

# Les causes de la déforestation tropicale

Colloque “La déforestation, une fatalité ? Des nouvelles du monde pour la Wallonie”  
Université de Namur  
1er décembre 2023

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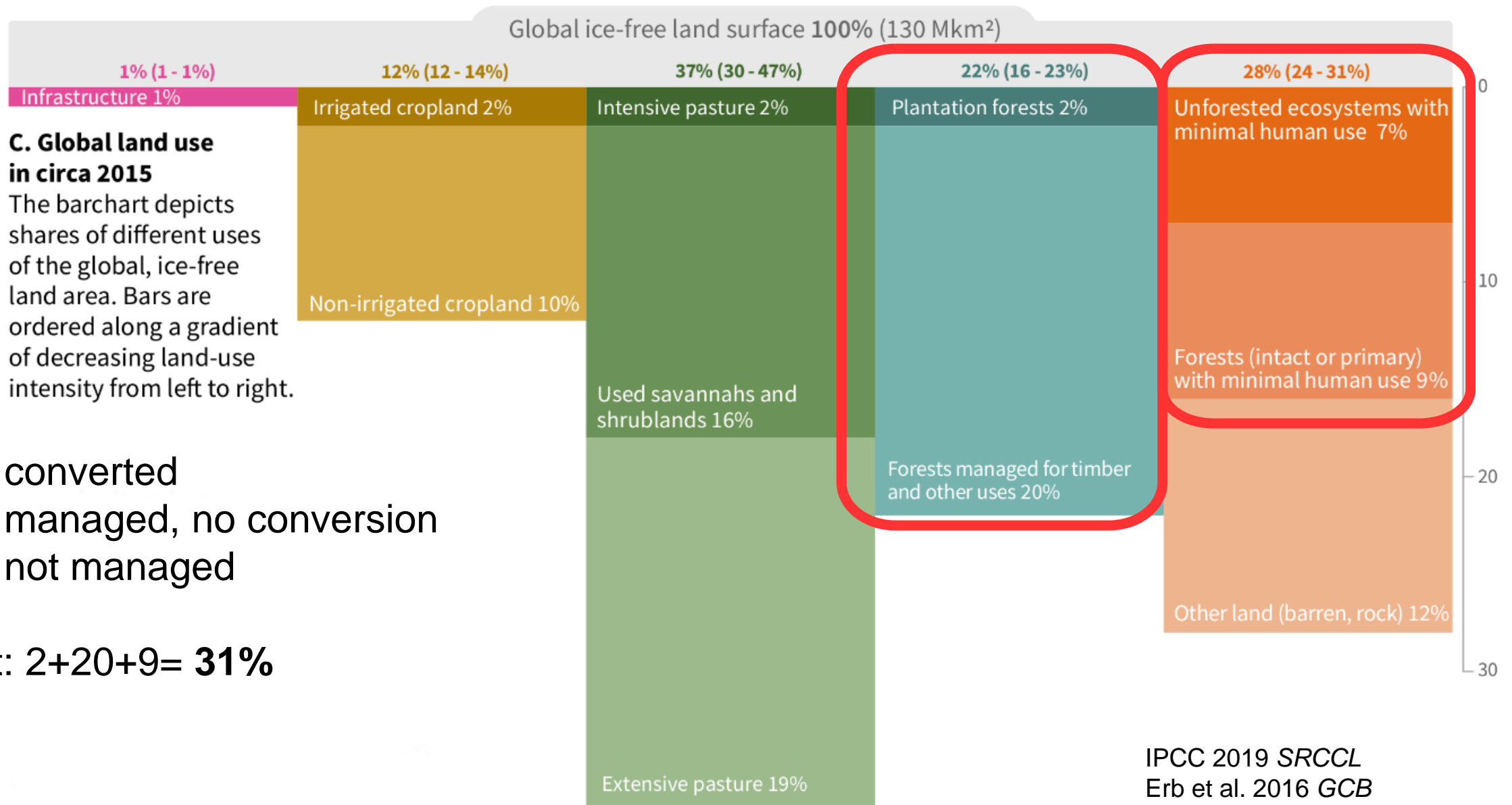


Les forêts, leur importance

Déforestation: tendance, causes

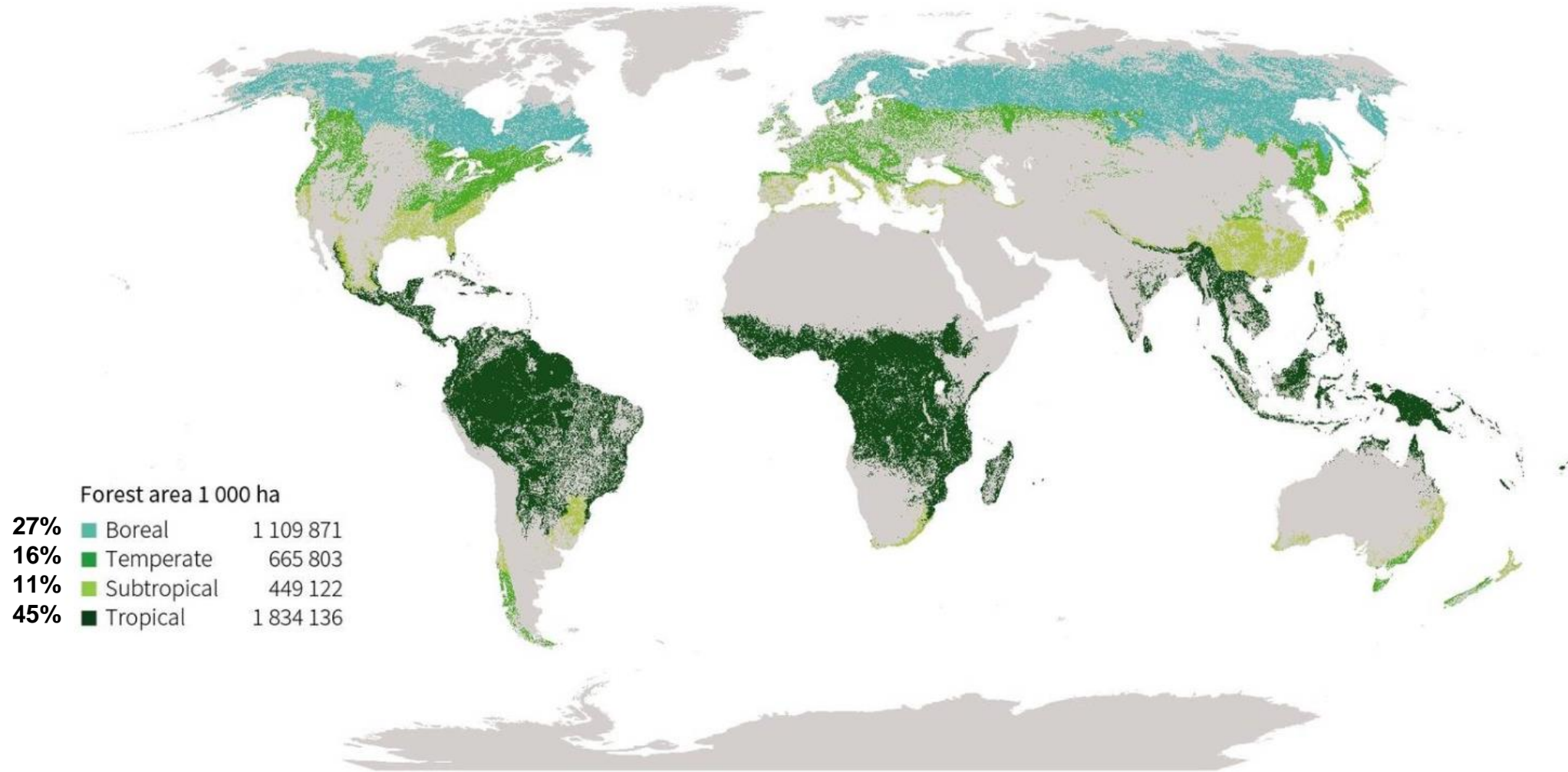


# Global land use & management : 13,000 Mha ice-free land



# Global forests - ~4,060 Mha , ~31%

The global distribution of forests, by climatic domain



Source: Adapted from United Nations World map, 2020.

