

THE ROLE OF REGIONAL FIRE MANAGEMENT RESOURCE CENTER – SOUTHEAST ASIA

In Improving Fire Science Knowledge to Reduce Smoke

***National Inter-Agency Round Table
Forest and Land Fire Management
and Launching Regional Fire
Management Resource Center –
Southeast Asia (RFMRC-SEA)***

**Monitoring Forest and Land Fire
through Hotspot**



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The Sea Fires Bulletin is a bulletin published with a special edition semiannually containing activities that have been done and news related to forest and land fires, both nationally and regionally. The emergence of this magazine is in line with the establishment of the Southeast Asia Regional Fire Control Center (RFMRC-SEA), where the Global Fire Monitoring Center (GFMC) of the Max Planck Institute for Chemistry, located at the University of Freiburg Germany has assisted in establishing this center in Faculty of Forestry IPB.



Cover : Launching RFMRC-SEA

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Preface

Thanks to God Almighty, because of His blessings and grace, SEA FIRES has been published and hopefully can provide useful information for the wider community, nationally, regionally and internationally.

The Editors are willing to accept and publish either the results of research, analysis or research relating to the control of forest and land fires, as long as the article can be accounted for.

This Bulletin is a form of our appreciation in increasing the insight and knowledge and information in Forest and Land Fires Control. Through the making of this Bulletin, we want to take a role in the efforts of enhancing awareness of information.

Our thanks to all the related parties. The shortcomings and errors may still be visible here and there. Therefore, any feedbacks and suggestions are welcome in order to make it better.

Bogor, December 2017

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The Global Fire Monitoring Center (GFMC)



Bogor Agricultural University



MAX-PLANCK-GESellschaft



Federal Ministry of Food and Agriculture



UNISDR IWPM International Wildfire Preparedness Mechanism

Introduction

The objective of the project is the establishment of the Regional Fire Management Resource Center – South East Asia Region (RFMRC-SEA), which will function as an independent regional center of competency and excellence for fire management and will operate at the interface between science and informed policy development (Science-Policy Interface – SPI).

The RFMRC-SEA will be established by the Faculty of Forestry, Bogor Agricultural University (Indonesia), with the assistance of the Global Fire Monitoring Center (GFMC) (Max Planck Institute for Chemistry, c/o University of Freiburg). These two institutions have been working together in fire science and fire management since the mid-1990s at bilateral level as well as within international projects. Prof. Dr. Ir. Bambang Hero is serving as coordinator of the UNISDR Regional Southeast Asia Wildland Fire Network, one of 14 regional networks of the Global Wildland Fire Network.

Prof. J.G. Goldammer and team meet Minister of Environment and Forestry Indonesia, Dr Siti Nurbaya (March 2017)



Prof. J.G. Goldammer and team Secretary General and Director General Peat Restoration Agency (BRG)



The Center shall successively build the following capacities:

1. Development of an **internet-based information portal**, which will include the **science** of vegetation fires and related scientific disciplines;
2. Development of a web-based documentation and information portal on the **practices that are prerequisite for the application of scientific principles** in informed fire management;
3. Creation of an **interface and promotion of the dialogue between services of specialized governmental institutions and civil society organizations**;
4. **Provision of advisory service** for sustainable forestry & land management and relevant policies;
5. **Promotion of regional cooperation through networks**, notably within the UNISDR Regional Southeast Asia Wildland Fire Network under the Global Wildland Fire Network; and
6. **Training and continuing vocational training in fire management** (main task: Information, training, training and education and the promotion of human resources and institutional capacities).

The Aim of the Center

- > The overall aim of the Center, which through its affiliation with Bogor agricultural University will be an independent, academic entity, is to **contribute to informed political decision making and the development of relevant policies** for Indonesia and the neighbouring countries of the Maritime Continent. The structure of a regional competence center for fire management is a measure of the decentralization of the work of the GFMC, which was established in 1998.
- > The establishment of the center follows the experiences of three centers established in universities and led by forest fire scientists:
 - > Southeast Europe / South Caucasus (2010 – based in Skopje, Macedonia) , Eastern Europe (2013 – based in Kiev, Ukraine) , Central Asia (2015 – based in Ulaanbaatar, Mongolia) ,
- The experience gained in Indonesia / SE Asia will assist in building the 4th and 5th Regional Centers in, Central Eurasia (2015 – Krasnoyarsk, Russian Federation) South America (2015 – Gurupi, Brazil)

Proposed Key Activities / Synergies

Working closely with the Ministry, the BRG and other key agencies of Indonesia three key activities with “political significance” could be organized:

- > 2017: In early July the RFMRC-SEA could be officially opened by the Minister for Forestry and Environment. This event could be organized *in tandem* with a **National Round Table on Fire Management**, in which all national ministries / agencies that are directly or indirectly involved in fire / fire crisis management would participate. The international / bilateral donors / fire-related projects would be invited, too, and synergize in a post-Round Table workshop.
- > 2018: In mid of the year a **Regional SE Asia Consultation on Cross-boundary Cooperation in Fire Management** would be organized in which neighbouring countries and international organizations would participate and discuss the state and future of cross-boundary cooperation. While the ASEAN Agreement / ASEAN Secretariat would be a key partner, the participation of international organizations or political entities such as the UN, EU, World Bank, ADB etc. would broaden the scope of regional to global cooperation in fire management
- > 2019: Participation of Indonesian representatives at the 7th International Wildland fire Conference in Brazil (May 2019) and consideration to announce that in
- > 2023: Indonesia could possibly host the 8th International Wildland Fire Conference (IWFC)

Sponsor and Timeframe

The project, which will support the establishment of the Center, will be sponsored by the German Federal Ministry of Food and Agriculture, based on a decision of the German Bundestag, under the program "Bilateral Research Cooperation and the Knowledge Exchange for International Sustainable Forest Management". The initial project time frame is 1 March 2017 to 28 February 2019.

Available Finances

- > The finances made available by the German Federal Ministry will be administered through the Max Planck Society for the Advancement of Science, Max Planck Institute for Chemistry, and are aimed at
 - > Employment of three forest fire scientists at RFMRC-SEA in Indonesia (2) and at GFMC in Germany and partially in Indonesia (1)
 - > Basic equipment of the RFMRC-SEA office in Bogor (IT and other infrastructure)
 - > Establishment of a web-based RFMRC-SEA Information Portal (bilingual: Bahasa Indonesia and English) with a repository of published and open non-published documentation and library on Monitoring of fire use and wildfires and the impacts of fire in the environment (ecosystems and climate) and society
- Operational costs for field work

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Global Fire Monitoring Center (GFMC)

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The role of RFMRC-SEA in improving Fire Science to Reduce Smoke

By : Bambang Hero Saharjo

The increasing of population growth in the tropical and sub-tropical countries since the 1980s has resulted in increasing of land conversion and use of natural resources, such as tropical forests and other ecosystems. The process of land cover change has increased due to the expansion of settlements, agriculture, livestock, agrarian and plantation forests. Similar case also happened at the beginning of this century, with the creation of a residential space for providing the human needs as a result of the rapid population growth, which spread largely in virgin forest areas.

The rapid growth of urbanization population globally, combined with the increasing of global market connectivity, has continued the opening of the remaining natural landscape, which increase more and more by the time for food supply purpose, cellulose and other raw materials such as soybean oil and palm oil. In addition to the ecological impact, these landscapes are often overwhelmingly populated by indigenous and poor populations which tend to cause destruction to these landscapes. In Indonesia, the use of fire as a tool in land use conversion has increased in use since the 1980s --- these economically cheap and easy-to-use tool was originally used to clean up unused biomass in order to preparation for planting. However, the price of fire usage is considerably high. Wet tropical forests and wetlands are not only home to high-value biodiversity, but also an important carbon storage. The use of fire, results in destruction of living spaces and habitats (e.g. species that are in endangered conditions with a highly fire-sensitive ecosystem). The carbon stored in these ecosystems is released in the form of gases and aerosols, which can affect the composition and function of atmosphere, weather and population throughout Southeast Asia. Therefore, the burning of vegetation biomass in Indonesia during the dry season can release equal amounts or more of daily activated carbon radiation, such as the burning of fossil energy sources throughout the EU region. If this carbon is not suppressed through the role of post-fire vegetation, these emissions will contribute permanently to the increasing of the impact of global greenhouse gases and eventually lead to climate change.



In addition, the impact of smoke from vegetation burning on the surface is fatal due to the health and resilience of human resources. Contamination of smoke near the surface produces consequences for human health. Children and the elderly, or especially people who require special treatment of health such as heart and respiratory diseases, are among critically affected people. Despite the vary in models, all parties agreed that every year hundreds of people around the world are affected by "premature death" as their respiration is disrupted by fine particulate from the fires that has long-term impacts, including lung cancer. A significant proportion of estimated "premature death" are occur in Southeast Asia nowadays.



Introduction of RFMRC - SEA to the Minister of Environment and Forestry of the Republic of Indonesia, Dr. Ir. Siti Nurbaya, M.Sc (Middle)

Since many years ago, there have already been some questions about why science and politics fail to bring real change even at a high level of vigilance. Clearly, the problem of excessive use of fire in Southeast Asia can not be equated solely through the act of fire fighting. Burning vegetation in Southeast Asia can not be equated with human-caused fires anywhere in the world. Burning vegetation and land use can be regulated, reduced or even prevented if this is the goal of all decision makers. However, this is not the problem, the complex economic and socio-political nature of a problem will also require political attention and efforts in a good government. While science has provided the basis for an assessment of excessive use of fire, and civil society demanding for solutions, making some gap towards the goal.



Introduction of RFMRC - SEA to the Peat Restoration Agency (BRG) Dr. Alue Dohong (Director of BRG) and Hartono Prawiratmadja (BRG Secretary)

RFMRC - SEA person in charge, Prof. Bambang Hero on a discussion with GFMC staff and RFMRC - SEA staff Ati Dwi Nurhayati

The Regional Fire Management Resource Center - Southeast Asia is implemented as a link between science and policy. With the assistance of the Global Fire Monitoring Center (GFMC) of the Max Planck Institute for Chemistry, located at the University of Freiburg, Germany, the new regional center will be built at the Faculty of Forestry Bogor Agricultural University (Indonesia). One of the tasks of this center is to develop scientific and best practice based online information portal, which is used in fire control management. Open access and transparency of this comprehensive documentation will provide advisory support in the formulation and implementation of relevant sectors and Indonesian policy holistically. Furthermore, the center will promote Southeast Asia cooperation through networks and prepare training for capacity building on fire control (in particular: information, training, human resource development, and institutional capacity). The establishment of this regional center for fire control is a form of the decentralization work of the GFMC, which was built in Freiburg in 1998. The establishment of this center in Bogor is based on views and experiences from the success and effectiveness of centers in Southeast / South Europe, Eastern Europe and Central Asia, that have already established between 2010-2015.

The objective of this project is to establish the Regional Fire Management Resource Center - Southeast Asia, which will act as a regional center of fire management control competencies, as a link between science and policy, or develop information policy. With the assistance of the Global Fire Monitoring Center (GFMC), the regional center is built at the Faculty of Forestry of Bogor Agricultural University (Indonesia). The main tasks of this center are as follows: (1) Development of Internet-based information portal in related disciplines; (2) Development of web-based information documentation and portal on activities required in the application of scientific principles in the management of fire control; (3) Creation of access and interface to relevant products from particular institution; (4) Provider of assistance for sustainable forest and land management and relevant policies; (5) Regional cooperation through networking, (6) Training and continuing vocational training in the field of fire control management. The purpose of the establishment of this center is to contribute in the political decision-making and the preparation of policies that are relevant to Indonesia and the neighboring countries. The structure of the regional competency center in fire control management is forms of the GFMC decentralization work, built in 1998 at the Fire Ecology Research Group of the MPI for Chemistry, c/o Faculty for Environment and Natural Resources, Freiburg University. The development of the center oriented by the development of 3 centers in Southeastern Europe, Eastern Europe and the Middle Europe, between 2010 and 2015.

