

To What Extent is Deforestation Increasing in West Papua?

Silverdale School

Chorus Education Trust

Silverdale School

IRIS The Institute for Research in Schools

Summary

The effects of deforestation within Indonesia have been investigated, in particular the region of West Papua. The aim for this project was brought forth by a World Resources Institute article that stated deforestation in Indonesia as a whole was decreasing by 40%. However, some parts of Indonesia like West Papua had a slight increase in deforestation. The objective of our project was to explore whether there remains an increase in deforestation in this region and how deforestation affects the country. This project consisted of the collection of satellite data from EO browser and analysing the rate of deforestation.

Earth Observation Satellites

The EO Browser is the web application that enabled us to conduct our research. The group of satellites that we used are part of the Sentinel-2 earth observation mission, launched in 2015, that aimed to map land and coastal waters in high resolution; each satellite has thirteen spectral channels each sensitive to a specific range of the electromagnetic spectrum. These can be used to create filters that can highlight objects with the special signature you want to target e.g., vegetation strongly reflects parts of the infrared spectrum so it would be clearly identifiable in an infrared image. The free public access to vast amounts of satellite data provided by the European Space Agency and the National Aeronautics and Space Administration and the EO browser's spatial visualisation tools facilitated the entirety of our research.



Images taken from EO browser for a field at the coordinates (-1.9, 132.1) on 2017-07-04 and 2022-01-14

Deforestation and its Effects in Indonesia

West Papua, a country located off the coast of mainland Southeast Asia, has displayed an overall decrease in the rate of forest destruction. The Global Forest Watch indicates a 40% decrease in deforestation in Indonesia's primary forests in 2018 compared to the average annual loss from 2002-2016. This compliments statistics released by the Indonesian government reporting 440,000 hectares of deforestation in 2018 compared to 480,000 hectares in 2017. Reasons behind this decline could be due to strengthened law enforcement for the prevention of forest fires and inhibition of forest clearance. However, seasons of wetter weather could also have contributed to a reduction of forest fires leading to a decline in forest loss. Despite overall decreases, some areas have experienced raised deforestation rates such as East Kalimantan, Maluku, and West Papua which have seen increases of 43%, 40% and 36% respectively between 2017 and 2018. Regrettably, Indonesia remains in the top three countries for the amount of forest lost.

The culprit responsible for this increase may be growth in the use of biofuels, especially palm oil, which sacrifices forests to clear land for plantations and results in a loss of biodiversity. Owing to the fact that forests are more effective at absorbing CO₂ from the atmosphere than crops, deforestation contributes to climate change on both a global and local level (it is thought to be responsible for heightened severity of recent droughts in Indonesia). The politics behind deforestation is steeped in complexity with officials claiming indigenous communities are the main cause of deforestation; a distraction from the proximate causes that the World Bank claims are the clearance of land for agriculture, commercial logging, fuel wood gathering and cattle raising. Foreign debt remains a driving factor behind deforestation as the Indonesian government perceives this biome as a valuable but dispensable resource. At COP 26 in Glasgow, Indonesia pledged to end deforestation by 2030. However, whether this promise will be achievable is uncertain.

