Europe is a major importer of deforestation embodied in metal products

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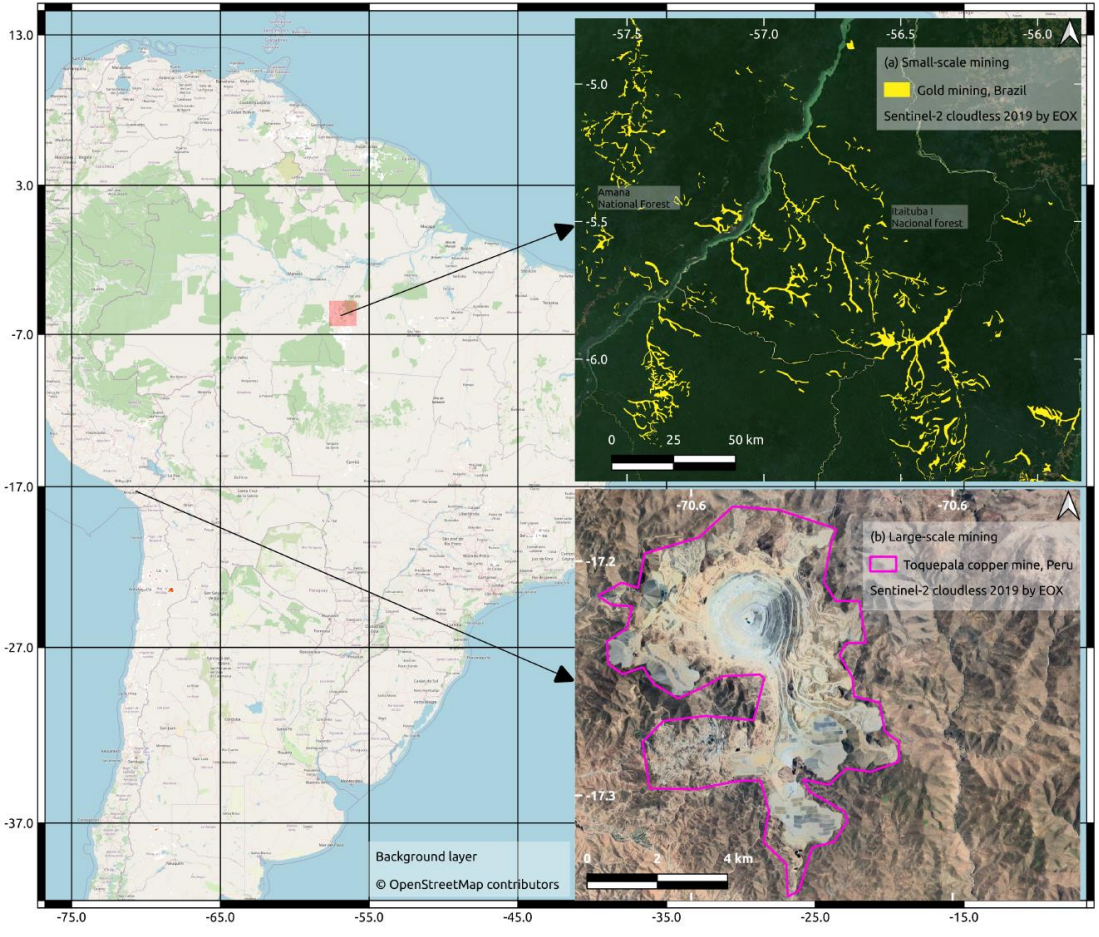
World Resources Forum, 05.09.2023

Objective and research questions

- **Tracing mining-induced deforestation from mining countries via processing sectors to final consumers**
  - Which forest areas have been lost due to the expansion of mining in the past 20 years?
  - The extraction of which raw materials was responsible for land use change and forest loss caused by mining?
  - How is deforestation embodied in consumption distributed across countries and sectors?

