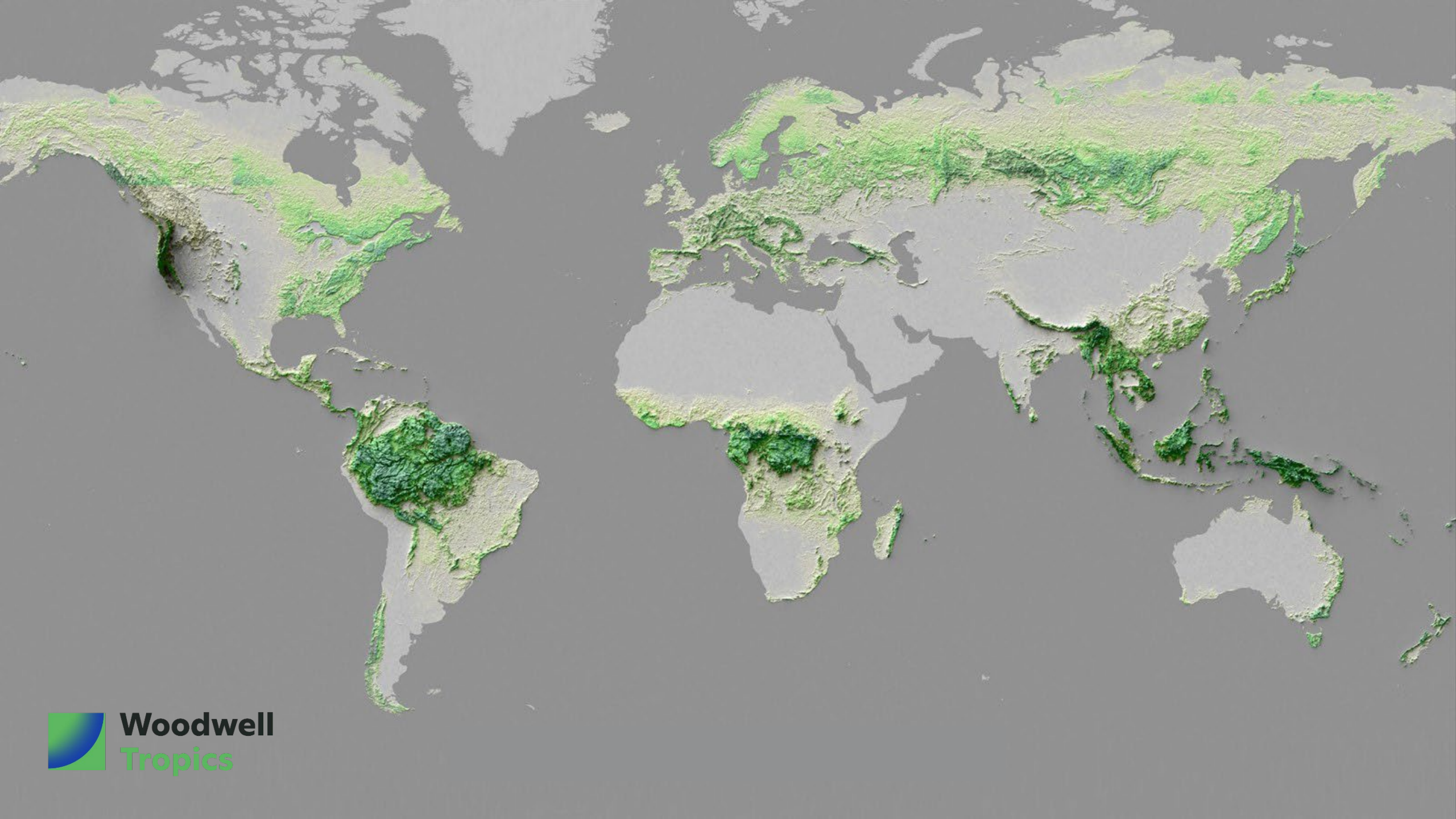
# Burning Question:

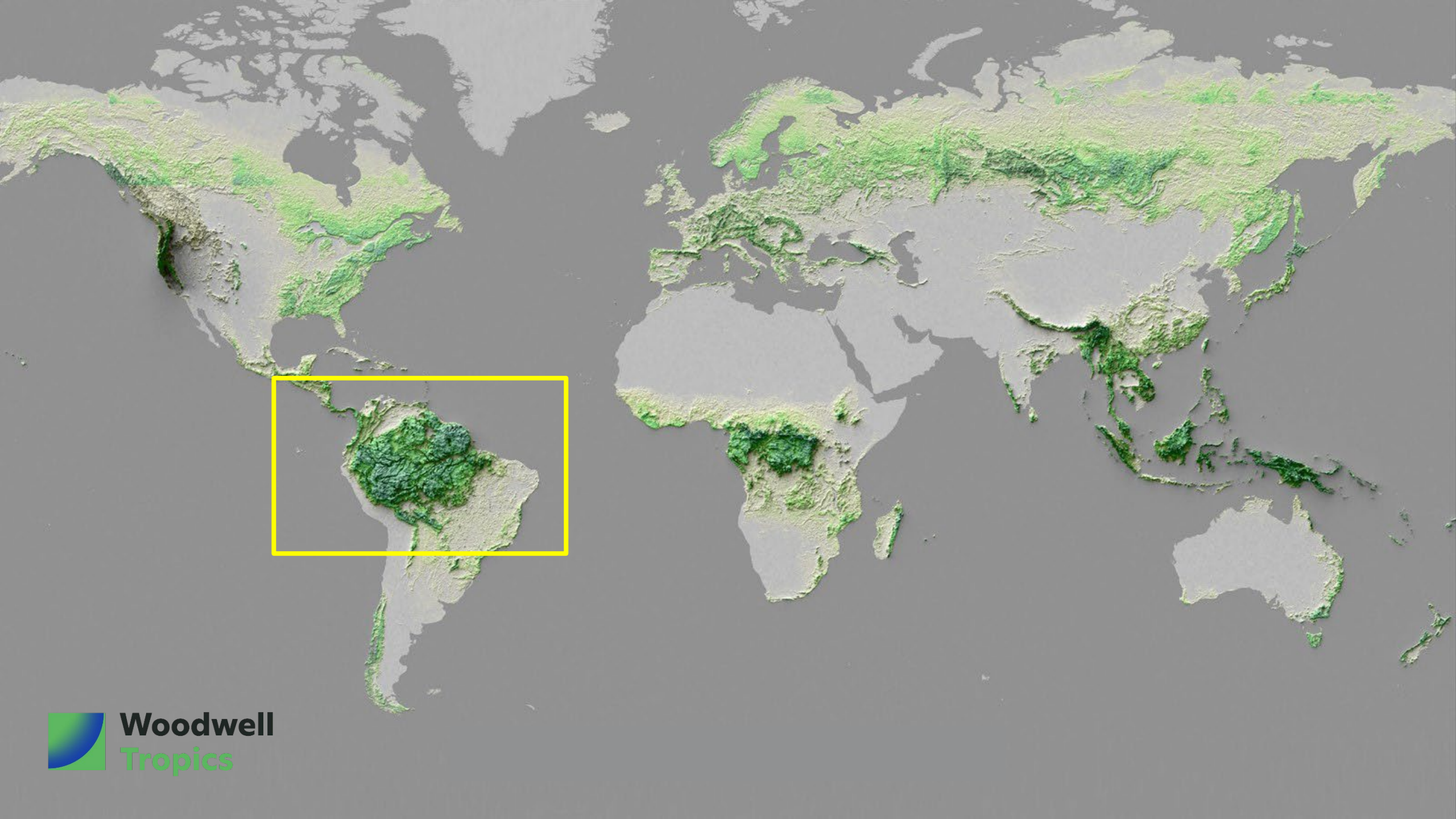
## What is the future tropical forests?

