

Far Flung Forest Landscapes in the Anthropocene

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

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

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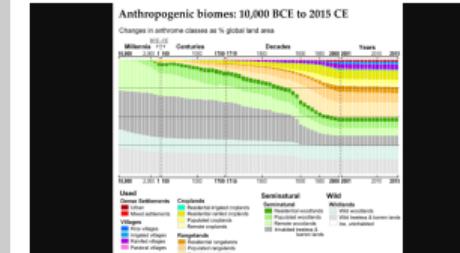
└ Context



1. Anthropocene = proposed geological epoch distinguished by human impacts

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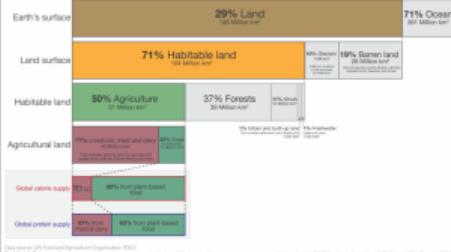
└ Context



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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1. Atmospheric changes = climate change, fire

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1. Climate change is causing hurricanes that make landfall to take more time to weaken, reports a study published 11th November 2020 in the journal Nature.

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1. Tornado damaged Southbridge, MA forest in 2011

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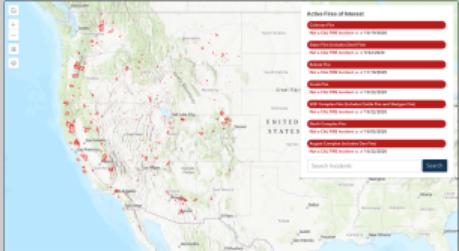
└ Context



1. Droughts

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1. CAL FIRE MAP Tue 17 Nov 2020 12:10:52 PM EST

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1. CA Cranston Riverside 2018

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1. Fires in Australia 2020

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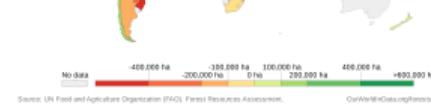
└ Today's Talk

- 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

- 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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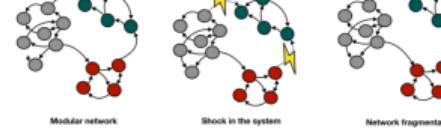
└ Economic and Ecological Landscape Extensions



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

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└ China's Forest Networks



1. China's Forests are Diverse

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$$H = - \sum_i \frac{T_{ij}}{T_-} \ln \frac{T_{ij}}{T_-}$$

Where, T_{ij} represents the effect that element i has on element j and the symbol \sum indicates summation over that index.

From the above formulas it is evident that a higher value of H indicates higher diversity in a system. There is also a hierarchical aspect of diversity as expressed in the three types of ecological diversity. One considers genetic, species, and ecosystem diversity as necessary features for continuing ecological functioning. In the micro-macro and perhaps meso scales addressed before, this includes the diversity of agents and network configurations - often expressed in terms of autocatalytic cycles (Gatti et al., 2014; Ulanowicz et al., 2014).

Information theory connects diversity and redundancy through a variable representing the efficiency of pathways within a network.

1. China's Forests are Diverse

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1. China's Forests are Diverse

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, $T_+ = \sum_i T_{+i}$, is known as the "total system throughput" (TST).

Redundancy refers to the replication of pathways, functions, or components which enhances a system's fault tolerance ability. When faced with shock or disturbance, additional redundancy, permits a system to continue a function without failure. Redundancy, however, does not necessarily benefit a reoccurring disturbance or a novel disturbance and the system may fail. Therefore, in addition to redundancy, a system may benefit from diversity. Diversity has important applications in any social-ecological system.

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└ China's Forest Networks

1. China's Forests are Diverse

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^{1,2}. 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^{3,4}. There is some disagreement about the degree to which forest restoration can or should contribute to atmospheric carbon removal^{5,6}, as mitigating climate change depends on decarbonizing the economy while protecting intact forests and restoring degraded landscapes⁷. 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?