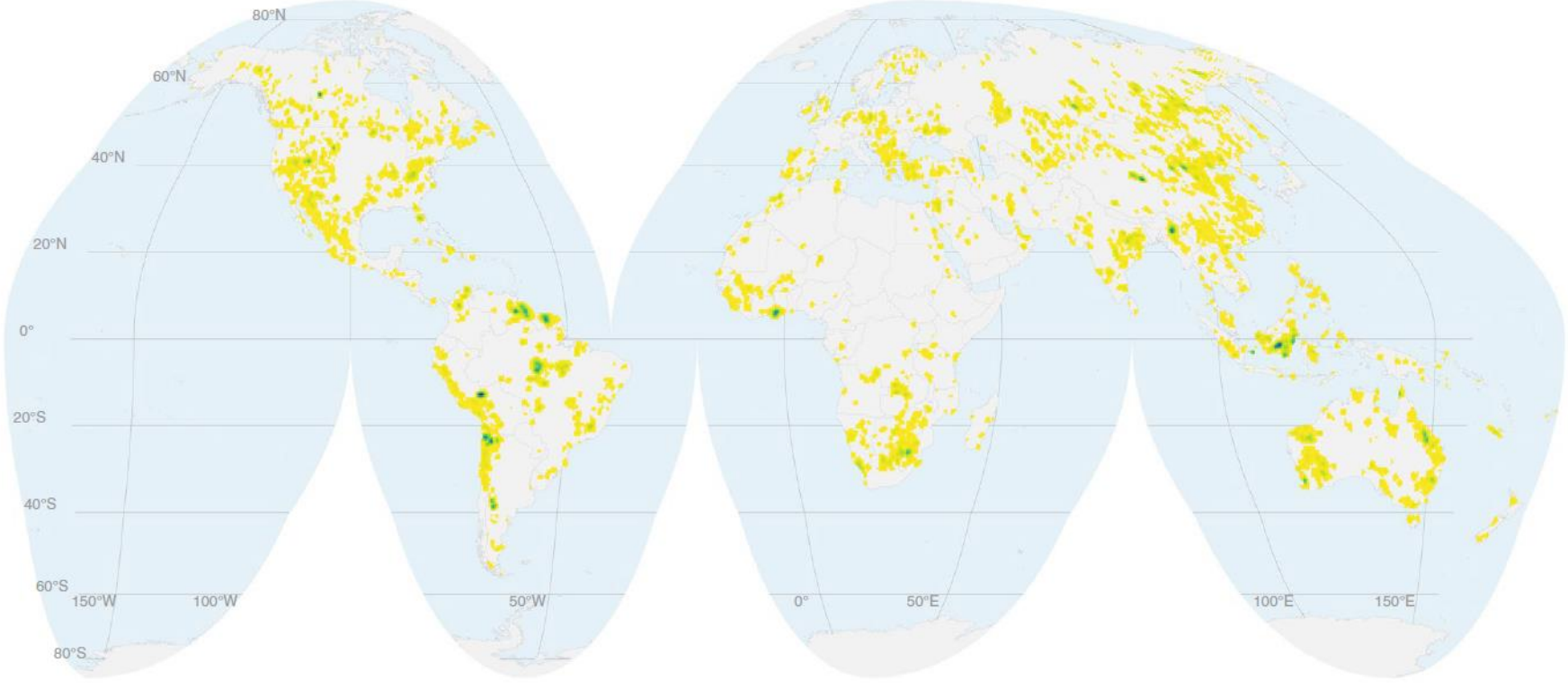
Direct land use of global mining



Source: Maus et al., 2022 / Nature Scientific Data

Direct land use of global mining

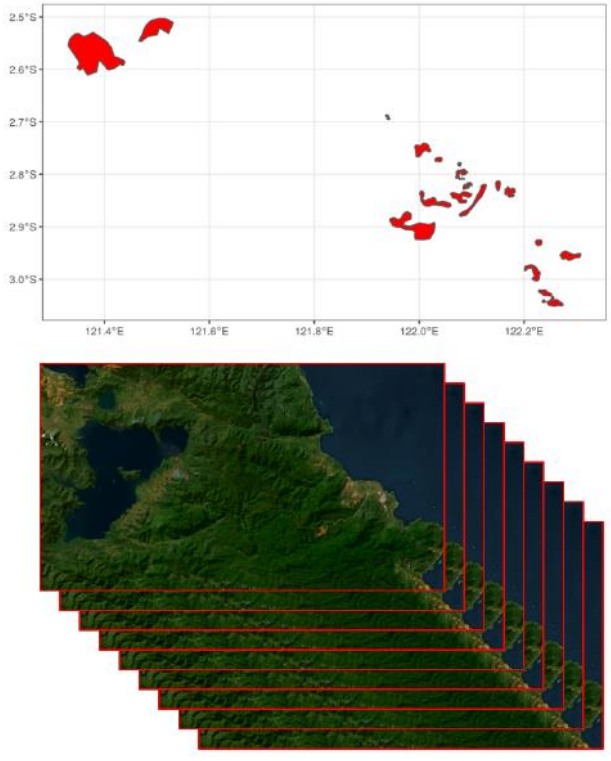
2019 satellite images: ~45,000 polygons, **>101,000 km²** (Austria: 84,000 km²)



