

WildFood toward the climatic change, new challenges ahead



Dr. Sven Mutke

Centro de Investigación Forestal (INIA, CSIC), Madrid

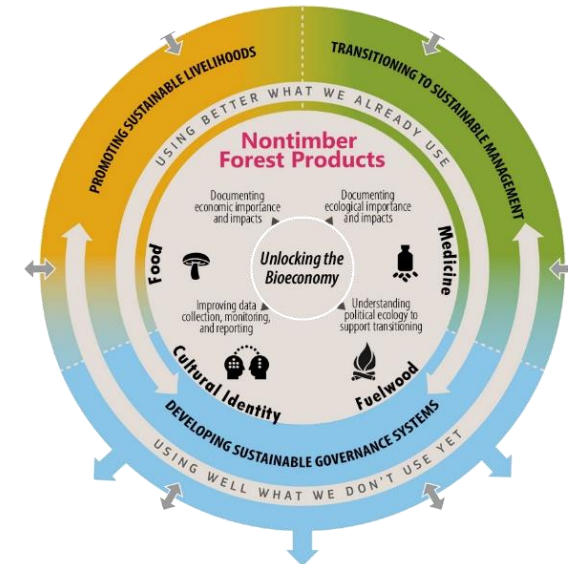
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

sven.mutke@csic.es




IUFRO Research Group 1.08 *Silviculture for edible NWFP*

IUFRO Task Force *Unlocking the Bioeconomy and NTFP*



Context of Global Change

“an environmental, demographic and ethical crisis of humankind as whole”

Climate change: Global Warming, increase of extreme weather events (20 M climate refugees/yr )
2021, awareness “even in the global north”:
 Floods in Germany or Tennessee, snow storms in Madrid or Texas, heatwaves in Canada, megafires...

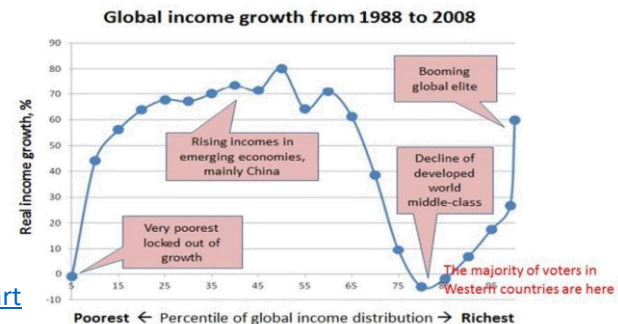
Land use changes: industrialisation, rural flight & megacities → industrial agribiz & corporative plantation forestry

Globalisation and hyper-globalisation: global shipping and global processing dependence (*global shmoba*), spreading exotic species, pests & diseases, incl. forest-sourced zoonosis (COVID-19...)

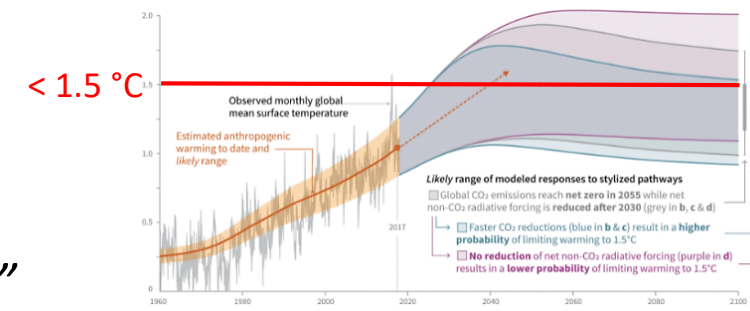
Build back better: transitioning to zero-carbon economy by **resilient smart degrowth**

Which world will we legate? Ruled by greed (inequality)

...or rather by the UN 2030 Agenda?



Milanovic's Elephant chart



IPCC Sixth Assessment Report 2021-2022, [AR6](#)

IPCC [SR15](#)

The Fires in Greece Are a Terrifying Warning

Aug. 27, 2021



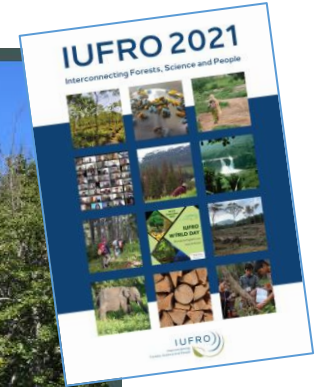
Yohai Du

Context of Global Change

Climate change

Land use changes

Globalisation



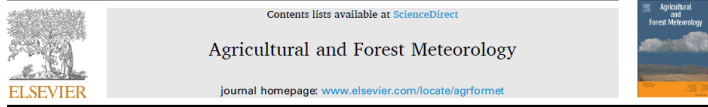
Context of Global Change

Climate change



Variability of Mediterranean Stone pine cone production:
Yield loss as response to climate change
Sven Mutke^a, Javier Gordo^b, Luis Gil^{a,*}

Agricultural and Forest Meteorology 319 (2022) 100918



Historical and future spatially-explicit climate change impacts on mycorrhizal and saprotrophic macrofungal productivity in Mediterranean pine forests

Albert Morera^{a,b,*}, Juan Martínez de Aragón^c, Miquel De Cáceres^d, José Antonio Bonet^{a,b}, Sergio de-Miguel^{a,b}



**DECLINES
SHIFTS**



Synergistic abiotic and biotic stressors explain widespread decline of *Pinus pinaster* in a mixed forest[☆]

Guillermo Gea-Izquierdo^{a,*}, Macarena Férniz^a, Sara García-Garrido^a, Olga Aguin^b, Margarita Elvira-Recuenco^a, Laura Hernández-Escribano^a, Dario Martín-Benito^a, Rosa Raposo^a



