

Disturbance of Forest Ecosystem in Indonesia

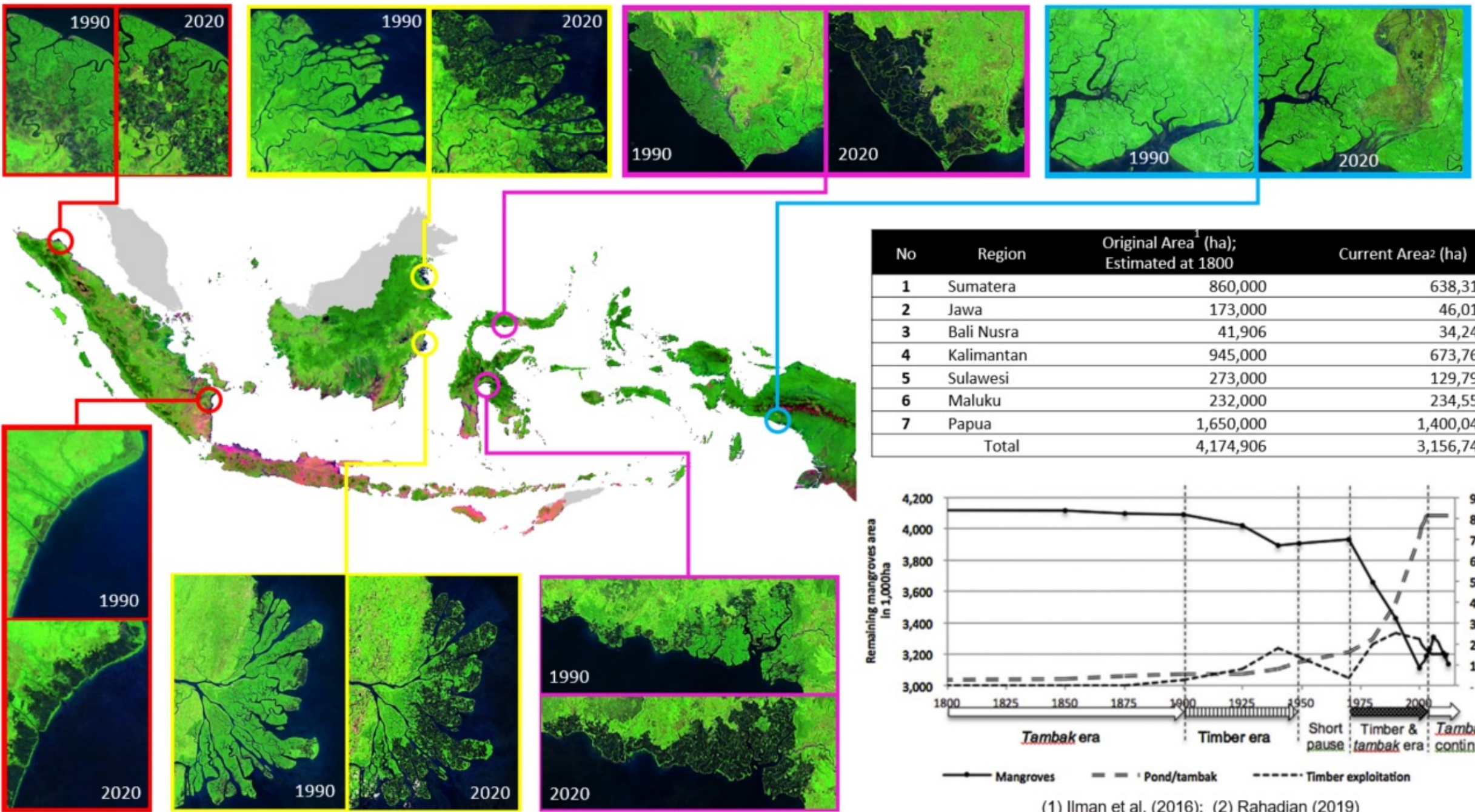


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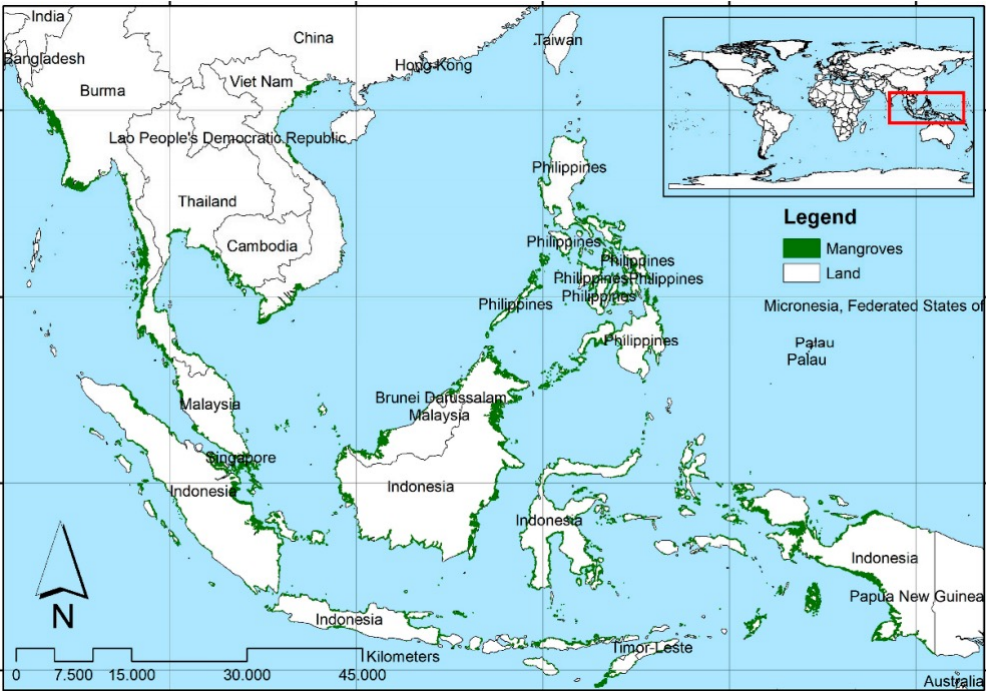
23rd March 2021

