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# Satellite Earth Observations for Impact Assessment of Global Supply Chains

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## What are the impacts of our consumption?



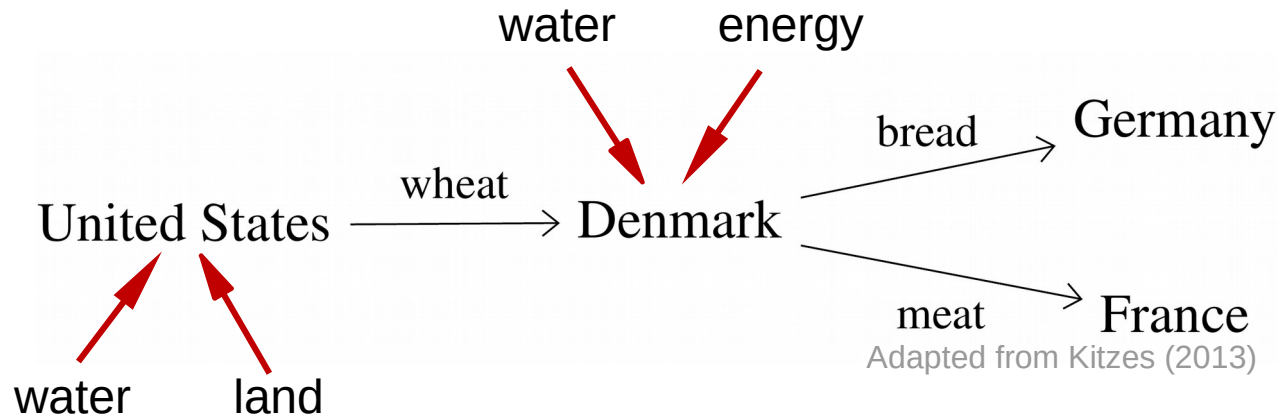


## What are the impacts of our consumption?

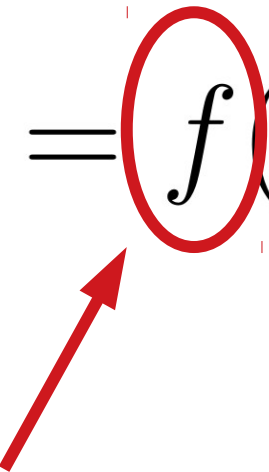


**Knowing where raw materials come from is crucial to correctly estimate the impacts!**

# Consumption footprint



$$F = fL = f(I - A)^{-1}$$

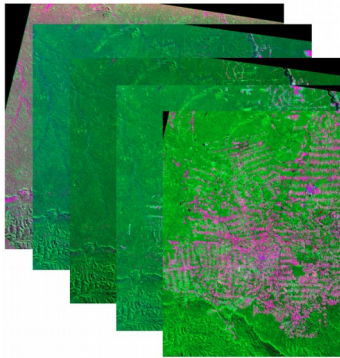
$$F = fL = f(I - A)^{-1}$$
A red circle highlights the variable 'f' in the equation, and a red arrow points from below towards the circle.

**Interface between Earth Observation and trade modeling**

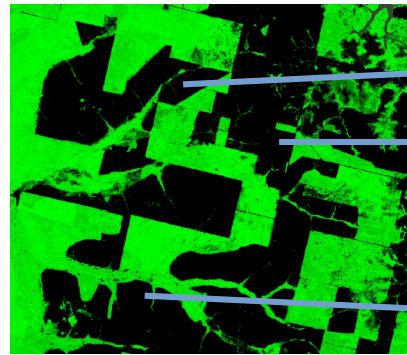
**Where exactly are commodities produced?**

