Report CIFOR-USAID Workshop:

“Understanding the role of climate in Indonesian fires (peat and non-peat soils), to better support fire management interventions”.



Jakarta, July 25th 2019

Summary for Policy Makers

This report summarizes the contributions of the CIFOR-USAID Workshop: “Understanding the role of climate in Indonesian fires (peat and non-peat soils), to better support fire management interventions”. Held on July 25th, 2019 at the Century Park Hotel, Jakarta, Indonesia, the workshop was organized by the Center for International Forestry Research and supported through a grant from USAID for the project entitled “Impact assessment for Indonesian interventions on fire: what are the most effective and efficient interventions and their barriers for scaling up?”.

In the last decades, the severity of fire seasons in Indonesia have resulted in the declaration of a ‘State of Emergency’. To contain and to reduce fire damages, many Fire Management Interventions (FMI) have been promoted in the form of policies, institutional activities, private-public partnerships, fiscal incentives, technical support and institutional reforms. However, it is unclear how climatic conditions can override fire management efforts, or which areas in the country are more reactive to climate than the others. This understanding would help Indonesian government officers, private companies, research centers, and society in general to better navigate future fire management action on the ground. This is indeed a critical contribution as Indonesia is getting ready to fight the current 2019 fire season, the worst since 2015. To that end, the main goal of the workshop was to support the reduction of fire risk and danger in the country by improving current knowledge of those geographies that are more reactive to climate stressors and by identifying the effectiveness of Fire Management Interventions to reduce fire risk and fire danger. The workshop had the following objectives: 1) display fire trends in the country with Landsat for the last 17 years, 2) analyze the reactivity of fire to climate at Provincial and District levels, and 3) discuss barriers and opportunities to improve Fire Management in Indonesia taking into account the different climate-fire reactivities.

The workshop was opened by Dr. Robert Nasi (CIFOR DG). He elaborated that fire has specific place in human development. In relation to fire uses there are differences between old time and current conditions such as related to the capacity to control fires. Fire is one of the most effective and used in land management system. Using fire is the cheapest way to clear the land but fire escapes are often happened so that better fire management interventions need to be developed. The program continued with presentations from participants related to the role of fire in management interventions in Indonesia, fire statistic systems and the development and Applications of Fire Danger Rating Systems in Southeast Asia, FDRS-BMKG operations for information on the potential of forest fires, the inventory of emissions and NDCs, regulatory and policy frameworks for fire management interventions, the Grand Design, and Collaborative Fire Management approaches. In addition, during participatory exercises and guided discussions participants were able to identify threats and uncertainties, discuss strategies and opportunities, and share on the ground experiences in the management of fire. The lead facilitator for the workshop was Dr. Rosa Román-Cuesta, the Main scientist who is also the project leader. The CIFOR team included Dr. Victoria Ramenzoni (Rutgers University), who is CIFOR consultant, and CIFOR researchers MS. Hety Herawaty and Mrs. Dina Hubudin. The workshop was attended by 48 participants representing Central Governments like Ministry of Environment and Forestry; and Meteorology, Climatology and Geophysics Agency; Provincial Forestry Offices such AS from Sumatera, Kalimantan, Sulawesi and Papua Islands; International Organizations such as USAID, GIZ, FAO and the World Bank; private sector such as APRIL; University (Bogor Agriculture University, Institut Pertanian Bogor); and also from CIFOR. This document highlights main findings from the workshop. Attached to the document are the list of participants and the agenda.

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I. Introduction

Indonesia is the country with the highest density of fire emissions in the world. The 2015 fire events meant losses of $16.124 billion, with significant impacts to human health and biodiversity. Main causes of fires are mostly anthropogenic and may be a result of land clearing from small-scale and industrial landholders, including logging operations and agricultural activities from large-scale plantations (e.g. oil palm). While the role of oil palm concessions remains controversial, fire is also influenced by the presence and extent of particular land uses/covers such as degraded peatlands and forests which are highly susceptible to re-ignition. As a response to the 2015 events, and through the presidential Instruction #11/2015 on the Increased Control of Lands and Forest Fires, the country imposed a total ban on fire use for land clearing and a moratorium on oil palm and mining concessions. Paradoxically, this ban may actually contribute to the transition from swidden small-scale agricultural practices toward cash crops, ultimately resulting in a higher frequency of fires. Along with more frequent ENSO events, future projections on climate change indicate an increase in the intensity and duration of droughts. Because fire events are closely associated (nb: *though non-linear*) with climatic conditions, it is estimated that the frequency of burning will increase in the years to come. Indonesia displays annual fire cycles as present studies have shown.

As a result of these challenges, there is a call for a more nuanced set of Fire Management Interventions (FMIs) that can consider factors such as the different uses of land, soil types, and the interaction of socio-economic variables. Numerous policies and regulations have been instituted since the 1980s to prevent, control, and manage fires. However, the approach has been mostly regulatory and highly centralized in nature and has largely failed to meet objectives. New frameworks that support the engagement and empowerment of local communities in the management and prevention of fires have also been presented as potential alternatives. Incentive-based solutions, which combine actors from the private and civil sectors, have been efficient in reducing fire re-occurence (e.g. Free Fire Alliance). There is also a need to outline new practical solutions that can identify pathways for behavioral change rather than just regulatory or enforcement instruments. To aid policy development and implementation, impact evaluation of policies and socio-ecological trends is direly needed. Reviews have shown that research has focused on short periods of time or has been regionally confined to small scales of analysis (concentration on East and Central Kalimantan and Sumatra). As a consequence, a systematic evaluation of FMI impacts, along with new instruments (new regulations, technical innovations, developments in fire monitoring, and incentives) and goals introduced post 2015 fires, is lacking.

The main goal of the workshop was to support the reduction of fire risk and danger in the country by improving current knowledge of those geographies that are more reactive to climate stressors and by identifying the effectiveness of Fire Management Interventions to reduce fire risk and fire danger. The workshop had the following objectives: 1) display fire trends in the country with Landsat for the last 17 years, 2) analyze the reactivity of fire to climate at Provincial and District levels, and 3) discuss barriers and opportunities to improve Fire Management in Indonesia taking into account the different climate-fire reactivities.

