The social counterpart of planetary boundaries

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ARTICLES
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nature sustainability

A good life for all within planetary boundaries

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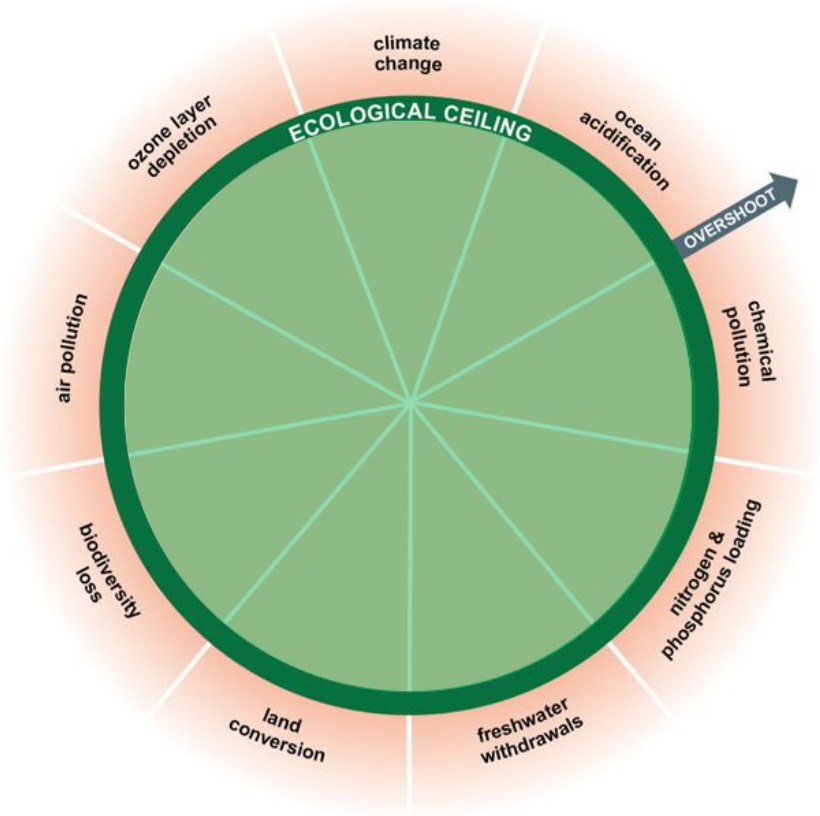
Context

