The background of the slide is a high-angle aerial photograph of a dense forest. The trees are numerous and closely packed, creating a textured pattern of green and yellowish-green shades. The lighting suggests it might be late afternoon or early morning, with some areas of the forest appearing darker than others.

Far Flung Forest Landscapes in the Anthropocene

Structural analysis of China's embodied forest network

Matthew Kekoa Lau (Ph.D.)

Chinese Academy of Sciences and Harvard University





forests

Biodiversity and Conservation in Forests

Edited by

Diana F. Tomback

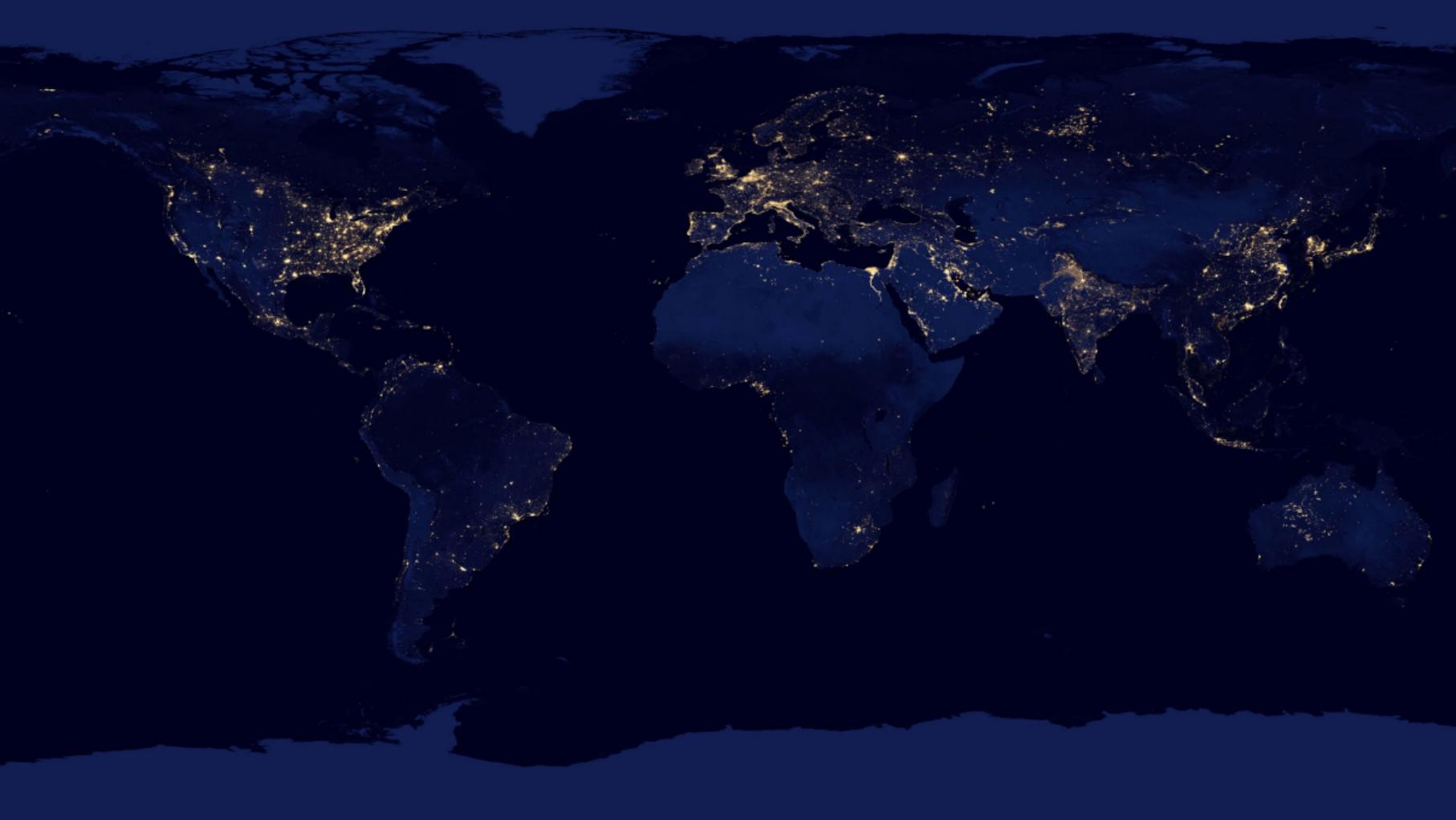
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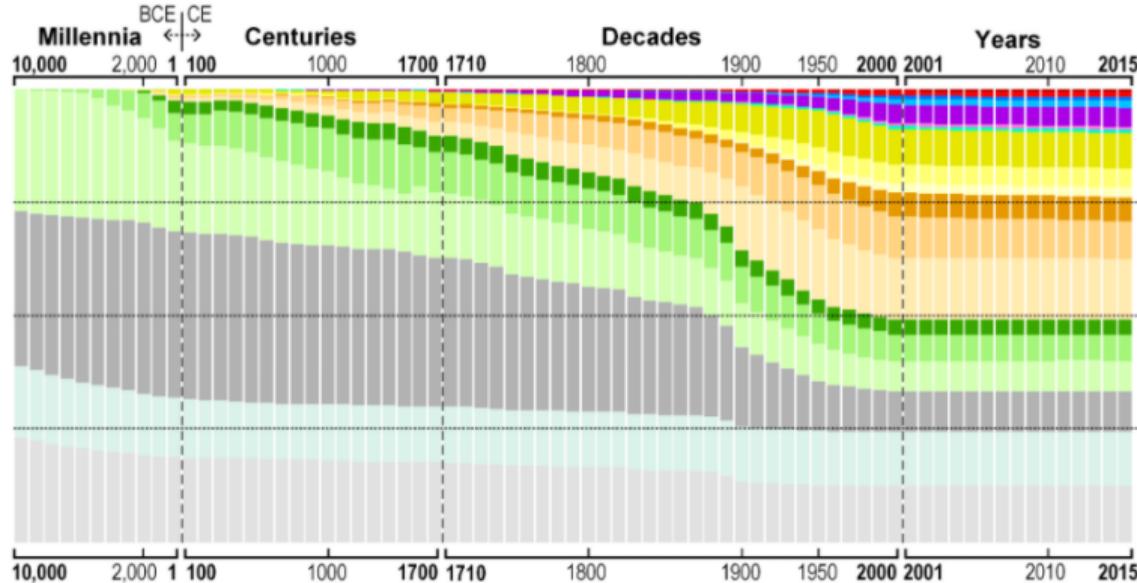






Anthropogenic biomes: 10,000 BCE to 2015 CE

Changes in anthrome classes as % global land area



Used

Dense Settlements

- Urban
- Mixed settlements

Villages

- Rice villages
- Irrigated villages
- Rainfed villages
- Pastoral villages

Croplands

- Residential irrigated croplands
- Residential rainfed croplands
- Populated croplands
- Remote croplands