A. MANGROVE DEFORESTATION & DISTURBANCE

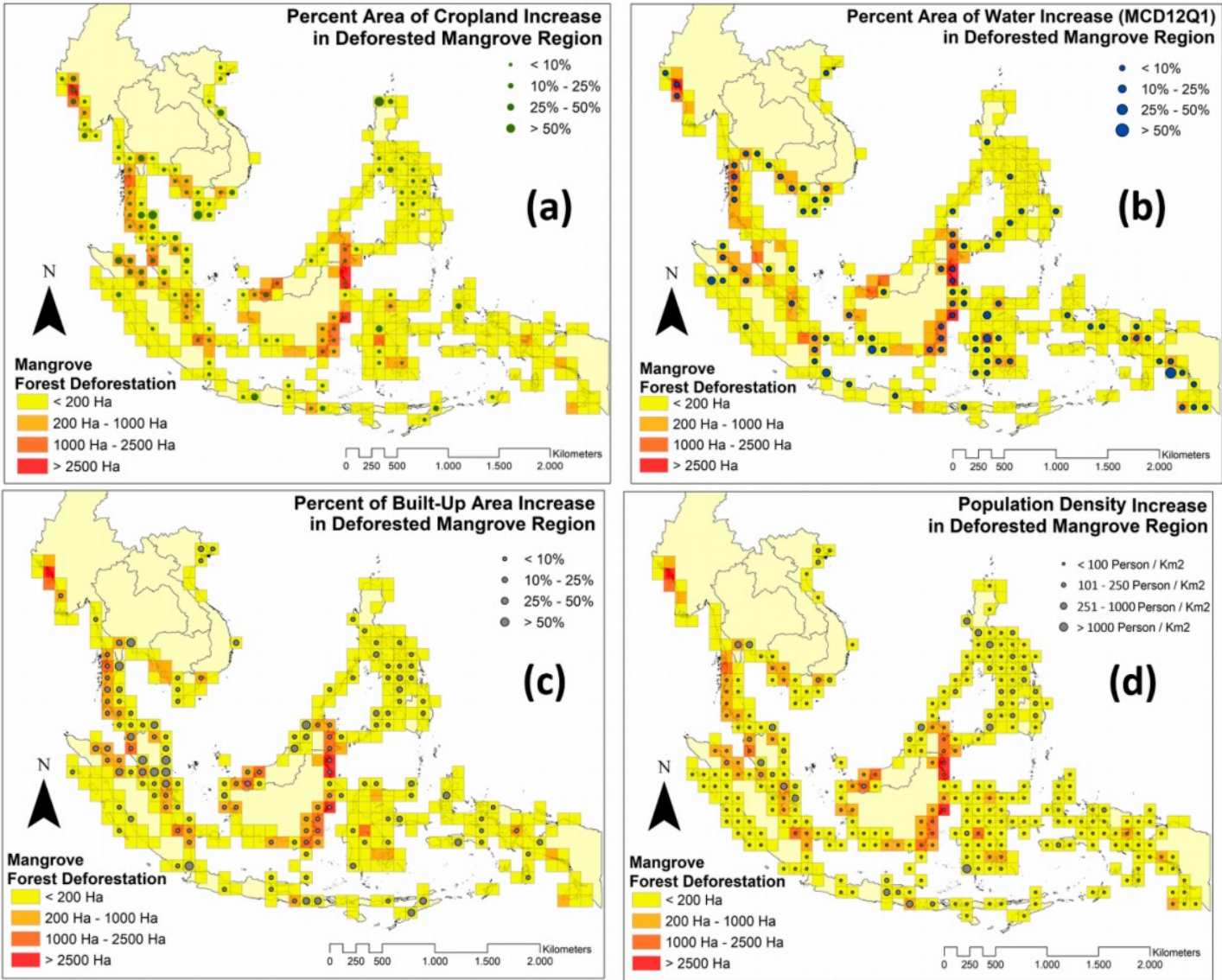


(1) Ilman et al. (2016); (2) Rahadian (2019)

Disturbance of Mangrove Forest : Agric. Expansion, Ponds conversion, Infrastructure & Population (2000-2012)