# Impacts of biomass supply chains

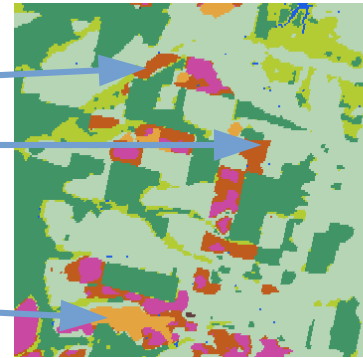
Satellite time series



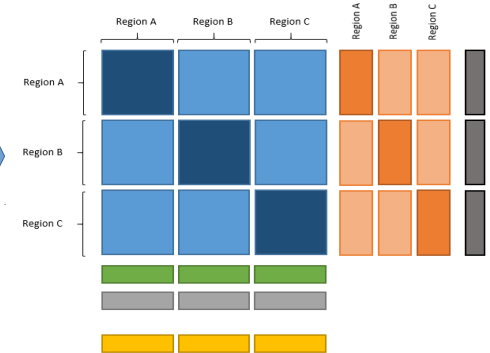
Deforestation



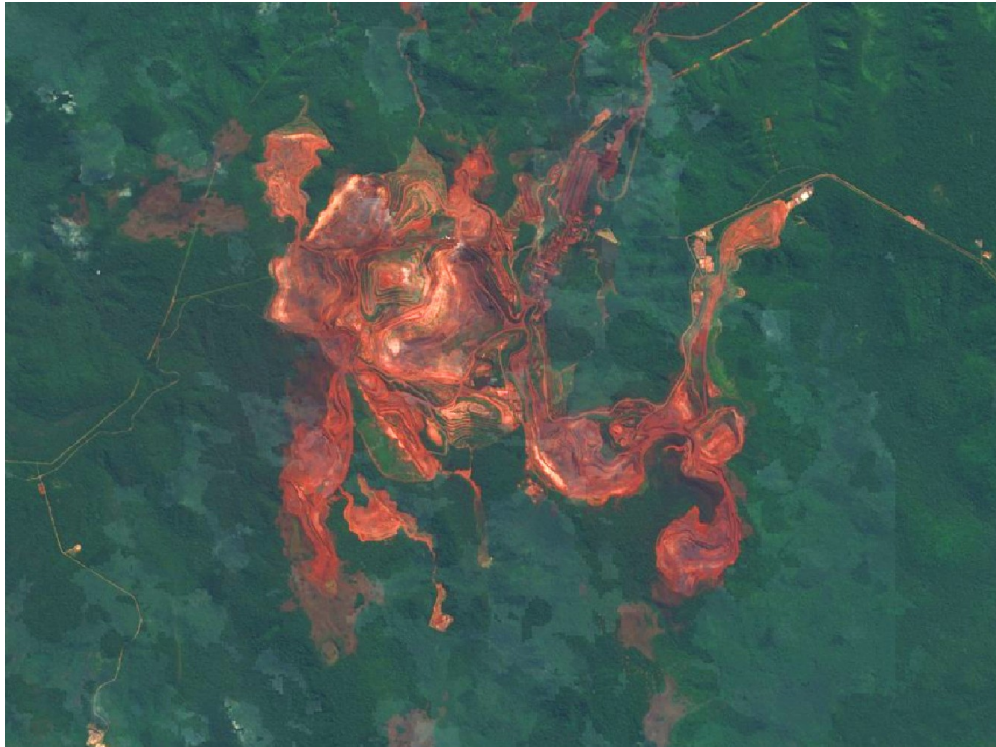
Agricultural production



Trade model



