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IS PEATLAND UTILIZATION THE MAIN CAUSE OF LAND FIRE IN INDONESIA?

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SUMMARY

In recent years, land fire has been occurred across islands in Indonesia. Peatland utilization is frequently associated with this land fire due to its susceptibility to fire during dry season. However, no scientific analysis has ever been reported to answer this rumor. Here, we present data analysis of spatial distribution of land fire in Indonesia and the status of fire on peat. Data was extracted from public domain reports between 2013 and 2015 including from Global Forest Watch Fires (GFWF), Sipongi (under the Ministry of Environment and Forestry) and LAPAN (Indonesian National Institute of Aeronautics and Space). Analysis was based on high confidence fires only across 33 provinces. Our analysis shows that during 2013-2015, fire alerts were found to be higher in 2015 than 2014 and 2013 with 48499 hot spots, 29512 hotspots and 11664 hot spots respectively. Higher number of hot spots in 2015, especially between September and November may relate to El Nino effects indicated by longer dry season. During 2015, fire alerts were found to be higher in South Sumatera and Central Kalimantan (based on data from GFWF and Sipongi) compared to other provinces. However, in 2013 and 2014, highest number of fire alerts was concentrated in Riau. Fire distribution pattern was found to be similar among 2015, 2014 and 2013 with fire alerts in non-concession area higher than in concession area with percentage 61%, 59 % and 58% respectively. Fire alerts on peat were found to be lower than on mineral soil (49%:51%) between 2013 and 2015. Those findings clearly show that land fires increased by year to year, and the main cause of land fires should be well identified and solved. There is not enough reason to blame peat cultivation as main cause of land fire since more than half of burned area was on mineral soil.

INTRODUCTION

Land fire in Indonesia is now becoming global issue due to its tremendous negative impact on ecosystem destruction and human health. First record of land fire was documented in 1982-1983 in East Kalimantan, where fire was mostly triggered by human activities, such as burning land for agriculture (Dirjen Perlindungan Hutan dan Pelestarian Alam 1983). Land burning was the traditional knowledge in local community to prepare land for agriculture in Sumatera and Kalimantan because it was cheap and believed that burned land will turn into fertilized land. For plantation, land clearing using burning method was not allowed by law. However, land fire was still recorded to occur by year to year. The most phenomenal case of land fire was what happened in 2015, where many areas in Sumatera and Kalimantan burned out and created dangerous air quality which impacted on sickness and death. There is no doubt that land fire brings many negative impacts not only on ecosystem, but also human health. Haze was recorded much higher than normal for more than one month.

Peatland cultivation especially for oil palm was suspected as main factor triggering land fire in many places and become global issue. This case was responded by the Government with some regulations to stop cultivating oil palm on peat. Unfortunately, no scientific analysis has ever been reported to answer the question ~~"~~does peat land cultivation trigger land fire in Indonesia?" Blaming peat cultivation as main factor of land fires without any depth analysis will lead to misleading decision. This particularly true since there are many social and economic activities on peat for many years ago. Land fires in a certain area can be well detected and identified with available satellite. Hotspots information is open access to public. Here, we present data analysis of spatial distribution of land fire in Indonesia and the status of fire on peat based on open access data (public domain information).

MATERIAL AND METHODS

We used public domain information to develop hot spot spatial distribution analysis to study pattern of Indonesia land fires. Hotspot is a certain size of area which shows a certain degree of temperature which are found to be higher than other surrounding areas. These hotspots that can be detected by specific satellite. In this analysis we used hotspots resulted from Satellite NOAA and Terra/Aqua MODIS that can be downloaded from open access websites: (a) Terra/Aqua MODIS, NASA (https://earthdata.nasa.gov/data/near-real-time-data/firms), (b) Global

Forest Watch Fires (https://fires.globalforestwatch.org). Hotspots from Satellite MODIS with confidence level ≥ 80% were selected for analysis since lower confidence level does not represent fires. Hotspots distribution across 33 provinces were analyzed to identify which provinces are more vulnerable to fire and why. Hotspots pattern between 2013 and 2015 were also monitored. Hotspots in relation to land-use including forestry plantation, logging concession, and oil palm plantations were analyzed to study the relationship between land-use and fires.