the ecological ceiling that we want to live inside

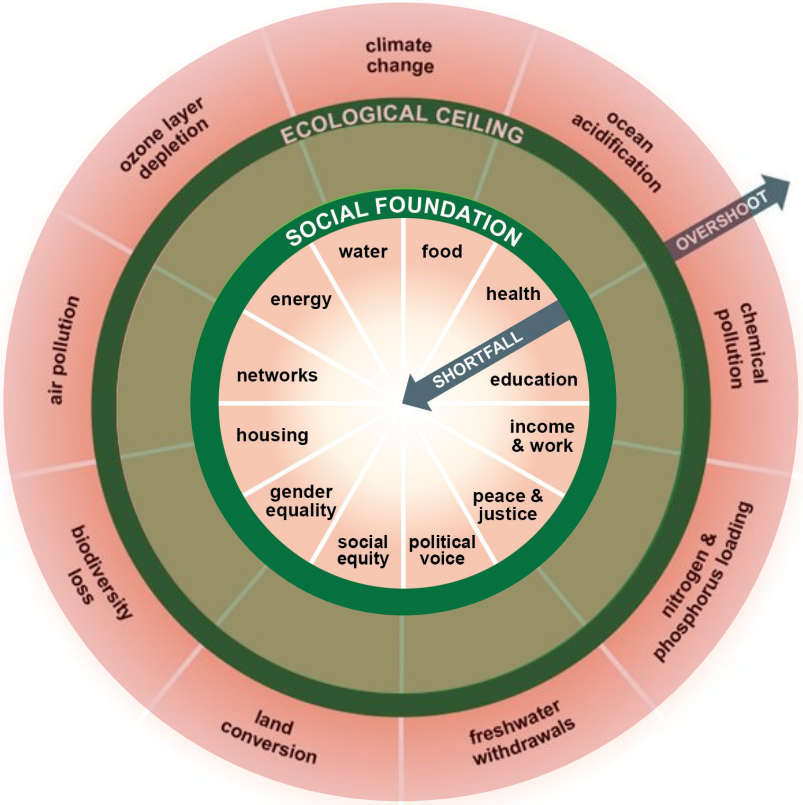


Context

the ecological ceiling that we want to live inside

vs

the social foundation that we want to go beyond



Context

the ecological ceiling that we want to live inside

vs

the social foundation that we want to go beyond

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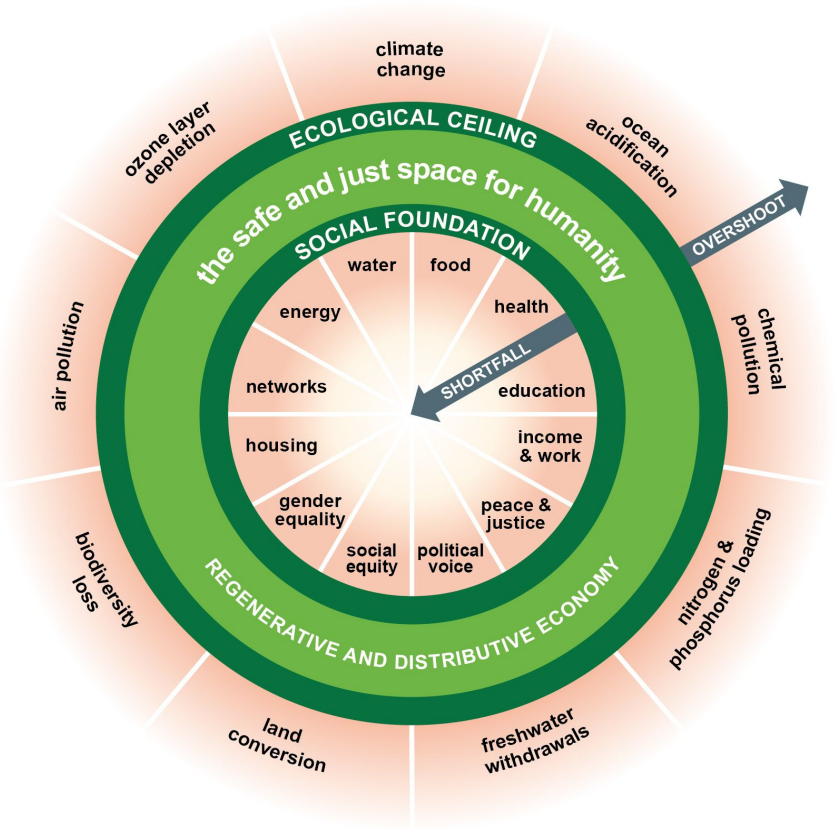
“the safe and just space for humanity”