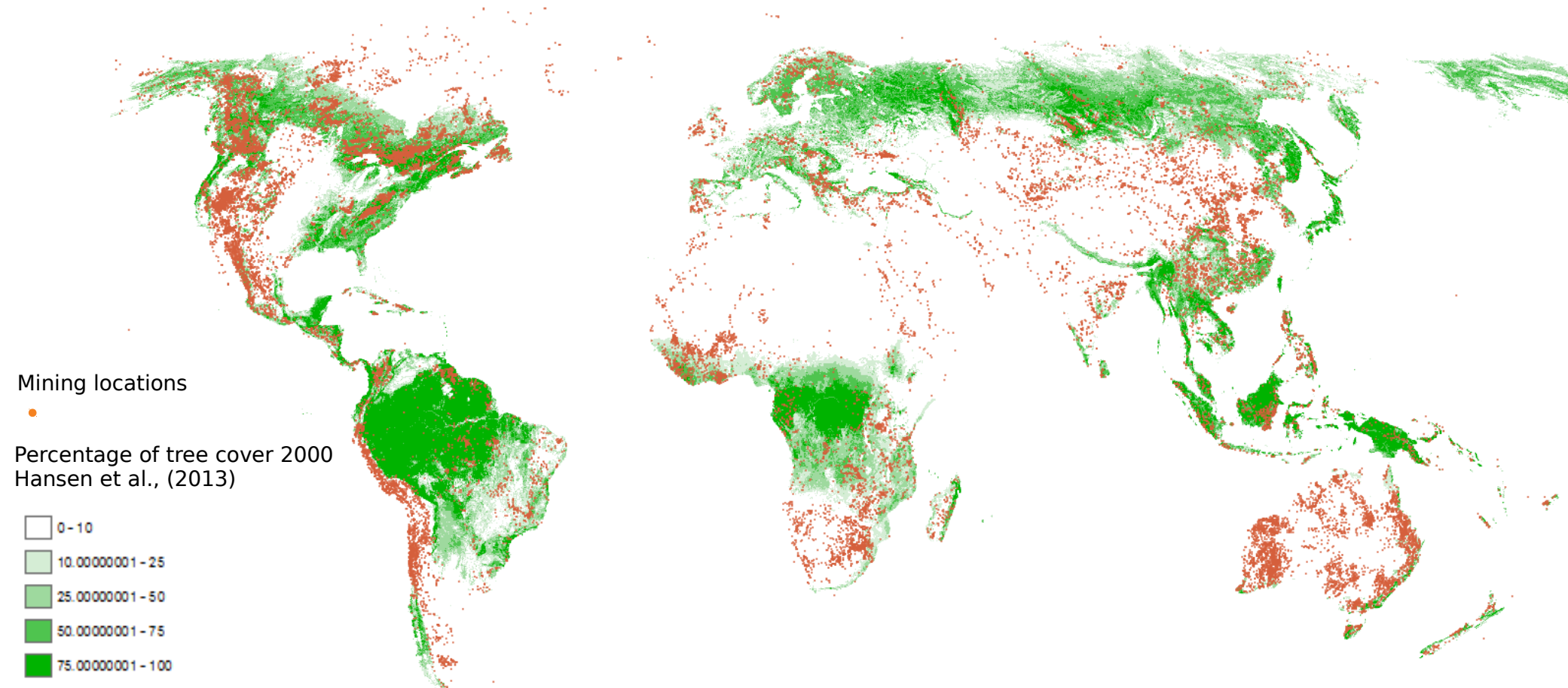
# Impacts of minerals supply chains



Carajas Iron Ore Mine, Pará, Brazil. Sentinel-2 (left); polygon of land use (right) "Sentinel-2 cloudless - <https://s2maps.eu> by EOX IT Services GmbH"

