POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH

CONSERVATION INTERNATIONAL

Prof. Dr. Johan Rockström

Why Biodiversity Matters

For Humanity's Future on Earth

Member of Leibniz Association

Trondheim Conferences on Biodiversity,
Trondheim, 02 July 2019

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Biodiversity in Peril:
60% Decline in Population Sizes Across Globe

Realm Living Planet Indices

As seen in the map below (figure 22), populations are in decline in all realms, but declines are especially pronounced in the three tropical realms. Here, average vertebrate abundance in 2014 was less than half of what it was in 1970. The LPI indicates that the Neotropical realm, covering South and Central America, and the Caribbean, has suffered the most dramatic decline at 89% loss compared to 1970. Nearctic and Palearctic populations are faring slightly better with declines of 23% and 31%.

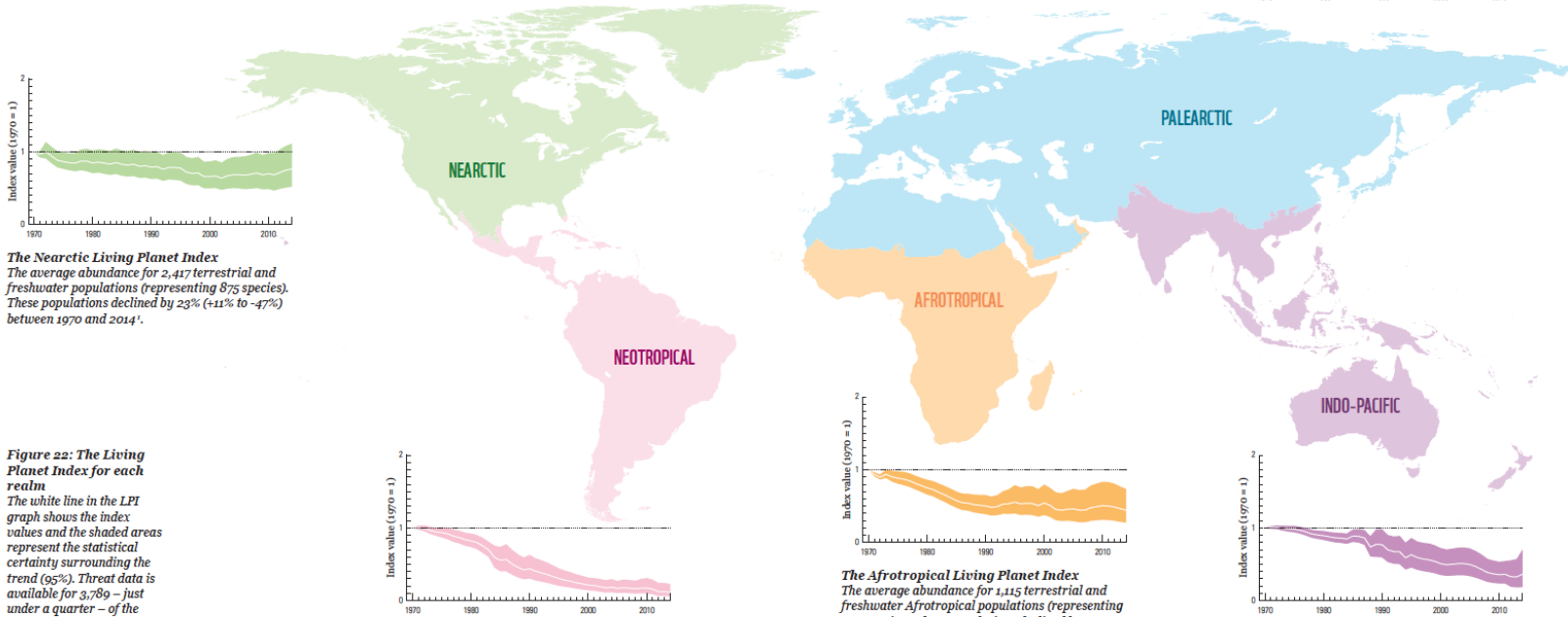


Figure 22: The Living Planet Index for each realm
The white line in the LPI graph shows the index values and the shaded areas represent the statistical certainty surrounding the trend (95%). Threat data is available for 3,789 – just under a quarter – of the populations in the global LPI[1]. This is explored in chapter 2.

The Palearctic Living Planet Index
The average abundance for 2,866 terrestrial and freshwater populations (representing 576 species). These populations declined by 31% (-6% to -50%) between 1970 and 2014[1].

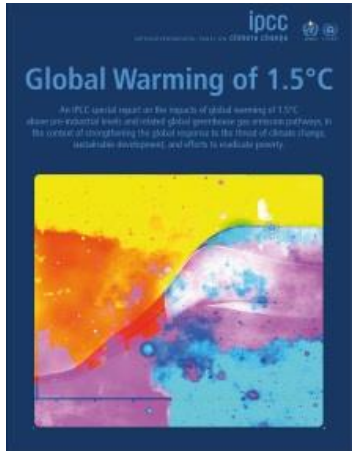
The Nearctic Living Planet Index
The average abundance for 2,417 terrestrial and freshwater populations (representing 875 species). These populations declined by 23% (+11% to -47%) between 1970 and 2014[1].

The Neotropical Living Planet Index
The average abundance for 1,040 populations (representing 689 species) in the Neotropical biogeographic realm. Vertebrate populations declined by an average of 4.8% annually between 1970 and 2014, translating to an overall decline of 89%. This represents the most dramatic change in any biogeographic realm[1].

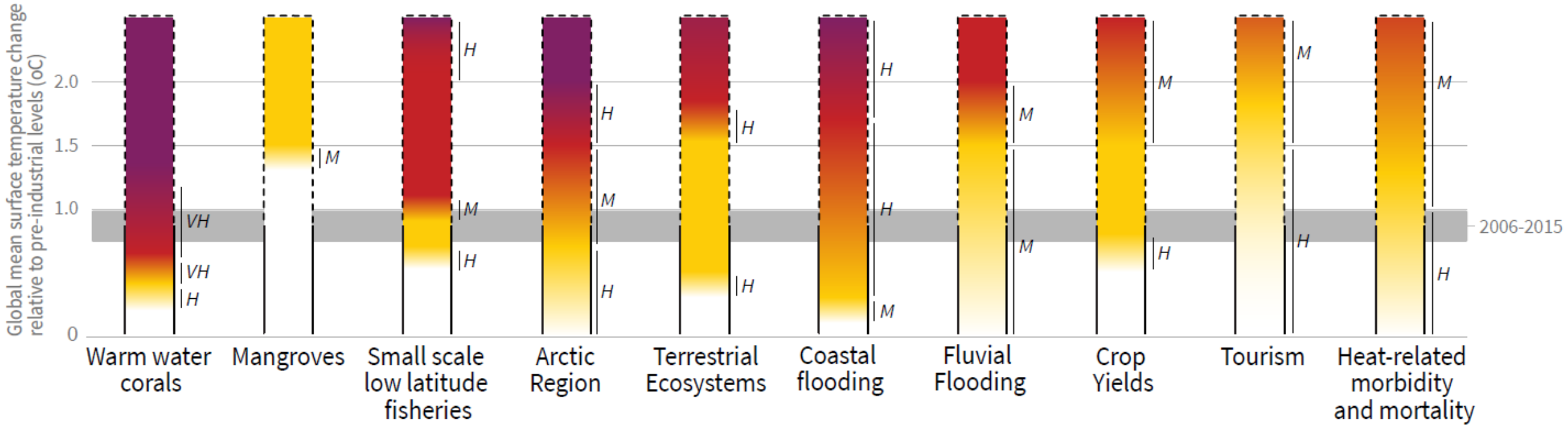
The Afrotropical Living Planet Index
The average abundance for 1,115 terrestrial and freshwater Afrotropical populations (representing 320 species). These populations declined by 56% between 1970 and 2014. The decrease was particularly steep in the 1980s[1].

