

6th International Forum on Sustainable Future in Asia: GER Post COVID-19



The Trilemma in Coping with **C**COVID-19 & Visioneering: Complex Systems View

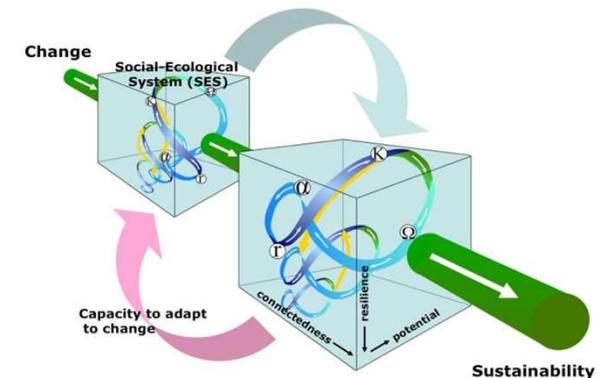
Joon Kim

Future Earth Program, Asia Center
Complex Systems & Visioneering SDG Lab
Dept. of Landscape Architecture & Rural Systems
Engineering
Seoul National University, Republic of Korea
<http://snuac.snu.ac.kr/futureearth>
joon@snu.ac.kr

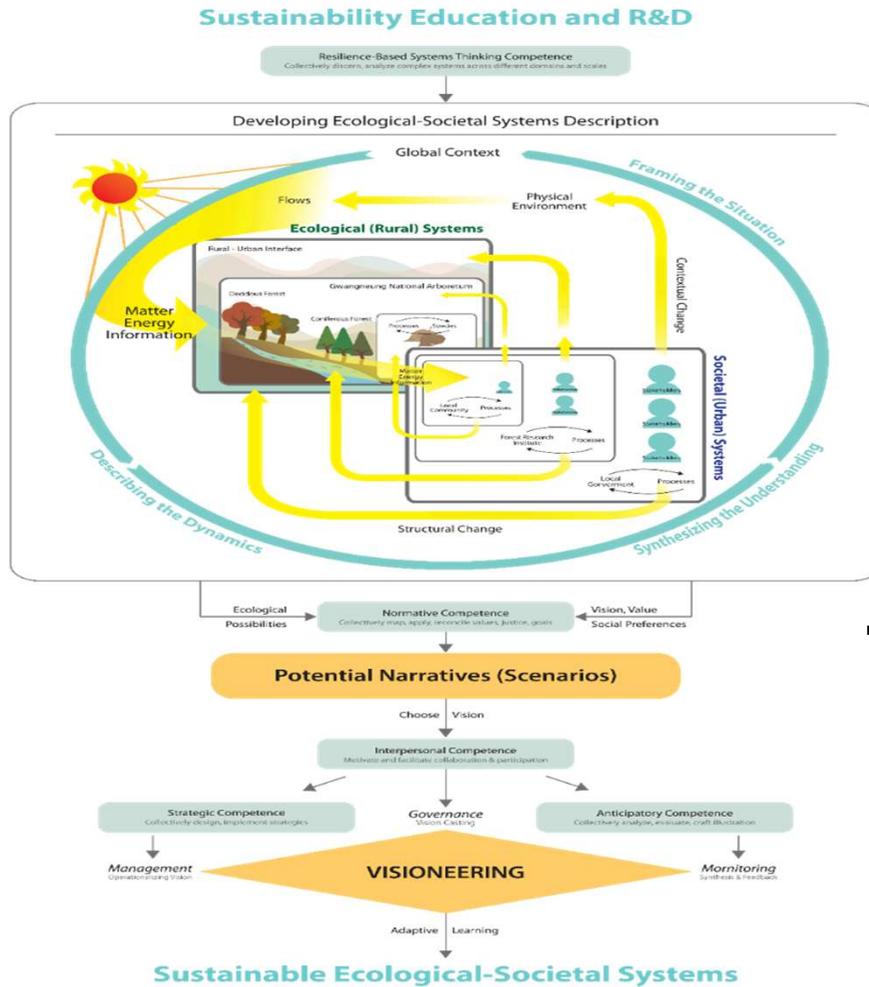
Lessons from COVID-19

Zakaria (2020)

- Outbreaks are inevitable but *pandemics optional*
- Challenge has not been to arrive at solutions but to find *willingness to implement* them
- Along with dynamism and growth, we need *security and resilience*
- We've confronted such crossroads before
- We can choose our path: either *turn inward*, embrace nationalism and self-interest or *look outward* toward more and better cooperation