Unravelling the associations between climate, soil properties and forest management in *Pinus pinaster* decline in the Iberian Peninsula
Cristina Prieto-Recio^{*}, Jorge Martín-García, Felipe Bravo, Julio J. Díez



Drought-induced decline in Mediterranean truffle harvest

NATURE CLIMATE CHANGE | VOL 2 | DECEMBER 2012 | www.nature.com/natureclimatechange

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**La uva de Rioja ante el cambio climático:
¿qué variedades se adaptan mejor?**

Publicado: 18 mayo 2022 19:10 CEST

<https://theconversation.com/la-uva-de-rioja-ante-el-cambio-climatico-que-variedades-se-adaptan-mejor-182878>

Context of Global Change

Climate change



Variability of Mediterranean Stone pine cone production:
Yield loss as response to climate change

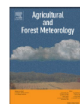
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journal homepage: www.elsevier.com/locate/agrformet

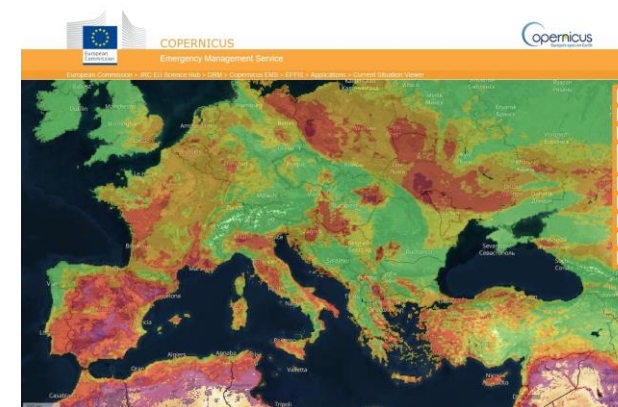


Historical and future spatially-explicit climate change impacts on mycorrhizal and saprotrophic macrofungal productivity in Mediterranean pine forests

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Snowstorm *Filomena*, Madrid January 2021



Current fire risk map/heat wave (May 18, 2022)

https://effis.jrc.ec.europa.eu/apps/effis_current_situation/
& May 20, 2022, tornados and hailstorms over Germany

DECLINES and SHIFTS

COLLAPSES (extreme events, pests 'n' pathogens, tipping points)

Apocalypse now? The alarming effects of the global food crisis



Focus-FoodCrisis-WEB Composite: Getty Images

<https://www.theguardian.com/world/2022/may/21/apocalypse-now-the-alarming-effects-of-the-global-food-crisis>

Contagious Collapse

GEORGE MONBIOT

20th May 2022

The global food system is in much more trouble than we think.

By George Monbiot, published in the Guardian 19th May 2022

For the past few years, scientists have been frantically **sounding an alarm** that governments refuse to hear: the global food system is beginning to look like the global financial system in the run-up to 2008.

While financial collapse would have been devastating to human welfare, food system collapse doesn't bear thinking about. Yet the evidence that something is going **badly wrong** has been escalating **rapidly**. The current surge in food prices looks like the latest sign of systemic instability.

Land use changes

Globalisation

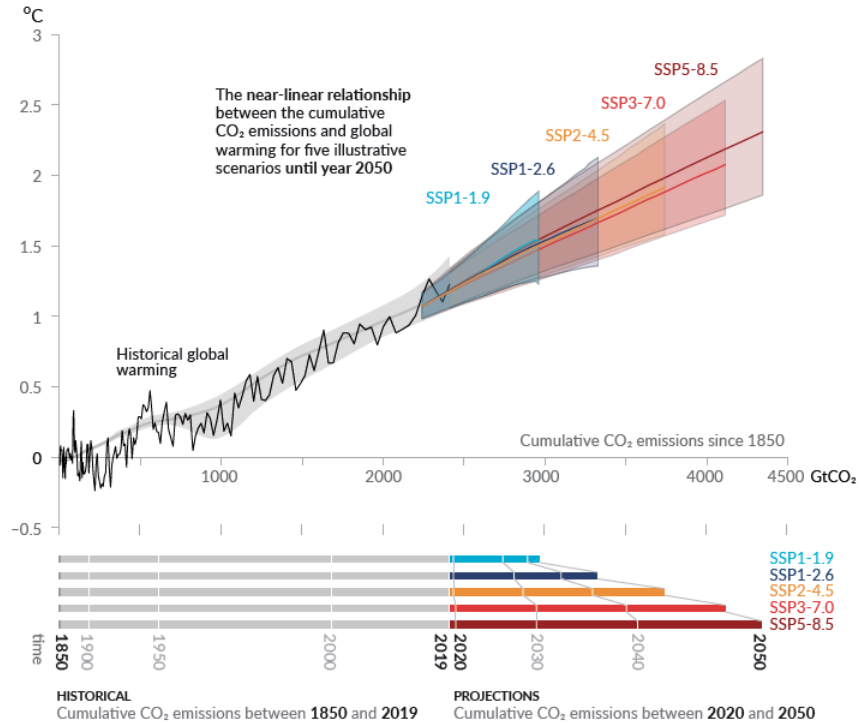
WildFood Policy forum

The present status of the most ancient human activity

Villa Bolasco, Castelfranco Veneto, 26th - 27th May 2022

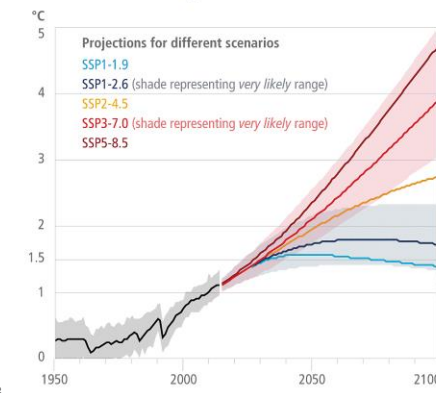
Every tonne of CO₂ emissions adds to global warming