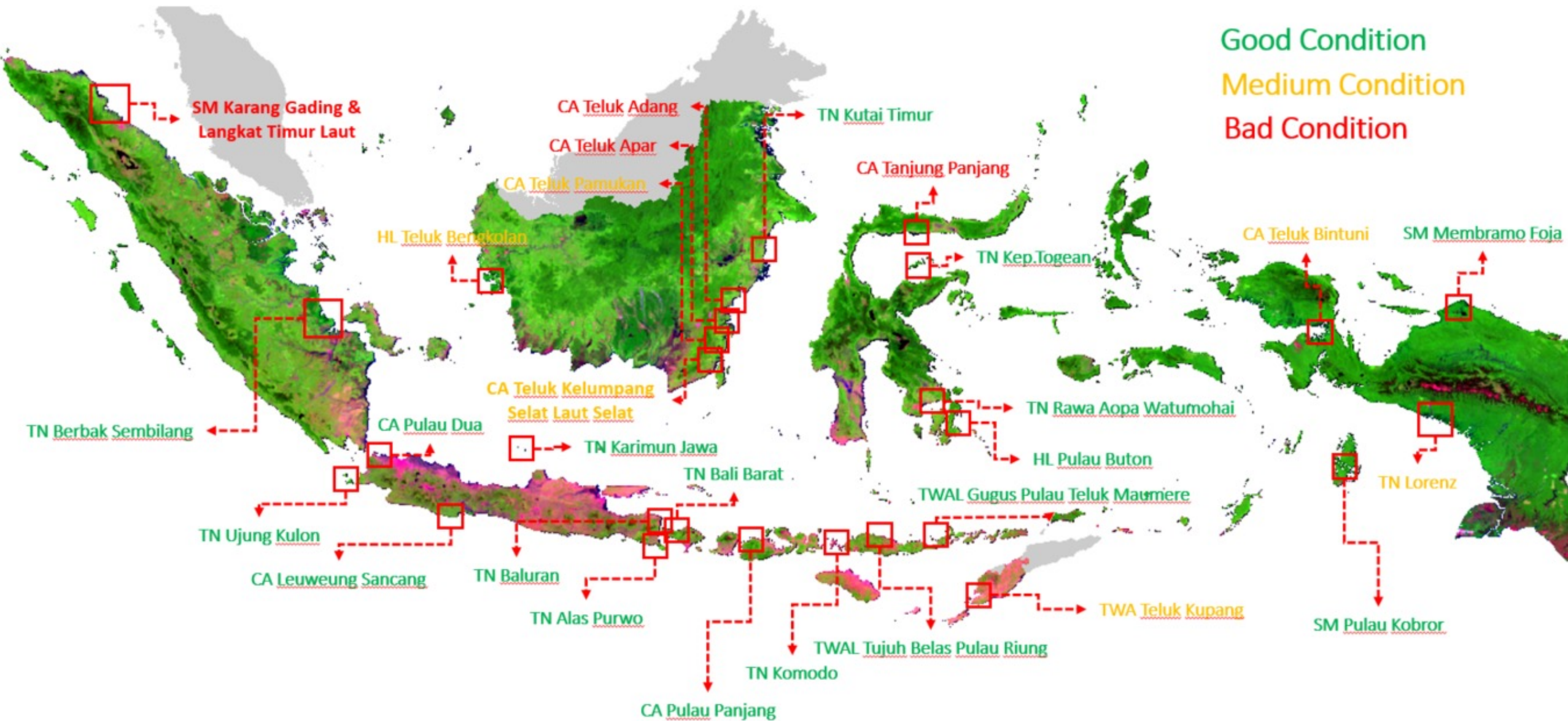


22.64% -> agriculture expansion,
5.85% -> aquaculture expansion,
0.69% -> infrastructure expansion,
54.47% -> couldn't be identified (abrasion, pollution, sedimentation, water balance, climate issue, pests, and diseases)
