

OLLI Study Group 395  
Climate Policies: what works, what doesn't.  
Miria Pigato

**Class # 3: The role of forests in climate mitigation**



# Outline

- What is a forest?
- Forests and climate change
- Drivers of deforestation
- Policies for the sustainable management of forests
  - Regulations, certification, Payments for ecosystem services, REDD +
- Fiscal Instruments to fight deforestation





**Trees are sanctuaries. Whoever knows how to speak to them, whoever knows how to listen to them, can learn the truth.**

[Wandering: Notes and Sketches](#), Herman Hesse



# What is a forest?

**A forest is an area of land dominated by trees.** Forests contain 80% of the Earth's biodiversity. Globally, 1.6 billion people rely on forests for their livelihoods, many of whom are the world's poorest.

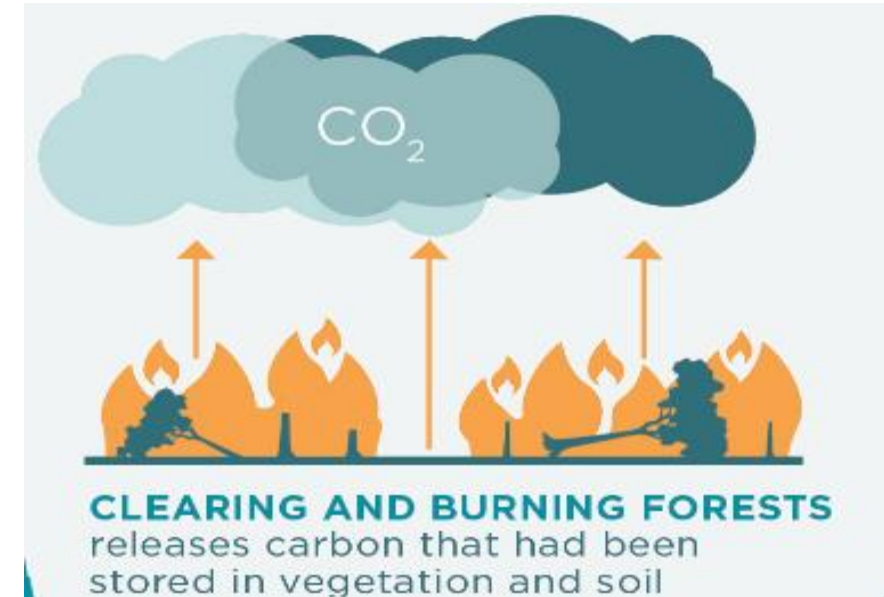
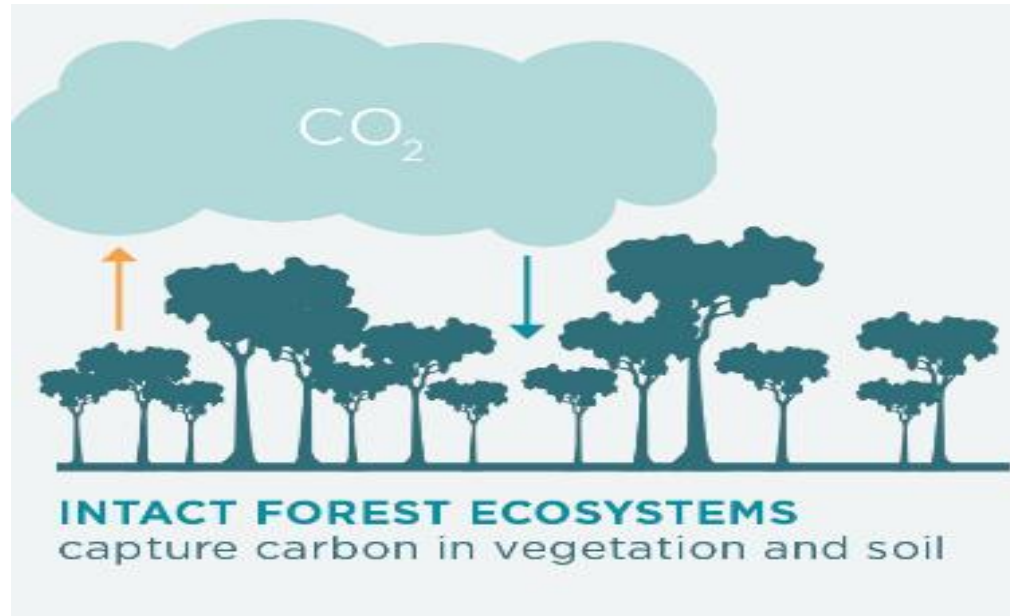
**Forests provide essential services:**

- **On site benefits:** Healthy soils, timber, firewood, fruits, shade and recreation.
- **Biodiversity benefits:** host a wide variety of species
- **Carbon benefits:** Sequester carbon in soil and biomass.
- **Water benefits:** Absorb, hold, filtrate and release water.



# Forests and climate change

- **Forests contribute to climate mitigation** by removing carbon from the atmosphere: about one-third of the CO<sub>2</sub> released from burning fossil fuels, is absorbed by forests every year.
- Forests produce oxygen by absorbing carbon through the process of photosynthesis; forest ecosystems represent the most important CO<sub>2</sub> reservoir world-wide.