Global surface temperature increase since 1850–1900 (°C) as a function of cumulative CO₂ emissions (GtCO₂)

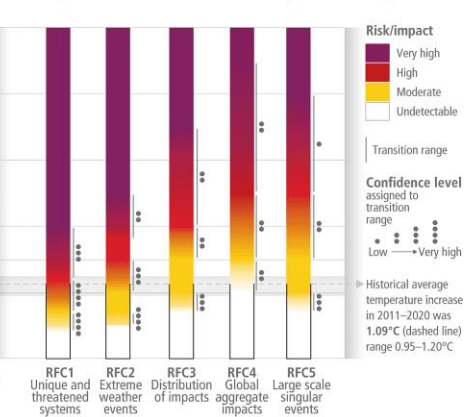


Global and regional risks for increasing levels of global warming

(a) Global surface temperature change
Increase relative to the period 1850–1900



(b) Reasons for Concern (RFC)
Impact and risk assessments assuming low to no adaptation

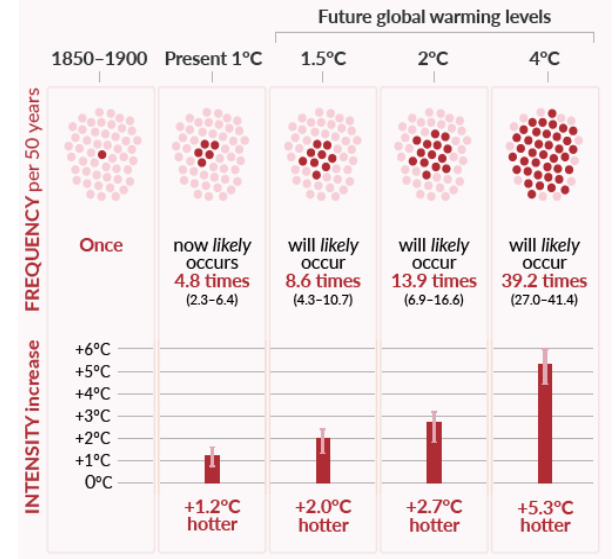


Future cumulative CO₂ emissions differ across scenarios and determine how much warming we will experience.

Hot temperature extremes over land

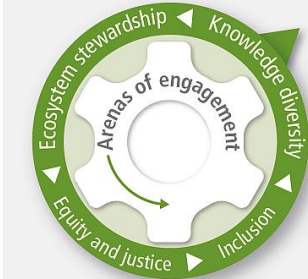
50-year event

Frequency and increase in intensity of extreme temperature event that occurred once in 50 years on average in a climate without human influence

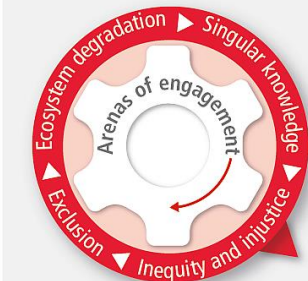


(a) Societal choices about adaptation, mitigation and sustainable development made in arenas of engagement