FAO. 2020. *Global Forest Resources Assessment 2020*. Rome.



# Diversité des forêts tropicales

Photos: P. Meyfroidt



# Importance des forêts

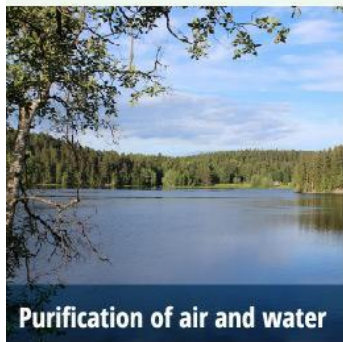
**Climat:** ~12% des émissions de CO<sub>2</sub> sont dûes à la déforestation; 23% utilisation des terres, 35% systèmes alimentaires

**Biodiversité:** les changements d'utilisation des terres, dont la déforestation et dégradation des forêts, sont la **cause principale** de perte de biodiversité; 62% des espèces Red List sont menacées par l'agriculture

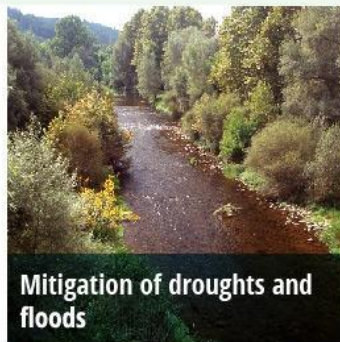
IPCC & IPBES reports



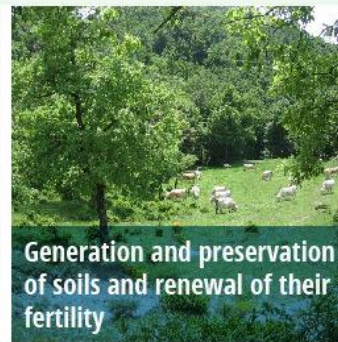
# Importance des forêts



Purification of air and water



Mitigation of droughts and floods



Generation and preservation of soils and renewal of their fertility



Detoxification and decomposition of wastes



Pollination of crops and natural vegetation



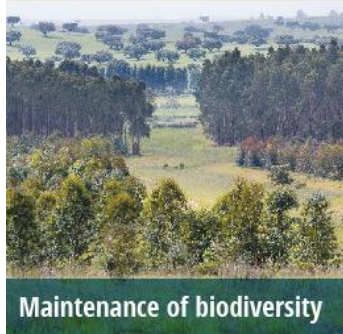
Dispersal of seeds



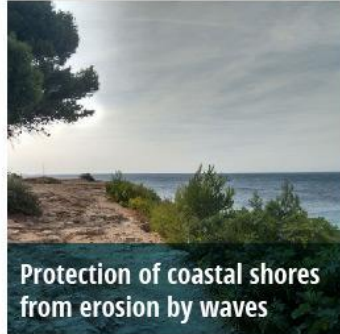
Cycling and movement of nutrients



Control of potential agricultural pests



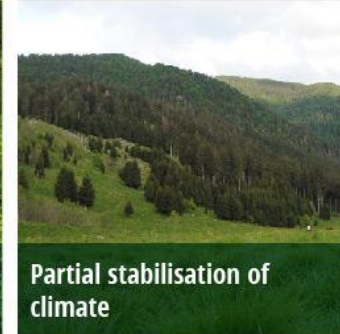
Maintenance of biodiversity



Protection of coastal shores from erosion by waves



Protection from the sun's harmful ultraviolet rays



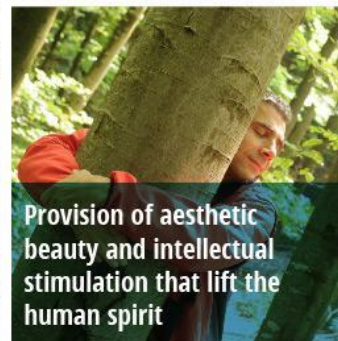
Partial stabilisation of climate



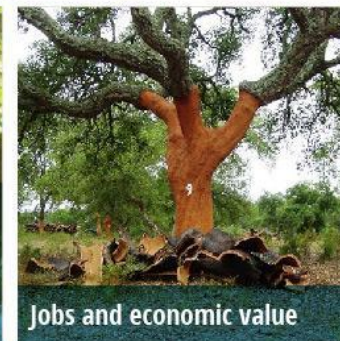
Moderation of weather extremes and their impacts



Hunting, fishing, tourism and other leisure activities



Provision of aesthetic beauty and intellectual stimulation that lift the human spirit



Jobs and economic value



# Valeurs intrinsèques, instrumentales, relationnelles

IPBES,

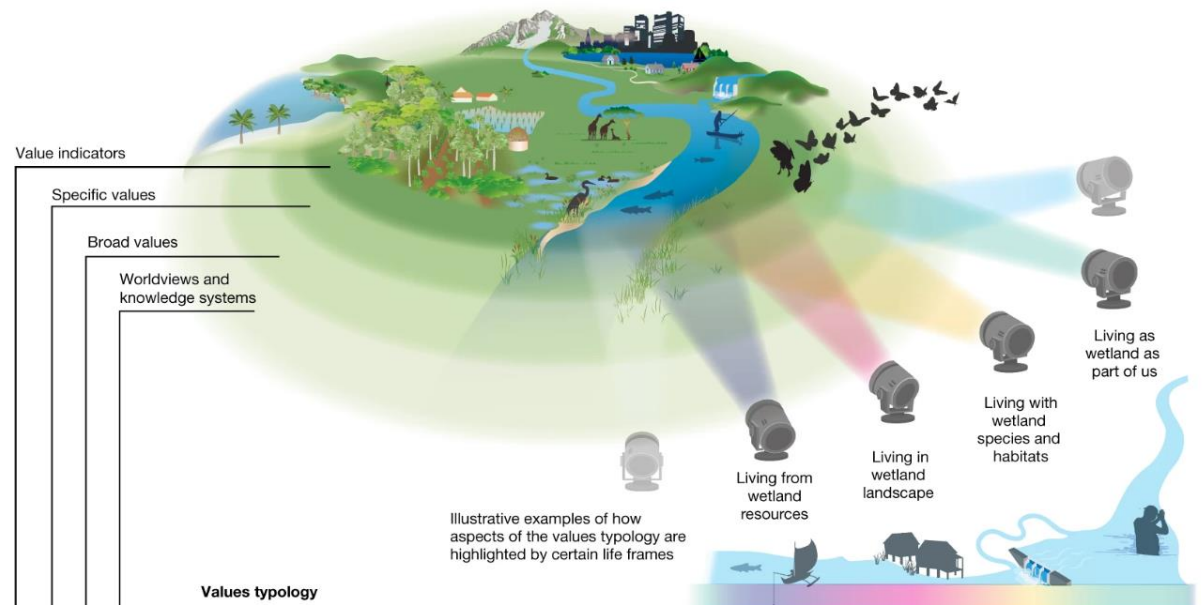
Pascual et al. 2023

Meyfroidt et al. 2022

FOCI OF VALUE	TYPES OF VALUE		EXAMPLES
<p><b>NATURE</b></p>	<p>Non-anthropocentric <i>Intrinsic</i></p>		<p>Animal welfare/rights Gaia, Mother Earth Evolutionary and ecological processes Genetic diversity, Species diversity</p>
<p>NATURE'S CONTRIBUTIONS TO PEOPLE</p> <p><i>NCP</i></p>	<p>Anthropocentric</p>		<p>Habitat creation and maintenance, pollination and propagule dispersal, regulation of climate</p> <p>Food and feed, energy, materials</p> <p>Physical and experiential interactions with nature, symbolic meaning, inspiration</p>
<p><b>GOOD QUALITY OF LIFE</b></p>			<p>Relational</p> <p>Physical, mental, emotional health</p> <p>Way of life</p> <p>Cultural identity, sense of place</p> <p>Social cohesion</p>