Woodwell Climate Research Center

IPAM Amazônia

Marcia N. Macedo
September 15, 2023
mmacedo@woodwellclimate.org


Woodwell
Tropics



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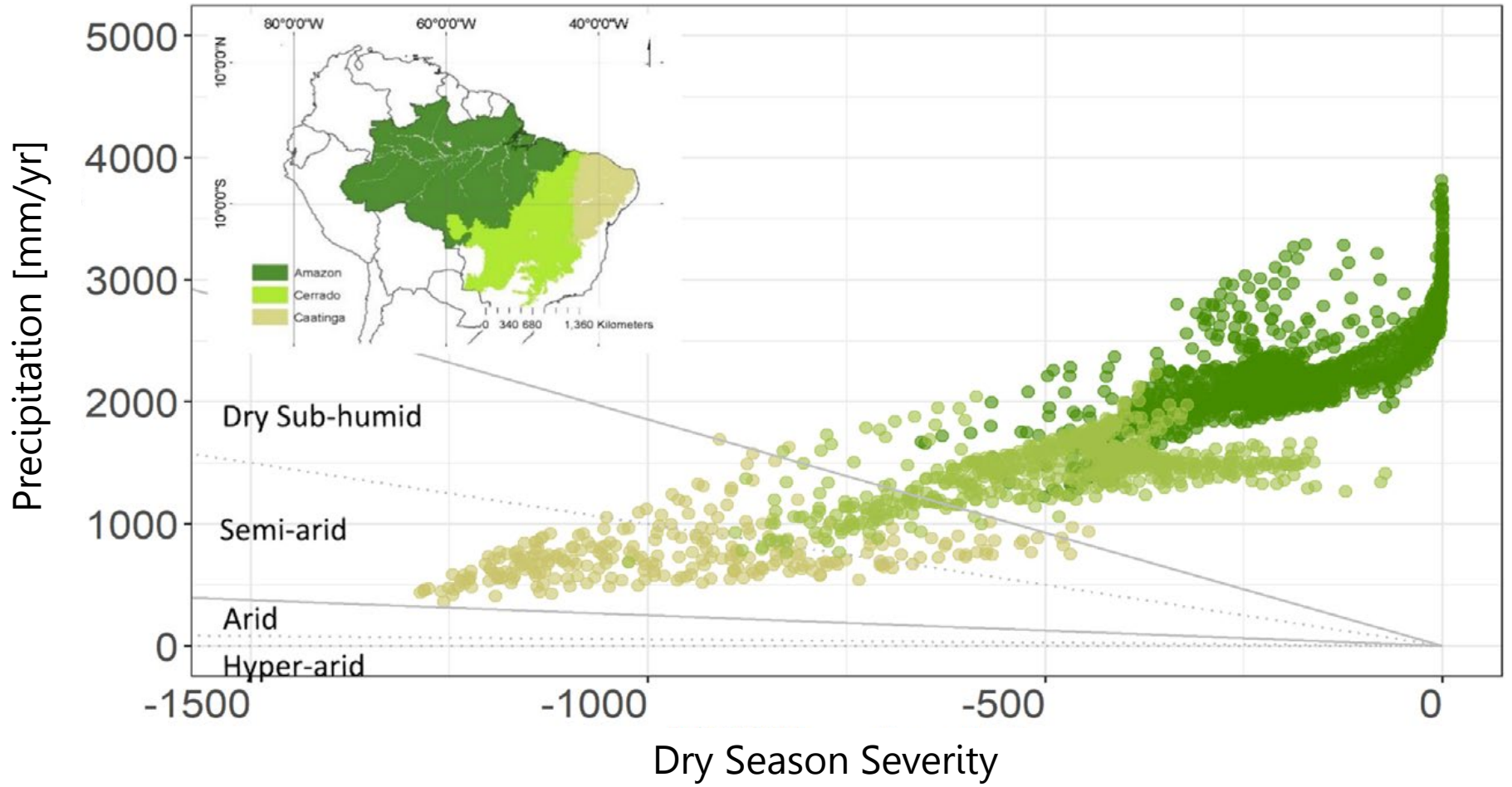
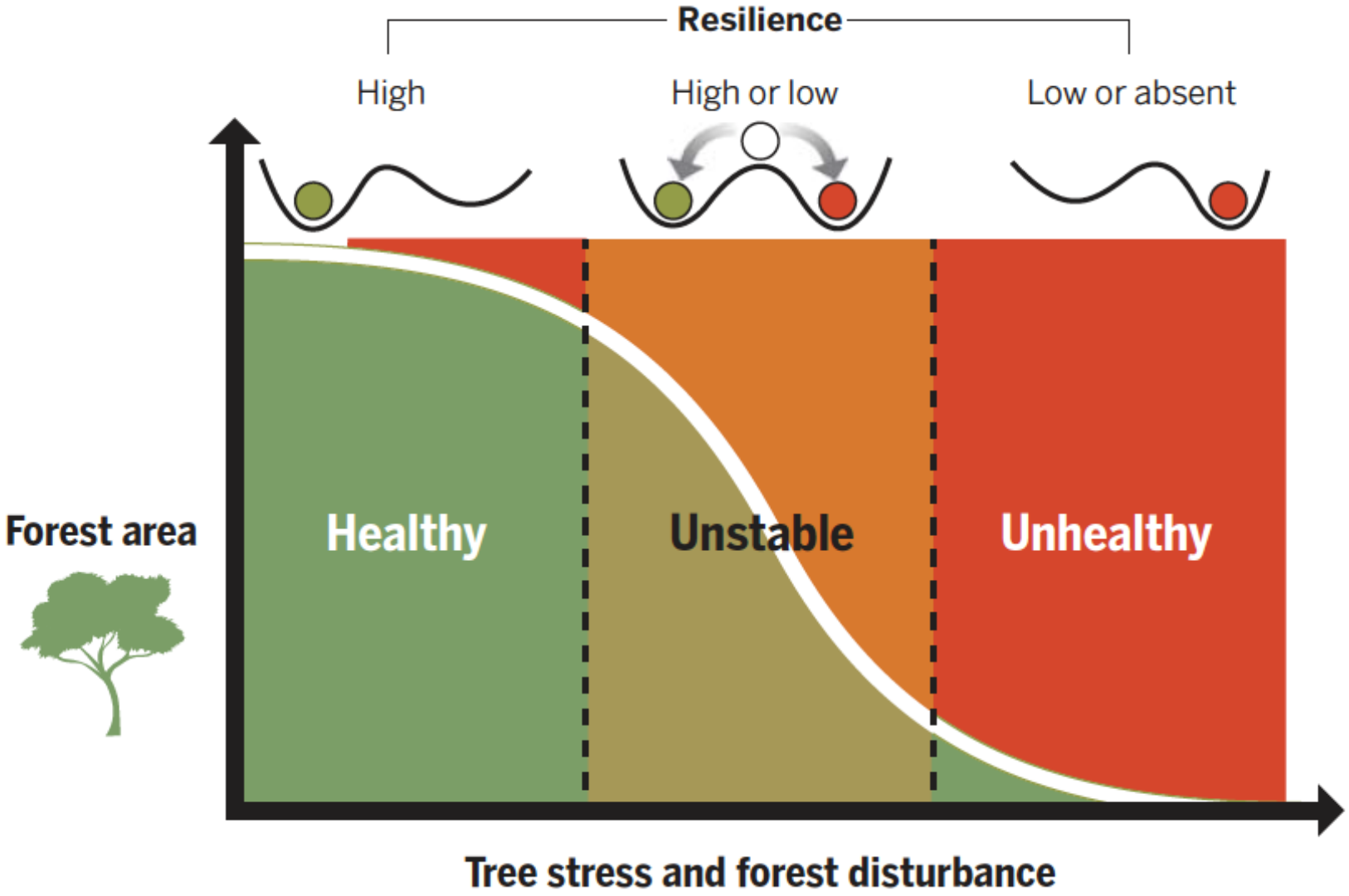
Tropics