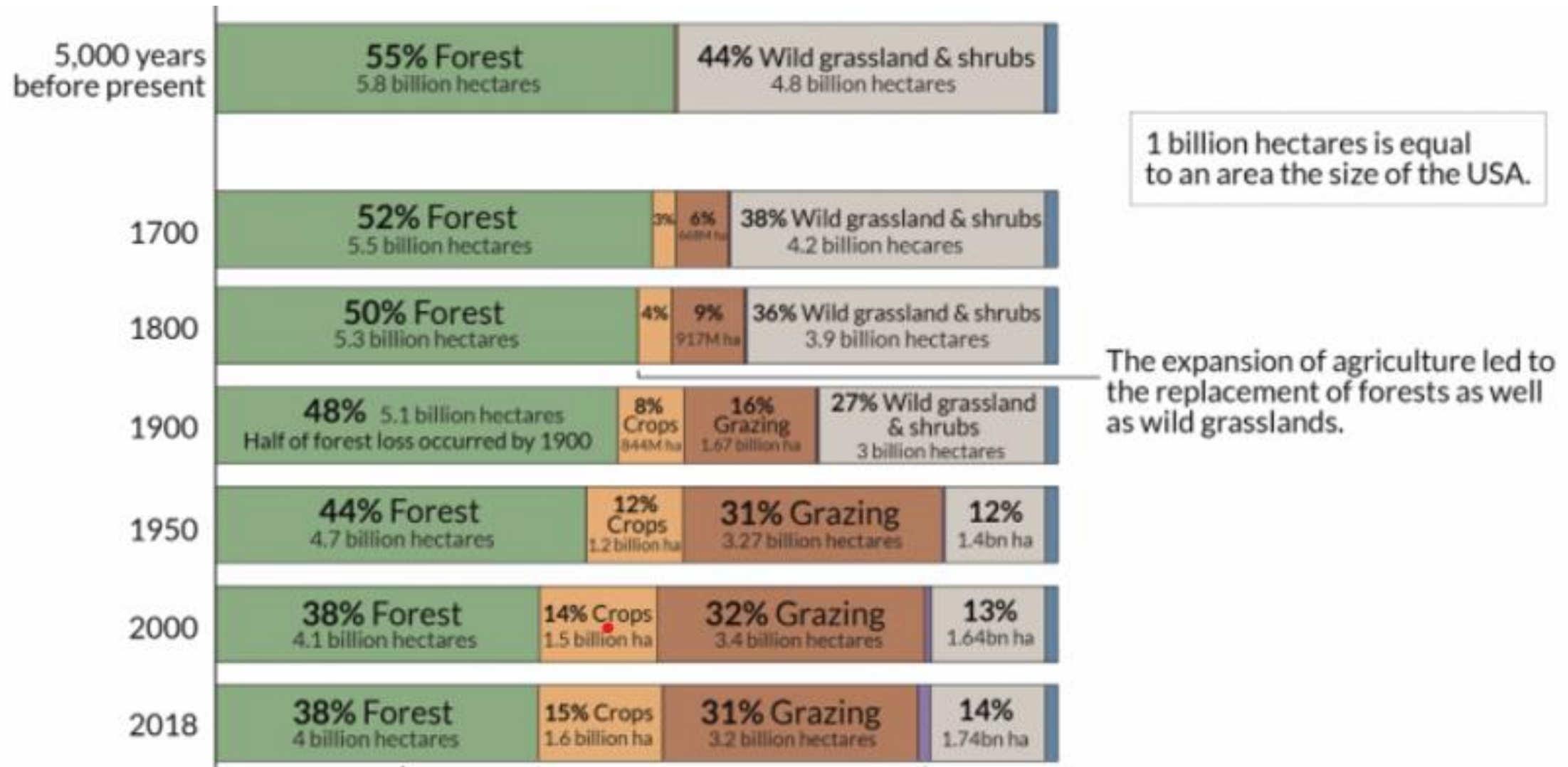


## Deforestation contributes to climate change:

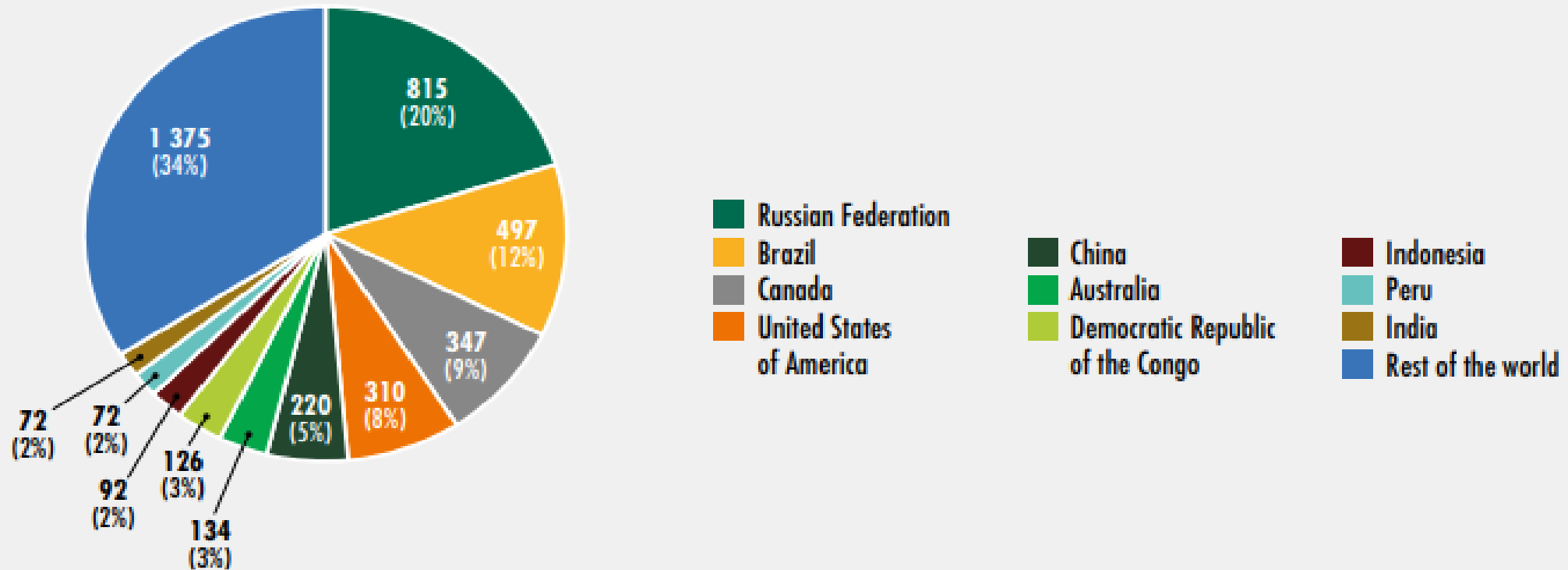
- Around 25% of global emissions come from deforestation and forest degradation.
- Deforestation emits more carbon than all cars and trucks on the planet combined.

<https://www.cgdev.org/sites/default/files/jonah-forest-blog-2.jpg>

# Forests are shrinking – agriculture is the largest driver of deforestation



# Global Distribution of Forests, 2020



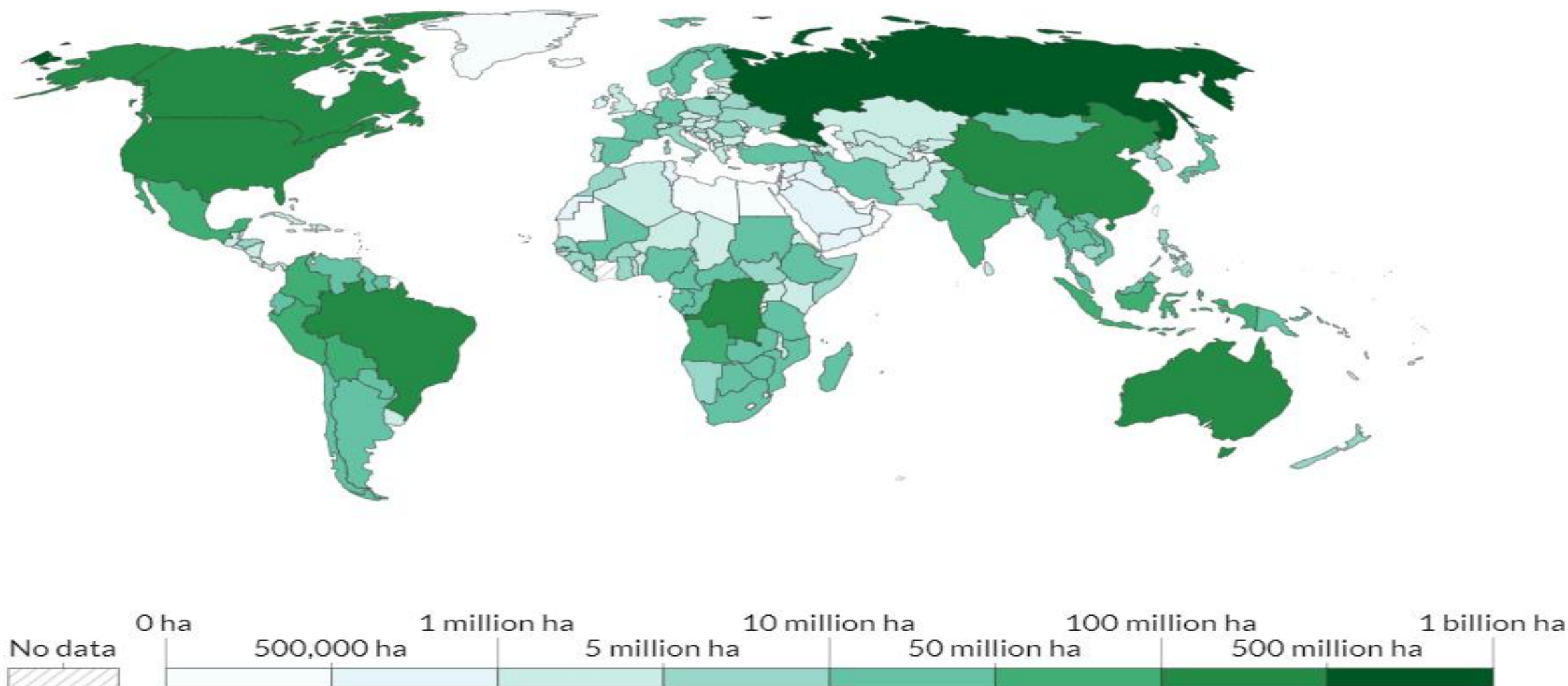
SOURCE: FAO, 2020.