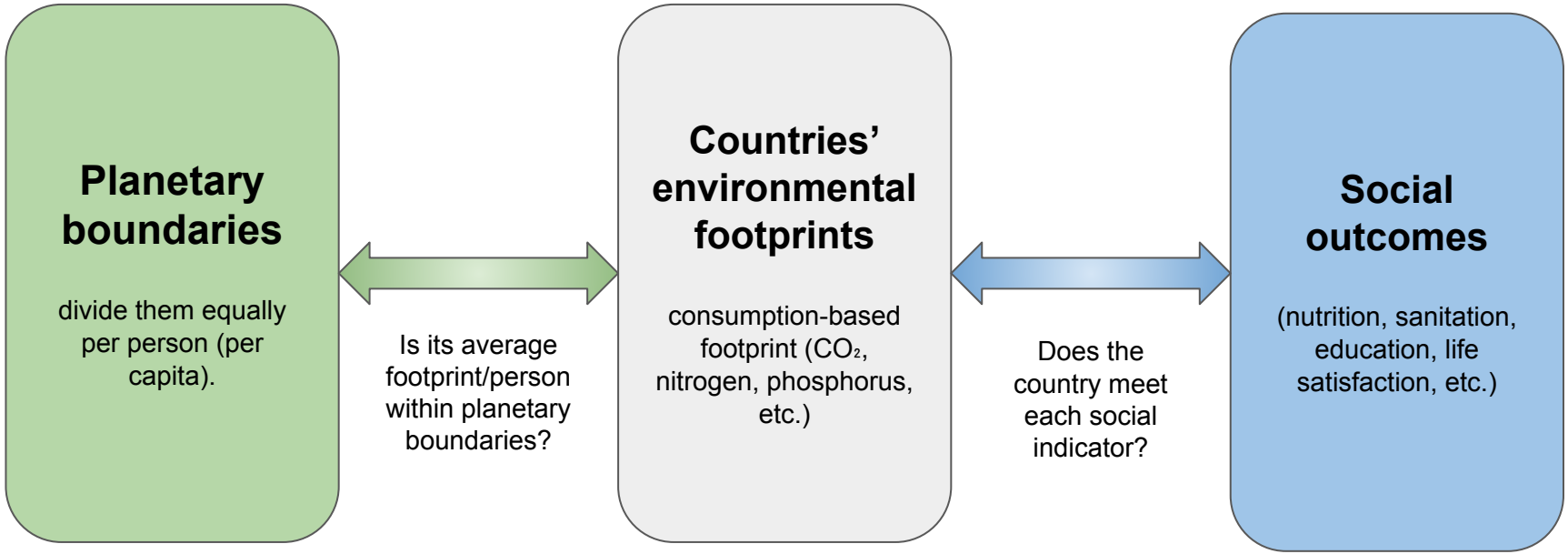
Research Question

What level of biophysical resource use is associated with meeting people's basic needs, and can this level of resource use be extended to all people without exceeding critical planetary boundaries?

Analysing the relationships between 7 biophysical boundaries and 11 social thresholds 150 countries using a safe and just space framework.

Method

Comparing national consumption-based environmental footprints to planetary boundaries, at national scale.



Indicators

7 biophysical indicators

CO_2 emissions

Phosphorous

Nitrogen

Blue water

Ecological footprint

Material footprint

Embodied human appropriation of net primary production (eHANPP)

11 social indicators

Life satisfaction (LS)

Healthy life expectancy (LE)

Nutrition (NU)

Sanitation (SA)

Income (IN)

Access to energy (EN)

Education (ED)

Social support (SS)

Democratic quality (DQ)

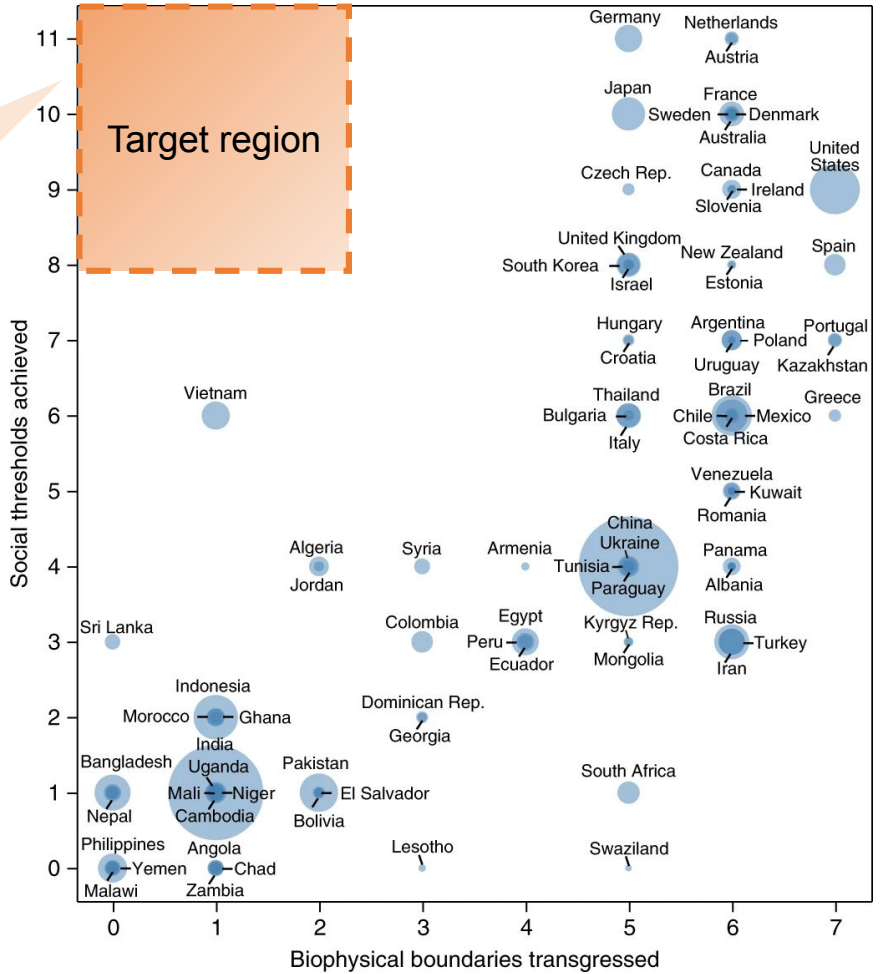
Equality (EQ)