# The ‘climate space’ defines the carbon carrying capacity

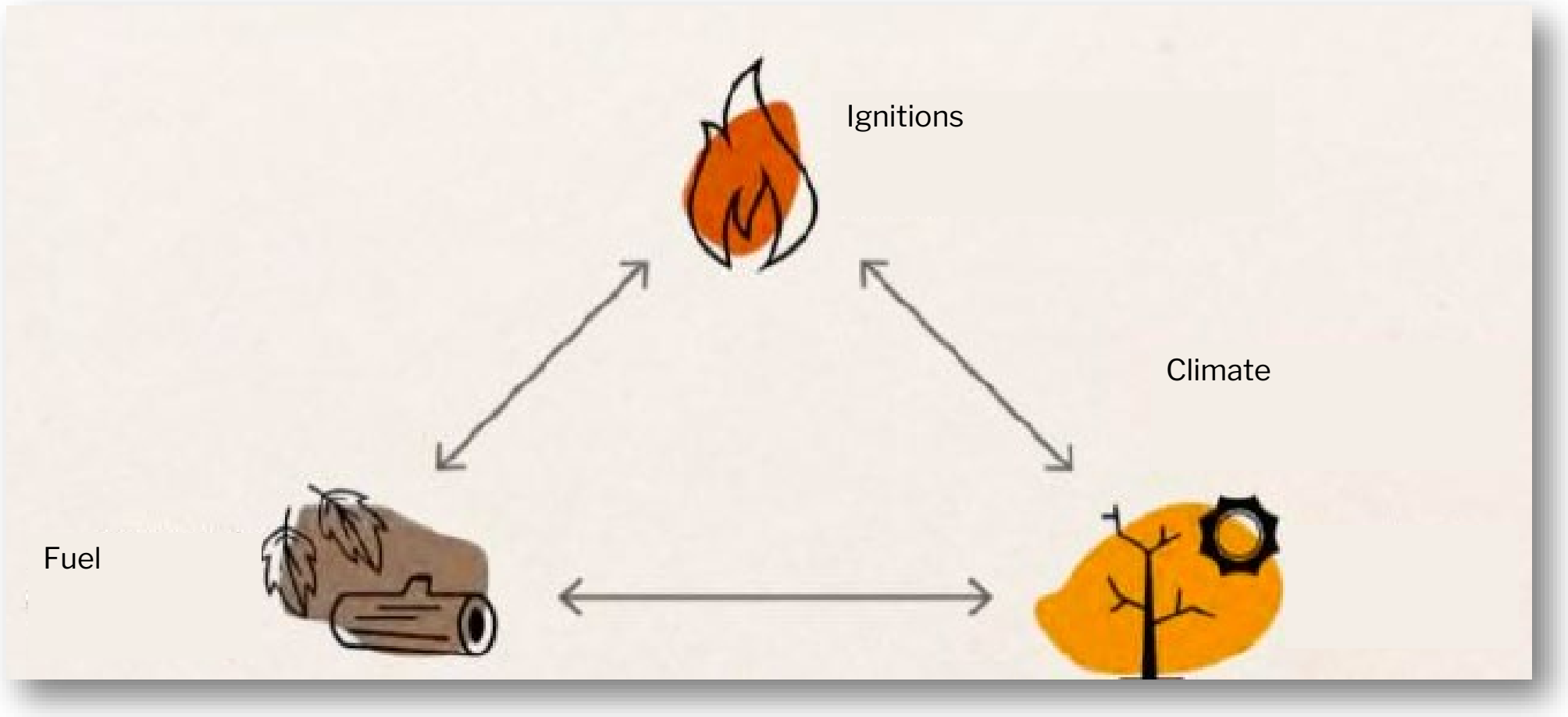



Castanho et al. 2020, *ERL*



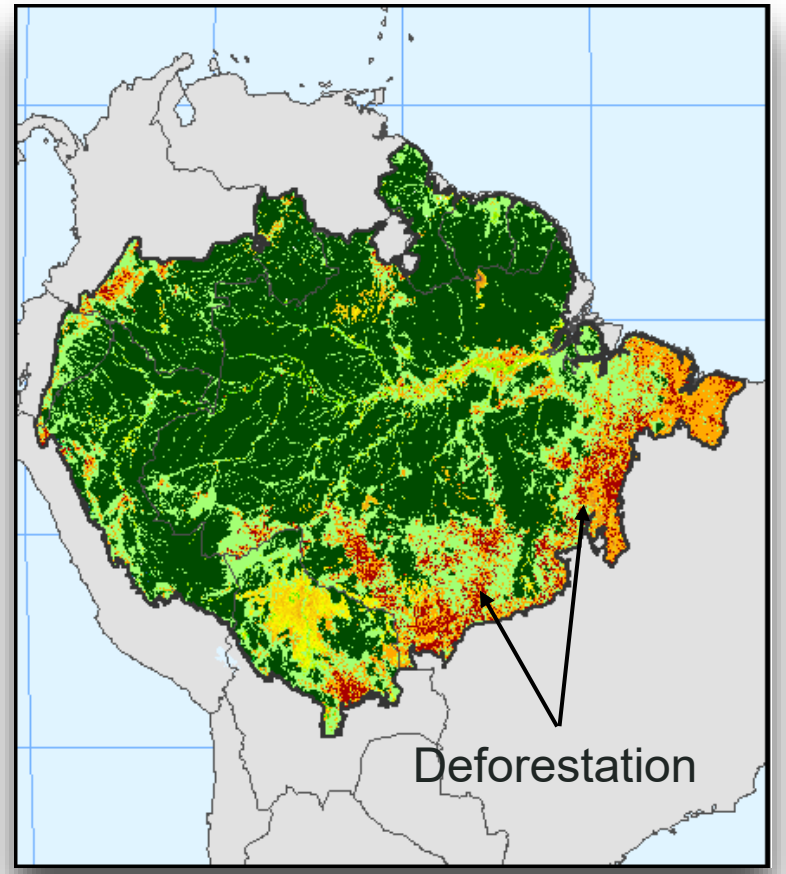

Trumbore et al. 2015, *Science*

