Impact of healthcare access and livelihood support on deforestation rates in Kalimantan, Borneo

Hopkins S, Hazel A, Pourtois J, Chamberlin A, Gajewski Z, Harryman I, Sokolow S, MacDonald A, Nova N, Ahmad A, Andiani J, Emerson A, Febriani N, Finley N, Izza Q, Miller A, Sartika I, Webb K, Siregar I, Jones I, Liu Z, De Leo G.

Conflict of Interest:
The author has declared no conflict of interest.

Photo credit ASRI

Introduction

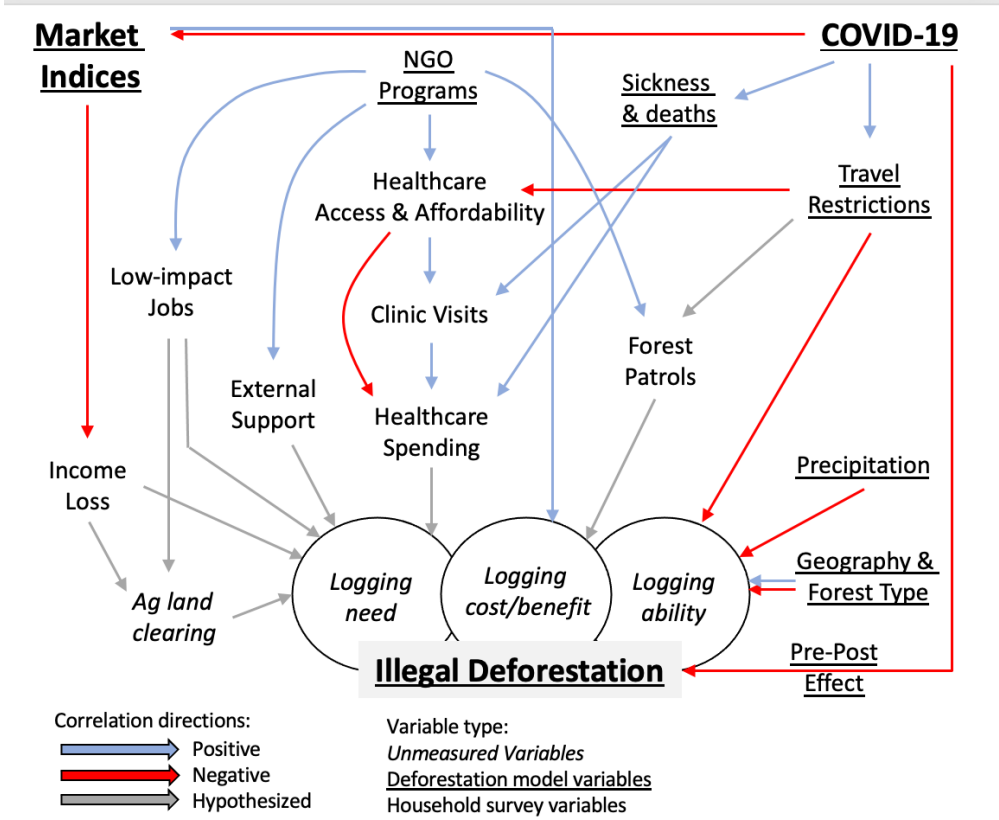
- Human health and the health of the planet are co-dependent
- Anthropocene – human activity is the dominant force shaping Earth's biophysical condition
- Decisive decade – need to stabilize at 1.5C
- Tropical rainforest sequesters substantial global carbon
- Unsustainable resource use near economically poor communities causes environmental degradation
- This leads to increased disease burden, poverty and unsustainable resource use, such as logging
- Local health and livelihood support may break this vicious cycle

newatlas.com

MEDECINS SANS FRONTIERES

Community Designed Solutions to Reduce Logging & Improve Wellbeing: Yayasan Planet Indonesia & Alam Sehat Lestari

