

LARGE SCALE DEFORESTATION DRIVERS ANALYSIS USING GIS AND CONTEXTUAL INFORMATION: A CASE STUDY OF INDONESIA

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INTRODUCTION

- **Global net emissions** from **forests and land use change** contributed for **11%** of total human-caused emissions as of 2010.
- **Deforestation** was suspected as the **root cause** since in **2011** it was reported that **Southeast Asia** experienced the highest deforestation for over the last decade, particularly in the early 1990s.
- According to FAO (FAO, 2015), Indonesia possessed the second largest contribution for deforestation with the annual forest loss area of 684 thousand ha – an area larger than Brunei Darussalam.

INTRODUCTION

- In 2010, the Indonesia-Norway REDD+ Partnership was established through an agreement between governments of the two countries. The aim was to support Indonesia's efforts to reduce emissions from deforestation and degradation (REDD+) of forests and peatland.
- Indonesia has pledge to reduce emissions to 29 – 41% by 2030. Thus, timing information on forest cover changes and monitoring efforts should be taken seriously and reported at national forest reference emission levels/forest reference levels (FREL/FRL).

OBJECTIVES

1. How many forest was lost in Indonesia during the period of 2000 – 2015?
2. What are the main drivers of that loss?
3. Effectiveness of moratorium policy released by Ministry of Forestry in 2011 until 2015.

Tree Cover Loss: all vegetation greater than 5 meters in height, and may take form of natural forests and plantations in a range of canopy densities.



DATA

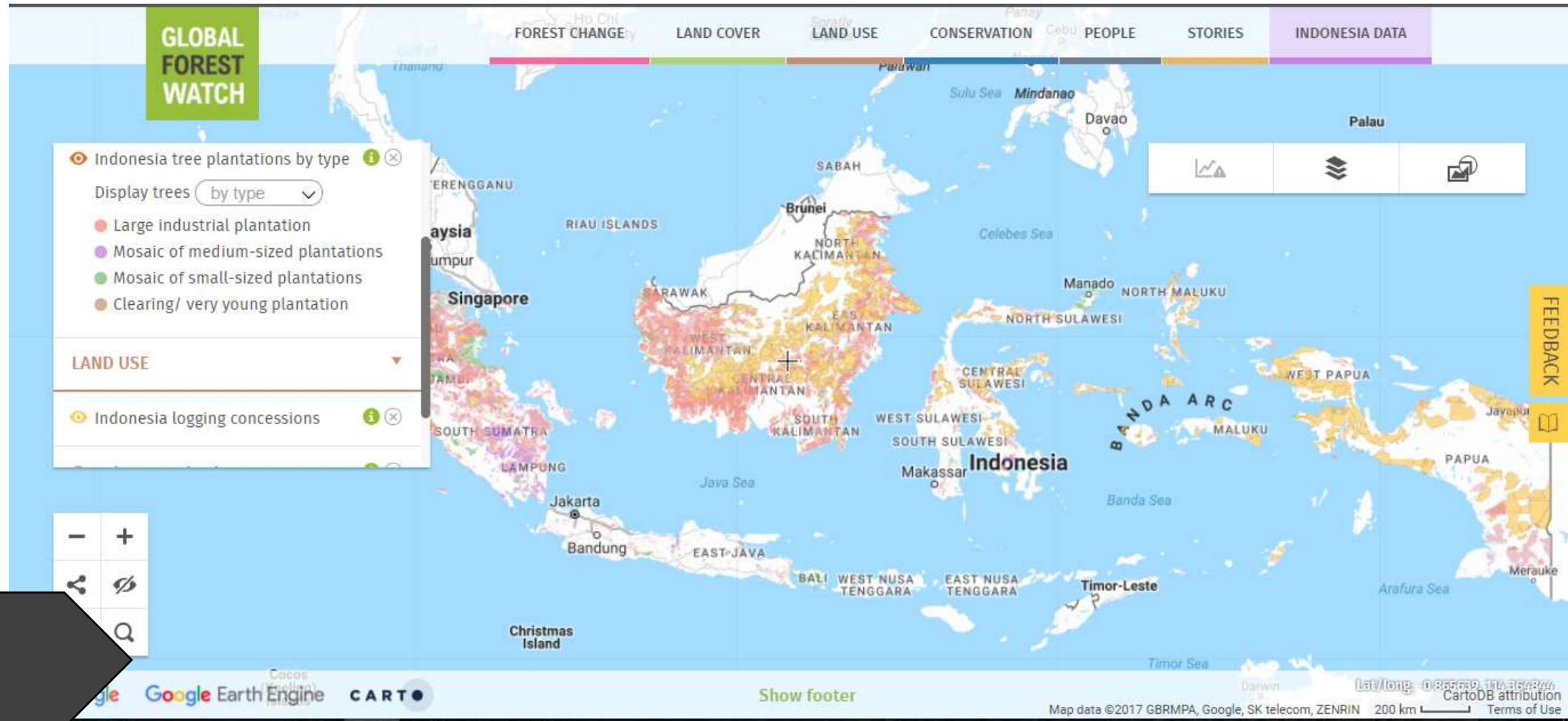
Primary Forest: mature natural forest cover that has not been completely clear in recent history (with 30 years or more) and exists in contiguous block of 5 ha or more. Consisting of intact and degraded forests.