Dimensions that enable actions towards higher climate resilient development

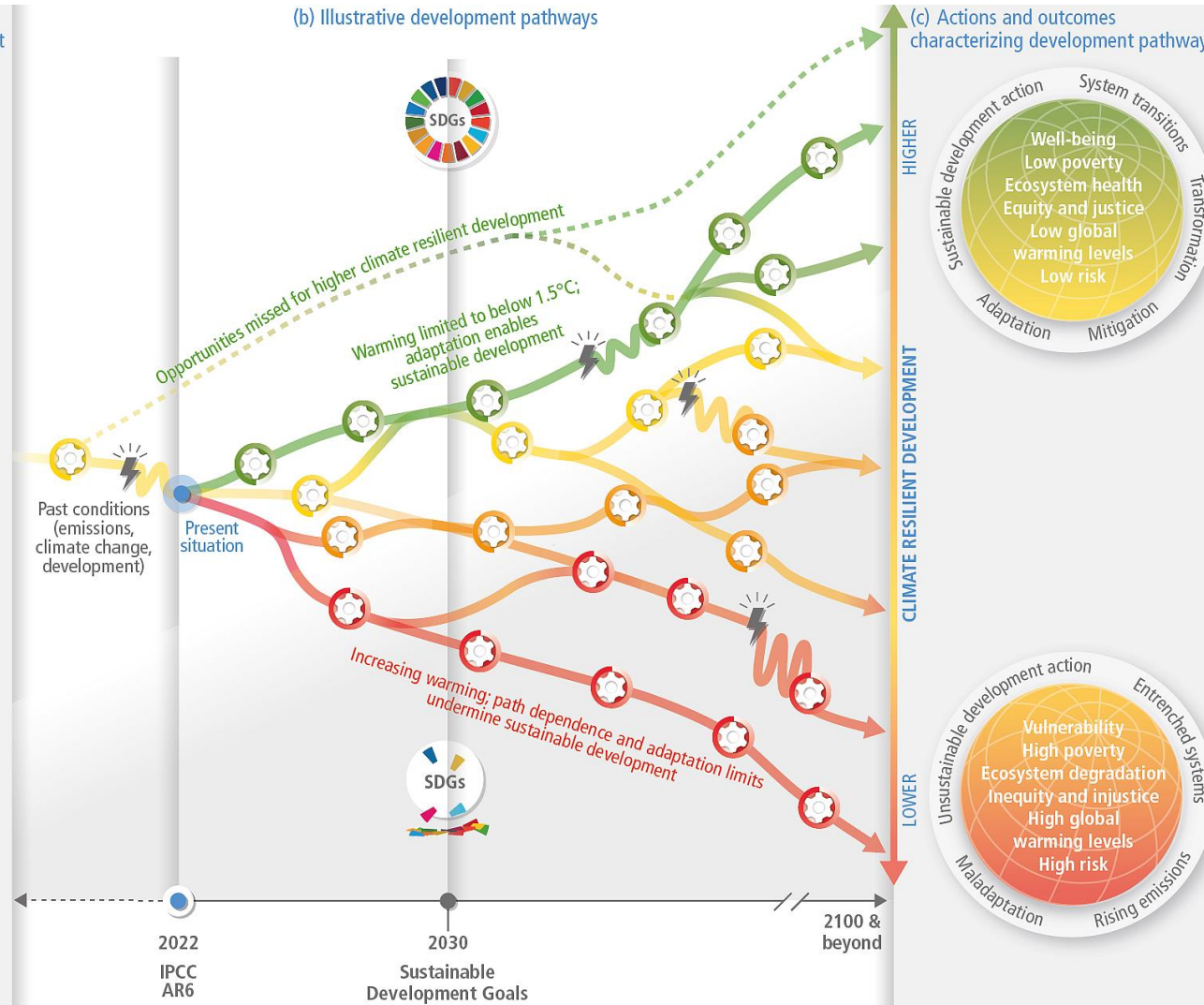


Arenas of engagement:
Community
Socio-cultural
Political
Ecological
Knowledge + technology
Economic + financial



Dimensions that result in actions towards lower climate resilient development

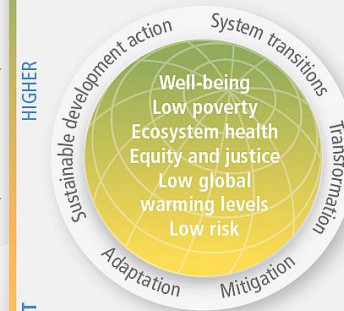
(b) Illustrative development pathways



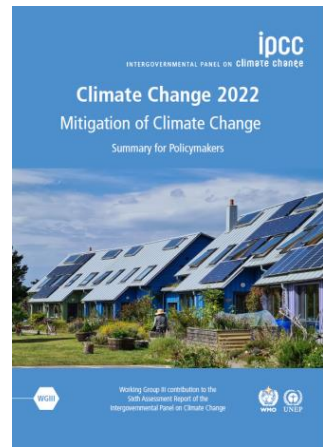
⚡ Illustrative climatic or non-climatic shock, e.g. COVID-19, drought or floods, that disrupts the development pathway

Narrowing window of opportunity for higher CRD

(c) Actions and outcomes characterizing development pathways



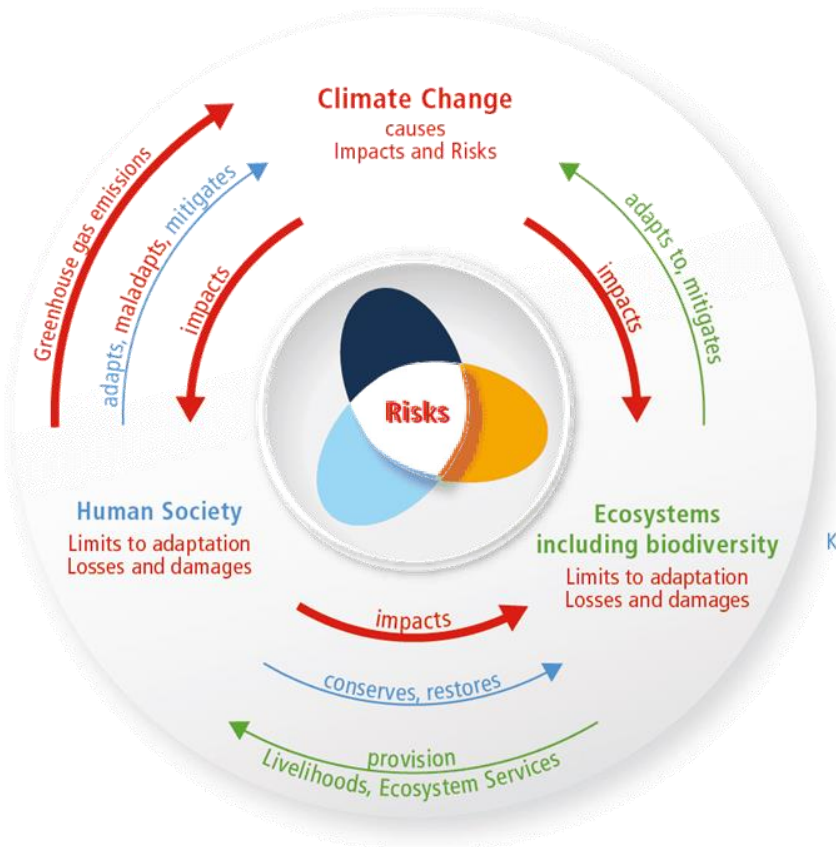
https://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_SummaryForPolicymakers.pdf



There is a **rapidly narrowing window** of opportunity to enable climate resilient development

From climate risk to climate resilient development: climate, ecosystems (including biodiversity) and human society as coupled systems