The Indo-Pacific Living Planet Index
The average abundance for 1,083 terrestrial and freshwater populations (representing 488 species) in the Indo-Pacific biogeographic realm. The Indo-Pacific Index experienced the second most pronounced decline, after the Neotropical index: 64% overall between 1970 and 2014[1].

The Global Living Planet Index: Average abundance of 16,704 populations representing 4,005 species monitored across the globe declined by 60% from 1970 to 2014.



Impacts and risks for selected natural, managed and human systems



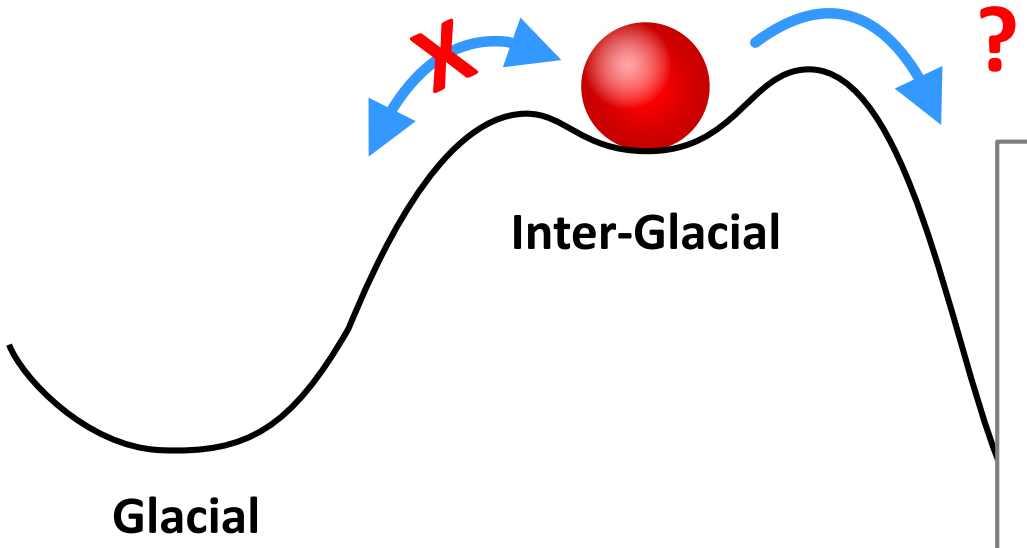
IPCC Special Report, 2018

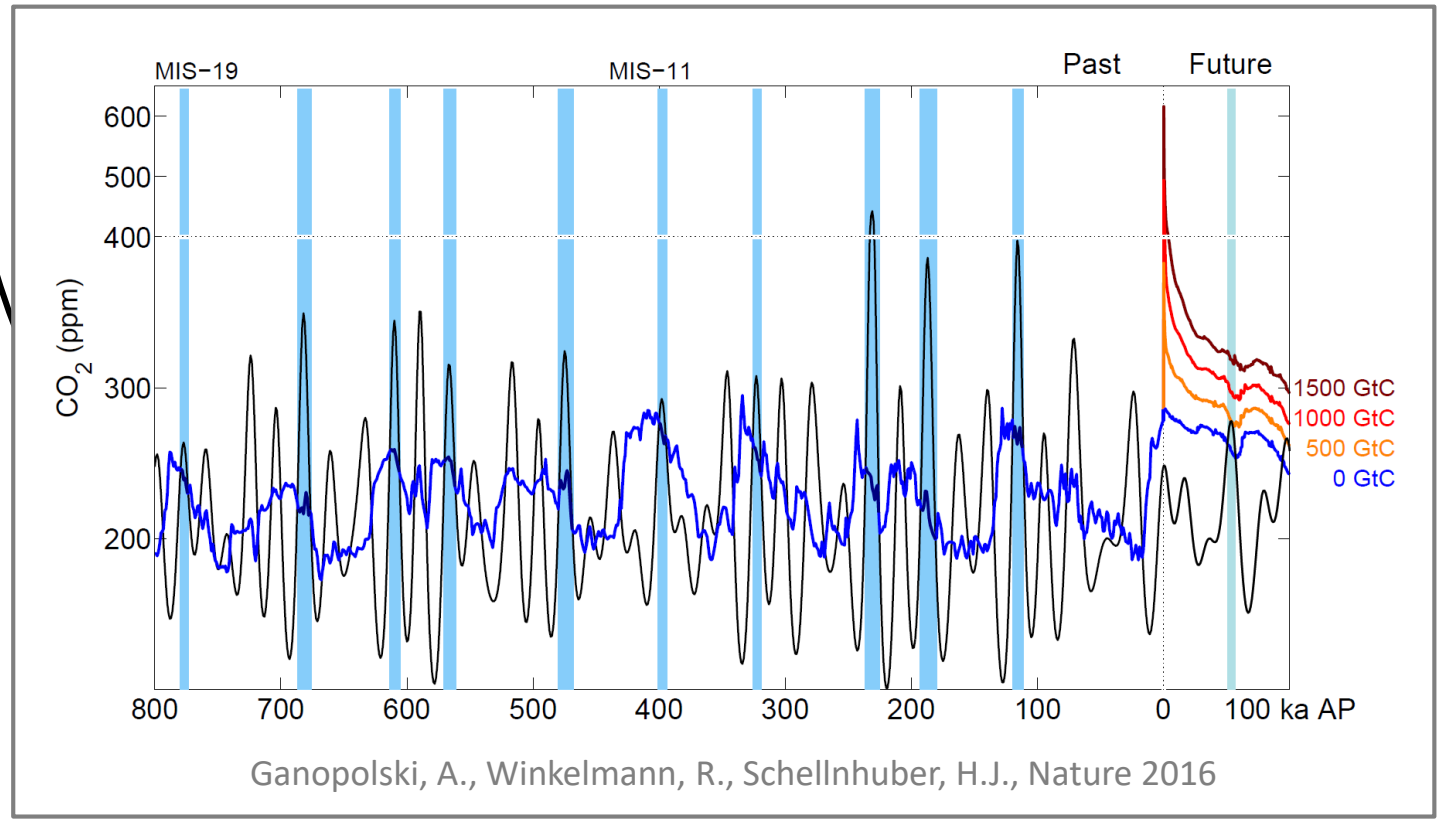
Article Will Steffen, Paul J. Crutzen and John R. McNeill

The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?