# We are changing the three main drivers of fire activity

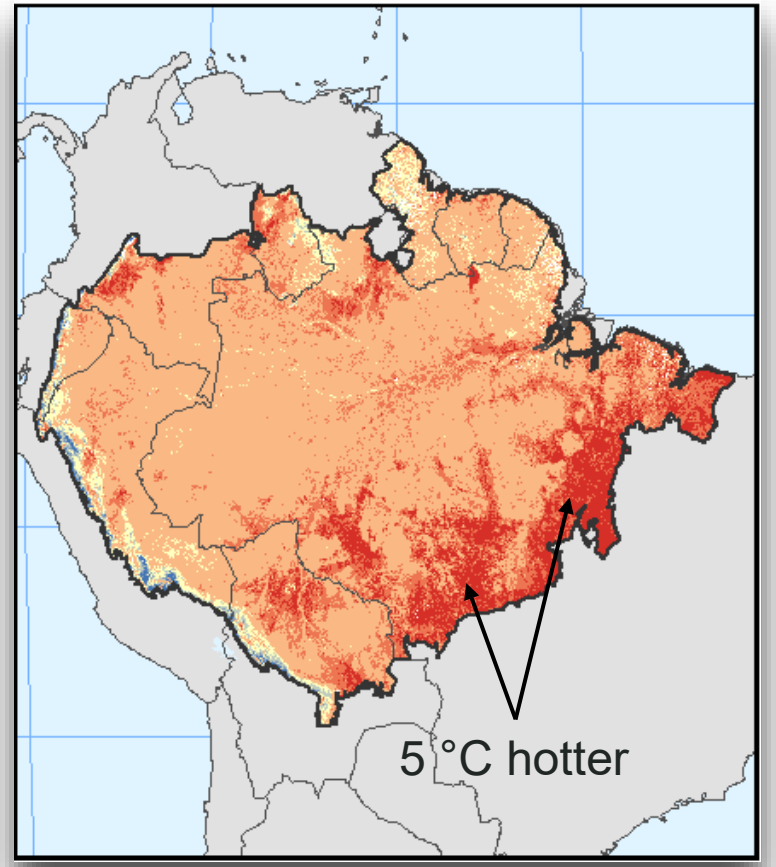



Alencar et al. 2020

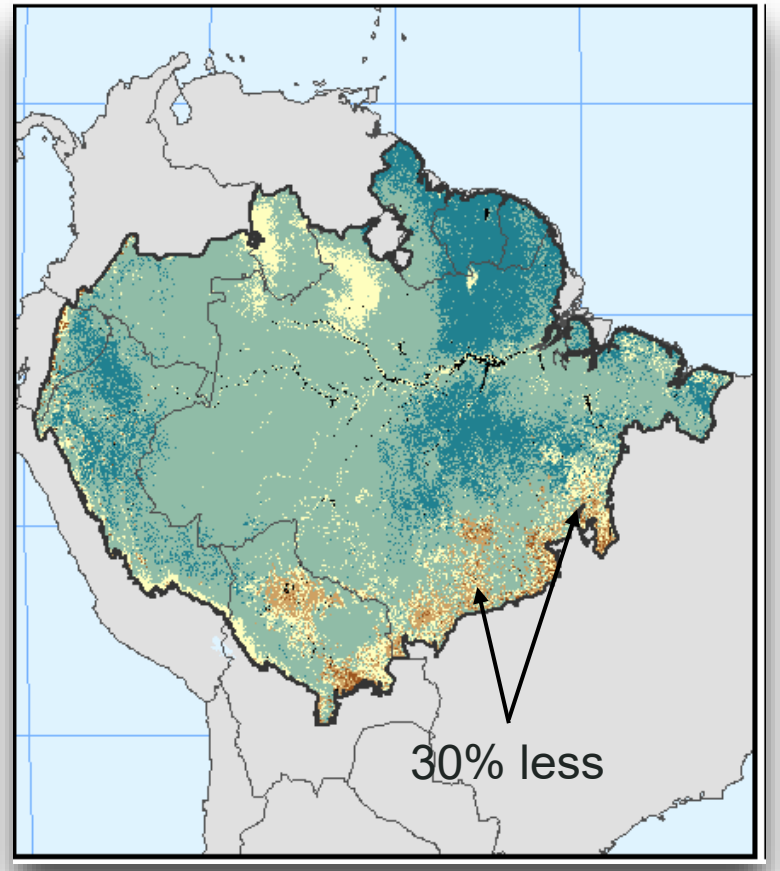
# Stopping deforestation is priority number one to reduce fires