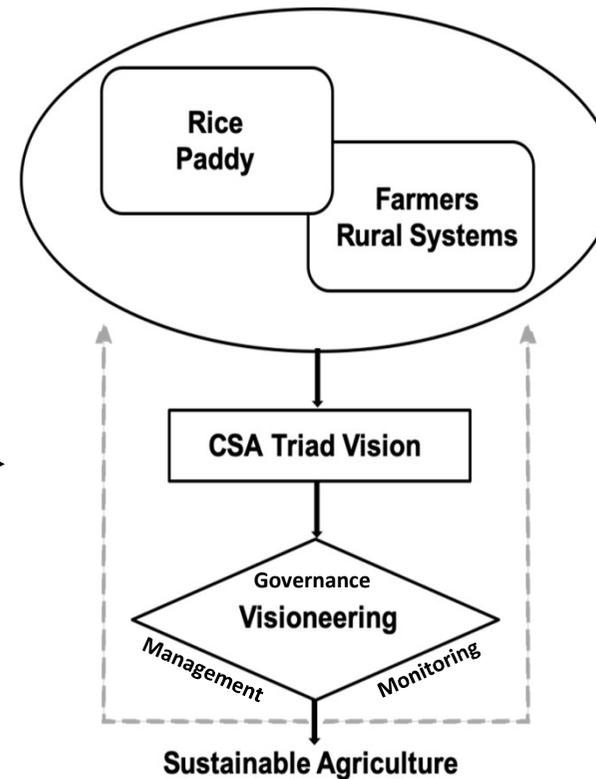


6th International Forum on Sustainable Future in Asia: GER Post COVID-19



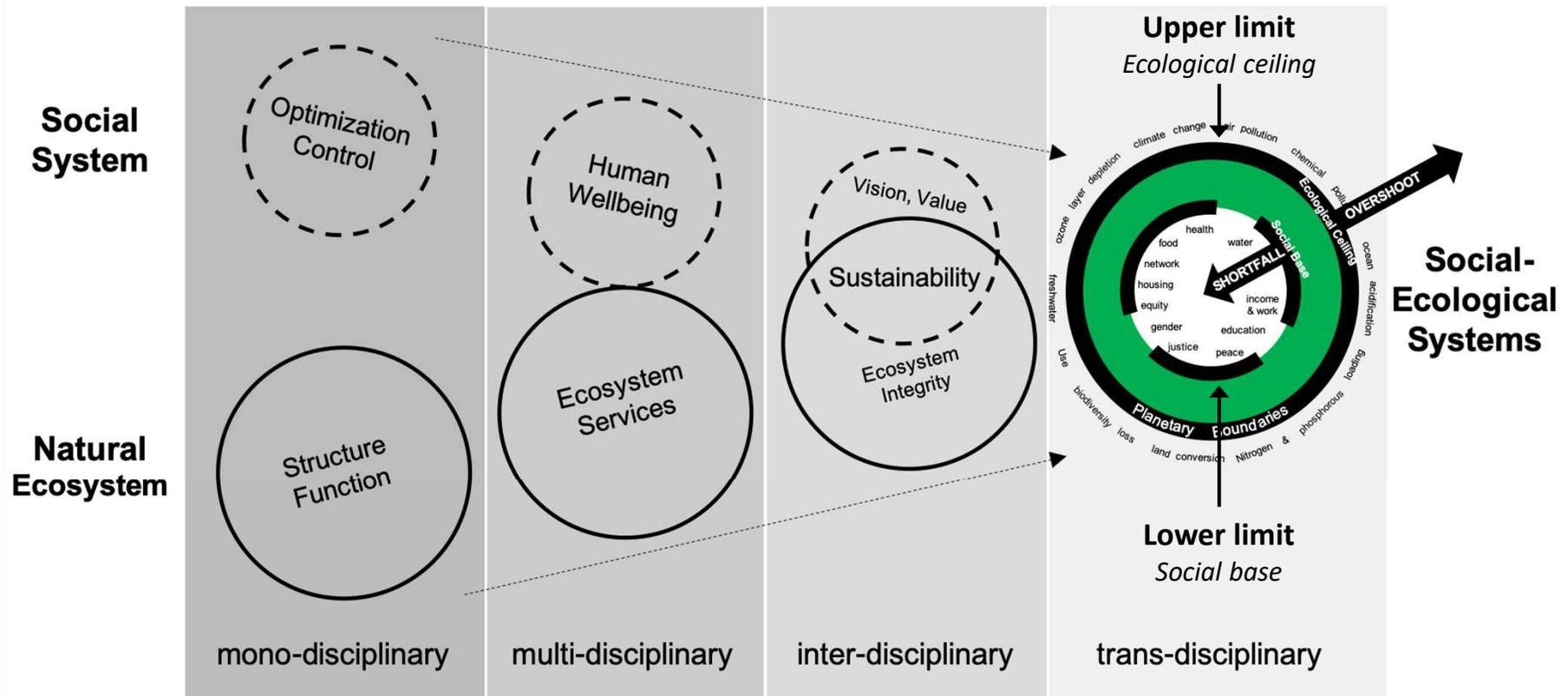
(www.asiaflux.net ; Kim *et al.* 2018)

Simplified Conceptual Model for Climate-Smart Agriculture (CSA)



