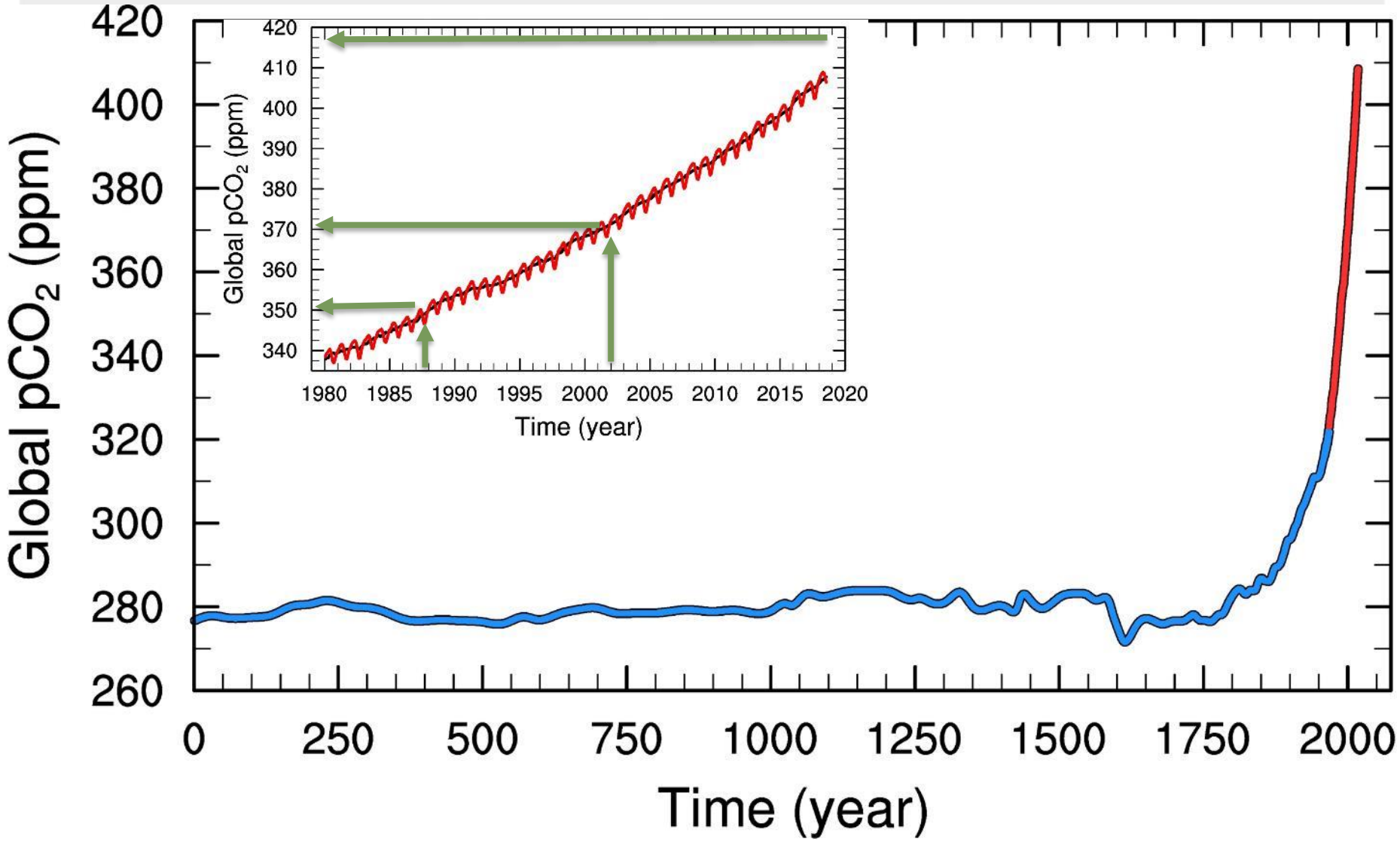
Må vi ofre naturen for å berge klimaet?

Vigdis Vandvik

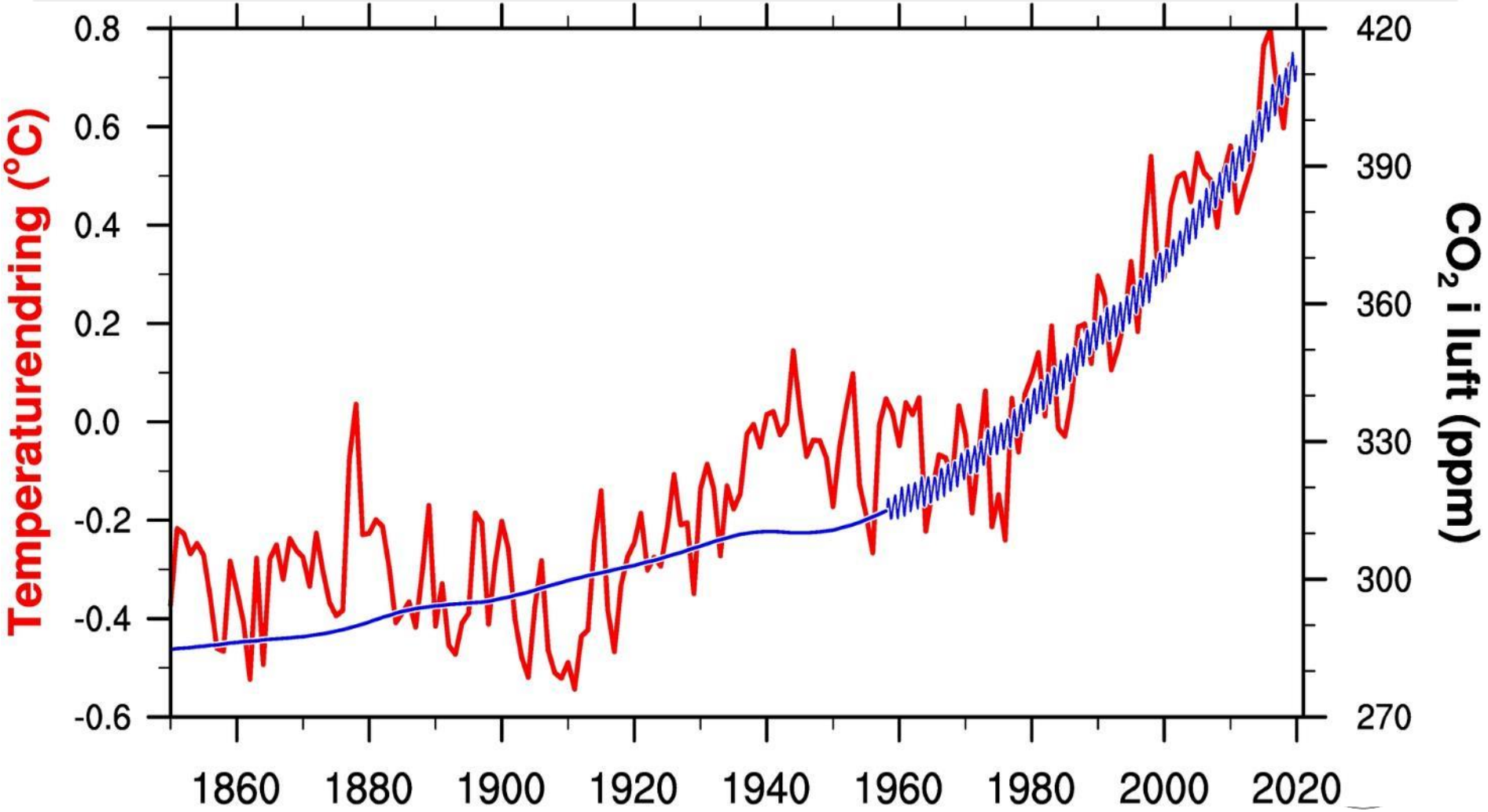
UNIVERSITETET I BERGEN

CO_2 i atmosfæren *eksploderer*



Helge Drange, Bjerknessenteret, UIB

Økt CO_2 endrer klimaet



Helge Drange, Bjerknessenteret, UIB

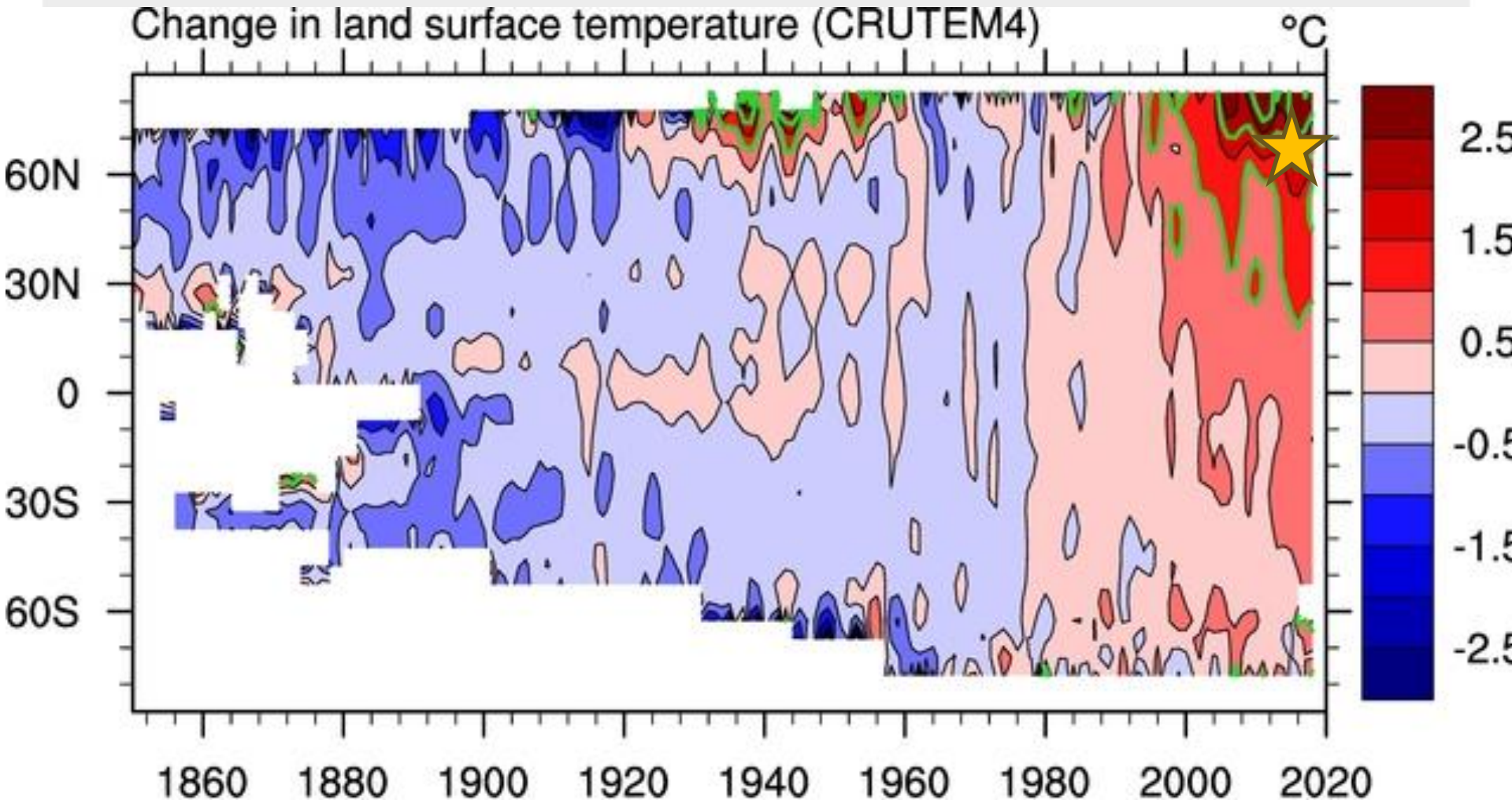
Eunice N. Foote (1819-1888)

"“*The receiver containing this gas became itself much heated—very sensibly more so than the other—and on being removed [from the Sun], it was many times as long in cooling*.” Looking to the history of the Earth, Foote theorized that "*An atmosphere of that gas would give to our earth a high temperature; and if, as some suppose, at one period of its history, the air had mixed with it a larger proportion than at present, an increased temperature from its own action, as well as from increased weight, must have necessarily resulted*."

he question was introduced by Wm. Partridge, of Binghamton, who took the position, that density of the atmosphere, and not the angularity of the sun's rays, was the principal reason why it was warmer in valleys than on the tops of mountains. His views were opposed by other correspondents, but none of them supported their opinions with practical experiments to decide the question; this we are happy to say has been done by a lady. A paper was read before the late meeting of the Scientific Association, by Prof. Henry for Mrs. Eunice Foot, detailing her experiments to determine the effects of the sun's rays on different gases. These were made with an air pump and two glass receivers of the same size—four inches in diameter, and thirty in length. The air was exhausted from one and condensed in the other, and they were both placed in the sun light, side by side, with a thermometer in each. In a short period of time, the temperature in the receiver containing the condensed air, rose thirty degrees higher than the other; thus proving conclusively that the greater density of air on low levels is at least one cause of greater heat in valleys than on mountains. Experiments were also tried with moist air, and its temperature was elevated above dry air. Hydrogen gas was placed in one receiver and oxygen in the other, when the temperature of the former rose to 104°, but the latter to 106° Fah.; while, in carbonic acid—a more dense gas than either—it rose to 126°. It is believed and taught by geologists that during the period preceding the carboniferous era,—when the coal bed materials were forming—that the atmosphere of the earth contained immense quantities of carbonic acid, and that there was a very elevated temperature of atmosphere in existence, in comparison with that of the present day. Those who believe that this earth was once a fiery ball, attribute this ancient great atmospheric heat to the elevated temperature of the earth; but Mrs. Foot's experiments attribute it to a more rational cause, and leave the Plutonists but a small foundation to stand upon for their theory.