Photos: Mattias Klum

3 Potential States of the Earth System

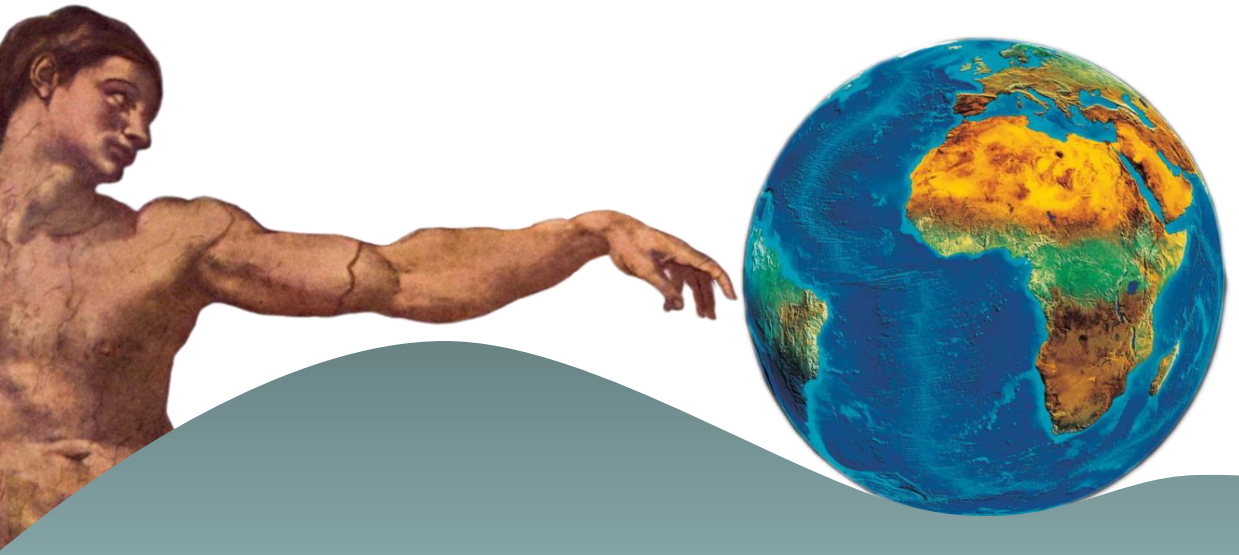




Ganopolski, A., Winkelmann, R., Schellnhuber, H.J., Nature 2016

Natural limit cycle in Pleistocene

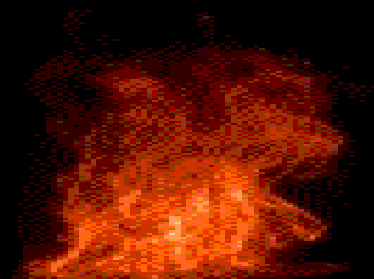
Earth Resilience



Living Biosphere –
Feedbacks and Dynamics

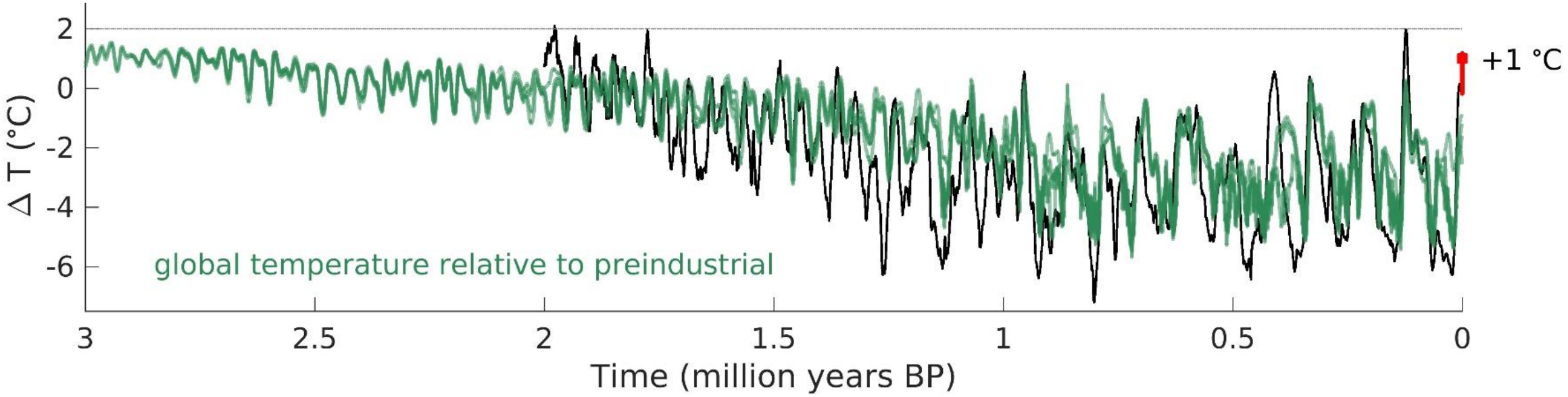
Stabilized Earth

Hothouse



Iceage