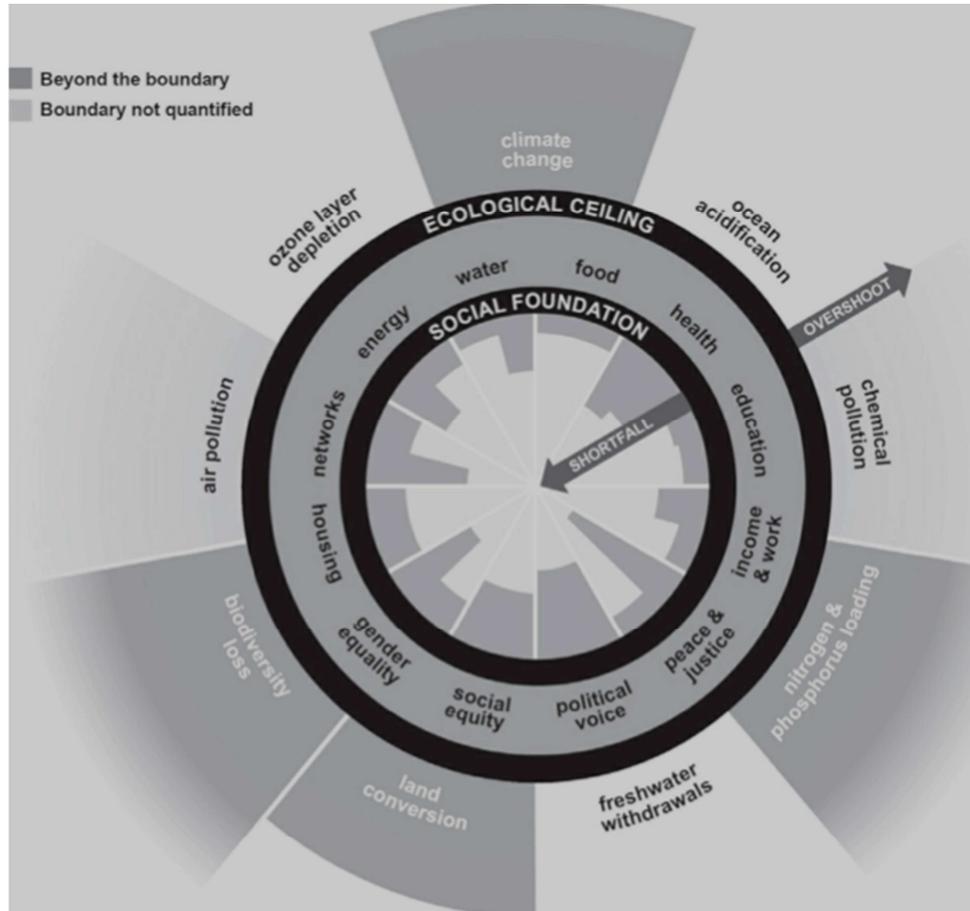
(Talucder & Kim, in prep.)

Paradigm Shift in Social-Ecological Systems Narrative



Adapted from Frumkin (2017) and Ramirez-Carrillo *et al.* (2018)

6th International Forum on Sustainable Future in Asia: GER Post COVID-19



Raworth (2018)

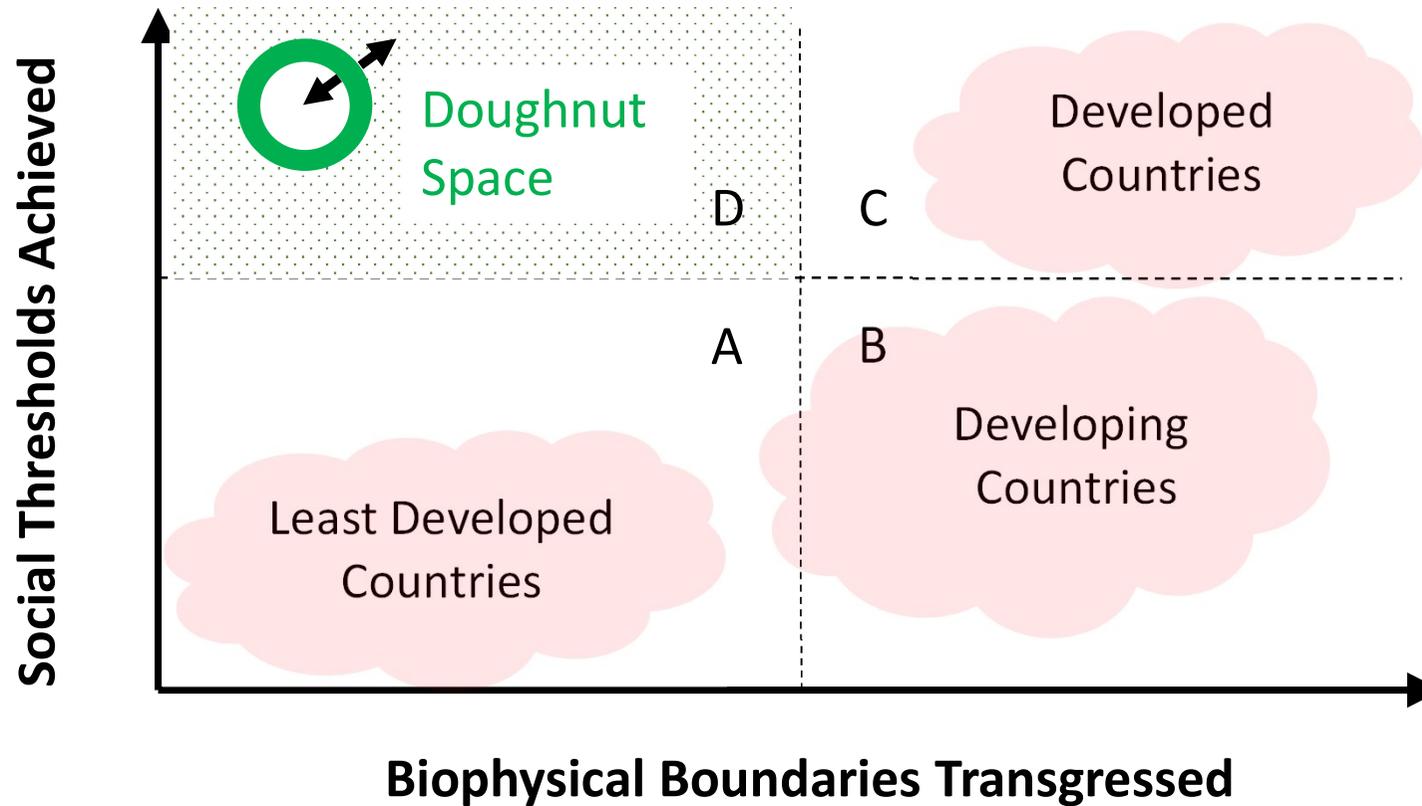
**First generation to have realized
what we've done to our planet**