Forest status



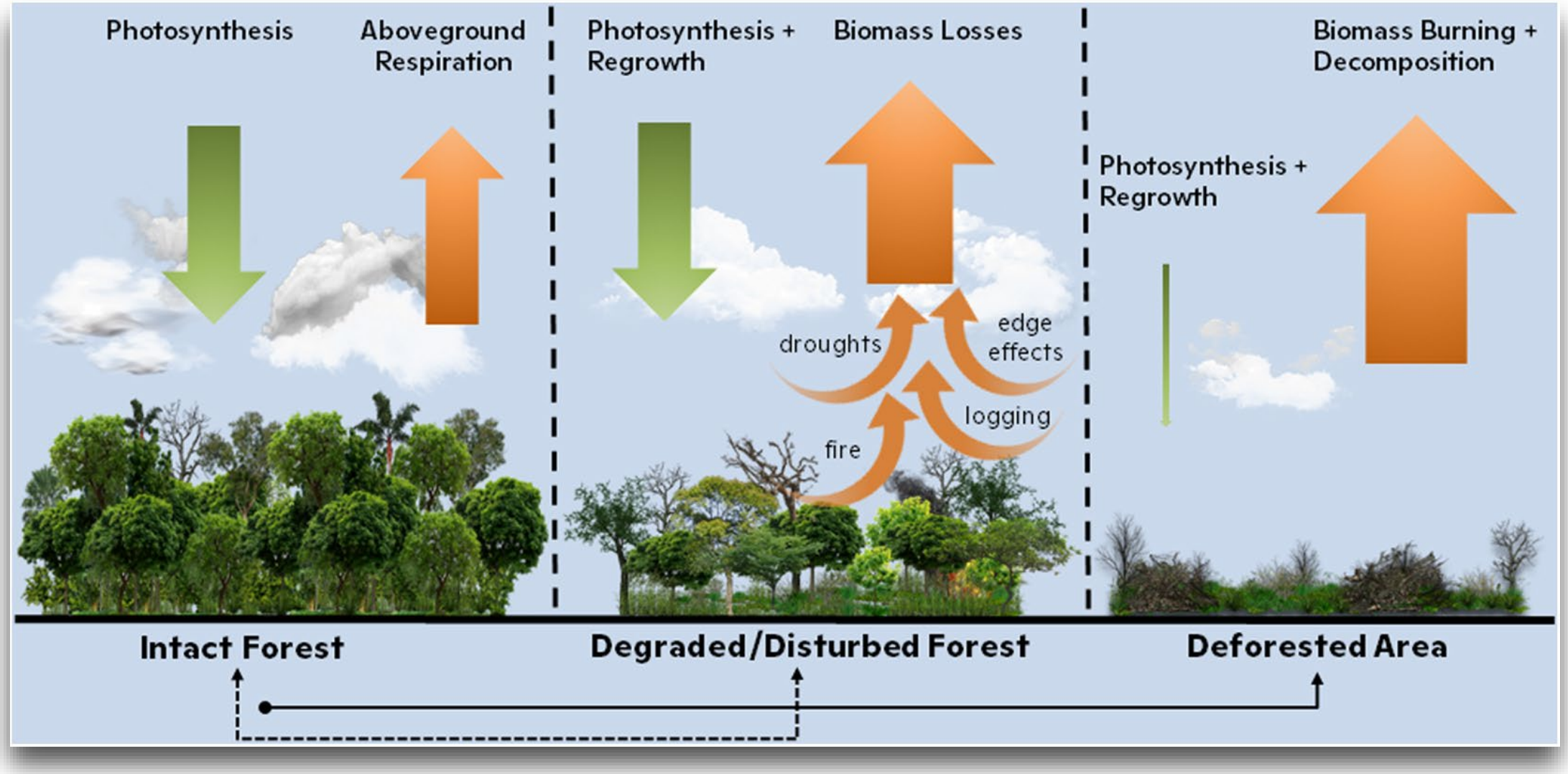

Land surface temperature




Evapotranspiration

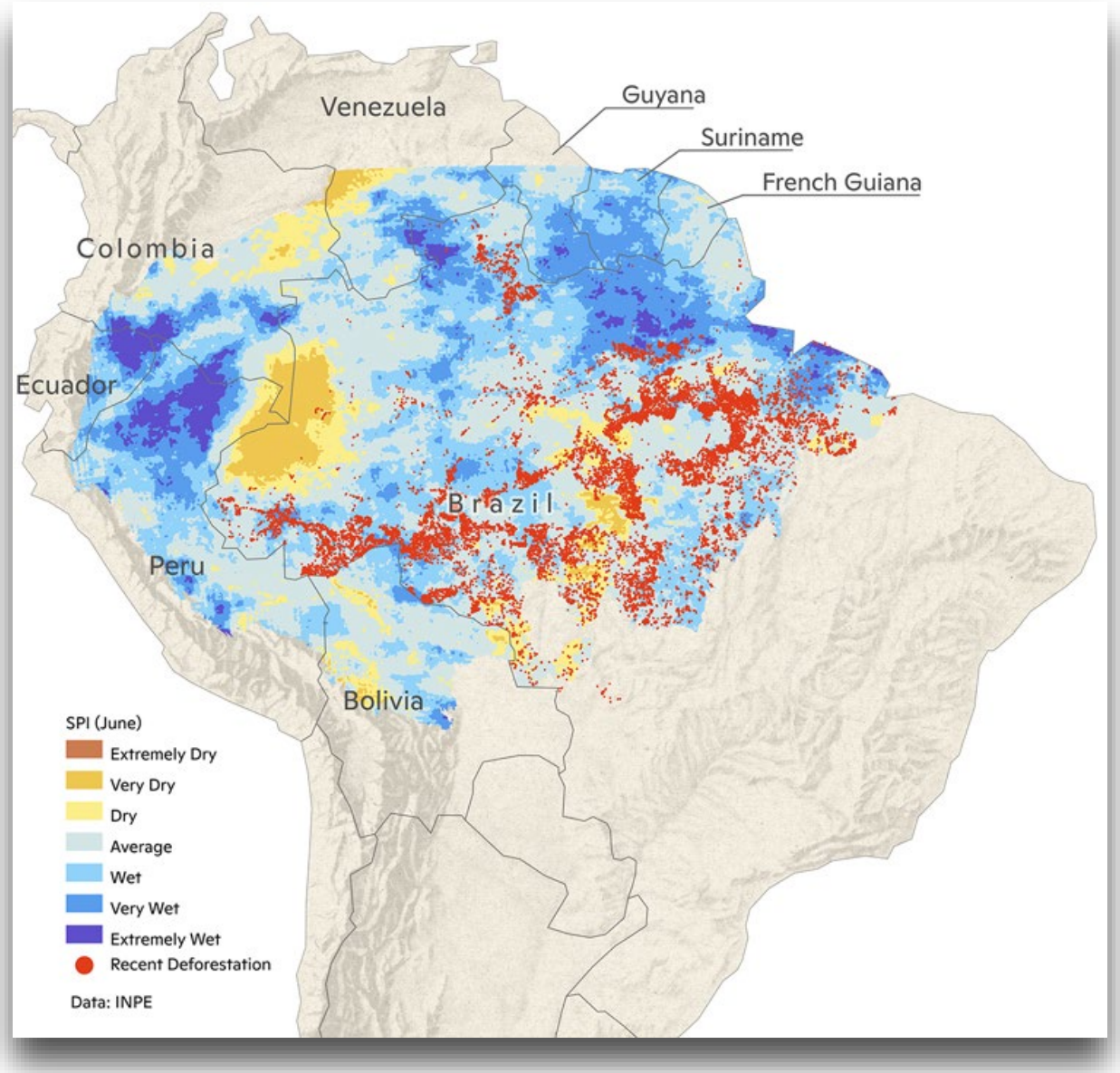
Coe et al. *In Review*

# Managing forest degradation is also key for reducing emissions




Kruid et al. 2021, *Frontiers in Forests & Global Change*

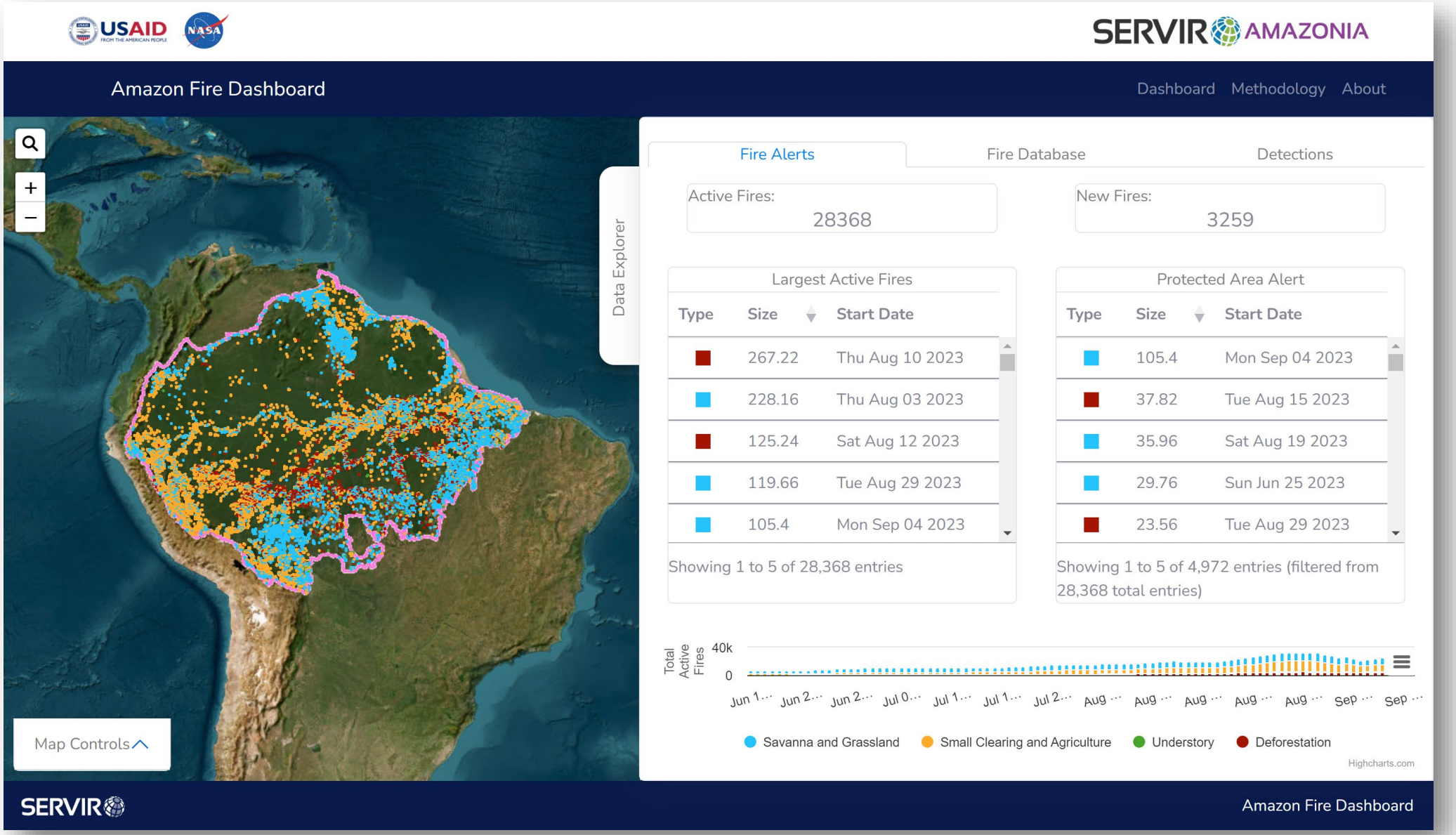
# We need to improve fire forecasting to enhance fire preparedness




- dryness
- fire type
- land tenure
- governance

# Differentiating fire types is key for prevention and suppression

Doug Morton



**Wildland-Ag. Interfaces matter too!**

Balch, Brando, et al. 2015, *Bioscience*

# Biodiversity could play a key role in restoring degraded landscapes

Lucas Paolucci

PAPER

WILEY bioTROPICA ASSOCIATION FOR TROPICAL BIOLOGY AND CONSERVATION

## Lowland tapirs facilitate seed dispersal in degraded Amazonian forests

Lucas N. Paolucci[1,2,*] | Rogério L. Pereira[3] | Ludmila Rattis[1,4] | Divino V. Silvério[1,3] | Nubia C. S. Marques[1,5] | Marcia N. Macedo[1,4] | Paulo M. Brando[1,4]

Paolucci et al. 2019, *Biotropica*

The Economist April 20th 2019

the advantages of being close to a river. That memories of disaster weigh more heavily in this calculation immediately after the flood is not surprising, says Dr Fanta. But that the memory is so short-lived is. He had expected people to heed history's warning for a century at least.

This collective forgetfulness is even more puzzling in light of a central preoccupation of ancient chroniclers, the communication of risk. Writing to preserve their eras for posterity, they recounted harrowing tales of extreme climatic events, fires, famines and plagues. Likewise, there is no shortage of written accounts of Hurricane Betsy or of historical floods in Prague—the maximum heights of many of which are marked along the Vltava's banks.