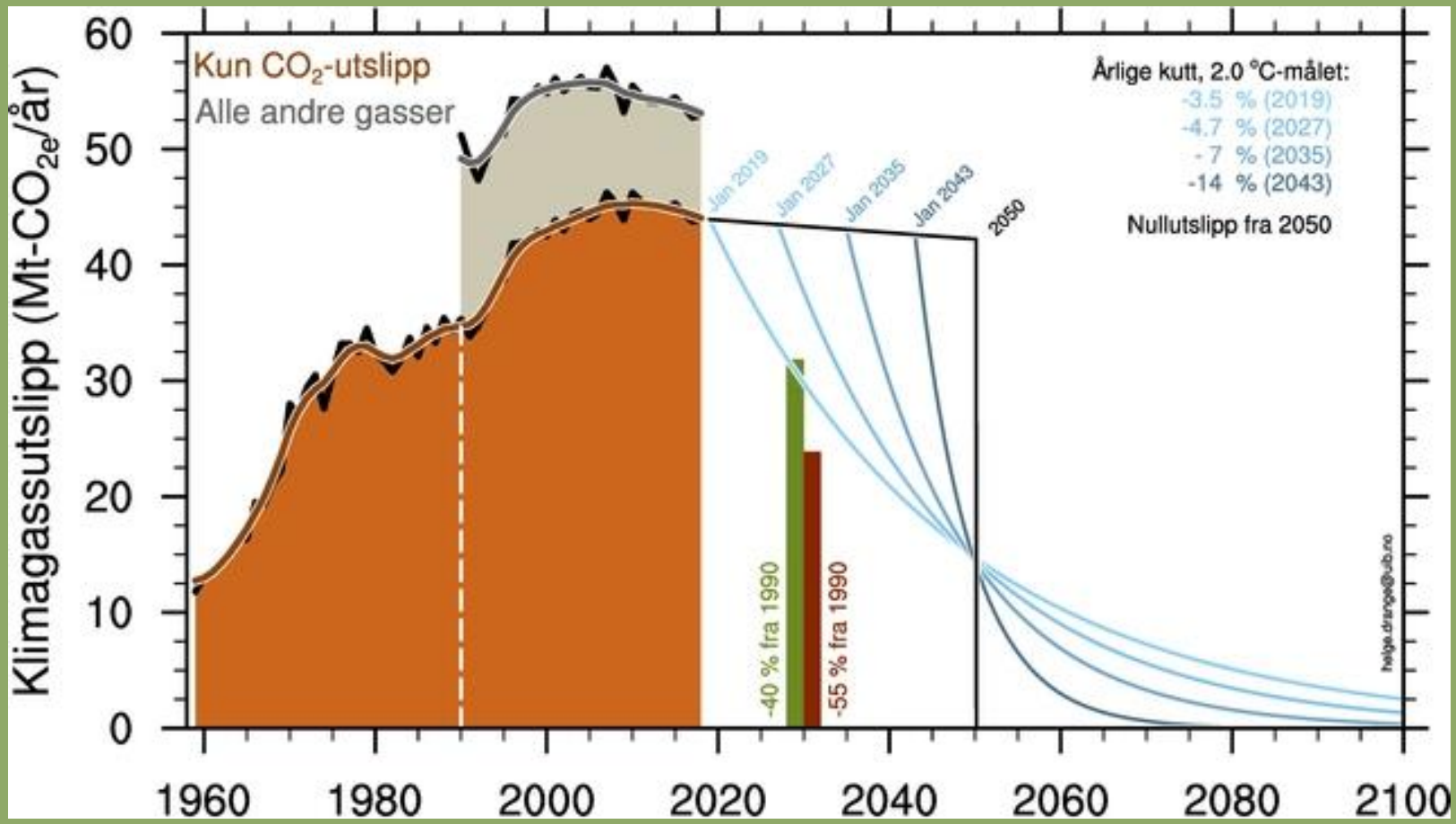
(Scientific American, 1856)

Klimaendringene *varierer*



Helge Drange, Bjerknessenteret, UIB

Vi må snu om på energisystemet vårt.



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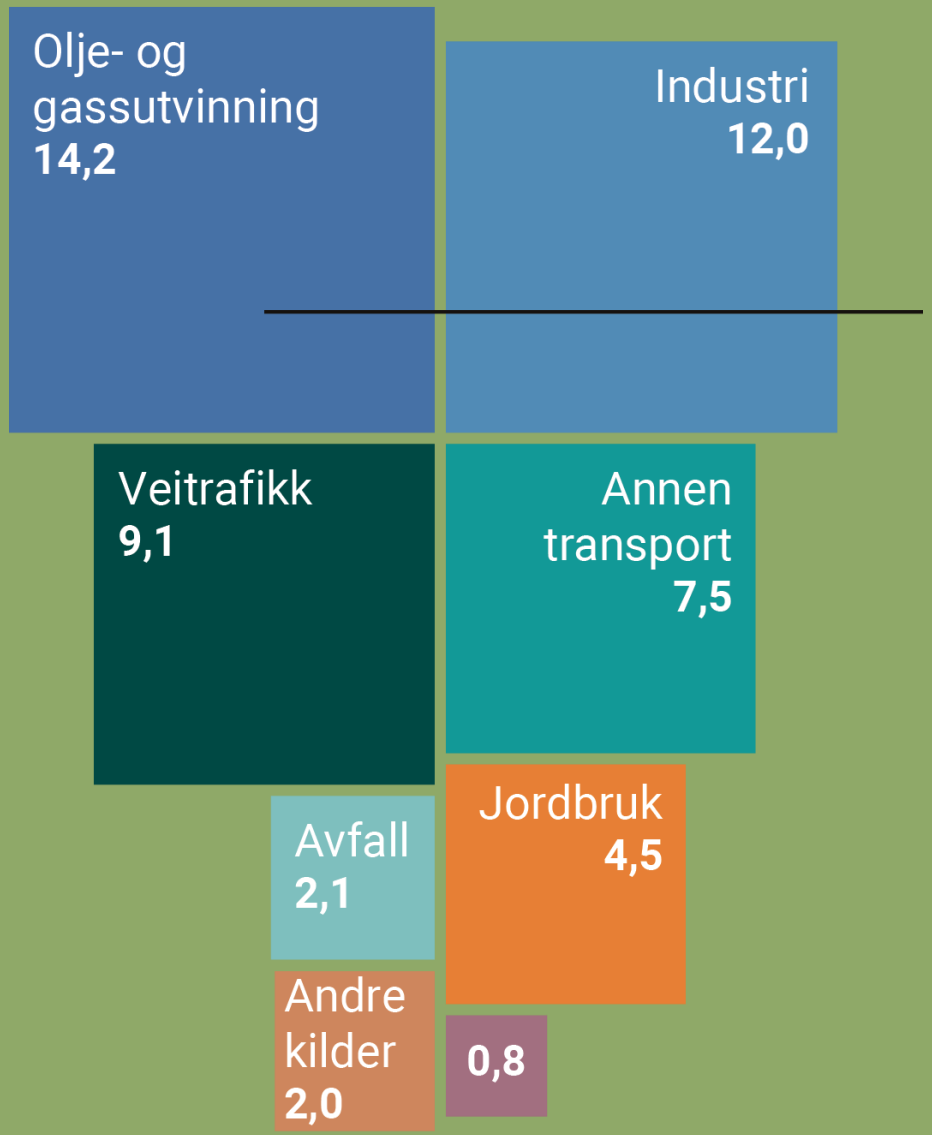
Norges totale klimagassutslipp



Klima og miljødirektoratet 2018

Vi må gjøre noe.

Mye.

Nå!

Natur:
En luksus vi ikke lenger har råd til?

Bør vi ofre naturmangfoldet for å berge klimaet?

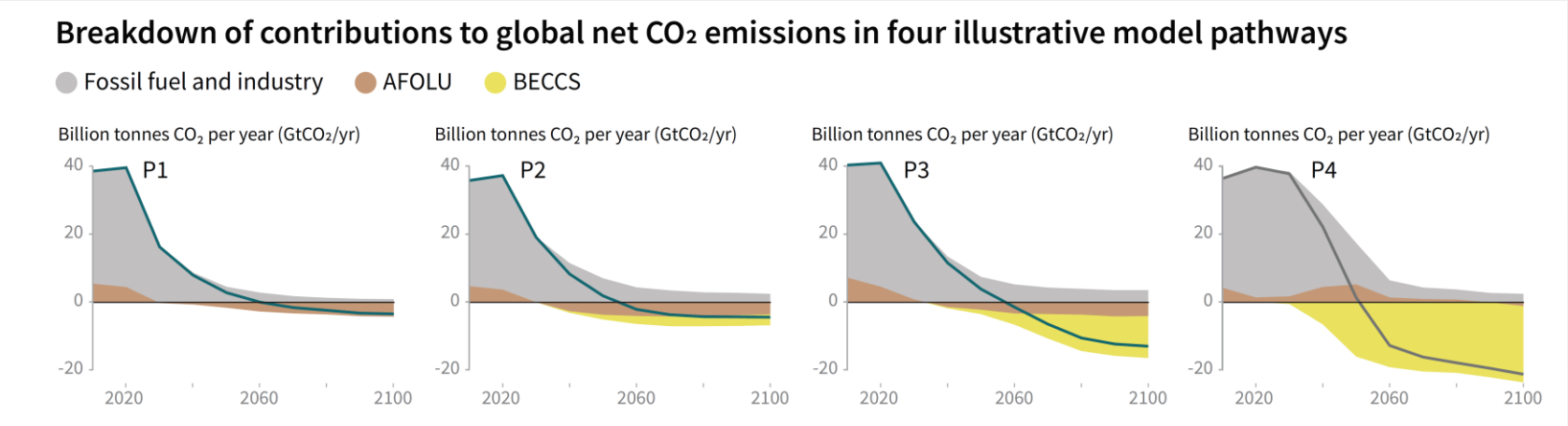
Nei.

Det kommer ikke til å funke.

Dessuten vil det bety slutten for oss.

Det enkle svaret: Det går ikke!

