

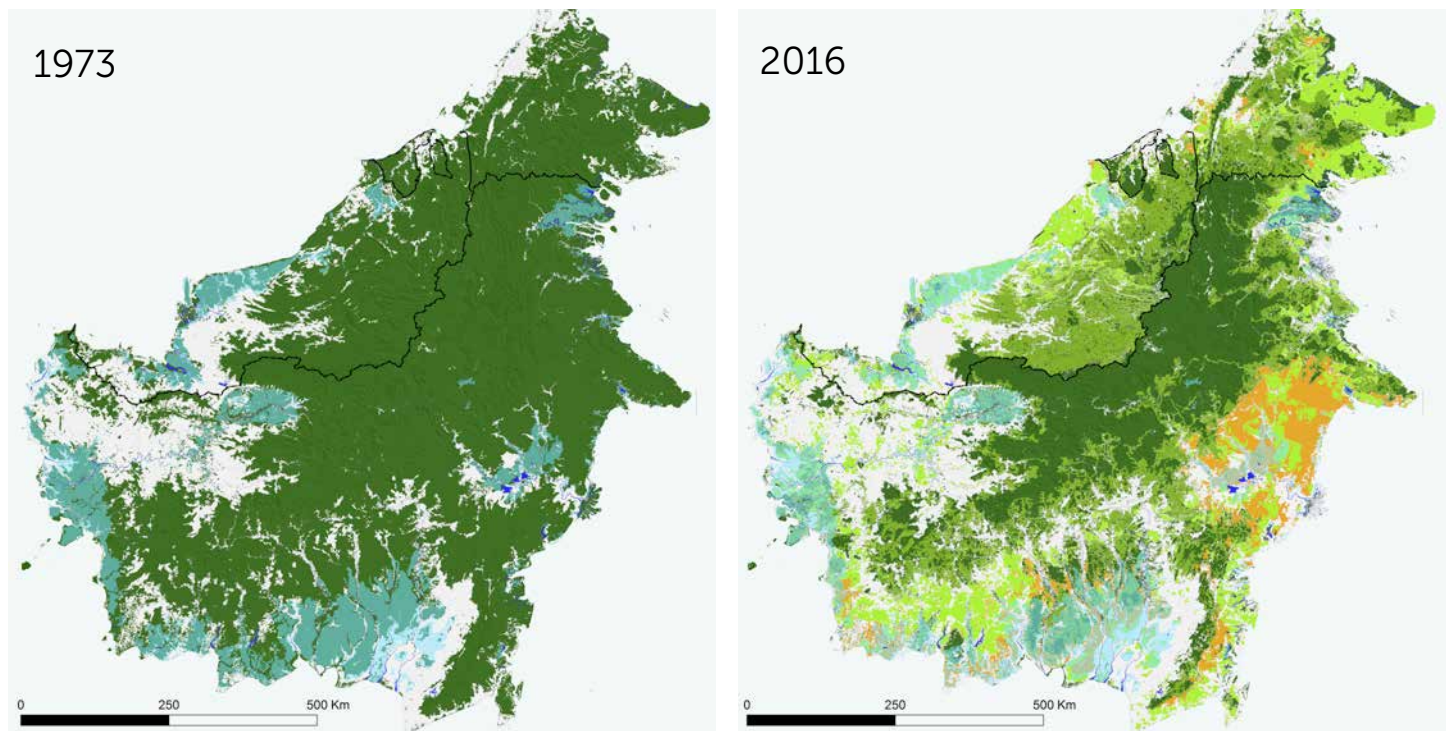


What a difference 4 decades make: Deforestation in Borneo since 1973













David L.A. Gaveau



In 1973, 55.8 million hectares (76%), of Borneo was old-growth rainforest. About 19.5 million ha of old-growth forest area was destroyed between 1973 and 2016 by fire and agricultural expansion. By 2016, 50% of the island remained forested.



