resilient peatland landscapes which provide livelihoods and support the well-being of local communities, as well as a secure fiber supply for APRIL. This is in line with our production-protection model where conservation, restoration and social inclusion are integral to our production approach.

To attain this, we have been working to develop a long-term, science based peatland management approach for our

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business and our supplier concessions. We are committed to continually improve and evolve our approach and practices in line with the latest scientific data and thinking. We recognize the impacts of drainage-based production models and we support the accelerated development and implementation of new approaches that address these.

Scientific research identifies two primary risks and managing them forms the critical components of our overall plan. They are first, minimizing subsidence and identifying, monitoring and establishing management options for high flood risk areas; and second, improved water-table management across the whole peatland landscape to reduce GHG emissions.

Equally crucial is the need to recognize the realities that characterize peatland landscapes in Indonesia, particularly in Riau where there is predominance of peatland as a land base and where responsible production is currently the most viable land management option. Fire prevention and management will continue to be an imperative where community engagement and capacity building are essential. There also needs to be an understanding of the impact of population growth and continuing community development needs which must be balanced with protection goals.

In the pursuit of this vision, we further commit to responsive, constructive and transparent stakeholder engagement.

Future IPEWG Meetings

The next scheduled IPEWG meeting is December 2018 by video-link
The next on-site meeting for IPEWG will involve the SAC's participation in 2019.