

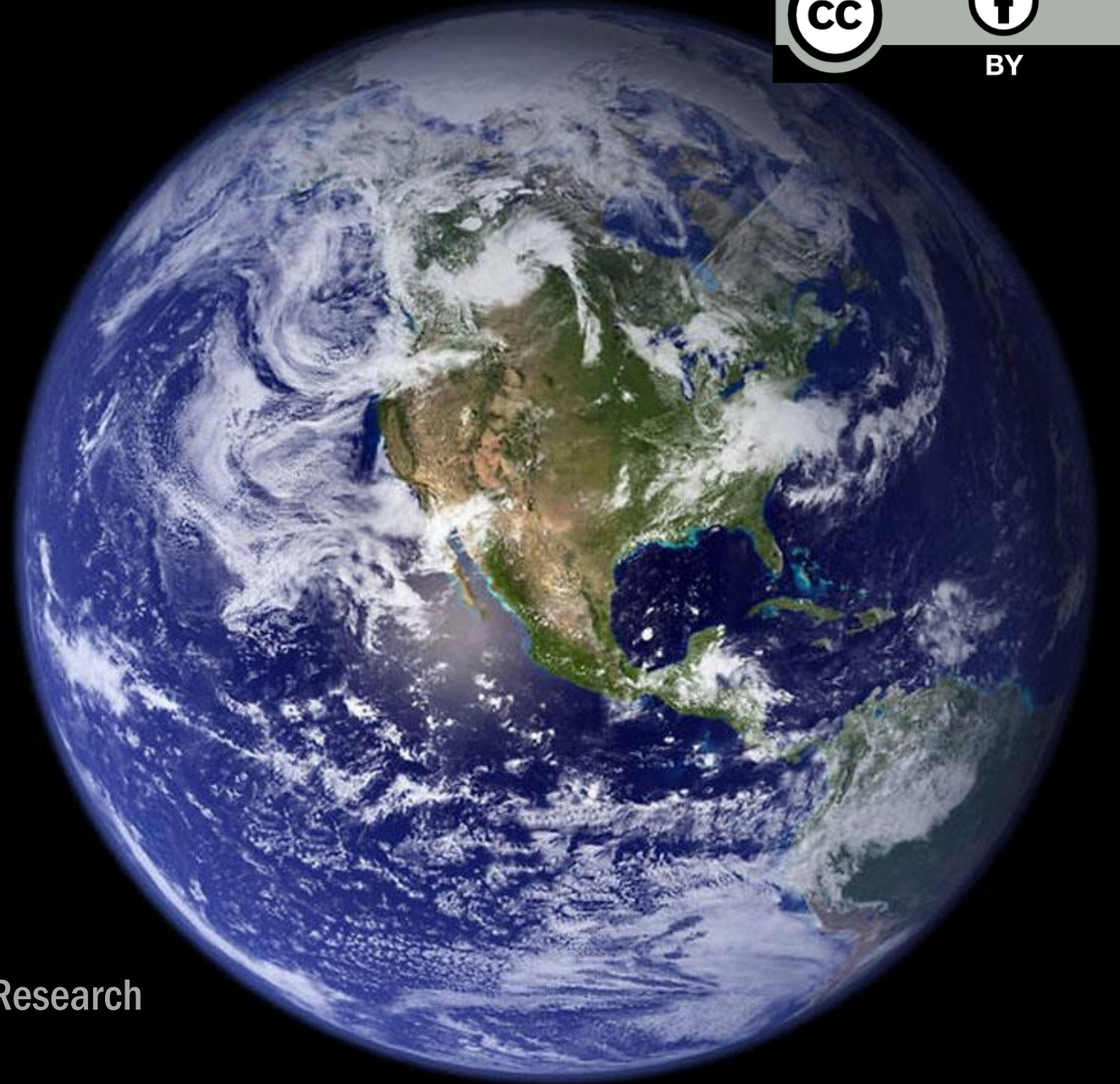


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# **Diversity** of Global Change Factors and Tipping Points

