



The Lake as a Microcosm

1887

*A lake forms a little world within itself -
a microcosm within which all the elemental forces are at work
the play of life goes on in full, but on so small a scale as to
bring it easily within the mental grasp.*

*Nowhere can one see more clearly
the impossibility of studying completely
any species out of relation to the others.*



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*In this lake, where competition is fierce;
where mercy and charity and all the virtues are utterly unknown;
where robbery and murder and the deadly tyranny of strength are the rule;
even here, out of these hard conditions, an order has evolved.*



If the system of life is such ...

*may we not trust much to the outcome where,
as in human affairs, the adjustments of nature are aided
by intelligent effort, by sympathy, and by self-sacrifice?*

The Lake as a Microcosm

1887



Charles Elton



Evelyn Hutchinson



Ramon Margalef



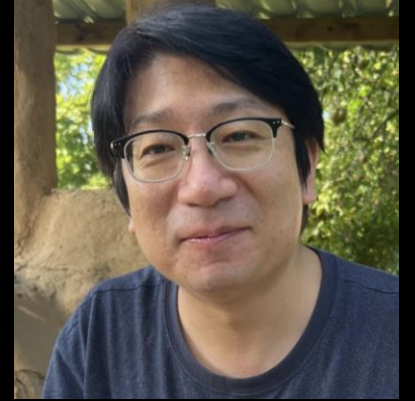
Henry Gleason



Robert MacArthur



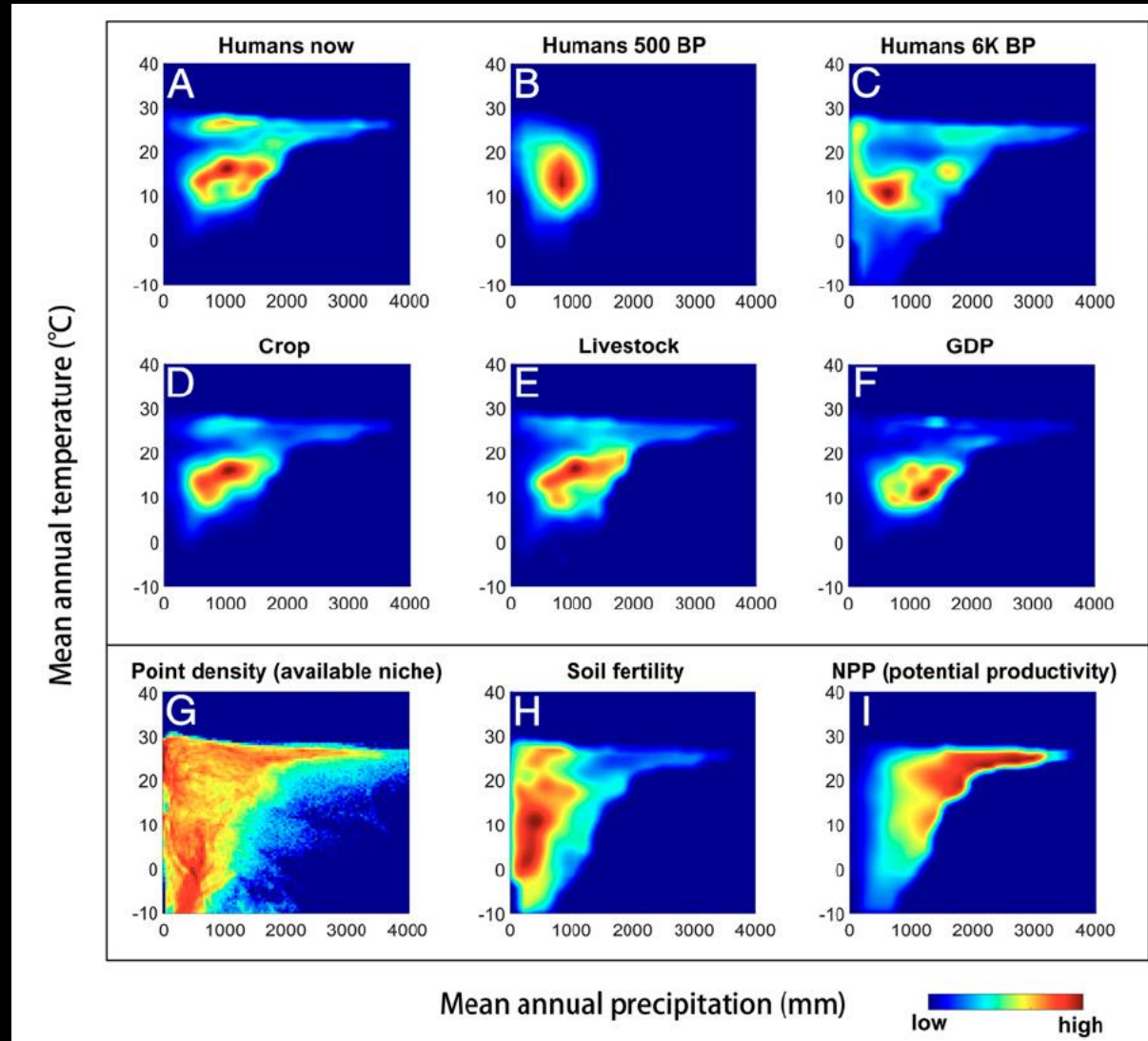
Do humans have a climate niche?



