

# Far Flung Forest Landscapes in the Anthropocene

Far Flung Forest Landscapes in the Anthropocene  
Structural analysis of China's embodied forest network

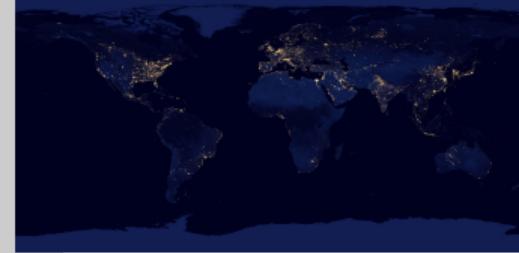
Matthew Kekoa Lau (Ph.D.)

Chinese Academy of Sciences and Harvard University

1. Forests ~ 80% terrestrial biodiversity (WWF)
2. Forests carry out important processes: clean air and water
3. Forests store carbon

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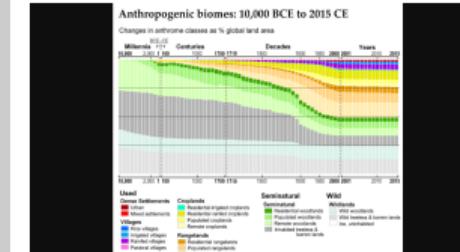
## └ Context



1. Anthropocene = proposed geological epoch distinguished by human impacts

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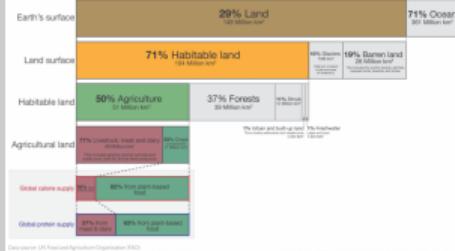
## └ Context



1. Land-use changes = conversion
2. One proposal is it started about 1950 with acceleration
3. Biodiversity changes = species introductions and extinctions

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## └ Context



1. 90% biomass on Earth is humans and livestock

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## └ Context



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1. Atmospheric changes = climate change, fire

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## └ Context

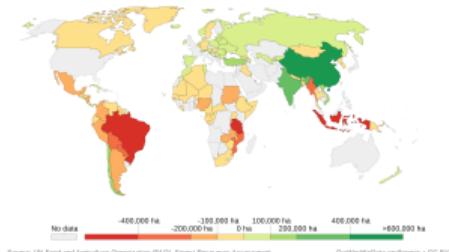
### └ Today's Talk

- ① Economic and Ecological Landscape Extensions
- ② Trade Networks of Forest Landscapes
- ③ Global Forest Networks
- ④ China's Forest Networks: Global
- ⑤ China's Forest Networks: Domestic/Local
- ⑥ Conclusions
- ⑦ Future Work

- 1.** Intro/Context
- 2.** Global forest loss and gain and change
- 3.** Global greening = India(Agriculture) + China(Forests)
- 4.** Economics\*Ecology = Landscape Extended Models
- 5.** Network Analysis of China's Greening
- 6.** Global Scale
- 7.** Local Scale
- 8.** Landscape = Tian 2019, Chen 2019
- 9.** Resilience Analysis of China's Forest LE-MRIO
- 10.** Conclusions and Future Work
- 11.** Acknowledgements

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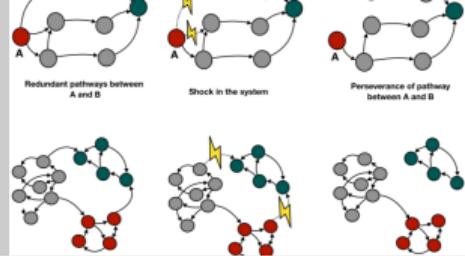
## └ Economic and Ecological Landscape Extensions



1. Global forest loss and gain and change
2. Global greening = India(Agriculture) + China(Forests)

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## └ China's Forest Networks: Global



### 1. China's Forests are Diverse

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## └ China's Forest Networks: Global

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:

$$H = - \sum_j \frac{T_{ij}}{T_{-i}} \ln \frac{T_{ij}}{T_{-i}}$$

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

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## └ China's Forest Networks: Global

and conditional entropy of a network system (Rutledge et al., 1976; R.E. Ulanowicz & Norden, 1990) is used to define redundancy ( $\psi$ ) 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  $j$ ,  $T_+ = \sum_j T_{ij}$  is the total flow leaving node  $i$ ,  $T_- = \sum_i T_{ij}$  is the total amount of medium entering node  $j$  and the sum of all flows in the system,  $T_0 = \sum_{ij} T_{ij}$ , is known as the "total system throughput" (TST).

Redundance refers to the reduction of pathway functions or components.

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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<sup>1</sup>. New research identifies the global extent of forest restoration opportunities, demonstrates the promise of forest restoration for mitigating climate change and calls for more ambitious global forest restoration efforts<sup>2,3</sup>. There is some disagreement about the degree to which forest restoration can or should contribute to atmospheric carbon removal<sup>4,5</sup>, as mitigating climate change depends on decarbonizing the economy while protecting intact forests and restoring degraded landscapes<sup>6</sup>. Yet prominent conservation initiatives such as 'global no net loss' of natural ecosystems, 'half for nature' and the Aichi Target 11 still combine conservation of intact natural habitat and restoration of degraded forests to reach their

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## └ Future Work



1. Questions, comments?