Such distant secondhand accounts are not enough, Dr Fanta concludes. To be deterred from placing themselves back in danger, people have to hear disaster tales from eye witnesses who can convey the visceral emotion of having lived through them. The group's findings thus suggest that one way of teaching history more effectively might be to bring eye witnesses into the classroom. That approach will not work for ever, of course. Over time, witnesses' own memories fade, and then the witnesses themselves expire.

The forgetting that Dr Fanta sees with respect to historical floods might also explain the recent rise of vaccine hesitancy and right-wing extremism, he suggests, as the survivors of now-preventable infectious diseases and Hitler, respectively, die of old age. Having not experienced those realities, or heard about them first-hand, many people alive today have quite simply forgotten the horror. ■

Just powdering my nose

Ecology

### Do tapirs defecate in the woods?

**It seems they prefer burned-out scrub.**

animals often defecate pips and stones from fruit they have eaten in places distant from where the food were consumed. Much research has therefore been devoted to luring them into damaged areas—sometimes with success. There is a limit, however, to the size of seed that a bat or a bird can carry, and that constrains which plants can be regenerated in this manner.

Lowland tapirs suffer no such constraint. They are the region's biggest herbivores and swallow lots of large seeds. Dr Paolucci thus wondered to what extent tapirs were transporting seeds from pristine to damaged areas. To try to find out he and a team of colleagues set up a study of tapirs' defecatory habits.

The researchers used a mixture of field observations and camera traps to monitor tapirs in three adjacent plots that are part of a larger project to study the effect of fire on Amazonian rainforest. These plots were confirmed at the beginning of the study to be similar in such matters as plant-species richness, the relative abundance of the commonest species, the density and com-