Xu Chi

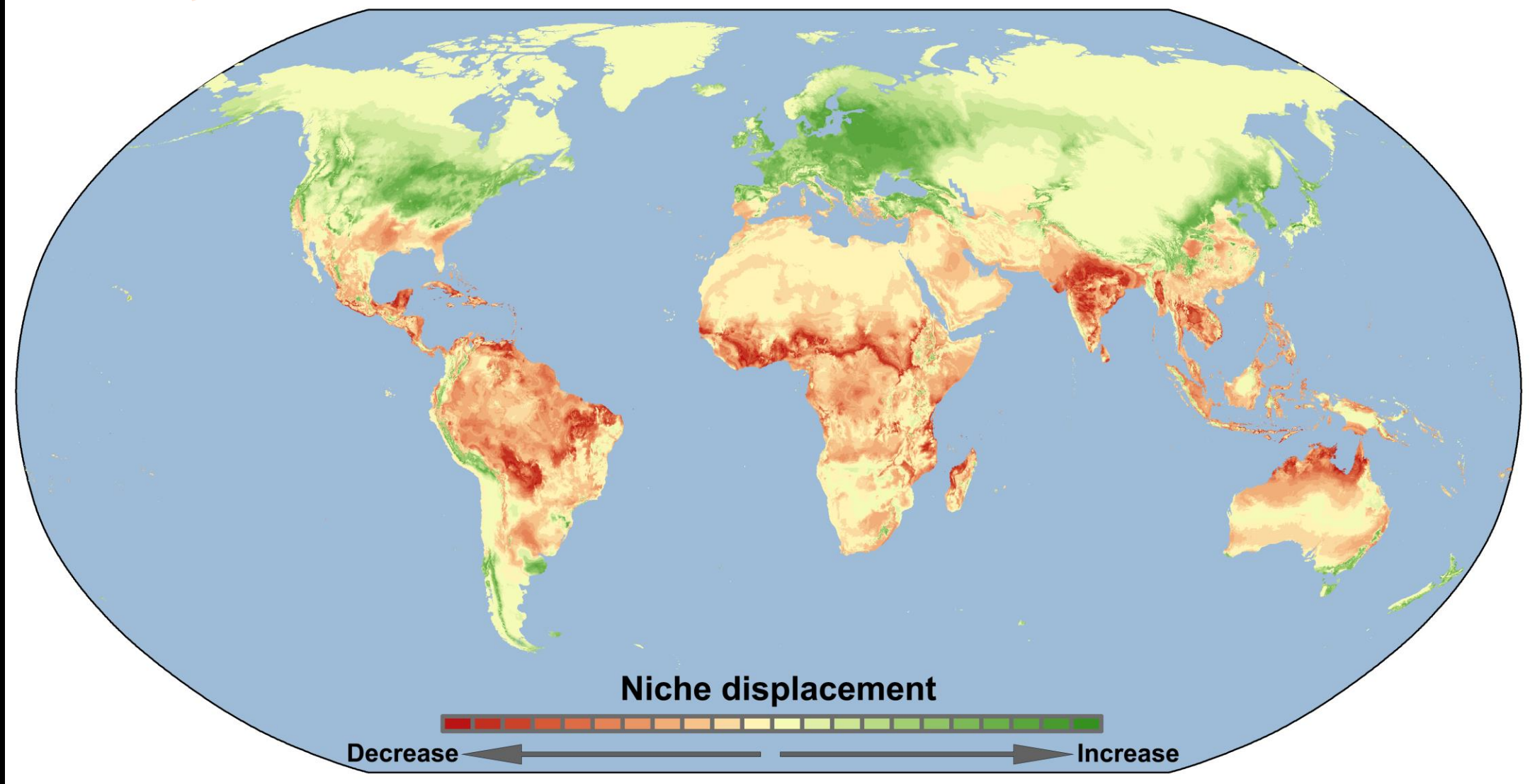


Do humans have a climate niche?