**Values typology**

Worldviews	Ways through which people conceive and interact with the world	Anthropocentric	Anthropocentric	Bio/ecocentric	Pluricentric
Knowledge systems	Bodies of knowledge, practices and beliefs • Academic, indigenous, local				
Broad values	Guiding principles and life goals	Prosperity, livelihood	Belonging, health	Stewardship, responsibility	Oneness, harmony with nature
Specific values	Judgements regarding the importance of nature in particular situations  • Instrumental: means to an end, nature as a resource or asset, satisfaction of needs and preferences, usefulness for people	Fish to sell at market	Health benefits of recreation on the river	Fish as regulators of food web structure and function	Fish to eat
	• Intrinsic: agency of other-than-humans, inherent worth of biodiversity as ends in and of themselves			The right of fish to exist	Fish as co-inhabitants
Value indicators	• Relational: importance of desirable, meaningful and often reciprocal human relationships	Cultural meanings of fishing	Sense of place of a fishing community	Awe inspired by spawning fish	Fish as part of kinship or clan relationships
	Quantitative measures and qualitative descriptors  • Biophysical	Tonnes of fish	Physiological effects of being in nature	Number of fish species	Fish as nutrition
	• Monetary	Price premium of eco-certified fish	Willingness to pay (WTP) for recreational fishing	Non-use (that is, existence and bequest) WTP of a river feature	
	• Socio-cultural	Gender-specific participation in fishing	Ratings of special places	Legal standing of biodiversity	Narratives of sacred places