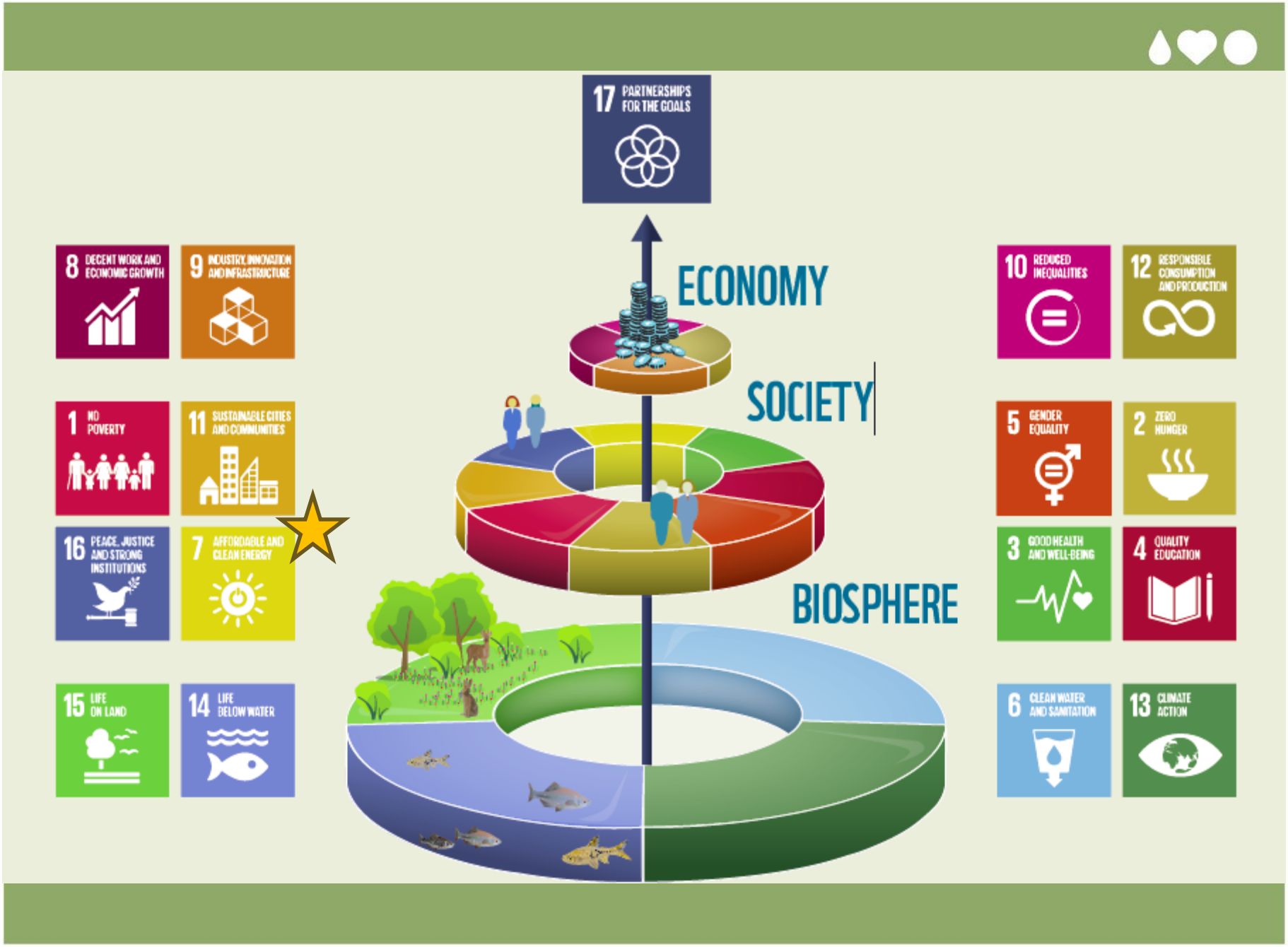
**Alle* IPCC 1.5°C scenariene avhenger av naturen..*



- Mellom 4 millioner km^2 *reduksjon* og 2.5 million km^2 *økning* i landbruksareal til mat og fór
- 0.5–11 millioner km^2 *reduksjon* i beiteland
- 0–6 millioner km^2 *økning* i areal til bioenergi
- Mellom 2 mill km^2 *reduksjon* og 9.5 mill km^2 *økning* i skogareal

…"profound challenges for sustainable management of the various demands on land for human settlements, food, livestock feed, fibre, bioenergy, carbon storage, biodiversity and other ES"…

IPCC


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

Plant en milliard trær – Quick fix?

How could trees save the planet?

Science

TECHNICAL COMMENTS

Cite as: P. Friedlingstein *et al.*, *Science* 10.1126/science.aay8060 (2019).

Comment on "The global tree restoration potential"

Pierre Friedlingstein[1]*, Myles Allen[2], Josep G. Canadell[3], Glen P. Peters[4], Sonia I. Seneviratne[5]

[1]College of Engineering, Mathematics and Physical Sciences, University of Exeter, Exeter EX4 4QE, UK. [2]Department of Physics, University of Oxford, Oxford OX1 3PJ, UK. [3]Global Carbon Project, CSIRO Oceans and Atmosphere, Canberra, ACT 2601, Australia. [4]CICERO Center for International Climate Research, Oslo 0349, Norway. [5]Institute for Atmospheric and Climate Science, ETH Zurich, 8092 Zurich, Switzerland.

*Corresponding author. Email: p.friedlingstein@exeter.ac.uk

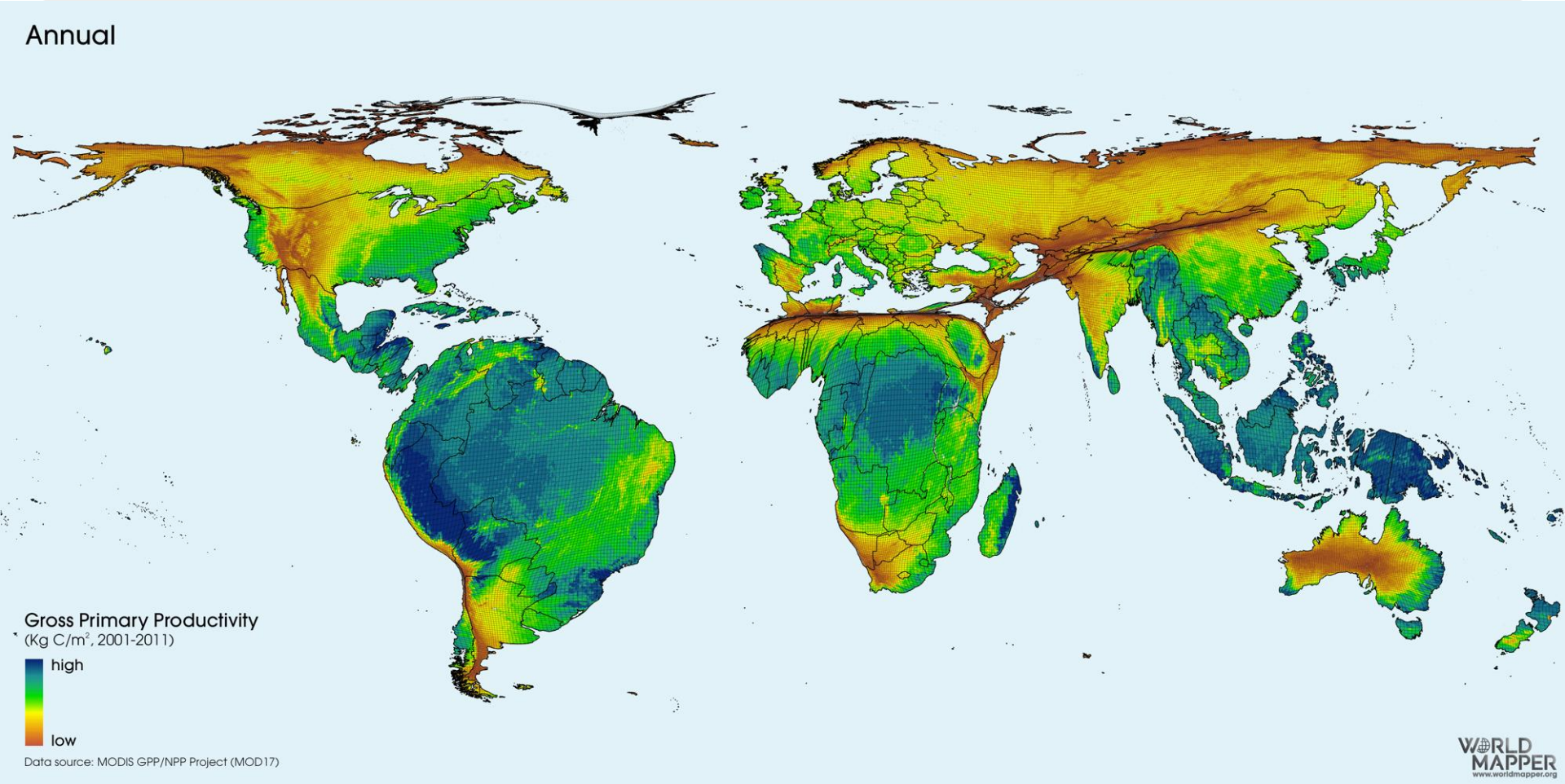
Bastin *et al.* (Reports, 5 July 2019, p. 76) claim that global tree restoration is the most effective climate change solution to date, with a reported carbon storage potential of 205 gigatonnes of carbon. However, this estimate and its implications for climate mitigation are inconsistent with the dynamics of the global carbon cycle and its response to anthropogenic carbon dioxide emissions.

Do

CROWTHER LAB

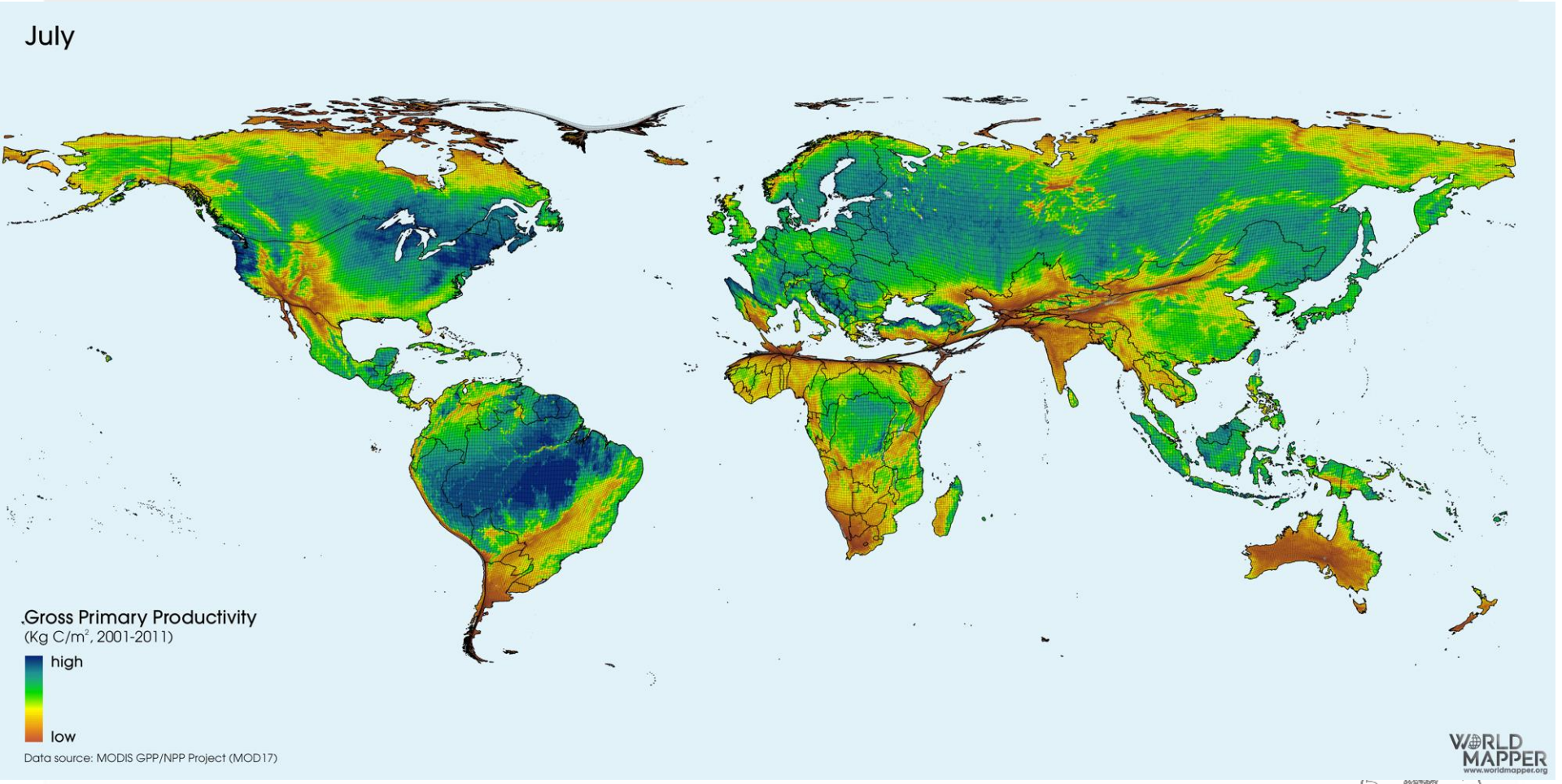
#TreePotential

Fotosyntesen – naturens mirakel!