RESULTS AND DISCUSSION

From the hotspot pattern, land fire significantly increased from 2013 to 2015. Highest hotspot number was found in 2015 covering 48.499 hotspots (See Figure1). Hotspot pattern was found to be different for different year. In 2014, hotspot number reached the peak in two different time periods, February-March and September-October. However, in 2013, peak of fire was found in June. In 2015, hotspots started to increase from August and reached fantastic number in October (See Fig 2). The differences in hotspots number from 2013 to 2015 may relate to many aspects such as climate, water scarcity, and human error. Longer dry season as an effect El-nino is predicted as climatic factor triggering land fire in 2015. Unfortunately, in many discussions, peat cultivation is frequently blamed as the main cause of national land fire. This was then responded by The Government to launch regulation to stop planting oil palm on peatland. However, data show different facts. Riau is one of province recognized to have biggest peat soil in Indonesia. Riau was recorded to become province with highest hotspot number both in 2013 and 2014 which contributed to 52% and 30% of national land fires respectively (See Fig 3a and 3b). However, in 2015, this pattern has changed. Riau only contributed about 5% of national land fires. Higher number of land fires was recorded in Sumatera Selatan and followed by Kalimantan Tengah which contributed 28% and 23% of national land fires respectively (See Fig 3c). Land fire was mostly found to occur in non-concession area. This pattern was similar in 2013, 2014 and 2015 which contributed 59%, 58%, and 61 % respectively (See Fig 4). Oil palm plantations only contributed less than 12 % of national land fires. More than half of national land fires occur in mineral soil, and fires on peatland covered 47% of national land fires (See Fig 5). This data clearly shows that blaming peat cultivation for crop is a misleading perspective that leads to an appropriate decision.

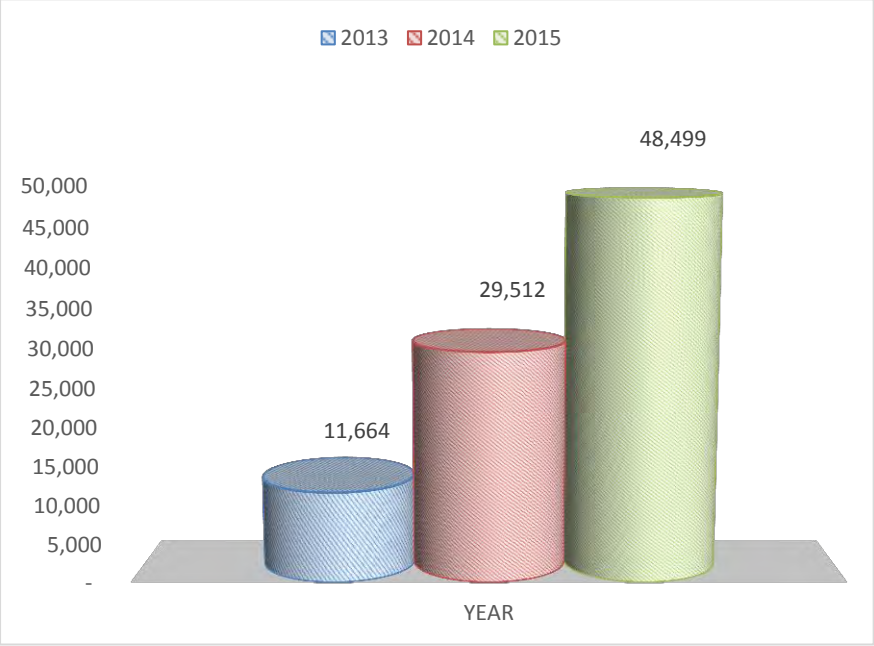
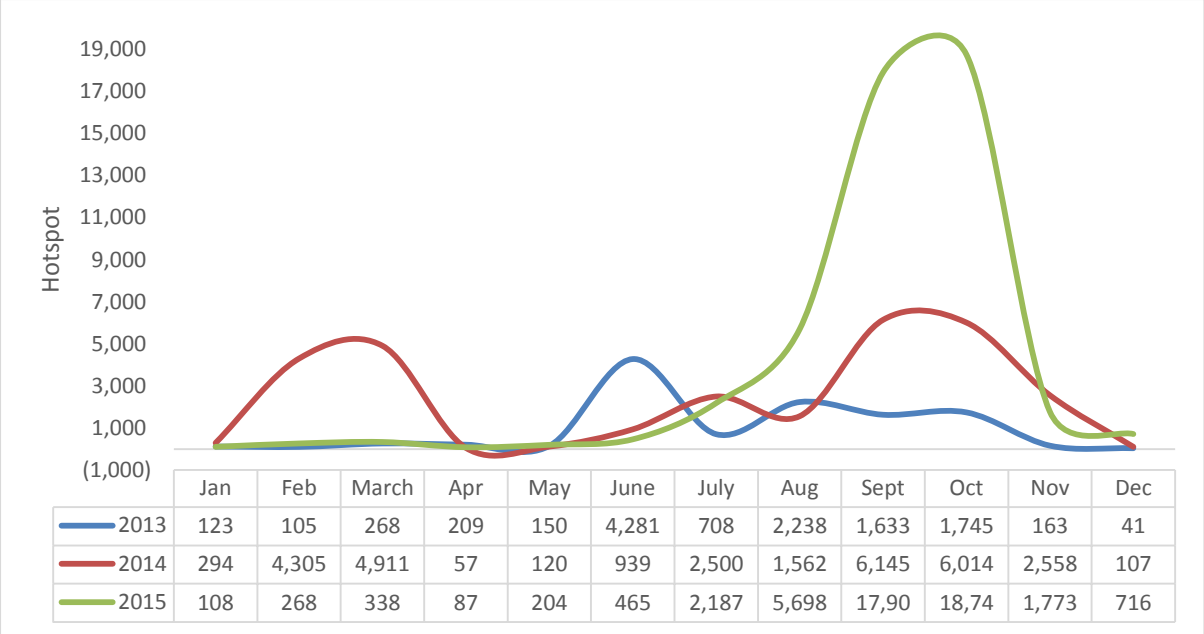