Employment (EM)

Key Results

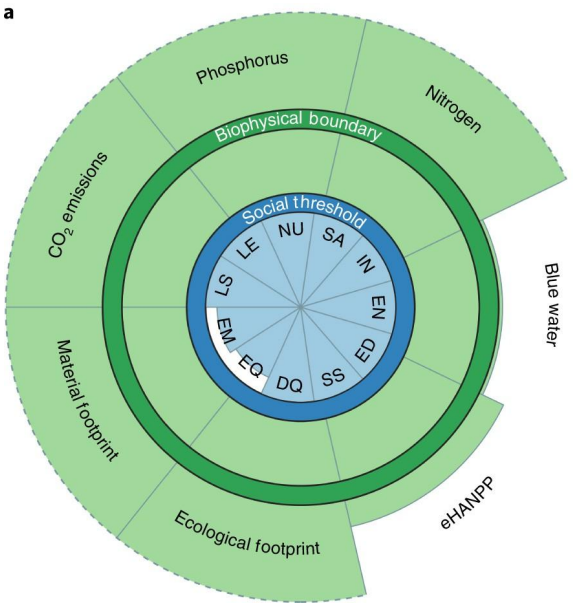
Current situation and prospective

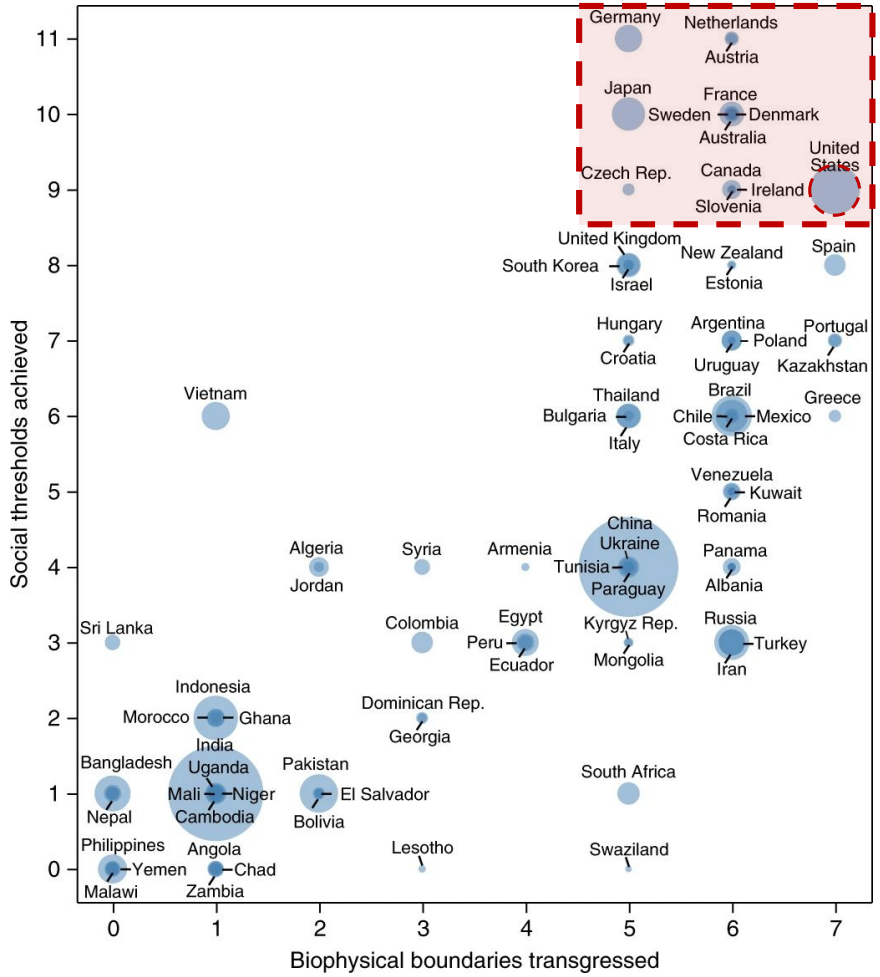
- With more **social thresholds achieved**
- But with fewer **biophysical boundaries transgressed**