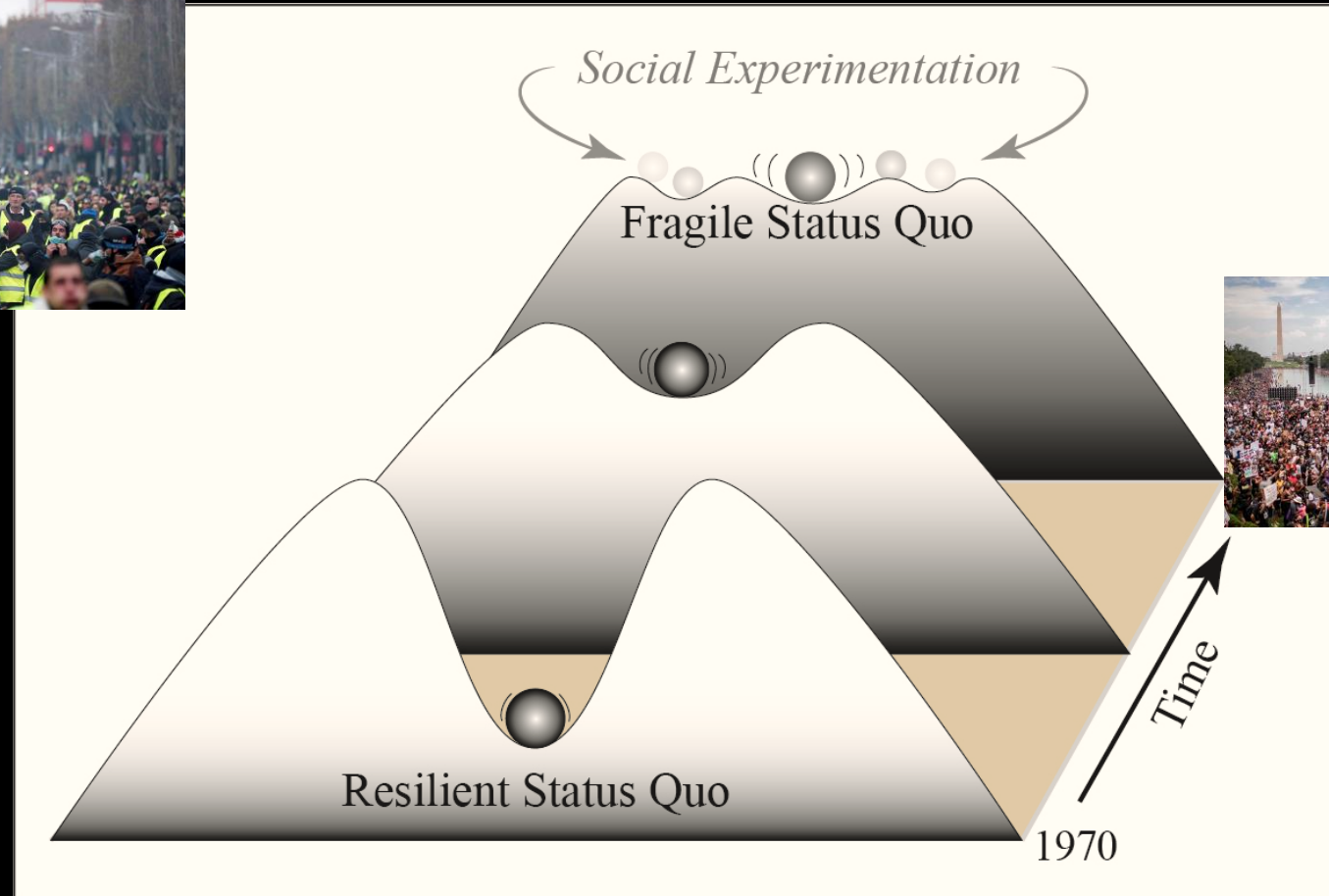
Xu Chi

Future of the human climate niche

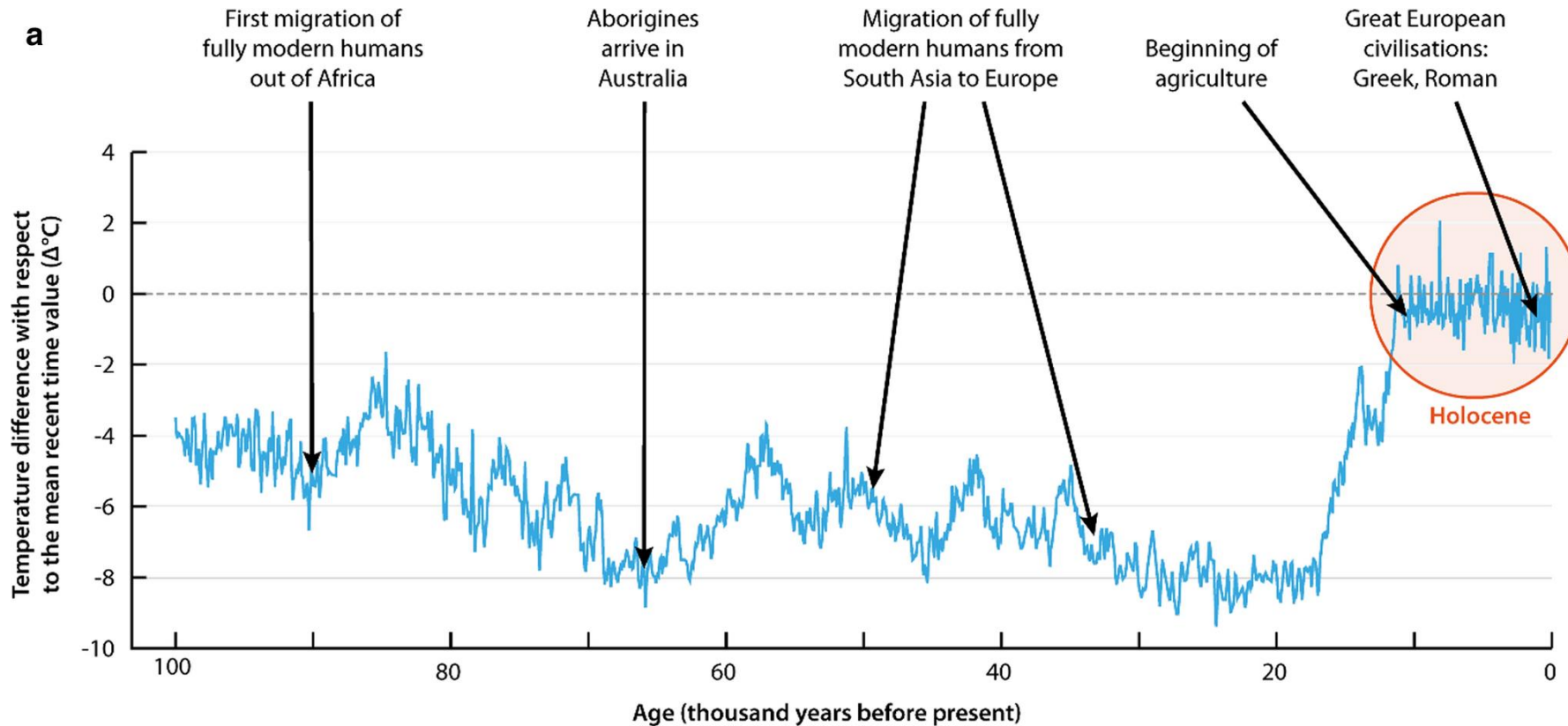


Xu, Kohler, Lenton and Scheffer PNAS 2020 & 'Quantifying the human cost', Lenton et al Nature Sustainability 2023