Figure 1: Hotspot number from 2013 to 2015



	Jan	Feb	March	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
2013	123	105	268	209	150	4,281	708	2,238	1,633	1,745	163	41
2014	294	4,305	4,911	57	120	939	2,500	1,562	6,145	6,014	2,558	107
2015	108	268	338	87	204	465	2,187	5,698	17,90	18,74	1,773	716

Figure 2: Temporal hotspot dynamic pattern from 2013 to 2015.

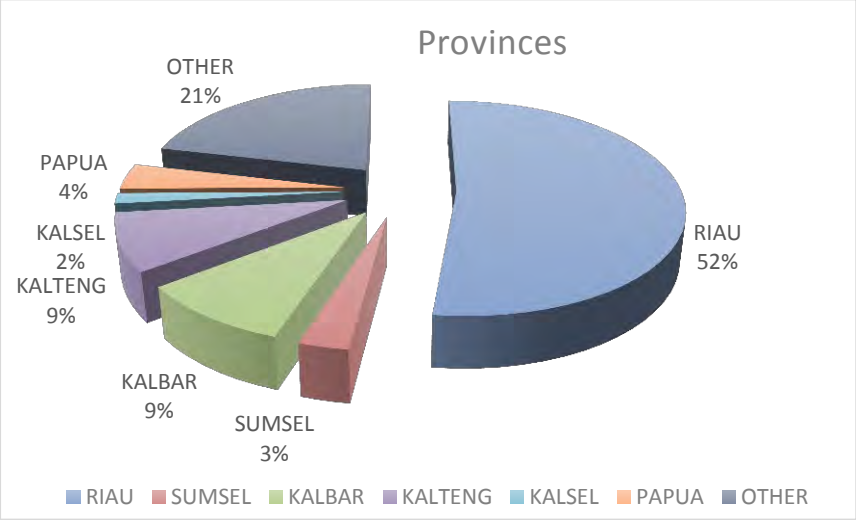


Figure 3 (a): Spatial distribution of national hotspots in 2013