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# GENERAL RESILIENCE VS. SPECIFIED RESILIENCE

**When we think about resilience, is it either focusing on**

**a few severe threats (specified) or**

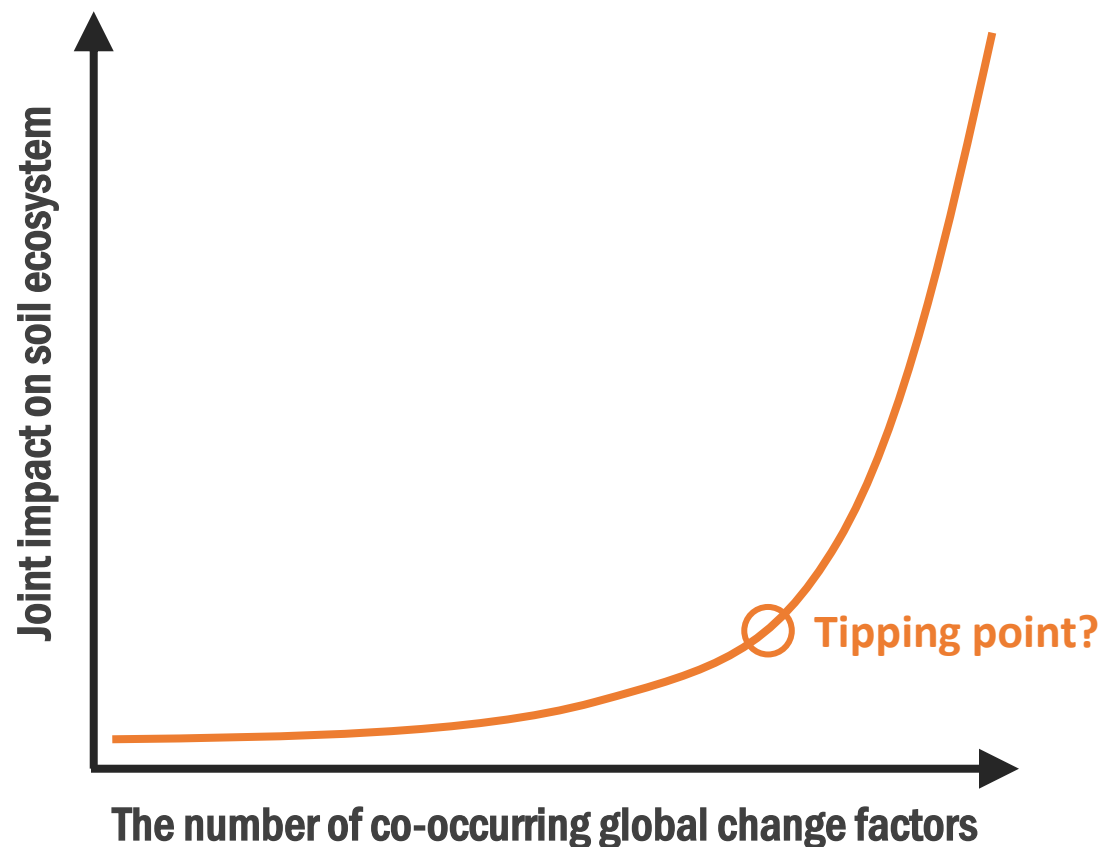
**several moderate/minor threats (general)?**

**- which is better under which circumstances?**

## BACKGROUND



# JOINT IMPACT OF SEVERAL GLOBAL CHANGE FACTORS



Rillig et al. 2019 in *Science* experimentally demonstrated that the co-occurrence of many global change factors can cause harmful synergistic impacts on soil functions and microbial biodiversity