Visual legend:

 Intact forest	 Industrial plantation	 Forest degraded by ENSO* fires	 Intact peat-swamp forest	 Selectively logged forests	 Non-forest areas
					
An Intact Dipterocarp forest on mineral soils. Photo: © CIFOR	Land converted to industrial plantations (oil palm or pulpwood). Photo: © CIFOR	7 Mha of forest turned to scrublands during ENSO fires mainly in 1982/83, 1997/98, 2002/04, 2006/07 and 2015/16. Photo: © H.-D.Viktor Boehm	Peat-swamp forest. Photo: © Adam Gynch / CIFOR	Forest areas that have been logged but remain standing. Photo: © Aidenvironment	Young forest re-growth, scrublands, tree plantations, agricultural land, and non-vegetated areas that already existed in 1973. Photo: © CIFOR / David Gaveau

4-decade overview: 1973-2016



The **plantation industry** (oil palm + pulpwood) has been a marginal driver of the loss of forest in Indonesian Borneo (Kalimantan), as **15% (2.2Mha)** of all recorded deforestation (14.4 Mha) over four decades was caused by companies.



The **plantation industry** (oil palm + pulpwood) has been the principal driver of the loss of forest in Malaysian Borneo, as **60% (2.5Mha)** of all deforestation (4.2 Mha) recorded over four decades was caused by companies



Over four decades, **ENSO* forest fires** have been the principle cause of the loss of old-growth forest in Kalimantan, with three peaks in 1982/83, 1997/98, and 2015/16, and account for **42% (6Mha)** of all recorded deforestation (14.4 Mha)

A large proportion of oil-palm plantations in Kalimantan were developed on lands cleared before 1973 and on degraded lands (predominantly forests converted to scrublands by fire) (see below).

Focus on the last decade: 2005-2016



From 2004 to 2013, the **plantation industry** (oil palm+ pulpwood) became the principal driver of deforestation in Kalimantan, as **53-64%** of annual deforestation was caused by companies



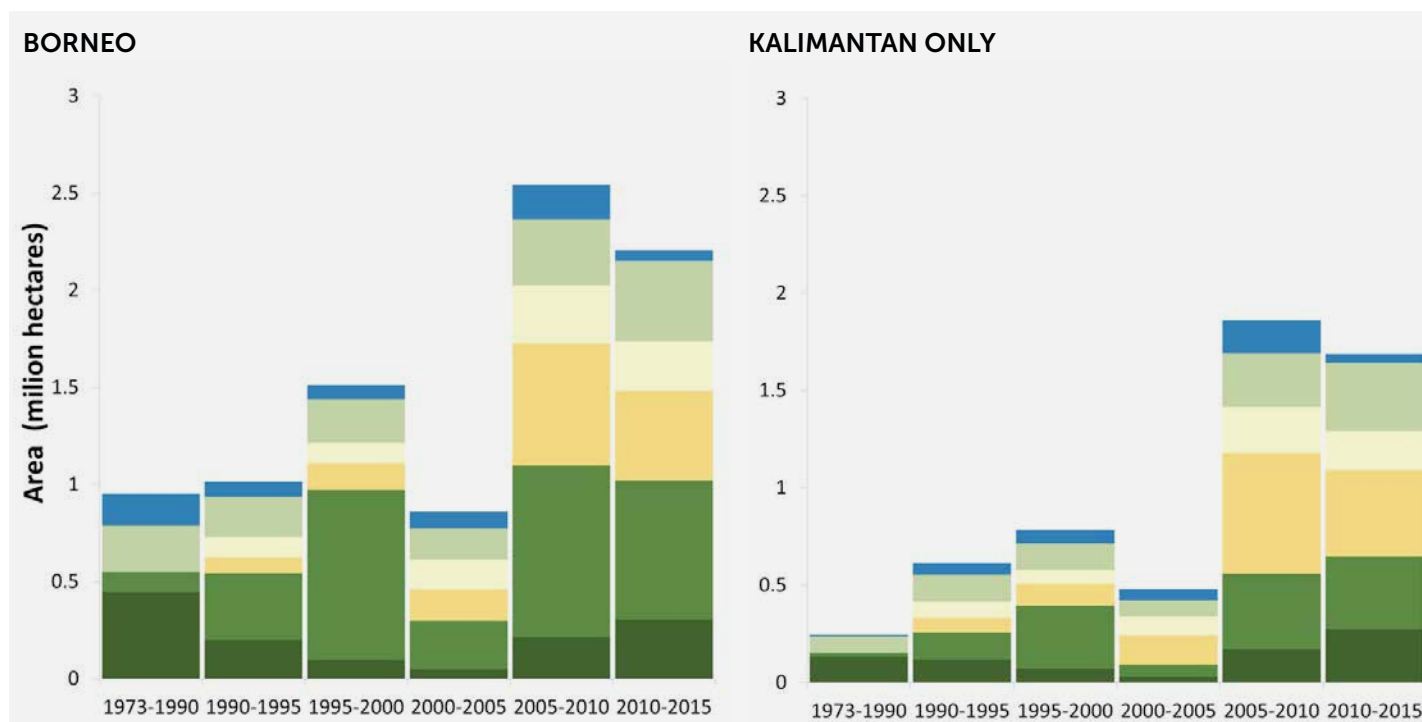
From 2001 to 2013, the **plantation industry** (oil palm+ pulpwood) was still the principal driver of deforestation in Malaysian Borneo, as **51-72%** of annual deforestation was caused by companies.