II. Workshop Structure

- Welcome. Opening Remarks.
- Morning Session: Objectives 1 and 2. Presentations on the national context of Fire. Share and discuss preliminary results on the trend analysis (biophysical and climate variables)-and if available socioeconomic variables—among participants. What are the confounding factors?
    1. Fire trends in Indonesia: historical fire+ climate + land cover dynamics (CIFOR)
    2. National fire statistics (MOEF)
    3. Fire danger rating system-operations and use in Indonesia (BMKG + CIFOR)
    4. Fire GHG Inventories and NDCs (MOEF)
    5. A historical perspective of regulatory frameworks for Fire Management Interventions (FMI) (Rutgers)
    6. Grand Design for Fire Prevention and an Example of Action Research (CIFOR)

7. Collaborative Fire Management (APRIL)

- Afternoon Session: Objective 3. Identify gaps in information regarding the development and implementation of new policies post 2015 (new regulations, technical innovations, developments in fire monitoring, and incentives) at the district and provincial level.
    1. Mapping Exercise: Spatial/temporal matrix of FMI actions.
    2. SWOT group exercise (Strength, weaknesses, opportunities, and threats).
    3. Closing Remarks

III. Opening Remarks and Presentations.

- **Welcome. Opening Remarks. Understanding the role of climate in Indonesian fires to better support management interventions. Dr. Robert Nasi, CIFOR Director General.**



Fire has a special place in the human psychic and development. Before we had language, what differentiated human beings was the capacity to control fire, to cook. Fire has been the most effective and most used system for land management. In addition, fire has and continues to be a weapon of the poor. It is the cheapest way to kill the land. Fire is something that is very deeply entrenched in the human culture and civilization. It is very important to understand both the biophysical factors: when fire can escape, the conditions that make fire dangerous. But, we also need to understand why people use it if we are going to have any chance at controlling fire. Unless we don't understand why people are setting fire in the first instance, we cannot effectively prevent it. It is important to look at prevention, it is most cost effective to prevent than to correct. In this way, prevention is cheaper than calling the firefighter. We need this interaction between science and practitioners, so that we can start the dialogue in order to develop better management interventions. It is not just about telling people what they need to do, it will not work. Just the police won't work. We need to provide people with solutions, a blanket banning does not work. And then we may be able to solve some of the problems of Indonesia.

- **Presentations + discussion:**

1) Fire trends in Indonesia: historical fire+ climate + land cover dynamics (CIFOR, Dr. Rosa Román-Cuesta, Project leader).

The presentation discussed the role of climate in Indonesian fires. Part of a USAID project to explore and identify fire hotspots in the tropics and to conduct an impact assessment of fire management interventions on a geospatial scale. The project spans three countries: Indonesia, Ethiopia, and Colombia. Indonesia is chosen due to the heath and economic impacts, but also in order to revise fire policies and their effect in reducing fires in the tropics specially where there are too many confounding factors. The goal is to try to identify interventions that are more effective in reducing fire. According to Andela (2017), who identifies fire prone and density areas, Indonesia shows relatively much less fire. However, a change in the trend in burned area from 1998 to 2015 can be observed. Areas with increased fire (red) emerge. Indonesia has a mixed trend. When taking into account the Nationally Determined Contributions (NDCs) from Indonesia, this includes the foreseen emissions and real emissions, two main sectors are key in reducing CO2 outputs: forests and energy. The NDCs are a political commitment to reduce fire in the country, thus, it becomes essential to understand which policies are more effective so we can improve future implementations. As part of the presentation, the authors visualized fire trends in a geopositioned. They relied on a spatial dataset from David Gaveau (2001-2018) which is not yet publicly shareable (resolution of 30 mts). The authors indicate that the disaggregation of fire according to fire triggers and density has great utility. The analysis allows to follow fire trends over time, to match Fire Management Interventions (FMIs) with

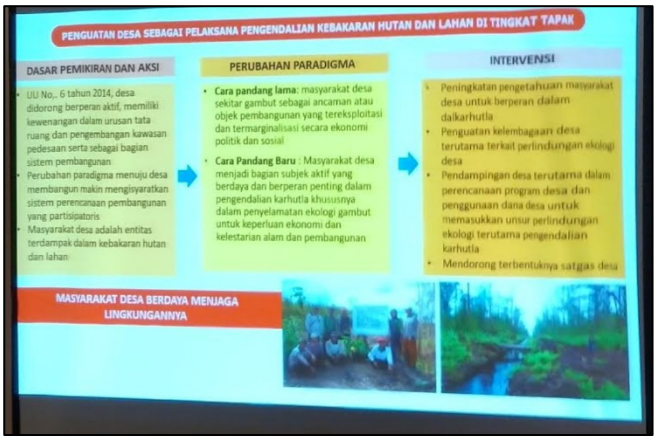
occurrences of fire, and to assess results of interventions quantitatively (e.g.: For fire reactive parts of Indonesia, when danger is high which FMIs should we prioritize?). There are some data gaps that hinder this analysis; especially in terms of spatial resolution authors underscored the paucity of geospatial information related to FMIs at the village level. This creates an issue of aggregation. In addition, the identification of trends is difficult due to the many confounding variables. To illustrate the challenges in identifying and predicting fire behavior over time authors include a comparative case study from California concerning the Chaparral systems. What happens with highly severe events (e.g.: 2017). What is driving this fire? What types of policies can we apply? Which FMIs are not effective in reducing fire? In California the exploration of fire trends has seen two opposing explanations (Minnich vs. Kelly) about the ecology of chaparral that leads to very different FMIs, and $ allocation. Researchers observe different dynamics in sizes of patches and that fire suppression may promote fuel accumulation in those areas with high proportion of absentee landowners. Therefore, it is key to understand the drivers of fire, the influence of climatic factors like higher temperatures, and the role of the different land uses in generating fire prone conditions. This implies also exploring the mediating role of fire on interventions, and distinguishing fire regimes from fire trends (Fire regimes: climatic long-term trends, decadal). As implications, the presenters underscore the mid to long-term consequences of fire policies on fire conditions as well as the role played by climatic and weather events that may override FMIs. Because of highly specific context (idiosyncratic factors), each area has its own dynamics challenging the scalability of fire trend analyses. To conclude, authors observe that for Indonesia, when studying fires between 2001 and 2018, there is a high connection between precipitation, drought, and conditions of fire. Landsat analyses indicate that most of the fires are not happening within forests… and that there is very dynamic peaking of fire associated with oceanic anomalies such as El Niño Southern Oscillation and the Indian Ocean Dipole. For each climate related anomaly, each island responds idiosyncratically. New peak of fire is seen in Papua. Other regions, such as Nusa Tenggara Timur may be more reactive to ENSO. Anomalies of precipitation during the dry season are also discussed for the different provinces including the duration of drought and intensity/accumulation of rain during dry months. Sumatra presents an interesting case. Associations have local variability, which suggests the need for different FMIs. They also underscore that confounding interacting factors are observed at both the space and temporal levels. Aggregation can be a problem. Thus, understanding the right scale of aggregation is important to tailor FMIs. It is essential to focus on fire risk (the probability of fire to happen, related to human presence) for targeting interventions and to consider different agriculture management instruments as a source for FMIs. The presenters finally highlight the role played by temperature in future fire risk and suggest that fire may be driven by heatwaves in the next decade.