1. Upper limit
Ecological ceiling

2. Lower limit
Social base

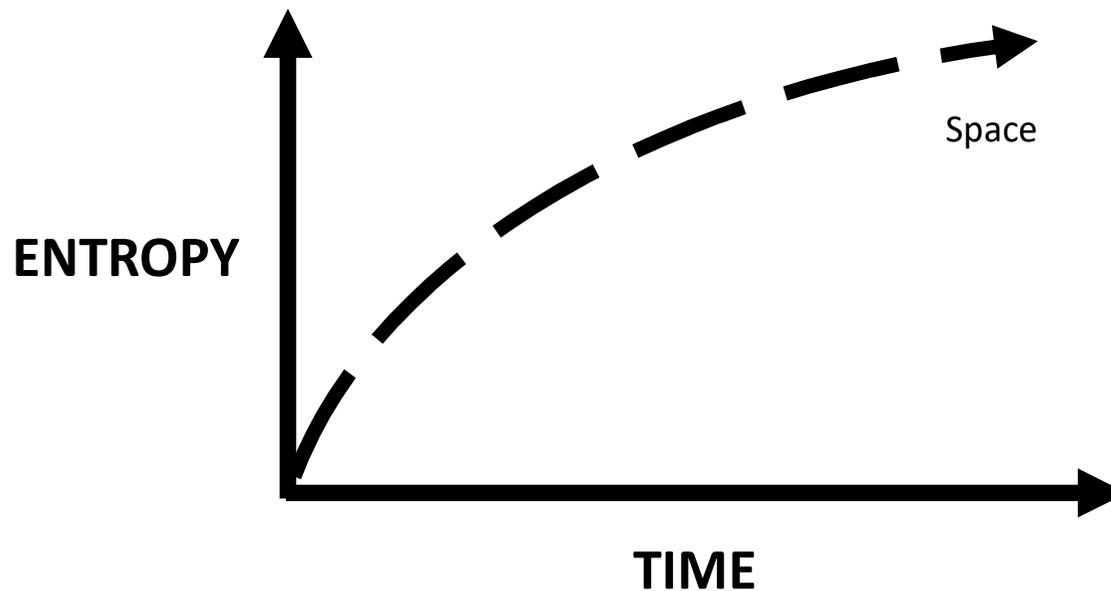
**Last generation to change the
path toward unsustainability**



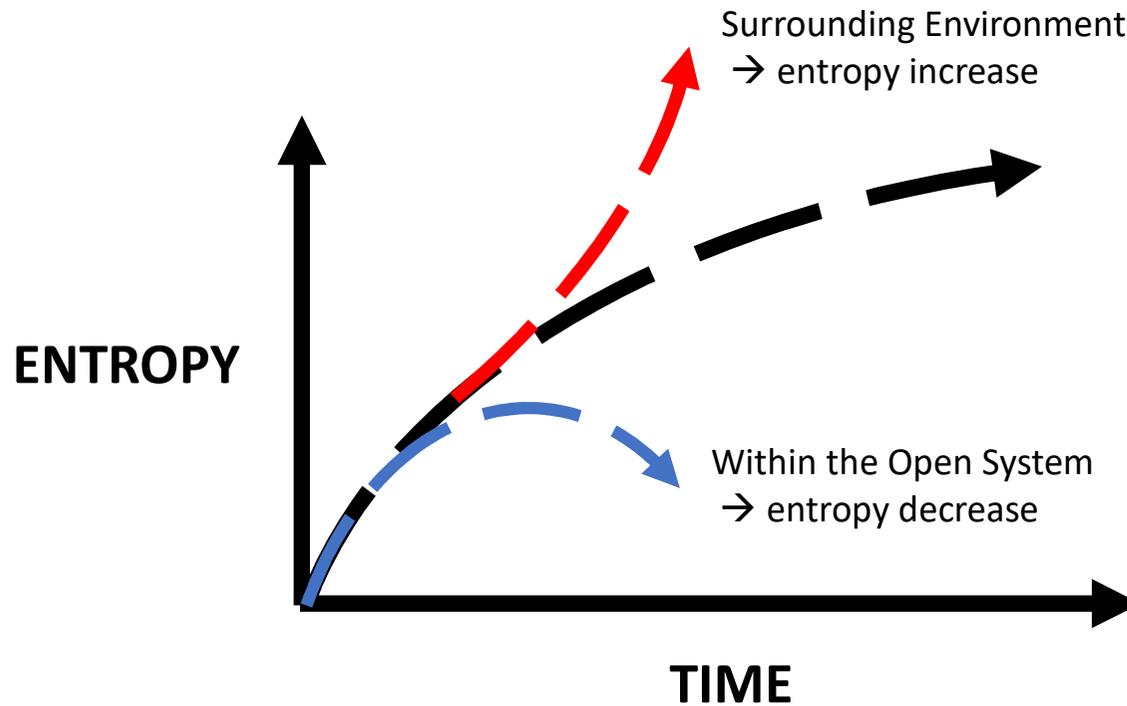
Adapted from Raworth (2017); <http://kateraworth.com>; O'Neill *et al.*, (2018); Kim (2020)