In 2003, 2007 and 2016, forest fires were the principal driver of deforestation in Kalimantan, and coincided with the 2002/03, 2006/07 and 2015/16 ENSO* forest fires.

- In 2016, Kalimantan lost forests at the fastest rate since 1997 (400,000 ha cleared)
- Half of this deforestation (200,000 ha) was against peat-swamp forests

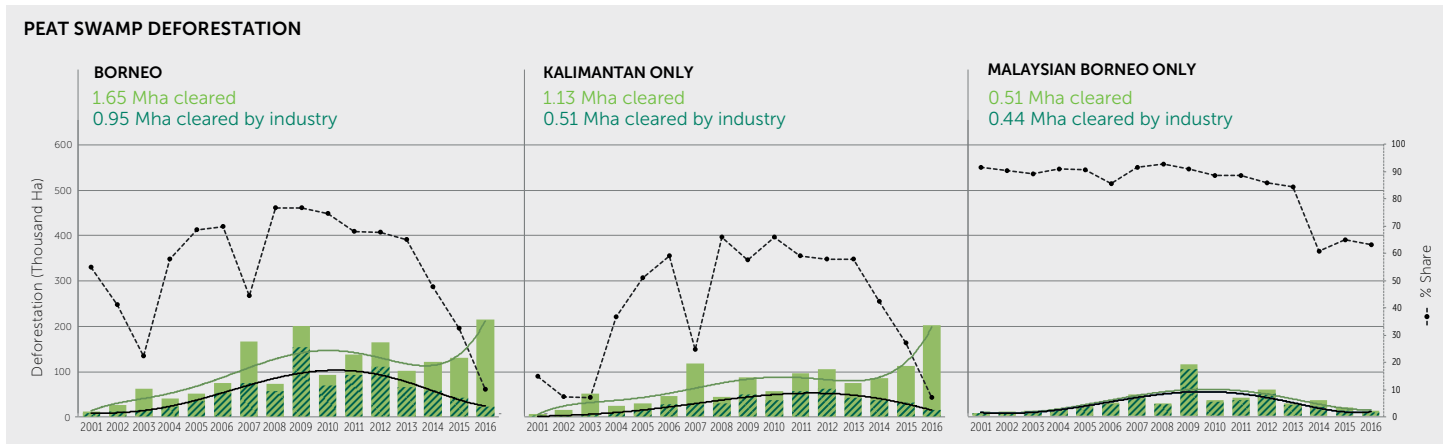
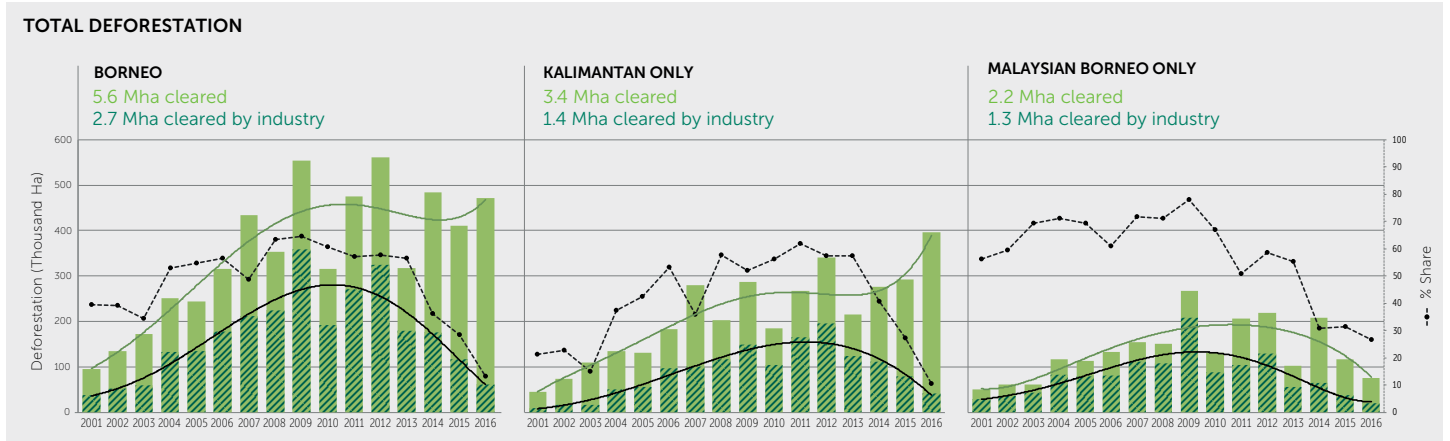
Types of vegetation cover converted to industrial plantations