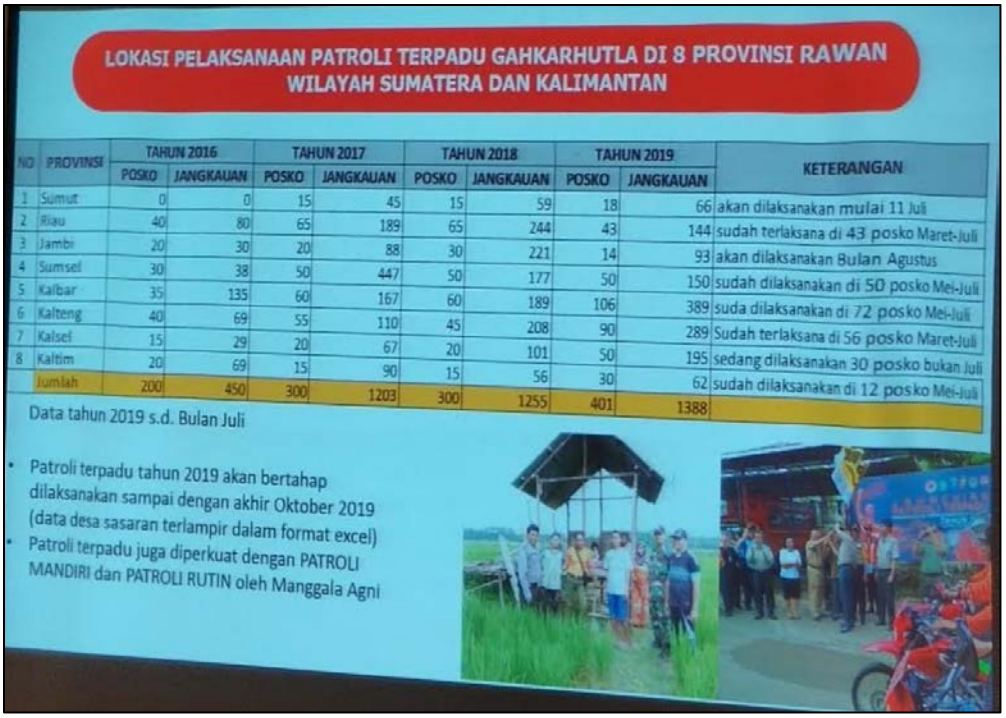
2) National fire statistics (MOEF)

The collection of statistical datasets began in 2015. Before, the measurement of fire relied on help from NASA and was based on the identification and count of areas with fire. The new dataset allows for the study of hotspots and their behavior over time (2015-2019). These analyses have identified that when the dry season begins the probability of fire increases. The beginning of the dry season is a critical moment where all institutions should work together in prevention. Multiple actions have been developed across Java, Riau (Sumatra), Districts of Kapuas and Tanah Laut (Kalimantan). These include integrated patrols for forest and land fire prevention which started around 2016. One local team includes 5 or 6 members, and a house is contracted for up to 2 months to support the regional monitoring tasks. The monitoring area includes 3 or 4 surrounding villages. Socialization tasks are also carried out. The most effective fire prevention interventions include socialization from house to house and the gathering of farmers in groups for information sharing. In the biennial 2016-2018, they have achieved approximately a 20% reduction. In addition to fire prevention, activities include the sharing and distribution of materials in all villages in fire hotspots. These activities of knowledge transfer are conducted on a daily frequency and reports are made monthly that reach offices and even the president. Activities are carried out in dry months and conclude in October when rains commence. A total of 401 posts, 1388 villages. One patrol 3 or 4 villages.


PATROLI TERPADU PENCEGAHAN KARHUTLA
Sumatera Utara
Riau
Jambi
Sumatera Selatan
Kalimantan Barat
Kalimantan Timur
Kalimantan Tengah
Kalimantan Selatan
Sulawesi Utara
Sulawesi Selatan
Sulawesi Tenggara
Location
of Integrated
Preventive Patrol


KEUNGGULAN PATROLI TERPADU PENCEGAHAN KARHUTLA
Pelaksana patroli lintas instansi/lembaga
Representasi kehadiran pemerintah dalam dalkarhutla di tingkat tapak
Beroperasi di tingkat tapak
Kondisi wilayah rawan termonitor setiap hari
Laporan harian Up to date
Monitoring harian dan berjenjang dari desa-pusat
Tindak lanjut kejadian dapat lebih cepat tertangani
Melibatkan masyarakat desa setempat
Proses transfer pengetahuan, proses perubahan sikap dan perilaku dapat berjalan
Optimalisasi peran masyarakat dalam dalkarhutla