Rangelands

- Residential rangelands
- Populated rangelands
- Remote rangelands

Seminatural

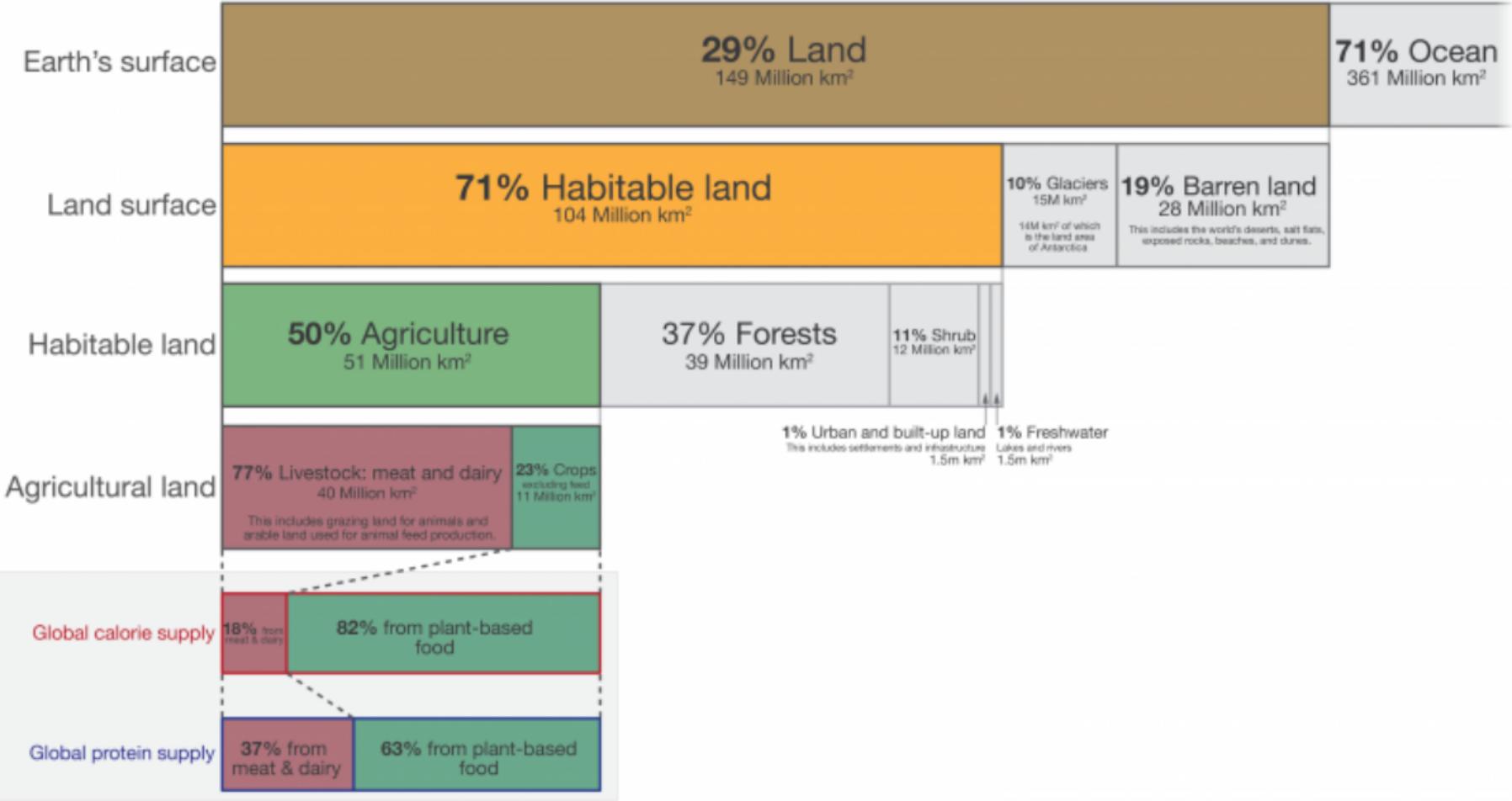
Seminatural

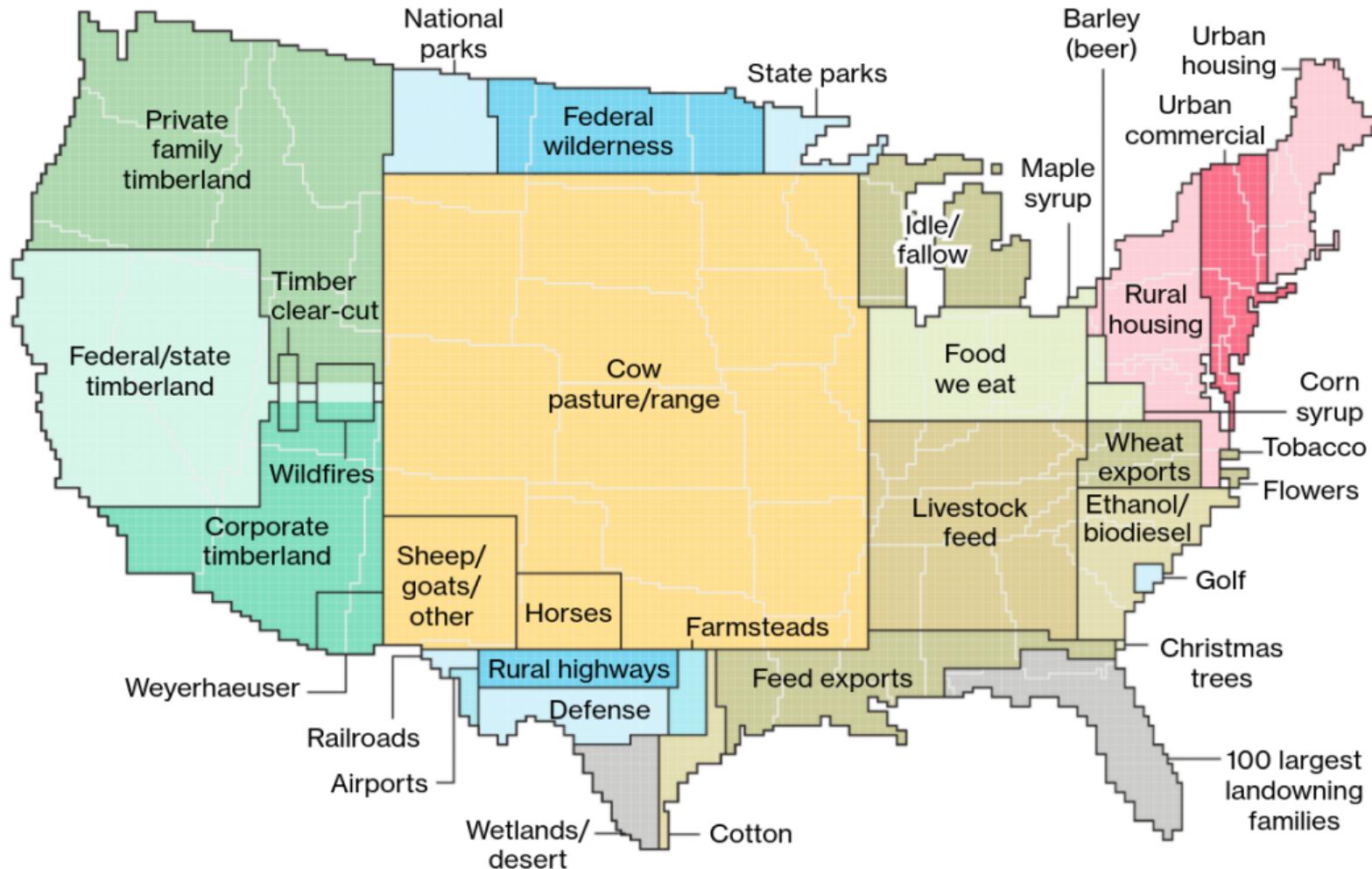
- Residential woodlands
- Populated woodlands
- Remote woodlands
- Inhabited treeless & barren lands

