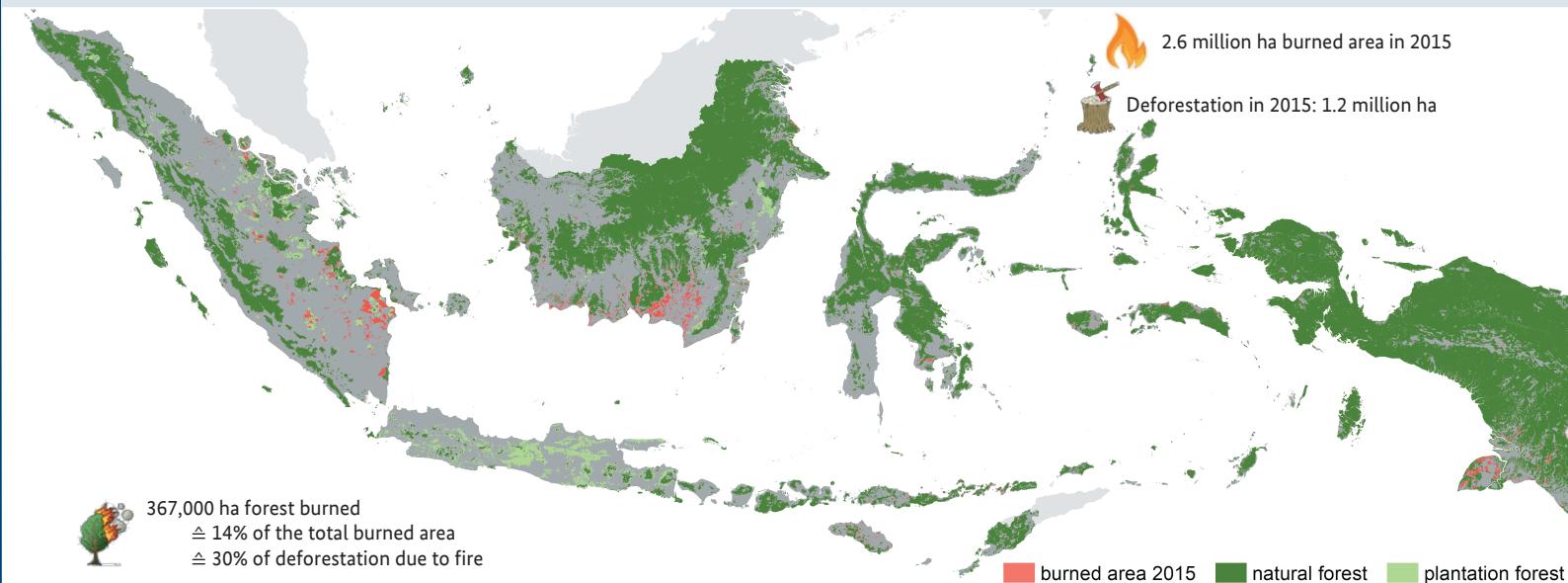




# IMPACT OF THE 2015 FIRE CRISIS ON DEFORESTATION IN INDONESIA



## Deforestation in 2015: 1.2 million ha

Land Status	Deforestation (ha)
Conservation Forest	100,700
Protection Forest	105,500
Production Forest*	734,500
APL	282,900

\*HP, HPT, HPK

## 95.8 million ha forest

Forest Estate	Forested	Non Forested	Total
Conservation Forest	17.5	4.4	21.9
Protection Forest	24	5.6	29.6
Production Forest	46.6	22.6	69.2
APL	7.6	59.4	67.0

\*HP, HPT, HPK

(million ha)

## 2.6 million ha burned area in 2015

Burned Area	Soil Type	Kawasan	Area (ha)	% of total BA	
Forested	Peat	Kawasan Hutan	151,000	5.9%	6.4%
	APL	APL	15,000	0.6%	14.2%
Non-forested	Mineral	Kawasan Hutan	164,000	6.4%	7.8%
	APL	APL	37,000	1.4%	
	Peat	Kawasan Hutan	535,000	20.8%	27.7%
	APL	APL	180,000	7.0%	85.8%
Mineral	Kawasan Hutan	880,000	34.1%	58.0%	
	APL	616,000	23.9%		