- Recognise indigenous communities ecological knowledge critical in identifying challenges and solutions
- All programmes are co-created by communities
- 'Radical' commitment to following community priorities
- Communities requested:
  - Increased access to healthcare
  - Sustainable livelihoods training
  - Monitoring of illegal deforestation
  - Return of indigenous land rights to protected forests



Prior to the pandemic, illegal logging rates were already lower in villages affiliated with NGOs

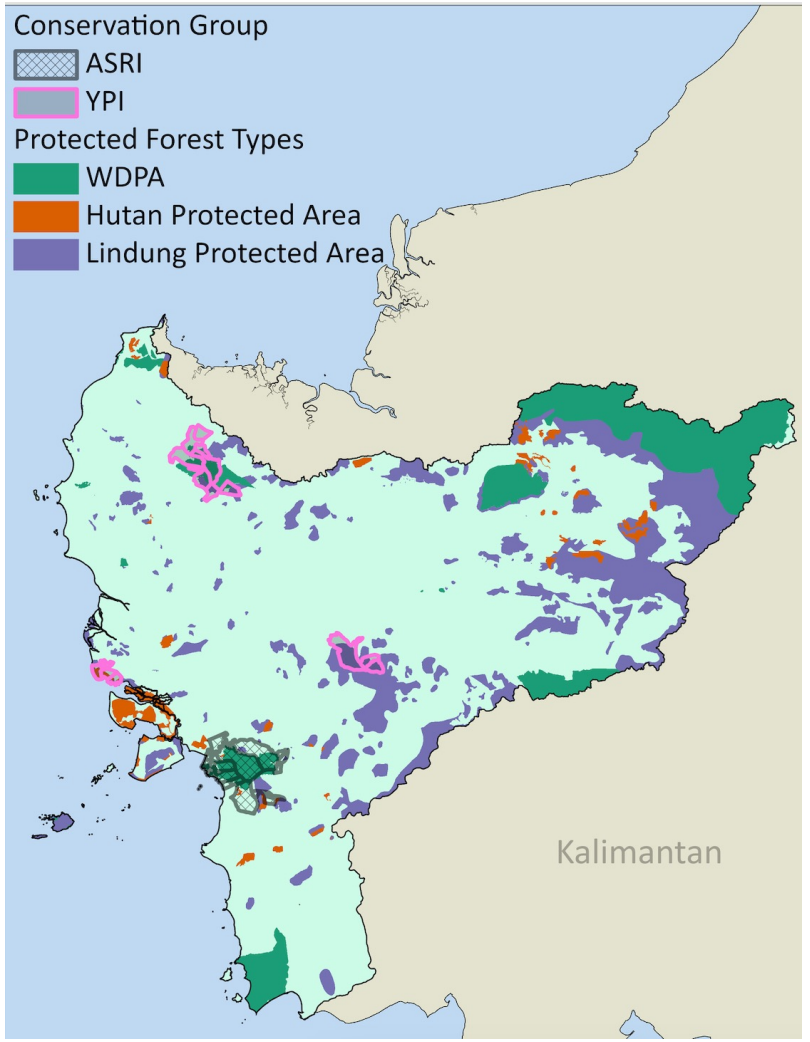
Would this continue to be the case during the economic shock created by the COVID-19 pandemic?

MEDECINS SANS FRONTIERES

SCIENTIFIC DAYS

Study design – (i) cross sectional mixed-methods survey (November 2021)

- Household survey in 10 villages in W Kalimantan
  - All living within the perimeter of tropical rainforest
  - 6 NGO affiliated villages (3 for each NGO)
  - 4 nearby unaffiliated villages (2 for each NGO)
- Affiliated villages selected with the longest link
- Unaffiliated had similar socio-ecological profiles
- 100 households/village; adults >18
- 1016 households across 10 villages
- Survey explored experiences pre-post pandemic
  - All sources and changes in income
  - Any external financial support
  - Healthcare needs, access and expenditure
- Differences compared between each NGO and unaffiliated villages using logistic regression



Ethical approval for the study received from IPB Bogor Ethical Review Board and Stanford University Institutional Review Board