The expanding area (9.1 Mha) of industrial plantations (oil-palm and pulpwood) shown in six time periods from 1973 to 2015, with the vegetation cover of the land just before observed conversion to plantations.

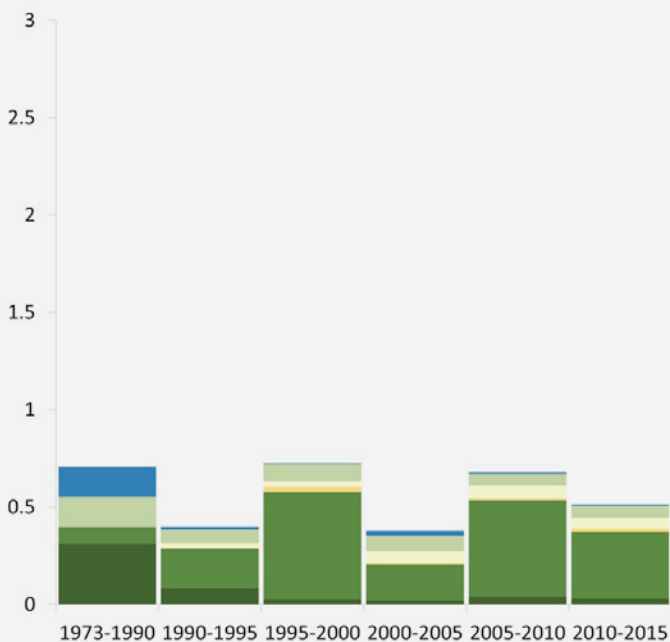


Deforestation 2001 - 2016: all forests vs. peat-swamps

- Total deforestation
- Deforestation caused by plantation industry (Oil Palm & Pulpwood)
- % share of deforestation caused by plantation industry
- Fitted curve for total deforestation
- Fitted curve for industry-driven deforestation