DATA

Concessions data: selective logging, wood fiber, and oil palm provided by GFW. Mining data from Mining's Area Permit by Ministry of Energy and Mineral Resources.

Tree plantations from Transparent World is the primary source to determine the drivers outside concessions

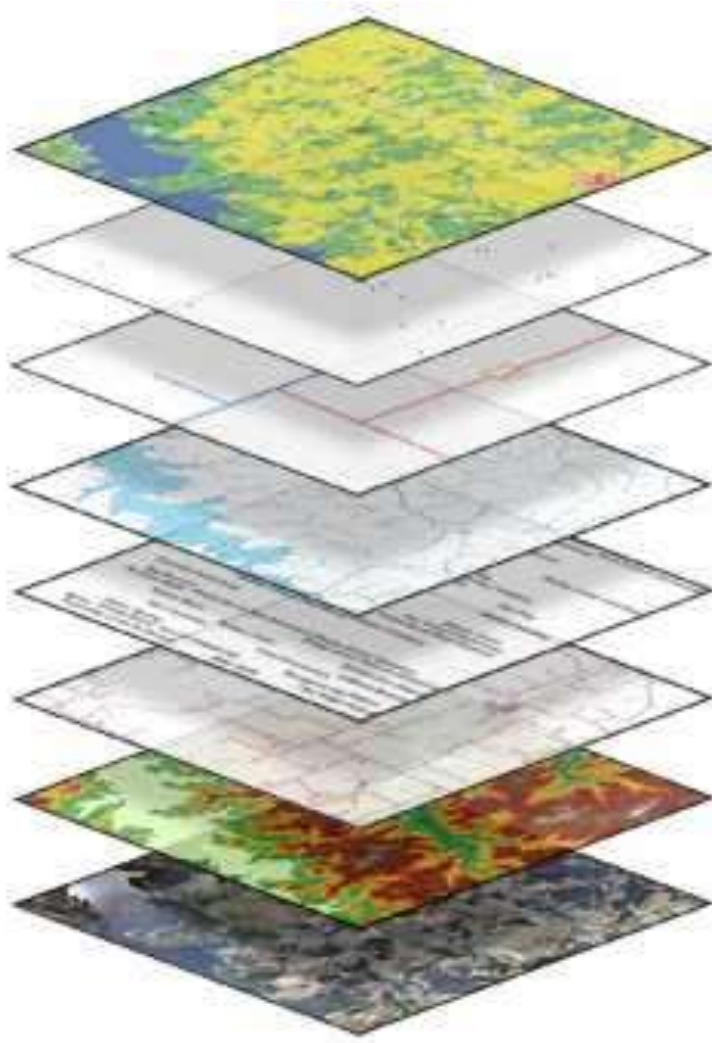


Moratorium Area: forest moratorium policy takes place at intact forest and peat lands



DATA

METHODOLOGY



All datasets overlaid each other.

Tree Cover Loss with Primary Forest = Primary Forest Cover Loss

Primary Forest Cover Loss = concessions area + tree plantation

METHODOLOGY

Not calculating overlapping data among concessions to eliminating ambiguity.

	<u>Land Area (Ha) *</u>	<u>Area of Industrial Sector (Ha) *</u>				<u>Overlapping Concessions</u>
		<u>Fiber</u>	<u>Logging</u>	<u>Mining</u>	<u>Oil Palm</u>	
<u>Java and Bali</u>	<u>14,030,705</u>	<u>0</u>	<u>0</u>	<u>85,687</u>	<u>0</u>	<u>0</u>
<u>Kalimantan</u>	<u>53,911,364</u>	<u>3,552,692</u>	<u>10,365,238</u>	<u>1,553,071</u>	<u>7,430,071</u>	<u>4,415,099</u>
<u>Maluku</u>	<u>7,618,322</u>	<u>37,997</u>	<u>1,186,755</u>	<u>166,018</u>	<u>0</u>	<u>182,135</u>
<u>Nusa Tenggara</u>	<u>6,671,511</u>	<u>0</u>	<u>0</u>	<u>230,283</u>	<u>0</u>	<u>0</u>
<u>Papua</u>	<u>41,513,997</u>	<u>1,386,880</u>	<u>10,447,556</u>	<u>80,331</u>	<u>411,957</u>	<u>290,068</u>
<u>Sulawesi</u>	<u>18,547,443</u>	<u>425,563</u>	<u>1,546,897</u>	<u>583,741</u>	<u>230,102</u>	<u>195,627</u>
<u>Sumatera</u>	<u>47,415,834</u>	<u>4,377,221</u>	<u>1,296,512</u>	<u>1,429,897</u>	<u>3,162,048</u>	<u>586,881</u>