IPBES,

Pascual et al. 2023  
Meyfroidt et al. 2022

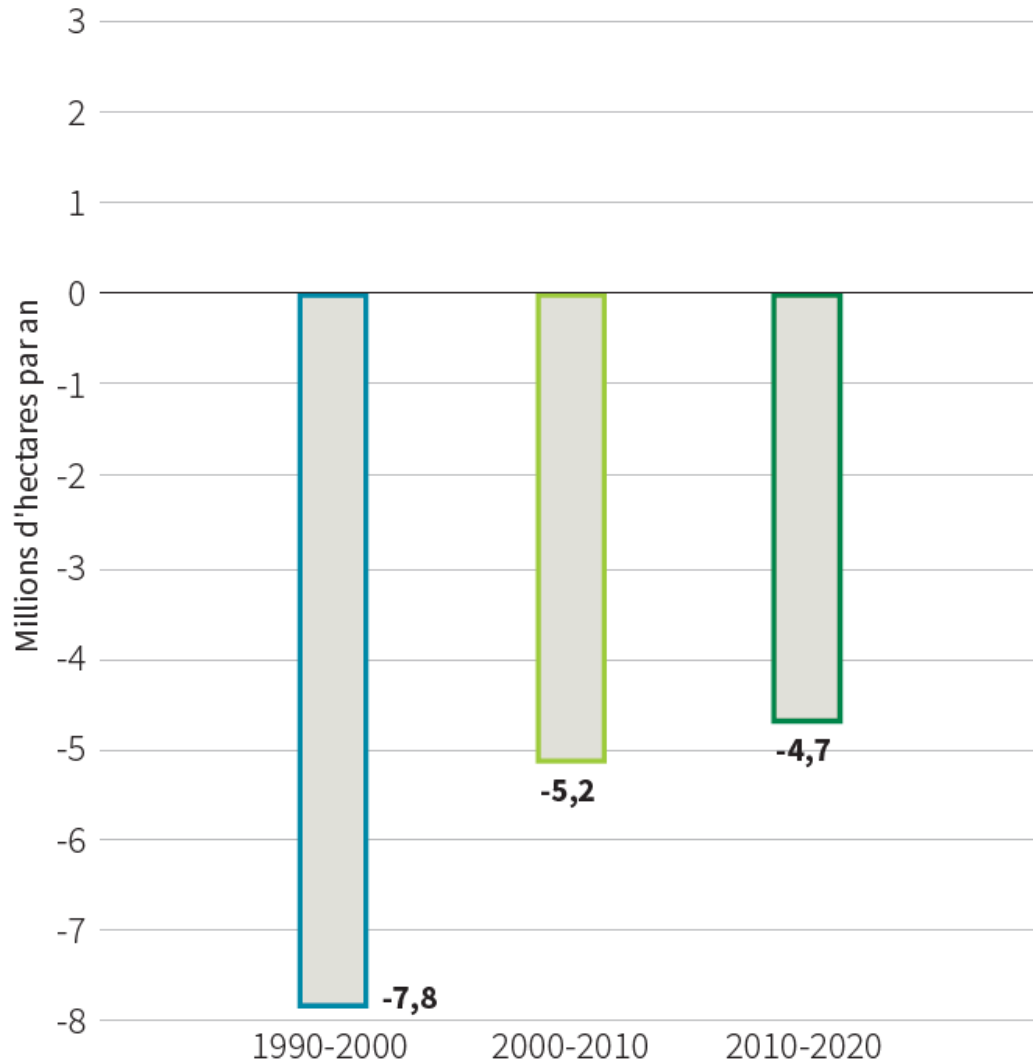


# Déforestation tropicale (taux, causes)



# Net vs gross changes

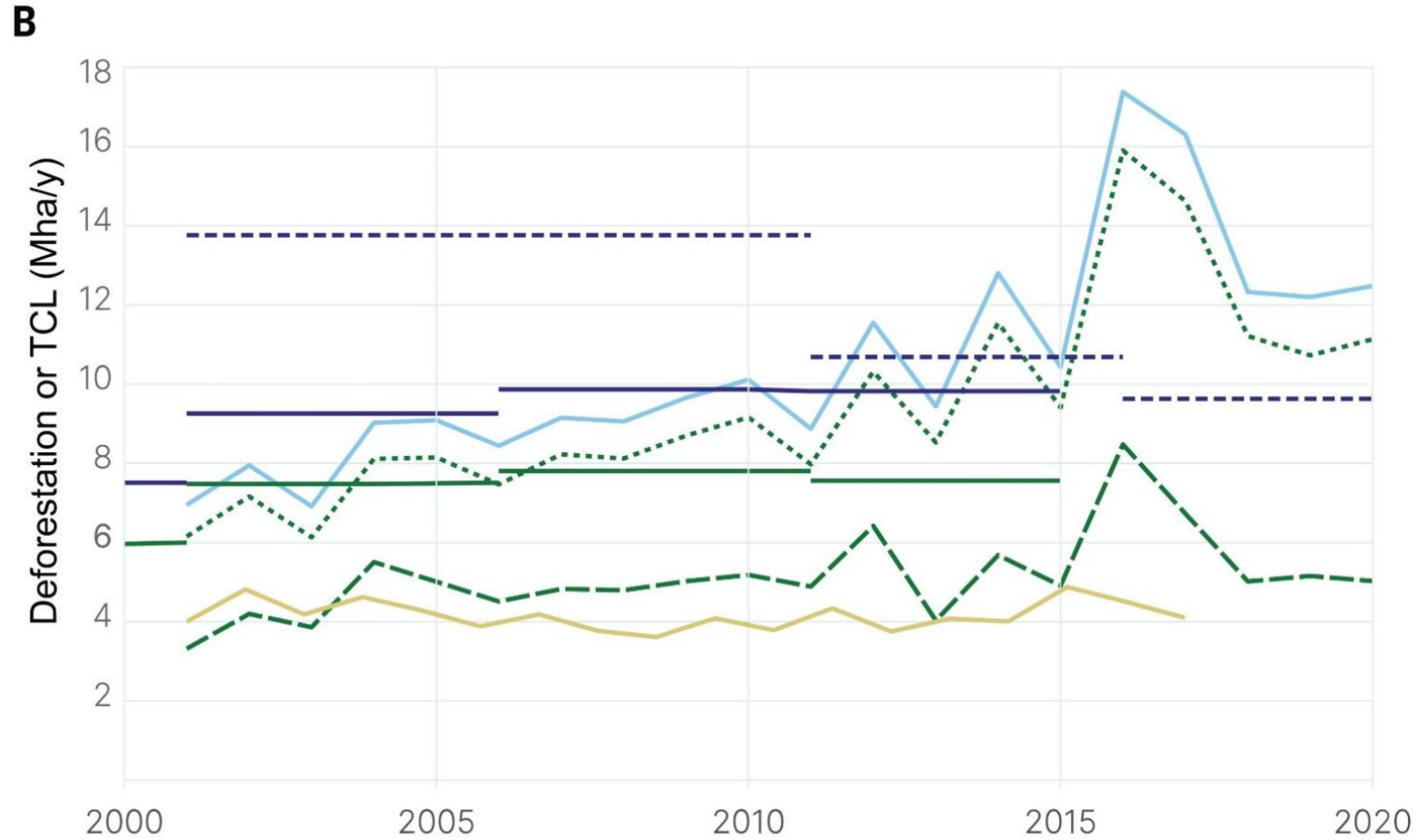
Changement annuel net de la superficie forestière mondiale, par décennie, 1990-2020



Taux annuel d'expansion de la forêt et de déforestation, 1990-2020



# Temporal trends



Tropical tree-cover loss

— GFC tree-cover loss  
(Hansen et al., 2013)

Tropical deforestation

--- FRA 2020 def.  
— Carter et al. (2018)  
def.

Total agriculture-driven def.

--- Curtis shifting agr. + commodity def.  
— Carter et al. (2018) agr. def.  
-.- Curtis et al. (2018) commodity def.

Def. resulting in agr. production

— Pendrill et al. (2019) agr. def.