16.35% -> was not converted to any kind of land use type but was indicated as being affected by other human activities

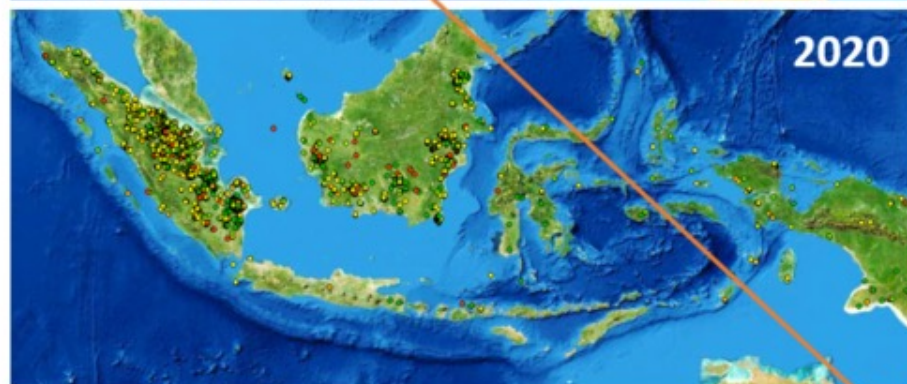
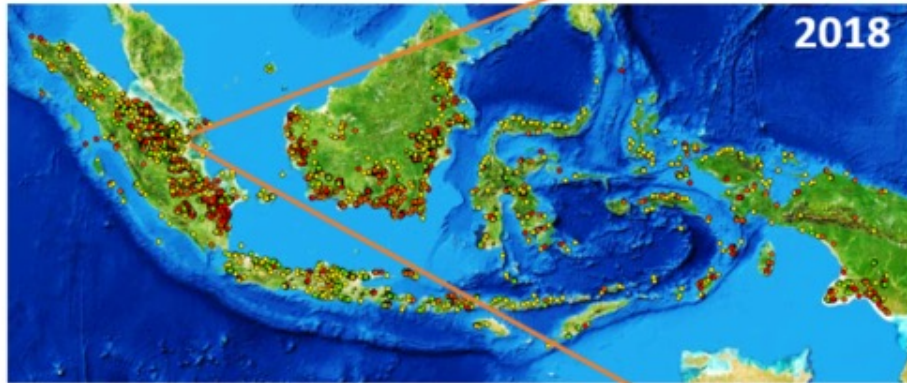


Spatial distribution of increased percentages of (a) cropland, (b) water (c) built-up areas, and (d) population density in deforested mangrove areas.