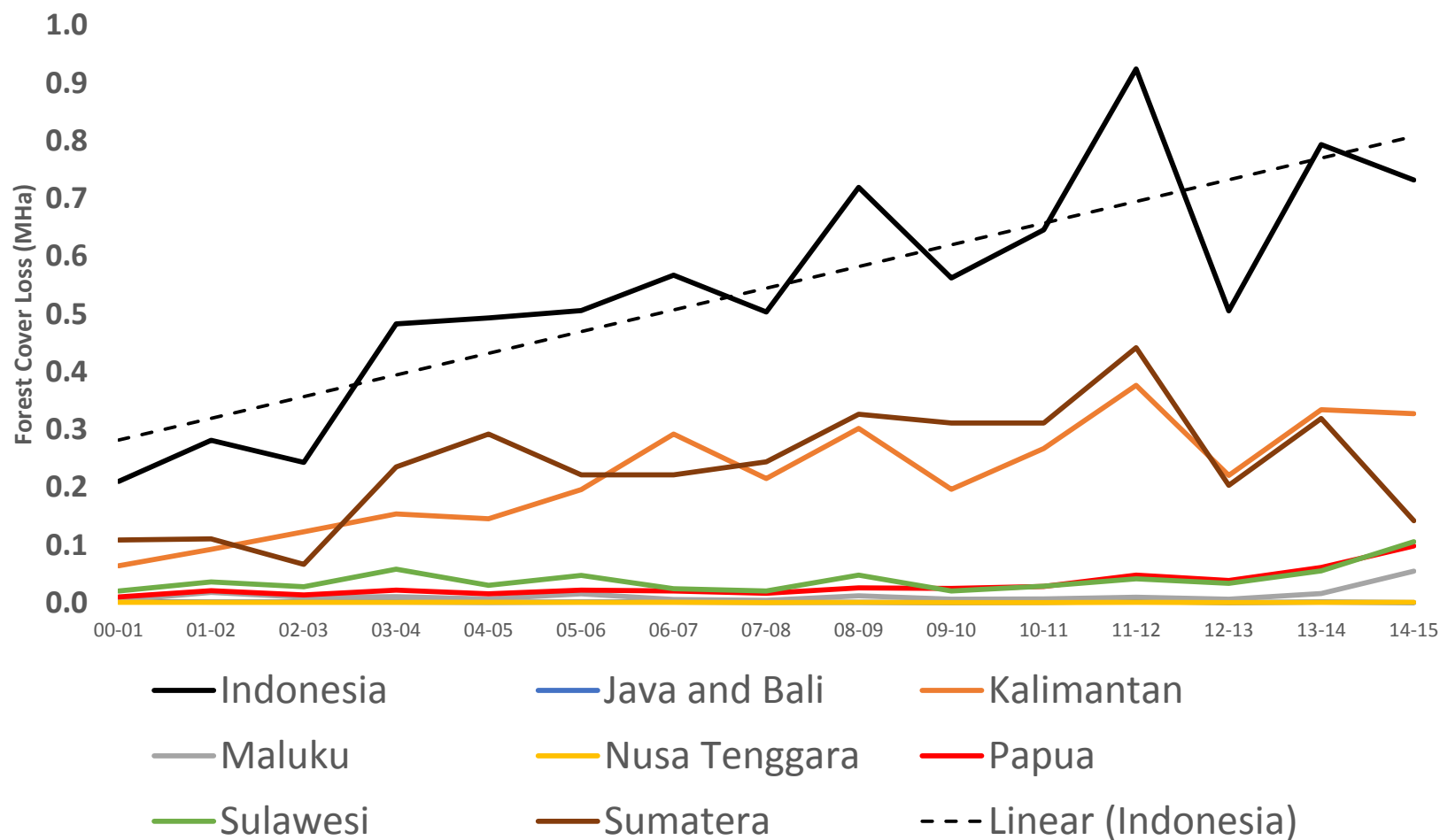
* calculated in WGS 1984 Web Mercator (Auxiliary Sphere)

DEFINITIONS

- **Deforestation** in this study **denotes the removal of trees** in above primary forest with the **intersection** of concessions and the **conversion** from forest into other land uses such as mining, agriculture, industrial plantations, etc.

