ADVANCED ECOLOGY DISCUSSION 10/24 Karlee & Dave J

Taylor & Rising (2021)

Strengths:

- About 230 years of data at a 0.5° grid (about 34 miles/55 km) is enough to see and detect small scale changes. *Yes?*
- Used a multi-scale analysis that accounts for interactions at global and national scales *and* considered feedback loops between economic development and land use *and* provided a feedback evaluation that recognizes endogenous relationship between rising incomes and land use. *Impressed?*
- Hidden Markov Chain Model provides framework for understanding tipping points as an emergent phenomenon. *Cool method?*

Weaknesses:

- Generalize land use tipping points; can vary significantly across regions due to local environmental conditions, cultural practices, and government. *Too vague?*
- Focused less on the ecological consequences, such as biodiversity loss, ecosystem services, or habitat fragmentation. *Are those important?*
- Assumes reforestation predictably follows agricultural decline during the "forest transition" phase. *Does reforestation always occur in this way?*
- Overlooks one of the most important ecosystems for global change, the Amazon rainforest. *Who does that?*
- No guidance for addressing tipping points for policy makers. *Whose job is it to do that?*

Dietz et al. (2021)

Strengths

- Evaluates 8 climate tipping points from the economics literature for 180 countries
- Ddeveloped a way to compare different studies with 8 different tipping point definitions
- "Replicated" modeling approaches by papers used
- Their definition of a "tipping element is broad: "subsystems of the Earth system that are at least subcontinental in scale and can be switched—under certain circumstances—into a qualitatively different state by small perturbations" (Lenton 2008) *Good?*
- Based on RCP4.5-SSP2; middle-road projection for CO_2 emissions. *Is this fair?*
- SCC (\$/t CO_2) reflect regional shifts from tropics to temperate. *Interesting?*

Weaknesses

- Meta-analysis uses only 21 papers "that are based on geophysical foundations (i.e., with at least a reduced-form representation of the key underlying geophysical relationship[s] that govern the tipping point)." *Too few?*
- Two years later (2023), ocean methane hydrates were no longer considered a potential climate tipping point (IPCC 6th Assessment Report), leaving permafrost thawing as the bad boy here (due to CH_4 release). Thus 21-2 = 19 papers and the max. remaining SCC ~ 8% increase in \$/t CO_2. *Meh?*
- Expresses all future costs of carbon as \$, thus assuming that all impacts can be measured as \$. *Is this fair?*