Wild

Wildlands

- Wild woodlands
- Wild treeless & barren lands
- Ice, uninhabited







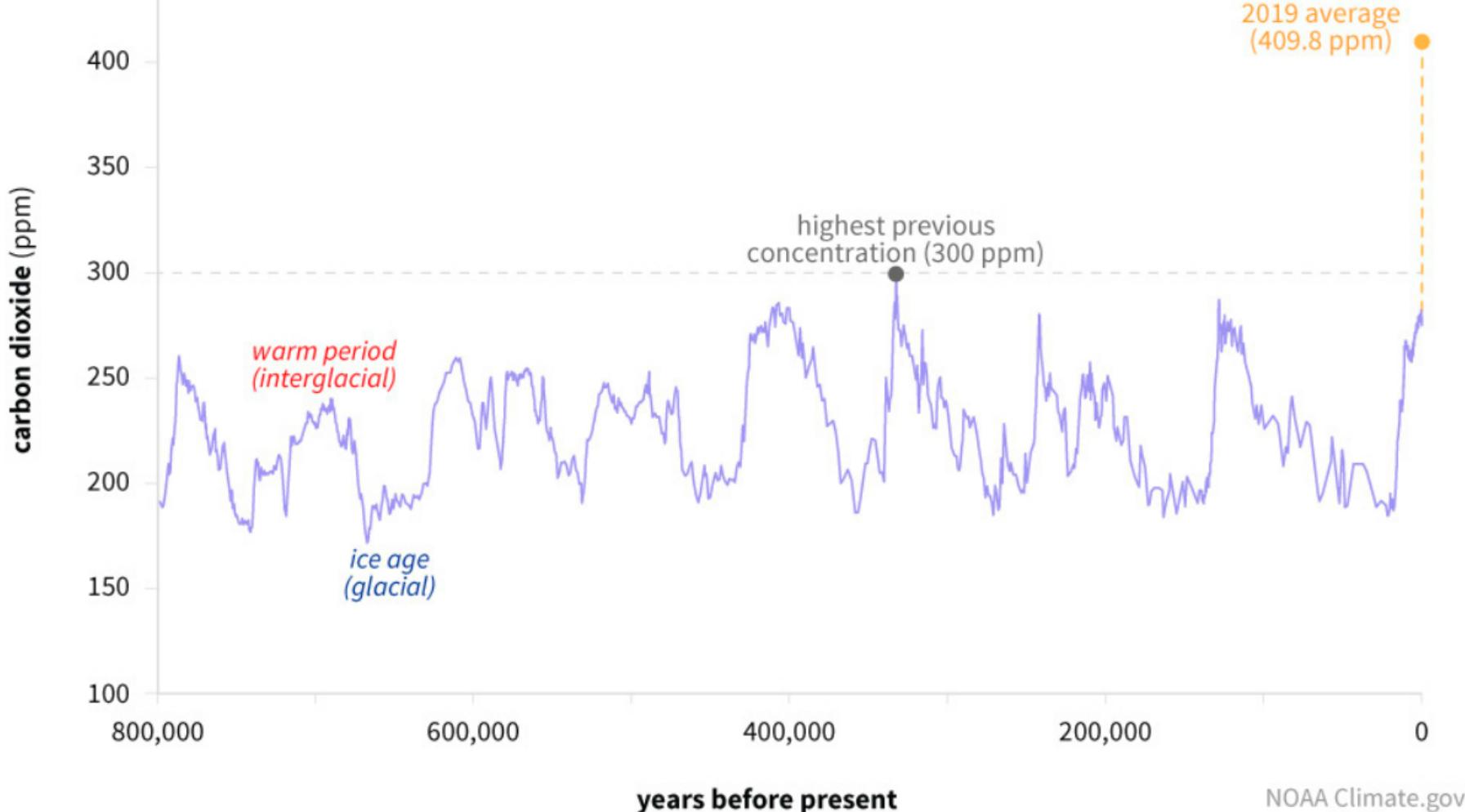


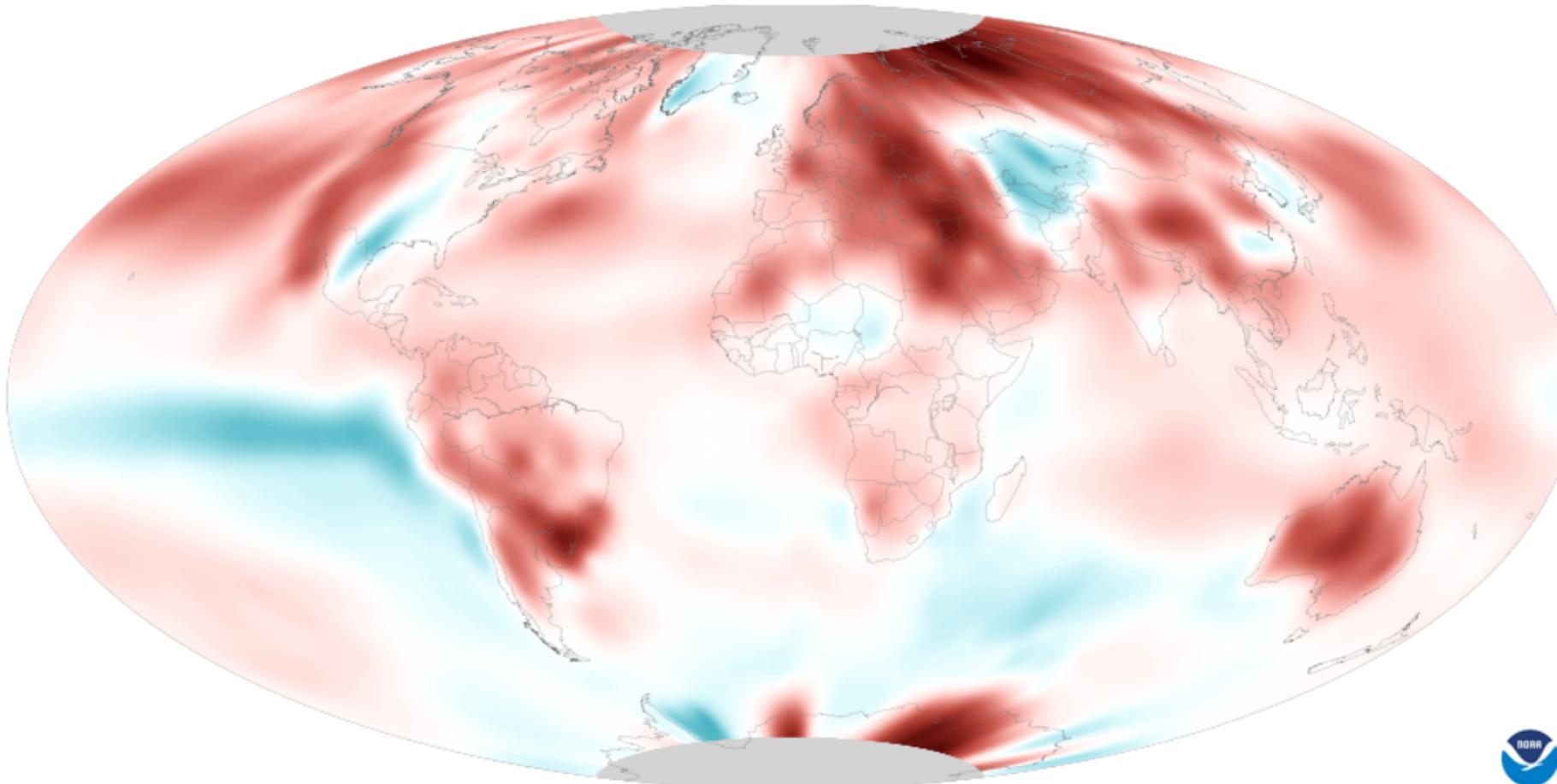