Tension

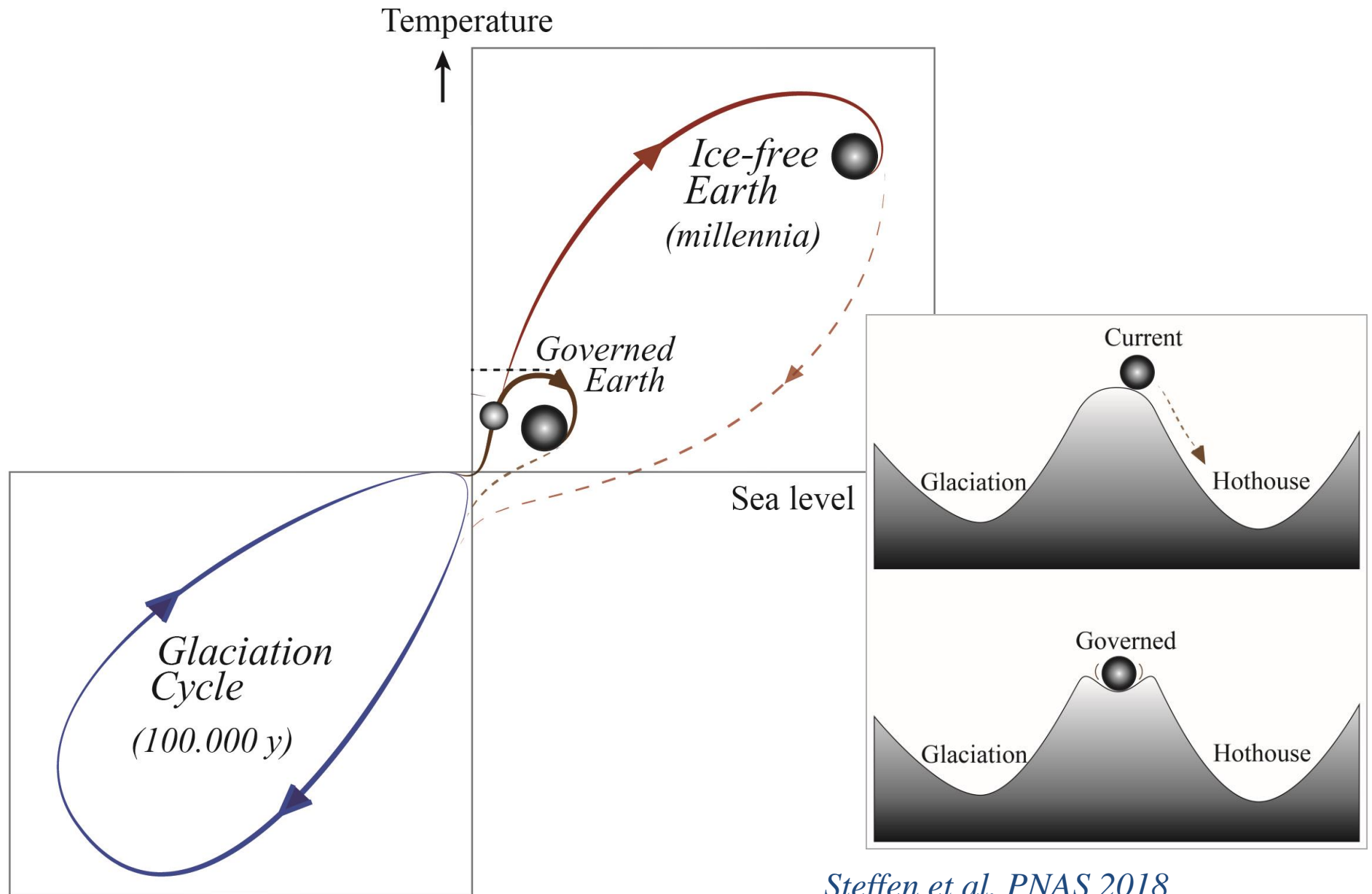


The Big Picture

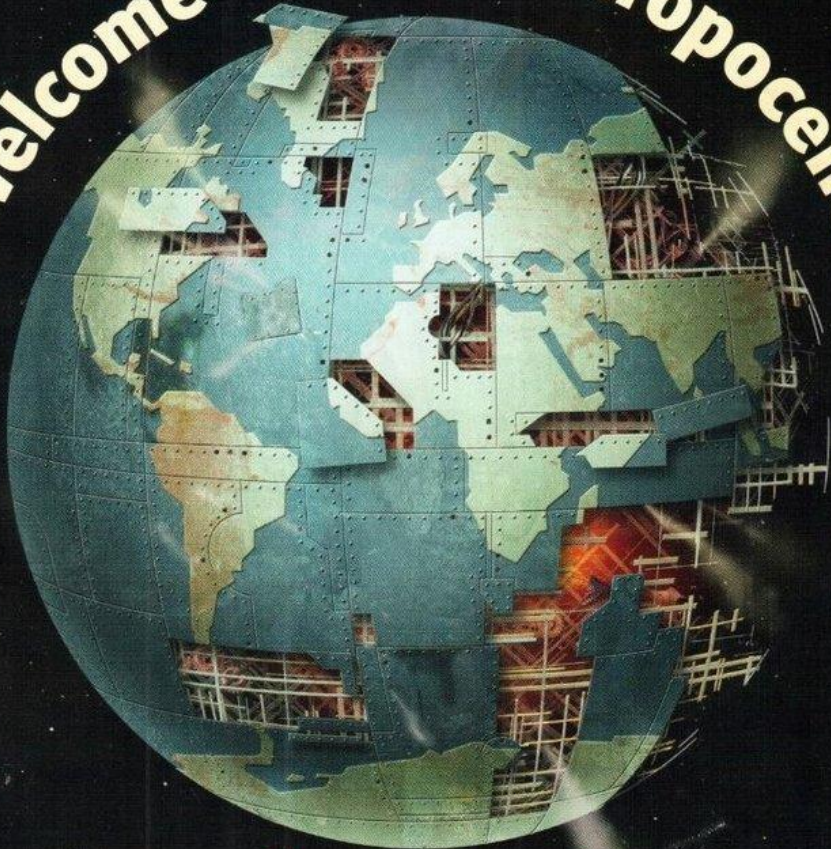


From Folke et al. 2021
Our Future in the Anthropocene.
Ambio

The Big Picture



Welcome to the Anthropocene



Geology's new age

Humans have changed the way
the world works.

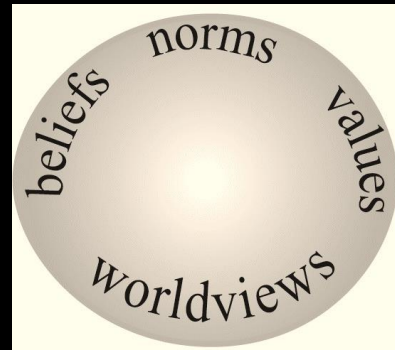
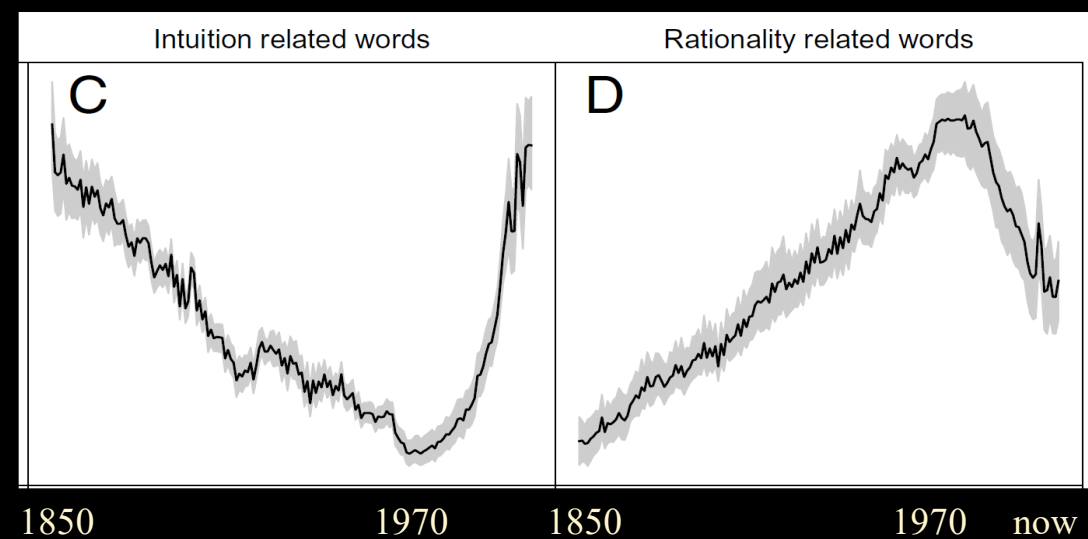
Now they have to change the
way they think about it, too

Can we change ?



Can we change ?

A post-truth world ?



The rise and fall of rationality
Scheffer et al. PNAS 2022

What is the role of
science and education?

Ancient civilisations

The average lifespan of a civilisation is 336 years



BBC FUTURE

Analyzing the rise and fall of 324 pre-modern societies
With Tim Kohler, Tim Lenton, Xu Chi, Egbert van Nes, Luke Kemp and others

How long did they live?