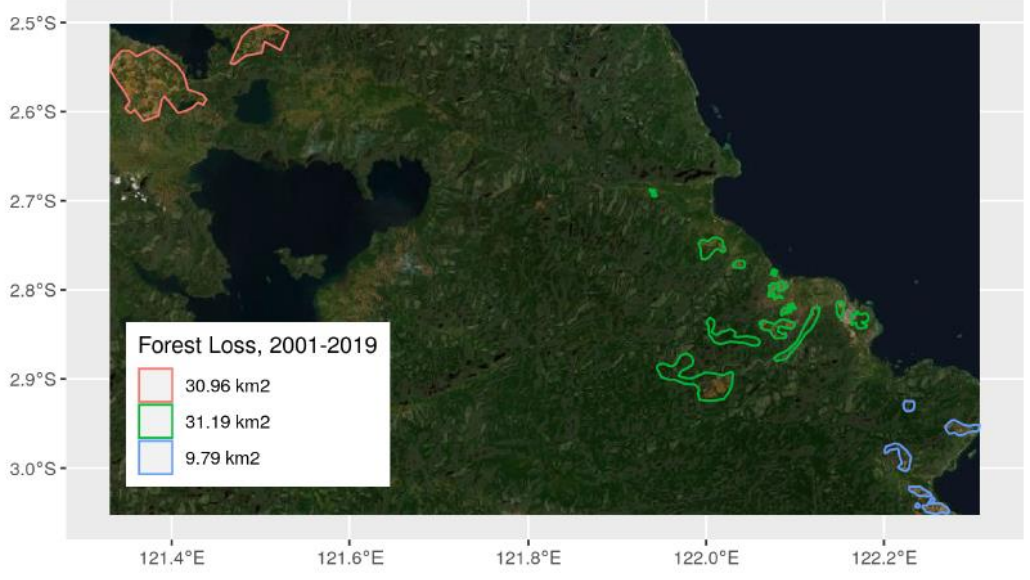
https://doi.pangaea.de/10.1594/PANGAEA.942325

Source: Maus et al., 2022 / Nature Scientific Data

Measuring mining-induced deforestation

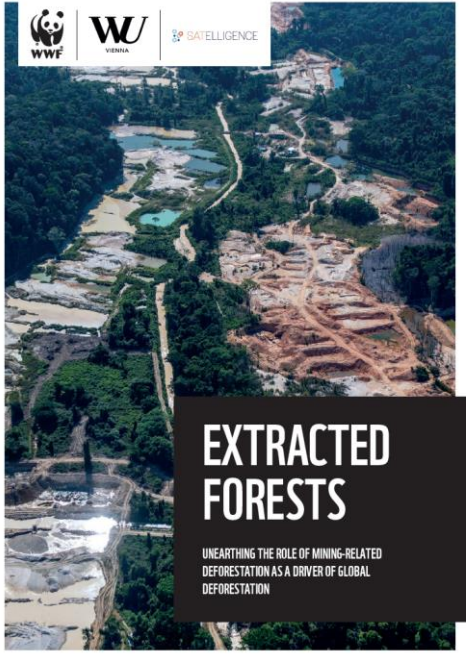


Spatial data set on land use of global mining (Maus et al. 2022)