ECLIPSE Ice Drill







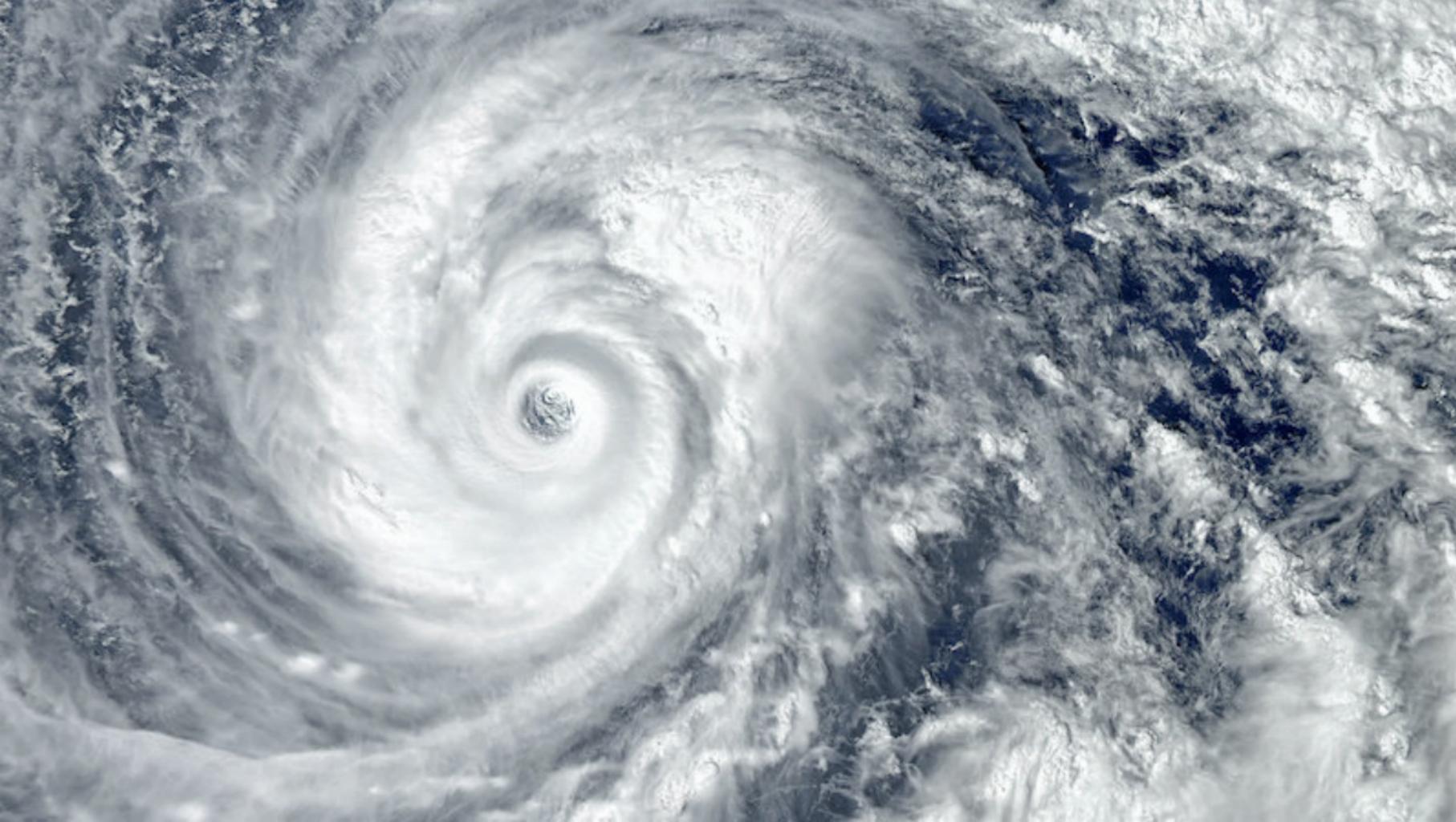
September 2020
Compared to 1981-2010

Difference from average temperature (°F)