Current situation (1)

- Case 1: United States





LS Life satisfaction | LE Healthy life expectancy | NU Nutrition | SA Sanitation | IN Income
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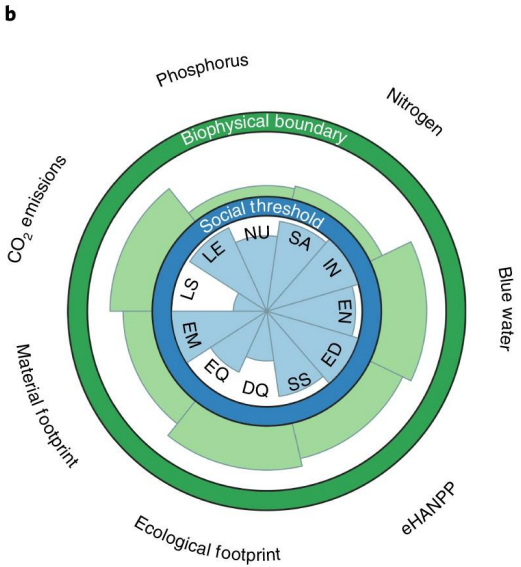
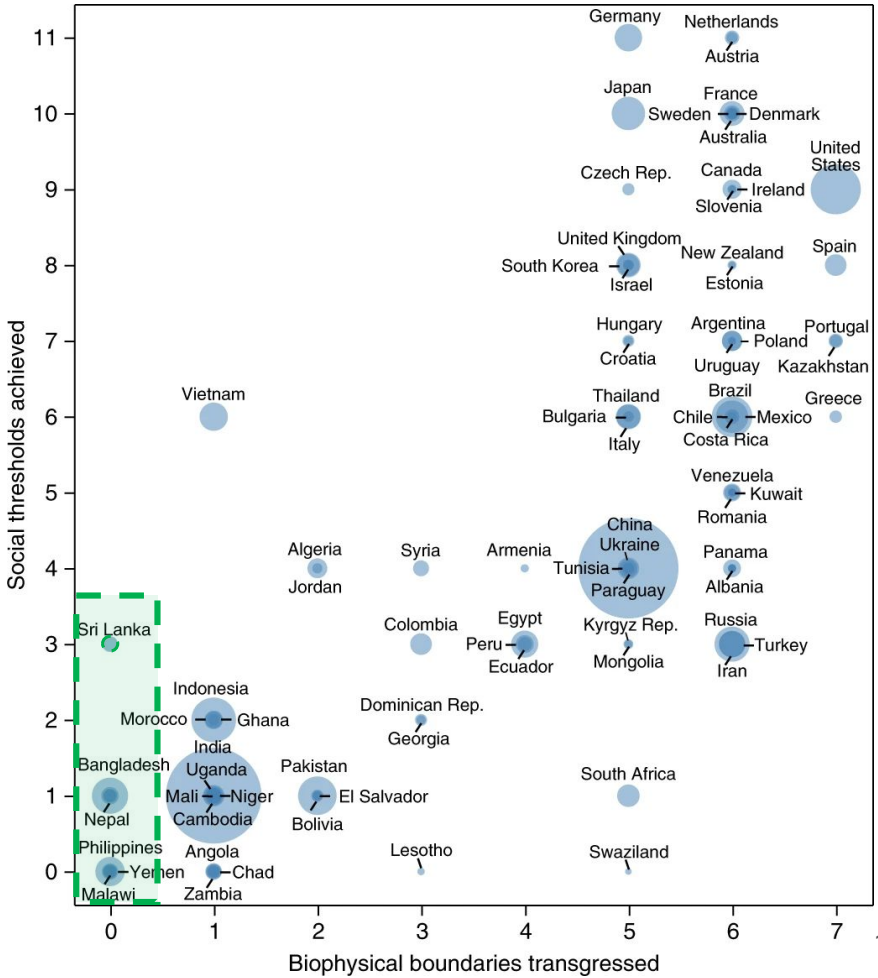
Current situation (2)

- Case 2: Sri Lanka





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How “expensive” to meet basic social needs?

How much resources did the “successful” countries use in achieving these basic social goals?