3. Thermodynamic Imperatives

Isolated System

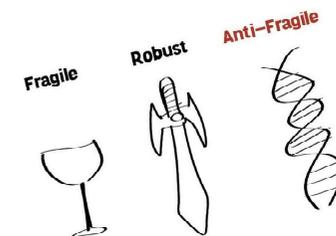
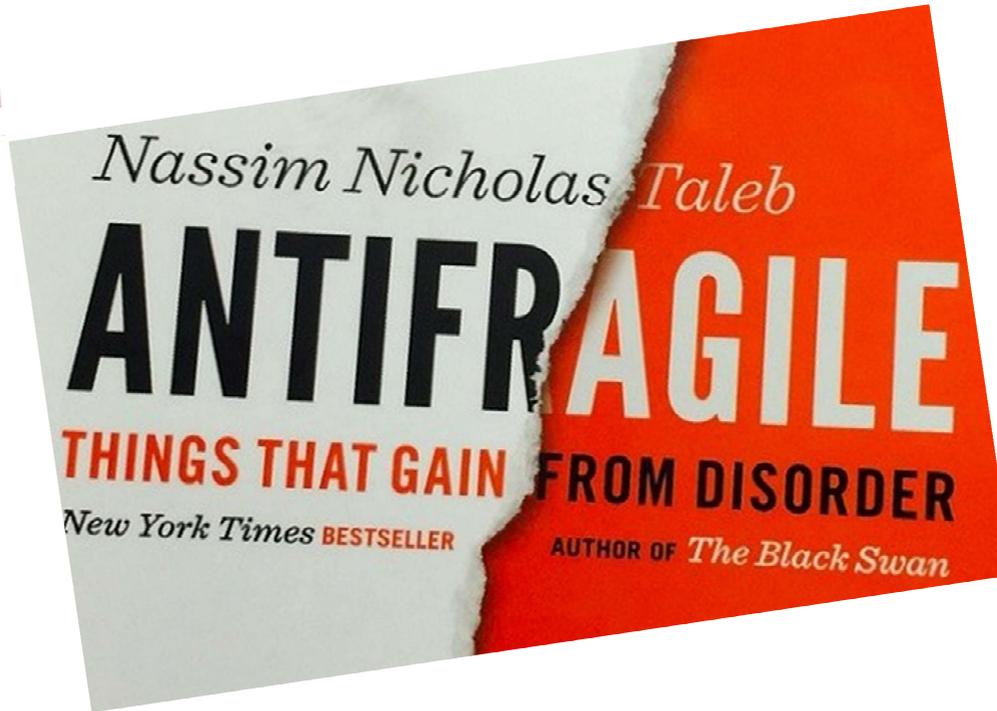
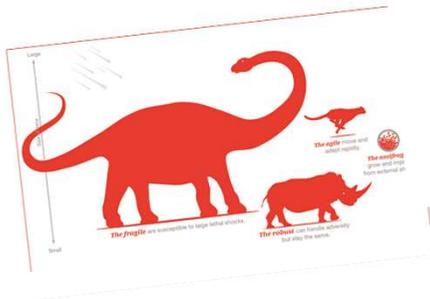