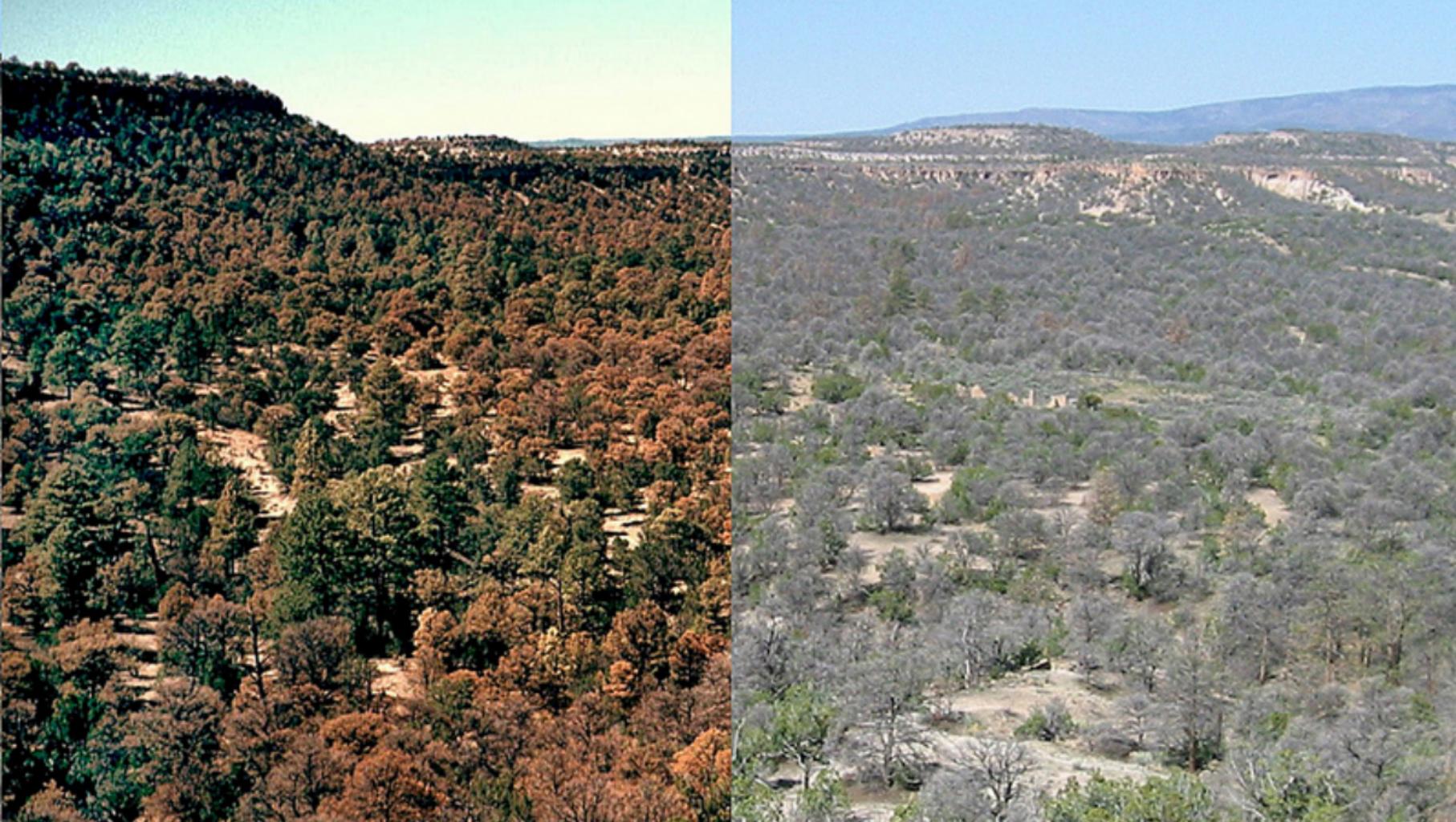
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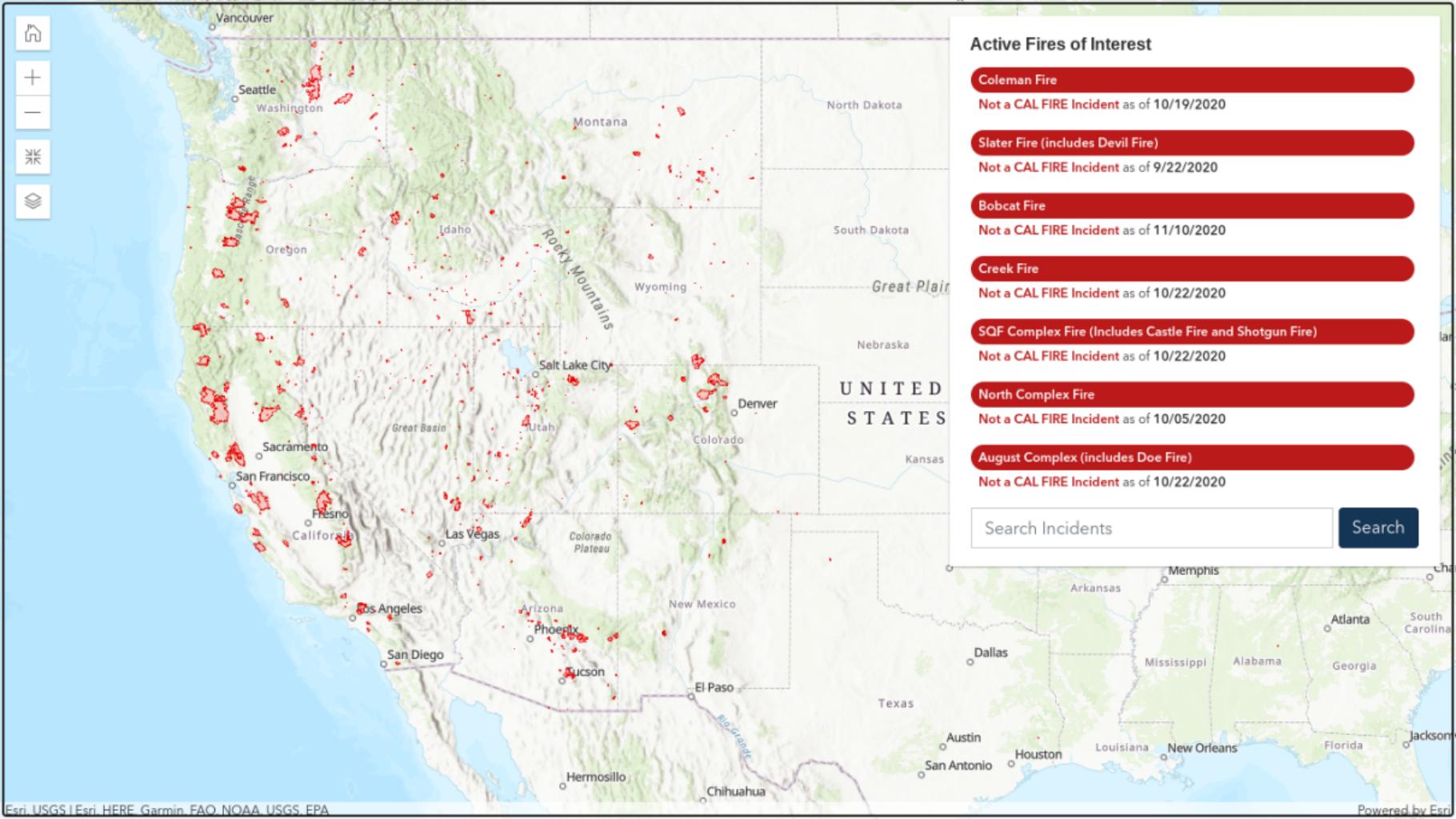