Coordination of Forest and Land Fires Control Activities and the Inauguration of RFMRC-SEA

By : Robi Deslia Waldi

Jakarta, 04 July 2017. The discussion among stakeholders on management of forest and land fire and RFMRC-SEA inauguration initiated by the Faculty of Forestry of IPB are led by prof. Dr. Ir Bambang Hero Saharjo, M.Agr and RFMRC-SEA team (Ati Dwi Nurhayati, S. Hut, MSi; Robi Deslia Waldi, S.Hut, and Wardana) coordinated with the Directorate of Forest and Land Fire Control (PHKL), led by Ir. Raffles B. Panjaitan, M.Sc and officials of PKHL. This coordination meeting discussed about the objectives and the expected outcomes and obtain from the meeting is the arrangement of events and speakers who can give a significant influence in the establishment of RFMRC-SEA. This activity will also be held at Manggala Wanabakti Building, Ministry of Environment and Forestry of Republic of Indonesia.

This Coordination Meeting was agreed that the objective of the discussion activities among the stakeholders is to comprehend the role of each stakeholder in attempt to control forest and land fires in Indonesia. The speakers presented in the discussion are selected based on the authority and expertise in controlling the forest and land and fire. Therefore, the invited guests can know and understand more about the authority of the speaker, so that it will not lead to a wrong point of view on the effort of forest and land fire control which often happened in Indonesia.

In this coordination meeting also, there are several things that are mutually agreed by the parties which is the invitation letter and distribution shall be issued or done by the Ministry of Environment and Forestry and the institutions that will be the main speakers are Assistant Deputy of Plantation and Horticulture of Ministry of Economic Affairs, Director of Plantation Protection of Ministry of Agriculture, Peat Restoration Agency (BRG), Indonesian National Institute of Aeronautics and Space (LAPAN), Indonesian Agency for Meteorological, Climatological and Geophysics (BMKG), Corruption Eradication Commission (KPK), Indonesian National Board for Disaster Management (BNPB), Production Forest Management Unit (KPHP), and Protection Forest Management Unit (KPHL).



National Inter-Agency Round Table Forest and Land Fire Management and the Launching of RFMRC-SEA

By: Ati Dwi Nurhayati

Bogor Agricultural University (IPB) together with the Ministry of Environment and Forestry (KLHK), organized the "National Inter-Agency Round Table of Forest and Land Fire Management and Launching of the Regional Fire Management Resources Center - South East Asia (RFMRC-SEA)" on July 10, 2017 at Manggala Wanabakti Building, Jakarta. This was held in the framework of the inauguration of RFMRC-SEA, as well as meetings with the stakeholders related to forest and land fire control, and funded by the German Government. The opening ceremony was attended by the General Secretary of KLHK (Dr. Bambang Hendroyono), Head of Environment Division of ASEAN Secreatariat (Mr. Saroj Srisai), General Director of PPI (Dr. Nur Masripatin M.For Sc), GFMC Executive (Prof. Dr. Johann G. Goldammer), Ambassador of Germany in Indonesia (Mr. Von Ungern-Sternberg), and Vice Dean for Academic and Student Affairs Faculty of Forestry IPB (Dr. Lailan Syaufina). RFMRC-SEA was inaugurated by the Minister of Environment and Forestry which in this case was represented by the Secretary General of KLHK. At this meeting was attended by several ministries / Institutions such as the Coordinating Ministry for Economic Affairs, Ministry of Agriculture, BMKG, BRG, KPK, LAPAN, BPPT, TNI Headquarters. Also present were GIZ, World Bank, JICA, Monash University, Wana Subur Lestari LLC, Wetland Internasional Indonesia and GFMC. The present press are Mongabay.com, Jakarta post, Green Economy, Antara News, Media Indonesia, Eljohnnews and Worldpronews.



The remarks from the Directorate General of PPI, Dr. Ir. Nur Masripatin M.For.Sc said that the issue of forest and / or land fires is the most challenging issue so that it can cause enormous forest destruction and have a profound impact on social community because it can cause conflict between them. Forest fires and / or land under El-Nino conditions can create major fires such as those occurring in Indonesia. Under these conditions, Indonesia try to control all forest fires and / or land owned. Great commitment in the era of President Jokowi is done to increase the capacity and awareness of stakeholders against fores or land fires

At the meeting, the German ambassador, **Mr. Von Ungern- Sternberg** strongly supports the establishment of RFMRC- SEA in Indonesia. He hope that throughout this project, Indonesia can reduce the incidence of forest and land fires, which will greatly affect in the reduction of carbon emissions and also affect the global climate



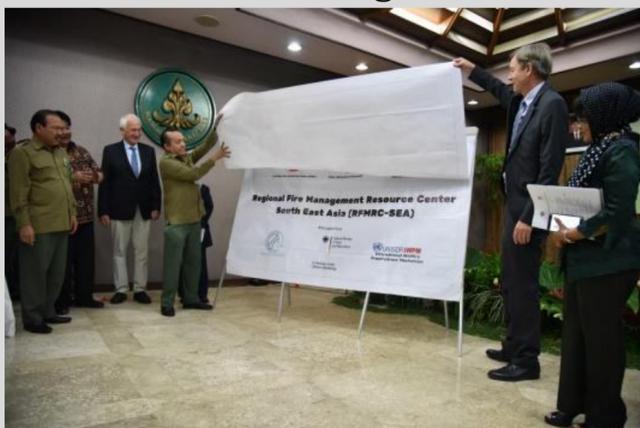
Executive Director of GFMC, **Prof. Dr. Johann G. Goldammer** stated that RFMRC-SEA's objective as an independent institution serves as a center of competence and management of forest and land fire controls, that provides scientific data and information for government policy-making. The Center will enhance capacity building of the stakeholders, by the development of an Internet-based scientific information portal, the development of web-based documentation and information portal of practices that are fundamental for the implementation of scientific principles in forest and land fire management, the creation of information and promotion services either for the government or private sector, the promotion of international cooperation especially in the matter of forest and land fires control under UNISDR Southeast Asia. This event is intended to invite stakeholders to cooperate with each other in the framework of this RFMRC-SEA establishment.



Secretary General of KLHK, **Dr. Bambang Hendroyono** said that RFMRC-SEA is expected to be a cooperation partner in forest and land fire control in Indonesia, which is based on science so that it can support in the determination of forest and land fire policy in Indonesia.



At the closing of the event, **Prof. Dr. Bambang Hero Saharjo** said that RFMRC-SEA will help the government in implementing scientific studies in the prevention and handling of forest and land fires, especially on the prevention. RFMRC-SEA not only works in Indonesia but also in Southeast Asia region, which has forest area to be maintained.



Monitoring the Forest and Land Fires through Hotspot

By : Robi Deslia Waldi

The Directorate of Forest and Land Fires Management of Directorate General of Climate Change of KLHK has anticipated the occurrence of forest and land fires although not yet fully resolved properly. However, this is a good step of the Government, especially the Ministry of Environment and Forestry in minimize the occurrence of forest and land fires by fulfilling the needs of facilities and infrastructure both in the central and local levels. The distribution of facilities and infrastructure is done through Manggala Agni which located in each Operation Area. In addition, the involvement of various parties such as Local Government, The National Board for Disaster Countermeasure, Indonesian National Armed Force and Indonesian National Police is a stimulant for the Ministry of Environment and Forestry in the management of forest and land fires. Another thing done by KLHK in addition to the real action is the early detection of hotspots (Hotspot) through the utilization of remote sensing technology.

Hotspots are indicators of a location that has a relatively high temperature compared to surrounding temperatures. The definition is written in article 1 point 9 Regulation of the Minister of Forestry Number : P12//Menhut-II /2009. The hot spots can be detected with NOAA (National Oceanic and Atmospheric Administration) satellites with AVHRR (Advanced Very High Resolution Radiometer) sensor. The AVHRR sensor is based on the thermal energy emitted from the observed object of an area with 42°C temperature. In addition to the use of NOAA satellites, Hotspot data can also be obtained from Terra/Aqua-MODIS Satellite. The MODIS is carried by Terra and Aqua satellites as one hyperspectral sensor (36 channel) with medium resolution (some canals have a resolution of 250 m²). Therefore, the use of MODIS in the monitoring of forest and land fires is a step that must be developed in the future (Solichin 2004).

Regional Fire Management Resource Center - South East Asia (RFMRC-SEA) which based in Dramaga Campus of Bogor Agricultural University, conducts Hotspot monitoring through Hotspot channel provided by LAPAN (<http://lapan.go.id/monitoring/>). Researcher of LAPAN Remote Sensing Utilization Center, Dr. Indah Prasasti, MS in the Round Table Meeting and RFMRC-SEA Launching on July 10, 2017 at Manggala Wanabakti Building said that LAPAN as technology and remote sensing data center has the main task to provide remote sensing data of Indonesian government for all Ministries/Institutions, Indonesian National Armed Force, Indonesian National Police, and Local Government in accordance with Law no. 21 Year 2013 on Space Activities which regulates Remote Sensing i.e. Provision of high resolution remote sensing data for Government Institutions and Local Government can only be implemented by Institution (article 18). In addition, he addressed that Remote Sensing Utilization for Forest and Landfill Application in accordance with Letter of the Minister of Environment and Forestry, April 20 2016, which agreed that Hotspot data will be taken from LAPAN. This is a respond to the direction of the President of the Republic of Indonesia on the National Coordination Meeting of Forest and Land Fires Prevention on January 18, 2016, and also, in order to synchronize the delivery of the Hotspot data and the extent of the burned forest area to the community.



Figure 1 Distribution of hotspots in Indonesia

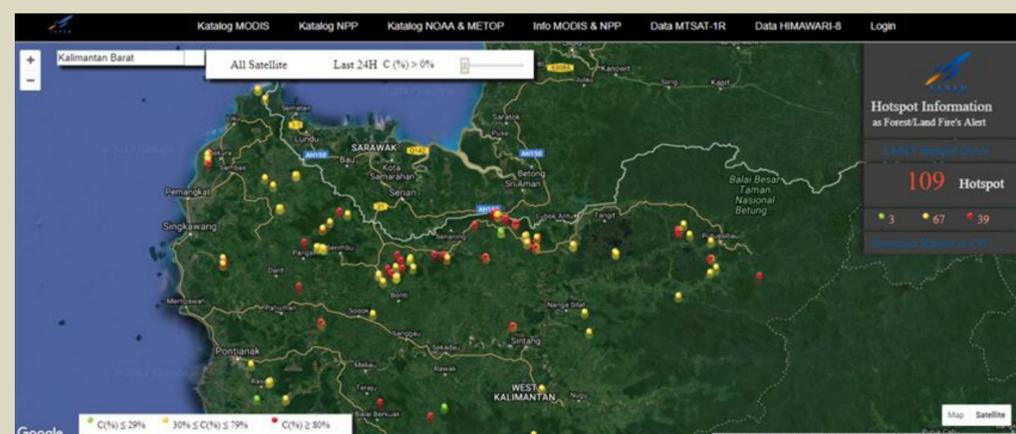


Figure 2 Distribution of hotspots in West Kalimantan Province

One of the objective of RFMRC-SEA is fires prevention and distribution of information of early detection through hotspot, because it can not be denied that remote sensing technology has contributed very valuable informations for the management of forests and land fires in Indonesia.

In addition, on the implementation, the accuracy of the detection process will determine the budget, accessibility of ground check, difficulty of the fire fighting process, and investigation needs in the case of violation of environmental law. If the early detection system can be run effectively and correctly it can help in preventing forest and land fires so that the incidence of forest and land fires can be suppressed or will not occur continuously.