# Forest area, 2020

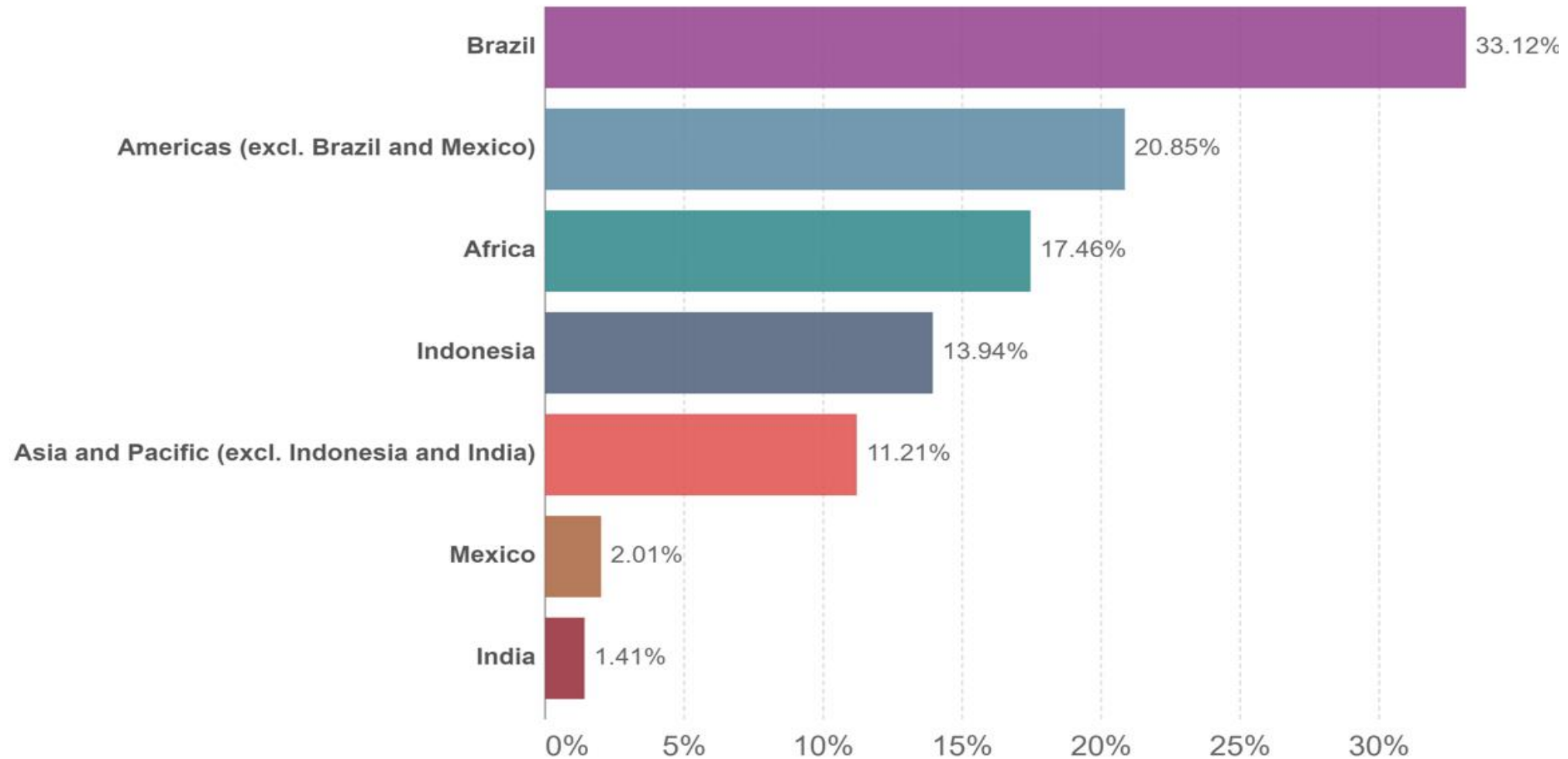
Forest area is land under natural or planted stands of trees of at least 5 meters in situ, whether productive or not, and excludes tree stands in agricultural production systems.

World



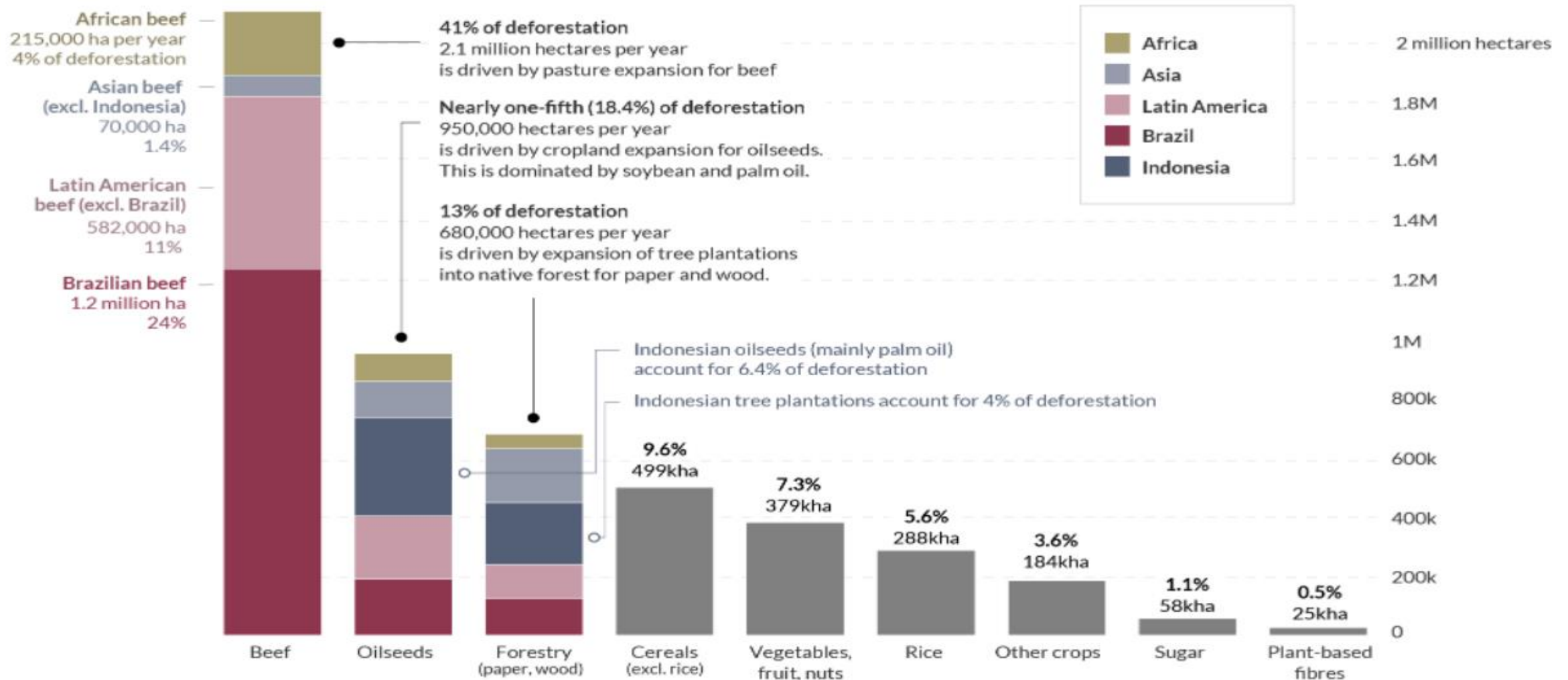


# Share of tropical deforestation



Source: Pendrill et al. (2019). Agricultural and forestry trade drives large share of tropical deforestation emissions.  
OurWorldInData.org/forests • CC BY