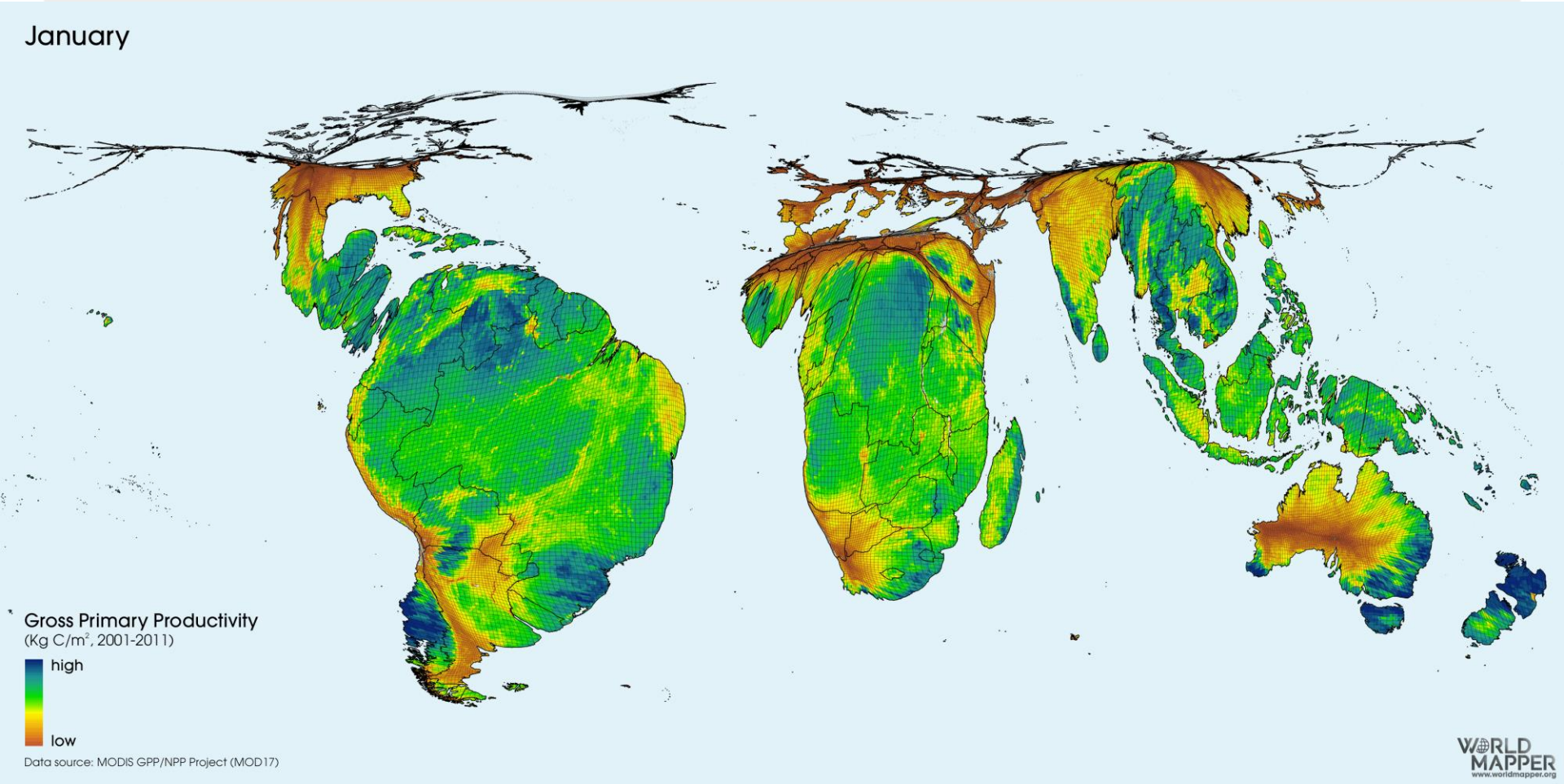
Yadvinder Mahli m fl

Fotosyntesen – naturens mirakel!



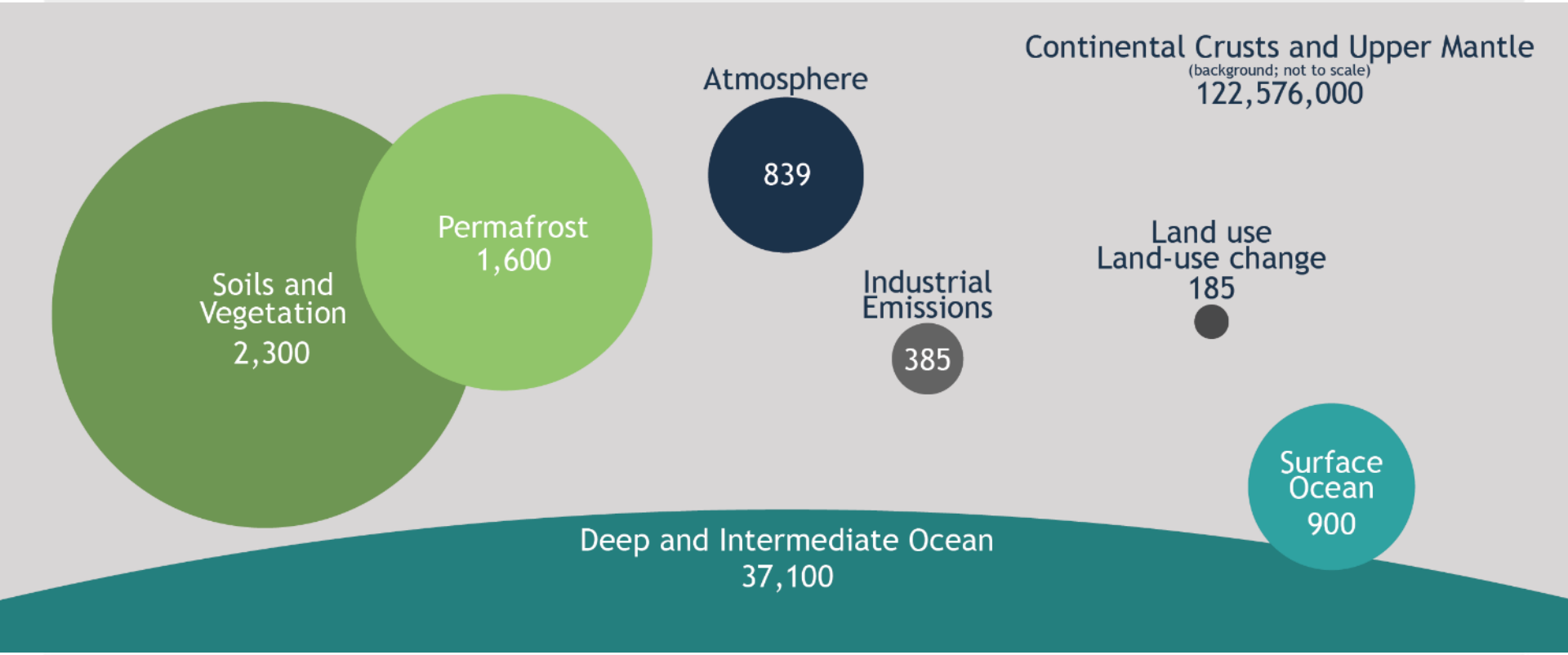
Yadvinder Mahli m fl

Fotosyntesen – naturens mirakel!



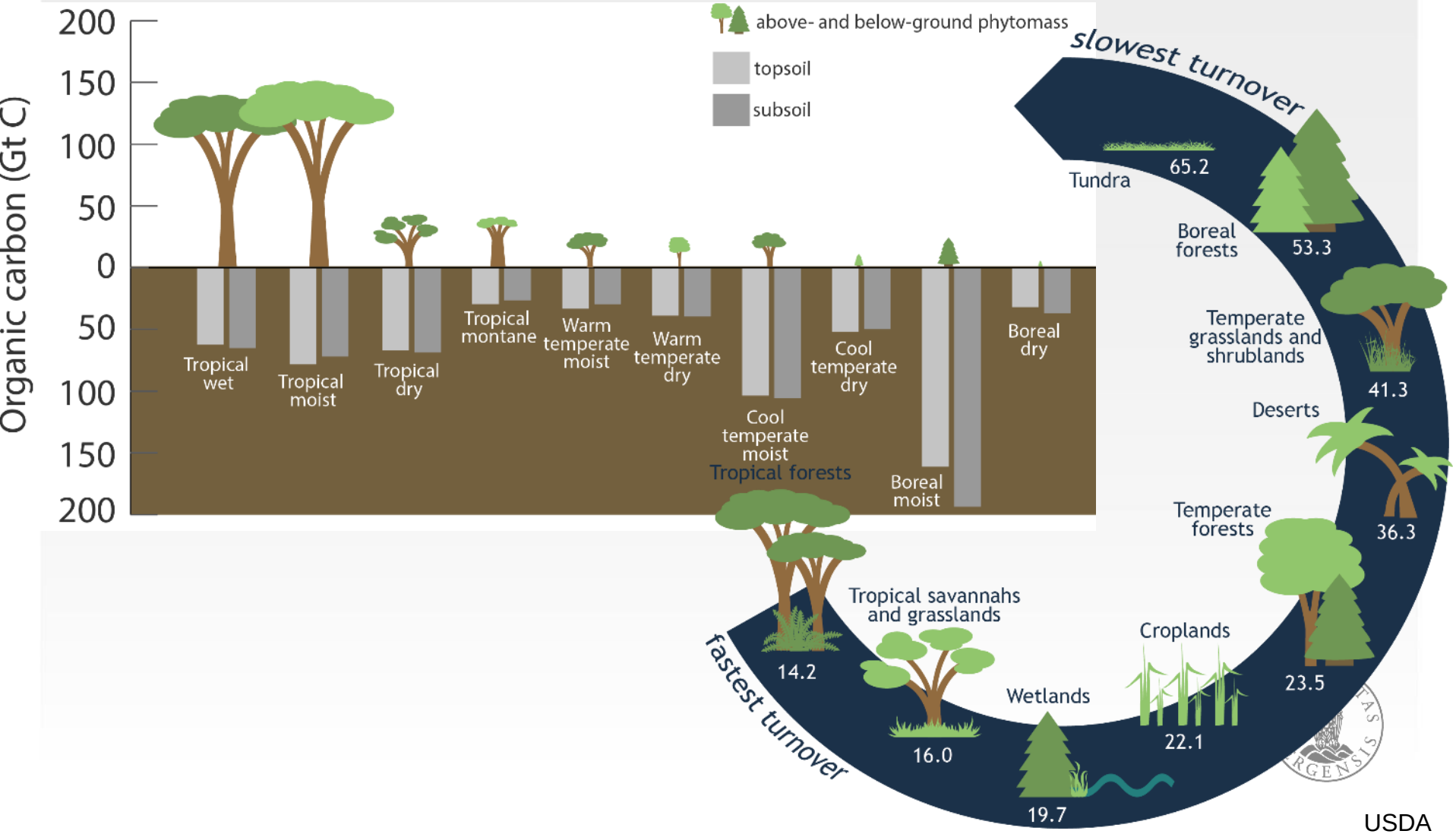
Yadvinder Mahli m fl

La oss snakke om karbon….