DEGREE OF DISTURBANCE IN PROTECTED MANGROVE FOREST : QUALITATIVE ASSESSMENT



B. Lowland, Swamp & Peat Forest : Disturbance of Agric. Expansion & Industrial Forest :



- Devegetation occurs in swamp forests, peat forests and lowland forests
- Disturbance is related to the development of oil palm plantations and management of industrial plantations

$$NDOAI = \frac{\rho_{SWIR} - \rho_{NIR}}{\rho_{SWIR} + \rho_{NIR}}$$

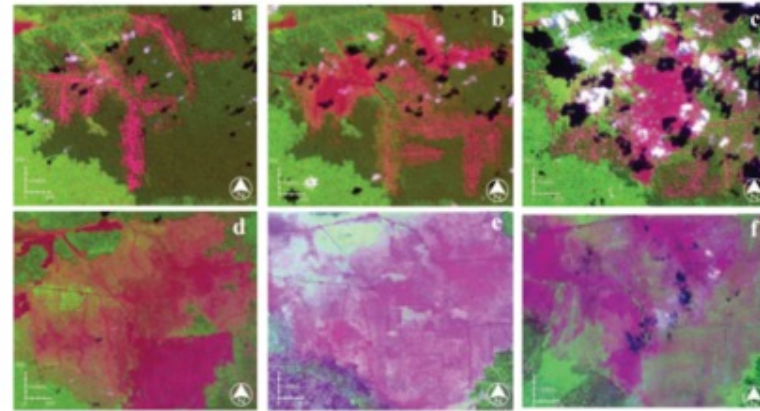
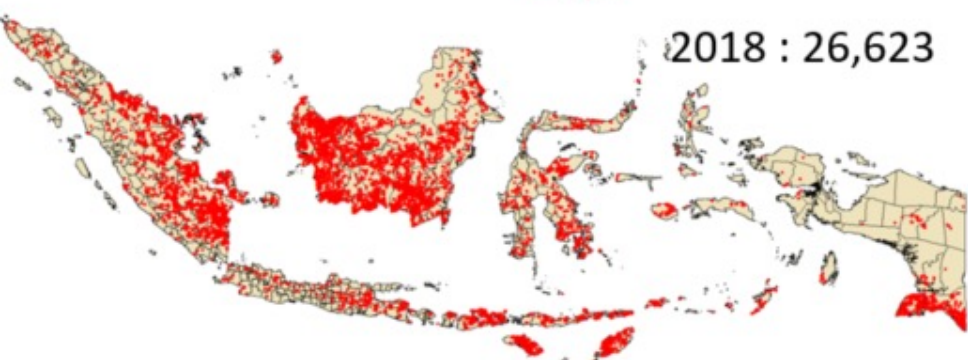
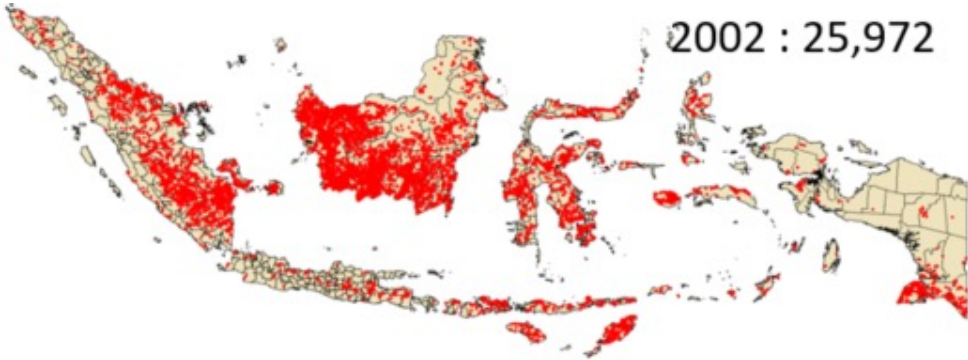
Equation is similar to NDSI (Normalized Difference Soil Index) , NDBI (Normalized Difference Built-up Index)

Soil: absorbs most of the NIR light; **reflects** a large portion of the SWIR light.