RESULTS

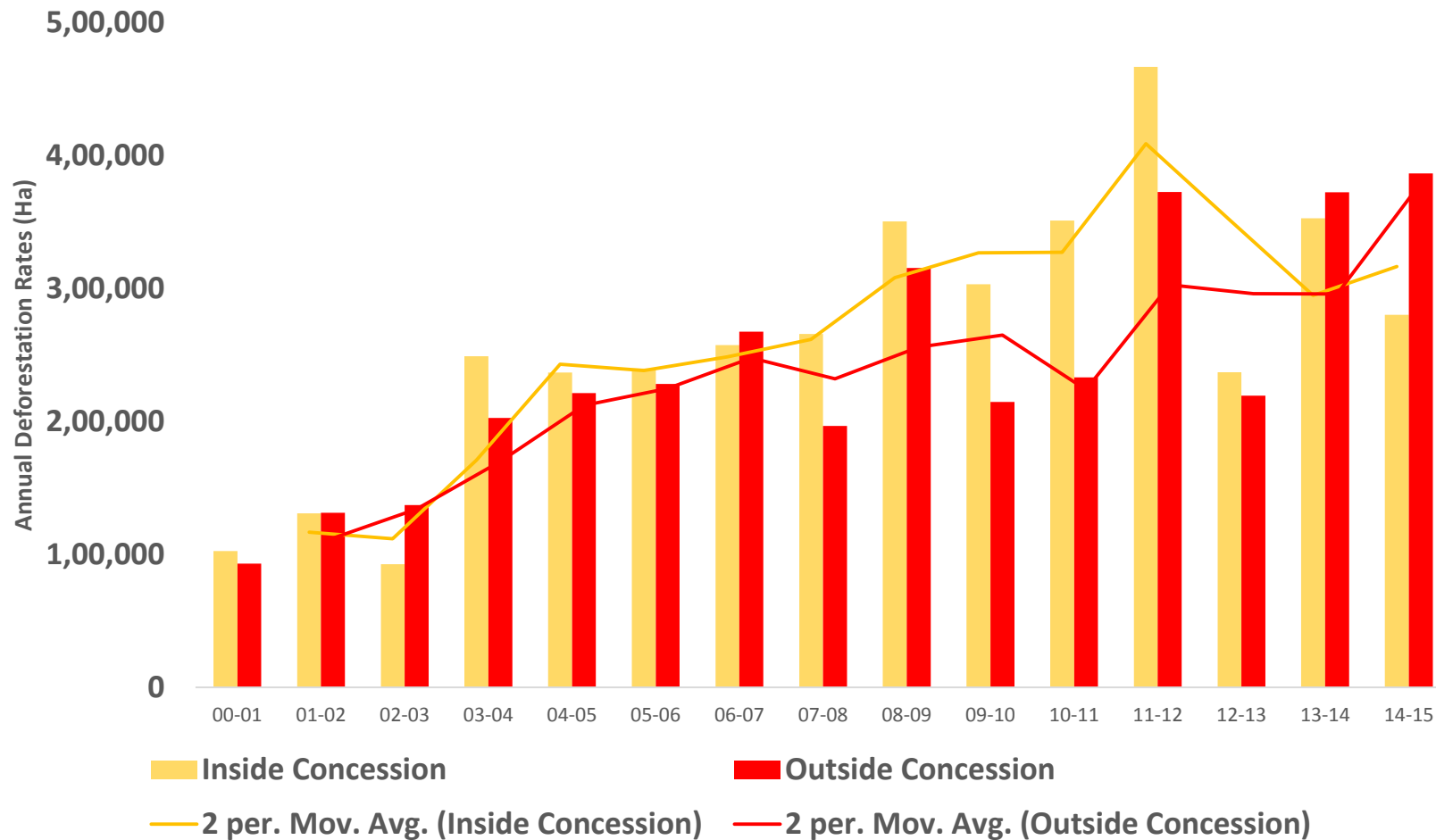
Annual primary forest cover loss during 2000-2015 in Indonesia and by island group



- Indonesia was loss **8 Mha** over 15 years – an area two times larger than Greenland
- Kalimantan contributed **3.3 Mha** (~**40.5%** of the total loss)
- Sumatra contributed **3.6 Mha** (~**43.5%** of the total loss)
- In Papua, the highest deforestation occurred in 2015 with 106.000 ha (~**23%** of **0.46 Mha** in total)

DEFORESTATION RATES

Primary forest cover loss inside and outside the concessions and overall forest cover loss across Indonesia