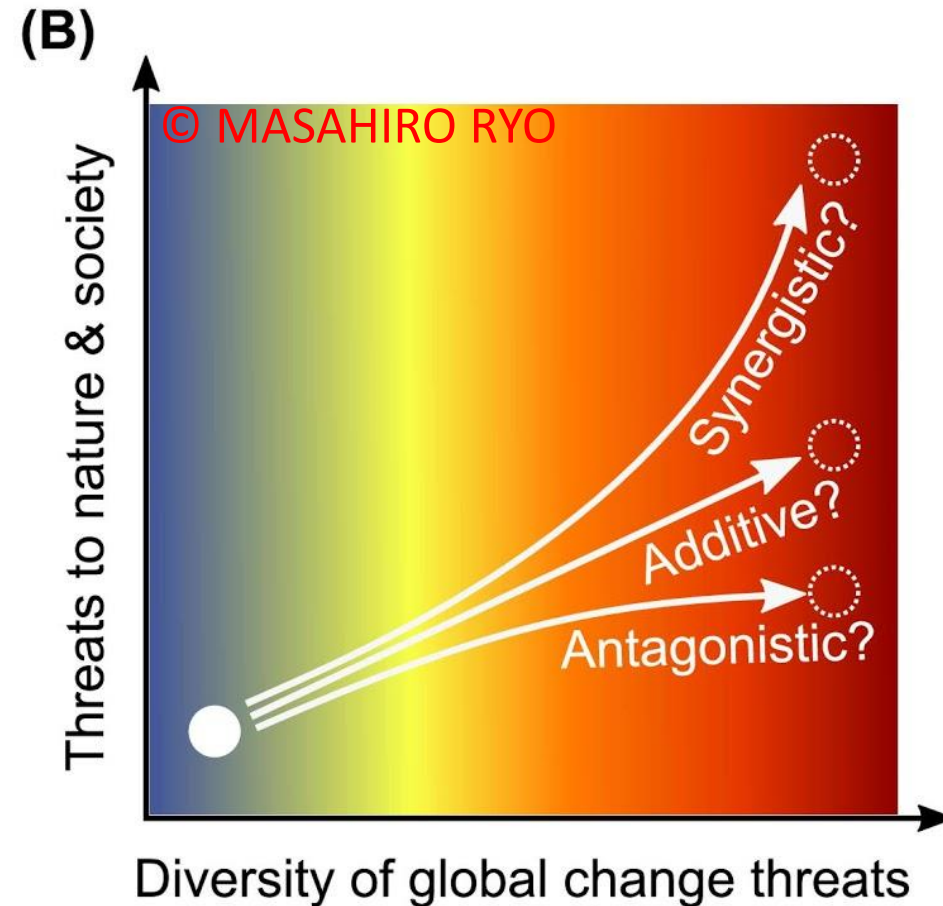
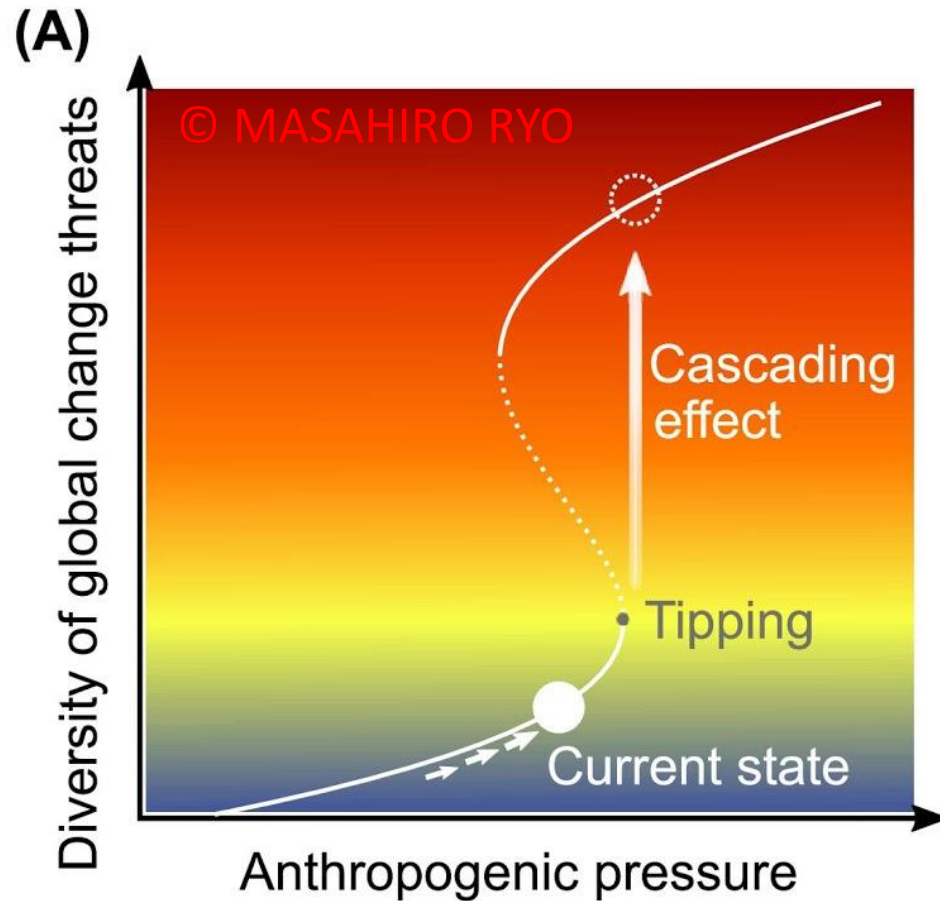
## NOVEL PERSPECTIVE