Pendrill et al. 2022 *Science*



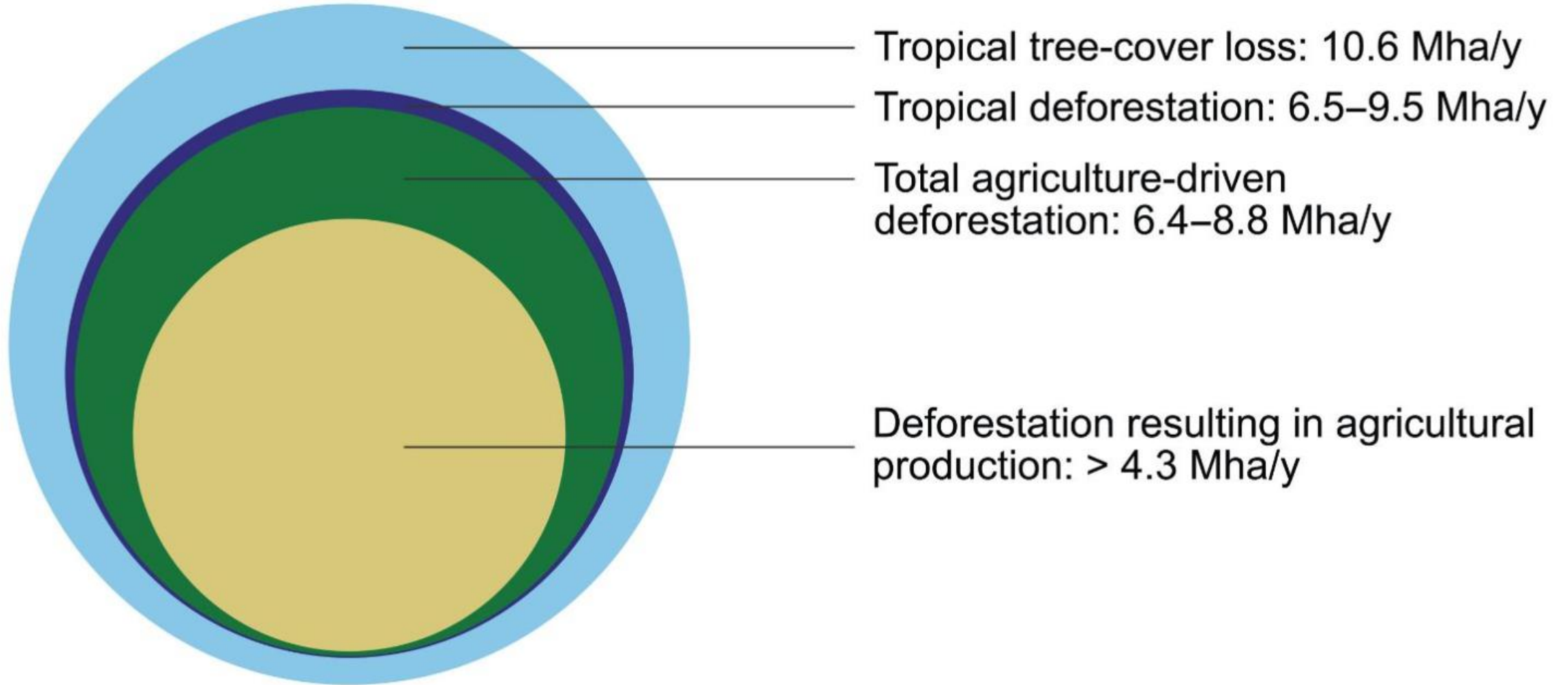
# Diversité des causes

Photos: C. Chiarella, P. Rufin, P. Meyfroidt, Shutterstock



# The “Onion” of tropical deforestation

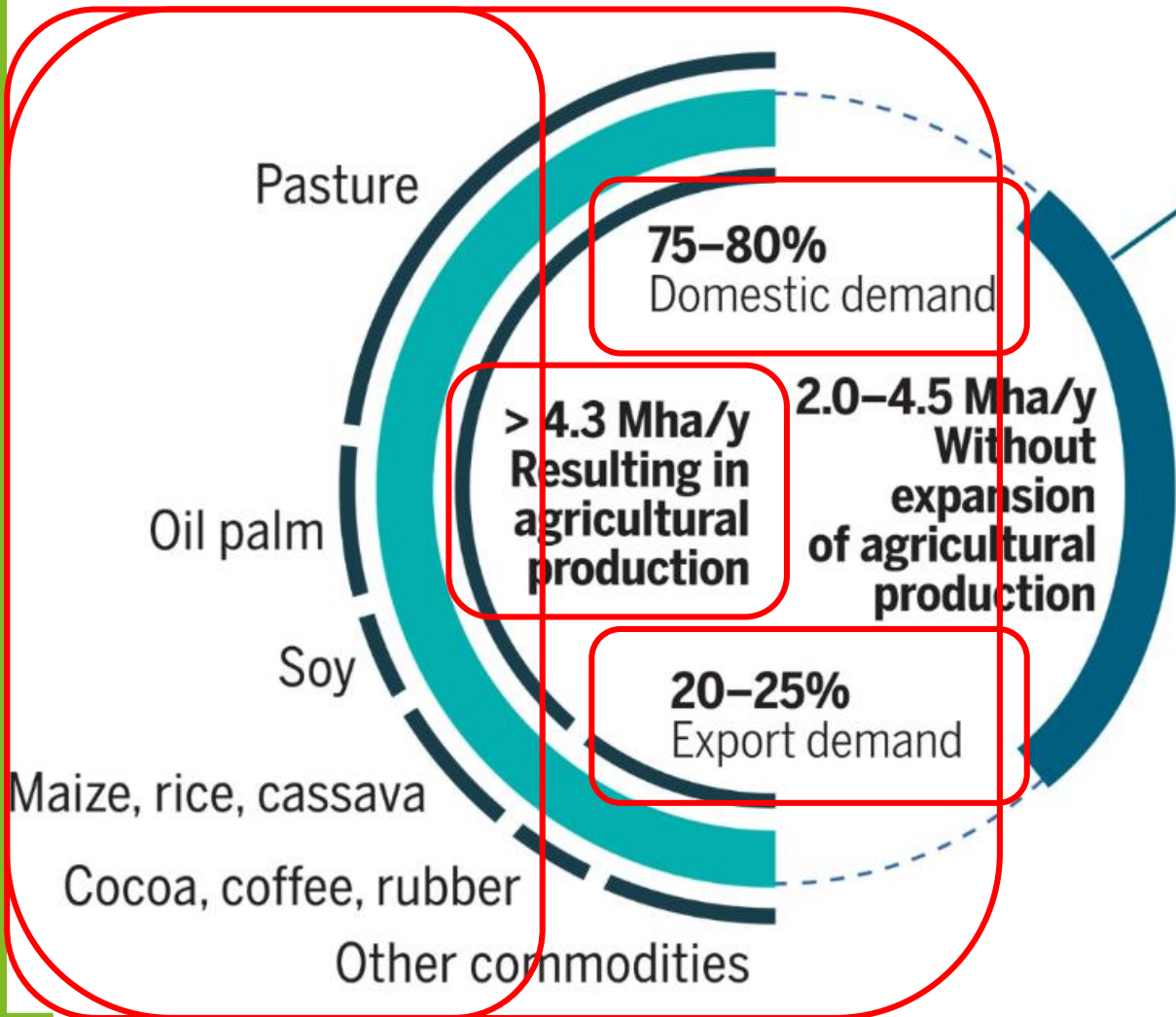
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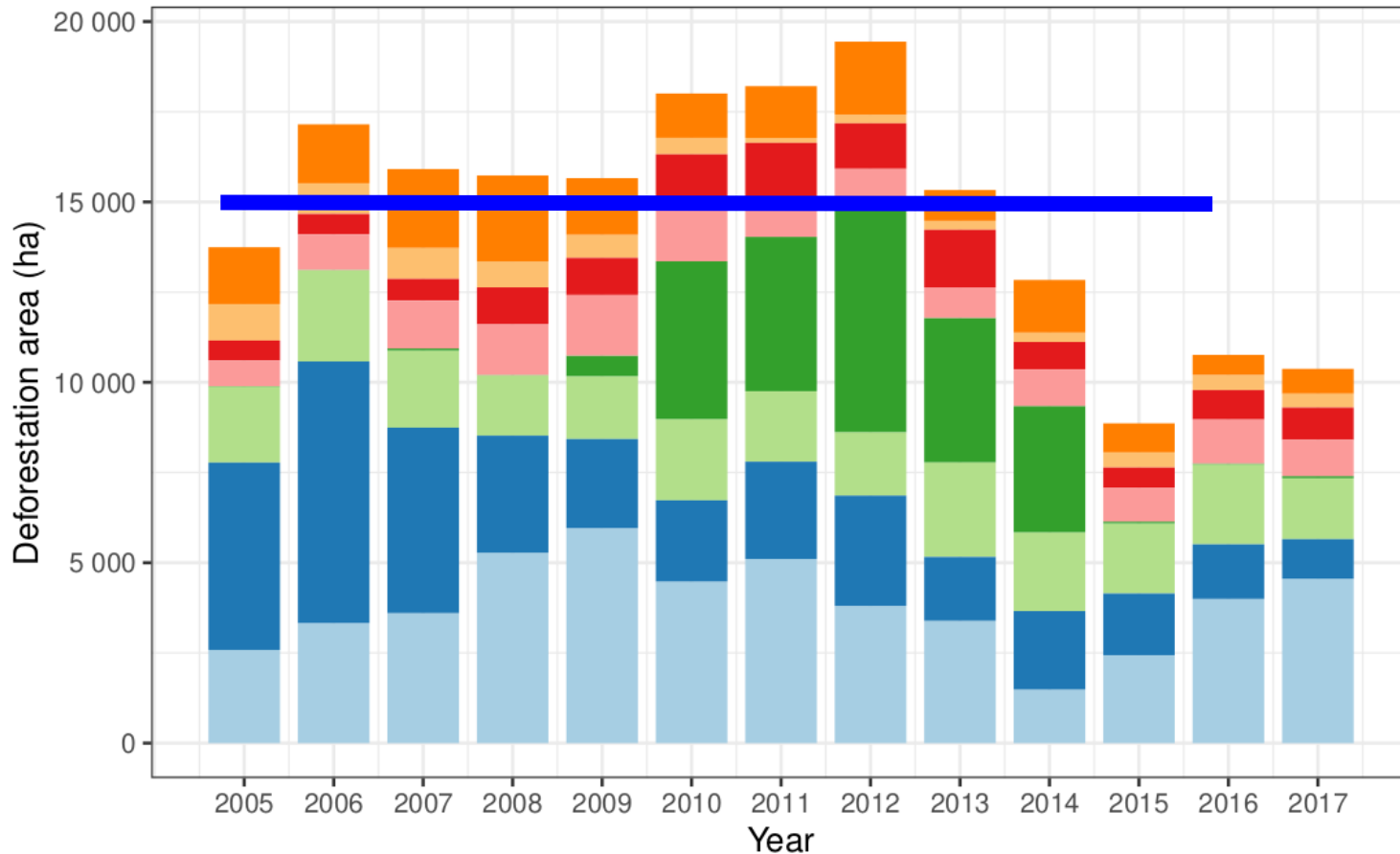
# Big picture on direct causes

Agriculture-driven deforestation

>>> 6.4-8.8 Mha/y



# Et la Belgique?



~15.000 ha par an  
= 3x la Forêt de Soignes (ou la réserve naturelle des Hautes Fagnes)

Sur 30 ans:  
~450.000 ha  
vs ~560.000 ha de forêt wallonne!