PNAS 2023

PNAS

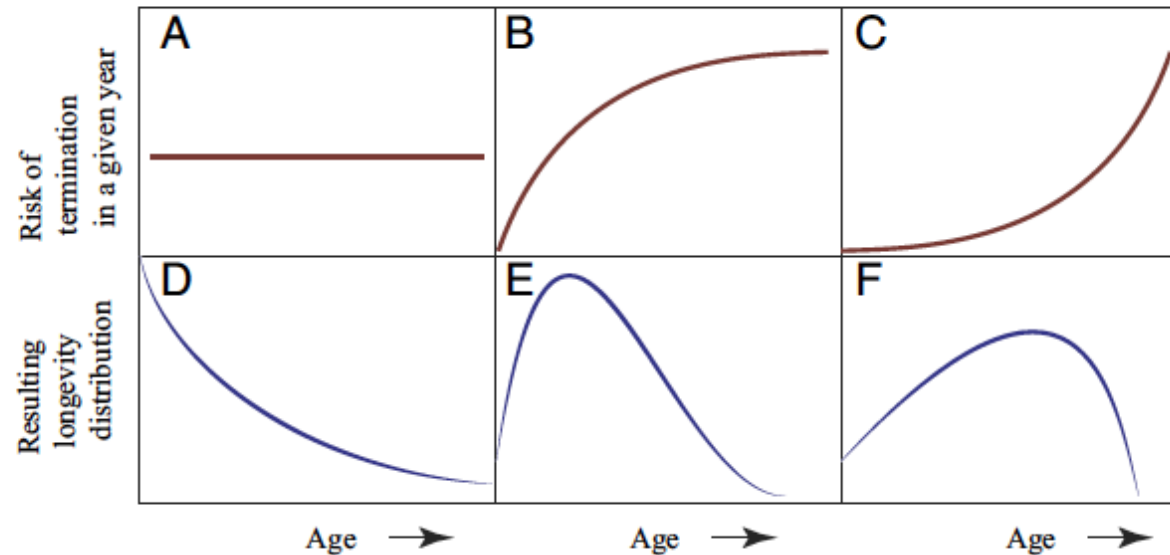
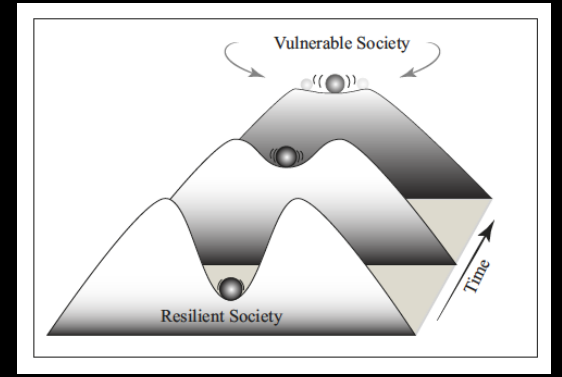
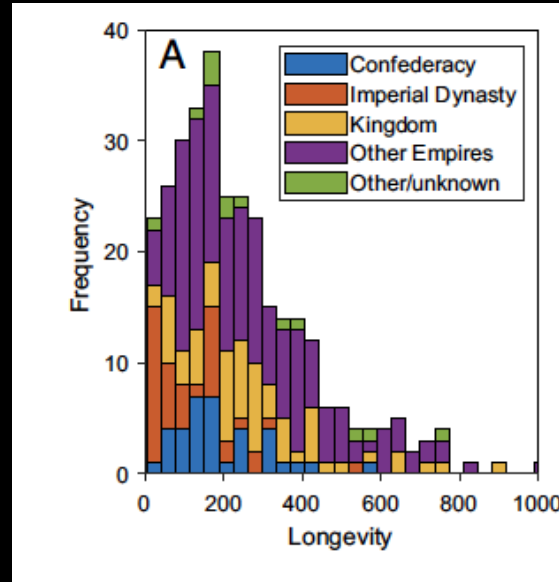
RESEARCH ARTICLE

ANTHROPOLOGY

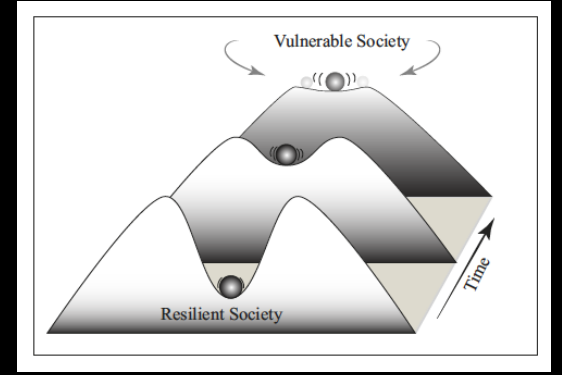
OPEN ACCESS

The vulnerability of aging states: A survival analysis across premodern societies

Marten Scheffer^{A,1}, Egbert H. van Nes^A, Luke Kemp^B, Timothy A. Kohler^C, Timothy M. Lenton^D, and Chi Xu^A