Table 1 Hotspot monitoring by Terra/Aqua (LAPAN) satellite (confidence level $\geq 80\%$) for April - September period 2016 - 2017 in the 10 highest Hotspot provinces by 2016

No	Provinsi	Titik Panas (Hotspot) Terra/Aqua (LAPAN)															
		2016								2017							
		Apr	Mei	Jun	Jul	Ags	Sep	Rata-Rata	Total	Apr	Mei	Jun	Jul	Ags	Sep	Rata-Rata	Total
1	Kalimantan Barat	0	0	2	20	844	442	218,00	1308	4	8	1	111	123	281	88,00	528
2	Riau	36	14	31	105	679	20	147,50	885	9	4	3	21	16	1	9,00	54
3	Sulawesi Selatan	19	108	69	72	46	41	59,17	355	18	38	8	18	16	53	25,17	151
4	Sumatera Utara	11	8	55	120	107	17	53,00	318	0	0	9	13	7	3	5,33	32
5	Kalimantan Tengah	0	1	1	16	45	123	31,00	186	0	0	1	3	3	44	8,50	51
6	Nusa Tenggara Timur	3	0	7	4	47	61	20,33	122	7	20	8	51	92	79	42,83	257
7	Sumatera Selatan	2	0	29	18	78	11	23,00	138	0	1	7	21	12	52	15,50	93
8	Kepulauan Riau	37	28	11	8	23	17	20,67	124	0	0	0	0	0	0	0,00	0
9	Kalimantan Utara	37	1	11	0	46	30	20,83	125	1	1	0	10	14	2	4,67	28
10	Kalimantan Timur	32	12	5	10	35	14	18,00	108	2	1	2	3	20	42	11,67	70
Rata-Rata		17,70	17,20	22,10	37,30	195,00	77,60	61,15		4,10	7,30	3,90	25,10	30,30	55,70	21,07	
Total		177	172	221	373	1950	776		3669	41	73	39	251	303	557		1264
Rata-Rata Indonesia		7,71	7,46	10,46	18,93	74,61	30,25	24,90		1,47	2,91	2,68	10,29	15,85	25,15	9,73	
Total Indonesia		216	209	293	530	2089	847		4184	50	99	91	350	539	855		1984

Source : http://sipongi.menlhk.go.id/Hotspot/matrik_tahunan

Based on the results of the monitoring that conducted by RFMRC-SEA from April to September by comparing hotspots of 2016 and 2017 in 10 highest Hotspots provinces in 2016 is presented in Table 1. It can be explained that by Terra/Aqua satellite (LAPAN) with confidence level $\geq 80\%$, the top Hotspot province in 2016 from most in a row is West Kalimantan, Riau, South Sulawesi, North Sumatra, and Central Kalimantan, which hotspots eventually have decreased in 2017.

Other things happen differently in the areas of West Nusa Tenggara, East Nusa Tenggara and Papua which hotspots have increased in number from year 2016 to 2017 as presented in Table 2. This became a new phenomenon that is Western Indonesia experienced a decreasing in number of hotspots while Eastern Indonesia experienced an increasing in number of hotspots.

Based on the reports of rainfall analysis results and rain characteristic of July 2017 from Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG) (<http://www.bmkg.go.id>), these kind of phenomenon happened because of in that period, most of the western Indonesia experienced rainfall that is categorized as medium (150-200) mm and only a few areas that have low rainfall (300 - 400) mm and high rainfall (50 - 100) mm.

Table 2 Hotspot monitoring by Terra/Aqua (LAPAN) satellite (confidence level $\geq 80\%$) for April - September period 2016 - 2017 in the 10 highest Hotspot provinces by 2017.

No	Provinsi	Titik Panas (Hotspot) Terra/Aqua (LAPAN)															
		2016								2017							
		Apr	Mei	Jun	Jul	Ags	Sep	Rata-Rata	Total	Apr	Mei	Jun	Jul	Ags	Sep	Rata-Rata	Total
1	Kalimantan Barat	0	0	2	20	844	442	218,00	1308	4	8	1	111	123	281	88,00	528
2	Nusa Tenggara Timur	3	0	7	4	47	61	20,33	122	7	20	8	51	92	79	42,83	257
3	Sulawesi Selatan	19	108	69	72	46	41	59,17	355	18	38	8	18	16	53	25,17	151
4	Nusa Tenggara Barat	0	0	1	0	3	8	2,00	12	1	0	16	17	34	82	25,00	150
5	Papua	0	5	0	5	3	0	2,17	13	0	4	3	1	93	15	19,33	116
6	Aceh	19	6	15	37	21	5	17,17	103	0	6	14	37	7	2	11,00	66
7	Sumatera Selatan	2	0	29	18	78	11	23,00	138	0	1	7	21	12	52	15,50	93
8	Kalimantan Timur	32	12	5	10	35	14	18,00	108	2	1	2	3	20	42	11,67	70
9	Kalimantan Tengah	0	1	1	16	45	123	31,00	186	0	0	1	3	3	44	8,50	51
10	Jawa Timur	6	13	7	0	0	2	4,67	28	0	0	2	5	13	33	8,83	53
Rata-Rata		8,10	14,50	13,60	18,20	112,20	70,70	39,55		3,20	7,80	6,20	26,70	41,30	68,30	25,58	
Total		81	145	136	182	1122	707		2373	32	78	62	267	413	683		1535
Rata-Rata Indonesia		7,71	7,46	10,46	18,93	74,61	30,25	24,90		1,47	2,91	2,68	10,29	15,85	25,15	9,73	
Total Indonesia		216	209	293	530	2089	847		4184	50	99	91	350	539	855		1984

Source : http://sipongi.menlhk.go.id/Hotspot/matrik_tahunan

The most effective efforts of forest and land fires prevention through hotspots is by establishing communication and cooperation with the community and to take part in assisting the farmers who do permanent or shifting cultivation, to conduct zero burning land clearing (PLTB). This needs to be continually socialized and accompanied so that the people do not turn back to the old eco-unfriendly tradition (Land clearing burning).

Communities also possible to be involved in reporting if they are aware of any fire before the fire spread to other areas. Based on the information obtained from Mongabay Indonesia (<http://www.mongabay.co.id/2016/11/10/norhadie-karben-activist-tani-the-do-practice-planting-paditanpa-burn-in-land>), the PLTB was done by Norhadie Karben, an agrarian activist who practiced zero burning land management in the Kuala Kapuas peatlands of Central Kalimantan. Norhadie Karben along with nine other farmers from the Karya Sakti farmers group who are trying to find the best methods to grow rice in peat land without burning.

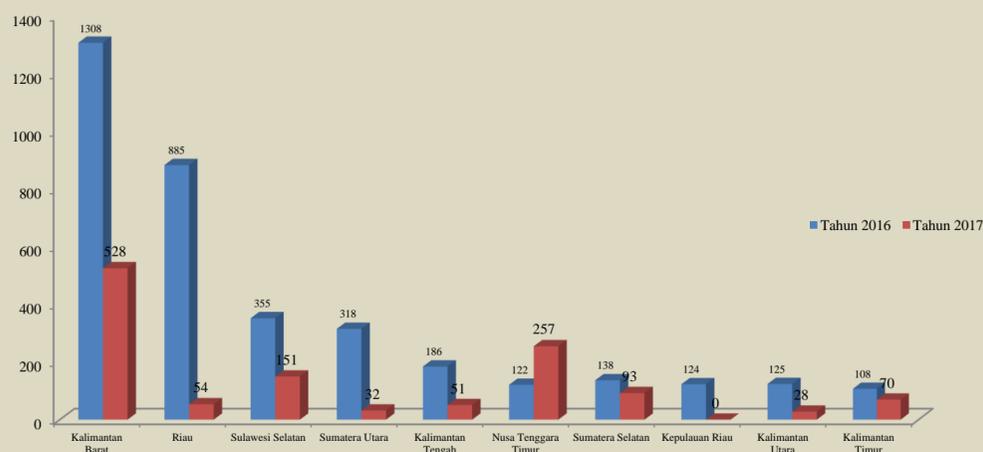


Table 2 Hotspot monitoring by Terra/Aqua (LAPAN) satellite (confidence level $\geq 80\%$) for April - September period 2016 - 2017 in the 10 highest Hotspot provinces by 2016.

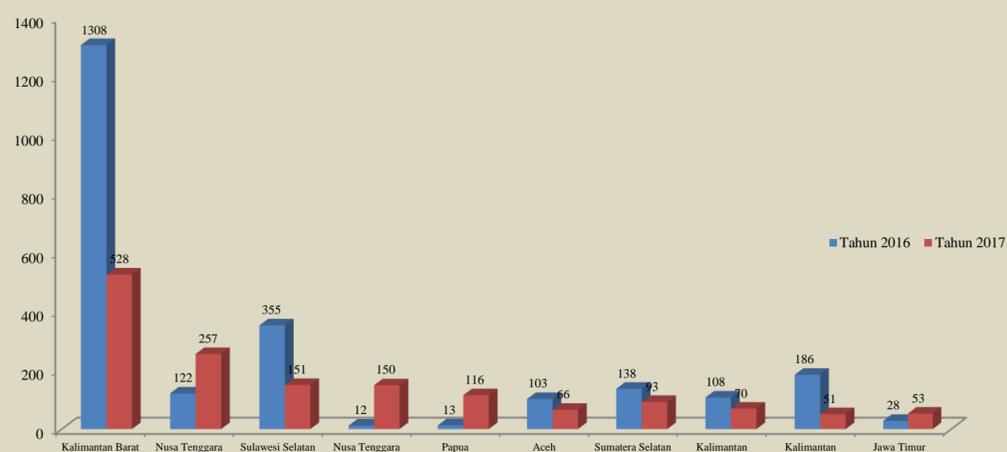
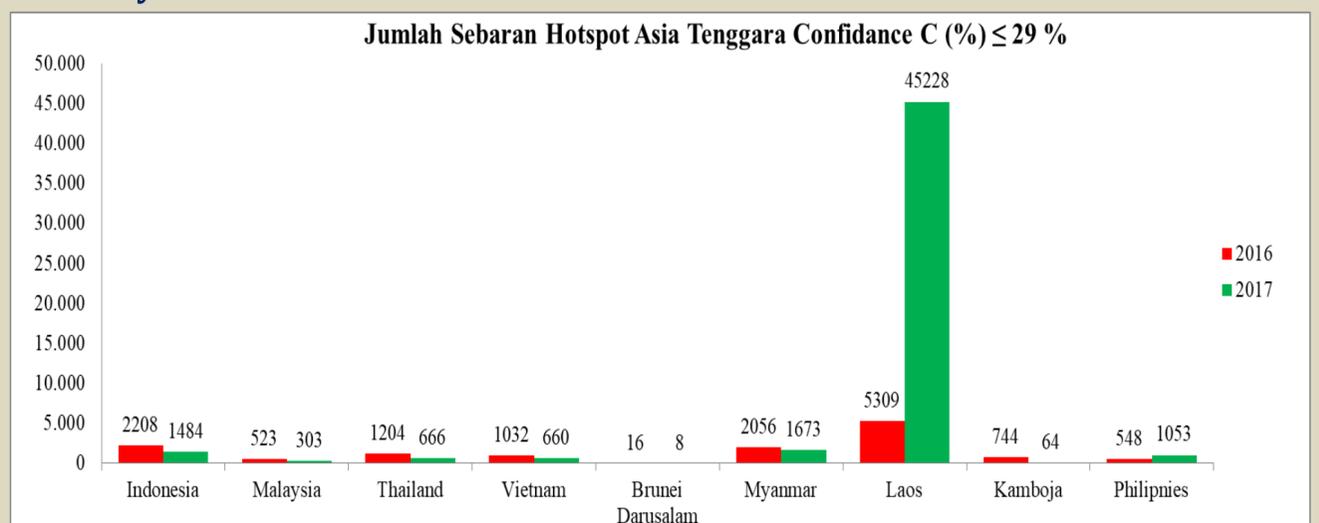


Table 2 Hotspot monitoring by Terra/Aqua (LAPAN) satellite (confidence level $\geq 80\%$) for April - September period 2016 - 2017 in the 10 highest Hotspot provinces by 2017.