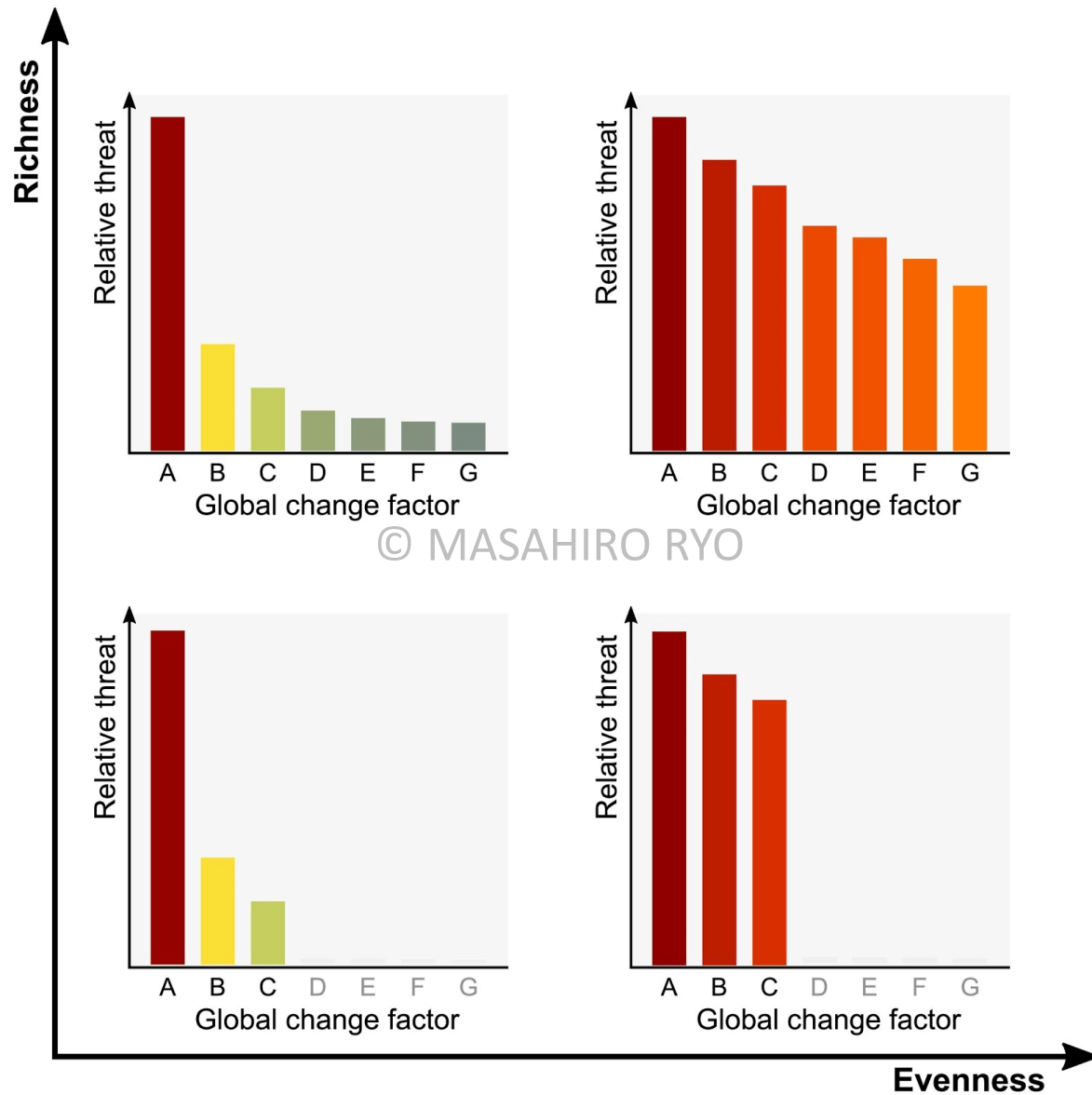
**How the diversity of global change factors will increase in the future, and how an increase in the diversity affect nature and society?**