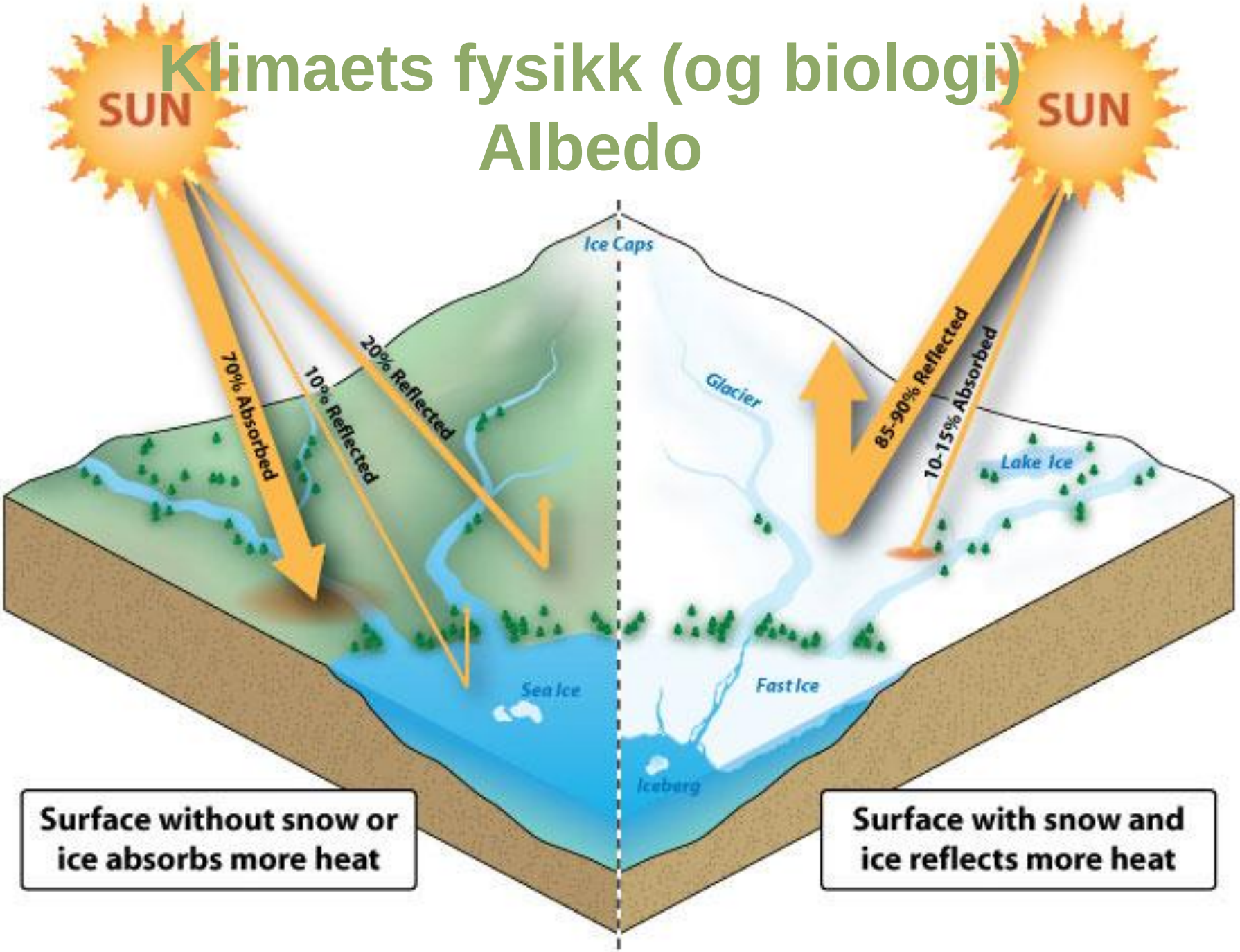
USDA

Klimaets kjemi (og biologi)
Karbonbinding og karbon lagring



USDA

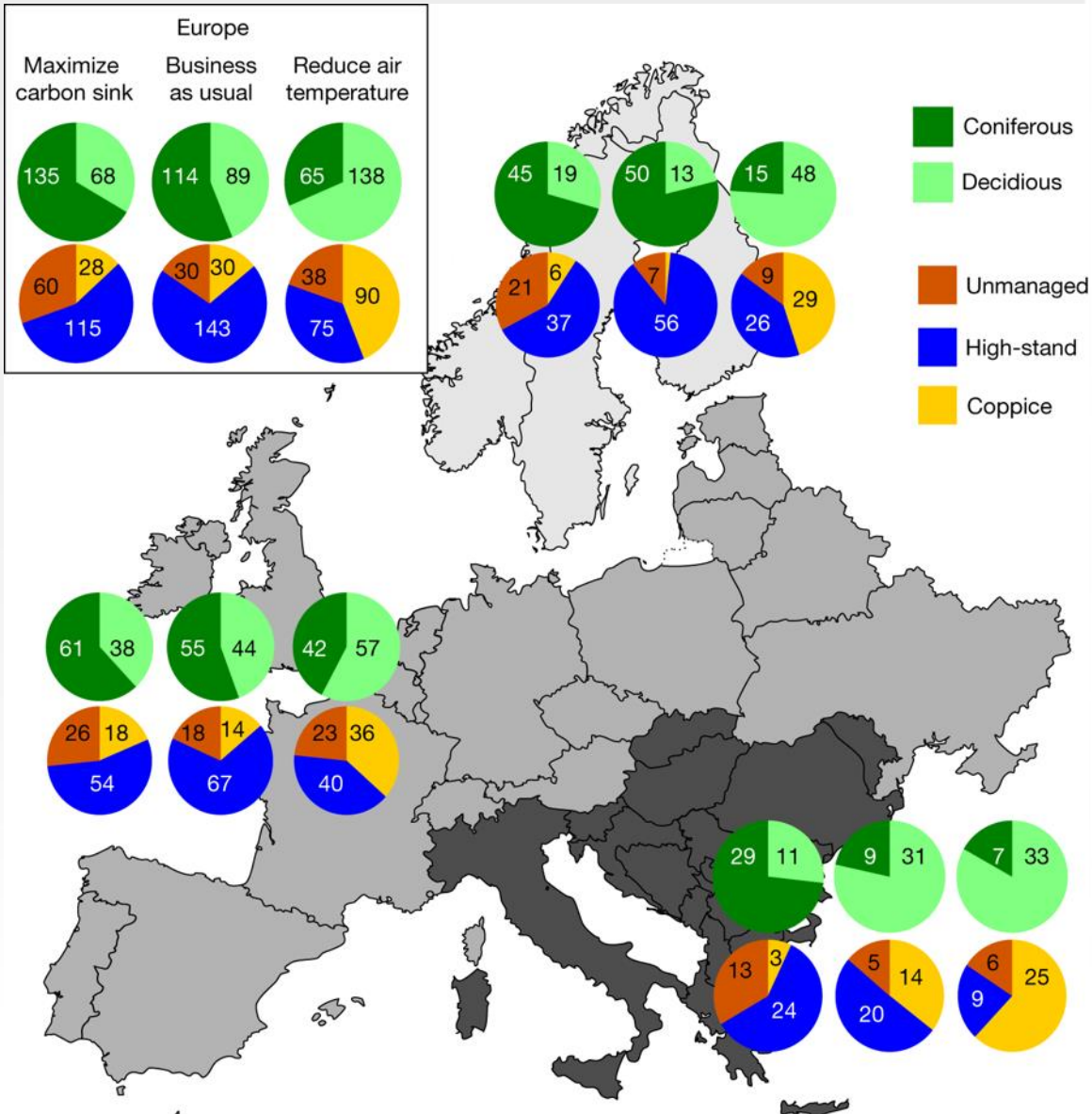
Klimaets fysikk (og biologi)
Albedo



Fikse klimaet med mer skog?

«**Europe should not rely on forest management to mitigate climate change.**

The modest climate effects from changes in forest management imply, however, that [] the forests could be adapted to climate change with neither positive nor negative climate effects.”



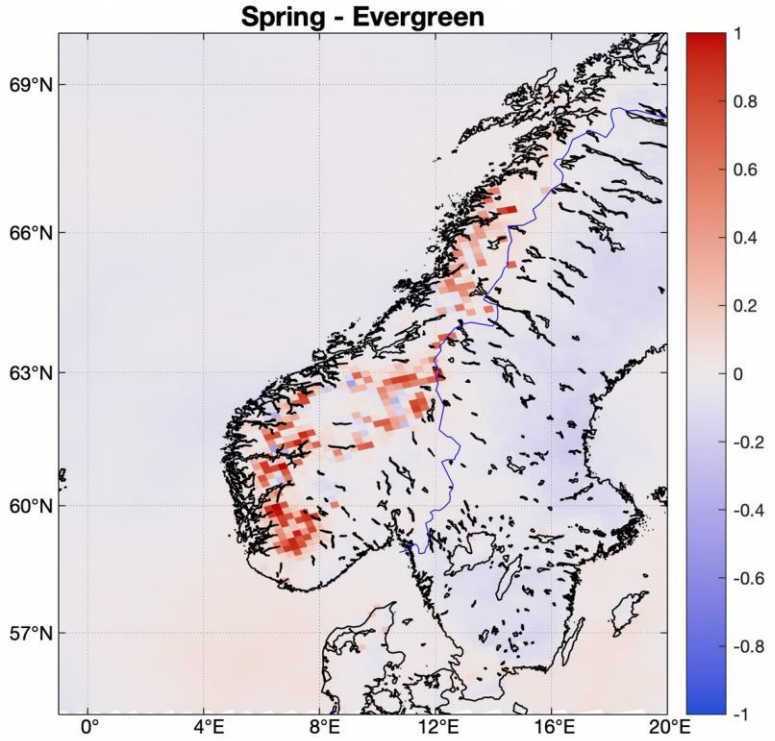
Luyssaert et al Nature 2018

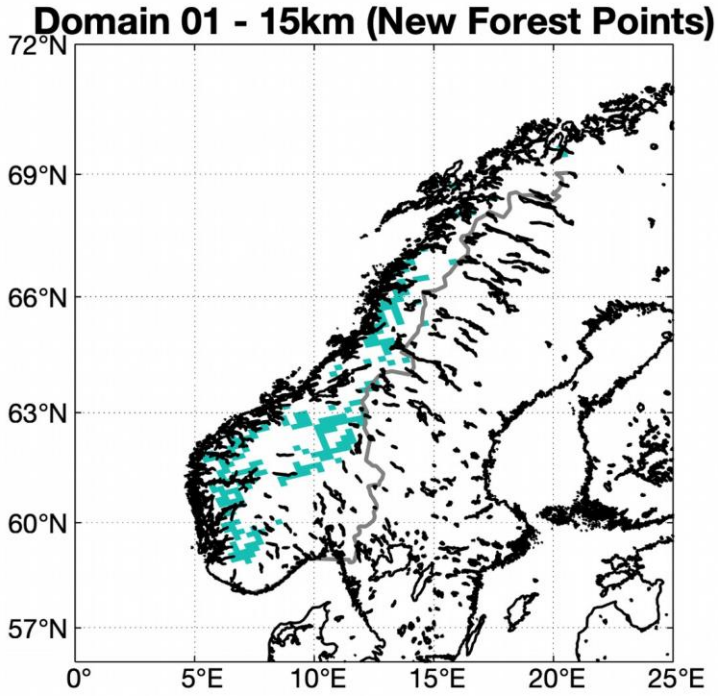
Treplanting i Norge - klimaeffekter

I en variabel verden må tiltakene også variere…

Regional Climate Modelling

Model simulations of afforestation scenario: spring air T increase





Blue areas indicate evergreen forest plantation

Mooney et al. Bjerknessenteret

Og det er mer: nye risiki

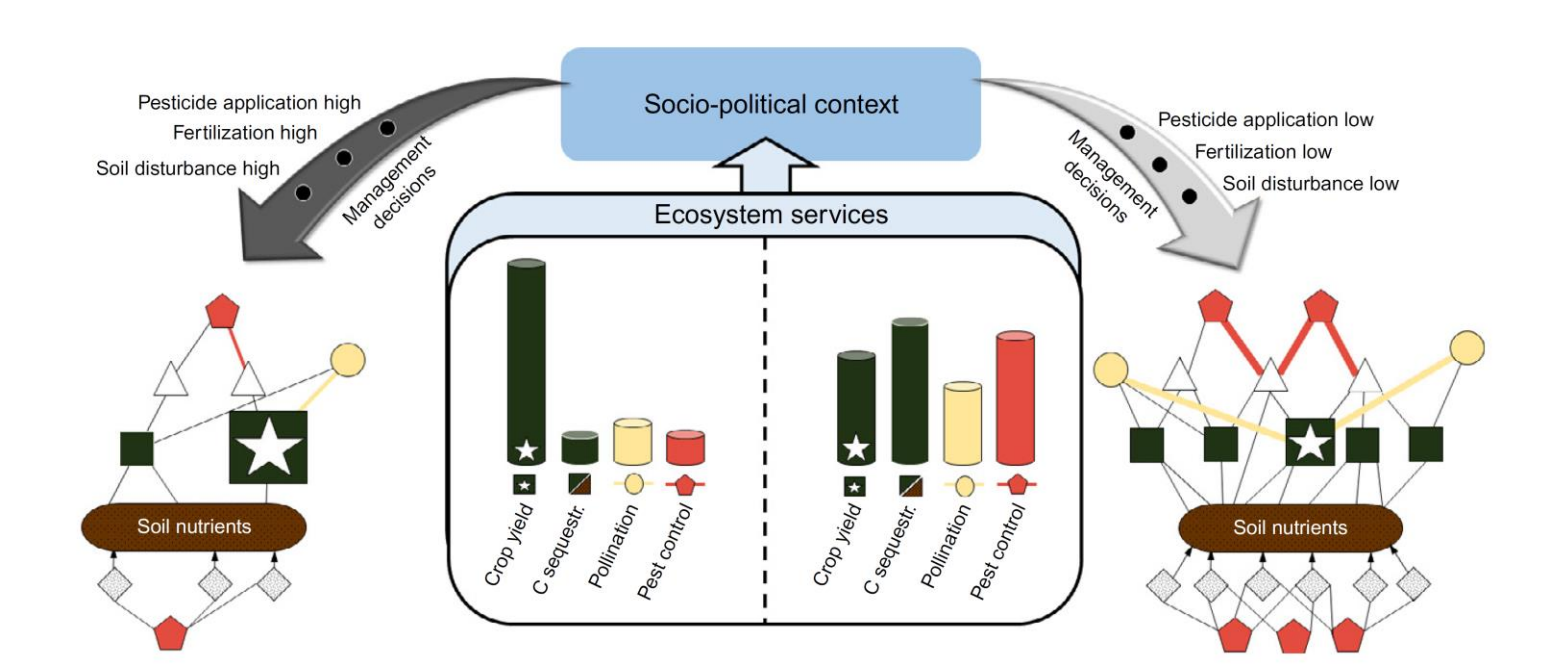
2018 – at travel år for frivillig brannvern