PENGUATAN DESA SEBAGAI PELAKSANA PENGENDALIAN KEBAKARAN HUTAN DAN LAHAN DI TINGKAT TAPAK
DASAR PEMIKIRAN DAN AKSI
UU No,. 6 tahun 2014, desa didorong berperan aktif, memiliki kewenangan dalam urusan tata ruang dan pengembangan kawasan pedesaan serta sebagai bagian sistem pembangunan
Perubahan paradigma menuju desa membangun makin mengisyaratkan sistem perencanaan pembangunan yang partisipatoris
Masyarakat desa adalah entitas terdampak dalam kebakaran hutan dan lahan
PERUBAHAN PARADIGMA
Cara pandang lama: masyarakat desa sekitar gambut sebagai ancaman atau objek pembangunan yang tereksploitasi dan termarginalisasi secara ekonomi politik dan sosial
Cara Pandang Baru : Masyarakat desa menjadi bagian subjek aktif yang berdaya dan berperan penting dalam pengendalian karhutla khususnya dalam penyelamatan ekologi gambut untuk keperluan ekonomi dan kelestarian alam dan pembangunan
INTERVENSI
Peningkatan pengetahuan masyarakat desa untuk berperan dalam dalkarhutla
Penguatan kelembagaan desa terutama terkait perlindungan ekologi desa
Pendampingan desa terutama dalam perencanaan program desa dan penggunaan dana desa untuk memasukkan unsur perlindungan ekologi terutama pengendalian karhutla
Mendorong terbentuknya satgas desa
MASYARAKAT DESA BERDAYA MENJAGA LINGKUNGANNYA



LOKASI PELAKSANAAN PATROLI TERPADU GAHKARHUTLA DI 8 PROVINSI RAWAN WILAYAH SUMATERA DAN KALIMANTAN

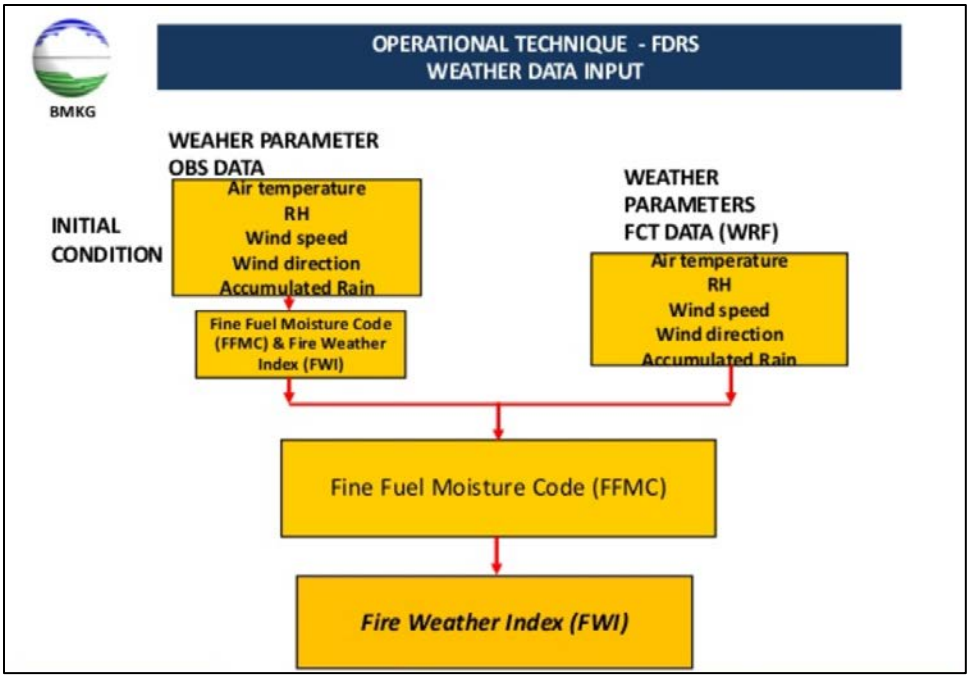
NO	PROVINSI	TAHUN 2016		TAHUN 2017		TAHUN 2018		TAHUN 2019		KETERANGAN
		POSKO	JANGKAUAN	POSKO	JANGKAUAN	POSKO	JANGKAUAN	POSKO	JANGKAUAN	
1	Sumut	0	0	15	45	15	59	18	66	akan dilaksanakan mulai 11 Juli
2	Riau	40	80	65	189	65	244	43	144	sudah terlaksana di 43 posko Maret-Juli
3	Jambi	20	30	20	88	30	221	14	93	akan dilaksanakan Bulan Agustus
4	Sumsel	30	38	50	447	50	177	50	150	sudah dilaksanakan di 50 posko Mei-Juli
5	Kalbar	35	135	60	167	60	189	106	389	suda dilaksanakan di 72 posko Mei-Juli
6	Kalteng	40	69	55	110	45	208	90	289	Sudah terlaksana di 56 posko Maret-Juli
7	Kalsel	15	29	20	67	20	101	50	195	sedang dilaksanakan 30 posko bukan Juli
8	Kaltim	20	69	15	90	15	56	30	62	sudah dilaksanakan di 12 posko Mei-Juli
	Jumlah	200	450	300	1203	300	1255	401	1388	

Data tahun 2019 s.d. Bulan Juli

- Patroli terpadu tahun 2019 akan bertahap dilaksanakan sampai dengan akhir Oktober 2019 (data desa sasaran terlampir dalam format excel)
- Patroli terpadu juga diperkuat dengan PATROLI MANDIRI dan PATROLI RUTIN oleh Manggala Agni