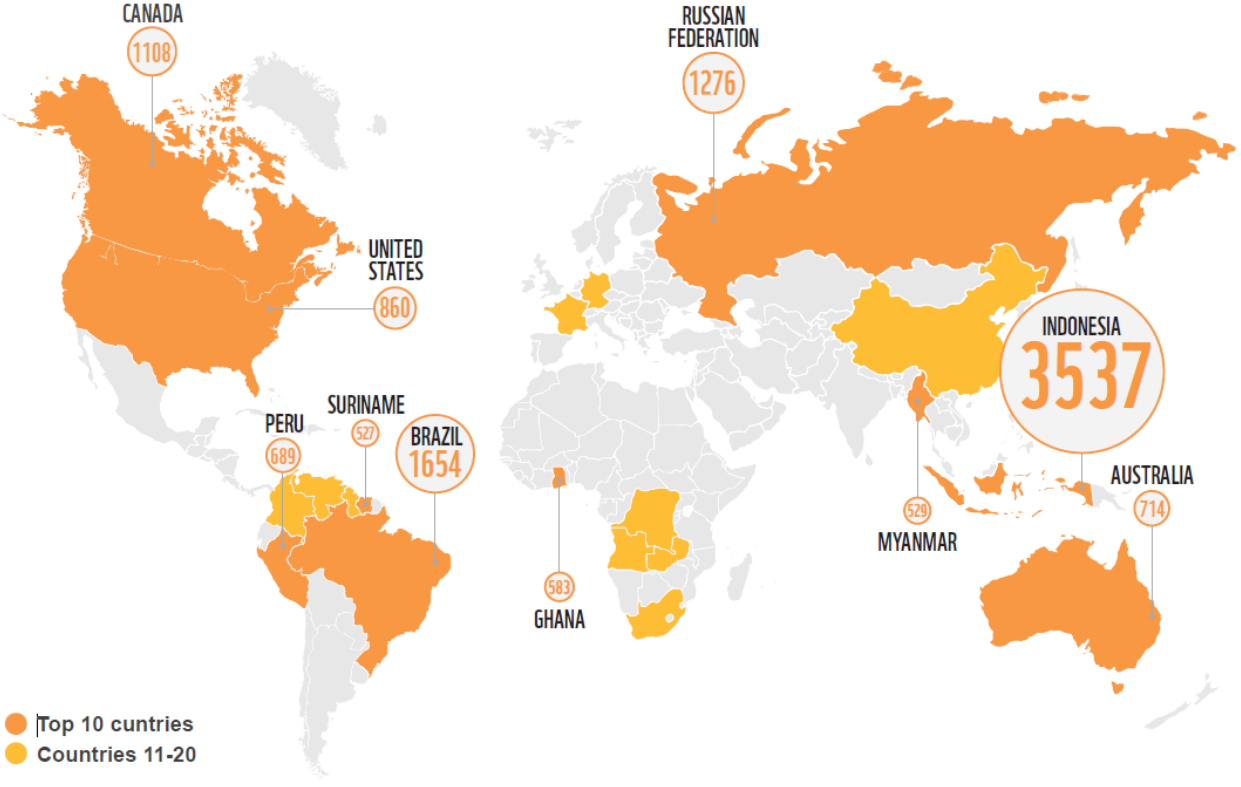


Global Forest Change data set 2000-2019 (Hansen et al. 2013)