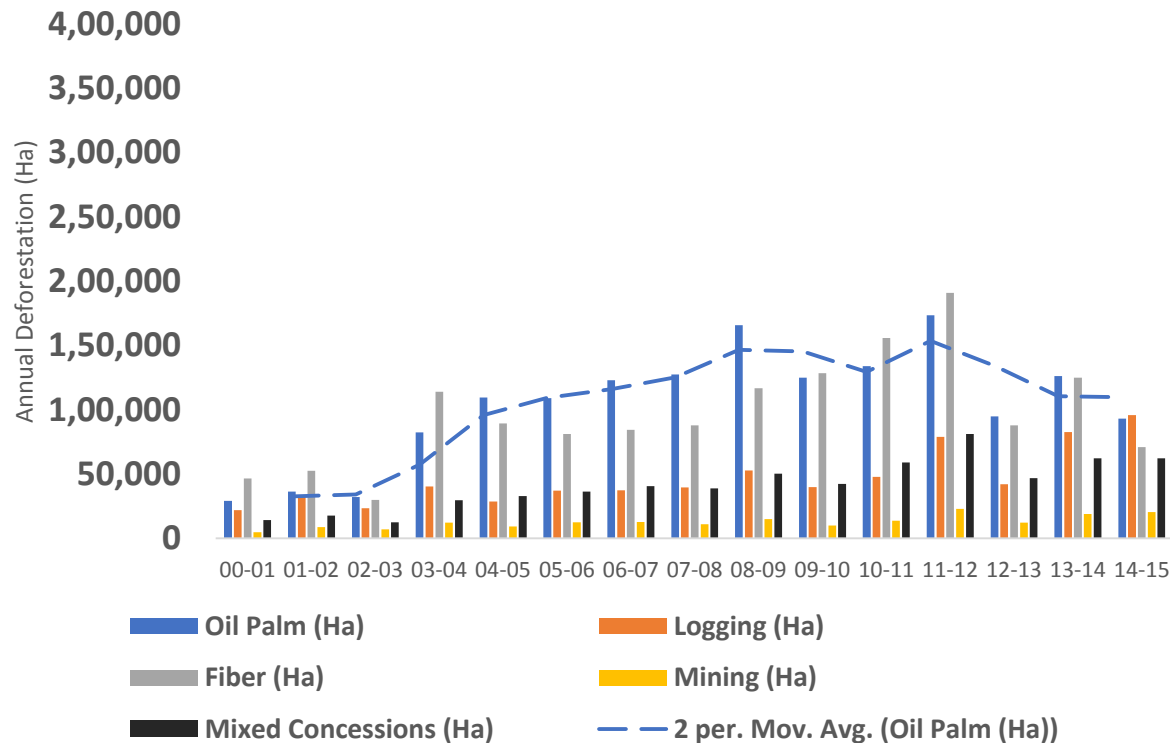
- **52%** of forest cover loss accounted inside concessions.

DEFORESTATION RATES

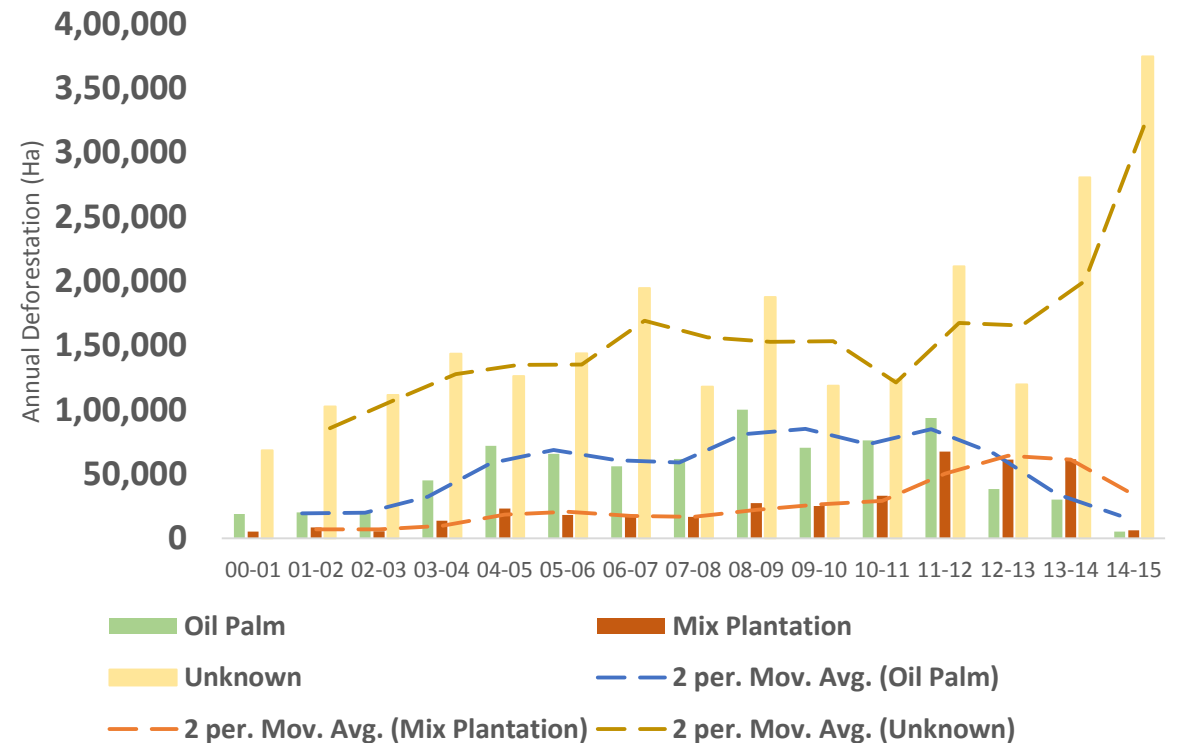
Nearly **1.5 Mha** (~**19.01%** from total of forest loss) and **1.4 Mha** (~**17.8%** of the total) were converted to oil palm and wood fiber respectively.

Unknown driver is the largest contributors with **2.43 Mha** (~**29.69%**) of forest loss.