Study design – (ii) Satellite analysis of deforestation across West Kalimantan

- Novel machine learning method developed
- Satellite imagery used to estimate weekly deforestation rates across all villages in West Kalimantan (n=726)
- LiDAR data from 2014 for baseline forest cover/model
    - Land cover classification
    - Vegetation indices
    - Topographical land features
- Landsat 8 to classify each 30m^2 pixel in weekly time series between Jan 2018 to November 2021 into forested or deforested
- Where cloud cover, pixel loss interpolated using model probabilities
- Aggregated time series pixel data to calculate how much deforestation in each village each week
- Negative binomial generalized linear mixed effects model

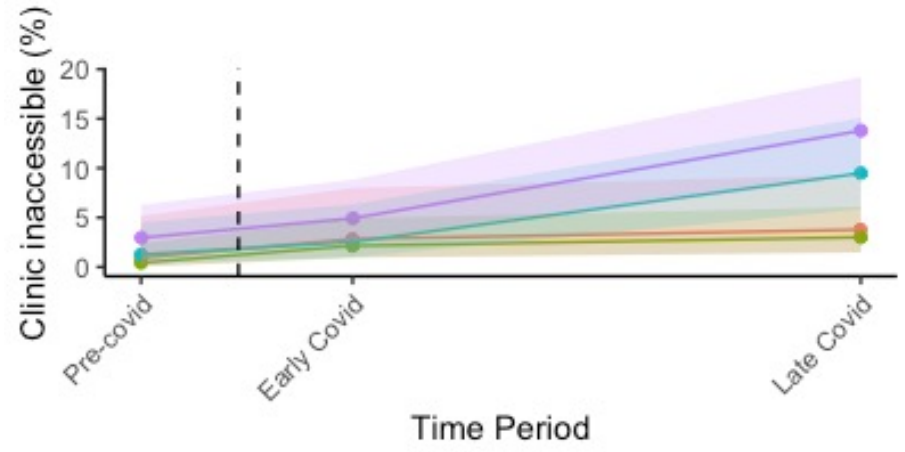
NASA Landsat

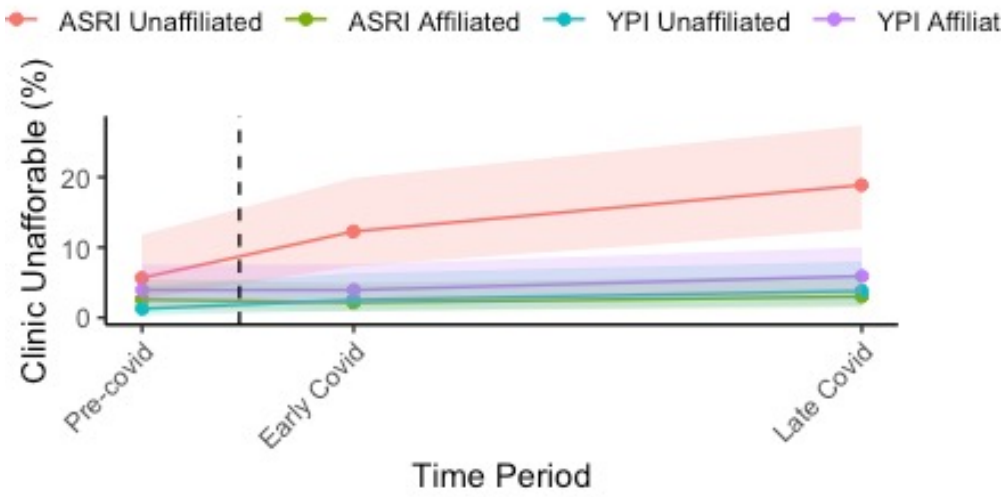
MEDECINS SANS FRONTIERES

SCIENTIFIC DAYS

Results (i) health impacts

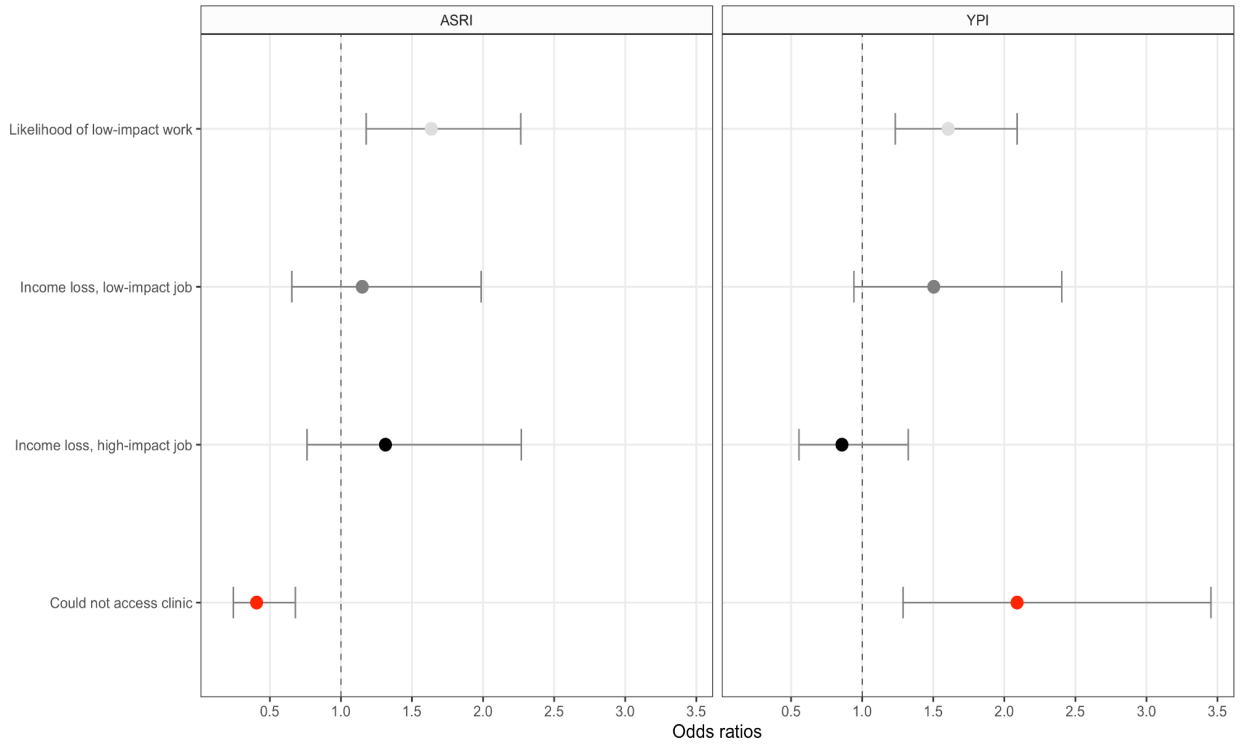
- ⇧ self-reported sickness and clinic visits in all villages
- Average monthly spending on healthcare doubled during pandemic across all villages
- ASRI affiliated villages less likely to report barriers to affordable healthcare than unaffiliated (OR 0.14, CI 0.05-0.32, p<0.001)
- No difference in accessibility between ASRI affiliated and unaffiliated villages (OR 1.2, CI 0.31-3.86, p=0.98)
- YPI affiliated and unaffiliated villages equally likely to report unaffordable or inaccessible healthcare (OR 1.58, p=0.38; 1.57, p=0.18)