Mining-induced deforestation



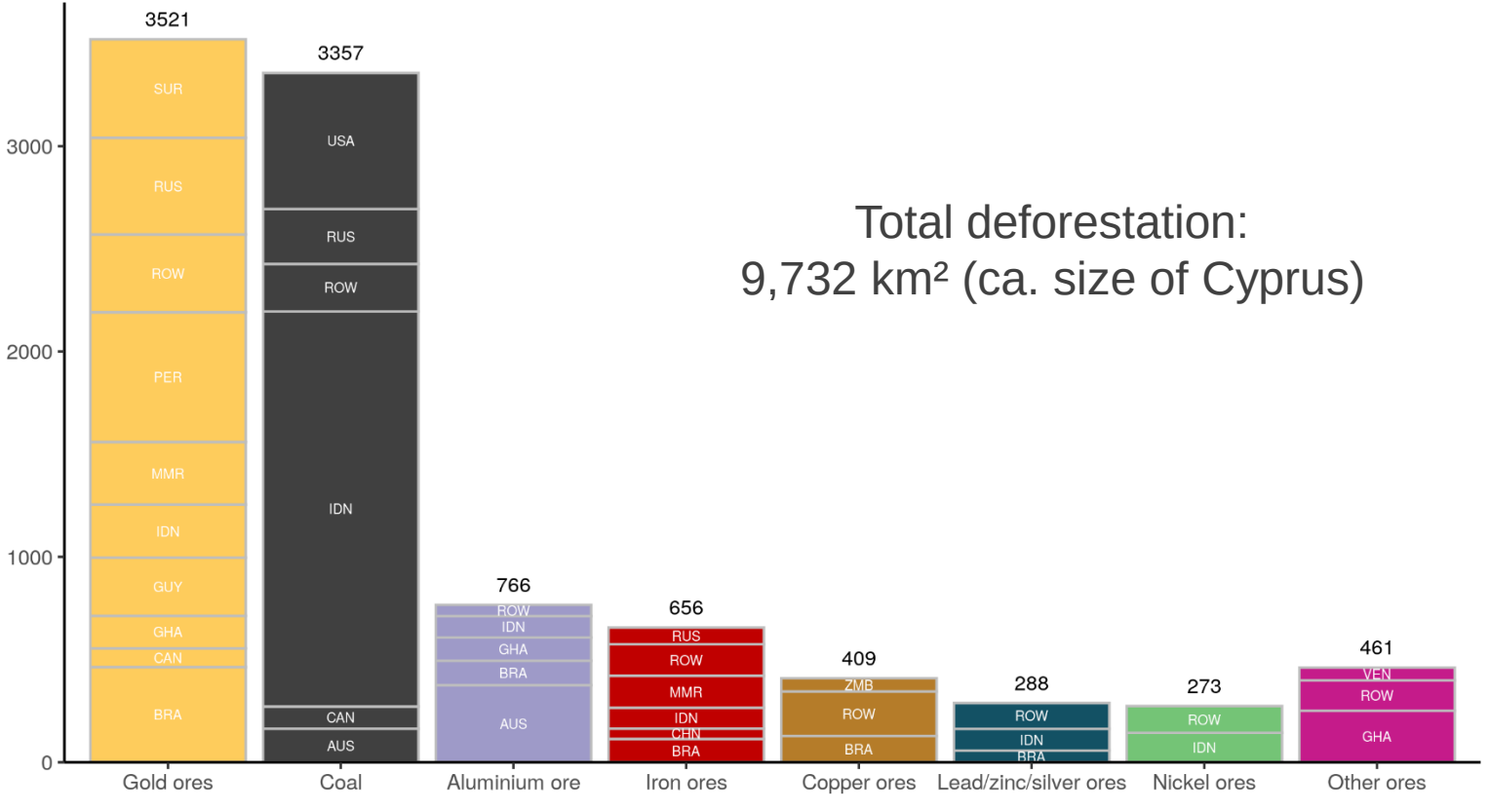
Direct deforestation due to industrial mining expansion, 2000-2019, in km²



Source: WWF et al., 2023

Deforestation by commodity

Deforestation (in km²) due to mining area expansion 2001-2019, by country and commodity*



Total deforestation:
9,732 km² (ca. size of Cyprus)

* Price allocation in case of polymetallic ores

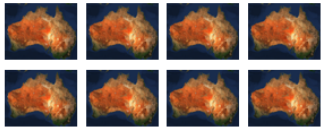
Source: Luckeneder et al., in preparation

Deforestation embodied in trade

Production Perspective

Mining land use

Forest loss maps



Deforestation within mining areas

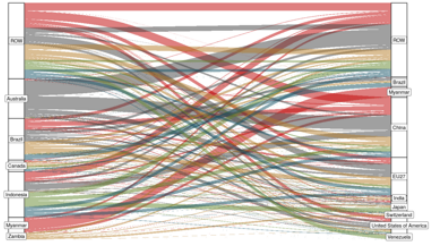
Multi-regional input-output (MRIO) model