We have never exceeded 2 °C in the last Three Million Years

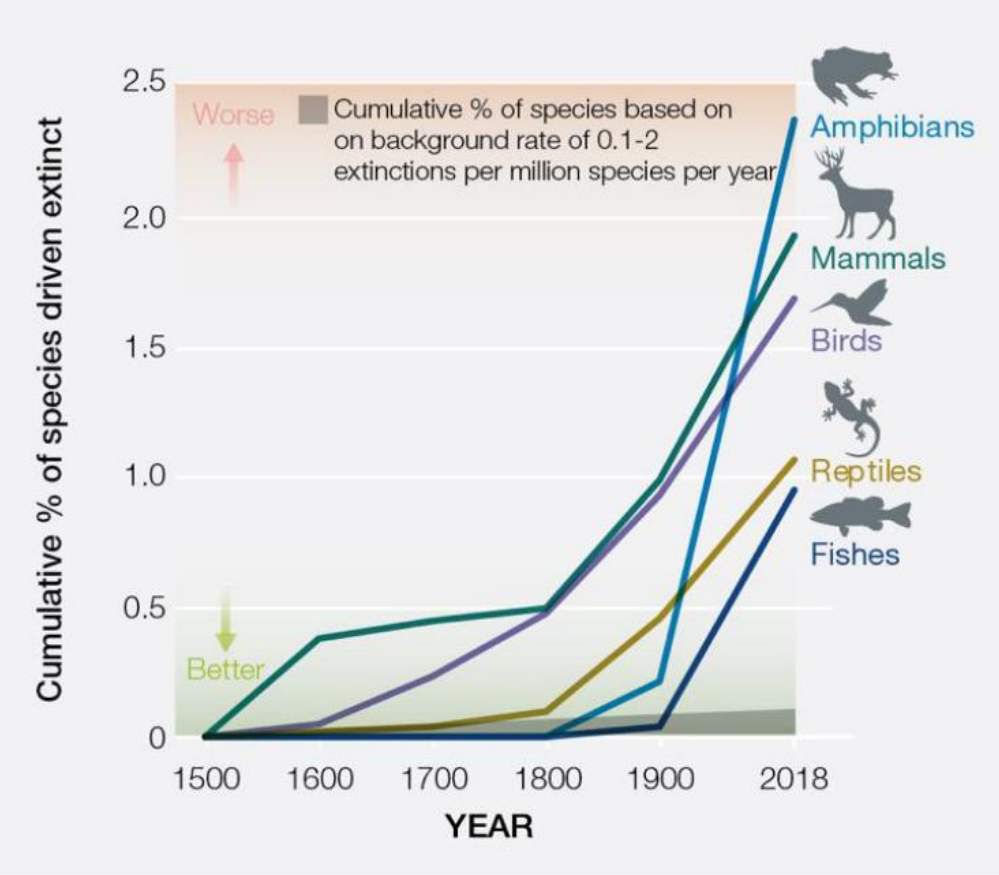


Results of model simulations: Observations shown in black, model results in colour.

Willeit et al., Science Advances 2019

Transgressing The Planetary Biosphere Integrity Boundary

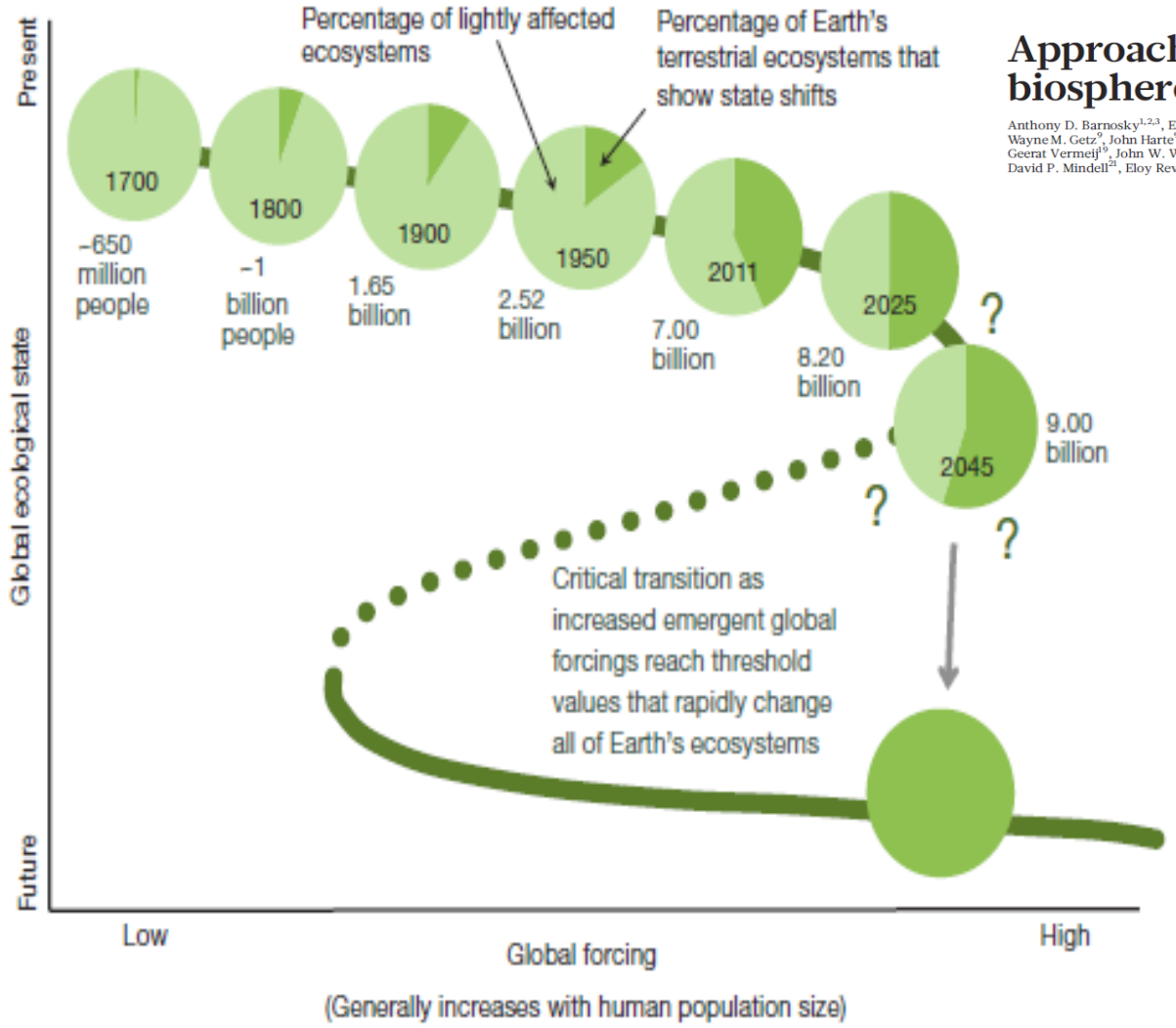
More species threatened than ever before in human history