Non-Equilibrium Open System

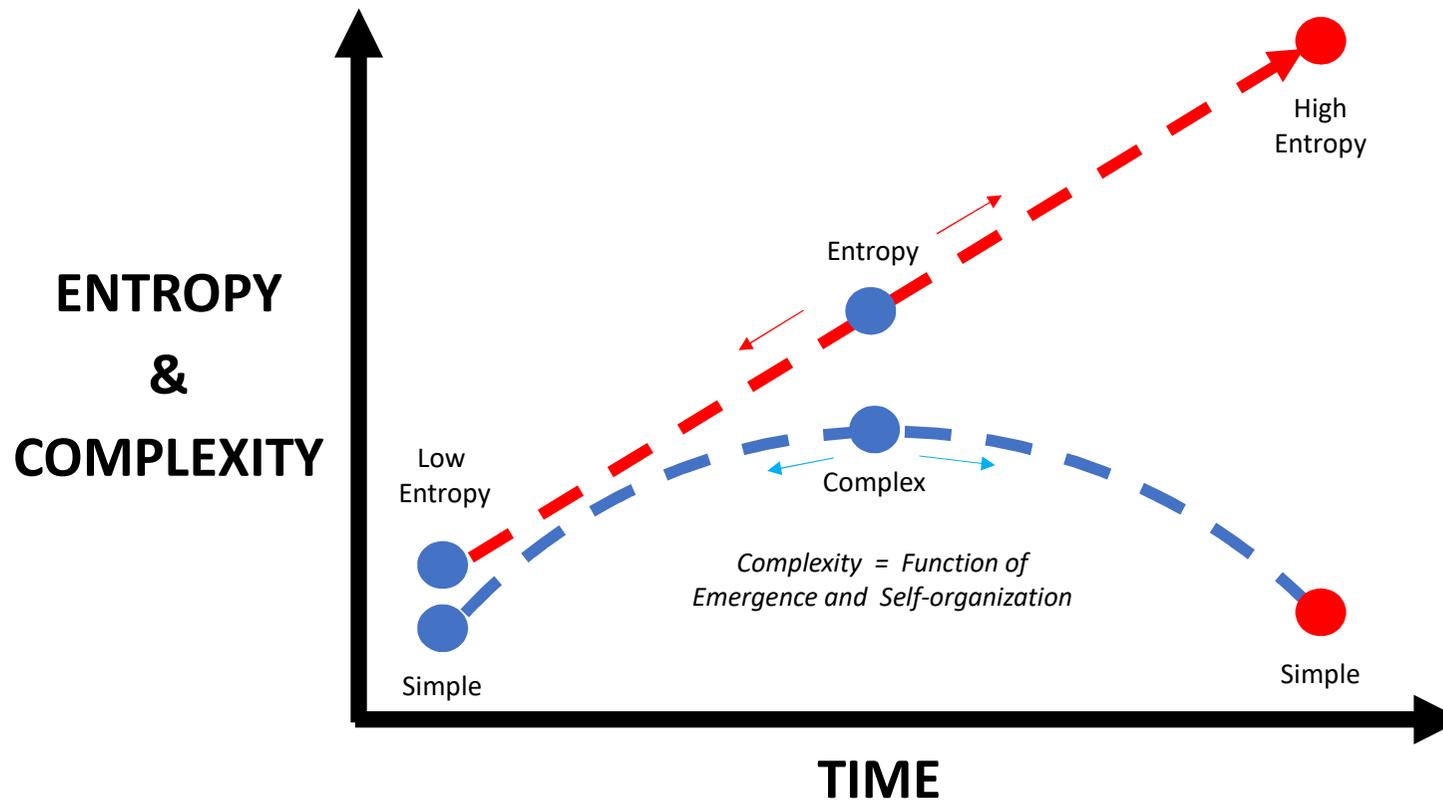


Perspectives on Systems State & Development

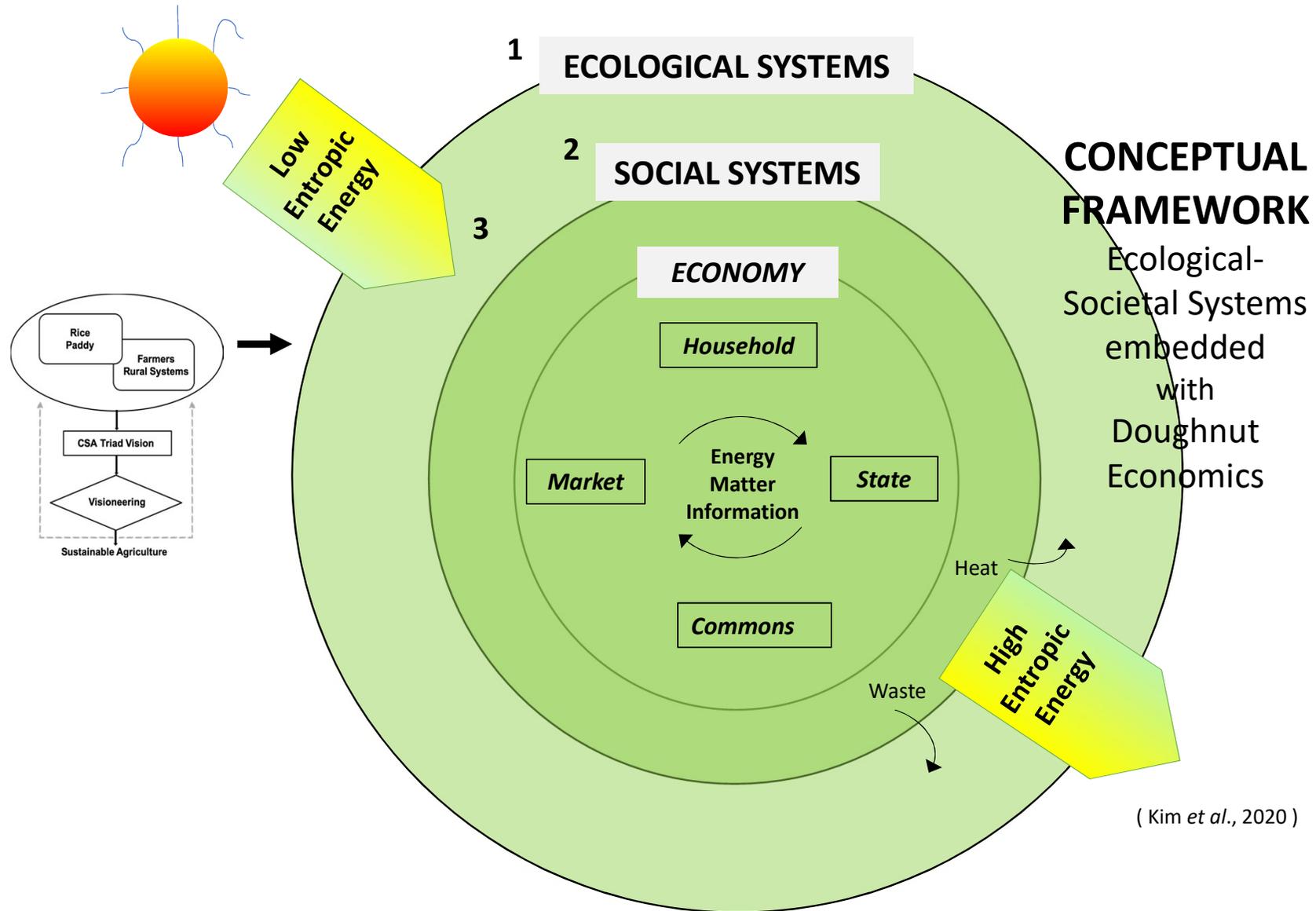
The Triad: *Fragile, Robust, Anti-fragile*
Paradigm shift from 'resilience' to 'antifragility'