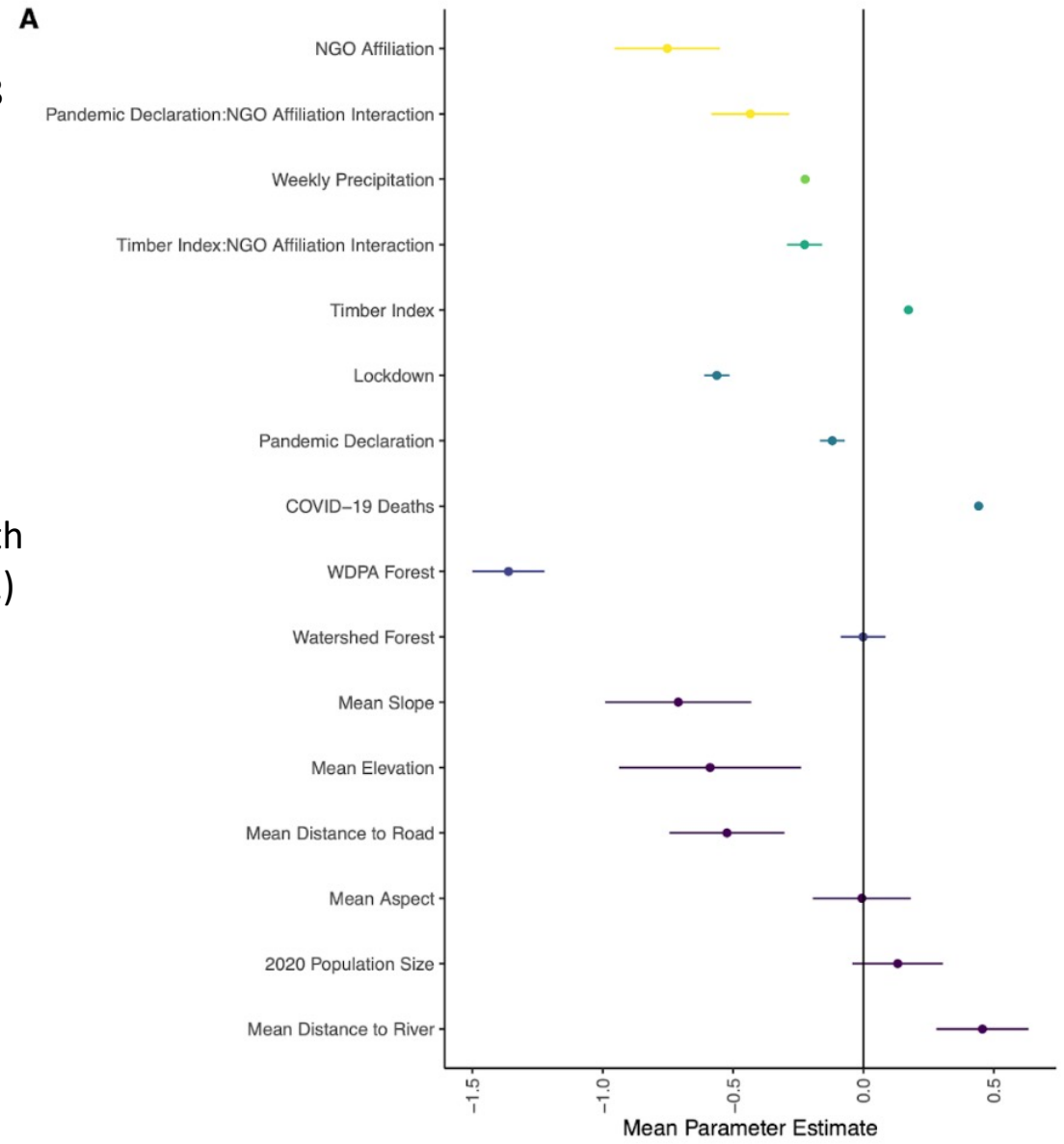
Results (ii) livelihoods impact

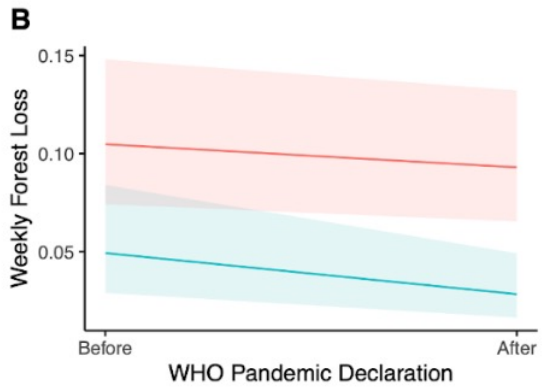
- All villages had similar income-generating jobs
- NGO affiliated villages were 1.6 times more likely to do jobs with low environmental impact (ASRI OR 1.62, CI 1.17-2.25, p=0.004; YPI OR 0.05, CI 0.01-0.15, p<0.001)
- NGO affiliated villages reported ⇩ resource intensive jobs (ASRI OR 0.25, CI 0.1-0.66, p=0.004; YPI OR 0.05, CI 0.01=0.15, p<0.001)
- All villages reported loss of income from nearly all jobs
- Affiliated villages ⇧ reported income from resource neutral jobs (vs 0 in unaffiliated)
- Affiliated villages ⇧ average sources of external support (YPI OR 1.36, p=0.004; ASRI OR 1.26, p=0.07)