Source: IPBES Global Assessment Report, 2019

A living biospere on a Sustainable Planet

Basis for human wellbeing



REVIEW

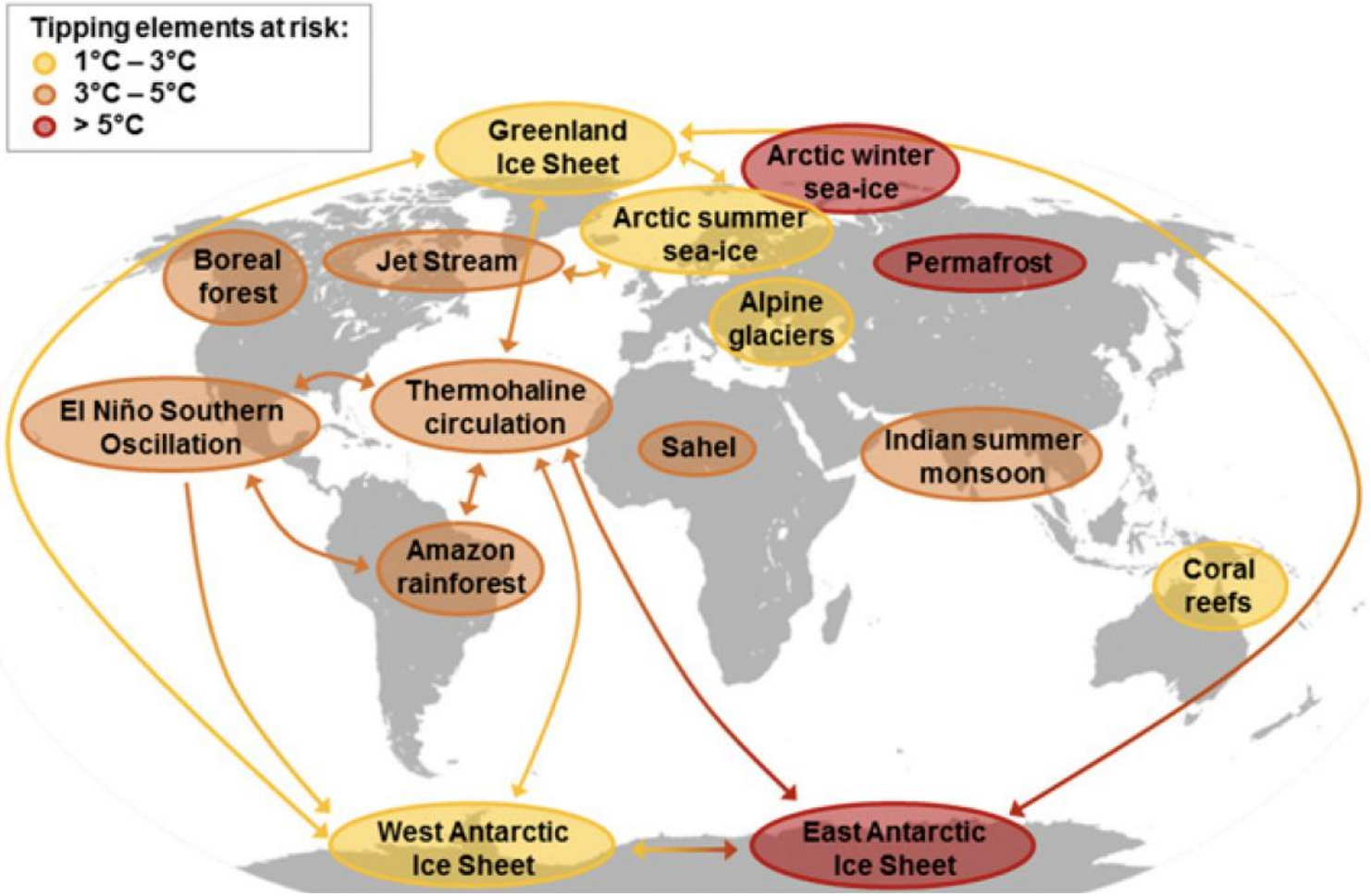
doi:10.1038/nature11018

Approaching a state shift in Earth's biosphere

Anthony D. Barnosky[1,2,3], Elizabeth A. Hadly[4], Jordi Bascompte[5], Eric L. Berlow[6], James H. Brown[7], Mikael Fortelius[8], Wayne M. Getz[9], John Harte[9,10], Alan Hastings[11], Pablo A. Marquet[12,13,14,15], Neo D. Martinez[16], Arne Mooers[17], Peter Roopnarine[18], Geerat Vermeij[19], John W. Williams[20], Rosemary Gillespie[9], Justin Kitzes[9], Charles Marshall[1,2], Nicholas Matzke[1], David P. Mindell[21], Eloy Revilla[22] & Adam B. Smith[23]

