

Free Markets: The Best Friend the Environment Has

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Three saying that stuck with me from John Baden

- 1. People don't care what you know, until they know you care (thus my podcast and introduction at each talk I give)
- 2. We have the moral high ground (where I disagree and why I'm a philosopher not an economist)
- 3. Oil and ecology (or capitalism and the environment) do mix.



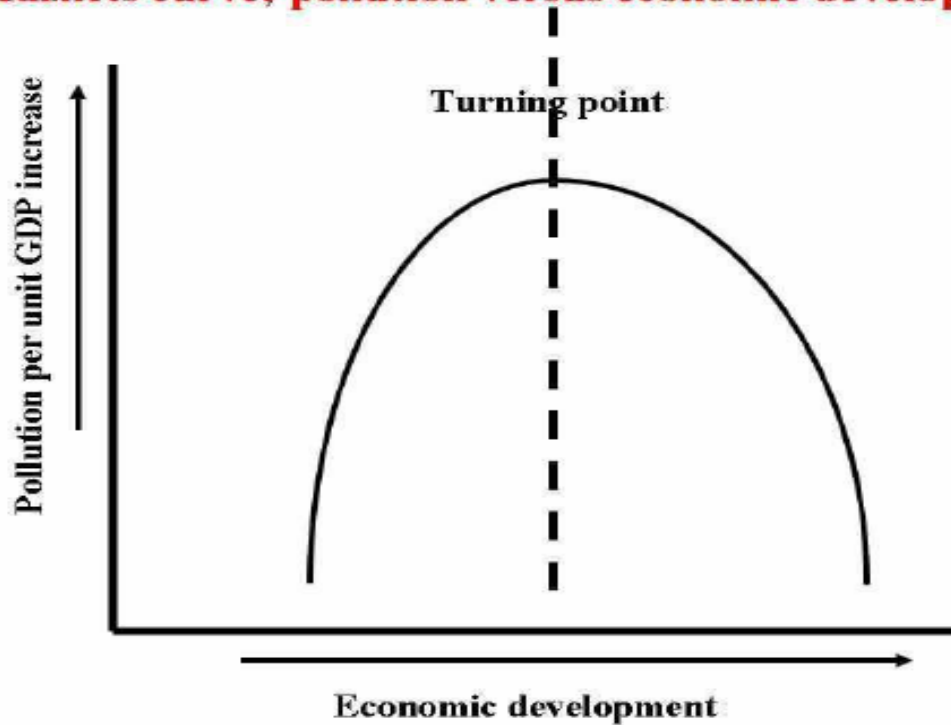
Endangered Scimitar Horned Oryx



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Endangered Dama Gazelle

Kuznets curve; pollution versus economic development





Dead Horses in Street, children playing



Manure Filled New York Street 1893

Earth is greener, mainly from FF related factors (70% CO₂, 9% N-deposition, 8% climate change)