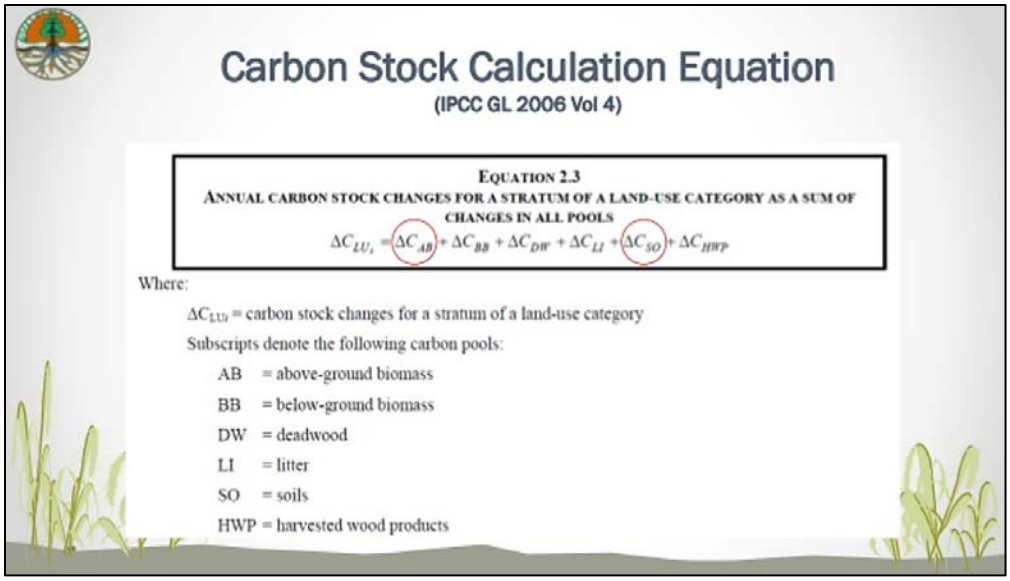
3) Fire danger rating system-operations and use in Indonesia (BMKG and CIFOR, Michael Brady and Fachri Radjab)

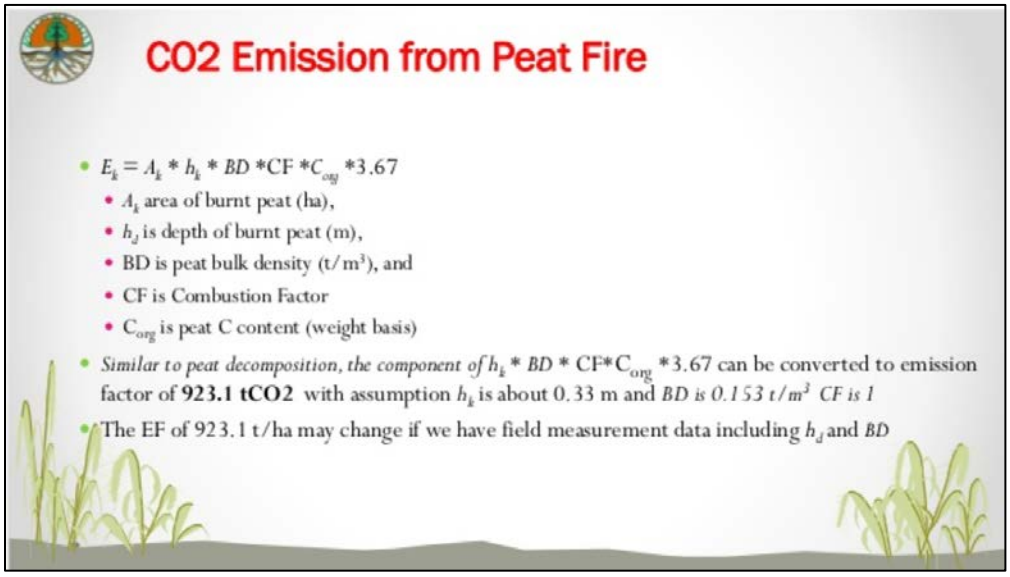
Presentation covered Fire danger rating systems in southeast Asia. Acknowledges previous collaborations with different partners from the region and beyond. Regional activities also include Malaysia, Vietnam, and Thailand. Now a regional system run by Malaysia on behalf of Asia. This responds to the Regional Haze action plan from ASEAN. Presenter discusses then cost considerations on fire management, and the fire rating to justify expenses for FMIs. Fire rating provides Decision Making (DM) support, enhances data value like hotspot information. It helps DM identify risks, priorities, timing and resource allocation for actions. Systems were developed in Canada in the 1920s. Well established in the science. Fire weather index is the most used system (CFFDRS structure) and is also complemented with other systems. The Indonesian system is a fire weather index, it includes 6 indices and codes. Used more specifically by management agencies for DM. Concepts well developed accepted and used. Underlying principle developed by Australian, fire intensity equation (FWI Behavior Indices, see figure below). Prevention measures: increased public awareness activities, step-up detection activities, notification of relevant agencies and companies. The real time monitoring fire hazard conditions is now used to decide whether to deploy more expensive resources and for the mitigation of hazardous conditions. Early warning and detection operating systems in Indonesia are based on weather daily inputs. For dry season, there is a 6-day short range forecast that is available. Other products include rainy/dry season forecasts, weather prospects, and FDRS products. Among limitations are the consideration of mostly meteorological parameters along with the low map resolutions (27km).



4) Fire GHG Inventories and NDCs (MOEF, Budiharto)

The presentation provides information on the Green House Gas emissions inventory as part of Indonesia's Nationally Determined Contribution. This is implemented with the support of different legislations and guidelines adopted in 2013 and 2017. The way emissions are estimated (carbon stock calculation, mostly of above ground biomass and organic soils) include data from activities pondered by an emission factor (see figure below). Activity data is derived from the National Forest Monitoring System (NFMS) which includes over 20 classes of land cover reflecting land use for above ground biomass, 7 of these classes refer to forest types such as primary dryland forest, primary swamp forest, and plantation forest. Other classes describe uses such as mining, human settlements, agriculture practices, and fishponds. Activity data is then converted to emissions according to differences in land cover and pondered by indices. For example, for 1 hectare of primary swamp forest that have been degraded the following calculus is made: non disturbed swamp forest (96.35 t C/ha), disturbed (-30 t C/ha) results in 66.35 t C/ha which amount to 243, 28 CO_{2e}/ha when multiplied by the emission factor 44/12 t CO_{2e}/ha. Emission factors are derived from previous research. For peatland areas, the calculation relies on considering the total area of decomposed peat, the depth of peat subsidence in relation to the height of the water table (this varies depending on the type of crop), peat bulk density, and carbon in peat content. The multiplying emission factor is 3.67 (see below), when considering mineral land and peatland combined it results in 923,1 t CO_{2e}/ha. Spatial data is used to calculate areas of fire (Landsat). Indonesia has significant reduction targets over the next decades (23% just alone in the forestry sector). To attain this goal, main areas of action contemplate reducing deforestation, consolidation of sustainable management principles, restoration of 12 million ha of degraded lands, and the restoration of 2 million ha of peatlands by 2030.