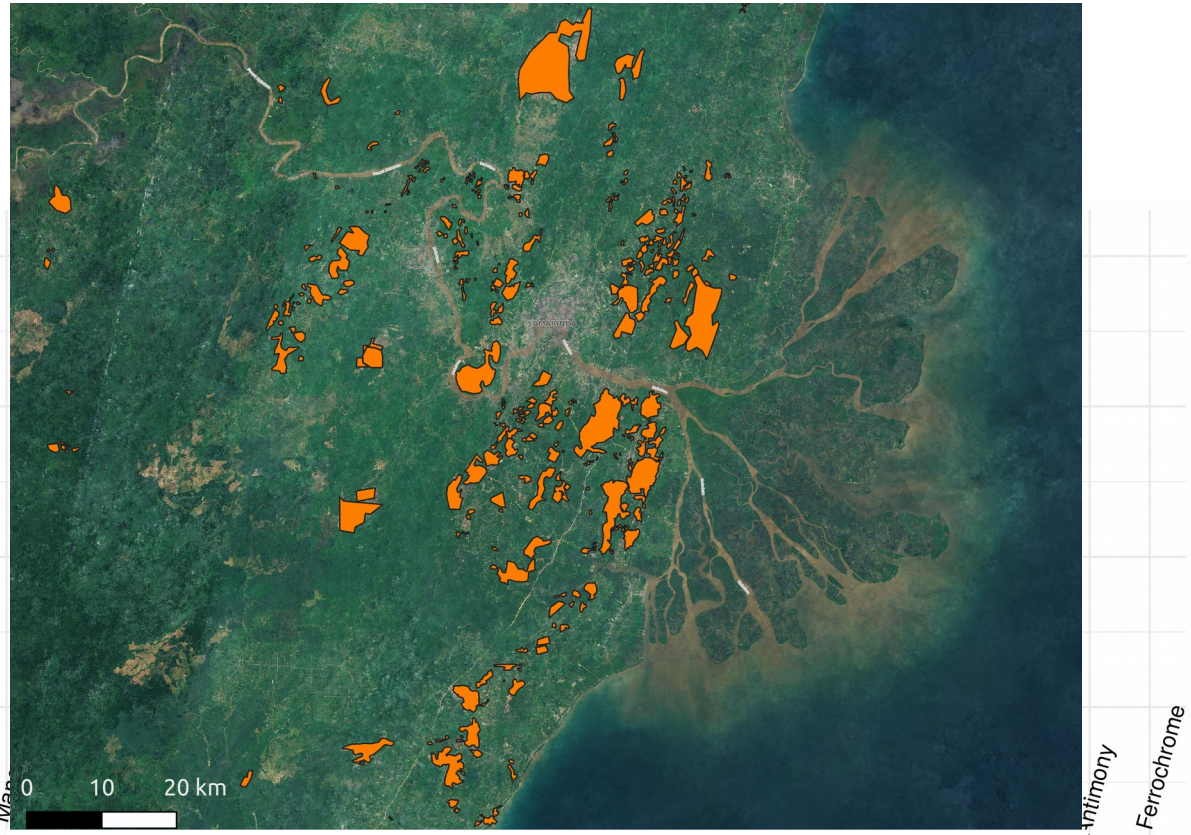
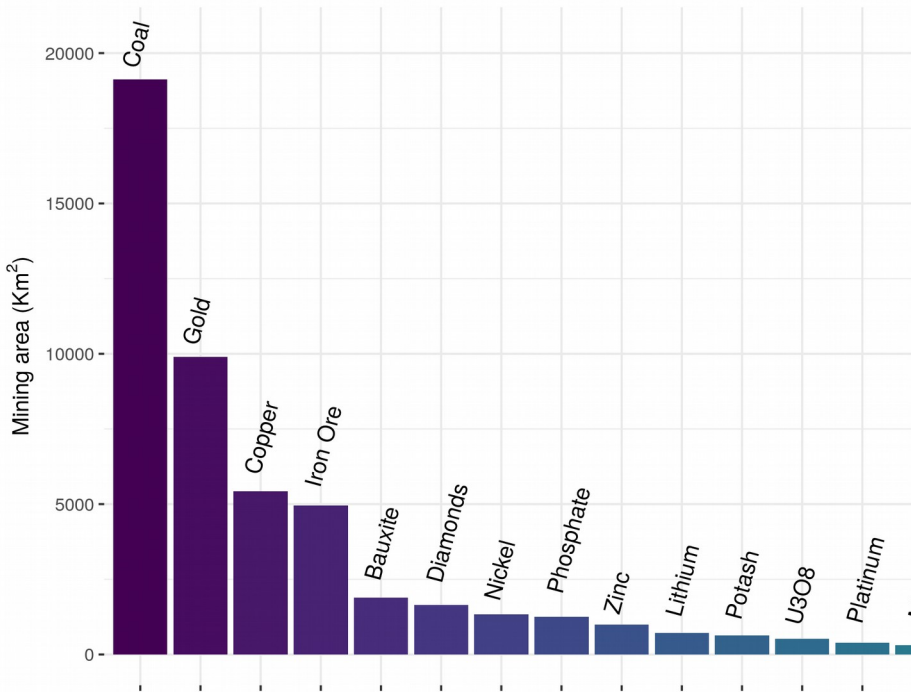


