

Who Started the Fire?

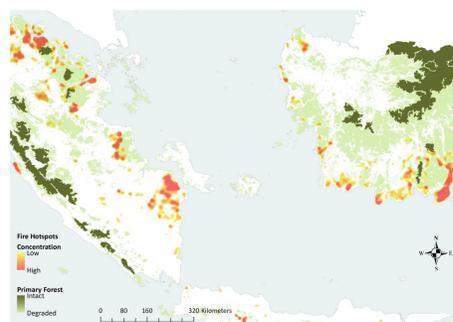
Investigating Spatial Trends Between Plantation Lands and Forest Fire Hotspots in Indonesia

BACKGROUND

Indonesia, the country with the second highest biodiversity of species in the world, is facing high rates of deforestation. Researchers found that from 2000 to 2012, over 6 million hectares of old growth (primary forests were lost) with deforestation rates increasing by 47,000 hectares each year (NASA Landsat).

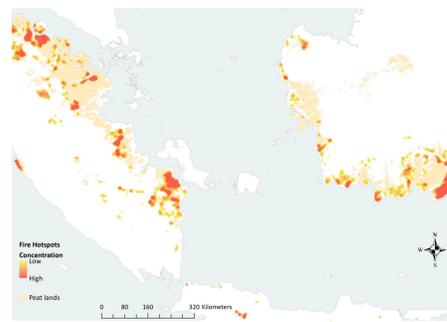
It is hypothesized that smallholder farmers and plantations affiliated with large corporations are clearing forests and land through open burning to increase production of cash crops. It is estimated that this year alone, 70,000 forest fires occurred (World Resources Institute). These fires, especially when burning on carbon rich peat lands, produce air pollution that spreads around the region becoming a public health crisis.

Of particular interest are the wood fiber (used for pulp to make paper) and palm oil industries. The government allocates land to major companies for productive use. It is hypothesized that plantations on legally conceded lands are largely responsible for the burning in their own area and their surrounding area.



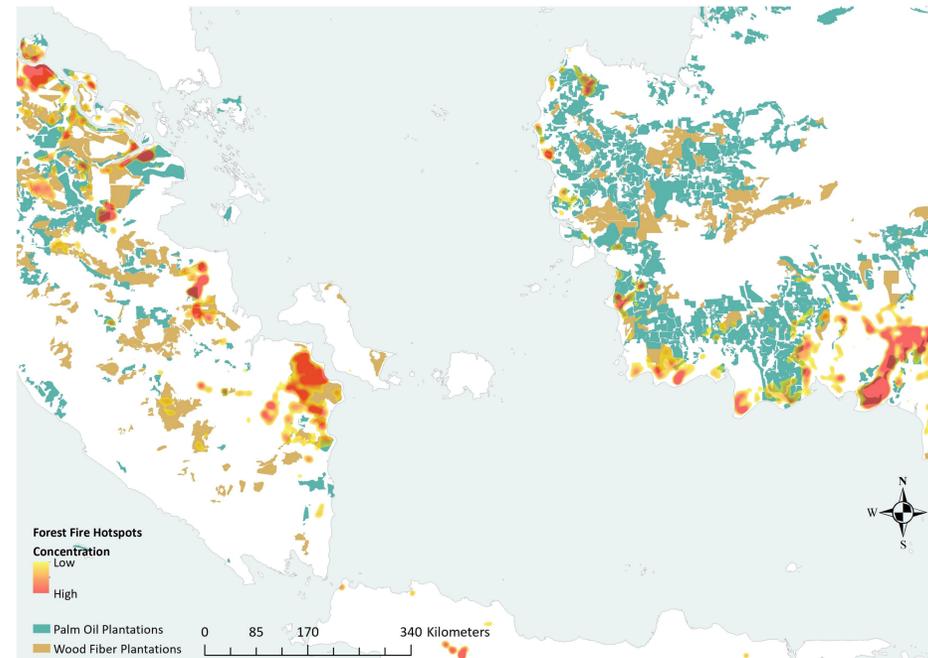
Fire Hotspots and Primary Forests

Fire hotspots occur mainly in and around degraded primary forest areas or non primary forest area. Intact primary forests are mostly not at risk from fire except for in North Sumatra.