GLORIA IO tables
164 countries
120 industry sectors

"Deforestation intensity"
(m2 deforestation / $ output in mining sector)

Consumption Perspective

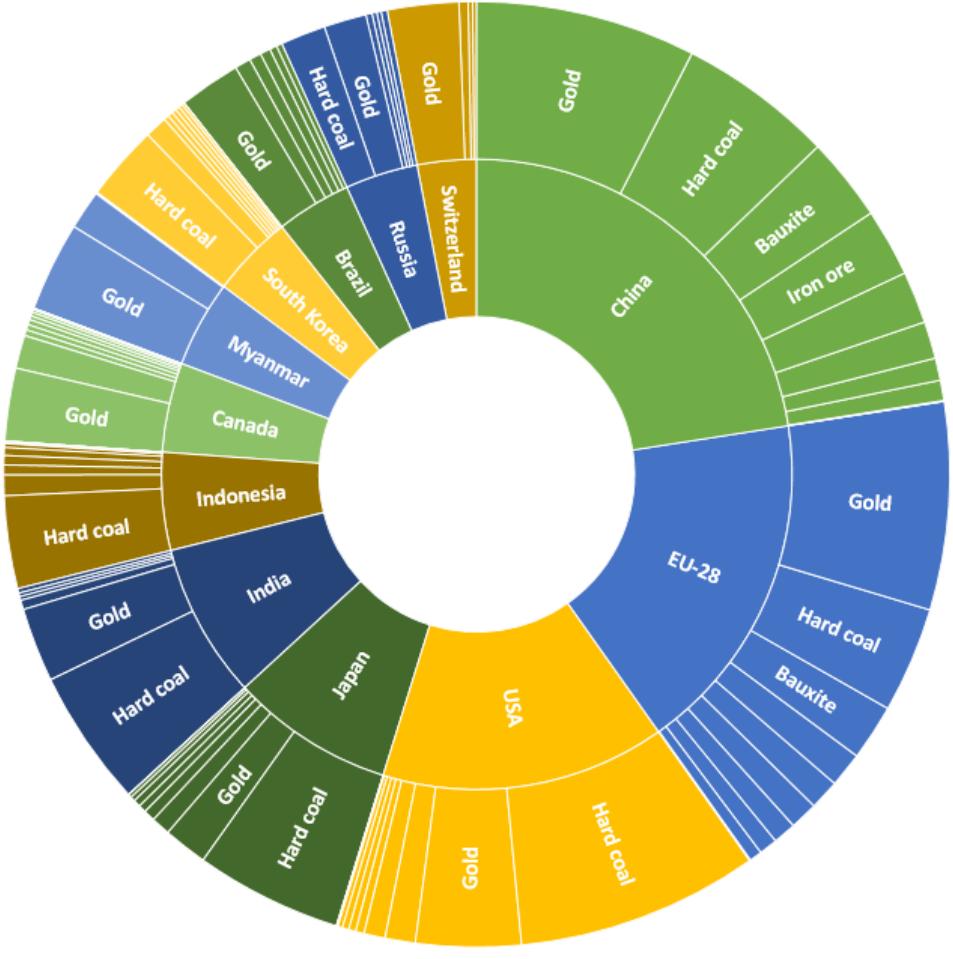
Local deforestation impacts



Deforestation embodied in consumer countries and sectors

Source: Luckeneder et al., in preparation

Top-12 consuming countries/regions



Top-12 consuming countries (EU aggregated) of embodied deforestation by commodity (79% of global total), 2001-2019