# Impacts of minerals supply chains



**~20,000 polygons; total area ~51,000 Km<sup>2</sup>**

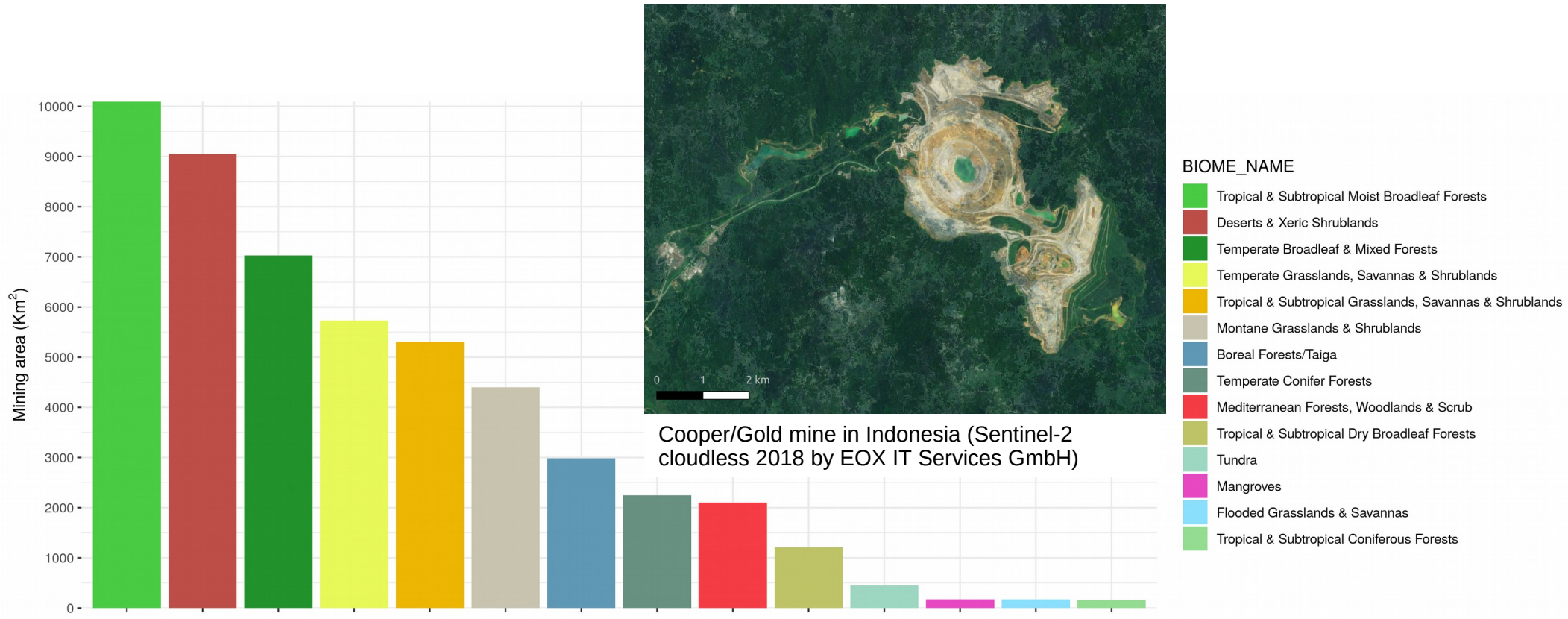
# Area x Commodity



Nearly 20,000 km<sup>2</sup> are Coal mines



# Area x Biome



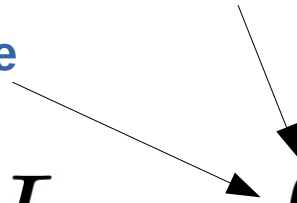
Cooper/Gold mine in Indonesia (Sentinel-2 cloudless 2018 by EOX IT Services GmbH)

**Tropical forest has the largest mining area, particularly in Brazil and Indonesia.**

# Calculating different consumption footprints

Land used per crop type

Deforestation per crop type

$$F = fL = f(I - A)^{-1}$$
Two arrows originate from the text labels above. One arrow points from 'Land used per crop type' to the variable 'f' in the equation. The other arrow points from 'Deforestation per crop type' to the variable 'L' in the equation.



# Calculating different consumption footprints

Land used per crop type

Deforestation per crop type

$$F = fL = f(I - A)^{-1}$$

Land used per mineral commodities

Deforestation caused by mining

# Calculating different consumption footprints

Land used per crop type

Deforestation per crop type

$$F = fL = f(I - A)^{-1}$$

Land used per mineral commodities

Deforestation caused by mining

What about indirect deforestation caused by mining?



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