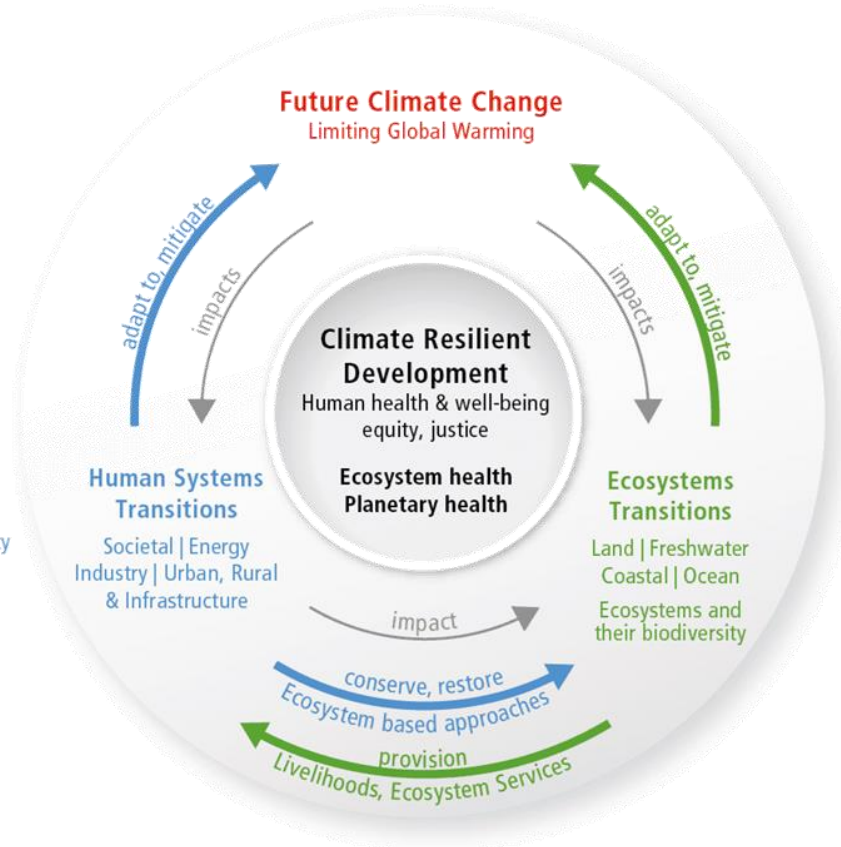
(a) Main interactions and trends



The risk propeller shows that risk emerges from the overlap of:



(b) Options to reduce climate risks and establish resilience



From urgent to
timely action

Governance
Finance
Knowledge and capacity
Catalysing conditions
Technologies

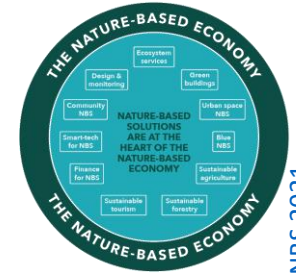
https://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_SummaryForPolicymakers.pdf

WildFood Policy forum

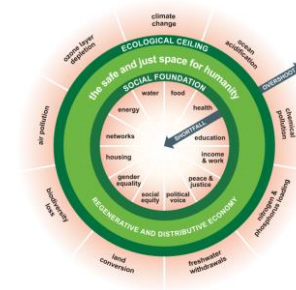
The present status of the most ancient human activity

Villa Bolasco, Castelfranco Veneto, 26th - 27th May 2022

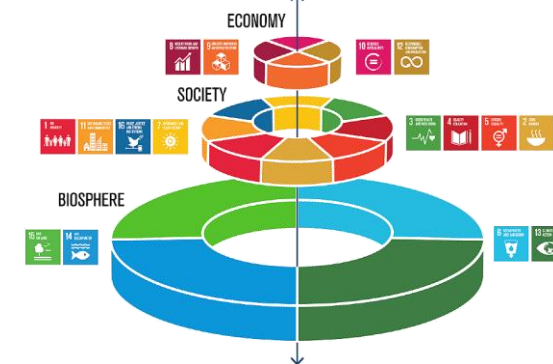
Transition to a bioeconomy, nature-based economy, doughnut economics...