Biosphere Feedbacks on Earth Stability

A Global Map of Potential Tipping Cascades

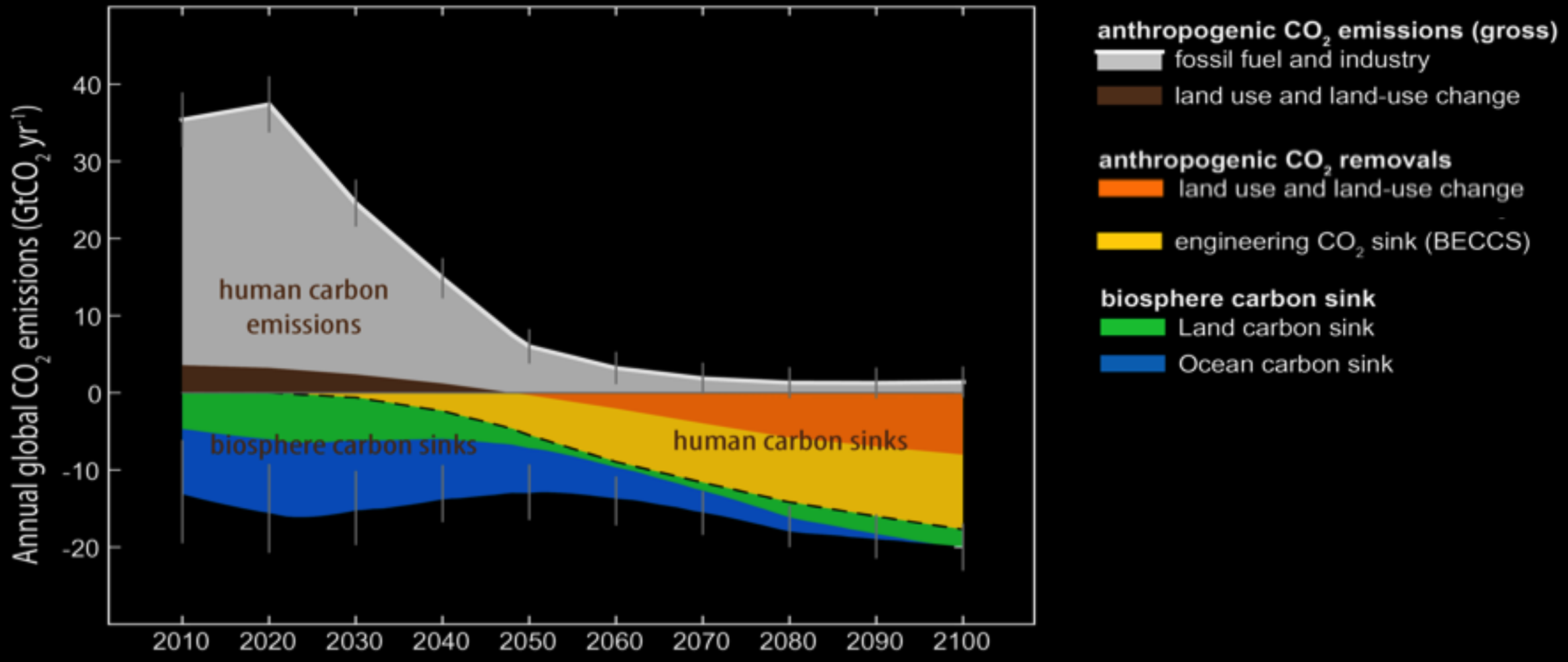


Trajectories of the Earth System in the Anthropocene

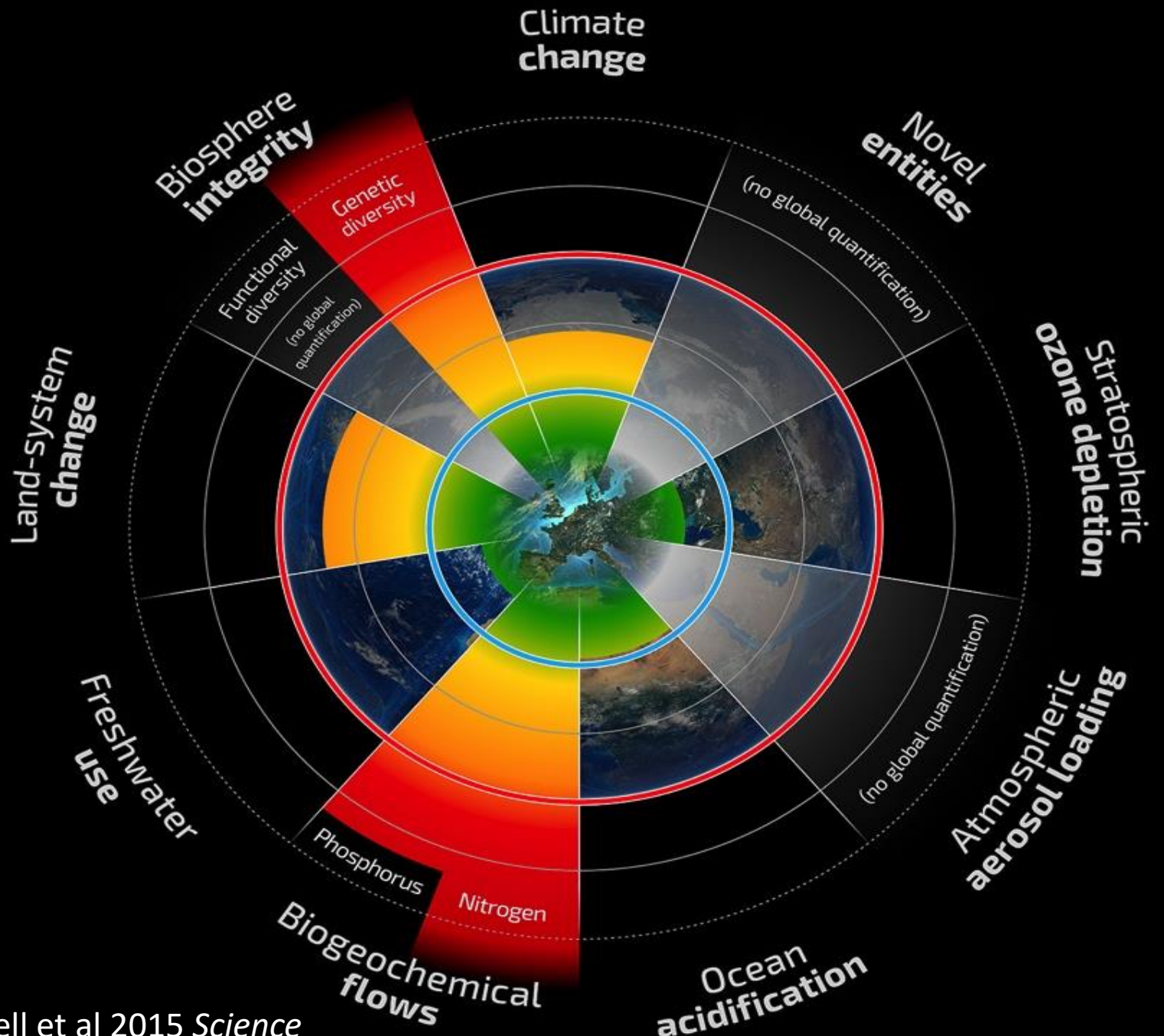
Will Steffen[a,b,1], Johan Rockström[a], Katherine Richardson[c], Timothy M. Lenton[d], Carl Folke[a,e], Diana Liverman[f], Colin P. Summerhayes[g], Anthony D. Barnosky[h], Sarah E. Cornell[a], Michel Crucifix[i,j], Jonathan F. Donges[a,k], Ingo Fetzer[a], Steven J. Lade[a,b], Marten Scheffer[l], Ricarda Winkelmann[k,m], and Hans Joachim Schellnhuber[a,k,m,1]

Edited by William C. Clark, Harvard University, Cambridge, MA, and approved July 6, 2018 (received for review June 19, 2018)

A Roadmap for Rapid Decarbonization



Rockström, Gaffney, Rogelj, Meinshausen, Nakicenovic, Schellnhuber. *Science* 24 March 2017



Steffen, Rockström, Cornell et al 2015 *Science*
Image: Globaia

Science Based Targets for the Earth System

comment

Aiming higher to bend the curve of biodiversity loss

The development of the post-2020 strategic plan for the Convention on Biological Diversity provi of opportunity to set out an ambitious plan of action to restore global biodiversity. The componer including its goal, targets and some metrics, already exist and provide a roadmap to 2050.

Georgina M. Mace, Mike Barrett, Neil D. Burgess, Sarah E. Cornell, Robin Freeman, Moni Andy Purvis

Key Elements and Innovations for the CBD's Post-2020 Biodiversity Framework: A Collaborative Discussion Piece

October 2018

Recommendations for the Post-2020 Framework

- Create a simple overarching "apex goal" that conveys the fundamental importance of nature in achieving climate resilience, sustainable development, and human well-being.
- Outline a clear logic structure for biodiversity priorities that clarifies relationships between specific targets and drives implementation of the actions needed at all levels to achieve larger objectives for the state of biodiversity.
- Ensure the targets on all levels are clear, concise and quantifiable, to clarify the actions needed and enable progress to be measured.