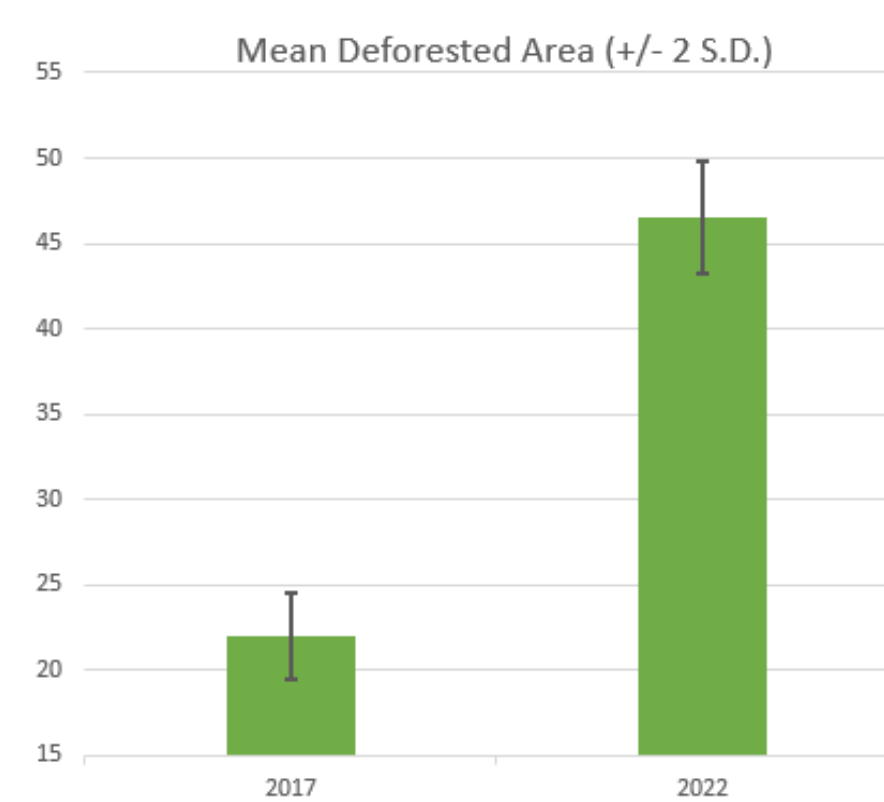


Experimental method

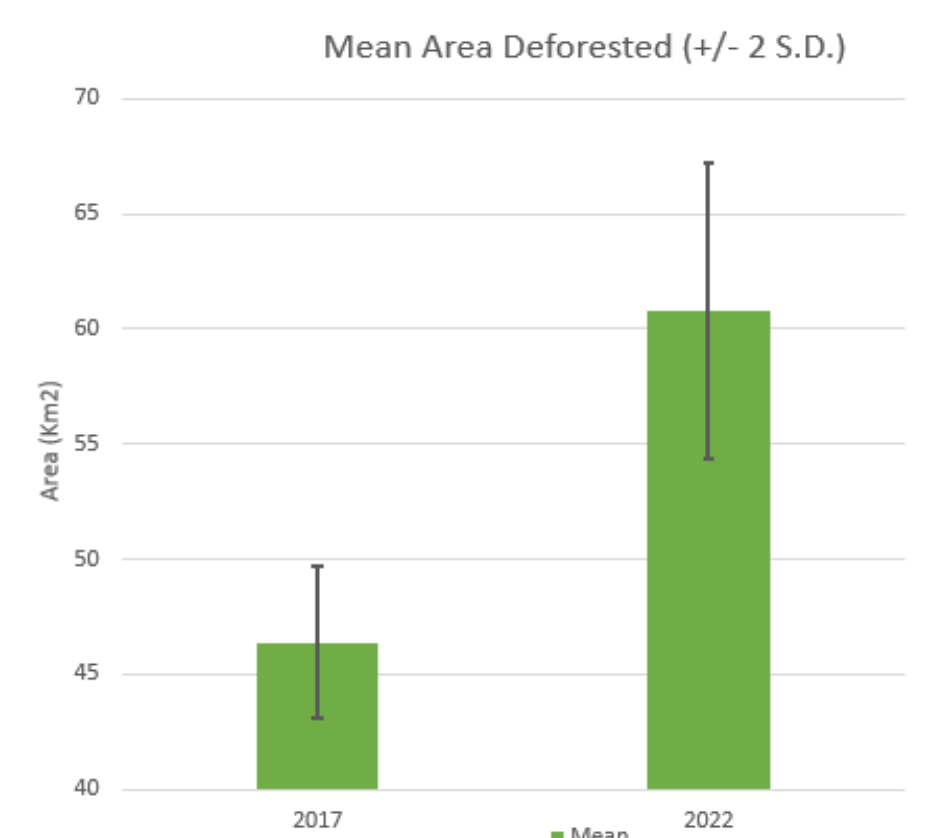
We measured the change in size of deforested areas in West Papua to determine whether the local governments' claims about preventing deforestation were true. We measured the size of the deforested land on different dates to calculate the level of change:

- We chose the dates 4th of July 2017 and 14th of January 2022 as images for these dates had the least cloud coverage so were the easiest for viewing the fields.
- We located 2 fields at the coordinates -1.9,132.1 and -1.89,132.35
- We measured the fields using the sentinel-2 satellite as our data source and utilised a false colour (urban) filter.
- We attempted to obtain an accurate measurement for the deforested area by repeating the same technique to measure the field 7 times by multiple people. This enabled the detection of anomalies.
- With complex field shapes we assembled multiple polygons as it was impractical to use one. The areas of these polygons were then added together to calculate the total area.
- However, we encountered some problems while measuring the fields such as their irregular shape and cloud coverage over the borderline. To overcome this problem, we altered the filter to true colour, enabling us to see field borders with greater clarity.

Results



Graph showing the increase in deforested land for a field at coordinates (-1.89, 132.35)



Graph showing the increase in deforested land for a field at coordinates (-1.9, 132.1)

Conclusion

Overall, there is a 40% decrease in the rate of deforestation in 2018 compared to 14 years prior. However, this figure does not represent what is happening on the local scale.

The WRI article claimed that there is a 36% increase in deforested land between 2017 and 2018. Following our research and data collection, we have reported an increase in deforested land, finding a mean increase of 71% in cleared land across the two fields between 2017 to 2022. There was a large variance between the sites, having a 31% increase and 112% increase in deforested land respectively. Reasons for this increase could be due to the expansion of plantations for biofuel production in addition to increased food demand due to a growing population and the use of wood as a raw material.

A limitation to our method would be that we only measured two fields from West Papua therefore our results can't be generalised to the wider region.

However, the importance of reducing deforestation is evermore present because once primary forests are destroyed it takes centuries to recover. This will inevitably impact on the carbon sink the forest provides and the biodiversity it supports.

References

- <https://www.bbc.co.uk/news/59387191> (date accessed 16/12/2023)
- <https://www.globalforestwatch.org/dashboards/country>
- <https://www.wri.org/insights/indonesia-reducing-deforestation-problem-areas-remain>
- Dauvergne, P. (1993). The Politics of Deforestation in Indonesia. *Pacific Affairs*, 66(4), 497-518. <https://doi.org/10.2307/2760676>