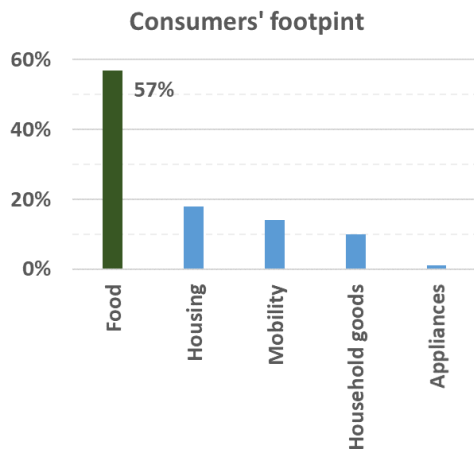
NBS 2021



<https://doughnuteconomics.org/>

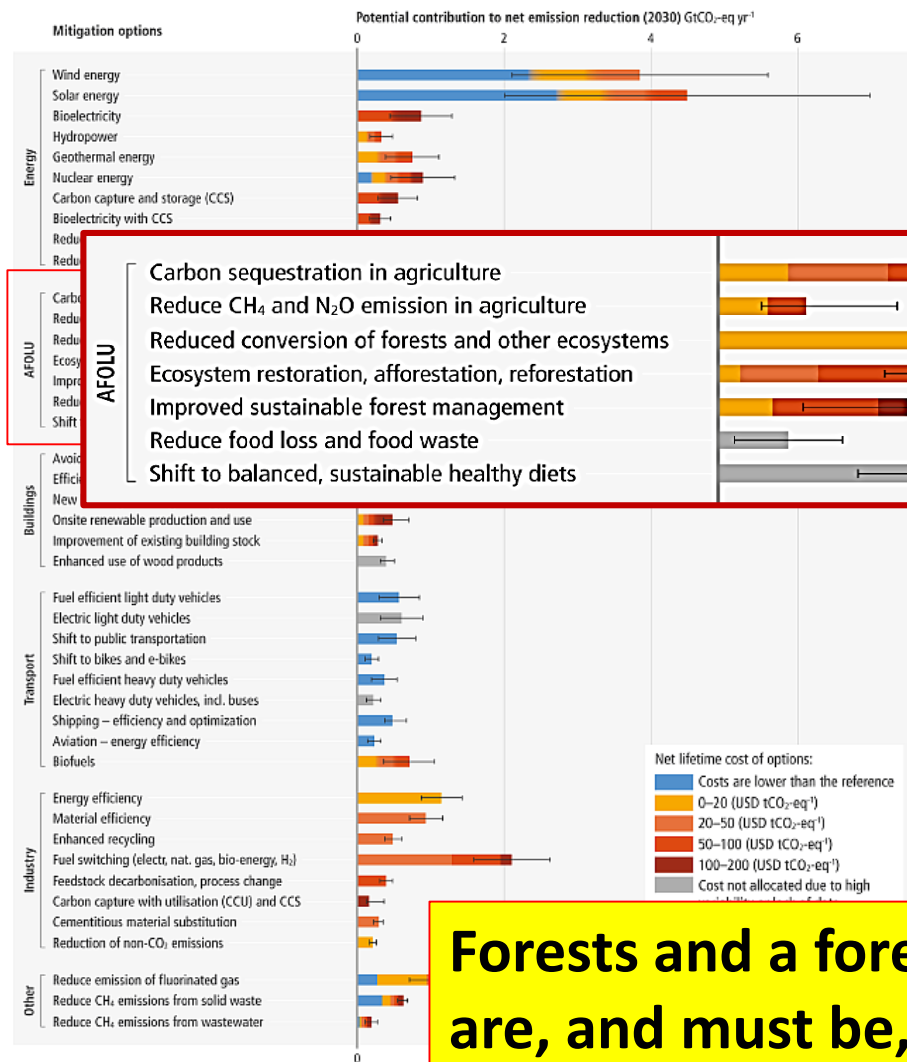
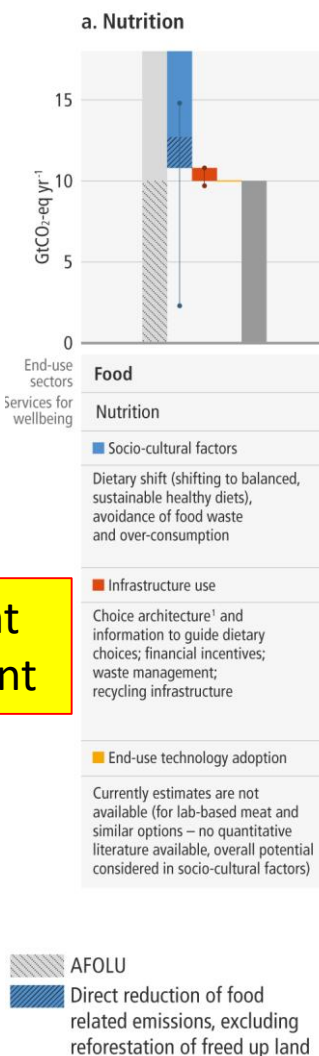


Demand-side mitigation can be achieved ...and on supply side, too.

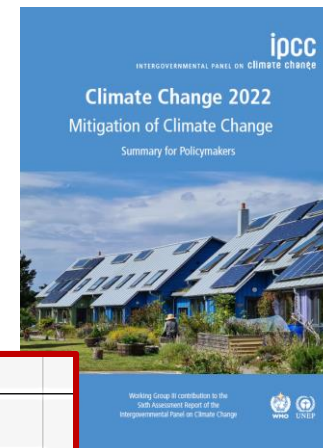


JRC, 2019, <https://doi.org/10.2760/403263>

Food choice is paramount in the consumers footprint



Forests and a forests-based bioeconomy are, and must be, part of the solution.





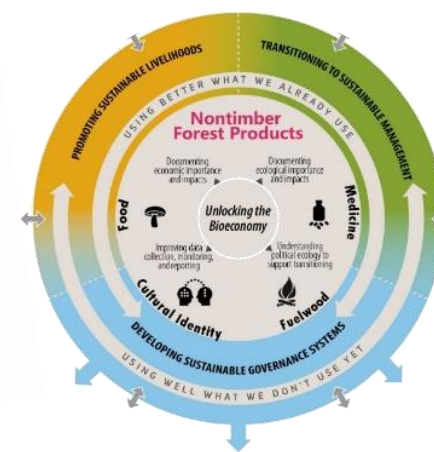
XV WORLD FORESTRY CONGRESS
Building a Green, Healthy and Resilient Future with Forests
2-6 May 2022 | Coex, Seoul, Republic of Korea

A transition framework for integration of non-wood forest products into the bioeconomy

James Chamberlain¹, Carsten Smith-Hall², Sven Mutke³, Dietrich Darr⁴, Davide Pettenella⁵