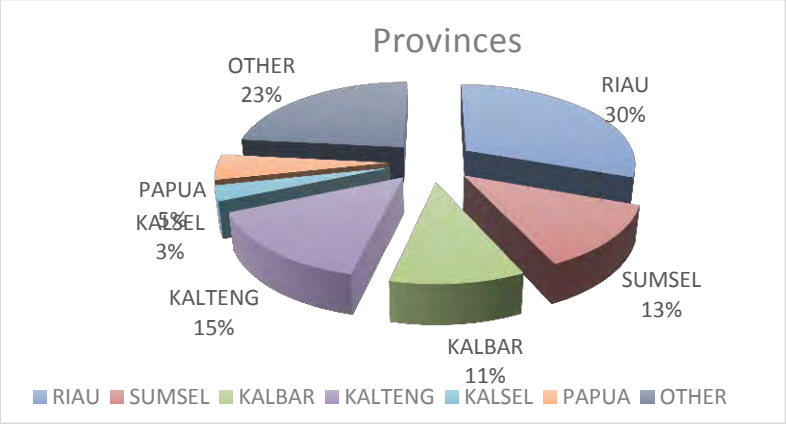


Figure 3 (b): Spatial distribution of national hotspots in 2014

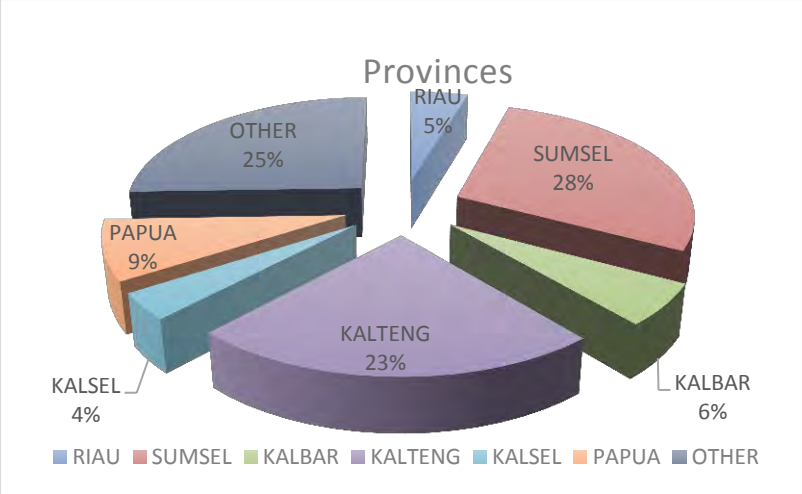


Figure 3 (c): Spatial distribution of national hotspots in 2015

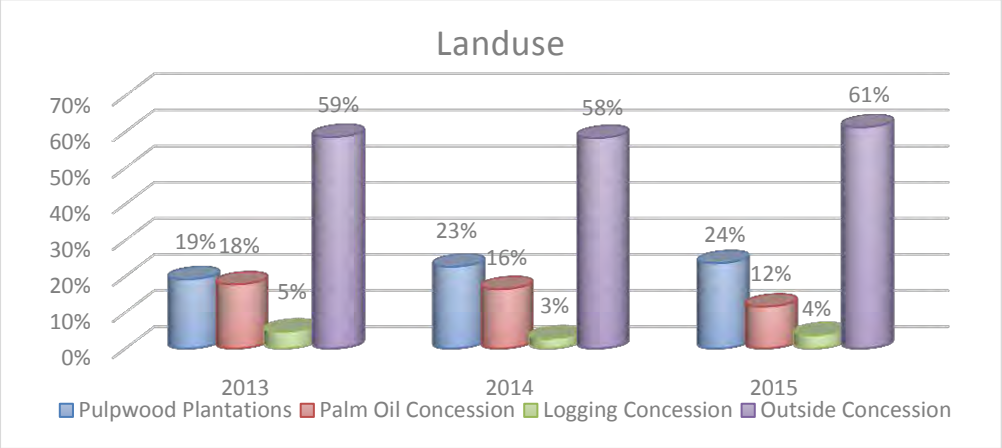


Figure 4: Land-use based fires distribution from 2013 to 2015

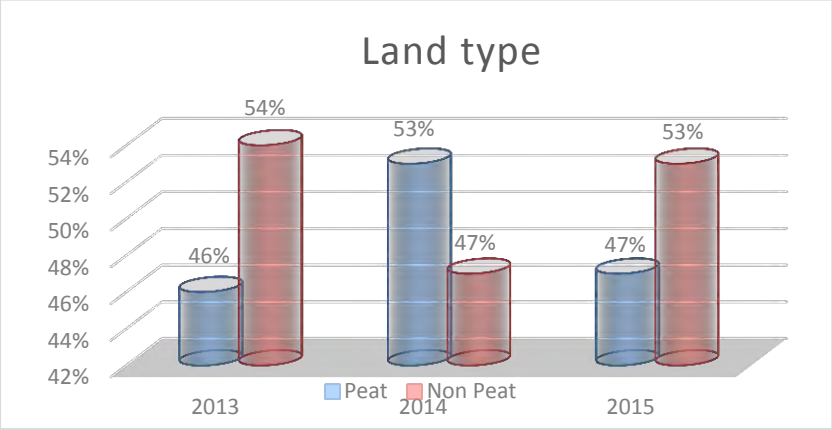


Figure 5: Land type based fires distribution from 2013 to 2015.

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