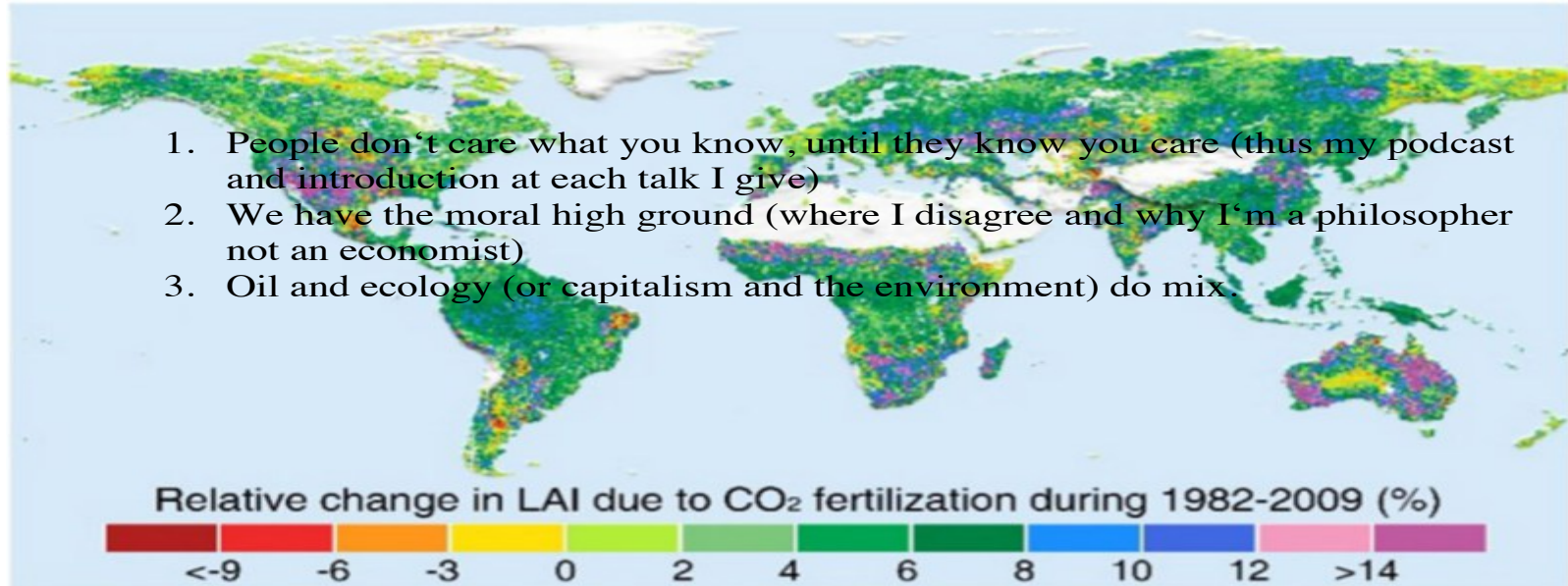


Figure 1. Spatial pattern of relative change of LAI due to CO₂ fertilization during 1982 to 2009. The relative change of LAI in each pixel is derived from the ratio of the increment of LAI driven by elevated atmospheric CO₂ to the 28-year average value of LAI simulated by model ensemble mean under scenario S1. Source: Figure S12, supplementary information from Zhu et al. (2016)

Effect on potential species extinctions from reduced habitat conversion

- Barnosky et al. (2012) estimate that 43% of global terrestrial ecosystem has already been converted to human use
- Absent FF, we would need to convert at least 21% more land to agricultural uses to sustain humanity at its current level — total of at least 64%
- The added land conversion would have put ecosystems and species at greater risk.
- Barnosky et al.'s “tipping point” paper in *Nature* postulates a tipping point if land conversion exceeds 50%. **We would already have gone past that postulated tipping point!**

Effect of increased habitat conversion on magnitude of potential species extinctions

- Species at risk of extinction would have increased by 70–78%, based on the species-area relationship (SAR)

Land saved by fossil fuels for Rest of Nature: Lower Bound Estimate for Cropland — 1

- ✓ ***Nitrogenous fertilizers***, mainly from natural gas via Haber-Bosch process. Responsible for 48% of global food production (Erisman et al. 2008).
- ✓ ***Synthetic pesticides***. Reduce losses in various food crops from 50–77% to 26–40% in the absence of any pesticides (Oerke 2006).
- ✓ ***CO₂ fertilization*** from increases in Atmospheric CO₂ from 277 ppm (preindustrial) to 400 ppm (current) increased food production 9–15% (based on IPCC 2013, and Idso 2013). [I'll assume 10%.]

Land saved by fossil fuels for Rest of Nature: Lower Bound Estimate — 2

Cumulative **increase** in food production from above 3 factors = 174%

To produce same quantity of food in the absence of fossil fuels:

- Global cropland area would have to be increased from 1.6 billion hectares to 4.3 billion ha.
- **Increase = 20.9% of global land area** (excluding Antarctica)
 - About the size of South America and Europe combined
 - **FF have saved more land than ALL land conservation effort (12.5%) through 2009**



Cuisinarts of the air. “Protected” eagle

Land-use intensity in 2030

(In square miles per terawatt-hour per year)