SMART INNOVATION
technological, organisational,
regulatory, social

Fossil fuel-based,
linear economy



Circular, green,
bio-based economy

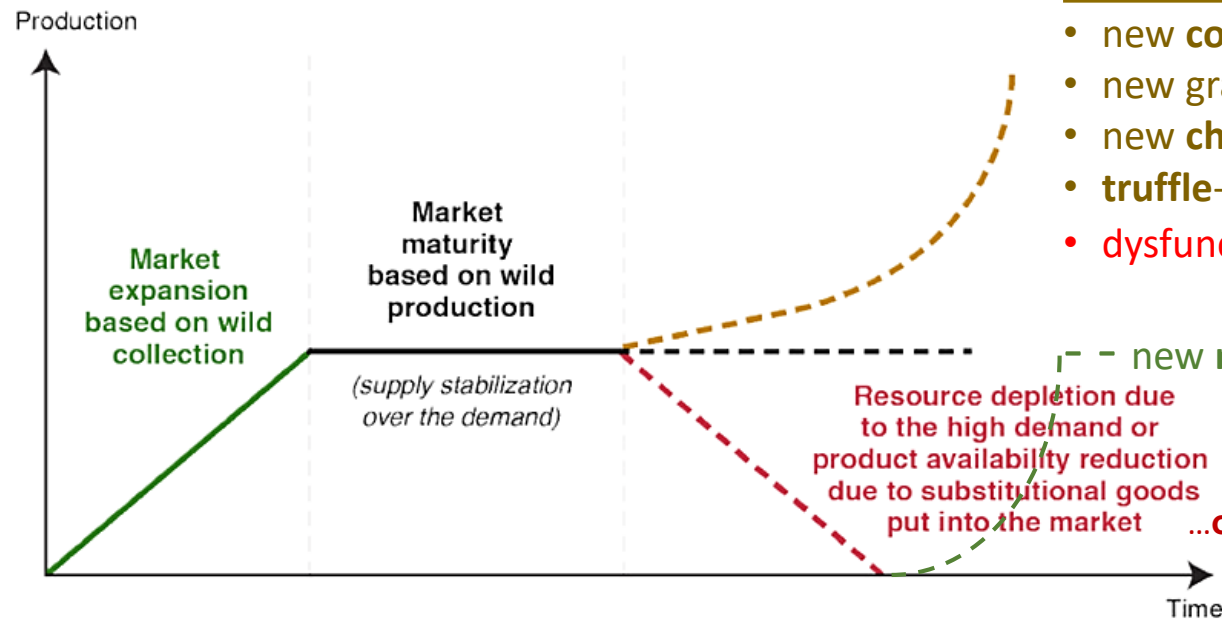


Mutke et al., 2018

Non-wood provisioning from Mediterranean forest ecosystems



Mutke, 2020



Towards Domestication

- new **cork** oak plantations > 0.1 Mha, now even watered
- new grafted stone pine orchards for **pine nuts**
- new **chestnut** groves, integrated phytosanitary control
- **truffle**-inoculated oak plantations ([Oliach et al., 2021](#))
- dysfunctional example: industrial berry agribiz (Southern Spain)

Figure 2. NWFP development paths.

Source: Pettenella^{as} modified from Homma (1992). Many NWFP may be considered in the market expansion phase (green line) heading towards a maturity stage based on wild collection (black solid line).

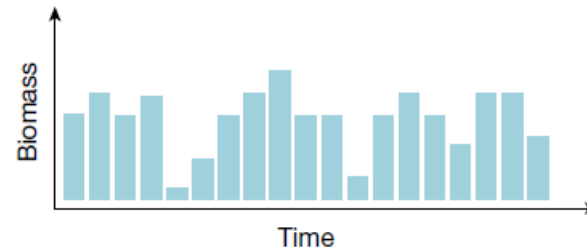
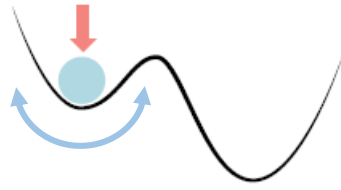
[EFI/FAO, 2021](#)

Masking Loss of Resilience

Nyström et al., 2019. Anatomy and resilience of the global production ecosystem. *Nature*. doi:[10.1038/s41586-019-1712-3](https://doi.org/10.1038/s41586-019-1712-3)

a Local low-intensity production ecosystem

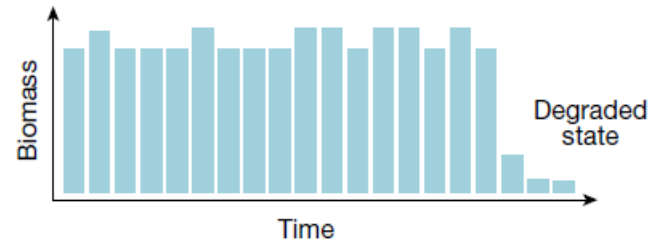
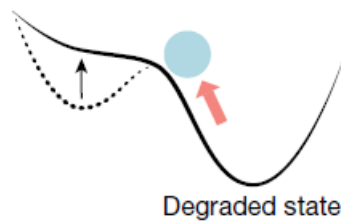
↓
Nutrient fixation
Predation
Grazing
Habitat
Dispersal
Pollination



- Artisanal fisheries
- Organic farming
- Free-ranging livestock

b Local high-intensity production ecosystem

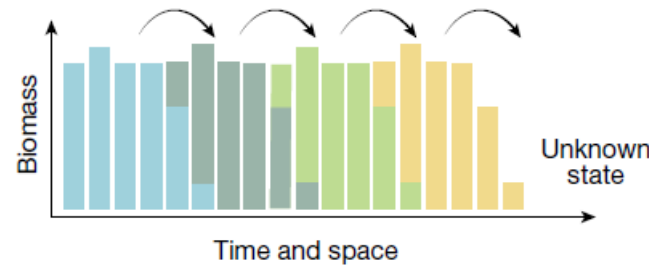
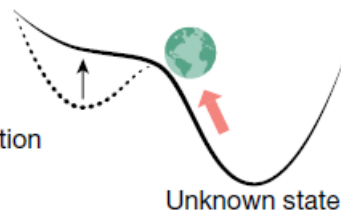
↑
Fossil fuel
Technology
Nutrient
Feed
Pesticide
Antibiotic



- Industrial fisheries
- Intensive agriculture
- High-density livestock
- Example: industrial blueberry agribiz (ES)

c Global production ecosystem

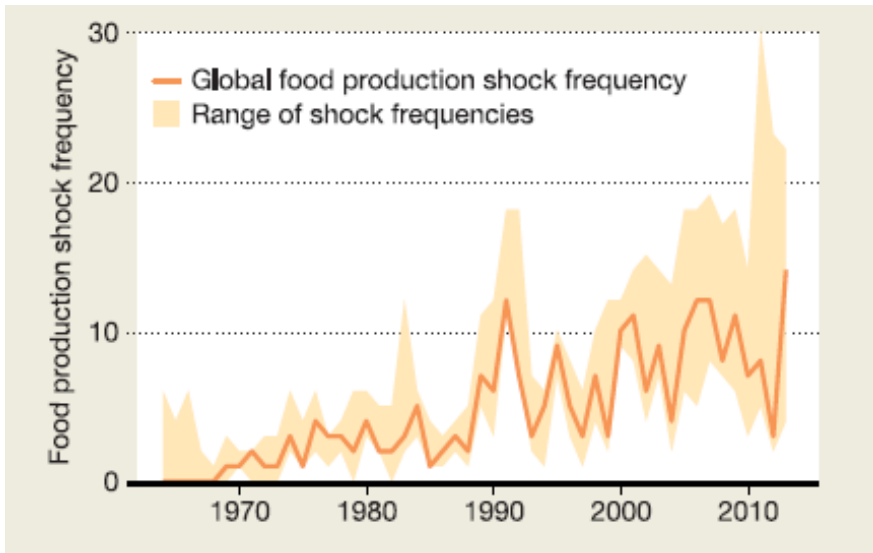
↑
Intensification
Trade
Sequential exploitation
Land displacement