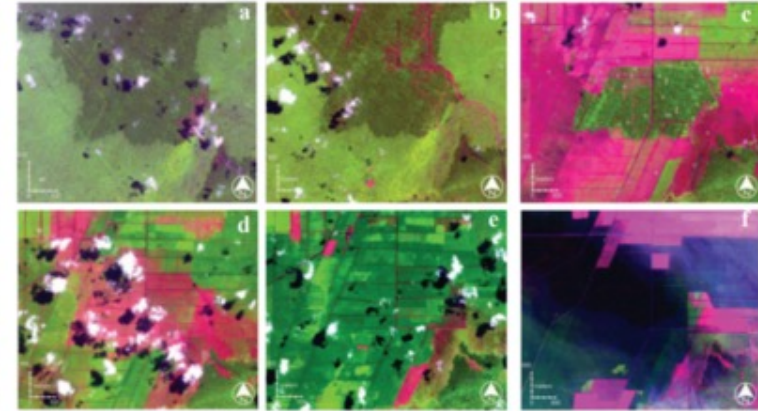
Vegetation: reflects most of the NIR light; **absorbs** a large portion of the SWIR light.

Setiawan, Y; K Kustivo; A Darmawan. 2016. A simple method for developing near real-time nationwide forest monitoring for Indonesia using MODIS near-and shortwave infrared bands Remote Sensing Letters 7 (4), 318-327

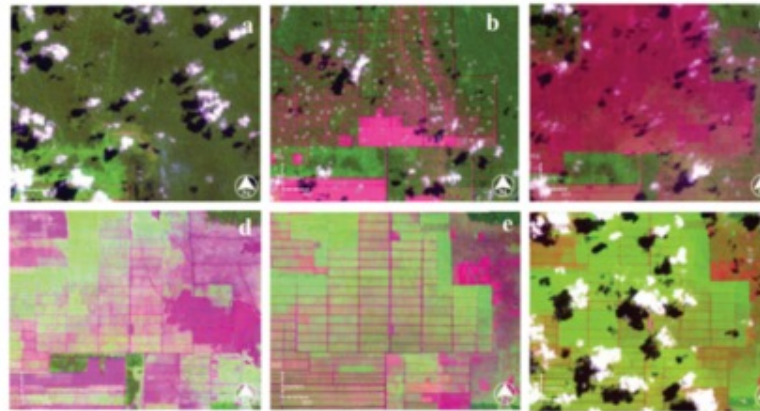
Forest Fire Associated with Bush & Forest conversion to plantation



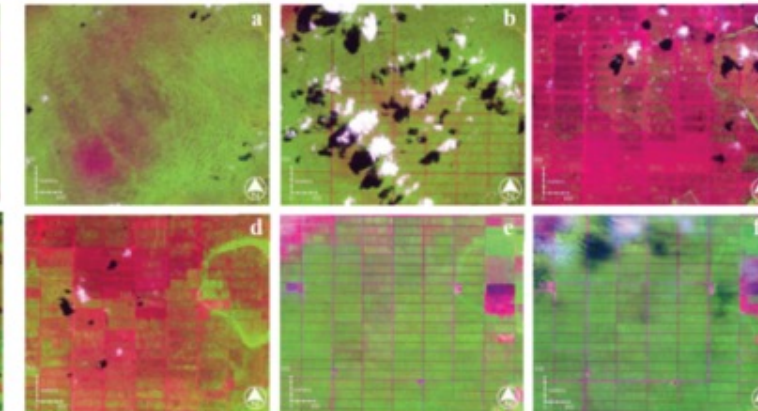
Trajectory from secondary forest to bush: false color composite of Landsat (a) in 2002, (b) 2003, (c) 2004, overlaid with 80% confidence of hotspot in 2004 (white circle), (d) 2005, (e) 2008 and (f) 2015.