    - Government programmes
    - NGO programmes
    - Others – co-ops, friends, family

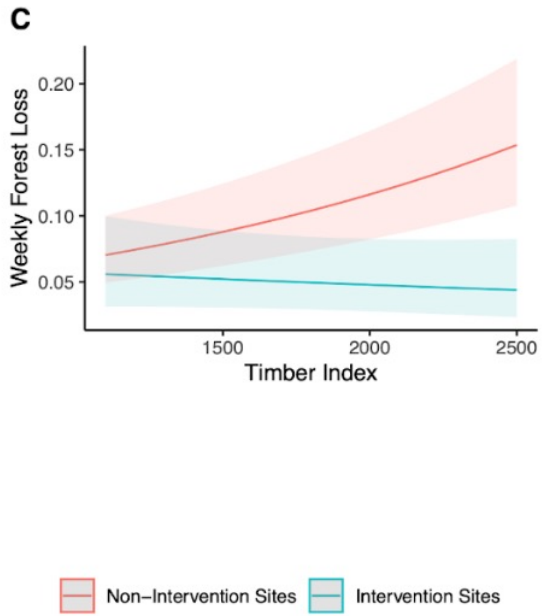


Results (iii) Deforestation impact

- Comparison of 28 affiliated villages with 698 unaffiliated villages across West Kalimantan
- Prior to pandemic, average deforestation rates were 70% lower in affiliated villages (0.018% vs 0.062%, p <0.01)
- After accounting for all other variables, average weekly deforestation during the pandemic was lower in affiliated villages both before and after (0.008% vs 0.026%, p <0.01)
- Deforestation declined more in affiliated villages during the pandemic
- Unaffiliated villages were reactive to the rebound Timber market demand; affiliated villages did not respond