- Burnt forested area (all forest types): ~ 367,000 hectares (~50% plantation forest)
  - ➔ Only a small fraction (14%) of the total burnt area affected forests, with 12% occurring on kawasan hutan and 2% on APL
  - ➔ Contribution of fires to deforestation was substantial (30%)
- $\frac{2}{3}$  of the burnt area occurred on kawasan hutan,  $\frac{1}{3}$  on APL
  - ➔ The majority of burnt area on kawasan hutan affected non-forested areas (82%)
- $\frac{2}{3}$  of the burnt area occurred on mineral soils,  $\frac{1}{3}$  on peatland
  - ➔ Peatlands were more severely affected on kawasan hutan (40% of the total burnt kawasan hutan) than on APL (23% of total burnt APL)

## Impact of Fires on Forests

The large fire events in 2015 raged on almost 2.6 million hectares of land throughout Indonesia. 86% of the burnt area affected non-forested land and only 14% forested land (natural and plantation forests). 32% of the burnt non-forested areas affected peatland, while for burnt forested areas the proportion of affected peat soil amounts to 45%. Overall, 34% of the burnt area occurred on peatland. Thus, even though the overall impact of the fires on the carbon-rich land cover type of forest is rather low (14%), they still caused high carbon emissions due to burning of peat as shown in a publication by DGCC ("Understanding Estimation of Emission from Land and Forest Fires in Indonesia 2015").

The overall impact of 14% of the 2015 fires on forested land affected natural forests and plantation forests equally (7% each). While on most islands natural forests were more affected, in Java and Sumatra mainly plantation forests were burnt (43% of burnt area on forested areas with 10% natural forests and 33% plantation forests, and 22% with 6% natural forests and 16% plantation forests respectively) (see Figure 1).

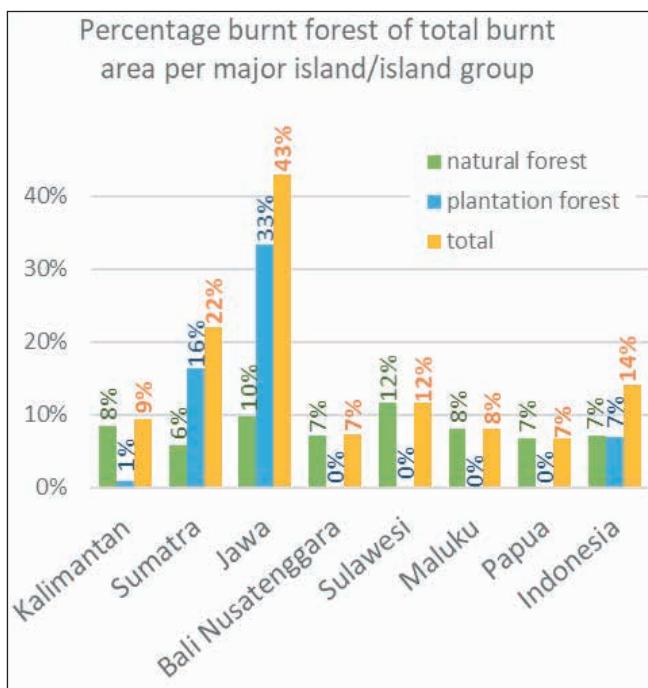


Figure 1: Impact of fires on forests per island

92% of all burnt area occurred in only 10 provinces, with 4 of them being located in Sumatra (39% of the total burnt area), 4 in Kalimantan (36%), 1 in Papua (14%) and 1 in Bali Nusatenggara (3%). The proportion of burnt forested areas (all forest types), however, of the total burnt area is in 8 out of those 10 provinces less than

20%, and also amounts in the remaining two provinces (East Kalimantan and South Sumatra) to only 21 and 26% respectively.