IUCN

POSITION PAPER

IUCN's position on review of progress and the post-2020 biodiversity framework

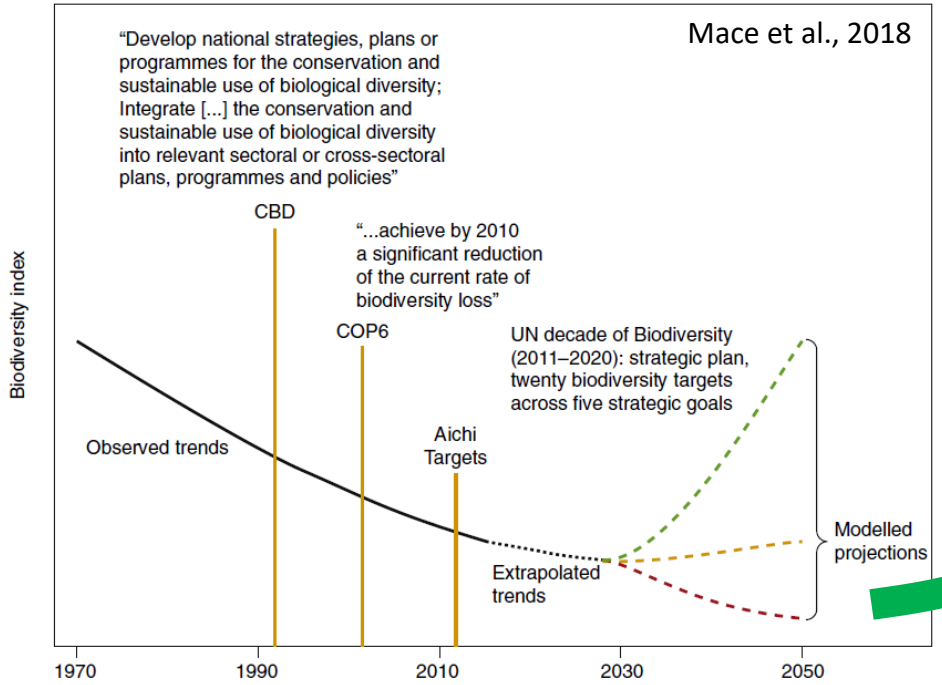
Convention on Biological Diversity
Fourteenth Meeting of the Conference of the Parties (COP14)
Sharm El-Sheikh, Egypt, 17-29 November, 2018

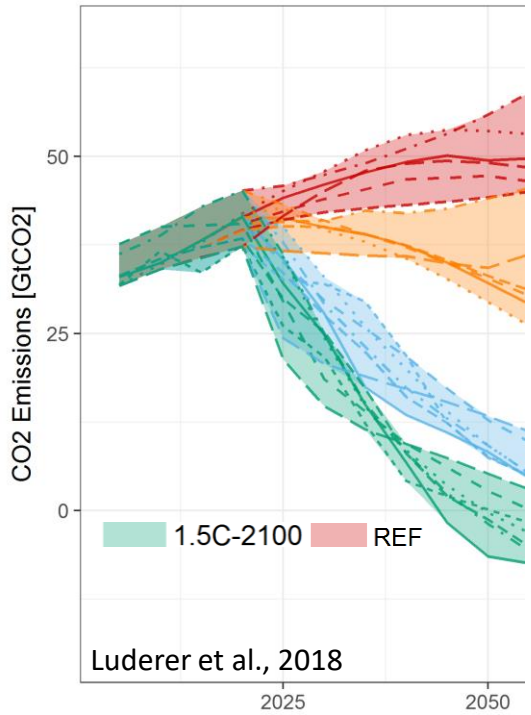
comment

Bold nature retention targets are essential for the global environment agenda

Ambitious targets for the retention — not just formal protection — of nature are urgently needed to conserve biodiversity and to maintain crucial ecosystem services for humanity.

Martine Maron, Jeremy S. Simmonds and James E. M. Watson





Biodiversity goal

Biodiversity challenge

Policy gaps

Climate challenge

Climate goal

Stable and Resilient Biosphere

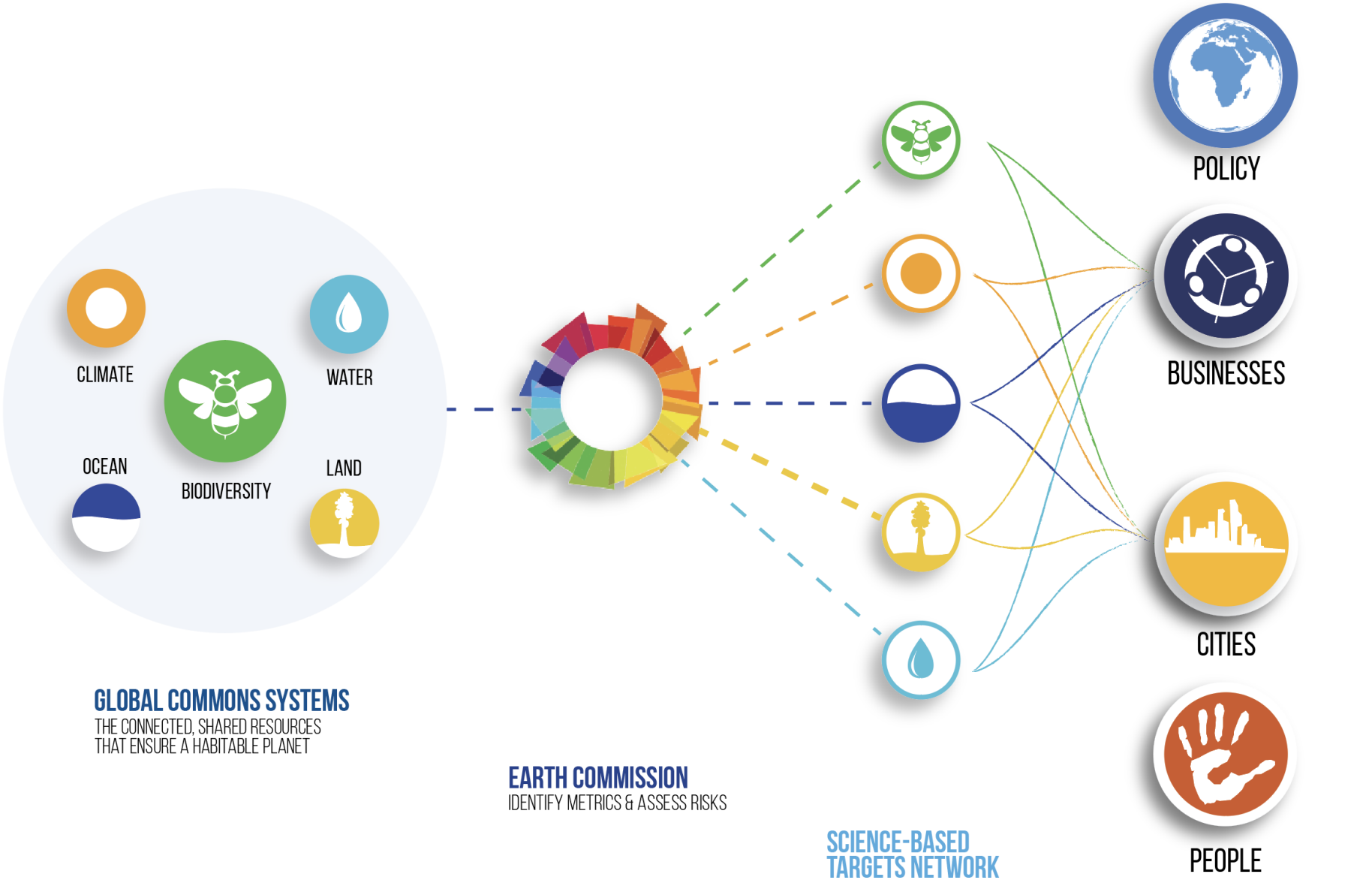
	Climate Change	Biodiversity
2020	Stay within global carbon budget < 800 $GtCO_2$	"Tackling the Extinction of Threatened Species" (CBD)
Apex Target?	**Bend the Global Curve of Emissions**	**Bend the Global Curve of Biodiversity Loss**
2030	Cut Emissions ½ 2020-2030	"Stabilize Trends in species, ecosystems, and genetic diversity" (IUCN, 2018) "Halting Biodiversity Loss" (CBD)
Apex Target?	**50 % Reductions by 2030 (40 %/1990)**	**Zero [Halt and Conserve]**
2050	Zero emissions by 2050 (± 5 $GtCO_2$)	Set of Science Based Targets as part of global biodiversity framework "Landing Lights"
Apex Target?	**Zero**	**Zero [Restoring & Recovery]**

Exponential road map for natural climate solutions

How do we realise the 37% biosphere potential by 2030?