MALAYSIAN BORNEO ONLY

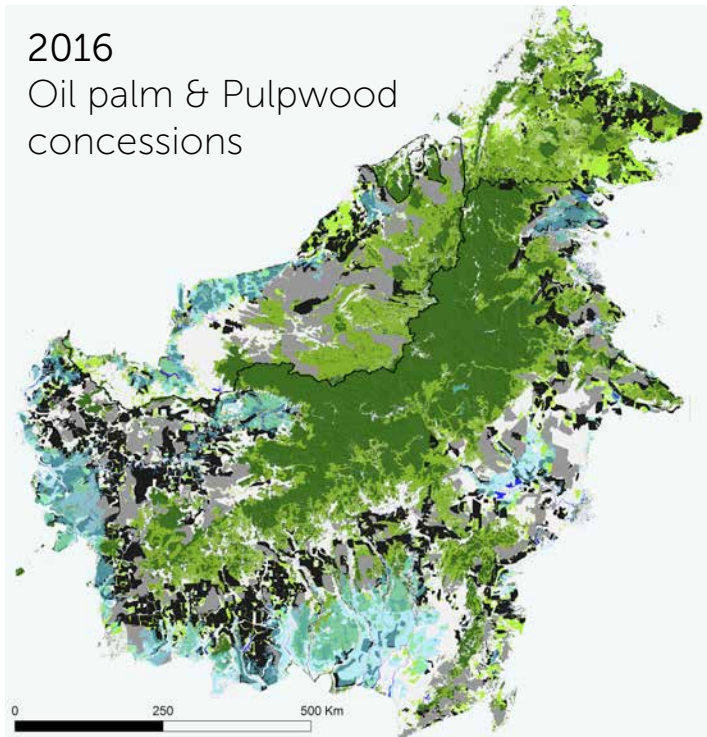


- Uncertain: no data, or area obscured by cloud
- Intact Forest: pristine old-growth forests.
- Logged Forest: old-growth forests that have lost their original structure and canopy cover through industrial-scale selective timber harvest at some point since 1973, indicated principally by the construction of logging roads.
- Scrub: old-growth forests impacted by drought and fire; these burn/drought scars tend to recover slowly. They are vulnerable to further burning and conversion to short vegetation follows; hence they appear as "deforested" in satellite assessments.
- Non-Forest since 1973: areas that have been cleared before 1973.
- Other Non-Forest: areas that have been cleared after 1973, but not converted to scrub.

We recognize that Non-Forest since 1973 and Other Non-Forest may include secondary forests: young-growth, forest fallow or agroforest.

Industrial oil palm, 1973 - 2016

2016 Oil palm & Pulpwood concessions



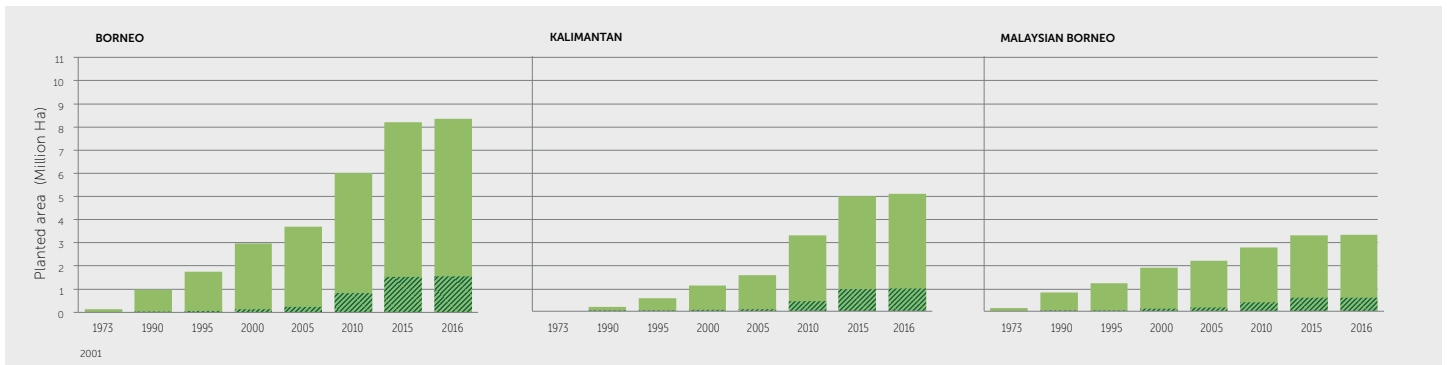
Borneo had 8.34 Million ha planted industrial oil palm in 2016, or about half of the estimated global planted area of 18 Mha (FAO)

- Oil palm concessions: 13 Mha
- Pulpwood concessions: 8 Mha
- Intact forest
- Intact peat-swamp forest
- Non-forest areas
- Industrial forests
- Selectively logged forests

Conservation opportunity: Areas left in concessions yet to be developed

Forest: 5.6 Mha
Peat forest: 1 Mha

- Planted industrial oil palm
- Planted industrial oil palm, on peatlands



Map data can be accessed at the Borneo Atlas:

www.cifor.org/map/atlas

Sources:

www.nature.com/articles/srep32017

journals.plos.org/plosone/article?id=10.1371/journal.pone.0101654

<https://www.youtube.com/watch?v=cBnbLJ5TzvE>

*ENSO = El Nino Southern Oscillation

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