# Drivers of tropical deforestation

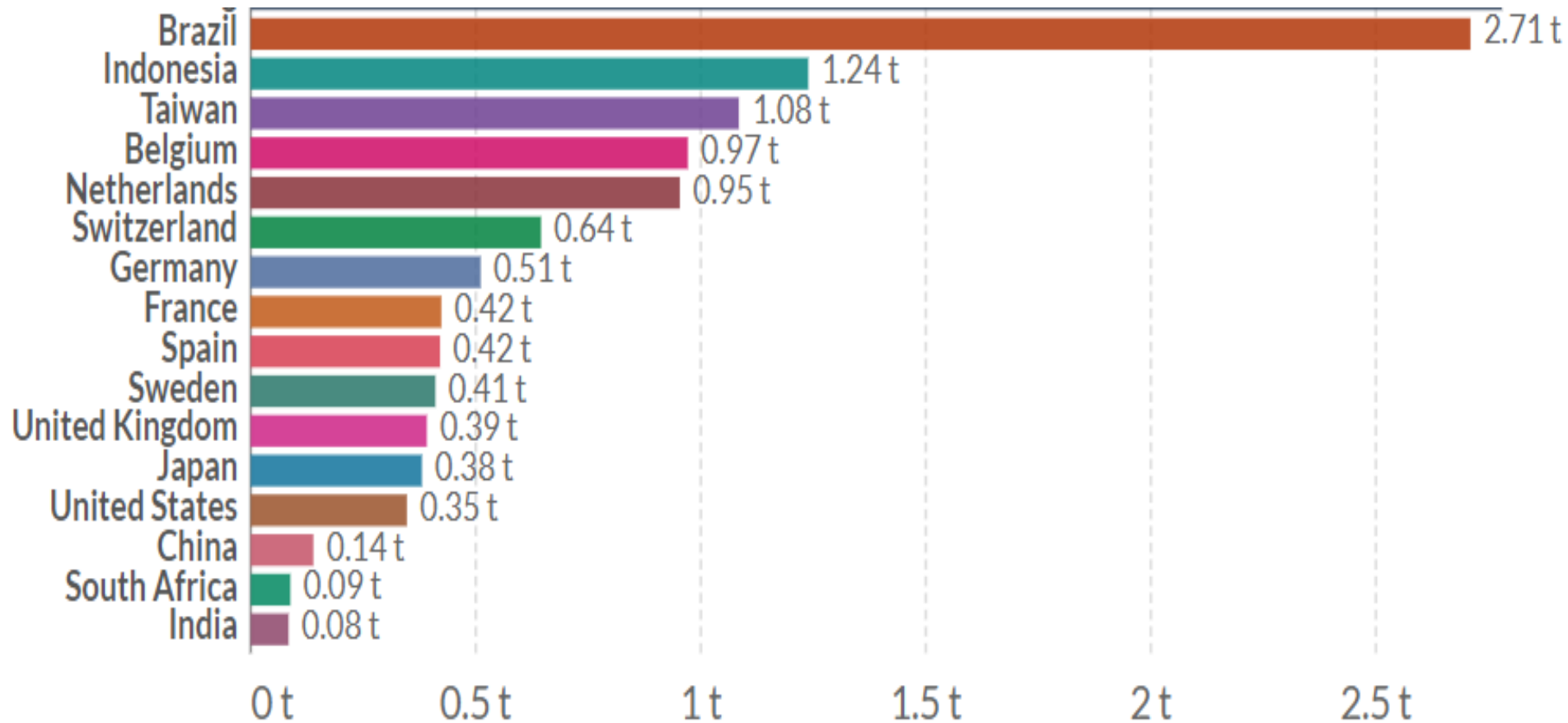


Data source: Florence Pendrill et al. (2019). Deforestation displaced: trade in forest-risk commodities and the prospects for a global forest transition.

OurWorldinData.org – Research and data to make progress against the world's largest problems.

Licensed under CC-BY by the author Hannah Ritchie.

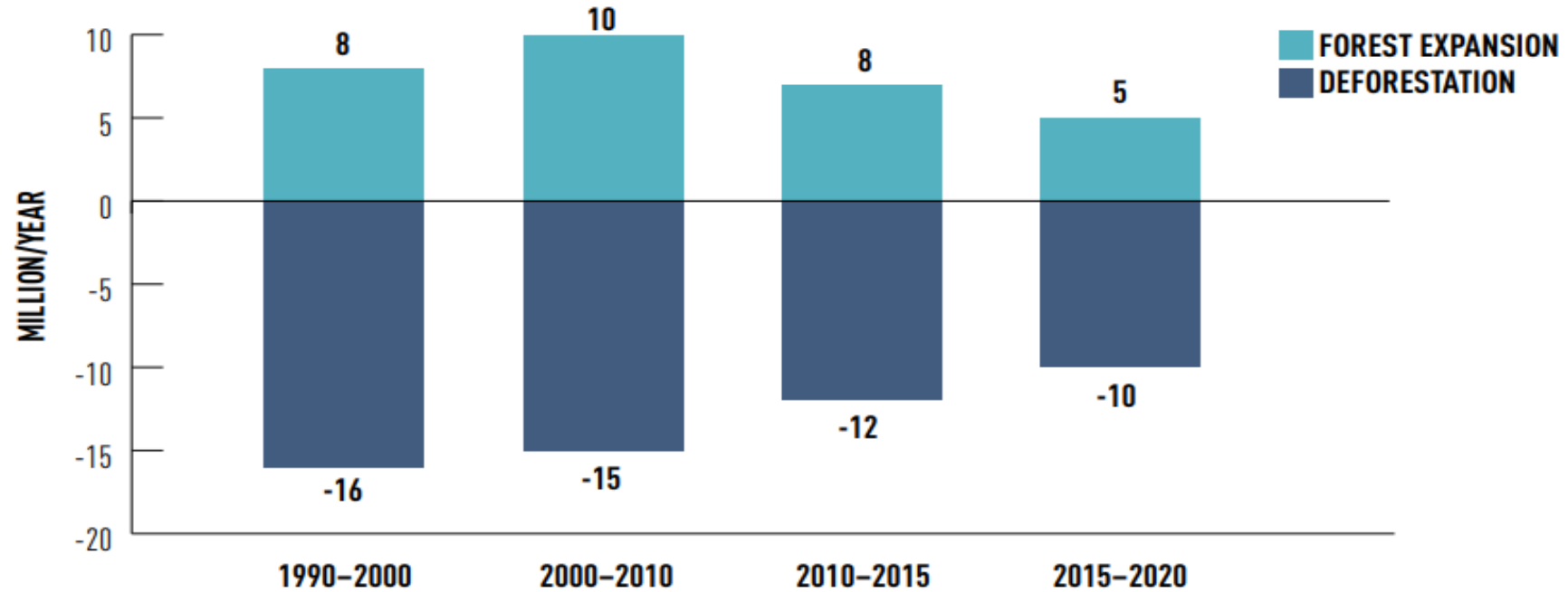
# Per capita CO2 emissions from deforestation for food production



Source: Pendrill et al. (2019). Agricultural and forestry trade drives large share of tropical deforestation emissions.  
OurWorldInData.org/forests • CC BY

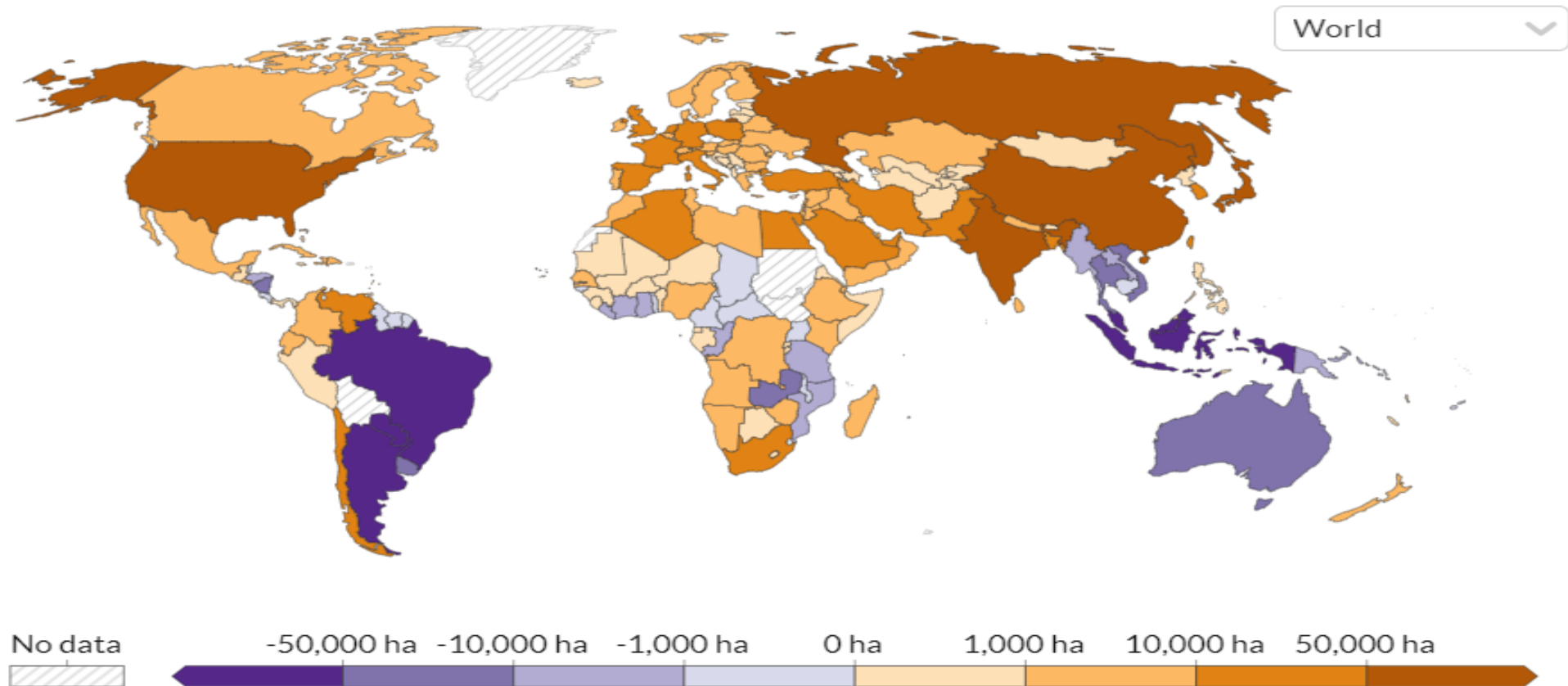


# Net change in forest area, 1990-2020



Source: FAO and UNEP 2020.