NOAA NN
Data: NC

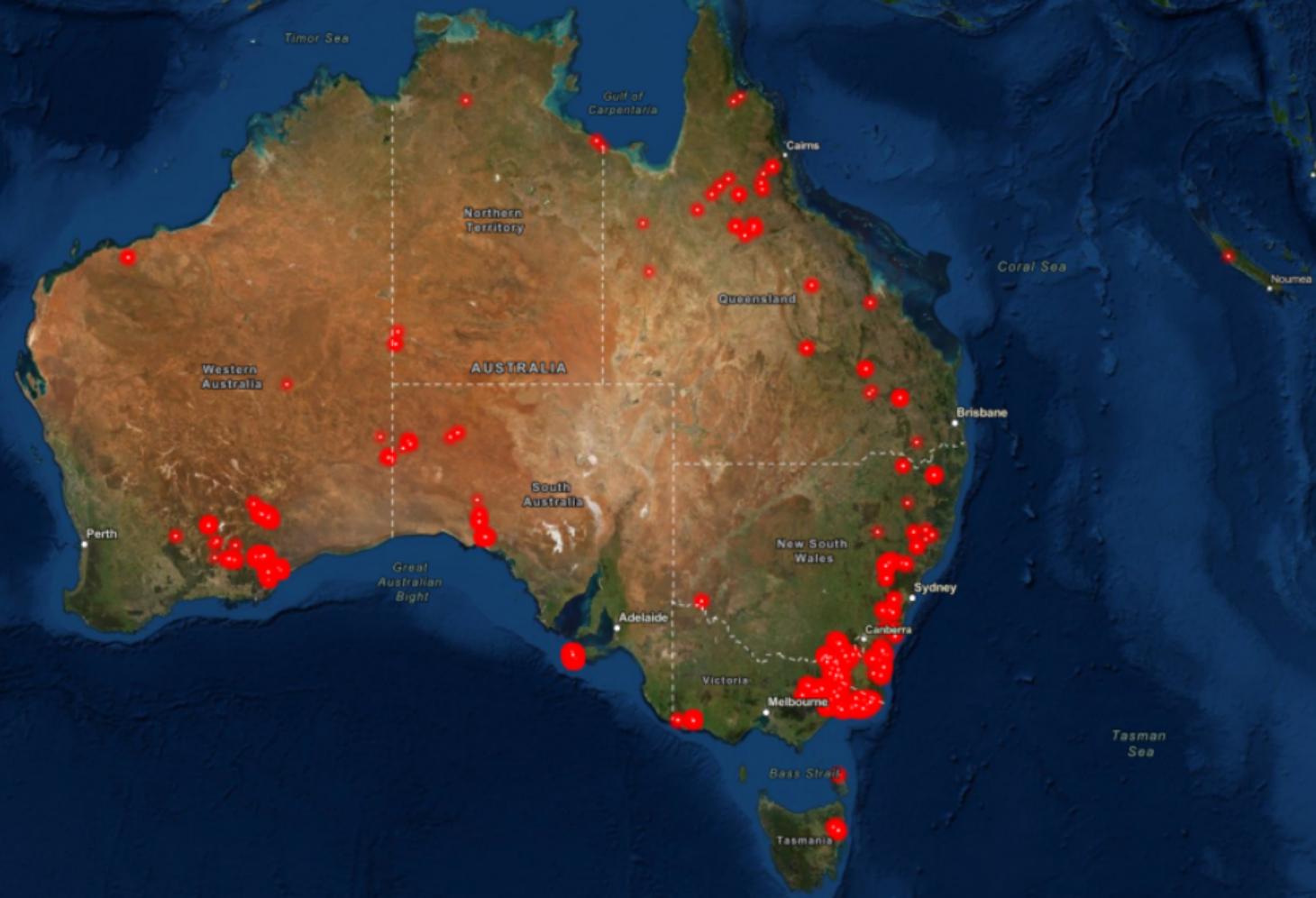












Forests in the Anthropocene

- Forests are changing from human impacts

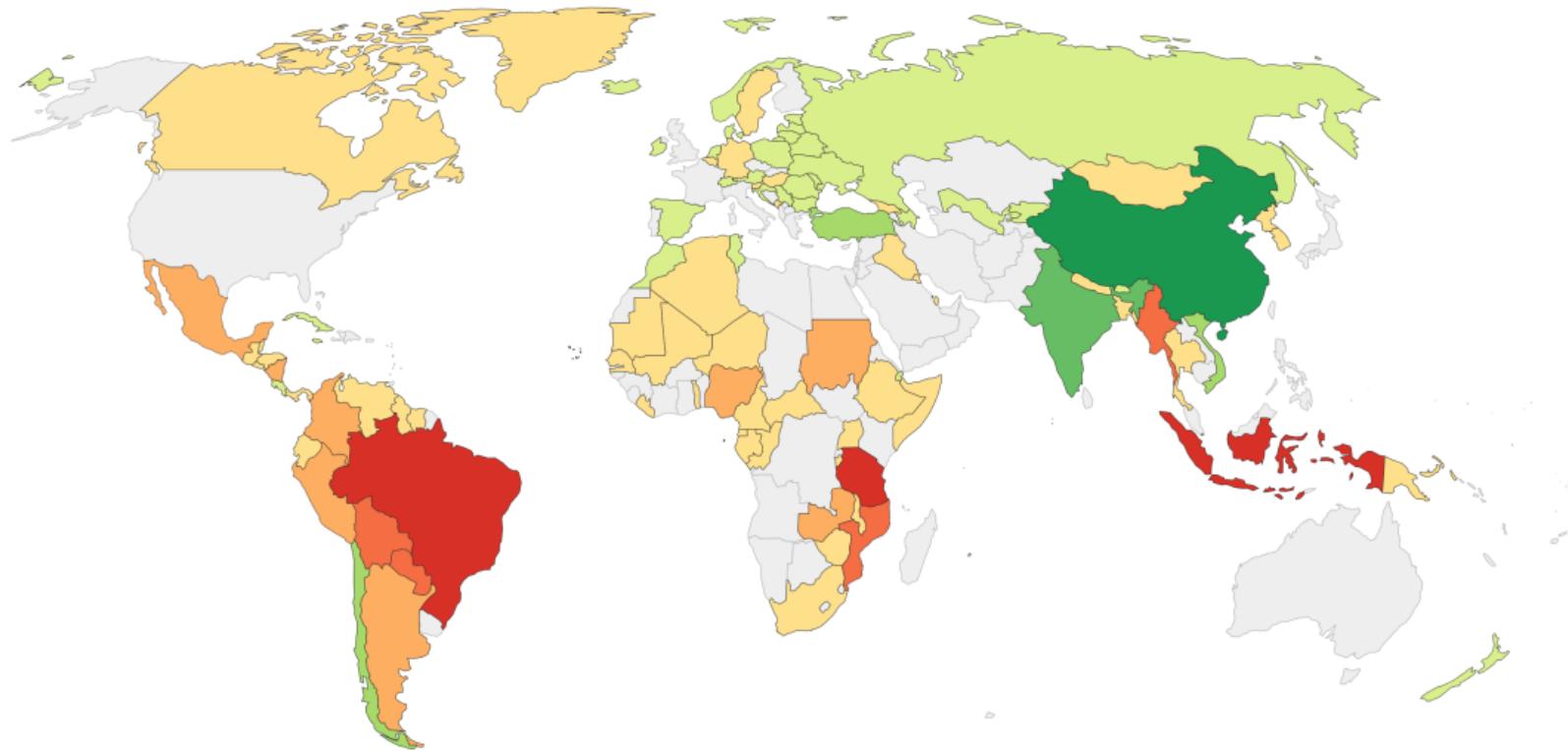
Forests in the Anthropocene

- Forests are changing from human impacts
- Large direct and indirect effects of land-use

Forests in the Anthropocene

- Forests are changing from human impacts
- Large direct and indirect effects of land-use
- How do we address indirect and systems-level effects?