Monitoring the Forest and Land Fires through Hotspot in Southeast Asia

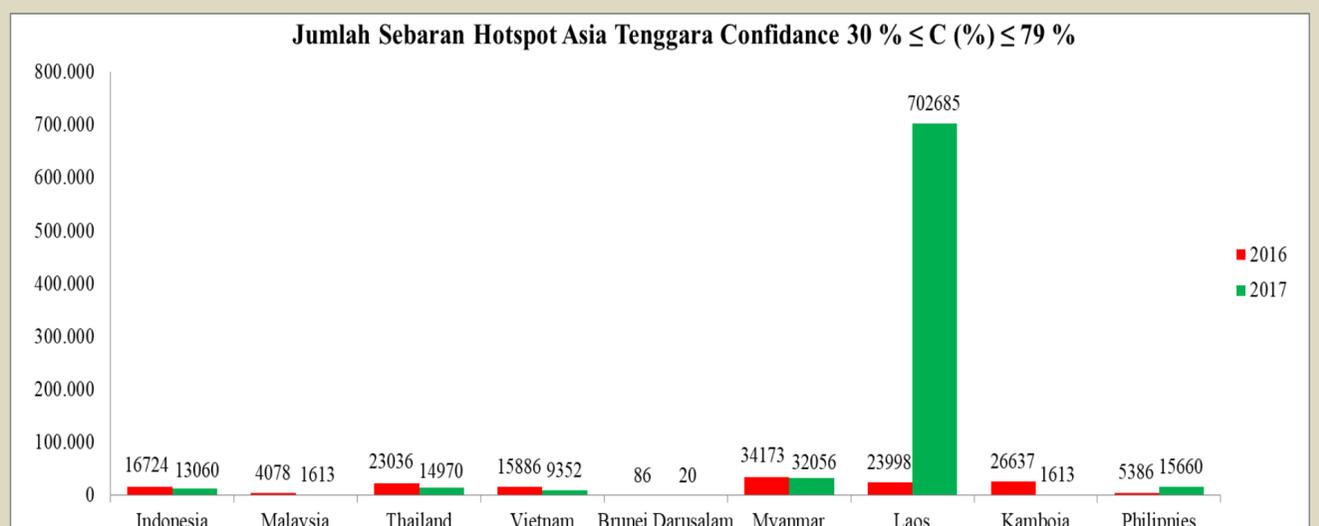
By : Robi Deslia Waldi

Regional Fire Management Resource Center - Southeast Asia (RFMRC - SEA), which has a role in forest and land fire control activities in Southeast Asia has conducted hotspot monitoring since its establishment in July 2017. In addition, RFMRC - SEA conducted Hotspot data collection in the Southeast Asia region as an effort to complement the data for further studies. The Southeast Asian region hotspot is obtained from TERRA/AQUA-MODIS satellite (NASA). This hotspot monitoring is one of the efforts of hotspots early detection in order to prevent the occurrence of Forest and Land Fires and the disclosure of the point of the forest fires occurrence is based on hotspot history in the area. Based on figures 1, 2, and 3, it can be seen that there is increasing in number of hotspots in Lao with a very significant increase which increase is averagely occurs in October, November, and December. This can happens because of the temperature in the country is relatively high for that period. Classification of the confidence level is divided into 3 of them, which is $\leq 29\%$, $30\% \leq C (\%) \leq 79\%$, and $\geq 80\%$. Out of the three confidence level, the $30\% \leq C (\%) \leq 79\%$ confidence level is the confidence level with highest spread of Hotspot.



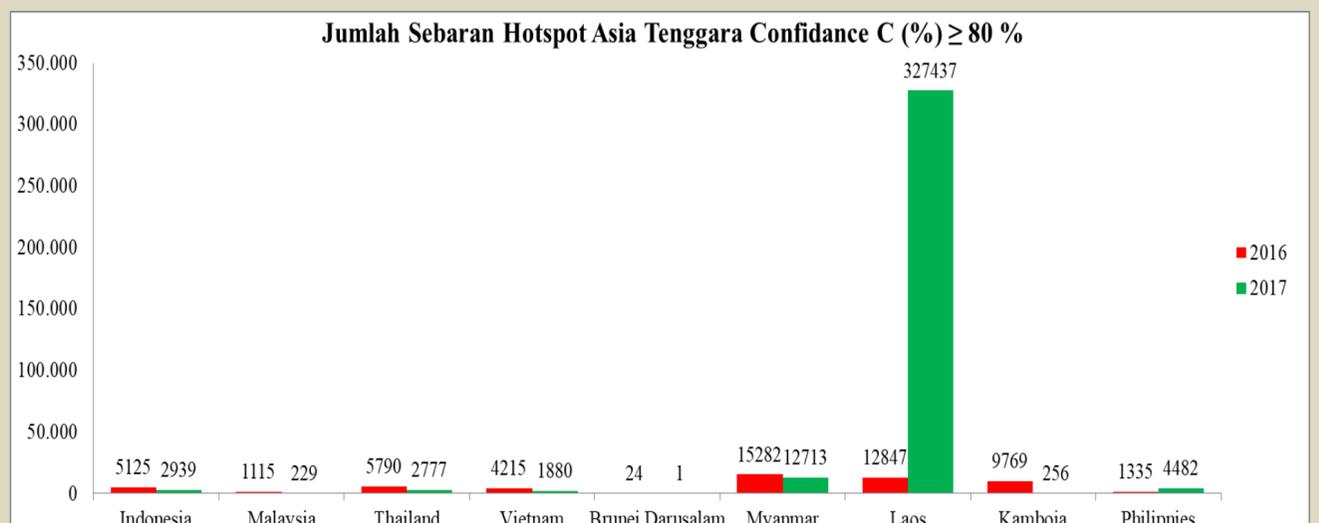
Source Link: NASA FIRMS (<https://earthdata.nasa.gov/earth-observation-data/near-real-time/firms>)

Figure 1 Monitoring *hotspot* (titik panas) Asia Tenggara satelit Terra/Aqua MODIS C6 (NASA) (confidence level C (%) ≤ 29 %) periode bulan Januari – Desember pada tahun 2016 – 2017



Source Link: NASA FIRMS (<https://earthdata.nasa.gov/earth-observation-data/near-real-time/firms>)

Figure 2 Monitoring *hotspot* (titik panas) Asia Tenggara satelit Terra/Aqua MODIS C6 (NASA) (confidence level 30 % ≤ C (%) ≤ 79 %) periode bulan Januari – Desember pada tahun 2016 – 2017



Source Link: NASA FIRMS (<https://earthdata.nasa.gov/earth-observation-data/near-real-time/firms>)

Figure 3 Monitoring *hotspot* (titik panas) Asia Tenggara satelit Terra/Aqua MODIS C6 (NASA) (confidence level C ≥ 80%) periode bulan Januari – Desember pada tahun 2016 – 2017

Collaboration of Scientific Research and Development with UNESCO

By : Ati Dwi Nurhayati

In the mean of research collaboration with UNESCO, research has been conducted on the three provinces that experienced severe forest and land fires in 2015, which is Central Kalimantan, Riau and Jambi provinces.

Central Borneo Province

.The selected locations in Central Kalimantan are Kalampangan Village and Tumbang Nusa Village.

Kalampangan Village is one of the village located in Sebangau district, Palangkaraya city. The majority of kalampangan villagers is Javanese transmigrants. Most of the villagers livelihood is based upon farming. Some of the farmers in the village of Kalampangan do the preparation of land by burning, and then, the ashes from the burning will be planted with crops.

However, forest fires that occurred in palangkaraya in 2015, have a great impact for the community, which losses felt by the farmers is not only in terms of health, but also in terms of economic. The villagers cannot harvest their crops because the crops are dead, and because of that, nothing can be sold to get the money as income for the family. The eye visibility also causing a big obstacle for the people to do their daily activities.

From the observation, it is found that there is one villager who prepared the land without burning. The land preparation is done by adding fertile soil, fertilizer and dolomite so that the nutrient element needed by plants can be fulfilled. The results are very good, as the plants that can grow include timber and agricultural crops. The timber consist of jelutung, aloes, rambutan and jackfruit, while the agricultural crops consists of chili, corn and cassava.





Tumbang Nusa Village is one of the villages located in Jabiren District, Pulang Pisau Regency. The Tumbang Nusa community is the native of the Dayak tribe.

The majority of the villagers relying to the resources that can be obtained in the sea to fulfill the families daily needs. The community considers that peatlands are quite unsuitable for any farming activities. Apparently, there is only a few people who are planting on the peatlands in the village.

The impact of the forest fires in 2015 is felt by the villagers. They admitted that the fires which occurred is not a man made fires by the community, but a fire from the land that has been burned before.

The impact of forest fires that experienced by the villagers is the visibility which very limited due to the very thick smoke. This happen to be affecting the community very much as they leave the old land clearing burning tradition to zero burning farmland preparation. They also believe that peatlands are unsuitable for planting crops and timber plants.



Prevention efforts against forest and land fires that have been done by the villagers is by installing drilled wells with a distance of 100 meters each borehole, which get funding from the Peat restoration Agency (BRG). Each wells's depth is about 20m.

Jambi Province

On a field trip to Jambi from 29 July - 3 August 2017, one of the research sites is in Sinar Wajo Village of Tanjabtim Regency, where the village experienced severe forest and land fires in 2015.

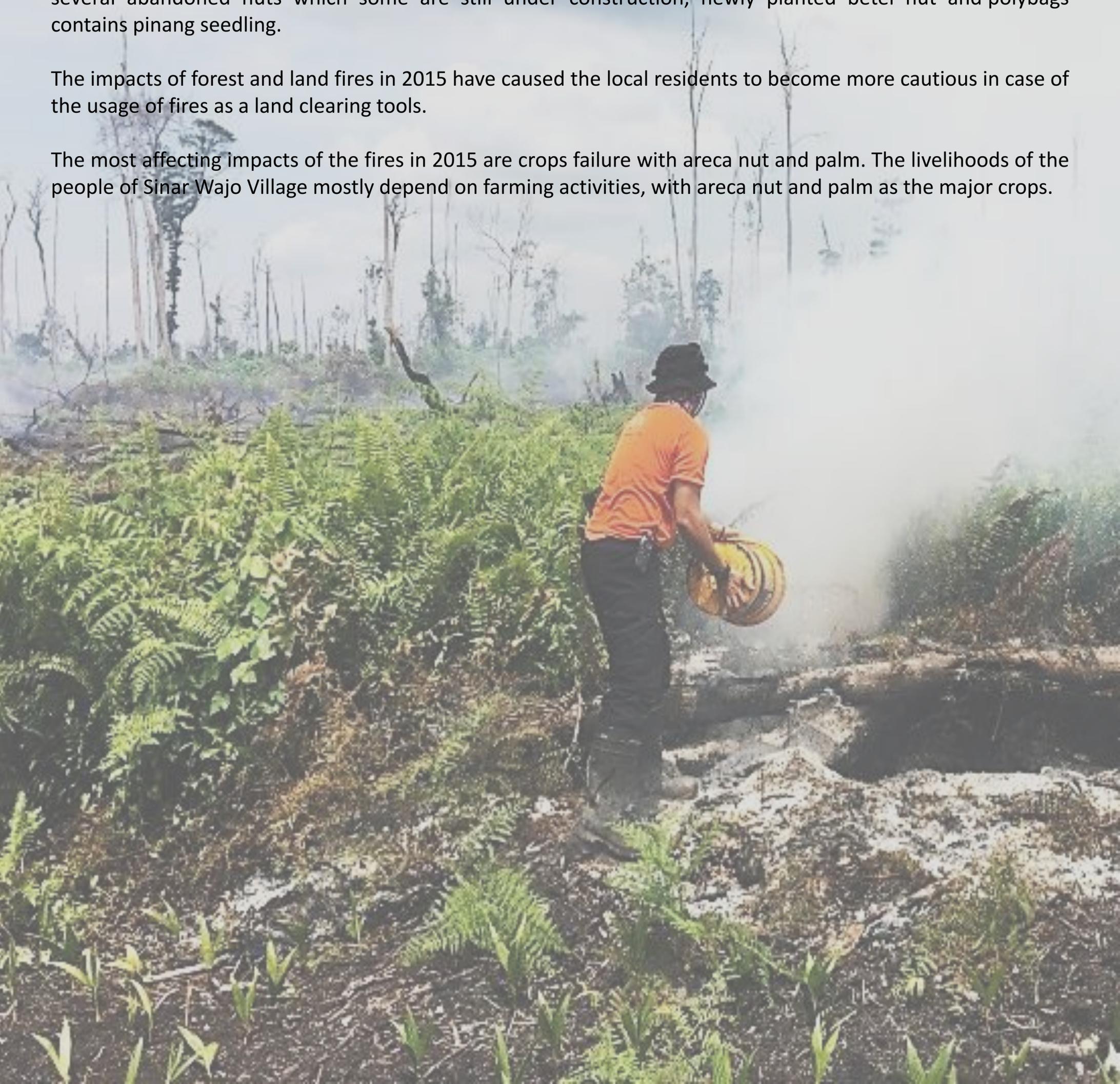


On 27 July 2015, there was a fire in the village area, with a burning of an area of 10 ha. The fire fighting process was assisted by Manggala Agni, the Indonesian National Board for Disaster Management (BNPB) and also local communities.