# Results provide a glimpse into what is happening in the Xingu Territory

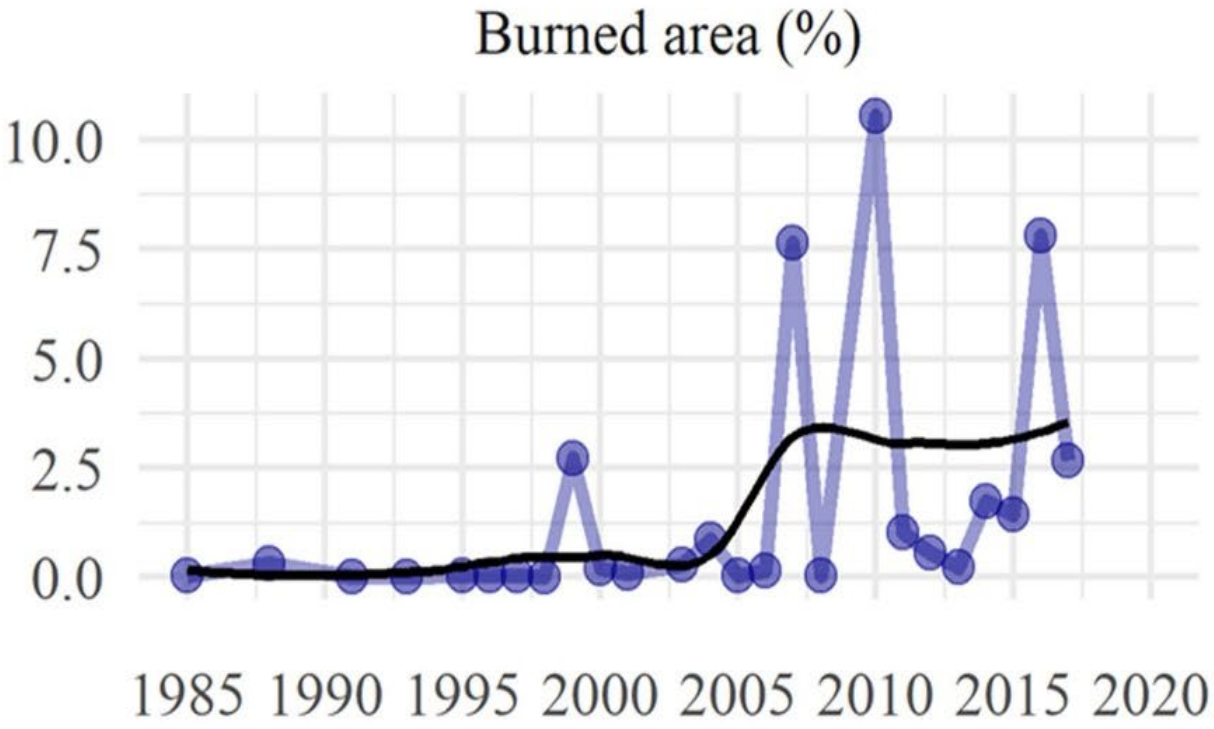
ENVIRONMENTAL RESEARCH
LETTERS

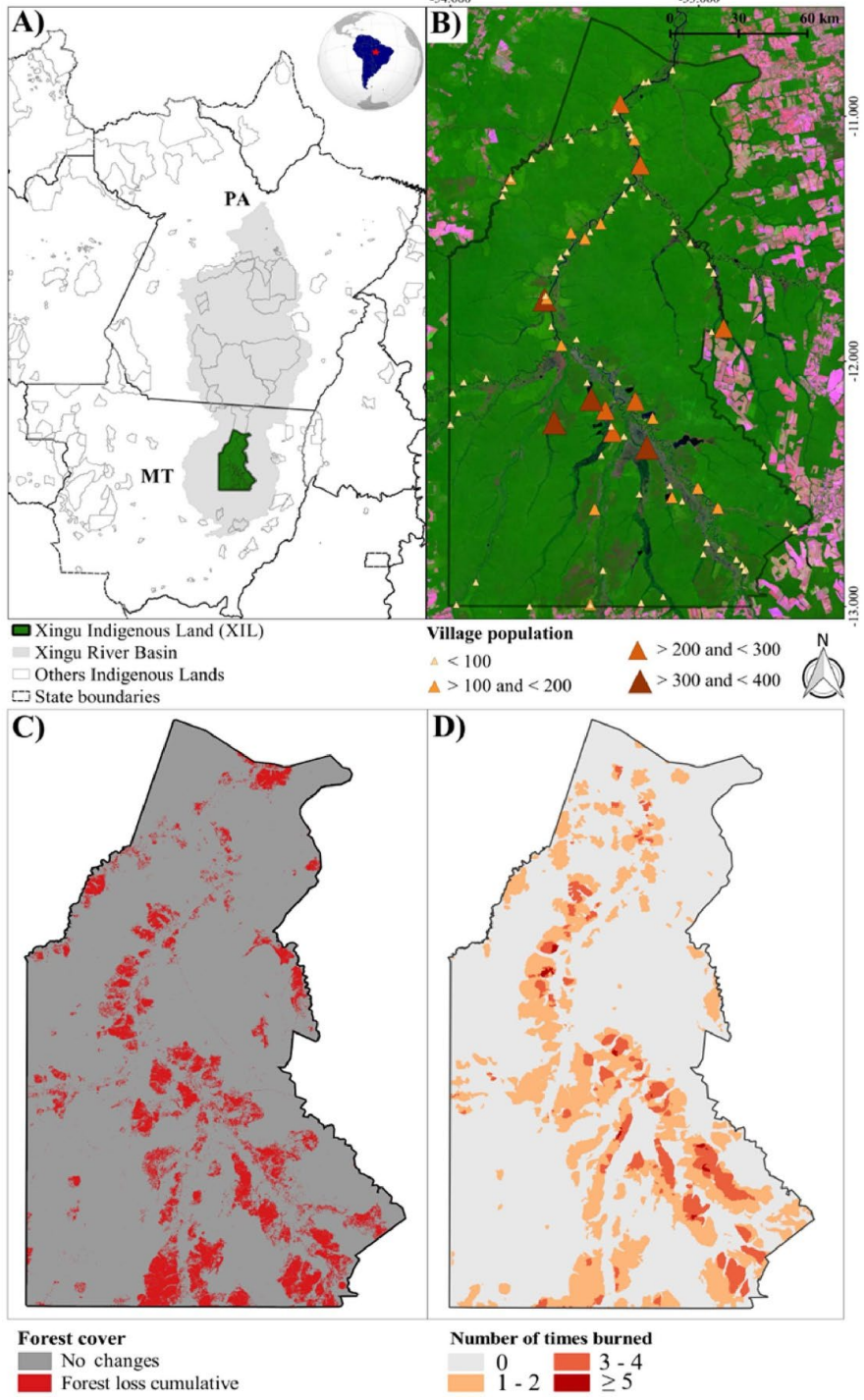
LETTER

# Intensification of fire regimes and forest loss in the Território Indígena do Xingu

Divino V Silvério[1,2,*], Robson Santana Oliveira[2], Bernardo Monteiro Flores[3], Paulo M Brando[2,4,5], Hellen Kezia Almada[2], Marco Túlio Furtado[5], Fabio Garcia Moreira[6], Michael Heckenberger[7], Katia Yukari Ono[8] and Marcia N Macedo[5,9]