0.5 t CO<sub>2</sub>/personne/an (sur 8)

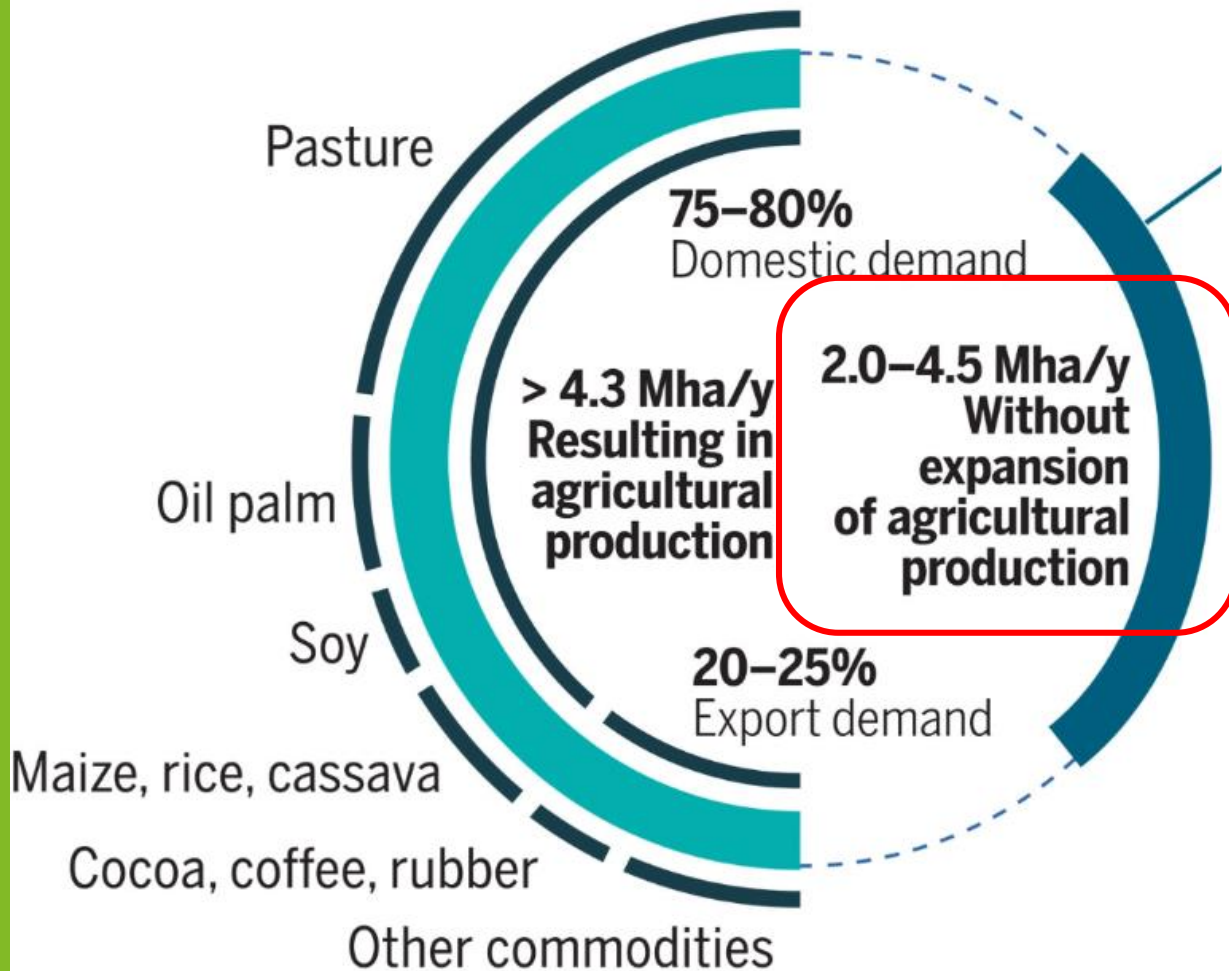
## Commodity





# 1/3-1/2 If not active agricultural production, what then?

## Agriculture-driven deforestation



Photos: A. Buchadas, P.  
Meyfroidt, Google Earth



# Causes sous-jacentes

**Consommation**

**Inégalités**

**Politiques (ex. subsides)**


**Démographie**

**Choix culturels, éthiques...**



# Comment participer ?



 [Copier le lien de participation](#)



1

Allez sur  
[wooclap.com](https://wooclap.com)

2

Entrez le  
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d'événement  
dans le  
bandeau  
supérieur

Code d'événement  
**DAPXZB**



1

Envoyez **@DAPXZB** au  
**0460 200 711**

2

**Vous pouvez participer**

**Starting points:**

**From myths to contingency**



# How did we narrow the range?

4.3-9.6 Mha/y

->>

6.4-8.8 Mha/y

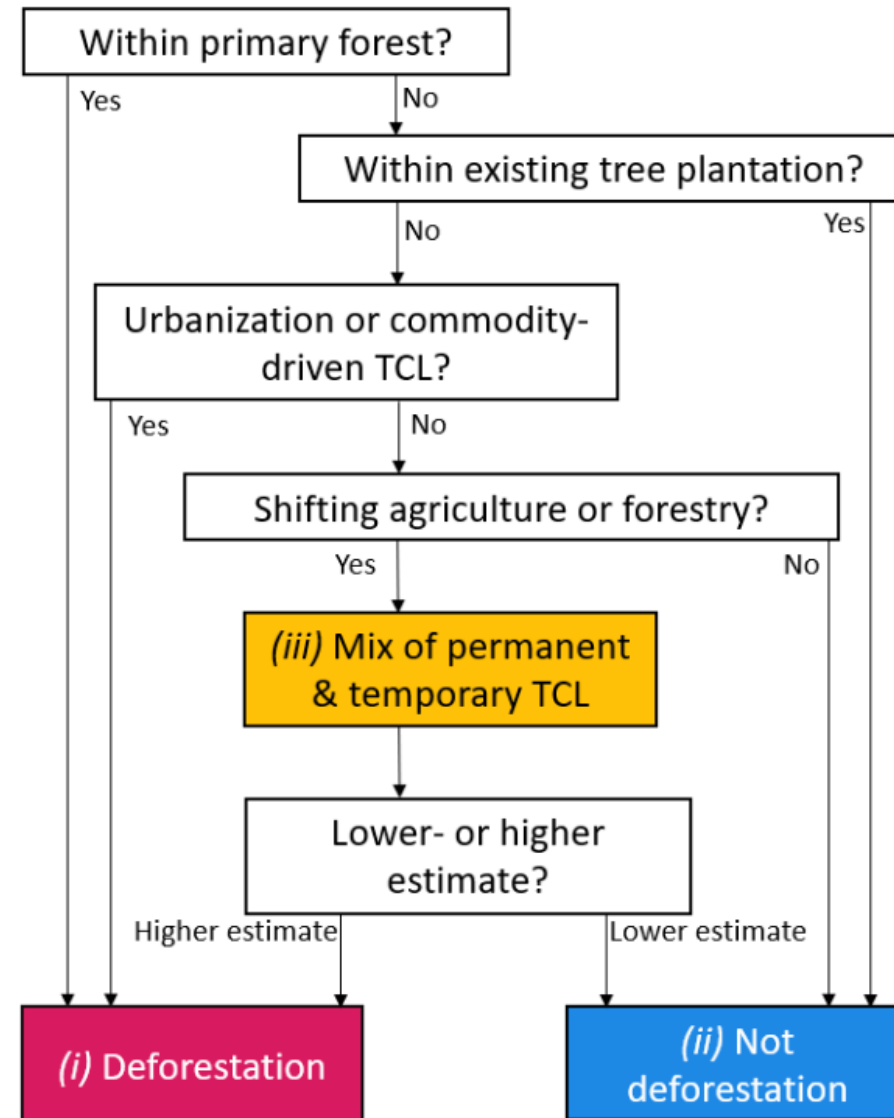


Fig. S4. Estimating the likely range of deforestation.