# Who is contributing to deforestation abroad?



Net importers of deforestation are shown in brown. Source: Our World in data

# Policies for sustainable management of forests





# Global commitments to sustainable forest management

- **In 2000, the United Nations established the Forum on Forests (UNFF)** to promote, *the management, conservation, and sustainable development of all types of forests and to strengthen long-term political commitment to this end*. The UNFF prepared non-binding guidelines for sustainable forest management in 2007.
- **Under the 2021 Glasgow Leaders' Declaration on Forests and Land Use**, 145 countries (including US, China, DRC, Brazil, Indonesia) committed to: halt and reverse forest loss by 2030, conserve forests and other terrestrial ecosystems and accelerate their restoration; facilitate trade and development policies that promote sustainable development, and sustainable commodity production and consumption....
- **Financial commitments:**
  - 12 countries including the United States and the EU will provide **\$12 billion** for forest-related climate finance between 2021 and 2025.
  - 30 leading financial institutions (collectively with over \$8.7 trillion in assets under management) pledged **\$7.2 billion** to the Global Forest Finance Pledge, and also pledged to eliminate agricultural commodity-driven deforestation from their portfolios by 2025.

# Country-level approaches to forest protection

There are three basic approaches to forest protection:

- **Regulatory approaches:** permits and quotas, designation of protected areas, bans, restrictions or prohibitions on trade of illegal timber, sustainability standards.
- **Information and voluntary instruments:** disclosure requirements and sustainability certifications, corporate environmental accounting, ecolabeling.
- **Economic instruments:** results-based expenditures, payments for ecosystem services, REDD+, and **fiscal instruments**.



# Regulatory approaches

## Regulatory policies

- **The forest sector has been highly regulated.** Examples include: land acquisition laws, laws regulating privately owned forest areas, timber laws regulating the cutting, harvesting and conservation of timber on state lands etc.
  - In the United States, laws like the Endangered Species Act, the Wilderness Act, and the Roadless Area Conservation policy help protect forests.
- **Laws to stop illegal wood products from entering the marketplace**
  - U.S. Lacey Act for timber (the world's first ban on trade in illegally sourced wood products) , EU Timber Regulation, and national policies on forest-risk commodities in EU and UK to reduce imports of illegal and unsustainable forest-risk commodities.
- **Regulatory failures** typically are linked to poor enforcement, corruption, weak legal systems, energy needs due to population growth, conflicting extra-sectoral policies and practices (e.g., agricultural expansion). The **lack of regulations in other sectors, such as agriculture**, has exacerbated forest degradation and deforestation.



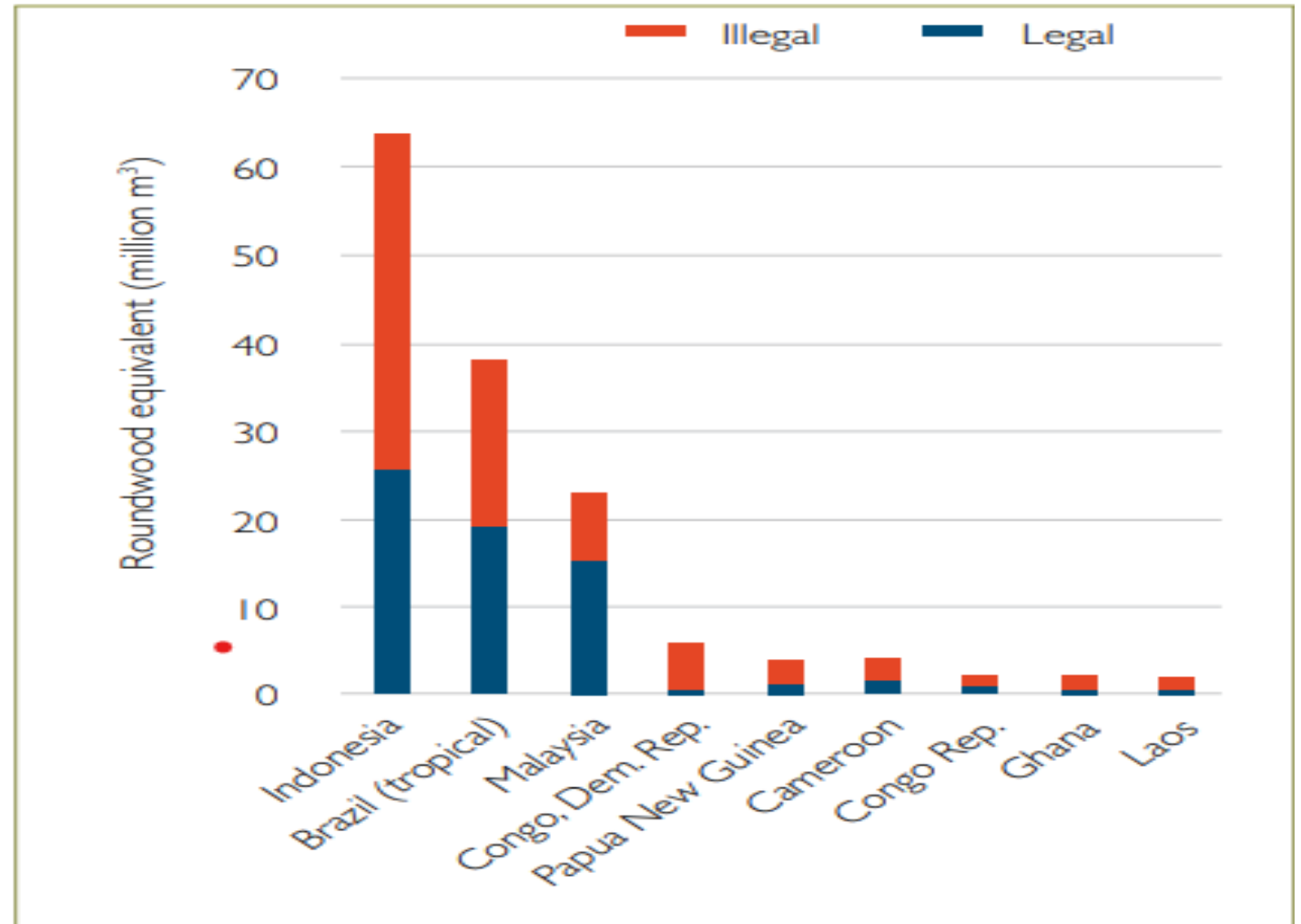
# Illegal logging continues

**Illegal logging accounts for 15–30 percent of global forestry production and up to 90 percent in tropical primary producer countries.**

Revenue loss estimates range from \$30 billion to over \$157 billion per year

Not only does illegal logging and its trade directly cost government revenues, it also is a drain on resources with little gain for domestic operators.

Estimated production of legal and illegal timber by selected tropical countries, 2013



# Information and voluntary partnership agreements to stop illegal trading

- **Information:** public disclosure requirements, information campaigns, audits, “eco-labels”, and certification systems.
- **Partnerships:** In 2005, the EU developed the **Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan** to address illegal logging. Under this plan, the European Commissions is empowered to negotiate legally binding bilateral trade deals called [Voluntary Partnership Agreements](#) with timber-exporting countries. Under a VPA, the partner country agrees to export only legal timber products to the EU, while the EU agrees to give verified legal ('FLEGT-licensed) timber products automatic access to the EU market.
  - **The Forest Stewardship Council (FSC) and the Program for the Endorsement of Forest Certification (PEFC)** set standards for sustainable forest products, certify forest management, and label products as “eco-friendly,” often using accredited subsidiary implementing agencies. They account for the vast majority of forests certificates.

# Certification

**Certification is a system to ensure forest land is managed responsibly through the entire supply chain.** The 'certifier' assesses the quality of forest management and production against a set of standards **approved by a public or private certification organization:**

- Compliance with the rules of law
- Well written and coherent forest management plans;
- Monitoring of operations to reduce forest damage
- Adequate working conditions
- Good relations with the people living in the area.