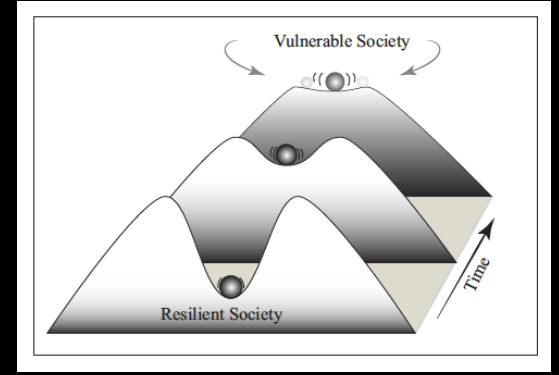
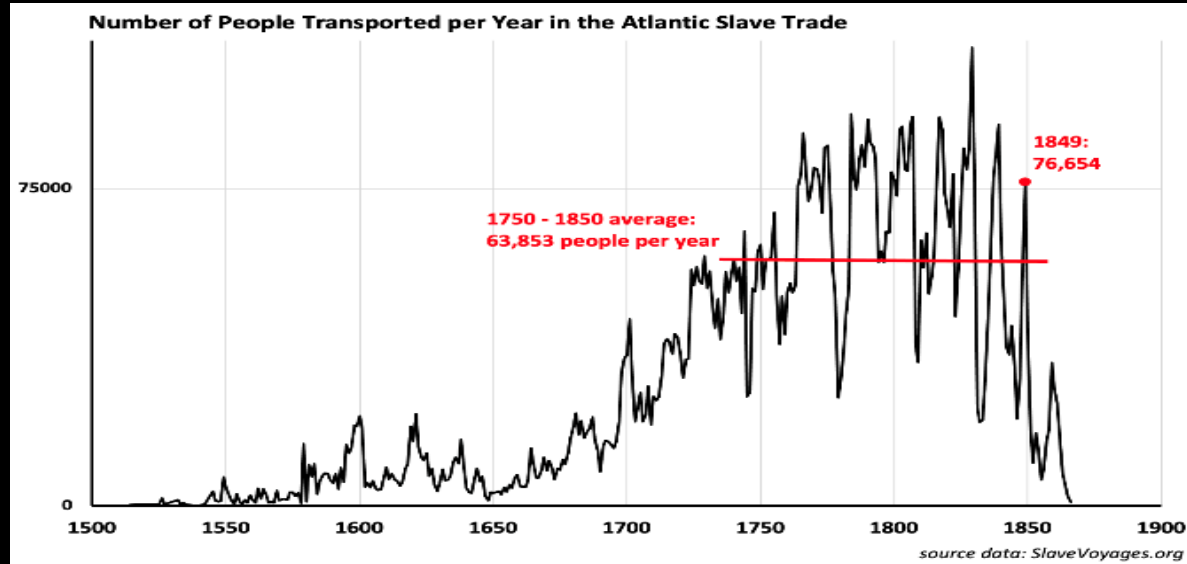


So, Societal Collapse is one way of tipping...

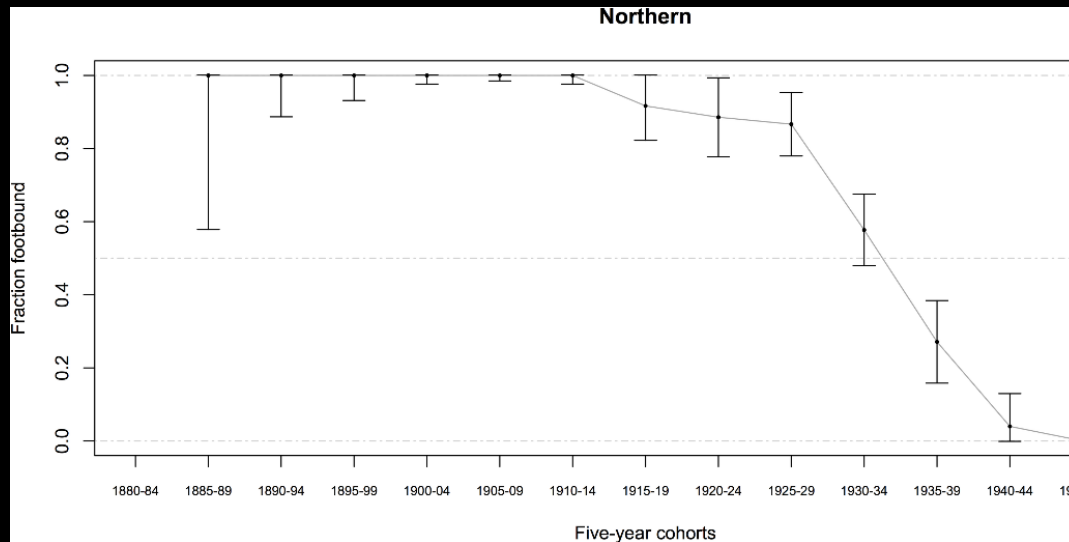


But, Social Norms may Tip too

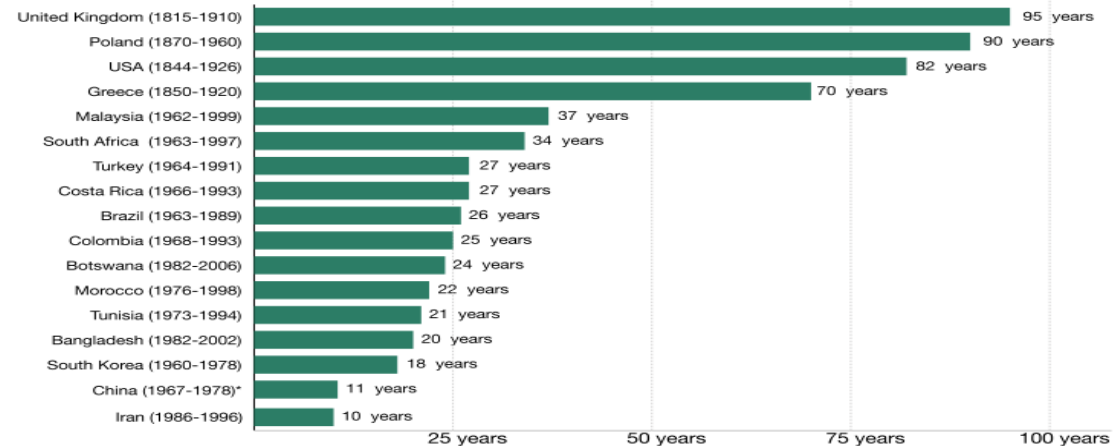
Slave-trade



Foot-binding



How long did it take for fertility to fall from more than 6 children per woman to fewer than 3 children per woman?