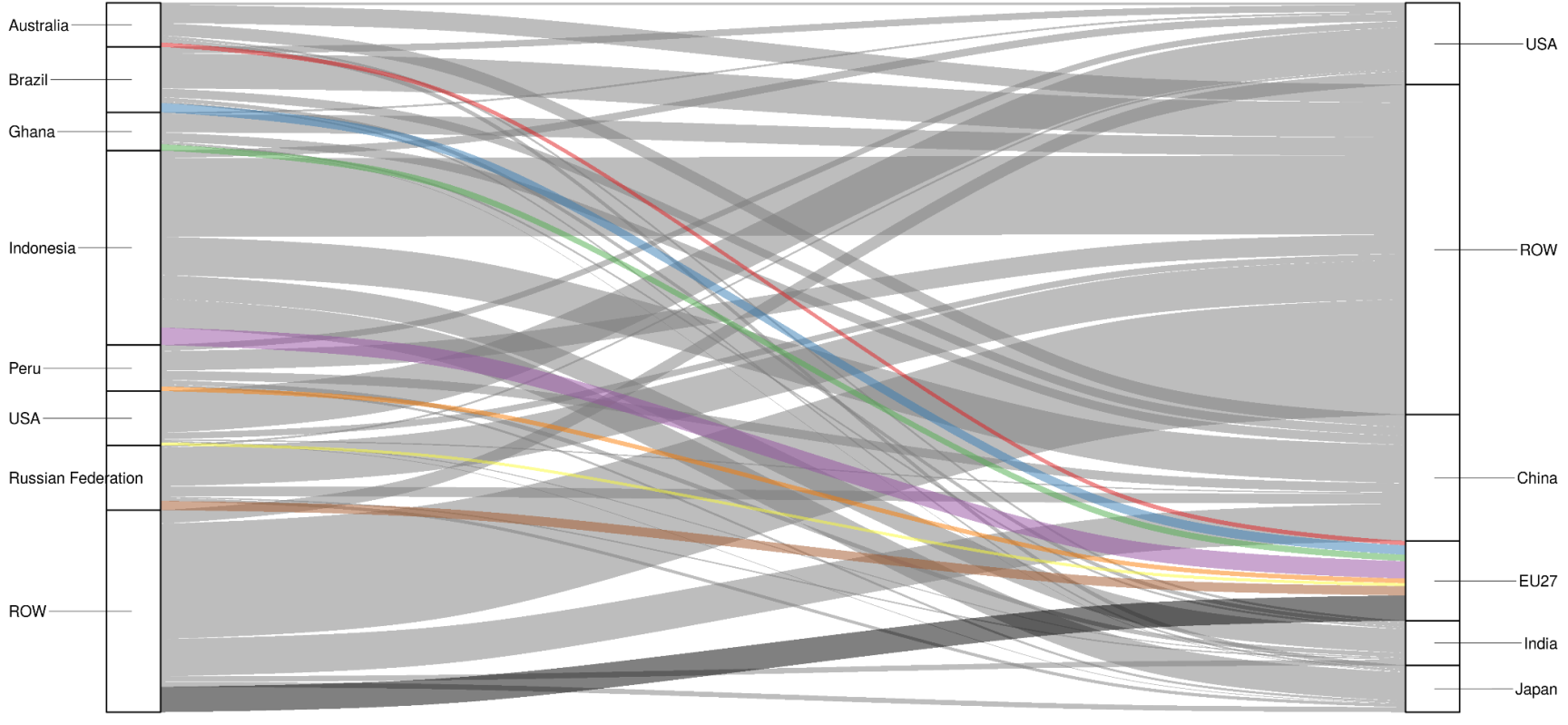
Shares in global total:
China: 18%
EU-27: 14%
USA: 12%
Japan: 7%

Top EU-27 sectors: vehicles, machinery, metal products, construction

Source: Luckeneder et al., in preparation

Geographical origin of EU-27 footprint

85% of the deforestation footprint of the EU-27 located in non-European countries



Source: Luckeneder et al., in preparation

Discussion

- With less than 10,000 km² since 2000, deforestation numbers of mining are small compared to agricultural expansion, but
  - Mining will significantly expand in the future
  - Indirect effects of mining increase deforestation
  - Drivers often re-inforce each other
- EU is major importer of embodied deforestation and has clear global responsibility (85% of forest loss abroad)
  - Upcoming EU regulations (CSRD, CSDDD) will increase demand to report on mining-related impacts, including deforestation

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