- 93 721 timer; 6 841 personer
- Totalkostnad 26.7 mill NOK
- Slokket branner *hver dag* i juli

(Data fra Sivilforsvaret)

vg.no

Økende problemer, behov, risiki; vi trenger *multifunksjonelle* landskap

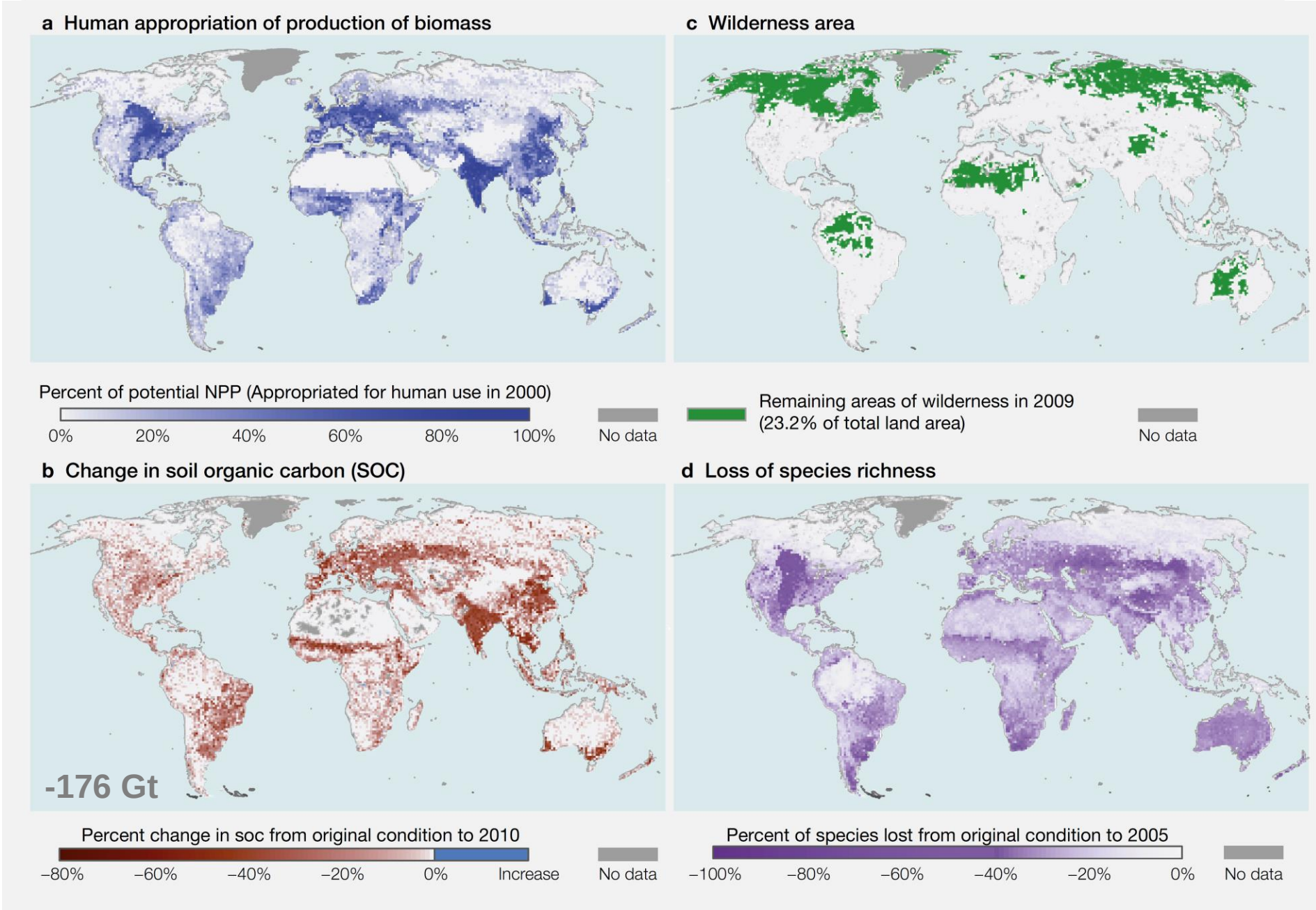


https://doi.org/10.1016/bs.aecr.2015.09.001


NutNet

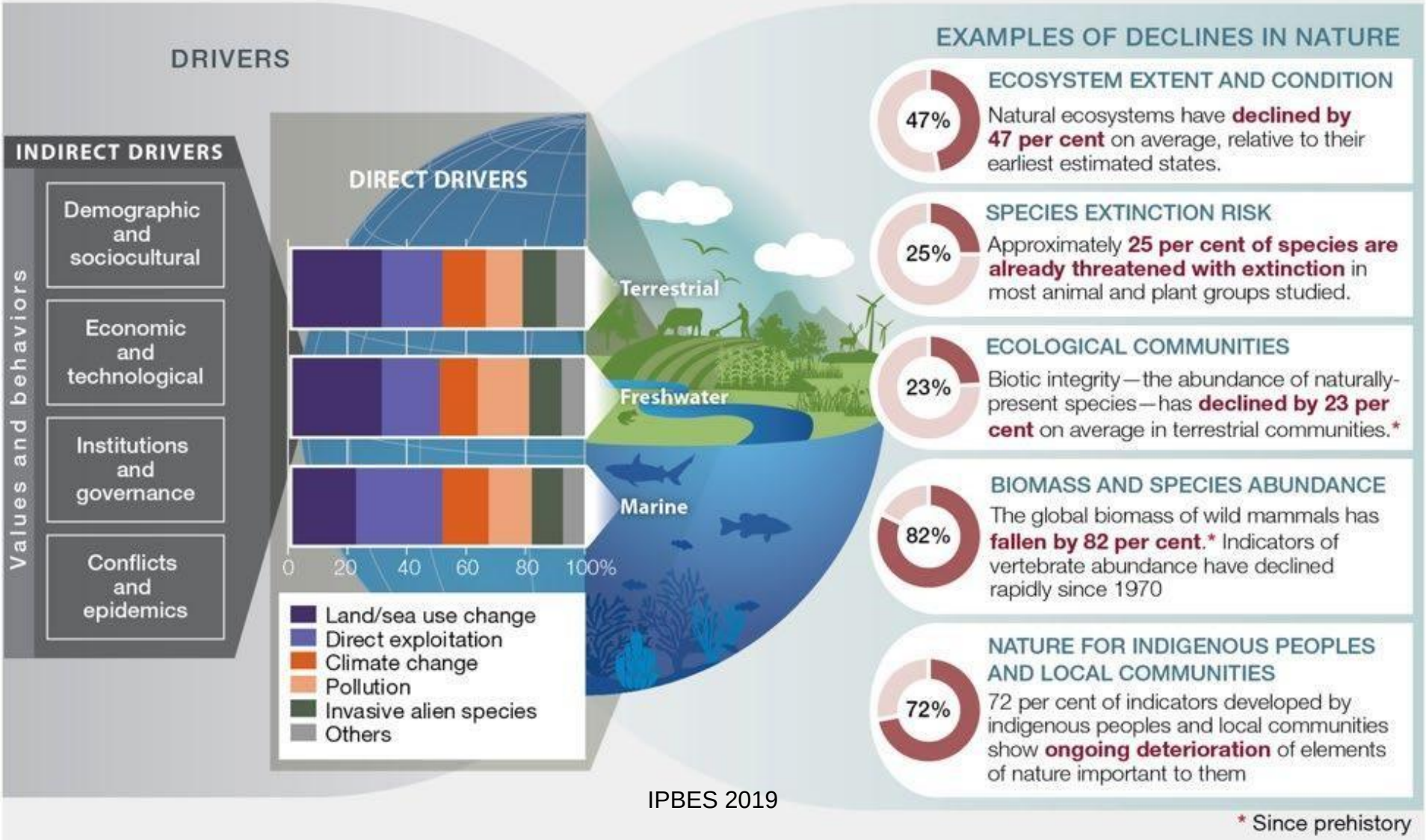
Naturen er ganske god på det den gjør…

….dessverre har den det ikke så bra om dagen



IPBES Land Degradation report 2018

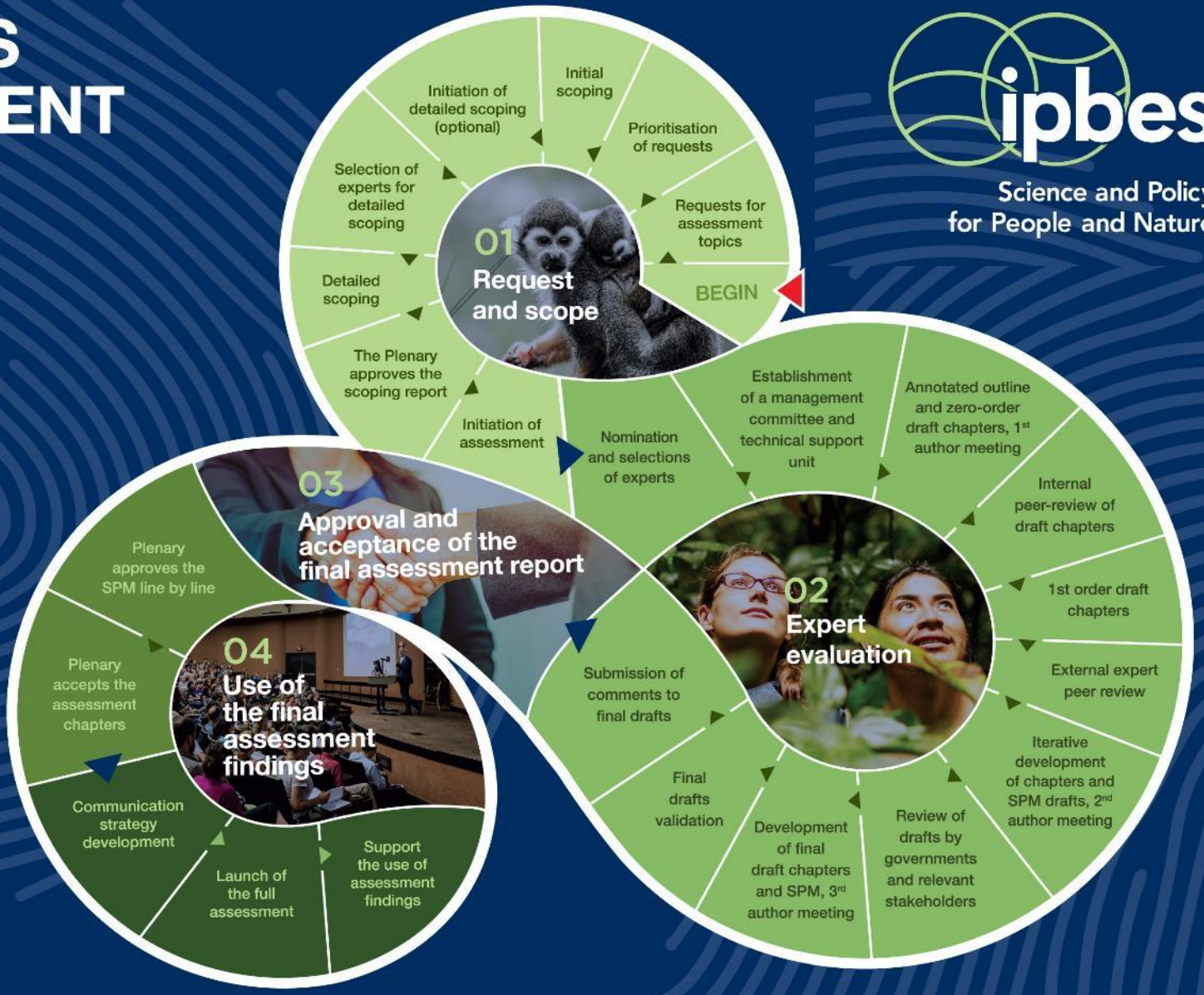
Klima er ikke hovedproblemet, *enda*…



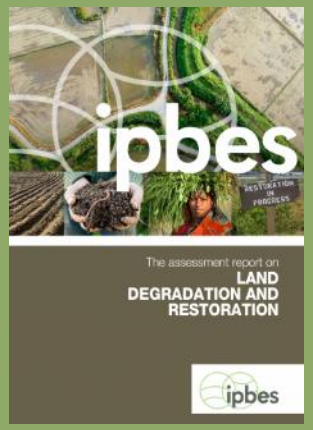
IPBES 2019

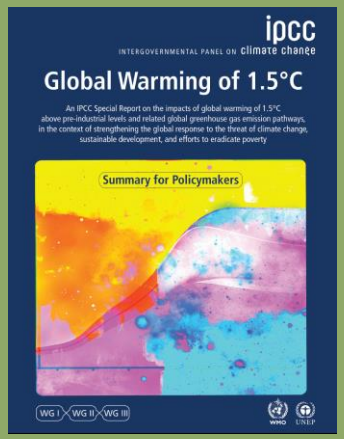
THE IPBES ASSESSMENT PROCESS

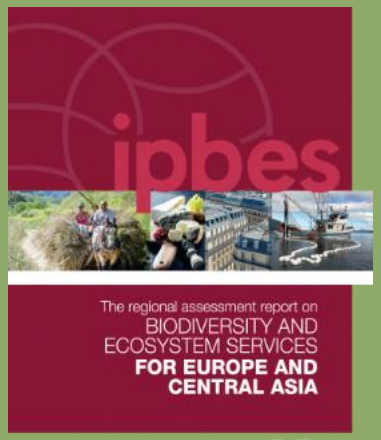
ipbes
Science and Policy for People and Nature

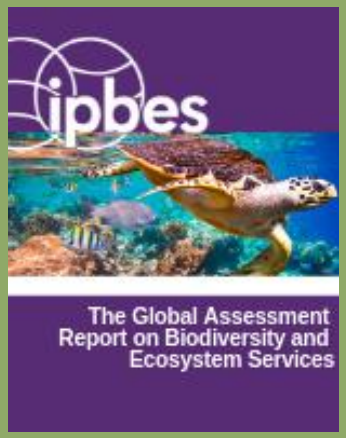


OK, så vi trenger kunnskapsbasert forvaltning av kompleks, variabel, multifunksjonell natur…?









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INTERNATIONAL JOURNAL OF AGRICULTURAL SUSTAINABILITY
2018, VOL. 16, NO. 1, 1–28
https://doi.org/10.1080/14735903.2017.1402504

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System of crop intensification for more productive, resource-conserving, climate-resilient, and sustainable agriculture: experience with diverse crops in varying agroecologies