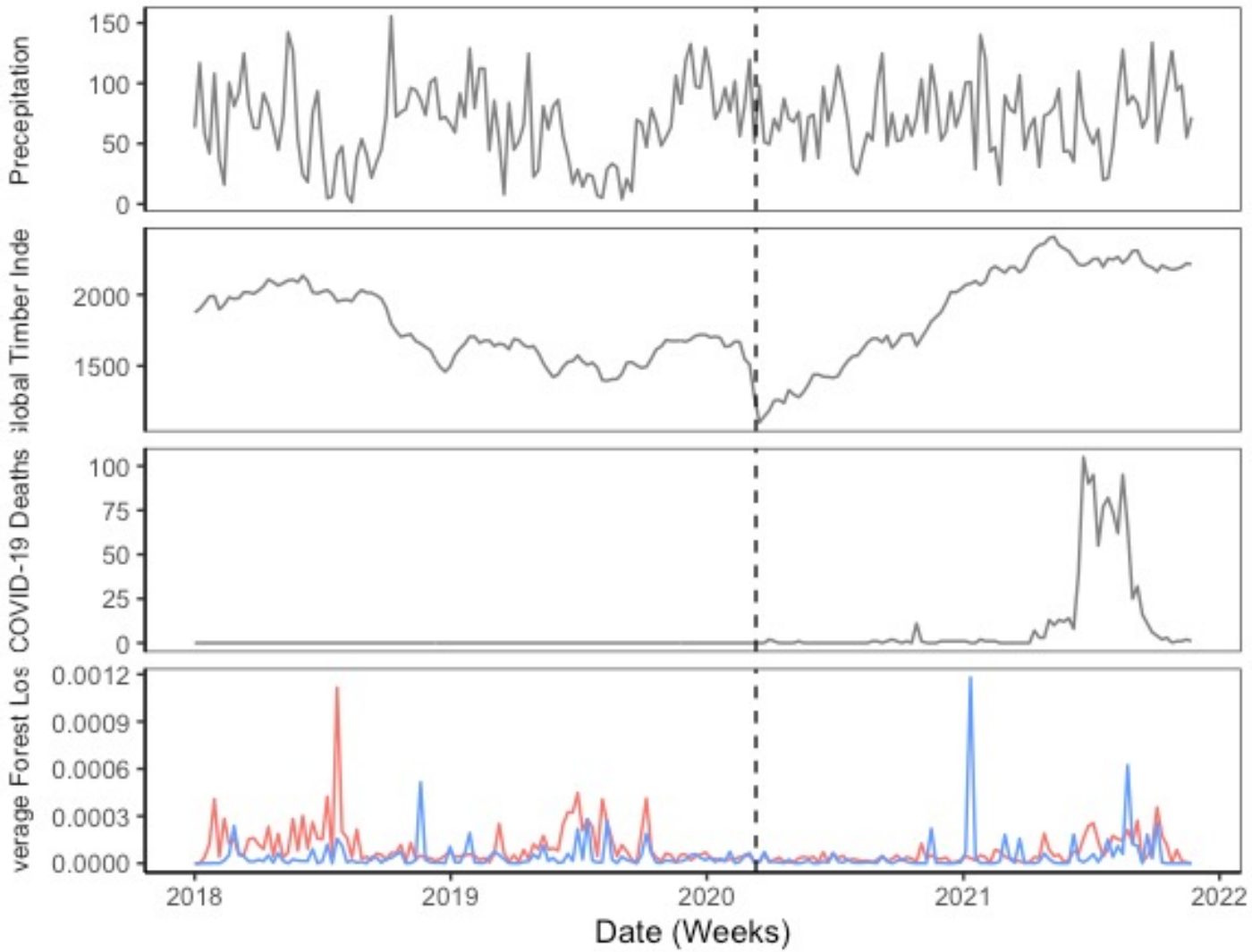


MEDECINS SANS FRONTIERES

Results (iv) Deforestation impact

- Deforestation was positively correlated with:
  - COVID deaths (All)
  - Timber market (Unaffiliated)

- Deforestation was negatively correlated with:
  - Lockdown periods
  - Precipitation



Implications and Impact

- NGO affiliated villages maintained low average illegal deforestation rates during the pandemic, with the gap with non-affiliated villages increasing
- Health-livelihoods programmes provided opportunities that allow NGO affiliated villages to maintain their sustainable trajectories despite economic and health shocks
- Positive conservation effect of health-livelihood support was resistant to the pandemic shock
- Similar approaches – which build on the expertise and priorities of communities – may benefit both conservation and human health efforts elsewhere, and address the drivers of deforestation
- Considering the extent and criticality of the climate crisis, providing health support to rural, lower density, populations who reside around rainforests (and who are typically at the forefront of climate shocks) with a planetary health perspective could be a convincing approach for organisations like MSF.

Thanks and acknowledgements

To all the communities that choose to work with us

To the partners of the research:

- Yayasan Planet Indonesia (YPI)
- Alam Sehat Lestari (ASRI)
- IPB University
- North Carolina State University
- University of California
- Stanford University
- Princeton University
- Health In Harmony

Photo: Nick Perry

"We have lived our lives by the assumption that what was good for us would be good for the world. We have been wrong. We must change our lives so that it will be possible to live by the contrary assumption, that what is good for the world will be good for us. And that requires that we make the effort to know the world and learn what is good for it."

Wendell Berry