Trajectory from secondary forest and bush to forest plantation: false color composite of Landsat taken in (a) 2001, (b) 2002, (c) 2004, overlaid with 80% confidence of hotspot in 2004 (white circle), (d) 2005, (e) 2006, and (f) 2013.

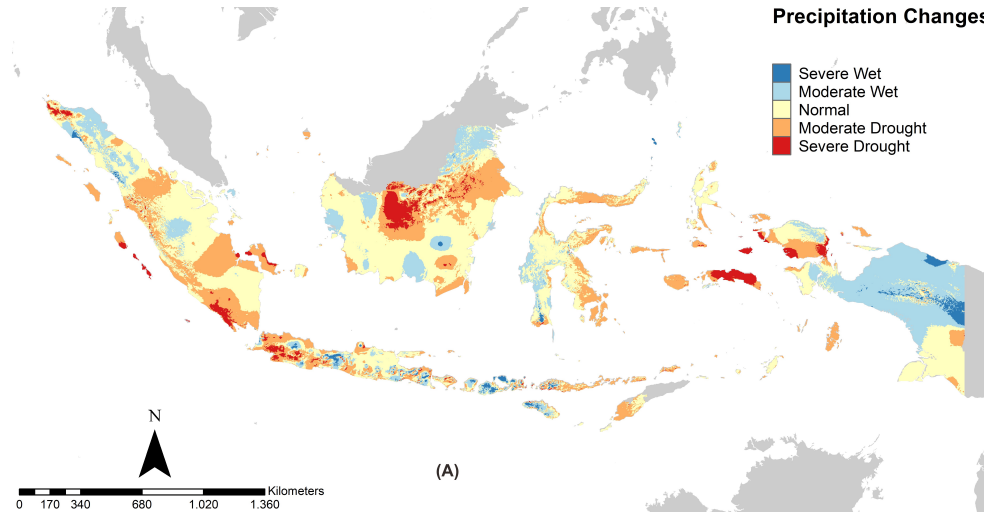


Trajectory from secondary forest to oil palm plantation: false color composite of Landsat taken in (a) 2002, (b) 2004, overlaid with 80% confidence of hotspot in 2004 (white circle), (c) 2005 (d) 2008, (e) 2013, and (f) 2014.

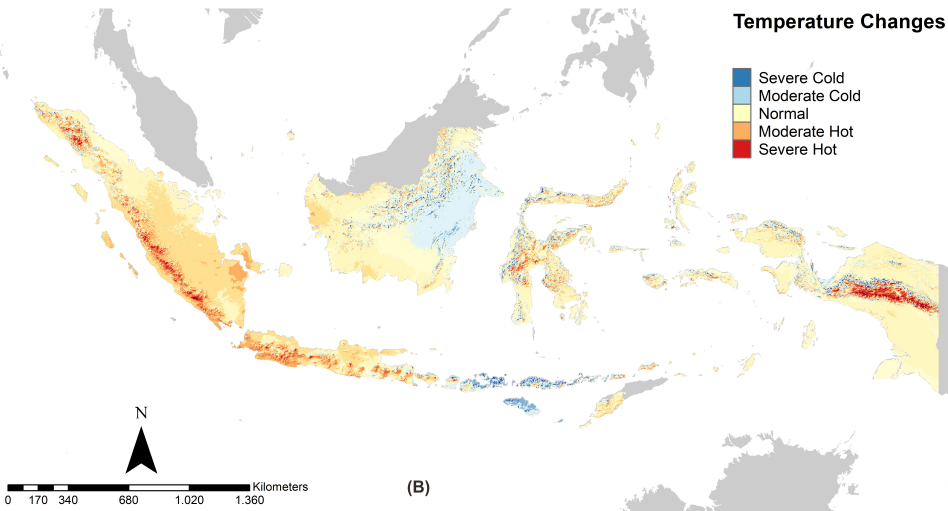


Trajectory from bush to oil palm, false color composite of Landsat taken in (a) 2002, (b) 2003, (c) 2004, overlaid with 80% confidence of hotspot in 2004 (white circle), (c) 2005, (d) 2008, (e) 2013 and (f) 2014.