The firefighting process was carried out by using a water bomb dropped from the BNPB helicopter, as well as direct water spraying on the burning peatland. This forest fire was successfully extinguished within 2 days 2 nights. Some evidence that were found indicates that the land is burned on purpose. The evidences include several abandoned huts which some are still under construction, newly planted betel nut and polybags contains pinang seedling.

The impacts of forest and land fires in 2015 have caused the local residents to become more cautious in case of the usage of fires as a land clearing tools.

The most affecting impacts of the fires in 2015 are crops failure with areca nut and palm. The livelihoods of the people of Sinar Wajo Village mostly depend on farming activities, with areca nut and palm as the major crops.



Riau Province

The research location took place in Sungai Rawa Village, Desa Rawa Mekar Jaya, and Dusun Penyengat Jempal Village. Sungai Rawa Village is dominated by Malayan and Javanese ethnic, while Rawa Mekar Jaya and Penyengat villages are dominated by various ethnicity. The main crops of these three villages are sago and followed by rubber and palm oil. Most of the villagers livelihoods is depending on these main crops.

Apparently, the local residents still use fire for their land preparation, as they think of it as old tradition that have passed from generation to generation. According to them, land clearing with burning is good for the starting point of sago planting, because it will clean the pests and diseases from the soil surface, and will provide a good natural fertilizer derived from mineral-rich ash from the vegetation burning that can support their sago growth.

But the situation have changed since some big companies like oil palm plantations and industrial companies come to their land and set up large canals by digging and clearing forest areas near the rivers. As a result, groundwater levels in the community land around the company are reduced which lead to the increasing of the fire sensitiveness of the peatlands there as it getting dryer than before. This situation causes serious problems for local communities because their lands that are normally safe from wild flames are now more easily flammable. This is one of the reasons why many big fires that occur on their land can not extinguished so easily and end up burning a large amount of area of their plantations.

The big problem then arises as because they lost their income, because most of their crops have been destroyed by the fires and they have no money to set up a new plantations. Unfortunately, there is still no support from the government and eventually they challenge their lives in the river to survive through fishing the fish and other products from the river. For people who have more money, they can grow other agricultural commodities such as rubber or palm oil or plant the burning area with pineapple. In addition, the village of Rawa Mekar Jaya has been formed an association, Masyarakat Peduli Api (MPA), which accomodate the villagers who care about how important these forest fires issue is and want to find a solution to it.



The Peak Collaboration of Scientific Research and Development with UNESCO



The scientific research and development cooperation between UNESCO and IPB, ends in November 2017 and the peak of this cooperation is the holding of meetings in Jakarta on December 6 -7, 2017. This meeting entitled National Bioethics Committee Forum on Cross Country Smoke Pollution : Seeking solutions through Bioethics and Sustainable Scientific Perspectives, which invited all parties who conduct research cooperation with UNESCO.

The universities that attend the meeting were IPB, UGM and Andalas University. There are also representative from the Institute of Islamic Understanding Malaysia (IKIM) and People's Movement to Stop Haze (PM Haze). Director General of Climate Change (PPI), Dr. Ir. Nur Masripatin, M.For.Sc and ASEAN Environment Secretariat Division are present as keynote speakers.

The forum as well as a declaration of ethical principles related to climate change. It aims to formulate a debate on fog pollution. UNESCO will incorporate ideas or thoughts generated from discussions on the forum into a document to generate recommendations based on field facts for the interests of relevant actors and stakeholders was held in order to present the results of research projects from various parties that linked to the universal declaration on bioethics and human rights



Establishing RFMRC – SEA Network at International Level

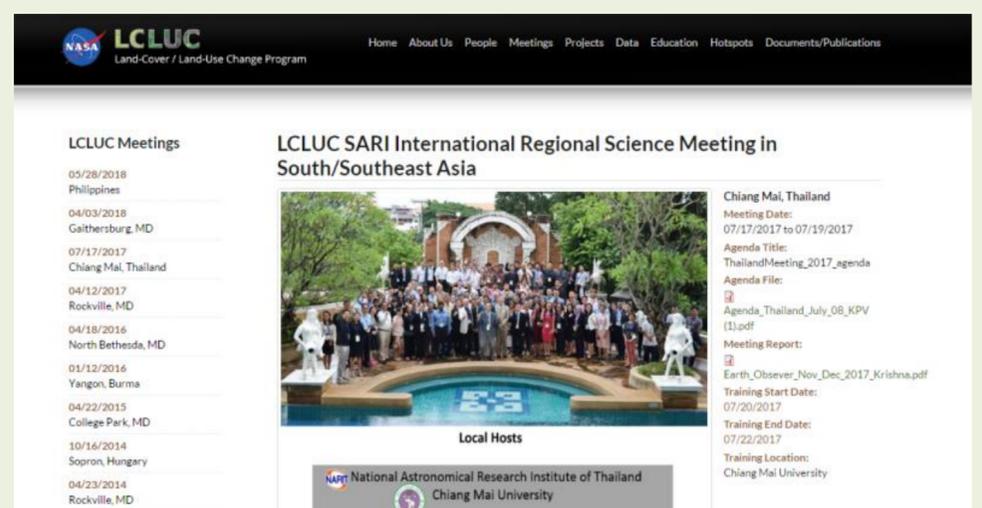
By : Bambang Hero Saharjo

Networks in the effort to control forest and land fires are indispensable in establishing cooperation with the international community that is needed to increase the capacity of human and technological resources. This needs to be done so that information related to forest and land fire controls can contribute in the field of science and reduce the occurrence of forest and land fires that continue to occurs each year. RFMRC - SEA conducted information development by building an intensive network by taking part in the international level, so its presence is expected to be part of the solution of forest and land fire problems. International activities followed by RFMRC - SEA, includes :

❑ International Regional Science Meeting on Cover/Land Use Change in South/Southeast Asia, Chiangmai, Thailand, 17-19 July 2017



In this International scientific meeting, the Regional Fire Resource Management Center - Southeast Asia (RFMRC-SEA) was introduced in the forum, by presentation and poster. The main organizers of the University of Maryland's which supported by NASA, respond very positively and hope that RFMRC-SEA would have a strategic role and act as bridges between academia and policy. This meeting was attended by researchers and related parties from various countries, which is USA, France, ASEAN, South Asia, and others.



❑ Forum of Indonesian-Malaysian Professors' Association (IPIMA), Universiti Putra Malaysia (UPM), Kuala Lumpur, Malaysia, 6-9 November 2017

The IPIMA meeting reintroduces the Regional Fire Management Resource Center - Southeast Asia (RFMRC-SEA) through oral presentations on the background, purpose and objectives of its establishment, expected benefits, and the importance of its existence as a bridge between academia and policy. The IPIMA meeting was held by the Assembly of Malaysian Professor (MPN), Professors of Bogor Agricultural University (DGB-IPB), Putra Malaysia University (UPM) and the Association of Indonesian Professors (API). The participants were professors and lecturers of IPB (about 86 persons), UPM faculty, other Indonesian university lecturers (from 16 Indonesian universities), which estimated for about 200 persons. The event was held at University Putra Malaysia (UPM).



Pendahuluan

- Meningkatnya populasi urbanisasi secara meningkatnya keterhubungan dengan pa
- Melanjutkan pembukaan lansekap alam y pembersihannya untuk menghasilkan ma lainnya seperti minyak kedele dan kelapa
- penggunaan api sebagai alat dalam peru penggunaannya sejak tahun 1980an-alat pada awalnya digunakan untuk membersi dimanfaatkan dalam rangka persiapan per
- Namun, harga penggunaan api adalah ma
- Hutan tropika basah dan lahan basah buka bernilai tinggi, tetapi juga merepresentasi
- Penggunaan api menghasilkan perusakan t (misal species yang dalam kondisi terancam sangat sensitif terhadap api

❑ **Australia Awards Short Course on Integrated Fire Management in Indonesia, Charles Darwin University, Darwin, 19-24 November 2017**



In this meeting, the establishment of Regional Fire Management Resource Center - Southeast Asia (RFMRC-SEA) has been briefly introduced. The meeting is a series of the Short Course on Integrated Fire Management organized by Charles Darwin University funded by the Australian Government. The participant come from various institutions in Indonesia. Beside meetings inside the classroom, there were also field trips.