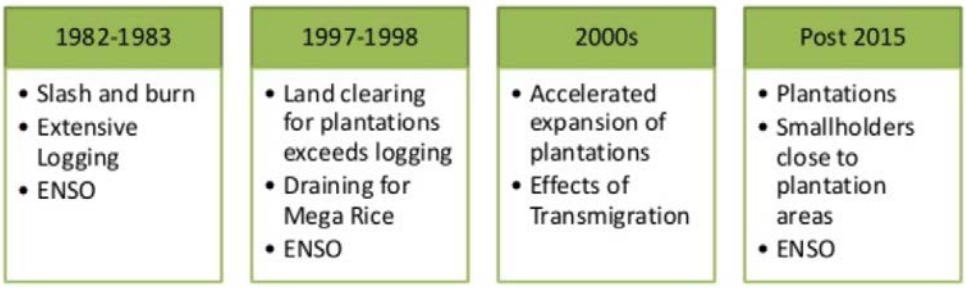
5) A historical perspective of regulatory frameworks for Fire Management Interventions (FMI) (Rutgers, Dr. Victoria C. Ramenzoni)

A wide set of policies and regulations have been instituted since the 1980s to prevent, control, and manage fires (FMIs). The preferred approach, mostly regulatory and highly centralized in nature, has failed to meet objectives. Analyses have pointed to misalignments on the identification of causes and proposed management solutions, different discourses related to whom is to blame (e.g. consumers and the product chain behind fire use; they decouple blame from transnational market processes), as well as important limitations in terms of stakeholder representation which pose additional issues on equity. Policies have also not effectively addressed causes of fires such as escaped fires from non-managed areas where landowners remain absentees. In the past few years, in its Intended Nationally Determined Contribution (INDC), Indonesia has prioritized FMI as part of the broader strategy for reducing emissions for land uses and forestry. But, the plan fails to include the oil palm plantations, a sector which is deemed to increase production from 33 to 36.4 million tons annually. In addition, the country has undertaken efforts to curve marginalization and poverty by the decentralization of forest management to local communities. The “Just

Economy" policy contemplates the redistribution of control over 21.7 million ha (includes 16.8 million ha of forests) of land by the end of 2019. Social forestry mechanisms may hinder the prevention and management of fires if the variability of anthropogenic pressures and land uses is not considered within the larger political and economic context. With growing economic pressures, many farmers may choose to convert their fallow areas to rubber agroforestry areas, and some that ceased traditional systems of fire management, may rely on burning for clearing land that later is sold to oil palm concessions. The legacies of previous development projects such as Mega Rice Agriculture and Transmigration policies also help amplify the socio-economic pressures for communities as many of their livelihood areas within the forest were destroyed.



As a result of a preliminary historical analysis of FMIs with a focus on regulatory instruments over 100 different policies were identified. Based on previous studies, a classification was adopted to systematize regulations into periods, each one of them representing a cycle with its own dynamics connecting forestry, agricultural, legislative, and government sectors with past legacies of land use and climatic trends.



As general observations, the analysis of policy instruments suggested the following points: Post 2015 fires there has been movement away from exclusively regulatory solutions to the inclusion of the participation of other sectors such as civil society organizations. While some of these changes are yet to be systematized in particular pieces of legislation, programs rely on incentives (e.g.: payment for ecosystem services) and active cooperation between different communities of stakeholders. One such example is Fire Free Villages. There is also a significant emphasis on preventive measures and restoration, the latter extending to the blocking of canals and the rewetting of peatland areas. This has led to the creation of a national peatland agency tasked with the restoration of key regions. New policies are moving to more transparency in the structure of the private sector and toward the certification of chains of production for cash crops. Among these measures are the mandate to inform the composition of company directories. In all, policies are projected to operate at different institutional, temporal, and spatial scales, while maintaining a highly localized focus. There still subsists a lack of specific instruments to aid in the process of participation and

involvement of different communities of stakeholders. Issues of coordination arise due to the highly centralized directives in a context of regional and provincial decentralization. New challenges are expected to ensue due to the nature of social forestry programs that build from the 2018 agrarian reform.

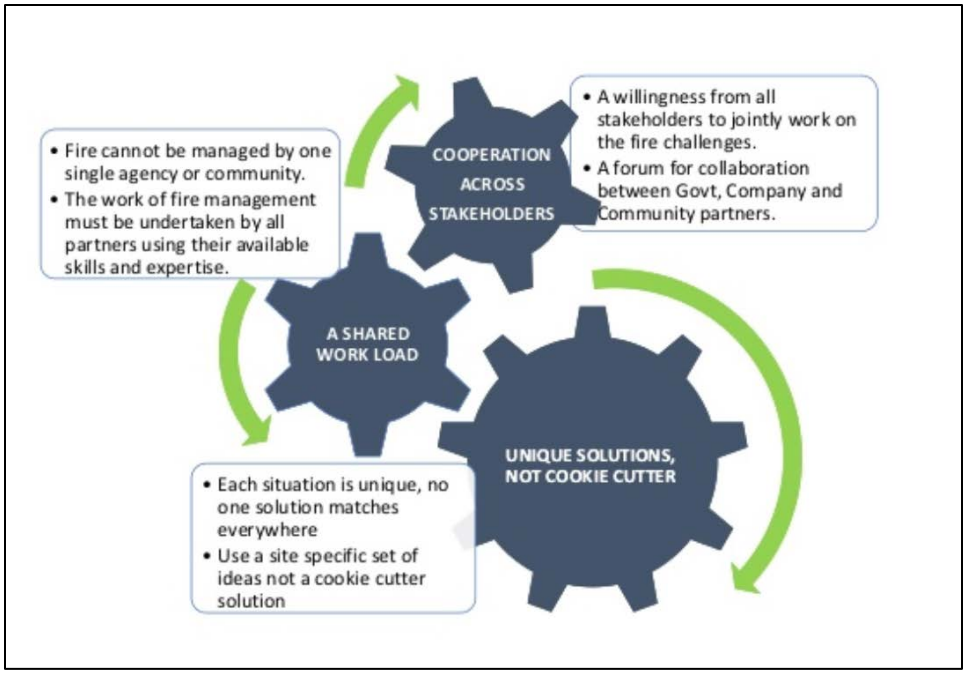
6) Grand Design for Fire Prevention and an Example of Action Research (CIFOR, Herry Purnomo).