Drivers of deforestation **inside** concession area across Indonesia



Drivers of deforestation **outside** concession area across Indonesia

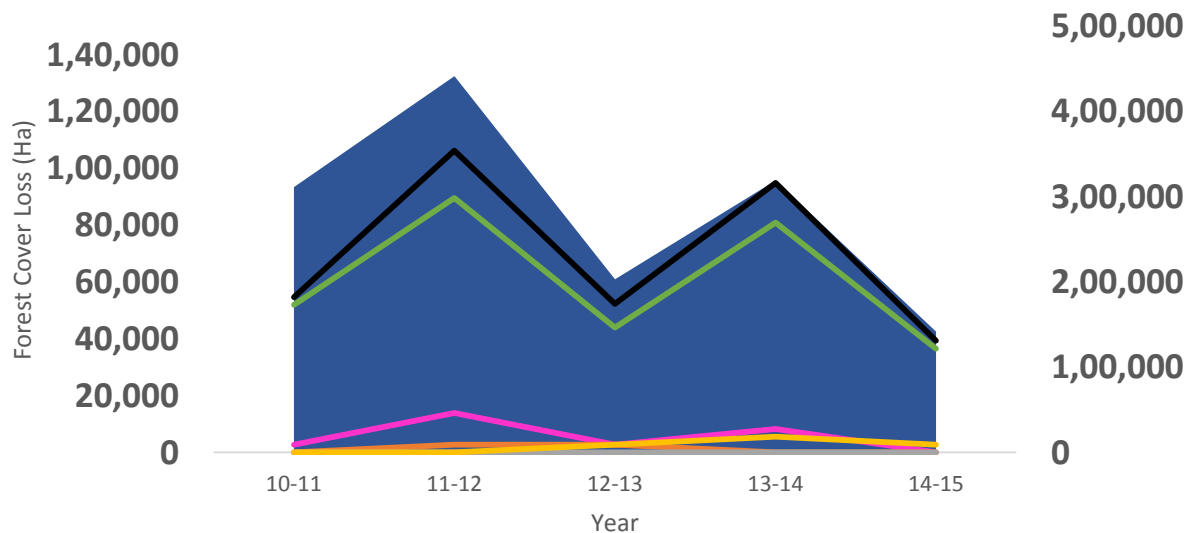


FOREST LOSS WITHIN MORATORIUM AREA

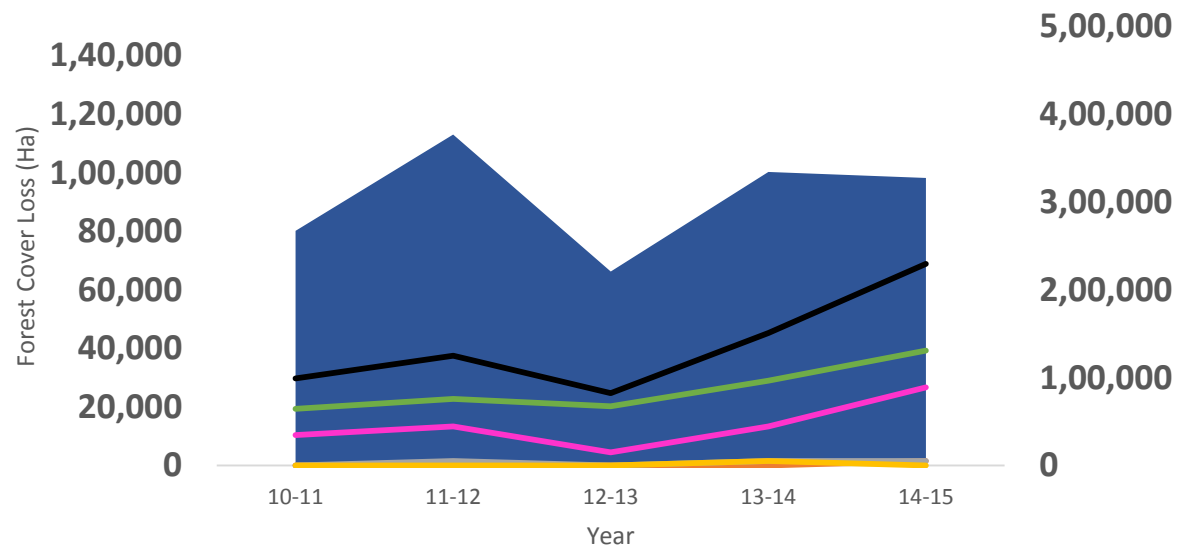
Forest in Sumatra has lost **347,349 ha** within moratorium area (~**9.77%** of the total loss) during 5 years

While in Kalimantan has lost **205,891 ha** (~**6.23%** of the total primary forest loss)