Source: Heine, D., & Hayde, E. (Eds.) (2021a). Designing Fiscal Instruments for Sustainable Forests. World Bank, Washington, D.C

## Estimates of price premium for certified commodities

Certified commodity	Price premiums
Timber	2%–56%, average 10.5%
Cocoa	5%–18%
Coffee	10%–30%
Palm oil	1%–6%
Soya	0.3%–80%

Source: Heine et al. (2021).

**Certified commodities command a premium.** Certificates, provide indirect incentives for timber producers to improve their production standards.

**Certification schemes are popular in the EU and in the US.**

- In the tropics, they cover only 6.6 per cent of all forests.
- Implementing third-party audited management systems has been extremely difficult in many tropical countries.



# Payments for maintaining forests and ecosystem services

- **Payments for ecosystem services (PES)** policies compensate individuals or communities for taking actions that increase the provision of ecosystem services such as water purification, flood mitigation, or carbon sequestration.
- **Redd, Redd+ payments:** developing countries receiving payments from developed countries for *reducing emissions from deforestation and forest degradation* and maintaining carbon stocks.
- **Voluntary or compliance forest carbon offsets:** An offset is a reduction in GHG emissions made in one place in order to compensate for emissions made elsewhere. Forest offsets include: projects in reforestation, avoided conversion; improved forest management.

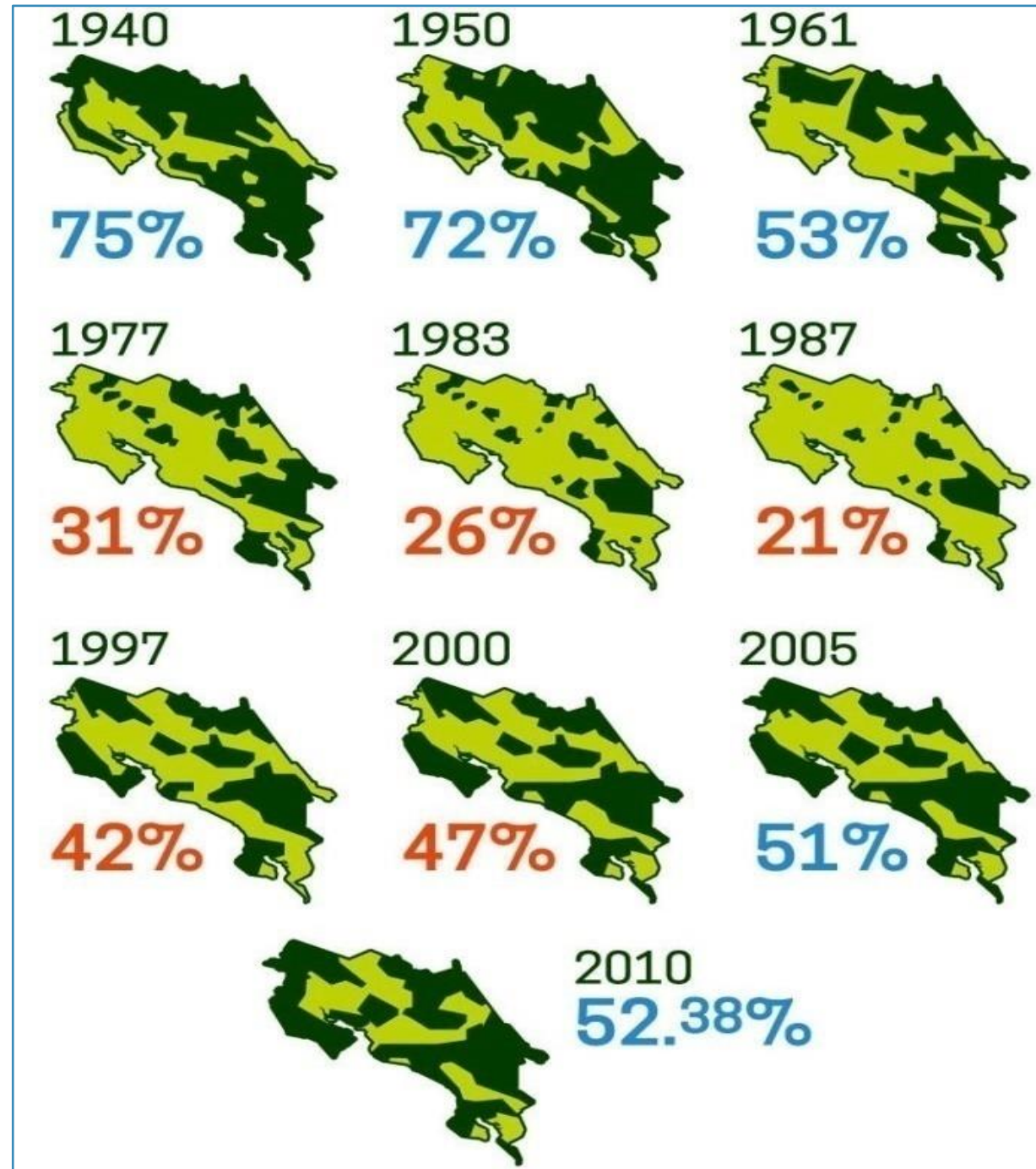
# Payments for ecosystem services: the New York City Watershed Protection Program

- Following the revised Clean Water Act in 1990, NYC needed to build a **large filtration plant** that would cost about \$6 billion to build and another \$250 million annually to maintain.
- **NYC chose instead a revolutionary idea to protect its drinking water:** it included improving treatment plants and septic systems, protecting the watershed, buying directly some upstate lands, and, since 1997, paying **forest owners for implementing sound land-use and management practices.**
- The watershed is the largest unfiltered water supply in the United States, serving 9 million New Yorkers with about 1.3 billion gallons of clean drinking water each day. It spans nearly 2000 square miles, extends 125 miles north and west of New York City, and includes 19 reservoirs.



# Costa Rica's reversed forest degradation

- 1991: Elimination cattle subsidies
- 1996: Government made it illegal to chop down forests without approval from authorities.
- 1997: **Introduction of Payments for Environmental Services (PES)** partly funded with a 3.5% tax on fossil fuel sales. It is a financial mechanism of the State to the owners and holders of forests, for maintaining the environmental services they provide.
- Development of eco-tourism: it currently represents more than 8% of GDP, employing 200 000 people





# REDD = Reducing Emissions from Deforestation and Forest Degradation in Developing Countries



1. Reducing emissions from deforestation

2. Reducing emissions from forest degradation

3. Conservation of forest carbon stocks

4. Sustainable management of forests

5. Enhancement of forest carbon stocks

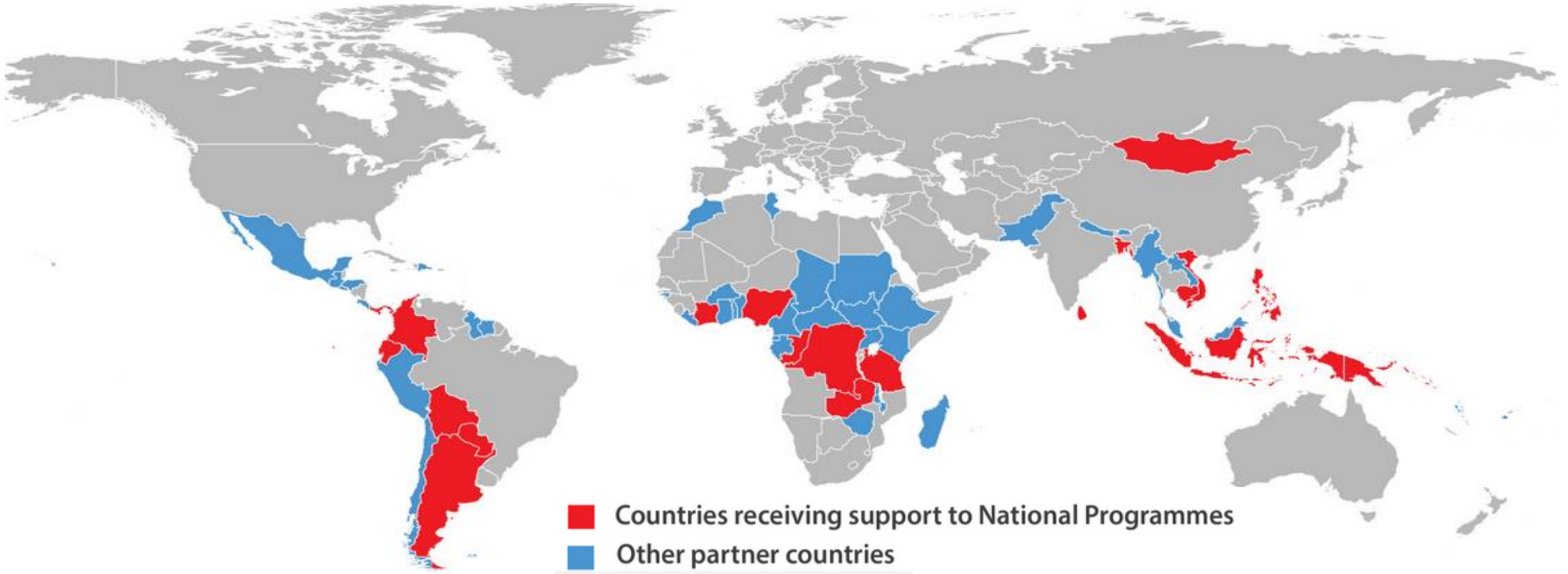
- **Established in Cancun, Mexico, in 2010, REDD+ is a UN-backed framework** that aims to curb climate change by stopping deforestation.
- Through REDD+, countries, the private sector, multilateral funds and others can pay countries to ***not cut down their forests***. This can take the form of direct payments or can be in exchange for “carbon credits,” which represent reductions in GHG emissions to compensate for emissions made somewhere else.