Grand Design (GD) was launched in 2017, a cross-institutional policy strategy that involves the activities of multiple organizations to prevent fire. The focus of this strategy is directed at first at equally reducing indirect and direct causes as well as rapid response. In the years to come (2020-2024), actions will be primarily directed at addressing indirect causes of fire. Direct causes are related to land clearing practices, lacking hydrological infrastructure, and weak institutions for response. Indirect causes include socioeconomic and political conditions, land conflict, dan lacking resources. The main strategies pursued by the GD include economic incentives and disincentives, the management of social institutions, the enforcement and synchronization of different regulations and activities, the development of infrastructure, and the strengthening of early fire response. Actions are expected to target 731 villages. An example of participatory action research is presented from Dompa Bengkalis, Riau, Sumatra, where betel nut, fishponds, and honey are proposed as alternative livelihoods.



7) Collaborative Fire Management (Brett Shields-APRIL)

Participants discussed issues related with Collaborative fire management. They emphasized the idea that there are no cookie cutter solutions and that work should be conducted in close integration with local communities. It was also suggested that rather than focusing purely on incentives, more efforts should be directed towards characterizing and reinforcing stakeholder engagement. Incentives may create very limited long-term change value. It is also key to understanding why people use fire and to empower people to make their own decisions. An example was discussed in Kawasan (Kabupaten) Palawan, Riau. It was indicated that collaboration without government support does not go far. In addition, rules and policies need to meet local realities to be effective. The following two slides were shared:


• Fire cannot be managed by one single agency or community.
• The work of fire management must be undertaken by all partners using their available skills and expertise.
COOPERATION ACROSS STAKEHOLDERS
• A willingness from all stakeholders to jointly work on the fire challenges.
• A forum for collaboration between Govt, Company and Community partners.
A SHARED WORK LOAD
UNIQUE SOLUTIONS, NOT COOKIE CUTTER
• Each situation is unique, no one solution matches everywhere
• Use a site specific set of ideas not a cookie cutter solution


Fire Management
RECOVERY
Community
Environment
Infrastructure
PREVENTION
Fire Management Planning
Stakeholder Engagement
Reduce unwanted fire ignition
Landuse Plan / Spatial Plan
Education & Training
Regulations for Peat and Fire
Compliance audits / Enforcement
PREPAREDNESS
Training
Risk map priority area
Water supply ponds
Early Warning
Detection
- Satellite tools
- Camera Towers
- Patrol ground / aerial
Road Access
Trigger points for readiness
RESPONSE
Post fire Patrol
Mop Up
Main Suppression
Initial attack
Tactical suppression plan
Rapid Response = small fire
Early Detection

IV. Mapping Exercise: Spatial/temporal matrix of FMI actions.



Before breaking for lunch, participants were encouraged to share their knowledge of fire management interventions in Indonesia. To facilitate recall, maps of 34 Indonesian provinces were put on wood stands and flipcharts were provided to annotate. Requested information included: place/s identification (village/district/province name) where the activity/ies had been/are been carried out; type of fire management (i.e. (1) technical; (2) regulation and enforcement; (3) incentives; (4) institutional change); the activity/ies name; the year; and the intervention/s executor/s (responsible institution/s). This information was later compiled and verified to update current databases of existing and previous fire management actions in Indonesia.

V. SWOT: Strength, Weaknesses, Opportunities, and Threats In Fire Management

After lunch, participants reconvened to carry out a Strength, Weaknesses, Opportunities, and Threats assessment (SWOT) of Fire Management Interventions. They were divided into two groups of ten participants, and each team worked discussing two of the categories related to fire management (Prevention, Preparedness, Response, and Recovery). Below are presented some preliminary observations from the exercise.





1) Prevention:

In the case of prevention, the following interventions were discussed: enforcement, rewetting, education and training, and regulations.

Strengths	Weaknesses
• Rewetting: Bring back hydrology • Education and Training: Data information for early warning, Community Fire Brigades	• Rewetting: Costly not always effective, large areas to rewet, limited budget for prevention - No topographic survey to design canals - Coordination communities-company on water management (not open the gate and flooding community)
Opportunities	**Threats**
• Education: Access to land clearing without fire	• Rewetting and Regulations: Conflict about Land-use policy - Overlapping regulations (multiple illegal uses) - Canal blocking can kill plantations, so water control is needed

Enforcement: Enforcement constitutes a topic of its own. There is good policy support however initiatives may fail in the field due to lack of consistent government presence. Threats and weaknesses are related to lack of participation and antagonism from local communities. Opportunities to grow if more cluster efforts and local communities are trained to fight fires.

Peatlands rewetting, canal blocking: Can bring back hydrology, but it is costly, it is not necessarily always effective. Weaknesses relate to a limited budget for prevention. Threats include overlapping of jurisdictions: central government may want to rewet, but local communities may want to develop. Areas that need to be rewetted are so large and often in remote areas, the logistics are difficult. A daunting task.