Systems Entropy & Complexity

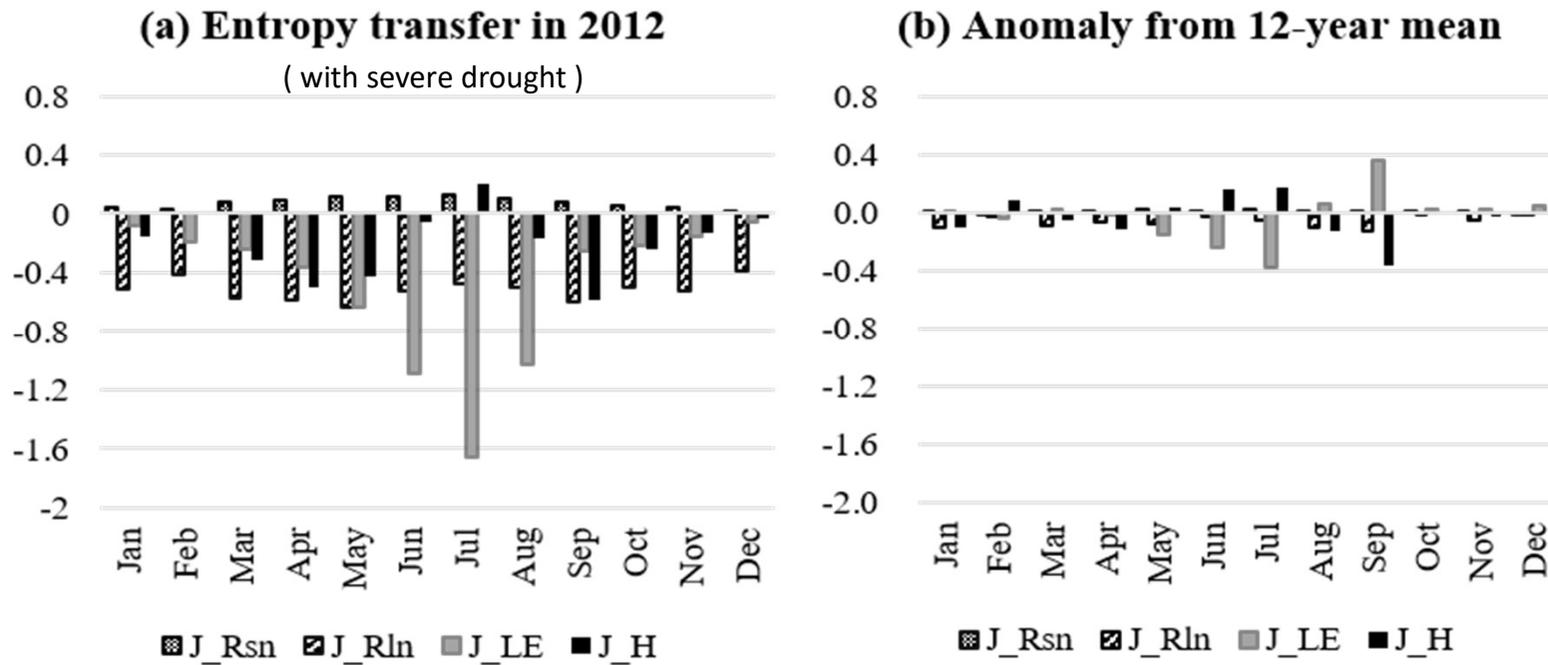


6th International Forum on Sustainable Future in Asia: GER Post COVID-19



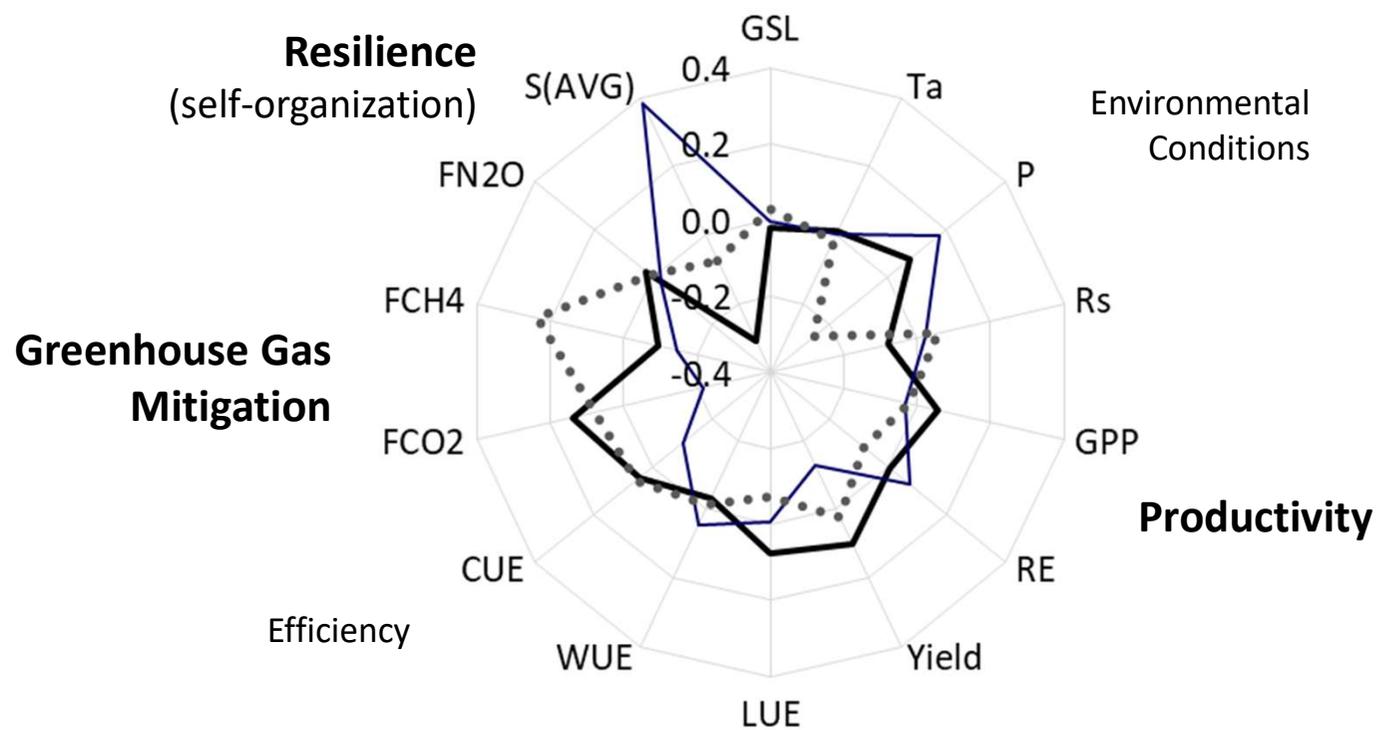
Changes in Entropy Transfer

(Irrigated Corn Field, NE, USA ; Yang *et al.*, 2020)



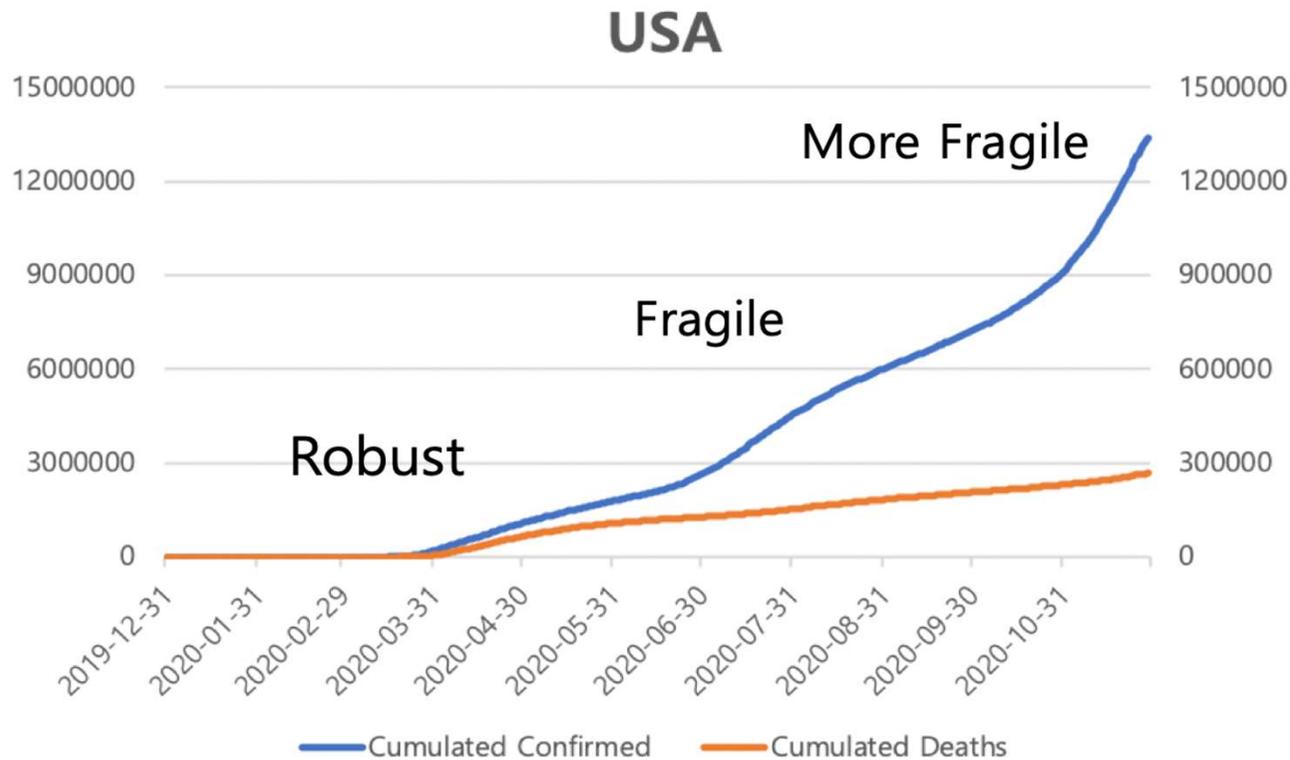
Trade-off between CSA triple challenge

(Rice Paddies with Intermittent Irrigation, Talucder *et al.*, 2020)



Application to COVID-19

(Kim *et al.*, in prep)



SUMMARY

- COVID-19 was not ‘black swan’ but expected social-ecological health disaster
- Humanities confronting crossroads: not the first but next could be the last
- Complex systems view: (1) upper limit, (2) lower limit, (3) imperative
- Collapse of ecosystems & social base, and violating thermodynamic imperative
- The pandemic poses serious problems but also opportunity to accelerate transformations of systems’ regime shift to go beyond post-normal or being resilient to being antifragile (*the resilient resists shocks and stays the same whereas the antifragile gets better.)
- Visioneering (triad of governance, management, monitoring) is essential
- Tools for sustainability (in ‘The Limits to Growth’ , Meadows *et al.*)
Visioneering, Networking, Truth-Telling, Learning, and Loving
- Need understand nature, cost, and principles of these tools