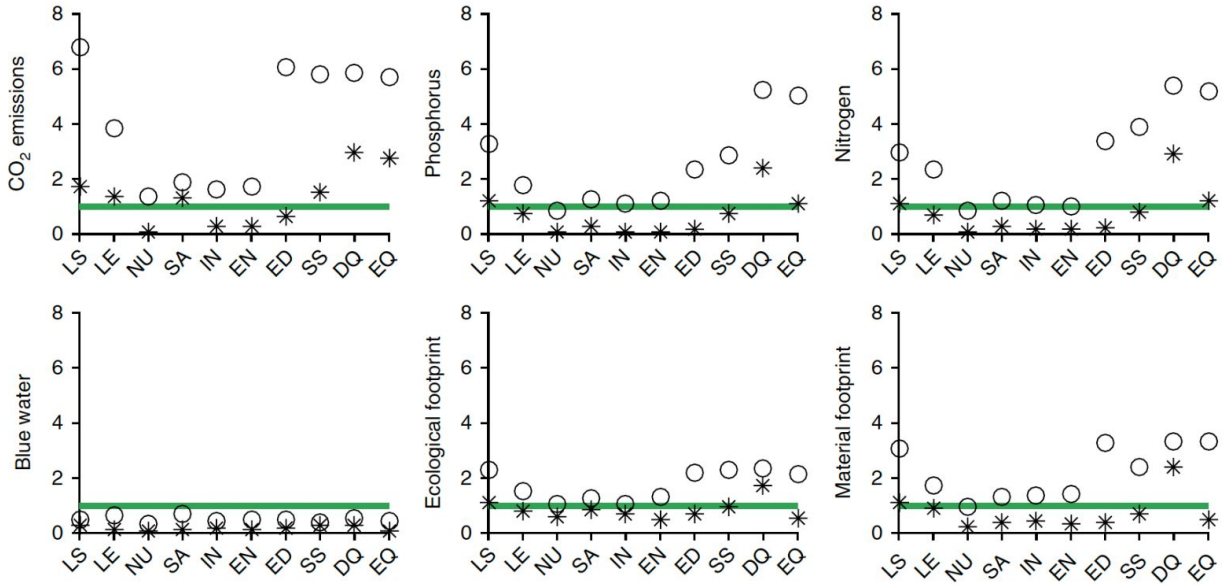

Fig. 4 | Estimated level of resource use needed to achieve a sufficient level of performance on each social indicator. O

LS Life satisfaction | LE Healthy life expectancy | NU Nutrition | SA Sanitation | IN Income
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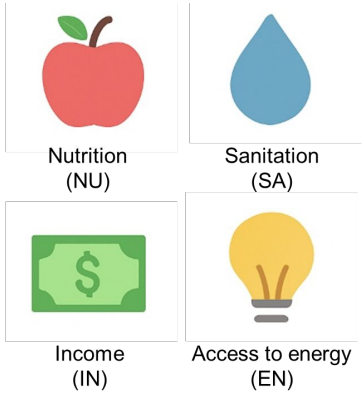
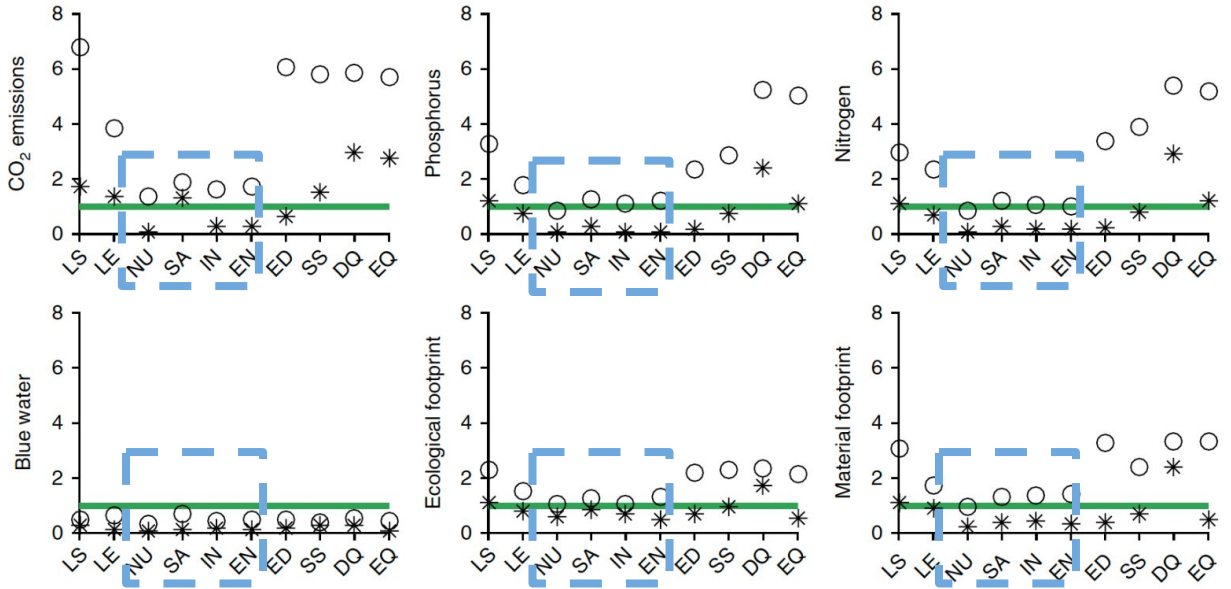
Physical Needs