Primary forest cover loss within Moratorium Area, 2011 -2015 in Sumatera



Primary forest cover loss within Moratorium Area, 2011 -2015 in Kalimantan

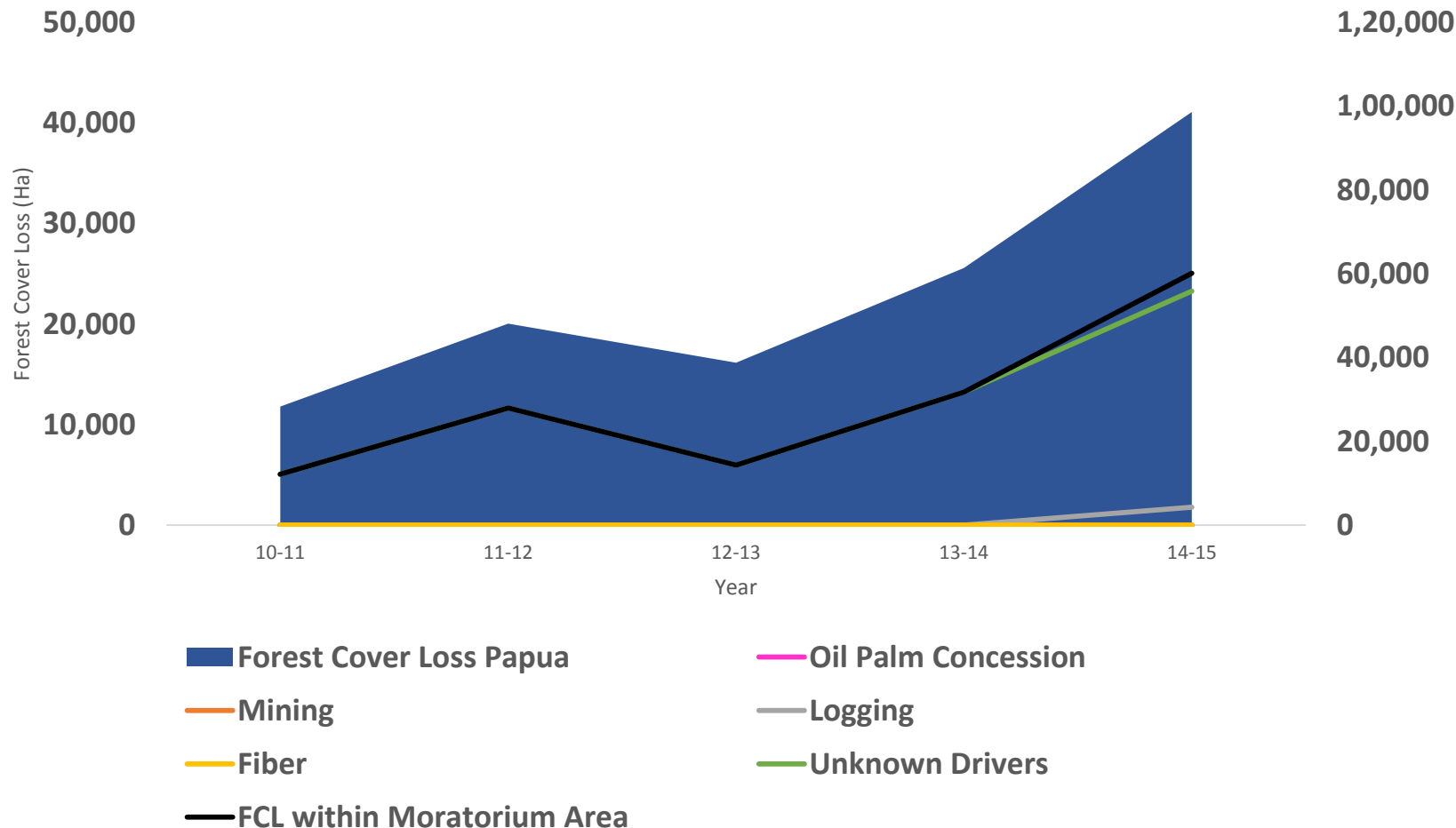


- Forest Cover Loss Sumatera
- Mining
- Fiber
- FCL within Moratorium Area
- Oil Palm Concession
- Logging
- Unknown Drivers

- Forest Cover Loss Kalimantan
- Mining
- Fiber
- FCL within Moratorium Area
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FOREST LOSS WITHIN MORATORIUM AREA