Contents lists available at ScienceDirect

## Global Environmental Change

journal homepage: [www.elsevier.com/locate/gloenvcha](http://www.elsevier.com/locate/gloenvcha)

## Middle-range theories of land system change

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 Y. Landon<sup>r</sup>, Y. le Polain de Waroux<sup>s</sup>, P. Messerli<sup>e,l</sup>, D. Müller<sup>m</sup>,  
 V. Rodriguez García<sup>a</sup>, M. Schlüter<sup>u</sup>, B.L. Turner II<sup>v</sup>, P.H. Veri



PERSPECTIVE | SUSTAINABILITY SCIENCE |



## Ten facts about land systems for sustainability

Patrick Meyfroidt , Ariane de Bremond , Casey M. Ryan , Emma Archer , Richard Aspinall, Abha Chhabra , Gilberto Camara, Esteve Corbera , Ruth DeFries , Sandra Díaz , Jinwei Dong , Erle C. Ellis , Karl-Heinz Erb , Janet A. Fisher, Rachael D. Garrett , Nancy E. Golubiewski, H. Ricardo Grau, J. Morgan Grove, Helmut Haberl , Andreas Heinemann , Patrick Hostert , Esteban G. Jobbágy, Suzi Kerr, Tobias Kuemmerle , Eric F. Lambin, Sandra Lavorel, Sharachandra Lele , Ole Mertz , Peter Messerli , Graciela Metternicht , Darla K. Munroe , Harini Nagendra , Jonas Østergaard Nielsen , Dennis S. Ojima, Dawn Cassandra Parker , Unai Pascual , John R. Porter , Navin Ramankutty, Anette Reenberg , Rinku Roy Chowdhury, Karen C. Seto , Verena Seufert , Hideaki Shibata , Allison Thomson, Billie L. Turner II , Jotaro Urabe , Tom Veldkamp , Peter H. Verburg , Gete Zeleke , and Erasmus K. H. J. zu Ermgassen [-46 Authors Info & Affiliations](#)

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Meyfroidt et al. 2018 GEC

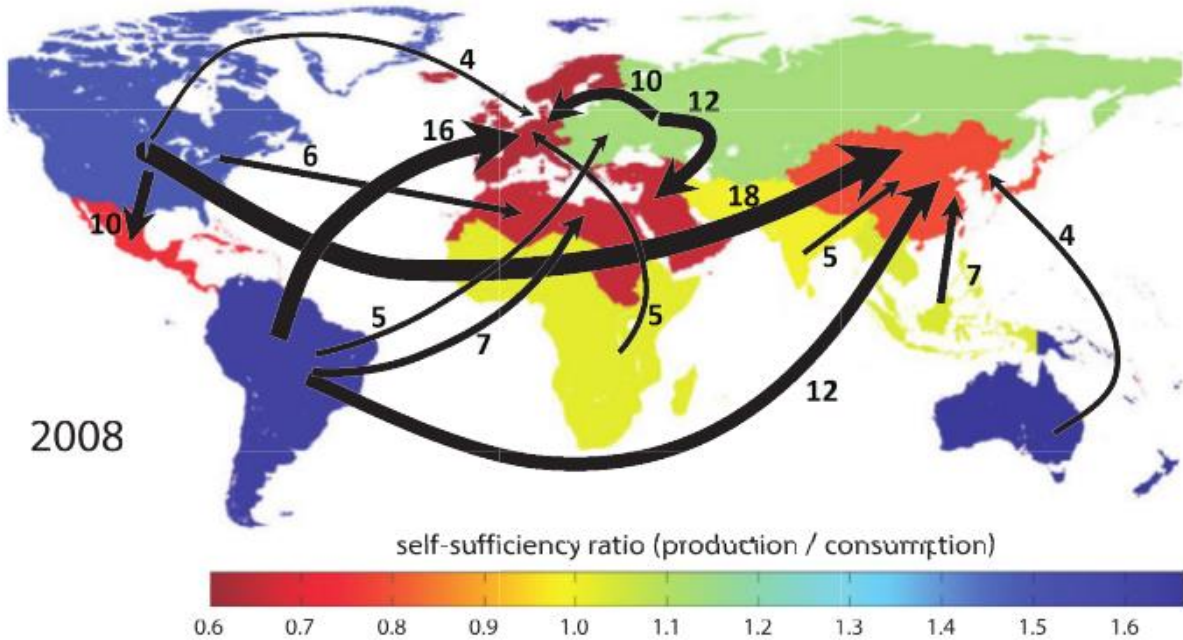
<https://doi.org/10.1016/j.gloenvcha.2018.08.006>

Meyfroidt et al. 2022 PNAS

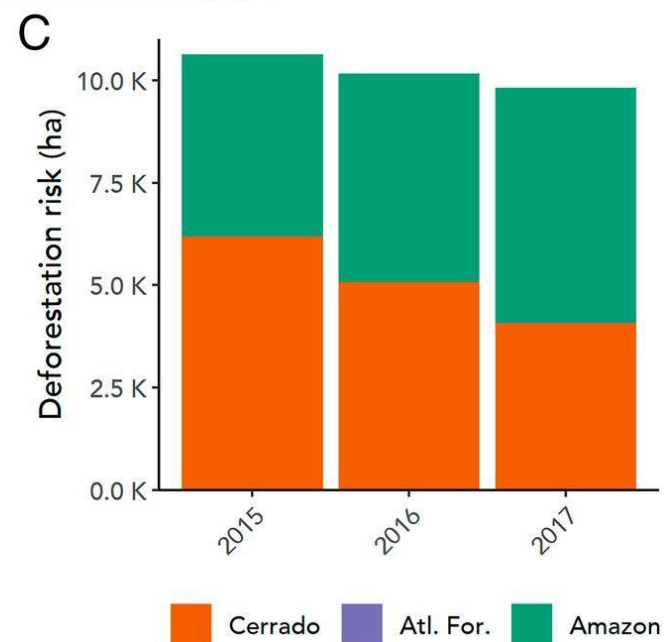
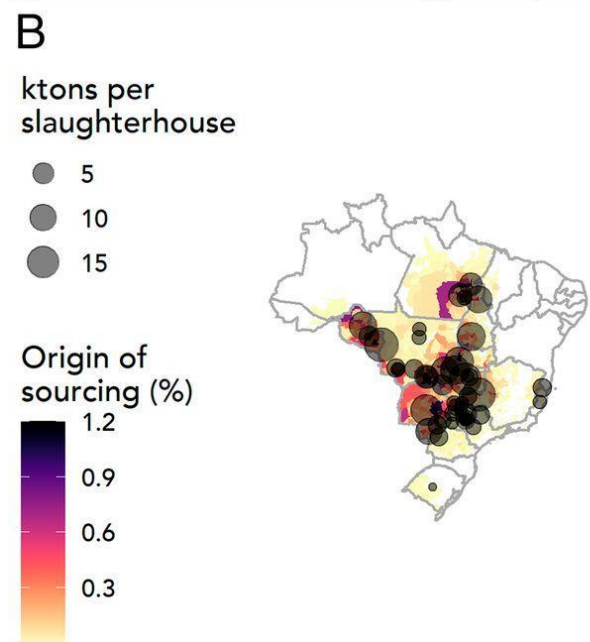
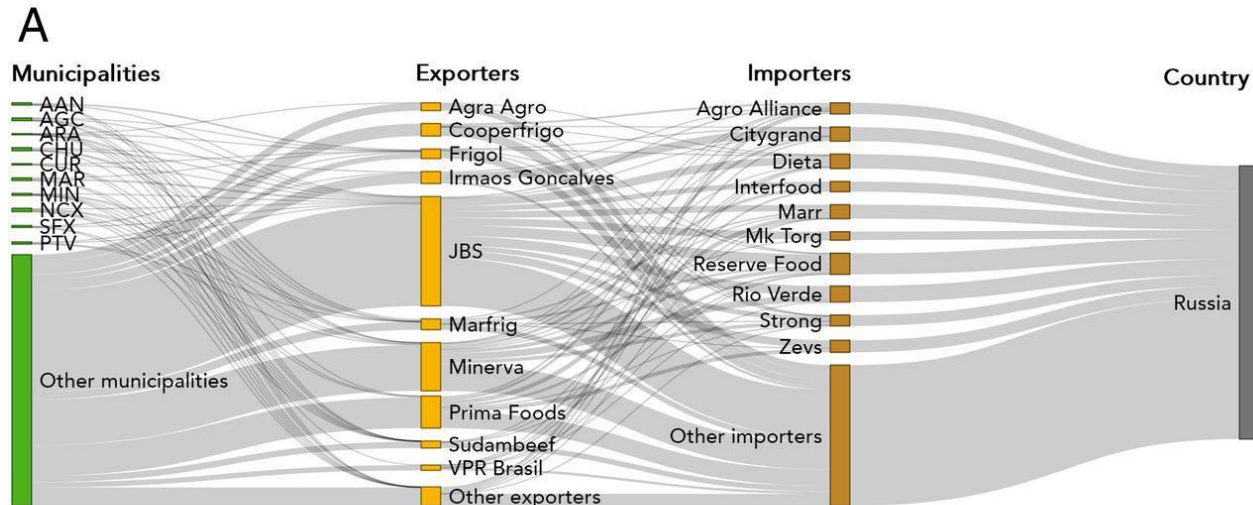
<https://doi.org/10.1073/pnas.2109217118>