* The one-child-policy in China was introduced after the decline of the total fertility rate below 3. It was introduced between 1978 and 1980.
Data source: The data on the total fertility rate is taken from the Gapminder fertility dataset (version 6) and the World Bank World Development Indicators.
The interactive data visualization is available at [OurWorldinData.org](https://ourworldindata.org). There you find the raw data and more visualizations on this topic. Licensed under CC-BY-SA by the author Max Roser.

Is the status quo losing resilience now?

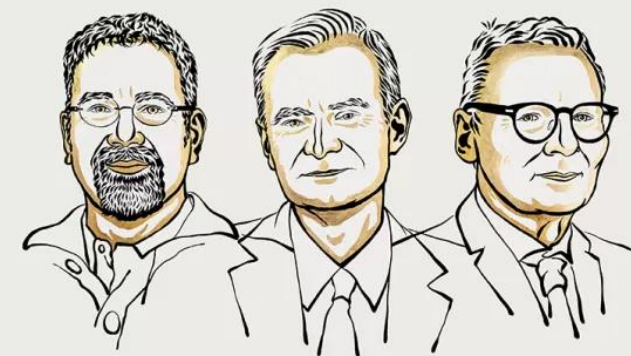
Will we tip right or tumble wrong?

Social disintegration

Isolationism
Populism
Fear, Anger
Intuition
Xenophobia
Autocracy

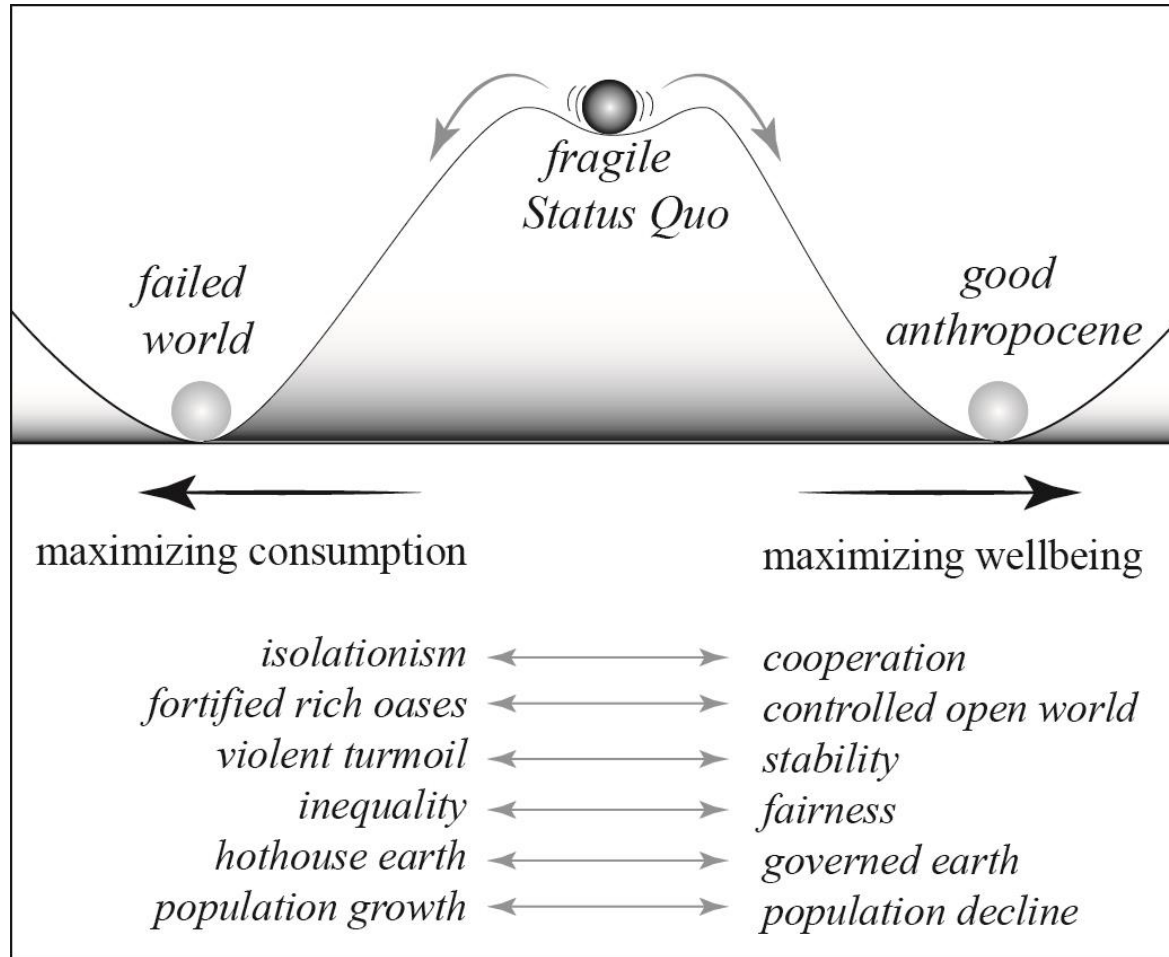
Cooperation
Movements
Trust, Hope
Rationality
Transparency
Democracy

Concerted action



Nobel Prize 2024
Make institutions work!

Free Will ?



Do we have a choice ?

A large, abstract watercolor splash in shades of blue, grey, and yellow, resembling a rock or a splash of paint, serves as the background for the book cover.

**MARTEN
SCHEFFER**

Hoe
samenlevingen
kunnen
veranderen

DE KANTIELING



VERTALING
NICO GROEN

September 2025