Natural climate solutions

Bronson W. Griscom[a,b,1], Justin Adams[a], Peter W. Ellis[a], Richard A. Houghton[c], Guy Lomax[a], Daniela A. Miteva[d], William H. Schlesinger[e,1], David Shoch[f], Juha V. Siikamäki[g], Pete Smith[h], Peter Woodbury[i], Chris Zganjar[a], Allen Blackman[g], João Campari[j], Richard T. Conant[k], Christopher Delgado[l], Patricia Elias[a], Trisha Gopalakrishna[a], Marisa R. Hamsik[a], Mario Herrero[m], Joseph Kiesecker[a], Emily Landis[a], Lars Laestadius[l,n], Sara M. Leavitt[a], Susan Minnemeyer[l], Stephen Polasky[o], Peter Potapov[p], Francis E. Putz[q], Jonathan Sanderman[c], Marcel Silvius[r], Eva Wollenberg[s], and Joseph Fargione[a]



GLOBAL COMMONS SYSTEMS

THE CONNECTED, SHARED RESOURCES
THAT ENSURE A HABITABLE PLANET

EARTH COMMISSION

IDENTIFY METRICS & ASSESS RISKS

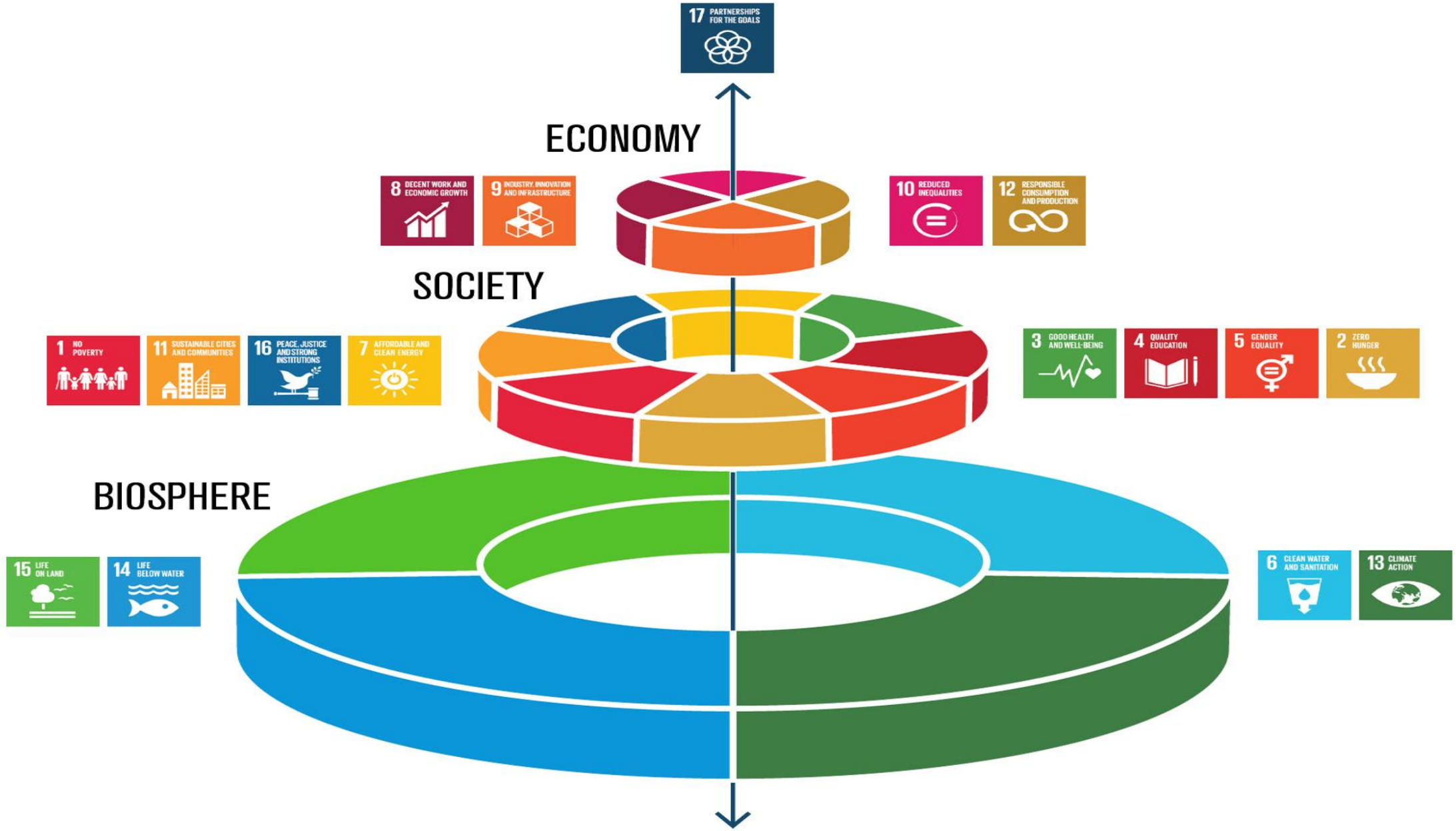
SCIENCE-BASED TARGETS NETWORK

TRANSLATE, DEVELOP METHODS,
CREATE DATA ARCHITECTURE,
PROMOTE, ENGAGE, & MOBILIZE

SYSTEMS ACTORS

SET & ADOPT TARGETS, REDESIGN
STRATEGY, CHANGE OPERATIONS &
ACTIVITIES

SUSTAINABLE DEVELOPMENT GOALS


17 PARTNERSHIPS FOR THE GOALS
ECONOMY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
SOCIETY
1 NO POVERTY
11 SUSTAINABLE CITIES AND COMMUNITIES
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
7 AFFORDABLE AND CLEAN ENERGY
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
2 ZERO HUNGER
BIOSPHERE
15 LIFE ON LAND
14 LIFE BELOW WATER
6 CLEAN WATER AND SANITATION
13 CLIMATE ACTION

Earth system STABILITY

BIODIVERSITY

ECOSYSTEM FUNCTIONS

GLOBAL COMMONS SYSTEMS

ECOSYSTEM SERVICES

HUMAN WELLBEING & EQUITY

Introducing a new definition of Sustainable Development

Prosperity and Equity within Stable and Resilient Earth System

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Thank You!

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