Education and training: Data information and early warning are in good shape. Good number of cluster efforts at village levels (Kelompok Peduli Api). In terms of opportunities: we should improve access to tools for land-clearing without fire.

Regulations: During the discussion of regulations (closely tied with enforcement issues), participants discussed the APP community engagement, a village revolving fund (Rph. $ 20,000 million). A village committee is set up and APP representative to monitor the fund. Who takes the loan has to repay the fund back with an interest, and then it gets re-assigned. The government can use it as an example for future actions of prevention. It must go together with economic development.

2) Preparedness: Early Warning Systems

In the case of preparedness, participants discussed early warning systems.

Strengths	Weaknesses
• MPA • Climate data availability • Ask farmers not to use fire when certain danger threats	• Extrapolation • FDRS there is no variable of GWL • Local community has limited access to FDRS Add more forest and land fire warning posts
Opportunities	**Threats**
• FDRS accessibility - Platforms android / IOS - Facebook /twitter • Training FDRS/ SDM Masyarakat (Community Human Resources)	• Equipment safety

Early warning system. As a benefit, they are present in every location or hotspot. The climatologic knowledge is solid, it is distributed across institutions, even the private sector. There is a problem with the extrapolation and downscaling of data products and the availability of weather stations to triangulate information. In terms of peatland, it is necessary to develop a product that can speak to the fire potential of a particular area. It can be like in Canada, where there is a variable that considers the input moisture. It is also important to share this knowledge with local communities including farmers, they rarely have access to this information. Warning signs and boards including meteorological information are rarely found among local communities. This presents an opportunity. Because these elements are low technological cost, it is possible maybe to expand into a platform that can be easily accessible to everybody. For example, developing an android app for cellphones. Threats are related to the possibility of losing equipment in the field. Since some of the meteorological equipment is imported, it is difficult to maintain and repair. Observation: fire index is available, SDN fire alert.

3) Response: Rapid Response

In relation to response, participants discussed rapid response capacities across all sectors.

Strengths	Weaknesses
• Plantation companies have good capacity for rapid response • Local presence - Good collaboration between locals and companies - Enough budget	• Lack of coordination among institutions (army, police) and spatial jurisdiction (kabupaten, kecamatan, desa (district, subdistrict, village)). Agencies only focus on certain areas
Opportunities	**Threats**
• All response actors use ICS (Incident Command System) • Assess resources needed	• Large areas - Unequal resource allocation

Rapid response systems among the private sectors (plantation and agricultural companies) can be used to support and develop local response systems at the village level. This is an opportunity to develop and give shape to a type of collaboration that is new. The local communities. Local communities could adopt a hybrid system of concessions to manage land in cases where owners do not have other alternatives than fire use for agricultural management. The adoption of the ICS incident command system can be also an opportunity for all the actors. A common way that partners which are close to each other can use a common framework to collaborate and coordinate. It is key to follow a common path, the middle ground, to solve conflicts between local peoples and private concessions. In terms of weaknesses and threats, it is key to strengthen coordination and the even flow of data. It should be noted that the spatial scale poses a challenge in terms of data dissemination. Issues in terms of different budgets and levels of resource allocation across provinces, districts, and jurisdictions need to be taken into account.

4) Recovery: Post-Incident Recovery

Concerning the issue of recovery, participants focused on post-incident recovery.

Strengths	Weaknesses
• Budget allocation • Institutions (BRG) • Planned in strategy - Existing livelihoods	• Insufficient monitoring • Capacity low • Access to credit is complex • Land use planning not enforced
Opportunities	**Threats**
• Synergy with prevention • International agenda for FLR • Access to new land	• Migration - post fire land clearing • Lack of coordination among governmental offices and agencies

The main options for postfire recovery include fostering community livelihoods and restoring the environment. As strengths, budgets have been allocated for post fire recovery. Activities are already considered as part of strategic plans. For example, there are programs for supporting livelihoods with microfinance. As weaknesses, even though recovery actions are considered, insufficient budgets reach the community. Funds are difficult to access due to bureaucracy. There is not enough funding for monitoring how the livelihood support or ecosystem service recovery initiatives are performing. There is also no land-use planning enforcement. As opportunities, it should be observed that some of the recovery activities can provide multiple benefits, added value (Co-benefits). There is momentum now for restoration under the UN agenda (this is the UN decade in restoration). Indonesia has already established an agreement with Norway for REDD+. In terms of threats, burnt areas become a social weapon for migration promotion. Complex dynamics intermix with the legacies of previous programs of transmigration and agricultural development. In addition, in terms of recovery actions there is a lack of coordination between institutions. We are missing a common categorization of land use in Indonesia.

General Comments: While finalizing the exercise, a question emerged in terms of how centralized policies and activities are downscaled to the provincial, district, and local jurisdictions. Participants indicated that the downscaling implies changing mindsets and opinions from stakeholders at all sectors. Programs like Fire free village initiatives are effective because it engages the interest of local people directly. The leader of a crew must be someone that can recruit effectively among the local community, give incentives upon participation, and establish good connections among villagers. If the person is local, there is a common language and people can understand and approach him. For example, leaders of youth organizations. In this way, it is possible to work with those responsible for fires directly and change their mindsets. This enables direct intervention. In all cases, the educational component is key. There must be a fluent communication with higher management at district and provincial levels, it is important that everybody is on the same page.

In addition, there must be training in terms of water tables, topographic methods, surveying methods before implementing actions such as canal blocking. It is key to develop a clear procedure that can be

implemented. To determine where to block, there must be coordination. As of now, there is a lack of clarity of whom is to lead initiatives as too many players and institutions are supposed to be involved. A concern was raised in terms of the seasonality of rains and the use of canals to avoid flooding. In some cases, people reopen canals when there is a risk of inundation. Additionally, water is shared for irrigation. Therefore, before any implementation takes place, it is essential to determine local uses.

VI. NEXT STEPS

Conclusions: If you had a little bit of money, which action would you promote?

There is only one, and it is social community engagement. Working with then, the challenges they face, and there is not a cookie cutter solution. Long term solutions, what they need not what you think they need.