- Sequential seafood exploitation
- Agricultural boom-and-bust
- Sequential deforestation

Loss of Resilience in a globalised system

Apocalypse now? The alarming effects of the global food crisis



Nyström et al., 2019. Anatomy and resilience of the global production ecosystem. *Nature*. doi:[10.1038/s41586-019-1712-3](https://doi.org/10.1038/s41586-019-1712-3)



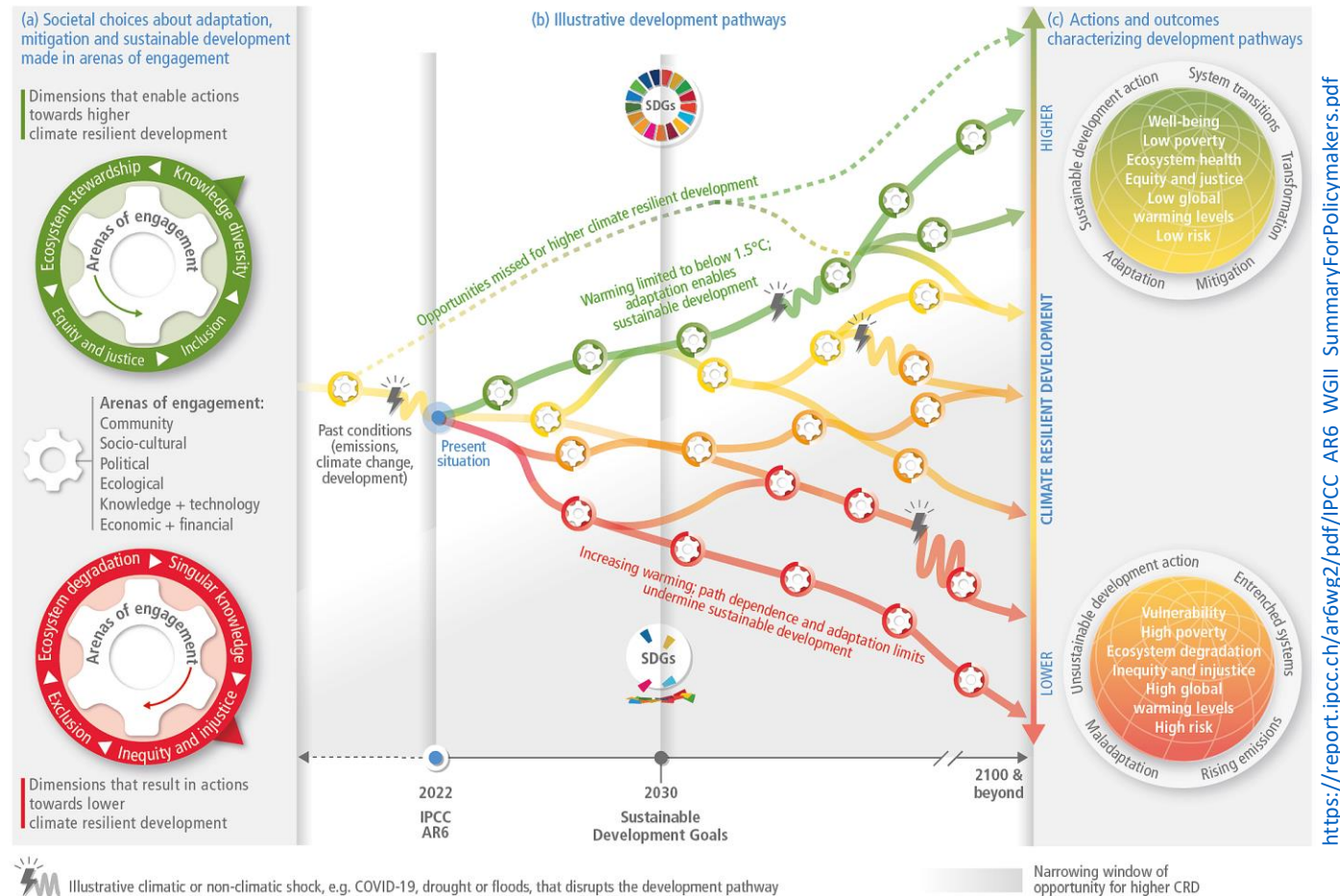
Radical transparency and traceability

Consumers can be influential in promoting sustainability by aligning their purchasing with sustainable thinking. They are also important as citizens whose perceptions and opinions drive the political will to address sustainability issues. Education and provision of information—such as certification, labelling schemes and public campaigns—are therefore central instruments for consumers to make informed decisions⁵⁴. However, if as a society we do not know where, how, in what quantity and by whom a given commodity is produced, it is arguably difficult to tackle sustainability challenges¹¹⁹.

Whereas transparency is necessary to assess the environmental sustainability of corporate and financial activities, traceability represents a key mechanism by which corporations can ensure that their supply chains are devoid of unacceptable behaviour, ranging from illegal sourcing and forced labour to poor sanitation and mislabelling^{120–122}. Many of the operations of the corporate and financial world

Nature | Vol 575 | 7 November 2019 | 105

There is a rapidly narrowing window of opportunity to enable climate resilient development



Thanks