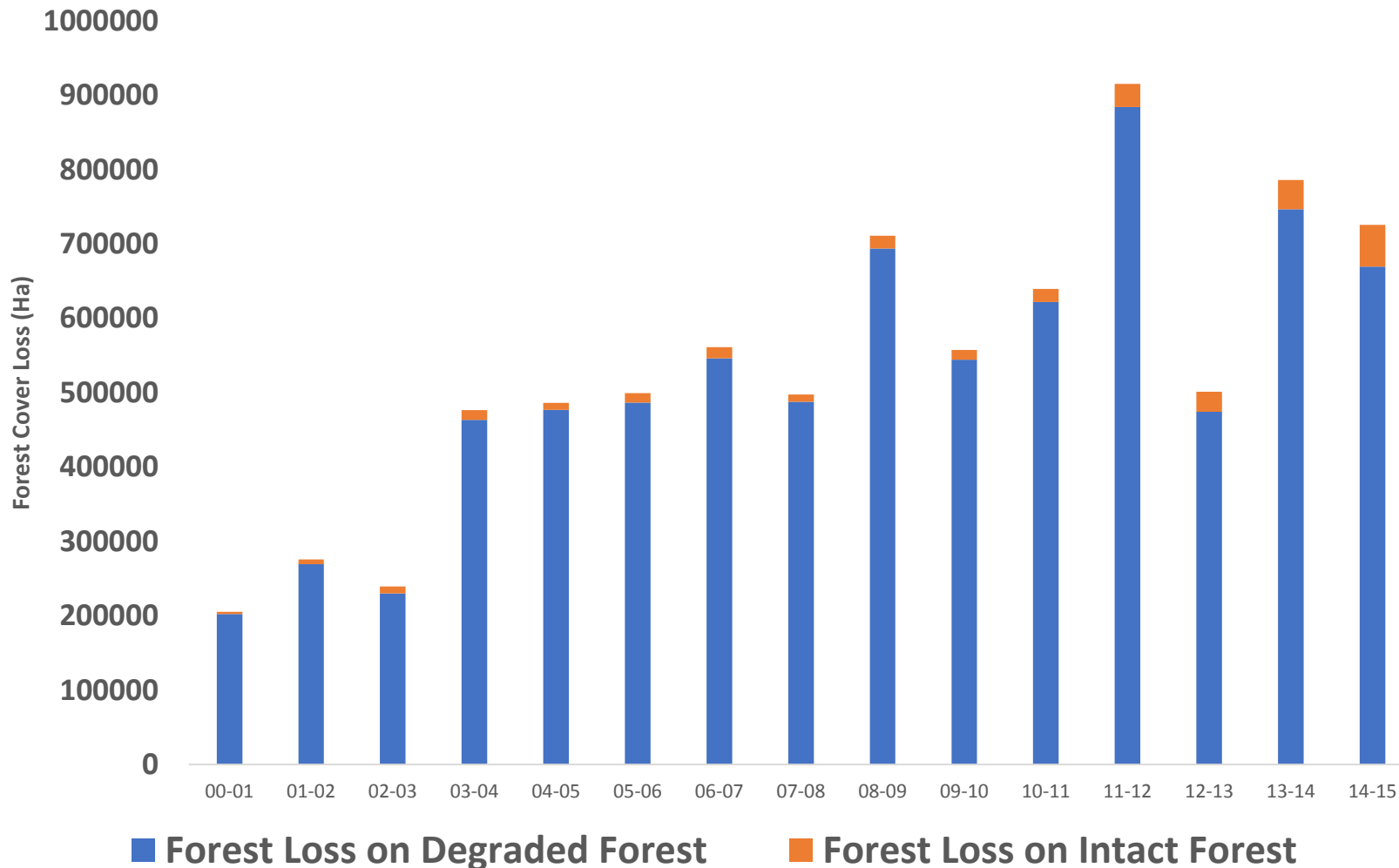
Primary forest cover loss within Moratorium Area, 2011 - 2015 in Papua



- In Papua, nearly 61,000 ha forest was lost within moratorium area (~**13.07%** of the total primary forest loss)
- Of the total, approximately Indonesia possessed 614.160 ha (~**7.52%** forest loss within moratorium area)

PERCENTAGE LOSS WITHIN PRIMARY FOREST

Forest Cover Loss on Intact and Degraded



- Much happened on degraded forest with **96.76%** and **3.24%** on intact forest evenly during 15 years.

SUMMARY OF FINDINGS

- Indonesia lost almost **8.2 Mha** of forest cover loss during fifteen years from 2000 – 2015. **Kalimantan** and **Sumatra** were the largest contributors, accounting with **40.5% (~3.3 Mha)** and **43.5% (~3.6 Mha)** respectively. The major drivers of the forest cover loss during this period were: oil palm industrial (~1.56 Mha), wood fiber (~1.46 Mha), selective logging (~0.7 Mha), oil palm outside concession (~0.77 Mha), mixed concession (~0.63 Mha), mix plantation (~0.39 Mha) and mining (~0.19 Mha), **unknown** (~2.43 Mha) driver that need to be studied further.
- It is highly important to have **greater transparency** and more **precise delineation** of concessions boundaries, considering the fact that **unknown driver** has the **largest contributors** to forest loss. The Indonesian government has already developed **“One Map” initiative** to create a single map of Indonesia for addressing this issue. This map is not only crucial for **environmental purposes**, but it could lessen the social conflict with local communities.

SUMMARY OF FINDINGS

- Moratorium Policy is not working effectively since Papua (13.07% of total forest loss), Kalimantan (6.23% of total forest loss), and Sumatera (9.77% of total forest loss) were still experienced deforestation. This policy will be **effective** to prevent deforestation if the moratorium area is not only taken at primary dry forest and peatland, but also **covered in secondary forest**.

A photograph of an elderly Black man wearing a grey hat and a light blue long-sleeved shirt. He is smiling and holding a small green sapling with soil in his hands. The background is a lush green forest.

MAY THE
FOREST
BE WITH YOU

Thank you