Prabhakar Adhikari[a], Hailu Araya[b], Gerald Aruna[c], Arun Bala
B. C. Barah[g], Debaraj Behera[h], Tareke Berhe[i], Parag Boruah[j], S

Global Food Securit

nature COMMUNICATIONS

ARTICLE

DOI: 10.1038/s41467-018-05956-1 OPEN

A global meta-analysis of yield stability in organic and conservation agriculture

Samuel Knapp[1,2] & Marcel G.A. van der Heijden[1,3]

Contents lists availa

ELSEVIER

Global Foo

journal homepage: www

How much of the world's food do smallholders produce?

Vincent Ricciardi[a,b,*], Navin Ramankutty[a,b],
Brenton Chookolingo[a,b]

Ecological Applications, 28(1), 2018, pp. 62–77

Cultivar mixtures: a meta-analysis of the effect of intraspecific diversity on crop yield

Emily

AGROECOLOGY AND SUSTAINABLE FOOD SYSTEMS
2018, VOL. 42, NO. 3, 264–273
https://doi.org/10.1080/21683565.2017.1359806

The "Biodiversity–Ecosystem function debate": An interdisciplinary dialogue between Ecology, Agricultural Science, and Agroecology

Dr. Valentin Daniel Picasso, PhD

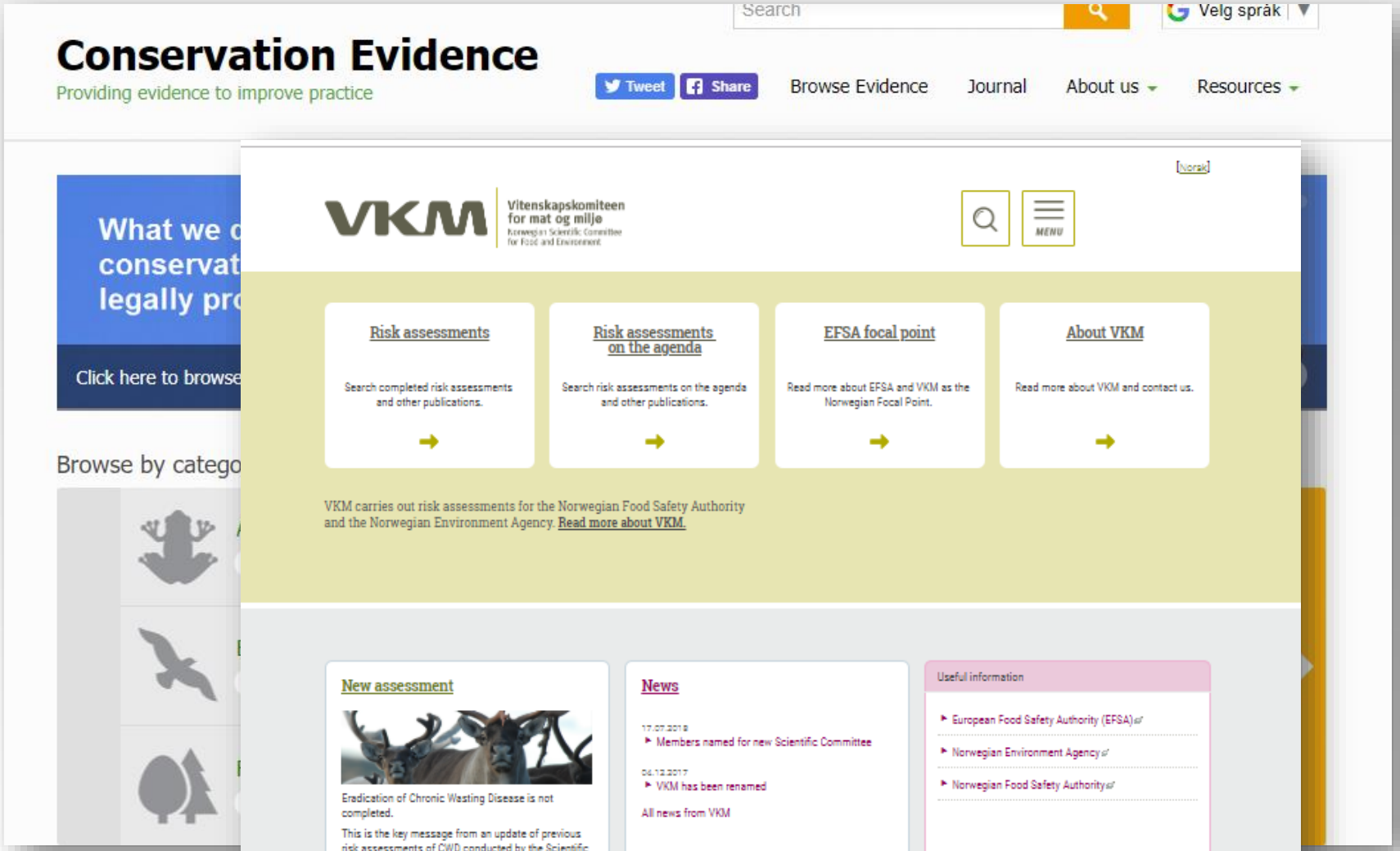
RESEARCH

FOREST ECOLOGY

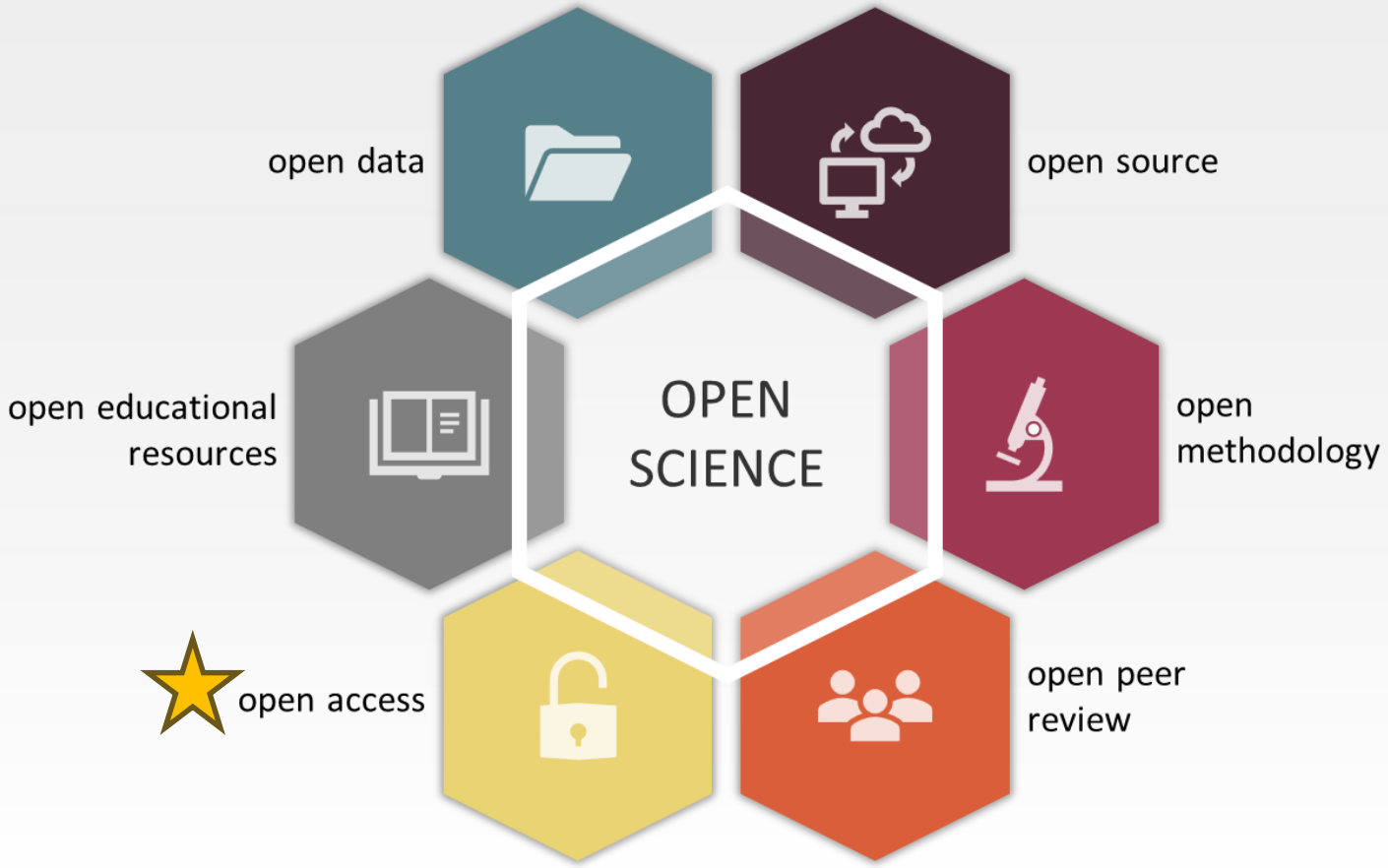
Classifying drivers of global forest loss