The Role of Rainfall on the Reduction of Forest and Land Fires Hotspots in 2016

By : Wela Alfa Velicia and Bambang Hero Saharjo

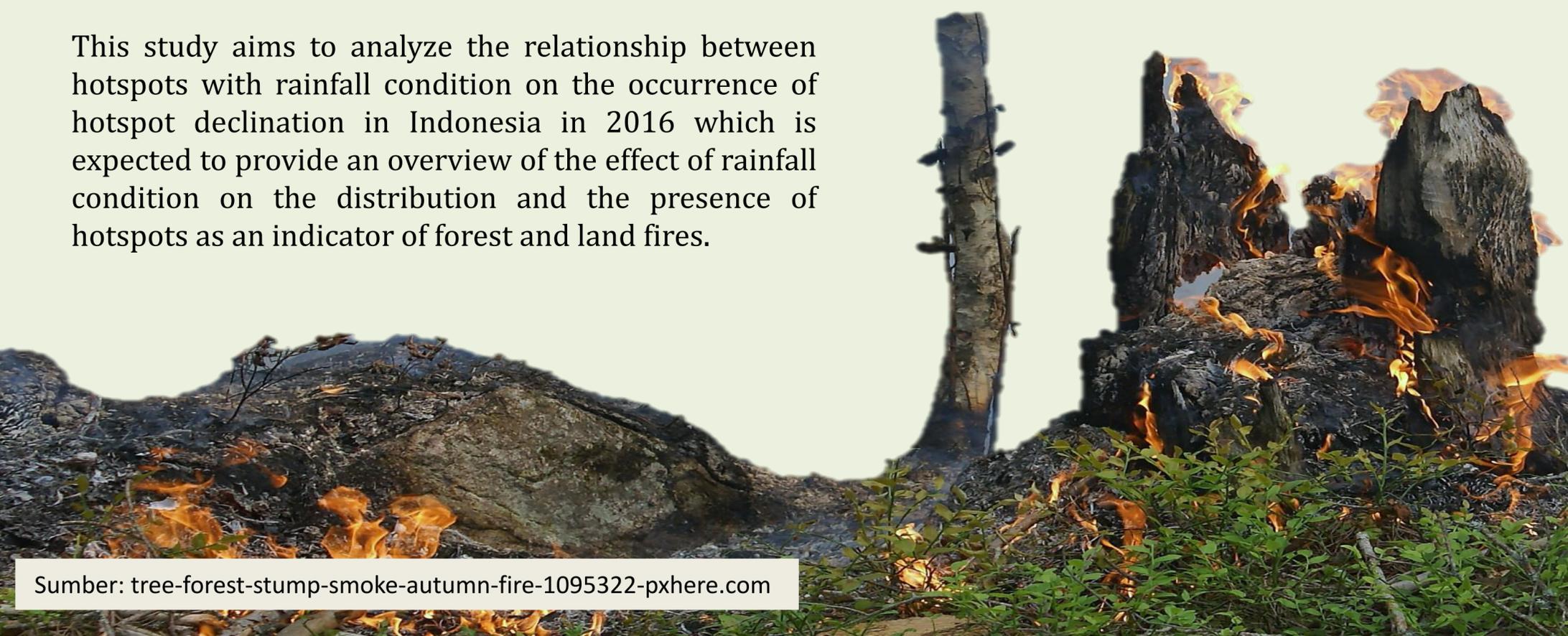
INTRODUCTIONS

Forest and land fires are not a new phenomenon for some parts of Indonesia, such as on the island of Kalimantan and Sumatra. Areas of Riau, South Sumatra, West Kalimantan, and Central Kalimantan are some provinces that almost every year experiencing the forest and land fires. These provinces are established by the Ministry of Environment and Forestry (2015) as the priority province for forest and land fire management. The four provinces have a high number of hotspots and are located in areas of easily flammable peatland forests that are large enough to cause smoke haze if burned.

The frequency of forest and land fire incidents in each year is vary. This can happen because of several factors that cause forest and land fires, including natural factors and human factors. Climate is one of the natural factors that can lead to a forest fire, because climatic conditions (temperature, humidity, rainfall, and wind velocity) can affect the dryness of surface fuel, the amount of oxygen present, and the speed of fire spreading (Syaufina 2008). Terra/Aqua MODIS (Moderate Resolution Imaging Spectroradiometer) satellites sensors can be used to identify hotspot in a particular location and moment.

Information on the number of hotspots that have an opportunity as a point of forest and land fires occurrence obtained from remote sensing via Terra/Aqua MODIS satellites. Hotspot information can provide early information for early detection of forest and land fires. To know the influence of climatic elements, especially rainfall on the occurrence of forest fires can be known by finding the relationship between hotspots with rainfall conditions, as an indicator of forest and land fires.

This study aims to analyze the relationship between hotspots with rainfall condition on the occurrence of hotspot declination in Indonesia in 2016 which is expected to provide an overview of the effect of rainfall condition on the distribution and the presence of hotspots as an indicator of forest and land fires.



Problem Formulation

The declining occurrence of forest and land fires in 2016 that we can see through Terra/Aqua MODIS satellites from the number of hotspots with a confidence level of more than 50% in 2015, from 137 466 hotspots to 16 416 hotspots in 2016. It is interesting to investigate the relationship between hotspots and rainfall with the occurrence of forest fires in Indonesia in 2016. Therefore, the main question of this research is whether the declination in the occurrence of forest and land fires is affected by rainfall.

METHODS Tools and Data

The tools used in this study is a computer device with software such as Microsoft Excel, MINITAB 16 and Arc Map GIS 10.1. The materials used consist of administrative map (Riau Province, South Sumatera Province, West Kalimantan Province and Central Kalimantan Province), hotspot data from 2015 - 2016 obtained from NASA MODIS hotspot dataset (<http://earthdata.nasa.gov>), and the rainfall data for the period of 2015 - 2016 is obtained from the Indonesian Agency for Meteorological, Climatological and Geophysics (BMKG).

Data analysis

Data analysis conducted in this research is descriptive analysis. The first data analysis was conducted by mapping hotspot distribution in Riau, South Sumatera, West Kalimantan and Central Kalimantan areas from 2015 - 2016 using MODIS hotspot data with confidence level $\geq 80\%$ processed using Arc Map GIS

10.1 software. After that, the rainfall data is recapitulated on a monthly basis using Ms.Excel software. Data of hotspots and rainfall that have been recapitulated by month in each year is then tested the correlation and P-Value analysis on MINITAB 16 software to know if there any influence of rainfall with hot spots and the significantly of the relationship between rainfall with the number of hotspot.

RESULTS AND DISCUSSION

Hotspot Distribution

Forest and land fires occurs every year in Indonesia, especially in Kalimantan (West Kalimantan and Central Kalimantan) and Sumatra (Riau and South Sumatra). These four provinces is the top donator of hotspots in Indonesia. This condition is proven by the hotspots found in the four provinces by satellite.

Based on observed hotspot data from TERRA/AQUA satellites, it can be seen that during the period from 2015 - 2016, the country of Indonesia has always encountered the appearance of hotspots with unequal density each year. In Figure 1 shows the number of hotspots found in the four provinces is 36 747 spots (2015) and 2 265 spots (2016).

The results of the hotspot counting are described in Table 1, which spreads across West Kalimantan, Central Kalimantan, Riau and South Sumatra by 2015. The highest number of hotspots appearance in 2015 was occurs in September with 15 197 spots, followed by October and August with 13 045 and 4 983 spots. The lowest number of hotspots appearance occurs in December and January where only 27 and 44 spots are found. The highest number of hotspots appearance in 2016 was in August with 1 266 spots, followed by September with 468 spots. The lowest number of hotspots appearance is in November and December where no hotspots were found in all four provinces.

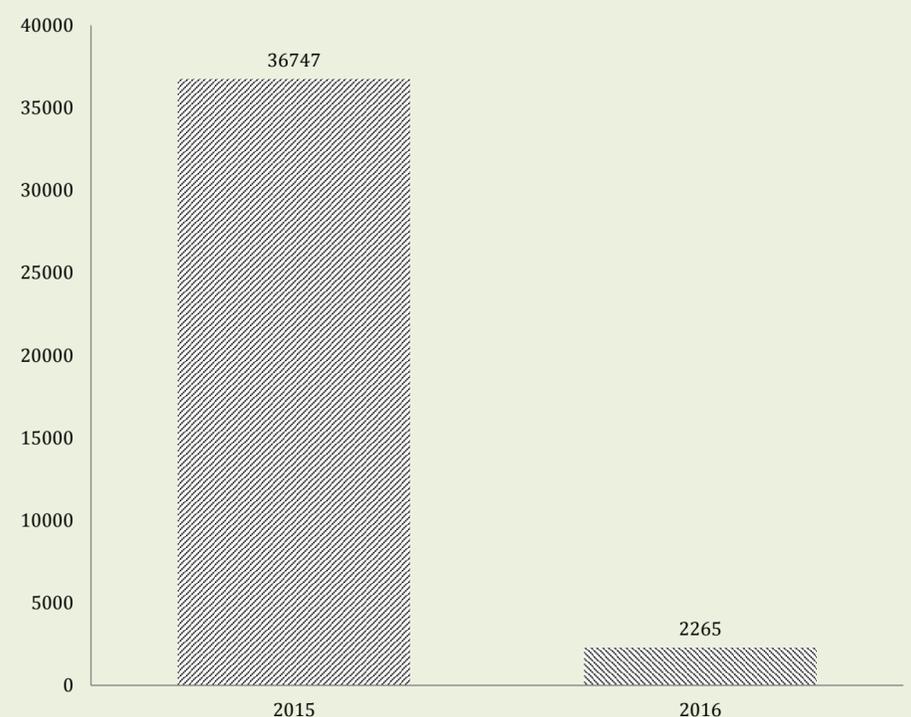


Figure 1 The number of hotspots in all four provinces

Table 1 The number of hotspots in four provinces in 2015 and 2016

Provinsi	Tahun																									
	2015												Jumlah	2016												Jumlah
	Jan	Feb	Mar	Apr	Mei	Jun	Jul	Augst	Sept	Okt	Nov	Des		Jan	Feb	Mar	Apr	Mei	Jun	Jul	Augst	Sept	Okt	Nov	Des	
Kalimantan Barat	1	5	10	1	4	11	364	1690	2075	345	14	1	4521	2	0	2	0	0	1	9	657	334	23	0	0	1028
Kalimantan Tengah	8	1	1	0	5	8	150	2098	6004	5295	291	15	13876	0	2	2	0	1	1	5	39	102	26	0	0	178
Riau	29	206	262	54	16	182	995	365	722	256	2	2	3091	1	46	146	123	5	15	54	518	12	33	0	0	953
Sumatera Selatan	6	6	3	5	49	44	236	830	6396	7149	526	9	15259	1	1	0	3	0	16	10	52	20	3	0	0	106
Jumlah	44	218	276	60	74	245	1745	4983	15197	13045	833	27	36747	4	49	150	126	6	33	78	1266	468	85	0	0	2265

Source: Data Processing results

The number of hotspots varies in each month according to the weather and climate conditions in that location. Weather conditions in the location of the hotspot have an important role on increasing the number of hotspots and the spread of hotspots to other areas. The dry season is marked by the low monthly rainfall rate which affecting the number of hotspots. The drier an area, the more hotspot will appear and vice versa (Solichin 2004). This is congruent with the statement of Syaufina (2008) that the drought is closely related to the occurrence of large forest fires in some places. Drought causes the vegetation's water content drop, so it resulting in the dead of plants, large woods lose it's water content and increasing the potential for fire to occurs.

In the year of 2015, hotspot began to be found in July to November in sufficient numbers as those are dry months. Hotspots appearance will reach very high number in the months that have low rainfall (Sulistiyowati 2004). According to Erica (2006) the high number of hotspots in the dry season shows the relationship that the dry months have the potential as a producer of hotspots. In those months it is also common for forest and land fires to occur frequently.

The Effect of Rainfall on Hotspot Number

Rainfall is a climatic element that has a high correlation with the incidence of forest fires and is the highest factor in determining fuel accumulation (Syaufina 2008). Each region in Indonesia has different accumulated amount of hotspots and rainfall. According to Mackinno et al. (1997) in Hadiwijoyo (2012), the wet month is characterized by rainfall of > 200 mm/month, while dry months are characterized by rainfall of <100 mm/month.

West Kalimantan has a dry season from July with a decrease in the amount of rainfall until September in 2015, while in 2016 it is occurred in July to August. Figure 2a shown that West Kalimantan from July has rainfall of 187 mm, the month of August was 78.7 mm and September decreased to 52.6 mm. In contrast to 2016 the peak of the dry season occurred in August with 1.5 mm, and increase in the next month. However, in September, there was a rise in the number of hotspots in line with the increase in rainfall. This happens because September has a high daily rainfall, which on September 3 2016 is 72 mm and on 21 September 2016 is 58 mm, causing the monthly rainfall to be high. While September have a low daily rainfall that causes the appearance of hotspots to be high.

Figure 2b explains that the monthly rainfall in Central Kalimantan from 2015 to 2016 ranges from 0 mm to 503.1 mm. The lowest rainfall occurred in September 2015 where hotspots has the highest number of appearance of 6 004. But in October the number of hotspots is still high while the rainfall is increased, it happens because high rainfall on October is caused by some very high daily rainfall, as in on October 28 2015 with 99 mm, which make the amount of monthly rainfall in September became high. Likewise in October 2016, the increase in the amount of rainfall in line with the rising number of hotspots. This happens because October 4 2016 has a daily rainfall of 111 mm, while the amount of other daily rainfall in October 2016 is low.