Fire Hotspots and Peatland Areas

When carbon rich peatlands are burned to clear land, huge amounts of carbon and smoke are released. 3800 km² of peat land was found to be part of a fire hotspot.



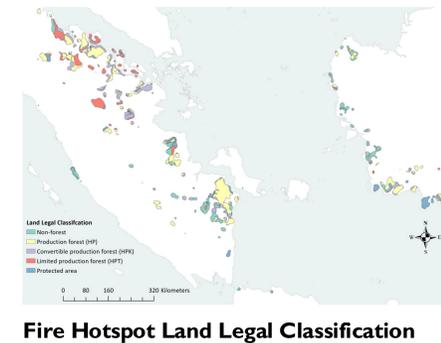
METHODOLOGY

This project aims to determine whether wood fiber or palm oil concession lands are more spatially associated with fire hotspots and which corporations have the highest amount of land near fire hotspots. The spatial trends of the legal status of forest fire hotspot areas are also investigated.

Fire hotspots were determined by converting a heatmap image of historical fire frequency to a raster using RGB color analysis. The raster was then converted to a polygon that was clipped to features interest such as land legal classification or wood fiber and palm oil concessions. A 10 kilometer buffer was created around the hotspots. The area within the hotspot as well as within the buffer was determined. The clipped wood fiber and palm oil concession layers were dissolved by the parent group of each plantation. The area within the buffer associated with each corporation was determined.

All the data was compiled from Global Forest Watch. The project was completed in ArcMap 10.7.1 using Model Builder with the Spatial Analyst extension.

Area	Wood Fiber	Palm Oil
In Hotspot	14341 km ²	13363 km ²
Within 10km	24922 km ²	25617 km ²



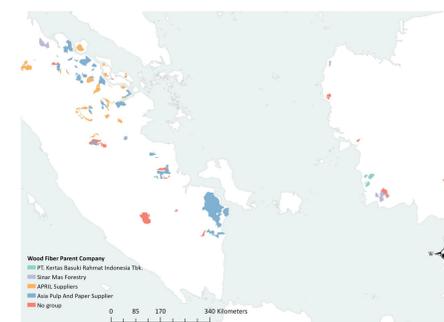
Fire Hotspot Land Legal Classification

RESULTS & CONCLUSIONS

Fire hotspots are highly concentrated around the borders of wood fiber and palm oil plantations or within a plantation. This highly supports the hypothesis that wood fiber and palm oil companies with government allocated land are burning to increase their productivity. The amount in area is about the same for both industries. Wood fiber has more area within a fire hotspot and palm oil has more area within 10km of a fire hotspot.

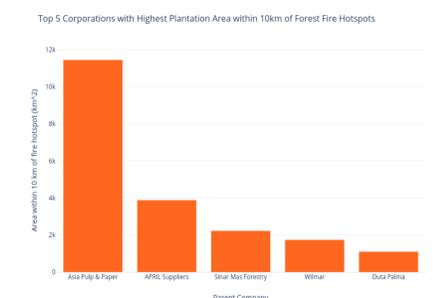
Most of the fire hotspots occur in production forest areas but some protected areas also have high fire frequency. Asia Pulp & Paper, a wood fiber company, has the highest area within 10km of a fire hotspot, suggesting they practice the most open burning.

The Indonesian government should penalize corporations that practice open burning by taking back allocated concession lands.



Fire Hotspots by Wood Fiber Parent Company

This map shows fire hotspot areas on wood fiber concession lands highlighted by the parent company of the plantation.



Corporations with Highest Concession Areas Within 10 km of Fire Hotspot

Asia Pulp & Paper has the highest area within 10 kilometers of a forest fire hotspot at 1146 km², followed by APRIL Suppliers and Sinar Mas.