# Trade flows



Kastner et al. 2014



zu Ermgassen et al. 2020





# Ten facts about land systems for sustainability

## FACTS about land systems:

## CHALLENGES for sustainability:

## IMPLICATIONS for governance and practice:

1

**Multiple values and meanings**

▶ Notions of land degradation and restoration are socially constructed and contested

2

**Land as complex system**

▶ Consequences are difficult to foresee and trace

3

Irreversibility & path-dependence

▶ Loss of option value, shifting baselines, no return to original state

4

Large impacts of small footprints

▶ Spillovers may be more important than direct impacts

5

Distant connections

▶ Solving local problems can displace issues elsewhere

6

**Used planet**

▶ No "free" land that does not already provide benefits

7

Prevalence of trade-offs

▶ Prioritizing a single goal such as carbon nearly always reduces other benefits for some

8

Multiple, overlapping, contested land tenure claims

▶ Identifying decision-makers and policy recipients is complicated

9

Unequal distribution of control and benefit

▶ Interventions always have distributional consequences

10

**Multiple dimensions of justice**

▶ Governance processes that do not acknowledge distinct forms of justice will be considered as unjust

**More sustainable and just solutions require:**

▶ **Acknowledging multiple perceptions, beliefs and values, multiple visions of justice, and power differentials**

▶ **Developing contextual and adaptive solutions, avoiding silver bullets and "one-size-fits-all" panaceas**

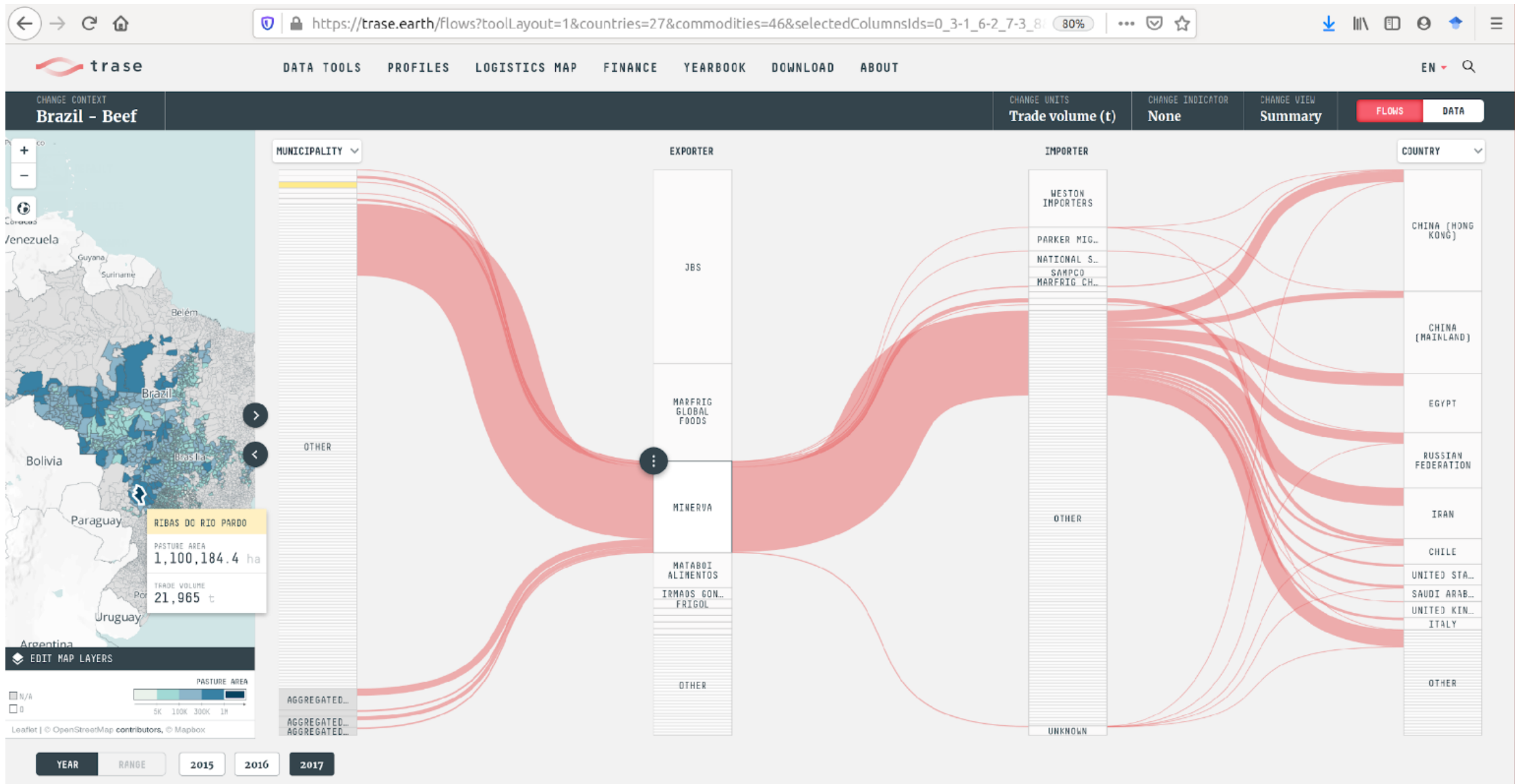
▶ **Considering spatial and temporal spillovers**

▶ **Preventing undesired irreversible impacts**

▶ **Fostering synergies but also acknowledging and mitigating unavoidable tradeoffs**

▶ **Explicitly addressing inequalities and acknowledging unclear land tenure**

# New datasets & approaches for supply chains



zu Ermgassen et al. under revision, trase.earth



# Complexity: Leakage



Alix-García & Gibbs 2017 *GEC*  
Miranda et al. 2019 *ERL*  
Herrera et al. 2019 *PNAS*



# Complexity: Leakage



Le Polain de Waroux et al.  
2017 *WD*



# Complexity: Leakage



Le Polain de Waroux et al.  
2017 *WD*  
Le Polain de Waroux 2019  
*Geoforum*



# Complexity: Leakage