- ① Economic and Ecological Landscape Extensions
- ② Trade Networks of Forest Landscapes
- ③ Global Forest Networks
- ④ China's Forest Networks
- ⑤ Conclusions
- ⑥ Future Work



Source: UN Food and Agriculture Organization (FAO). Forest Resources Assessment.

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Economic and Ecological Landscape Extensions

Trade Networks of Forest Landscapes

Global Forest Networks

D

China Imports 2018: Wood (Lumber and Sawn)

Units

Value (US \$)

Weight



Share of global forestry products trade



Scale

5m t

10m t

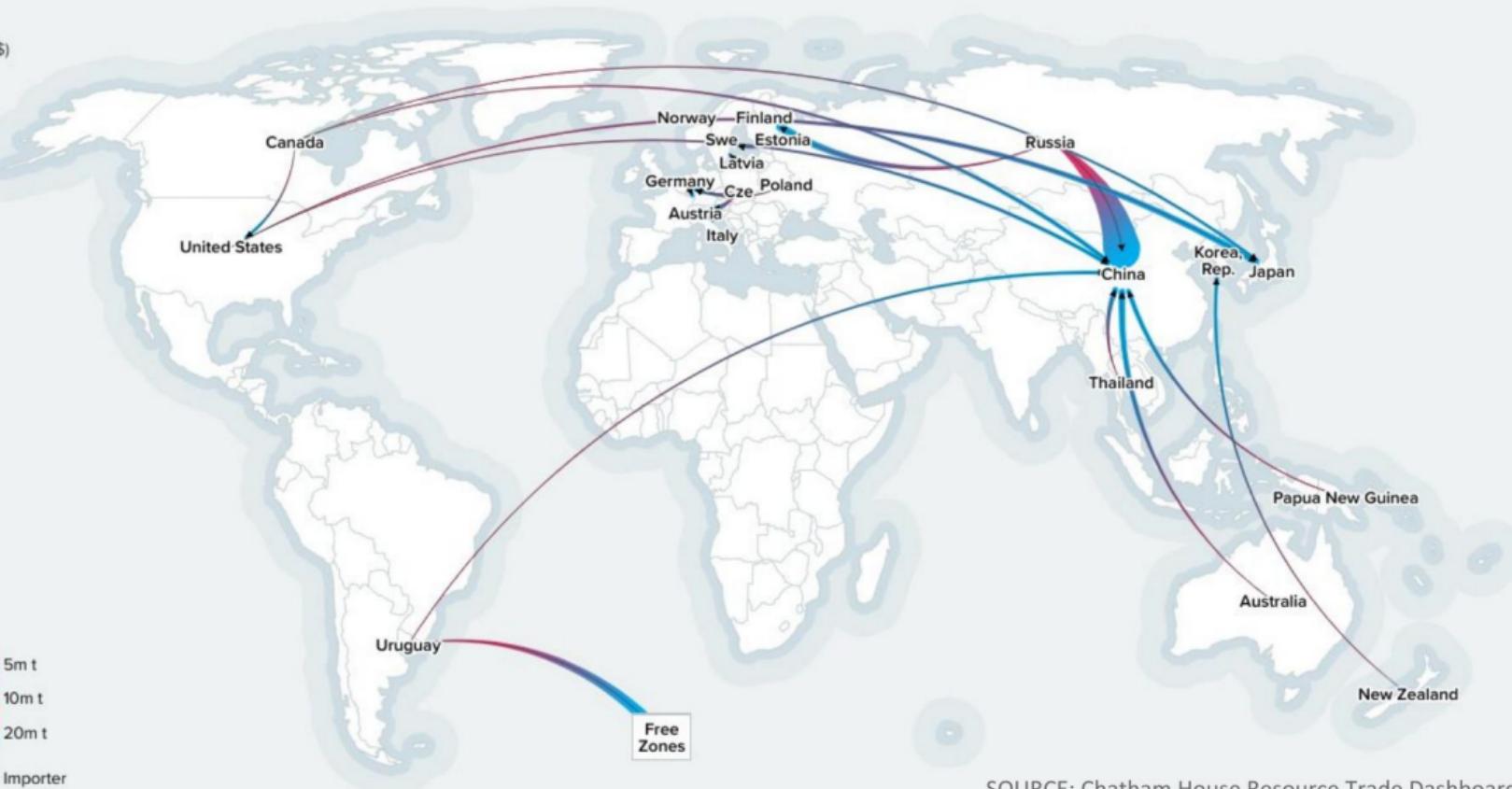
20m t

Exporter

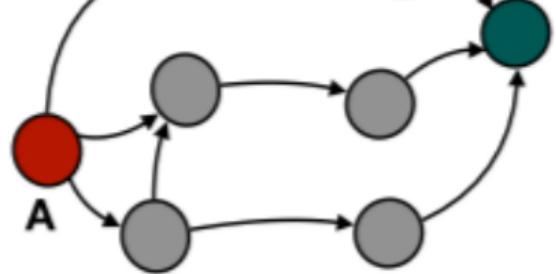
Importer

Free Zones

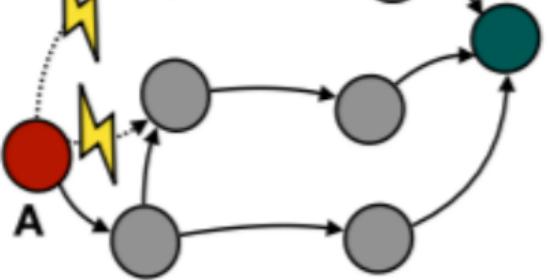
Importers



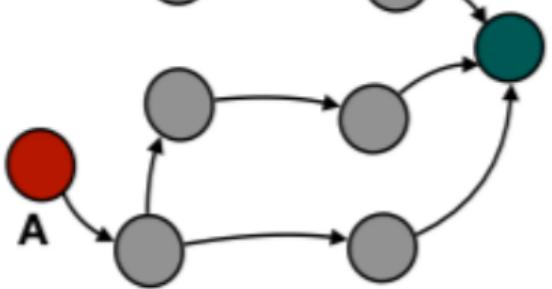
SOURCE: Chatham House Resource Trade Dashboard