# REDD +: how it works

Participation is voluntary. REDD+ results-based actions are **measured, reported, and verified (MRV)\***;

- Phase 1 – readiness: the development of national strategies or action plans.
- Phase 2 – demonstration of national strategies and results-based demonstration activities.
- Phase 3 – result-based payments after the implementation of result-based actions.
- **Payments are based on the difference between actual forest emissions and a reference level.** Requirements:
  - A national forest reference\*\* (emission) level with the same coverage of emissions and removals.
  - A transparent national forest-monitoring system to estimate actual emissions and removals, expressed in t CO<sub>2</sub>eq per year.
    - Use a combination of remote sensing and ground-based forest carbon inventory approaches for estimating forest-related GHG emissions and removals, forest carbon stocks, and forest area changes.

## Countries participating in REDD+



Source: UN REDD Programme: Link: <http://www.unredd.net/about/un-redd-programme.html>



# Forests carbon offsets

**Forests remove carbon from the atmosphere, thus offsetting a portion of global annual GHG emissions.** Emitters of GHG can purchase **offset credits** from forest owners, and count those credits against their emissions. The ‘offset’ is represented by the incremental increase in carbon stored in a forest (or part of it). The price is determined by the market.

In November 2013, the California Air Resources Board issued the first carbon credits under its cap-and-trade Forest Offset Protocol.

[www.arb.ca.gov/cc/capandtrade/protocols/usforestprojects.htm](http://www.arb.ca.gov/cc/capandtrade/protocols/usforestprojects.htm)

- Each offset equals 1 metric ton of CO<sub>2</sub>. It represents an additional ton of carbon that is stored in the forest above what would otherwise occur under “business as usual” forest management. This can be achieved by:
  - **Reforestation** of sites that have been out of production at least 10 years
  - **Improved Forest Management (IFM)** that increases the carbon storage of stands through longer rotations.
  - **Avoided Conversion:** Avoiding land conversion and loss of forests that would have otherwise occurred.

# Technological innovations to support forests

- **New artificial intelligence monitoring technology in Russia**, supported by the WWF and IKEA forest partnership, detects logging operations in forests in a matter of minutes – this will help tackle illegal logging and monitor forest cover loss.
- **Remote sensors are collecting data** from terrestrial or airborne platforms: optical data distinguish forest tree species composition, radar and lidar make detailed measurements of forest structure, heights and volume and thermal sensing provides insight into forest ecosystem functions.
- **Drones are used to assess volume**, detect disease and manage forest fires.
- **Substantial developments in Measurement, reporting and verification (MRV)** systems since the creation of the REDD+ program: digital technologies to streamline data collection, processing and quality control in MRV processes.

# Fiscal instruments to fight deforestation

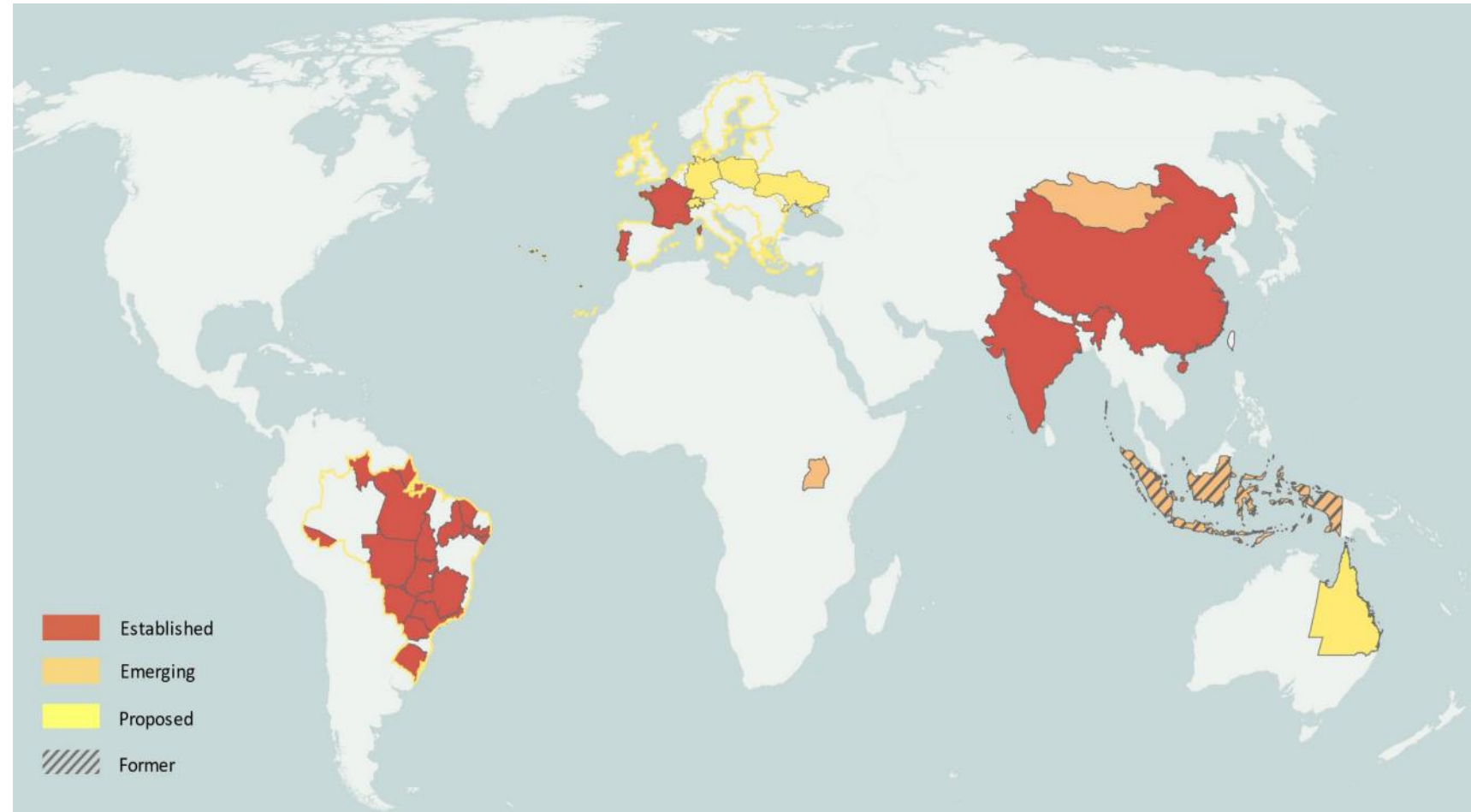




# Ecological Fiscal Transfers

**A share of public revenue is redistributed through transfers from national to subnational governments to:**

- Take care of conservation efforts where conservation takes place.
- Compensate sub-national/local governments for the cost and effort invested in nature conservation and restoration, on the basis of on ecological indicators.



# Ecological Fiscal Transfers in India

- In 2014, India's central government added forest cover in the formula used to redistribute tax revenue from central to state governments. Currently 10% of centrally collected tax revenue are distributed to states to protect forests.
- 2015–2019: Government of India devolved about US \$6–\$12 billion per year to states in proportion to their 2013 forest cover, amounting to around \$174–\$303 per hectare of forest per year.