Philip G. Curtis[1]*, Christy M. Slay[1], Nancy L. Harris[2], Alexandra Tyukavina[3], Matthew C. Hansen[3]

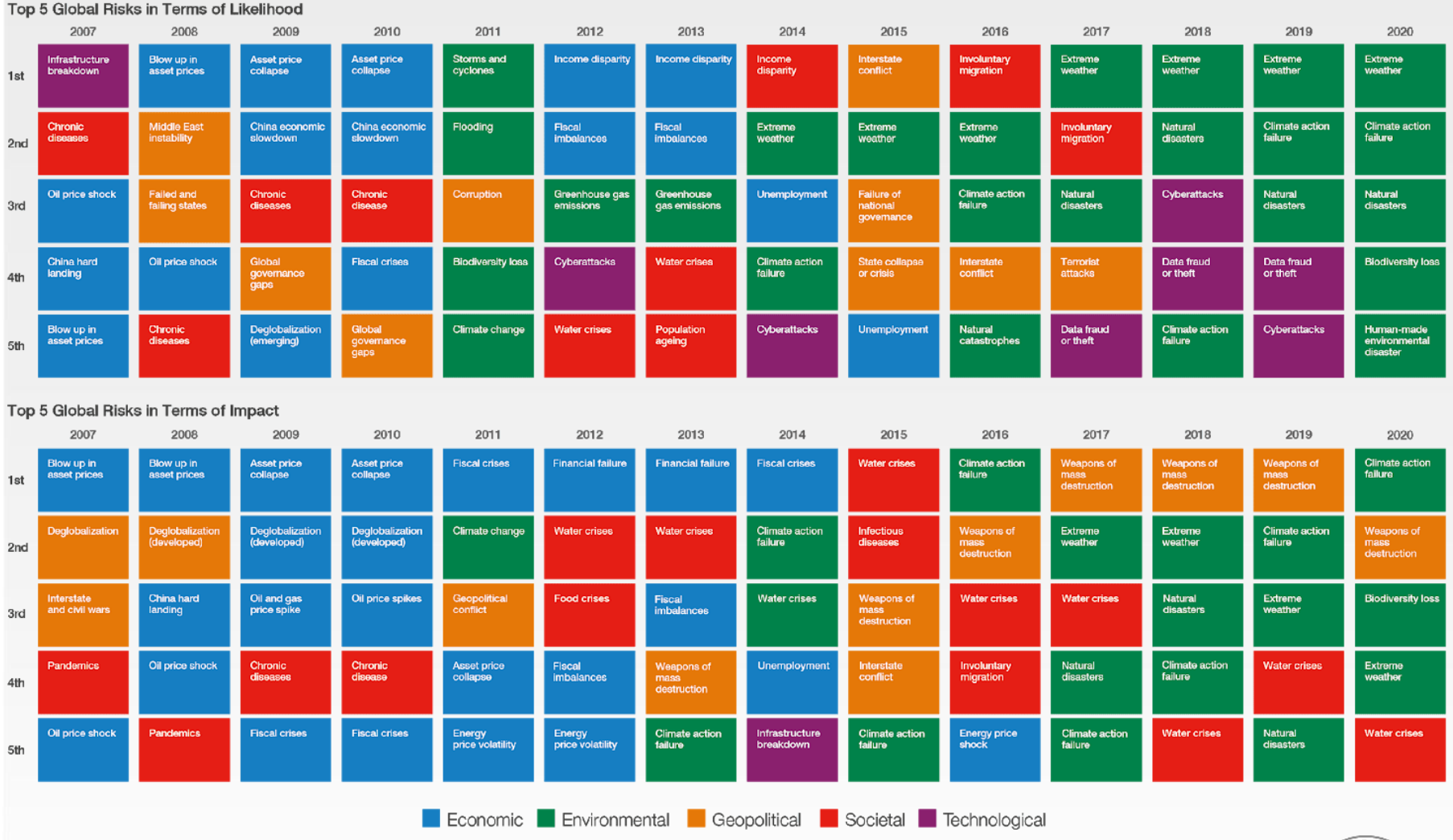
Kunnskapssynteser for spesifikke behov og kontekster



Kunnskapssynteser avhenger av FAIR*, åpen vitenskap



*Findable, Accessible, Interoperable, Reproducable


Top 5 Global Risks in Terms of Likelihood
2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
1st Infrastructure breakdown | Blow up in asset prices | Asset price collapse | Asset price collapse | Storms and cyclones | Income disparity | Income disparity | Income disparity | Interstate conflict | Involuntary migration | Extreme weather | Extreme weather | Extreme weather | Extreme weather
2nd Chronic diseases | Middle East instability | China economic slowdown | China economic slowdown | Flooding | Fiscal imbalances | Fiscal imbalances | Extreme weather | Extreme weather | Extreme weather | Involuntary migration | Natural disasters | Climate action failure | Climate action failure
3rd Oil price shock | Failed and failing states | Chronic diseases | Chronic disease | Corruption | Greenhouse gas emissions | Greenhouse gas emissions | Unemployment | Failure of national governance | Climate action failure | Natural disasters | Cyberattacks | Natural disasters | Natural disasters
4th China hard landing | Oil price shock | Global governance gaps | Fiscal crises | Biodiversity loss | Cyberattacks | Water crises | Climate action failure | State collapse or crisis | Interstate conflict | Terrorist attacks | Data fraud or theft | Data fraud or theft | Biodiversity loss
5th Blow up in asset prices | Chronic diseases | Deglobalization (emerging) | Global governance gaps | Climate change | Water crises | Population ageing | Cyberattacks | Unemployment | Natural catastrophes | Data fraud or theft | Climate action failure | Cyberattacks | Human-made environmental disaster
Top 5 Global Risks in Terms of Impact
2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
1st Blow up in asset prices | Blow up in asset prices | Asset price collapse | Asset price collapse | Fiscal crises | Financial failure | Financial failure | Fiscal crises | Water crises | Climate action failure | Weapons of mass destruction | Weapons of mass destruction | Weapons of mass destruction | Climate action failure
2nd Deglobalization | Deglobalization (developed) | Deglobalization (developed) | Deglobalization (developed) | Climate change | Water crises | Water crises | Climate action failure | Infectious diseases | Weapons of mass destruction | Extreme weather | Extreme weather | Climate action failure | Weapons of mass destruction
3rd Interstate and civil wars | China hard landing | Oil and gas price spike | Oil price spikes | Geopolitical conflict | Food crises | Fiscal imbalances | Water crises | Weapons of mass destruction | Water crises | Water crises | Natural disasters | Extreme weather | Biodiversity loss
4th Pandemics | Oil price shock | Chronic diseases | Chronic disease | Asset price collapse | Fiscal imbalances | Weapons of mass destruction | Unemployment | Interstate conflict | Involuntary migration | Natural disasters | Climate action failure | Water crises | Extreme weather
5th Oil price shock | Pandemics | Fiscal crises | Fiscal crises | Energy price volatility | Energy price volatility | Climate action failure | Infrastructure breakdown | Climate action failure | Energy price shock | Climate action failure | Water crises | Natural disasters | Water crises
Economic Environmental Geopolitical Societal Technological

The assessment report on

LAND DEGRADATION AND RESTORATION

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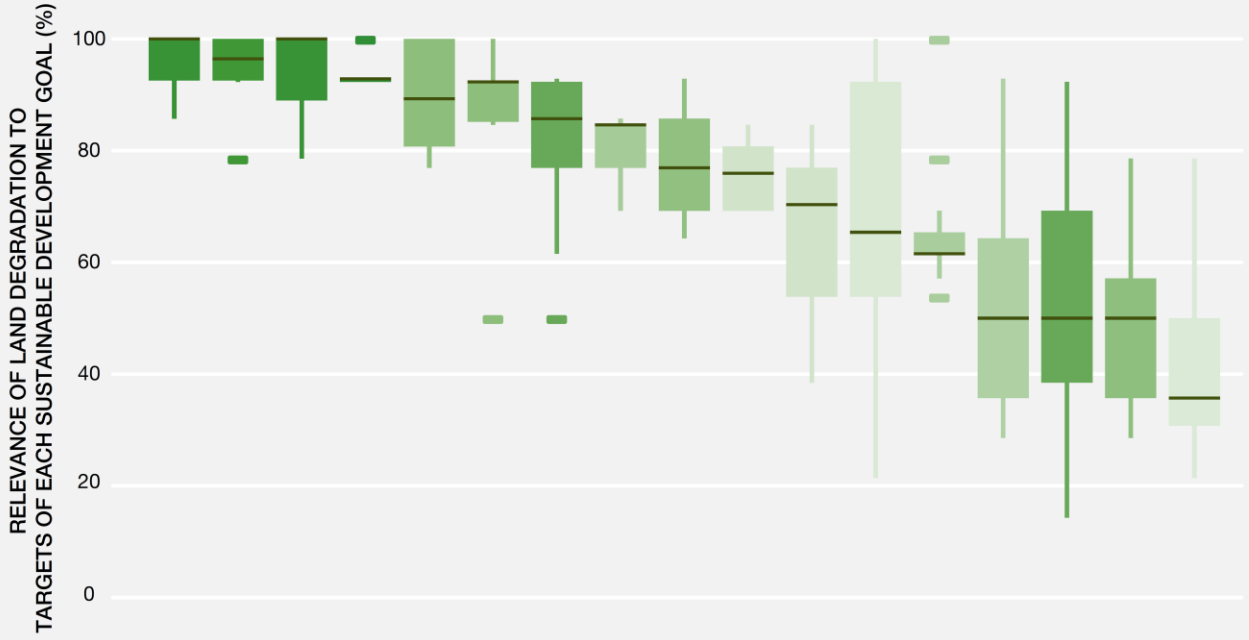
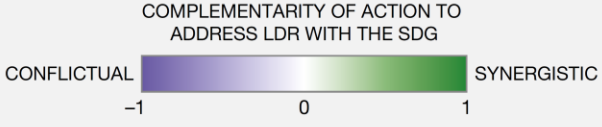
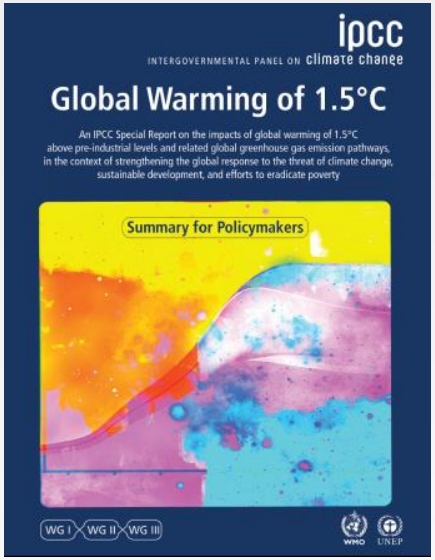


SUSTAINABLE DEVELOPMENT GOALS

- Life on land
- Clean water and sanitation
- Responsible consumption and production
- Climate action
- Zero hunger
- No poverty
- Sustainable cities and communities
- Affordable and clean energy
- Partnerships to achieve the goal
- Industry, innovation and infrastructure
- Reduced inequality
- Decent work and economic growth
- Life below water
- Quality education
- Peace, justice and strong institutions
- Gender equality
- Good health and well-being





Length shows strength of connection

The overall **size of the coloured bars** depict **the relative potential** for synergies and trade-offs between the sectoral mitigation options and the SDGs.

Shades show level of confidence

The shades depict **the level of confidence** of the assessed potential for **Trade-offs**/**Synergies**.

Very High *Low*

Energy Supply

Trade-offs | Synergies

Energy Demand

Trade-offs | Synergies

Land

Trade-offs | Synergies

SDG1 No Poverty

SDG2 Zero Hunger

SDG 3 Good Health and Well-being

SDG 4 Quality Education

SDG 5 Gender Equality

SDG 6 Clean Water and Sanitation

SDG 7 Affordable and Clean Energy

SDG 8 Decent Work and Economic Growth

SDG 9 Industry, Innovation and Infrastructure

SDG 10 Reduced Inequalities

SDG 11 Sustainable Cities and Communities

SDG 12 Responsible Consumption and Production

SDG 14 Life Below Water

SDG 15 Life on Land

SDG 16 Peace, Justice and Strong Institutions

SDG 17 Partnerships for the Goals

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