Out of the 10 provinces with the highest proportion of burnt forests of the total burnt area, 7 have actually only a small extent of total burnt area (< 10,000 ha), namely Yogyakarta (22 ha burnt area, 100% forest), Sumatra Utara (5,900 ha, 58% forest), Jawa Barat (2,800 ha, 51% forest), Jawa Tengah (2,100 ha, 50% forest), Jawa Timur (8,100 ha, 39%), Sumatra Barat (3,900 ha, 37% forest), and Aceh (900 ha, 33% forest).

Provinces in Sumatra and Java experienced forest fires largely in plantation forests - South Sumatra, for example, shows a particularly wide difference between natural and plantation forests where only 10% of the total burnt forest in the province affected natural forests – while on the other islands predominantly natural forests have burnt.

These figures suggest that even though generally forests were not the core area of the 2015 fire events, there were provinces which failed to prevent and/or control fires particularly on forested land. This seems to be particularly the case for plantation forests in Java: if only natural forests are considered the proportions of burnt forest drop considerably for Yogyakarta (no natural forest burnt), Jawa Tengah (3% of the total burnt area natural forest), Jawa Barat (11%) and Jawa Timur (11%).

## Contribution of Fires to Deforestation

The total gross deforestation rate in the period 2014-2015 amounts to roughly 1.2 million hectares (about 62% natural forests and 38% plantation forests). 77% of the total deforestation occurred on Kawasan Hutan. The 10 provinces with the highest deforestation rates amount together to 86% of the total gross deforestation. 4 of these 10 provinces are located in Sumatra (46%), 4 in Kalimantan (33%), 1 in Papua (6%) and 1 in Sulawesi (2%).

30% of the total deforestation can be attributed to fires (roughly 367,000 ha; with 50% plantation forests) of which 86% (315,000 ha) occurred on Kawasan Hutan.

Variations among provinces, though, are again high and range from 1% contribution of fires to deforestation (NTB) to 73% (Jambi). Sumatra Selatan is the province with the largest burnt area (640,000 ha) as well as with the highest deforestation rate (336,000 ha) of which 49%

(164,000 ha) were fire related, followed by Kalimantan Tengah with the second largest burnt area of 577,000 ha and second highest deforestation rate of 189,000 ha of which 56,000 ha (30%) were fire-related (see Figure 2).

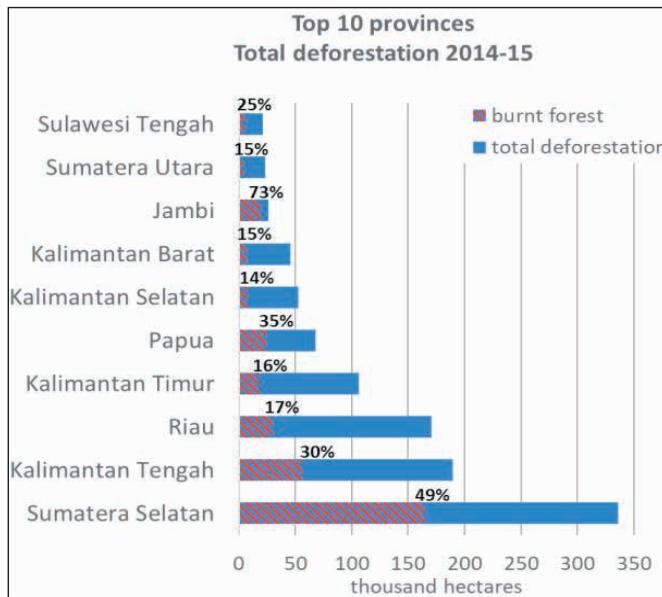


Figure 2: 10 provinces with the highest deforestation rate in 2014-15 and respective contribution of fires

There are several provinces which have a low deforestation rate (< 10,000 ha) but with a high proportion of fire-related deforestation (> 20%), namely Maluku (4,900 ha deforested, 67% fire-related), Yogyakarta (52 ha, 42% fire-related), Jawa Timur (7,700 ha, 41% fire-related), Bali (78 ha, 29% fire-related), Sulawesi Tenggara (7,100 ha, 26% fire-related), Jawa Barat (6,000 ha, 24% fire-related), and Jawa Tengah (5,200 ha, 21% fire-related).