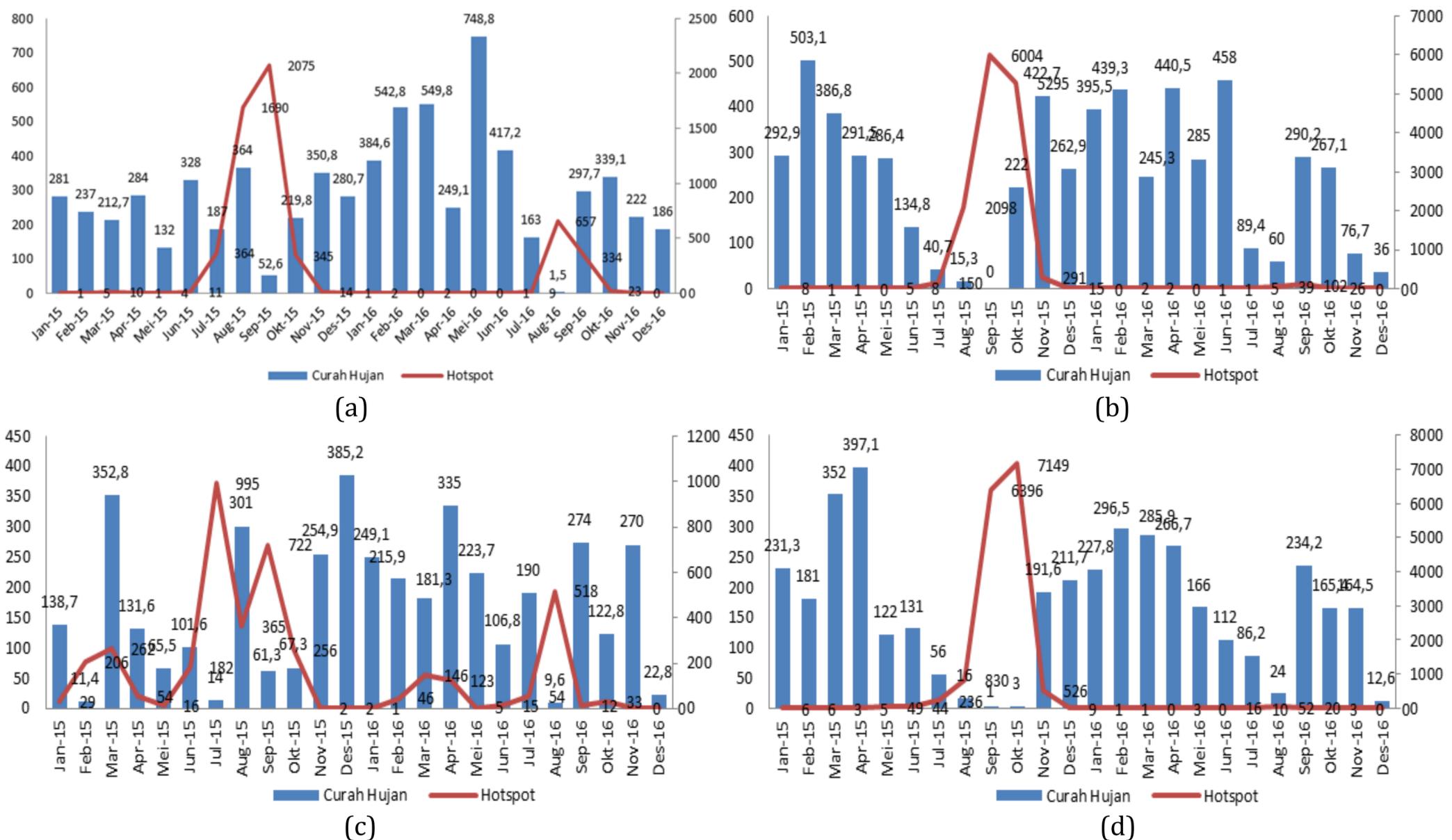


Figure 2 The total monthly rainfall and number of hotspots in West Kalimantan (a), Central Kalimantan (b), Riau (c) and South Sumatra (d) in 2015 - 2016

Figure 2c presents the relationship of rainfall and hotspots in Riau Province. Riau Province has a decrease in monthly rainfall in July 2015 by 14 mm so that the hotspots in July rose sharply as much as 995 hotspots. In August there was an increase in the amount of rainfall again so that the number of hotspots is declined. From September to October the amount of rainfall decreases again with the range of monthly rainfall of 61.3 mm to 67.3 mm, and after October the amount of rainfall increase again, so the number of hotspots decreases. Differently, in 2016 there is a decrease in the amount of rainfall drastically in August of 9.6 mm and has the largest amount of hotspot as many as 518 spots.

Figure 2d shown the decreasing of the amount of monthly rainfall in 2015 in South Sumatra Province occurred from July to October with the lowest peak of rainfall amount occurs in September with 1 mm. During July to October 2015 the number of hotspots rose to the highest peak with 7 149 spots in October. After October the number of rainfall increase again and the number of hotspots decreased. While in 2016 there was a decrease in the amount of rainfall in August by 24 mm. But the increase in the number of hotspots is not as much as in 2015.

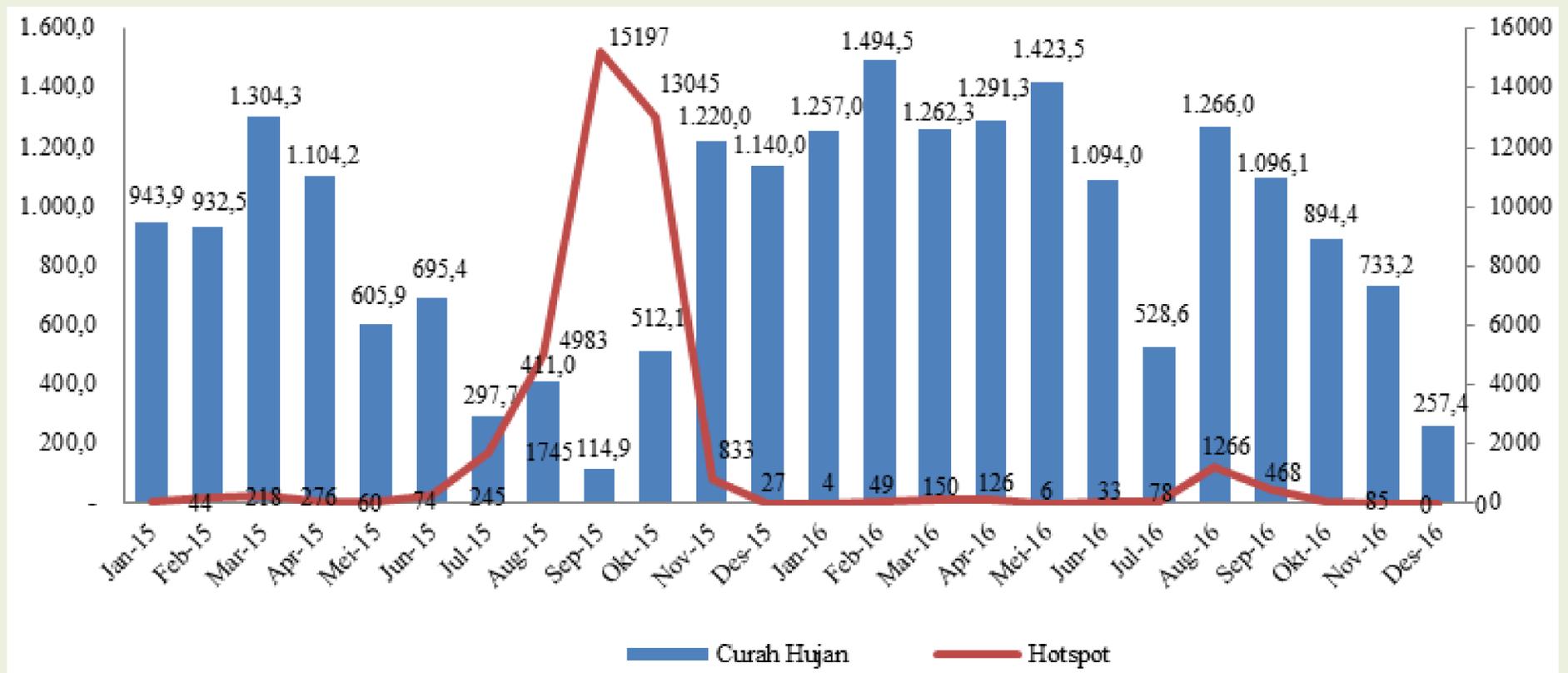


Figure 3 Relationship between monthly rainfall and hotspot in fourth province 2015 – 2016

The occurrence of forest and land fires is related to the dry season. It can be seen in Figure 3 that the recapitulation of the number of hotspots and rainfall in the four provinces are fluctuating. The number of hotspots is high in the dry season where rainfall is low, i.e. in July to October 2015 and July to August 2016. The high rainfall that occurs makes the fuel becomes moist and difficult to burn, so the number of hotspots decreased and the occurrence of forest and land fires is also decreased. The amount of rainfall in a region then the hotspot potential will be reduced.

Figure 3 shows the highest number of hotspots in the four provinces of 2015 occurred in September (15 197 dots) ,followed by October (13 045 dots), and in 2016 the highest number of hotspots occurred in August (1 266 dots), followed by September (468 dots). As for the lowest number of hotspots in 2015 occurred in December (27 points) and in 2016 occurred in November and December with no hotspots found in the four provinces.

From the result of regression analysis presented in Table 2, the number of hotspots with the amount of rainfall in each province is significantly affecting each other, because each province has P-value less than 0.05. The value of R-Square shows the influence of rainfall on the existence of hotspot.

Tabel 2 Regression result hotspot in fourth province 2015 – 2016

Provinsi	Tahun					
	2015			2016		
	R-Square	P-Value	Persamaan Model Regresi	R-Square	P-Value	Persamaan Model Regresi
Kalimantan Barat	92,5%	0,000	y = 1551 - 5.51 x	82,8%	0,000	y = - 1.81 + 0.00971 x
kalimantan Tengah	59,4%	0,003	y = 1749 - 4.36 x	53,7%	0,016	y = 5.24 - 0.00907 x
Riau	48,9%	0,011	y = 277 - 0.674 x	52,7%	0,008	y = 150 - 0.504 x
Sumatera Selatan	36,4%	0,038	y = 3167 - 12.0 x	74,3%	0,000	y = 20.2 - 0.0702 x

Conclusion

From the results of this study, it can be explained that the amount of rainfall with the number of hotspots in the four provinces have a significant relationship. The result of regression analysis showed the equation model of 2015 in West Kalimantan ($y = 1551 - 5.51 x$), Central Kalimantan ($y = 1749 - 4.36 x$), Riau ($y = 277 - 0.674 x$), and South Sumatra ($y = 3167 - 12.0 x$), while 2016 has different regression models with 2015, namely in West Kalimantan ($y = - 1.81 + 0.00971 x$), Central Kalimantan ($y = 5.25 - 0.00907 x$), Riau ($y = 150 - 0.504 x$), and South Sumatra ($y = 20.2 - 0.0702 x$). The four provinces have negative correlation that shows an inverse relationship where the decrease in rainfall will be followed by an increase in the number of hotspots. The increase in the number of hotspots follows the low rainfall pattern in the months where the dry season occurs. The calculation of P-value correlation analysis which resulted with the value of less than 0.05 in terms of the relation of rainfall and hotspot number, shows that both are closely related.

Suggestion

Further research is needed by adding other parameters such as temperature, humidity and wind speed, and on other areas that have high fire vulnerability.