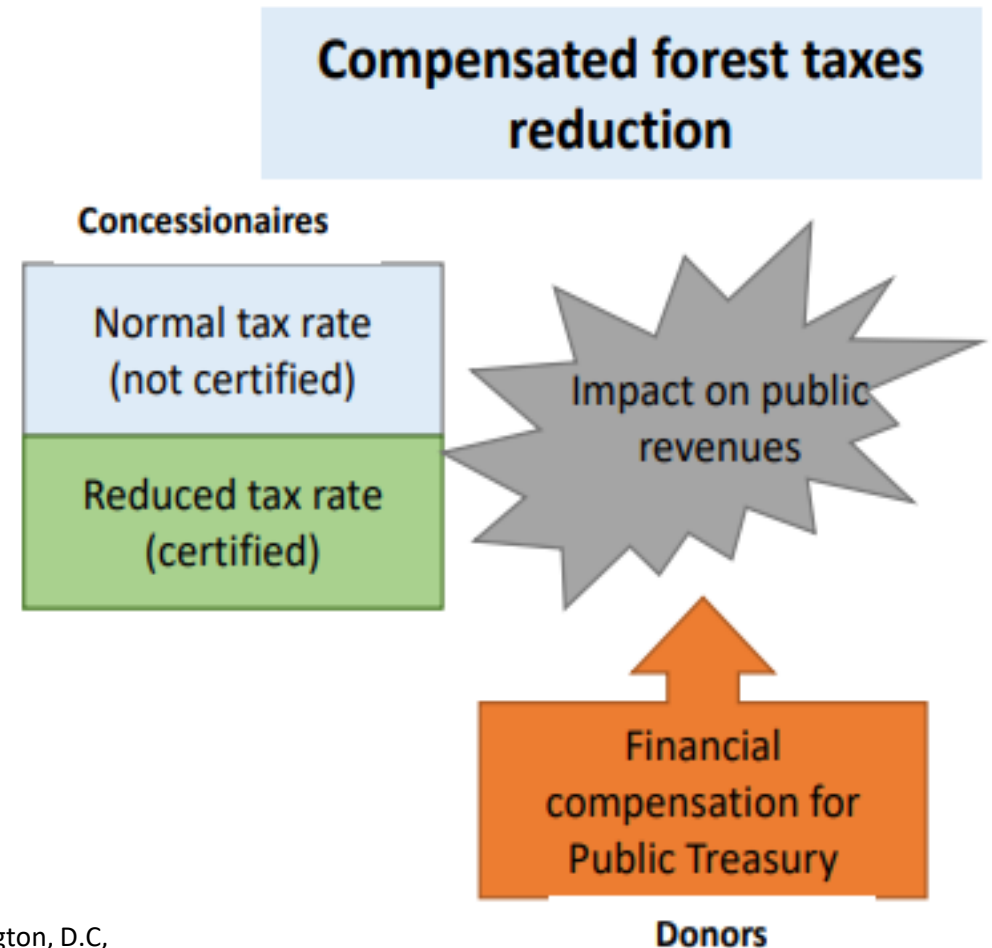
Results are mixed: in the three years after the introduction of ecological fiscal transfers, the share of the many states' budgets allocated for forestry was lower than before 2015.

- Most likely because states did not know that if they increase their forest cover, they will be transferred more revenue. This has now been addressed.

# From indirect to direct incentives

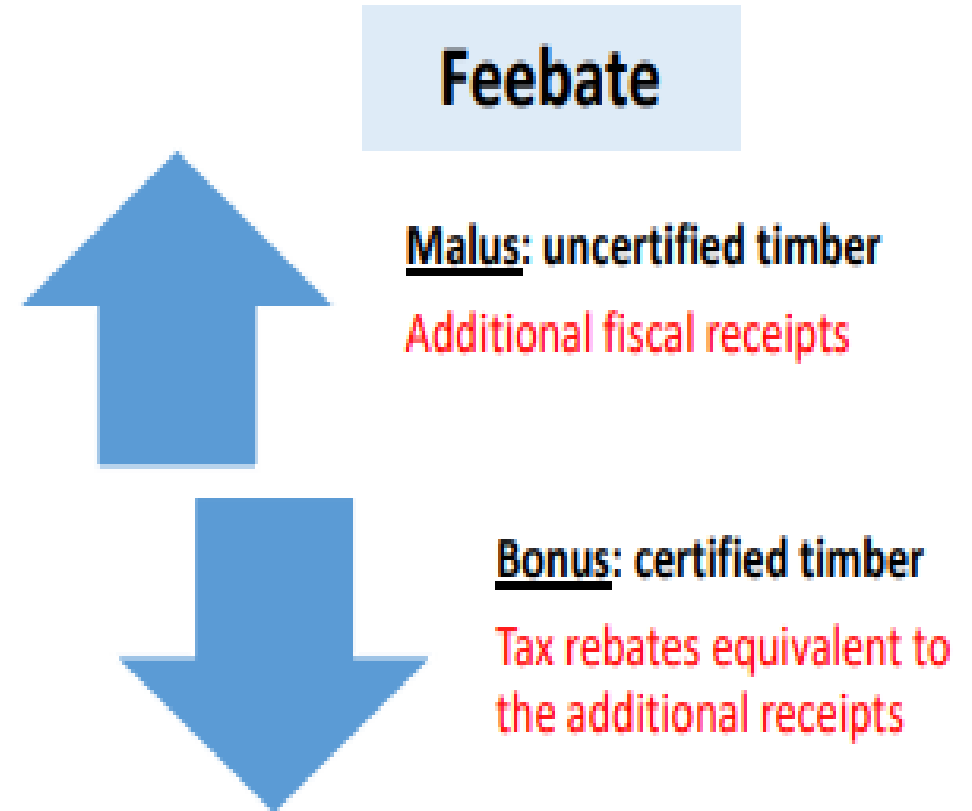
Idea to link forest taxation rates with certifications.

- It emerged around 2010. Peru and Brazil offer (limited) rebates for certified forest operations.
- Governments could encourage certification by linking fiscal incentives to third-party certification and lowering taxes on certified products.
- Gabon has adopted this type of measure in 2020.



# Feebates

- Feebate, also known as bonus-malus mechanisms: an eco-tax instrument that combines **an increase in taxes on unsustainably produced timber with a decrease in taxes on products deemed sustainable (e.g. certified)**. The aim is to achieve budget neutrality by balancing (on an annual basis) tax increases and decrease.
- **Condition: forest owner must prove legality/sustainability of timber via eligible third-party verification agency**





# Satellite monitoring for forest fiscal policy

1. Satellite captures image
  2. Computer processes data to identify alerts
  3. Alerts are overlaid with property boundaries and high resolution satellite imagery.
- Validate violations and send out notices of tax penalty. Or:
  - validate absence of deforestation and sent out notices of tax rebates.

Source: MIKAELA WEISSE & JESSICA WEBB in Heine, D., & Hayde, E. (Eds.) (2021a).  
Designing Fiscal Instruments for Sustainable Forests. World Bank, Washington, D.C., page 130.



# Conclusions

- **Deforestation and forest degradation continue around the world, especially in low-income countries with low governance capacities.** The loss and decay of forests also threaten global biodiversity, the provision of ecosystem services, and other core ecological functions that economies worldwide rely on.
- **Pressure to clear forests for land-intensive resources is likely to intensify:** global population is expected to grow to about 10 billion by 2050, increasing future global food demand by 50 percent. The demand for timber is expected to quadruple by 2050.
- **Forests benefits, including for climate mitigation, are undervalued - this is a** significant cause of deforestation and forest degradation. A first vital step would be the systemic valuation of forest benefits.
- **Policy makers should take an integrated approach to designing policies across land use sectors:** forestry, agriculture, extractive industries, and other land use sectors influences incentives for sustainable forest management.
- Payments for ecosystem services, REDD+ , forest carbon offsets and new combinations of fiscal instruments are effective instruments in combating deforestation.

# References

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Taking Stock: Payments for Forest Ecosystem Services in the United States By D. Evan Mercer, Katherine Hamilton - David Cooley, Gregory E. Frey, Chalisa Kallayanamitra, Philadelphia Wilkens, Natasha A. James,

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Source: California Cap-and-Trade Regulation U.S. Forest Offset Projects

Forests and Climate: Economics and Policy Issues [Updated 2022] by Anne-Marie Codur, Jonathan M. Harris and Maliheh Birjandi Feriz