Remarkably, 45% of all fire-related deforestation in Indonesia in 2014-15 occurred in just one province, i.e. Sumatra Selatan (164,200 ha), followed by Kalimantan Tengah (15% or 56,200 ha) and Riau (8% or 29,500 ha).

A total of 38% (460,000 ha) of the deforestation occurred on peatland, of which 36% was caused by fires (166,000 ha) which is about 45% of the total burnt forest. 151,000 (91%) out of these 166,000 ha of burnt forested peatland were located on Kawasan Hutan (77% on production forest HP/HPT/HPK and 14% on conservation and protection forest HK/HL). Figure 3 illustrates the spatial overlaps between deforested and burnt areas.

## Fire Impact on Kawasan Hutan and Peatlands

Overall, fires occurred more often on Kawasan Hutan than on APL (67% and 33% respectively) and more often on mineral soils than on peatland (66% and 34% respectively). 78% of the total burned peat area occurred on kawasan hutan (with 52% on production forest HP/HPT/HPK and 26% on protection and conservation forest HL/HK) but the majority of it was not forested prior to the fire occurrence (81%). Only 17% of the burned peatland on kawasan hutan affected forests, i.e. only 9% of the total burned kawasan hutan occurred on forested peatland. Figure 4 gives an overview of the spatial overlaps of Kawasan Hutan, forest cover, burnt area and peatland.