**Divino Silvério**




Silvério et al. 2022, *ERL*

# Integrating traditional knowledge about fire use (and impacts) is crucial.

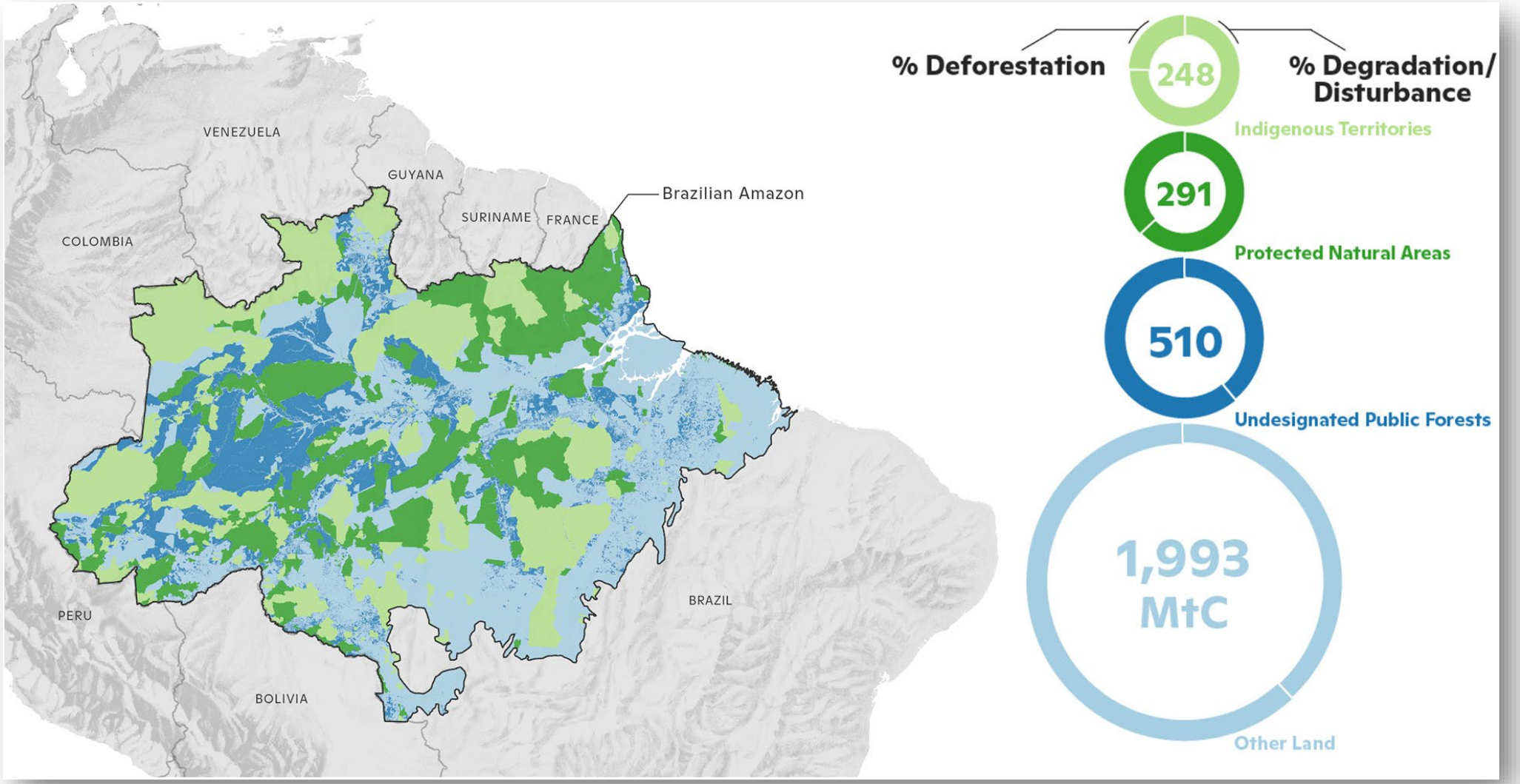
Xingu field team: Aldeia Afukuri, Dec. 2021

# Adapting fire management to local realities

- 60 species collected
- Most seeds collected in the late dry season (JASO)
- Half overlap with Rx burn areas

Aldeia Afukuri
September 2022

# 1. Clarify land tenure and protect protected areas

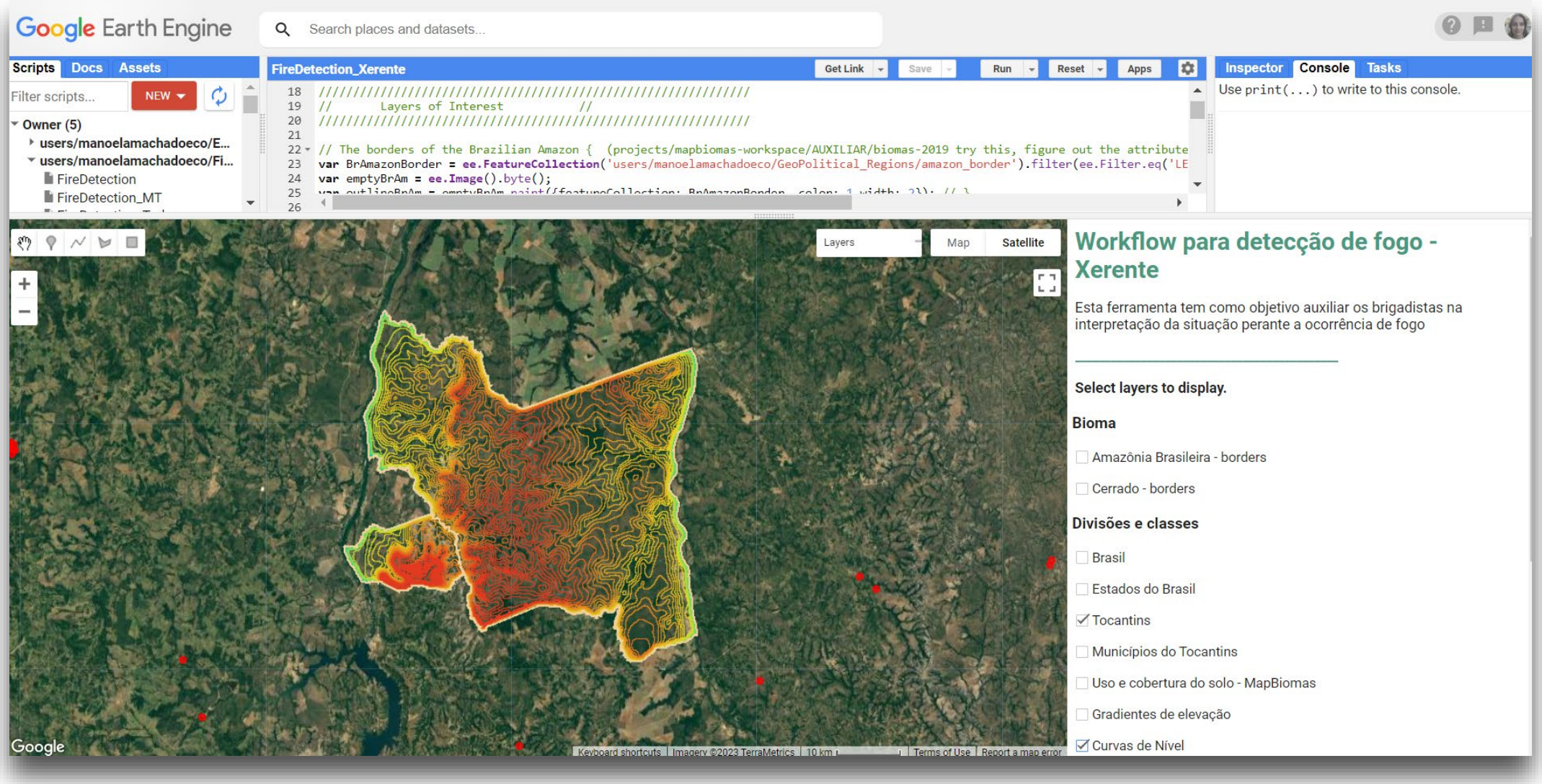



Kruid et al. 2021, *Frontiers in Forests & Global Change*

# 2. Streamline data flows to support firefighters

Manoela Machado

# 3. Build capacity and data tools to support firefighting efforts



# 4. Support Indigenous land rights and leadership

Valéria Paye

Opinion

## We Know How to Stop the Fires

**By Marcia Nunes Macedo and Valéria Paye Pereira**

Dr. Macedo is an ecologist and climate scientist. Ms. Paye, of the Kaxuyana people, is a policy expert and activist based in Brazil.

Oct. 2, 2020

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https://www.nytimes.com/2020/10/02/opinion/amazon-rainforest-fire-prevention.html