Climate Change & Anthropogenic Disturbance



Most Province getting drier, but some are Increase : Lampung, Aceh, Bangka Belitung, Kalimantan (HoB), Ambon, Papua Barat

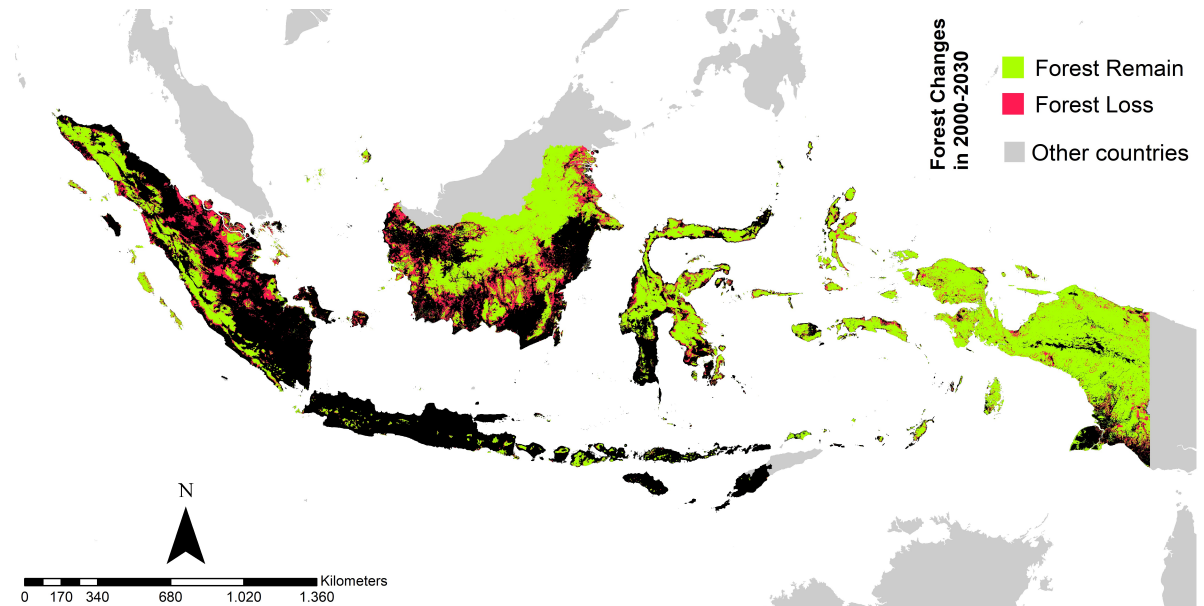
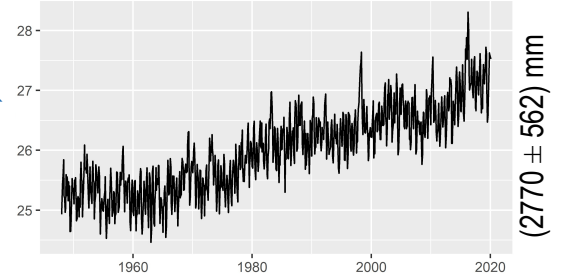


Most Province hotter, but some are Cooler : Kalimantan Timur dan Nusa Tenggara Timur

During period : 2000-2030

Pessimistic Scenario (RCP8.5)

1.17 °C↑ 32 mm↑



Challenge :
How is the species adapt to the climate change & disturbance ?

Condro, A.A.; Prasetyo, L.B.; Rushayati, S.B.; Santikayasa, IP.; Iskandar, E. 2021. Predicting Hotspots and Prioritizing Protected Areas for Endangered Primate Species in Indonesia under Changing Climate. *Biology* 2021, 10, 154. <https://doi.org/10.3390/biology10020154>