# IDEA



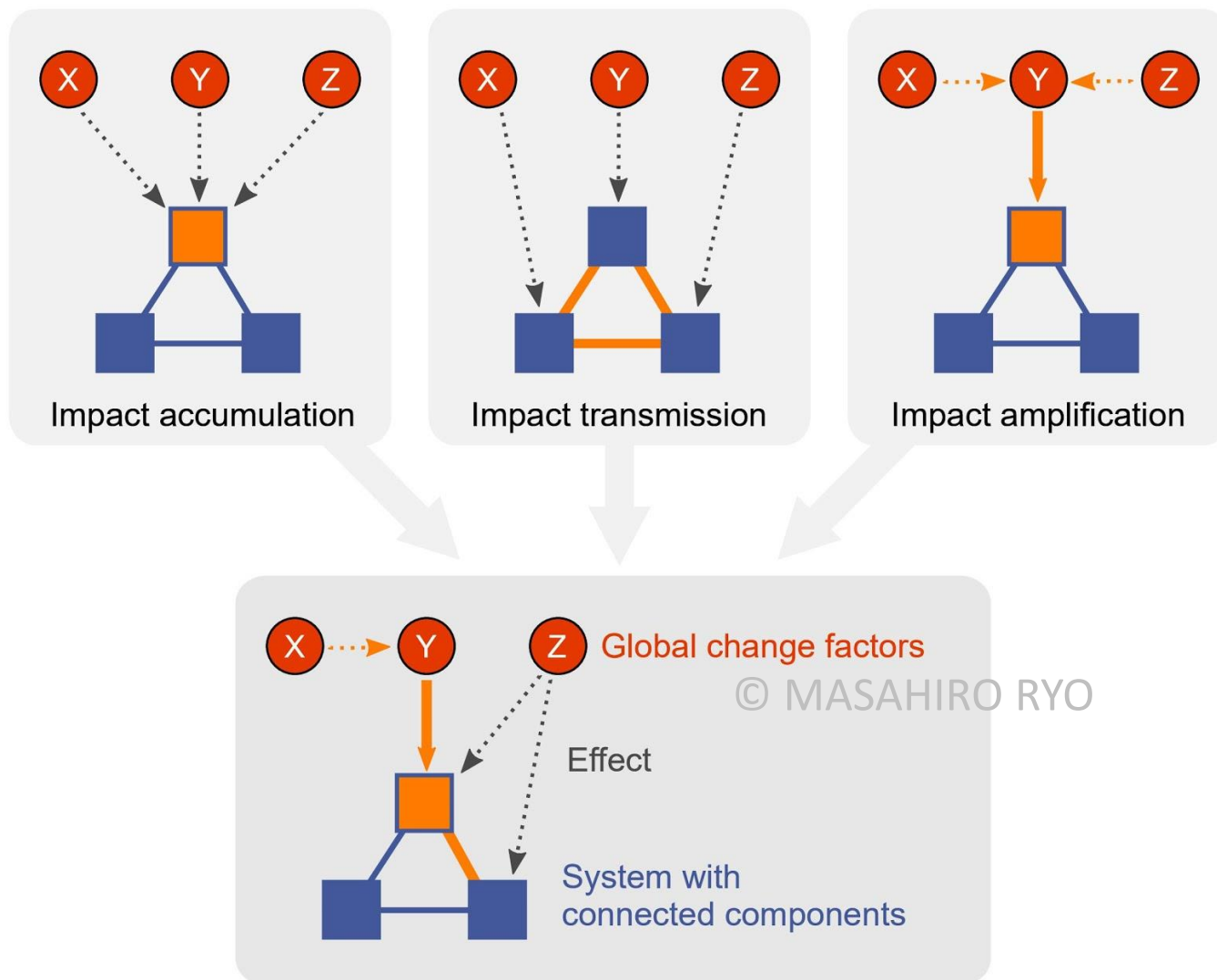
## Viewing the diversity of global change factors as a holistic threat to nature and society





## APPROACH IDEA1

**Assessing the diversity of global change factors in terms of the relative threat and number of factors**



## APPROACH IDEA2

**Assessing the joint effect of multiple factors by knowing how the effects are combined.**

# FUTURE WORK

## APPLY THE APPROACHES ACROSS SCALES



GLOBAL

REGIONAL

LOCAL

### Planetary Boundaries

Not only climate change  
but many other changes  
would co-occur

Rockström et al. 2009

### TIPPING ELEMENTS

Critical transitions can occur  
abruptly and subsequently  
at the regional scale

Lenton et al. 2008

### SAFE OPERATING SPACE

Need to know the joint effect of  
multiple changes on local systems  
to avoid regime shifts at the local scale

Scheffer et al. 2015





**Collaboration/feedback wanted:  
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