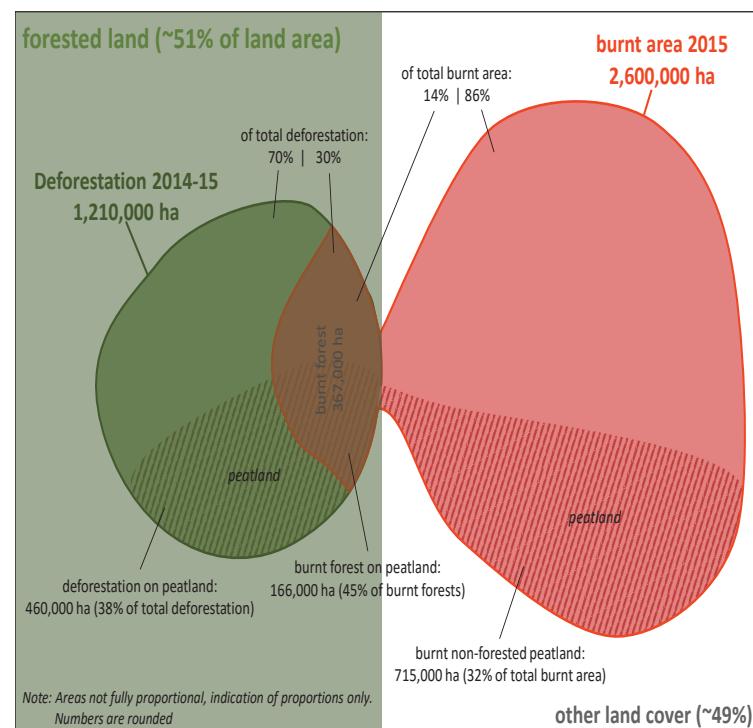


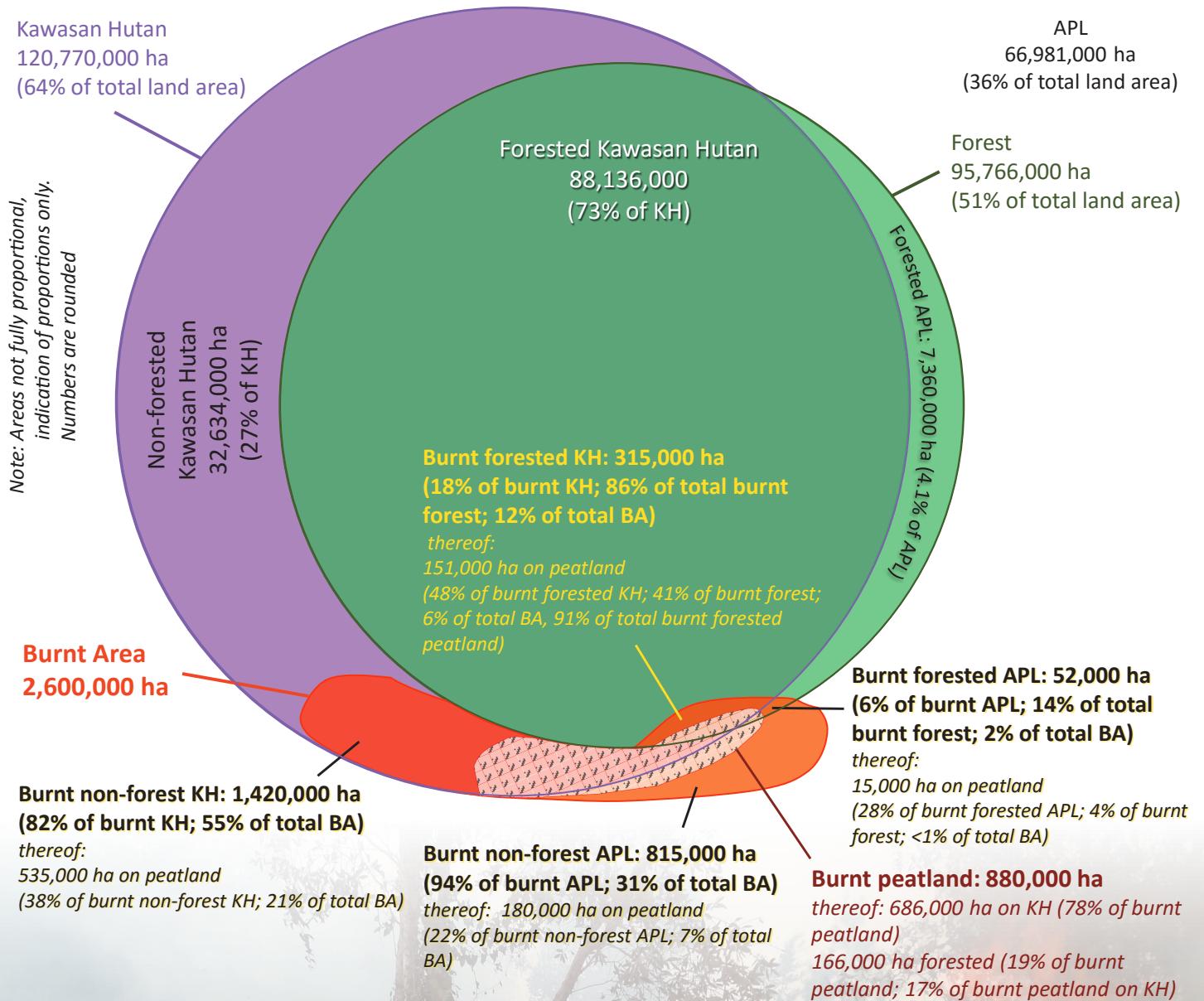
Figure 3: Deforestation and burnt area 2015

## Data

The Directorate of Forest Resources Inventory and Monitoring (IPSDH) of the Ministry of Environment and Forestry (KLHK) provides annual updates of Indonesia's land cover as well as on burnt areas. These official data sets were used to spatially analyse the impact of the 2015 fire crisis on Indonesian forests, forest land and peatland.

## Disclaimer

The burnt areas derived from Landsat data have only been partially validated in the field and is thus be afflicted with unquantified uncertainty. Besides, it cannot be ruled out that areas here labeled as 'deforested due to fire' may in fact have been already deforested prior to the fire event and the identified burning has happened on an already clear-cut area.



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