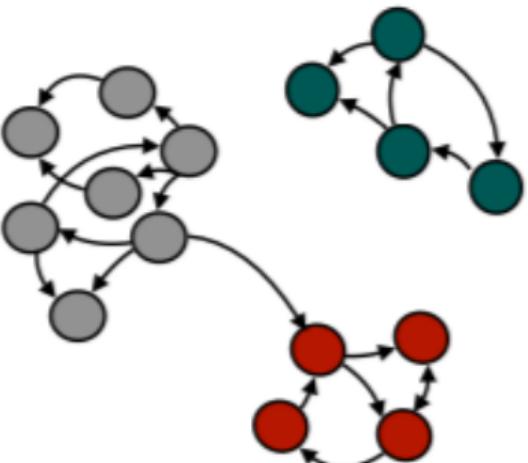
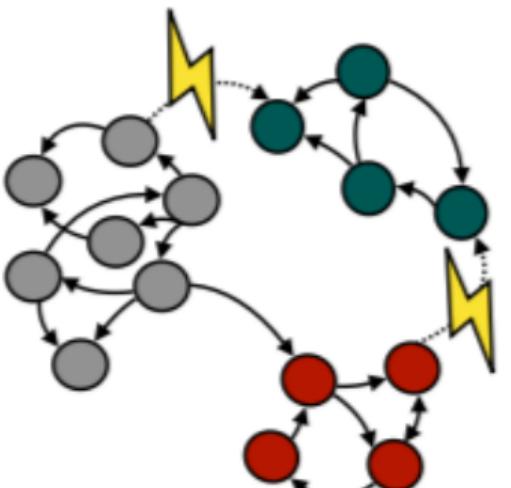
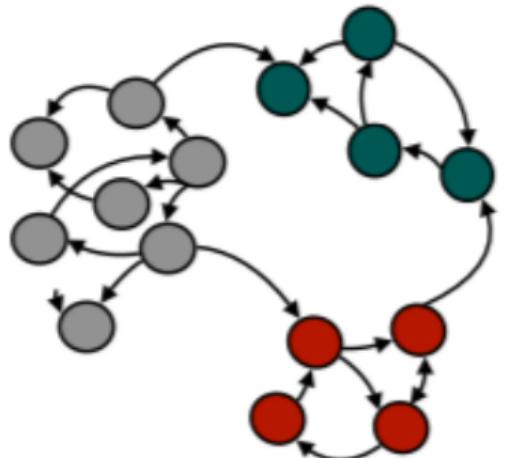
Redundant pathways between
A and B



Shock in the system



Perseverance of pathway
between A and B



has been a widely used approach in the literature as it takes into consideration both variety and balance (Sterling, 2010). It is defined as:

$$H = -\sum_i p_i \ln(p_i)$$

Here p_i indicates the proportion of category i within the total categories. The above formula can be rewritten in terms of systems process as:

$$H = - \sum \frac{T_{ij}}{T_{..}} \ln \frac{T_{ij}}{T_{..}}$$

Where, T_{ij} represents the effect that element i has on element j and the period signifies summation over that index.

From the above formulas it is evident that a higher value of H indicates

and conditional entropy of a network system (Rutledge et al., 1976; R.E. Ulanowicz & Norden, 1990) is used to define redundancy (ψ) as:

$$\psi = -k \sum_{i,j} \frac{T_{ij}}{T_{..}} \ln \frac{T_{ij}^2}{T_{i..} T_{..j}}$$

Here, T_{ij} is the flow from node i to node j , $T_{i..} = \sum_j T_{ij}$ is the total flow leaving node i , $T_{..j} = \sum_i T_{ij}$ is the total amount of medium entering node j and the sum of all flows in the system, $T_{..} = \sum_{ij} T_{ij}$, is known as the “total system throughput” (TST).

Redundancy refers to the replication of pathways, functions, or compo-

Forest restoration occupies centre stage in global conversations about carbon removal and biodiversity conservation, but recent research rarely acknowledges social dimensions or environmental justice implications related to its implementation. We find that 294.5 million people live on tropical forest restoration opportunity land in the Global South, including 12% of the total population in low-income countries. Forest landscape restoration that prioritizes local communities by affording them rights to manage and restore forests provides a promising option to align global agendas for climate mitigation, conservation, environmental justice and sustainable development.

Forest restoration is considered to be a crucial strategy for conserving global biodiversity and mitigating climate change^{1–3}. New research identifies the global extent of forest restoration

world's biodiversity opportunities for carbon sequestration, number of billion populated land areas

Forest restoration work with local communities and have been as effective as reforestation performance of forests without probably leading to more or costly more legitimate) and



























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后院
车库

WiFi

严厉

自然保护区
杨尚昆
一九八九年





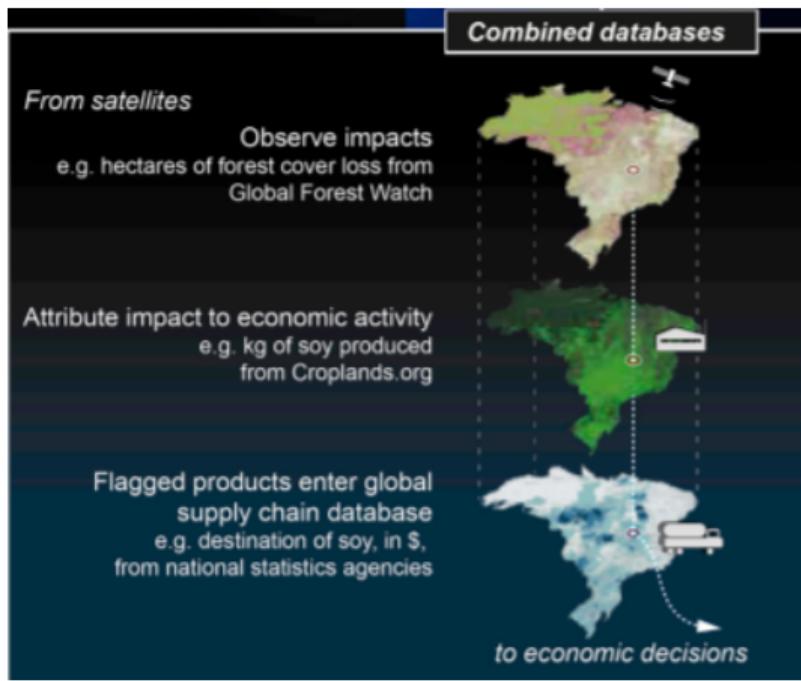
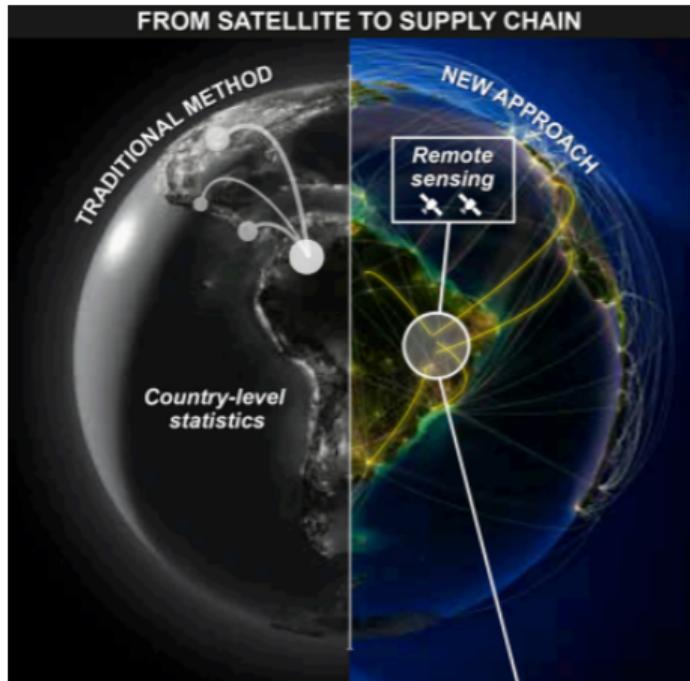
China's Forest Networks: Global

China's Forest Networks: Domestic/Local

Conclusions

Future Work

Future Work



Acknowledgements



[1] [2] [3] [5]

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