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Integrated Education and Training on Crime Handling as the Main Capital in the Law Enforcement of Forest and land fires case in Indonesia

By : Robi Deslia Waldi

Integrated Education and Training on Forest and Land Fire Crime handling is the first Regional Fire Management Resource Center - Southeast Asia (RFMRC-SEA) event that facilitates participants from law enforcement officers: Judges, Prosecutors, Police Investigators and the Civil Servant Investigator of the Ministry of Environment and Forestry with the total participant of 30 persons in each batch. This activity was carried out in RFMRC - SEA and Forest Fire and Landfire Laboratory, Department of Silviculture - Faculty of Forestry IPB which was driven by the Agency of the Public Prosecution Service of the Republic of Indonesia. The purpose of this training is to provide the information on Forest and Land Fires to improve knowledge, skills and understanding of the law enforcement and the field executive team in handling Environmental Crime and Forest Crime that encourage law enforcement thoroughly and meticulously based on science.

These Integrated education and training was conducted twice, the first batch on September 25 2017 and the second batch is on November 17 2017. This activity was started with the materials presented by Prof. Bambang Hero Saharjo, M.Agr (Professor of Forest Fire and Environment Faculty of Forestry IPB and Director of RFMRC - SEA), he explains that the Forest and Land Fires in Indonesia 99% caused by humans because Indonesian forest type is tropical rain forest. This is a type of forest that always rain all year round. The high number of forest and land fires in 2015 due to the land clearing burning that was exacerbated by the El-Nino phenomenon in Indonesia, unlike the 2016 forest and land fires in Indonesia that decreased due to the occurrence El-Nina phenomenon.





Figure: RFMRC with the participant of Integrated Education and Training on Handling of Forest and Land Fire Crime batch I on September 25, 2017 (Source: Personal documentation)

This Integrated education and Training is expected to be the main capital for the Judges, Prosecutors, Police Investigators and the Civil Servant Investigator of Ministry of Environment and Forestry in cope with the law enforcement cases of forest and land fires in Indonesia. Another objective of this event is to provide deep understanding about the process of forest and land fires occurrence and the way to reconstruct the fire incident from the hotspot information. This is important for the law enforcement-based participant to know that hotspot can provide information for the decision making during the courts. Hotspots can provide the information whether it is true that the fire is originally caused by the hotspot or not to help ensuring the decision making process.

The participants are very enthusiastic with the material related to the field facts and the disclosure of forest and land fire cases that have been or have not been on the court. This is proven by the number of participants who asked for Prof. Dr. Ir. Bambang Hero Saharjo, M.Agr opinion related to the behavior of forest fire culprit from the company who argued that it was not caused by the company but by the community around the company. However, it is answered that the Company has made a negligence in the omission that caused the fire to enter the company area without any forest fire handling efforts. Some efforts like integrated patrol and the availability of adequate facilities and infrastructure should be done by the company so that the fire won't enter the company area as in accordance with Government Regulation no. 45 year 2004 on Forest Protection which explains that for the level of the unity of production forest management, the unity of protection forest management, forest utilization permits, forest and forest area utilization permits need to provide fire fighting facilities.



The participants are not only given materials related to forest and land fires but also given the opportunity to practice the combustion test with various types of fuel and sources of fire at the Forest and Land Fires Laboratory. The types of fuels used in this practice are leaf litter and twigs, peat soil, wooden blocks of 20 x 20 cm and sawn timber. This is done so that participants know the level of smoke and the percentage of fires for each type of fuel as well as proofing of burning using burned cigarette butts. The participants become more familiar with the process of forest fires after doing the practice and more understand about the seriousness of disruption of respiration caused by the smoke released from Forest and Land Fires.

Through this Integrated Education and Training, the Participants is expected to understand more about technical analyzes of the case study of forest and land fire cases. It is important that the culprits of forest fires case to receive the punishment with deterrent effect that is equal with the seriousness of the offense, that only judges who have a good understanding about forest and land fire cases are capable to determine

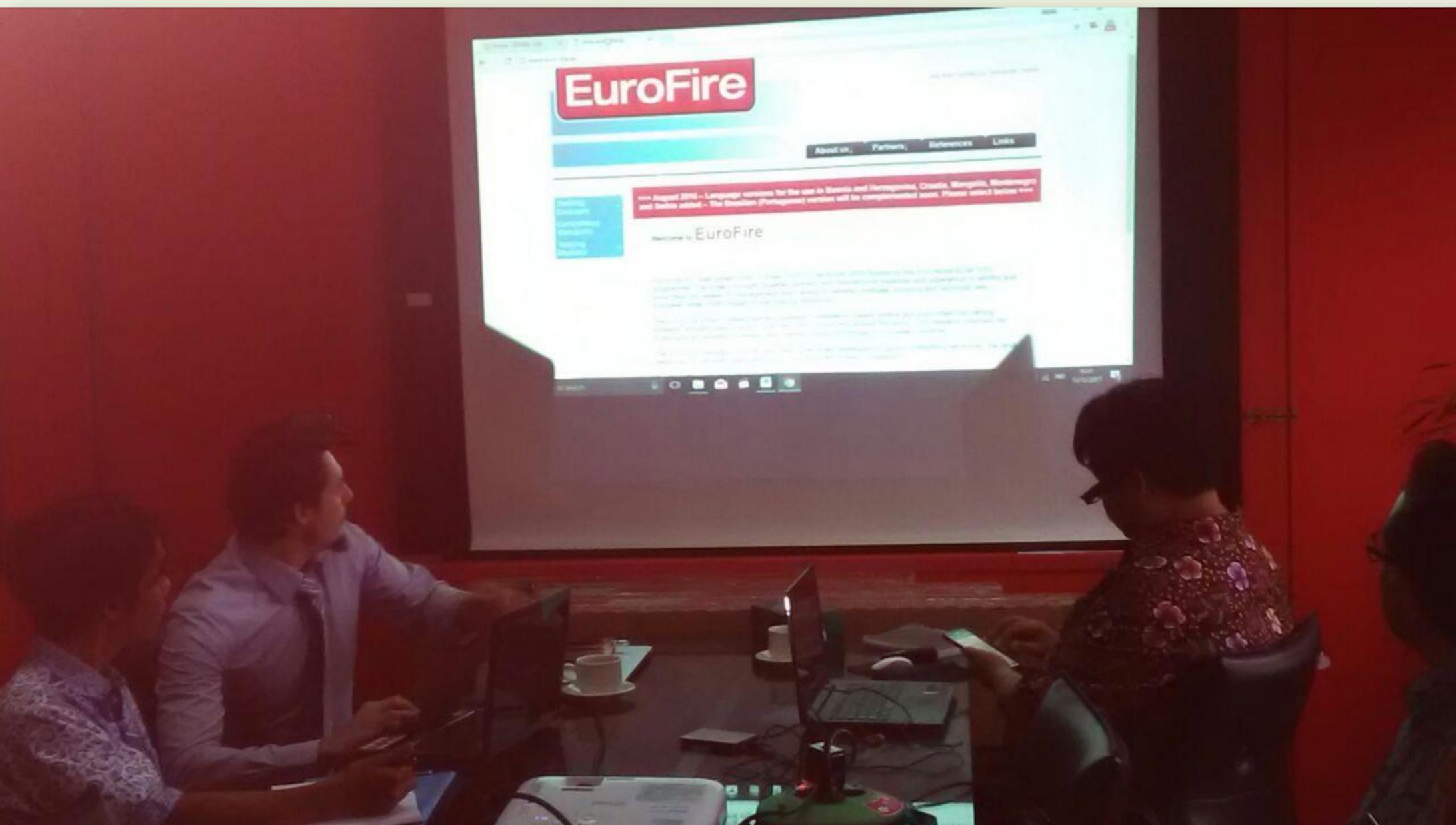


Round Table Meeting on the Management of Forest and Land Fires, December 2017

By : Robi Deslia Waldi

Round Table Meeting on the Management of forest and land fire in December 2017 was held at Manggala Wanabakti Building of Ministry of Environment and Forestry (KLHK), Jakarta. Participants who attend this meeting are from the Directorate of Forest and Land Fire Control (PKHL) - Ministry of Environment and Forestry, Ministry of Home Affairs, Ministry of Agriculture, GIZ, Forclime, PT. WSL located in West Kalimantan, Germany's Global Fire Monitoring Center (GFMC), and RFMRC - SEA.

In this meeting, it is also presented some projects that the Regional Fire Management Resource Center - Southeast Asia (RFMRC - SEA) was done in 2017 including International Regional Science Meeting on Cover/Land Use Change in South/Southeast Asia which was held in Chiangmai - Thailand on the 17th -19 July 2017, Integrated Education and Training on Forest and Land Fires Crime Handling batch one on September 25, 2017 and batch two on November 17, 2017 held at RFMRC-SEA Office, the Forum Indonesian-Malaysian Professors' Association (IPIMA) conducted in Universiti Putra Malaysia (UPM) - Kuala Lumpur - Malaysia on 6-9 November 2017, Australian Awards Short Course on Integrated Fire Management in Indonesia held at Charles Darwin University - Darwin on 19-24 November 2017, and The 2017 Asia Forest Fire Management Training & Pan-Asia Wildland Fire Network Conference was successfully held from 15 to 22 October 2017 in Republic of Korea. It also have been planned to hold Southeast Asia Regional Roundtable Meeting by RFMRC-SEA.





This Round Table Meeting aims to know the actions that have taken by various parties related to forest and land fires in the effort of Forest and Land Fire management in Indonesia and synchronize the activities that have been done by RFMRC - SEA in 2018 to have unity of vision and mission in Forest and Land Fire Management. This is very important to do so that there is no difference of information and data obtained by every stakeholder and remain ready to standby when the weather is uncertain like today (today rain tomorrow dry or otherwise).

This meeting also discussed the EURO FIRE Standards that contents will be adjusted again with the conditions in Indonesia so that it can be applied in Indonesia properly. The EURO FIRE standard contains some description of the performance required in the efforts of Forest and Land Fire Control based on the science that can support the activity. Response from stakeholders to these EURO FIRE standard is very big as it is necessary to have standards related to Forest and Land Fire Management in Indonesia to provide concrete actions in the field of prevention, extinguishment and post-fire handling of forest and land fires in Indonesia.

This meeting is very important and not just audiency without any feedback, as the participant is expect to take real action in the effort of Forest and Land Fire Management so that in the future, the Forest and Land Fire in Indonesia can be minimized as in line with the vision and mission of zero forest and land burning in Indonesia.

NEWS ABOUT FOREST AND LAND FIRES IN INDONESIA YEAR 2017

By : Robi Deslia Waldi

2017, Besarkah Potensi Kebakaran Hutan dan Lahan di Indonesia?

LUTFY MAIRIZAL PUTRA

Kompas.com - 10/06/2017, 11:05 WIB

Senin 07 Agustus 2017, 19:36 WIB

Menteri LHK: Waspada Kebakaran Hutan di Agustus-September 2017

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Pada 2017, Luas Kebakaran Hutan dan Lahan Menurun 71,5 Persen

Oleh: Tempo.co

Senin, 23 Oktober 2017 09:19 WIB

0 KOMENTAR

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Enam Provinsi Tetapkan Status Darurat Kebakaran Hutan dan Lahan

KRISTIAN ERDIANTO

Kompas.com - 22/08/2017, 11:41 WIB



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Akurasi data soal kebakaran hutan jadi polemik

Minggu, 03 Desember 2017 / 14:22 WIB

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Titik Api Kebakaran Hutan di Kalbar Meluas

Oscar Ferry, CNN Indonesia | Senin, 31/07/2017 09:30 WIB

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Ilustrasi kebakaran hutan (AFP Photo/Anne-Christine Poujoulat).



Malaysia 'bebas kabut asap dari kebakaran hutan' di Indonesia: Faktor hujan atau keseriusan pemerintah?

Heyder Affan
BBC Indonesia

© 23 November 2017

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Seorang petugas memasang masker kepada seorang bocah di Kuala Lumpur, Malaysia, 23 Juni 2013, ketika kabut asap melanda wilayah itu akibat kebakaran hutan di wilayah Indonesia.

Apa faktor utama yang menyebabkan kebakaran hutan di wilayah Indonesia dalam dua tahun terakhir ini tidak menyebabkan kabut asap



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