Physical needs (nutrition, sanitation, energy access, poverty reduction) → achievable within limits.





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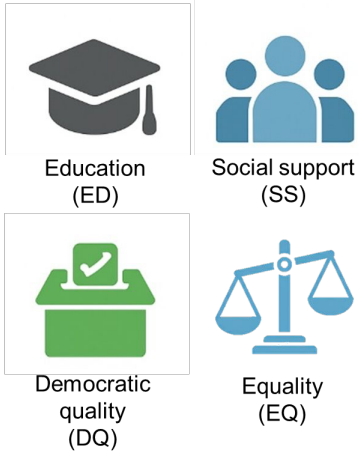
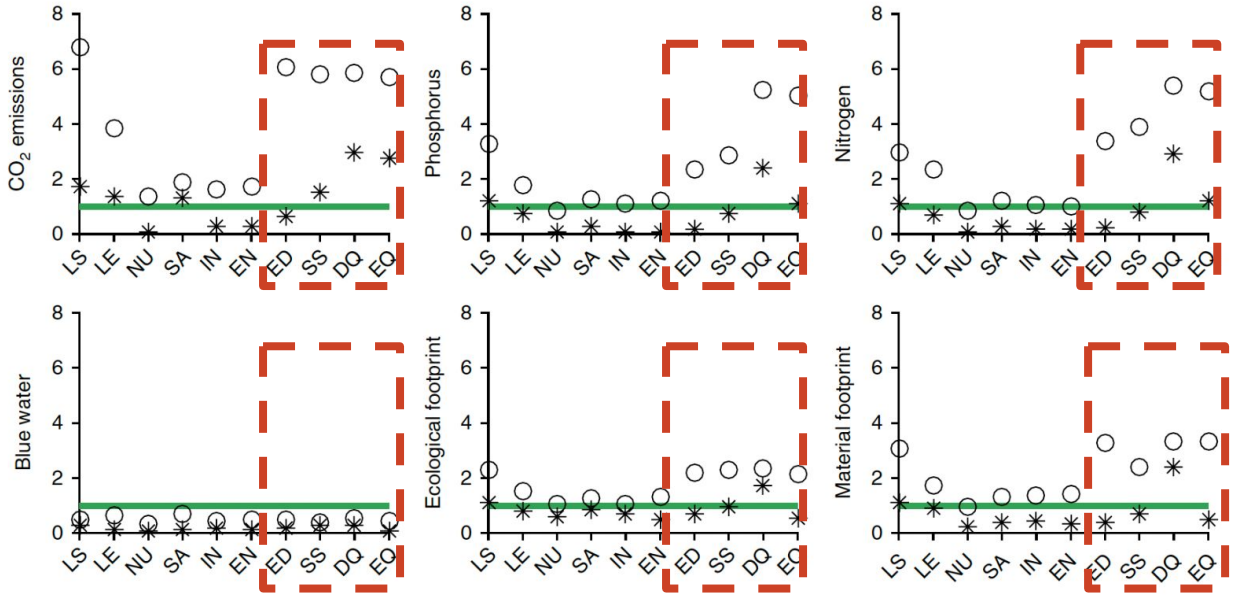
Qualitative Needs

Qualitative needs (education, equality, life satisfaction, democracy) → 2 to 6X overshoot.





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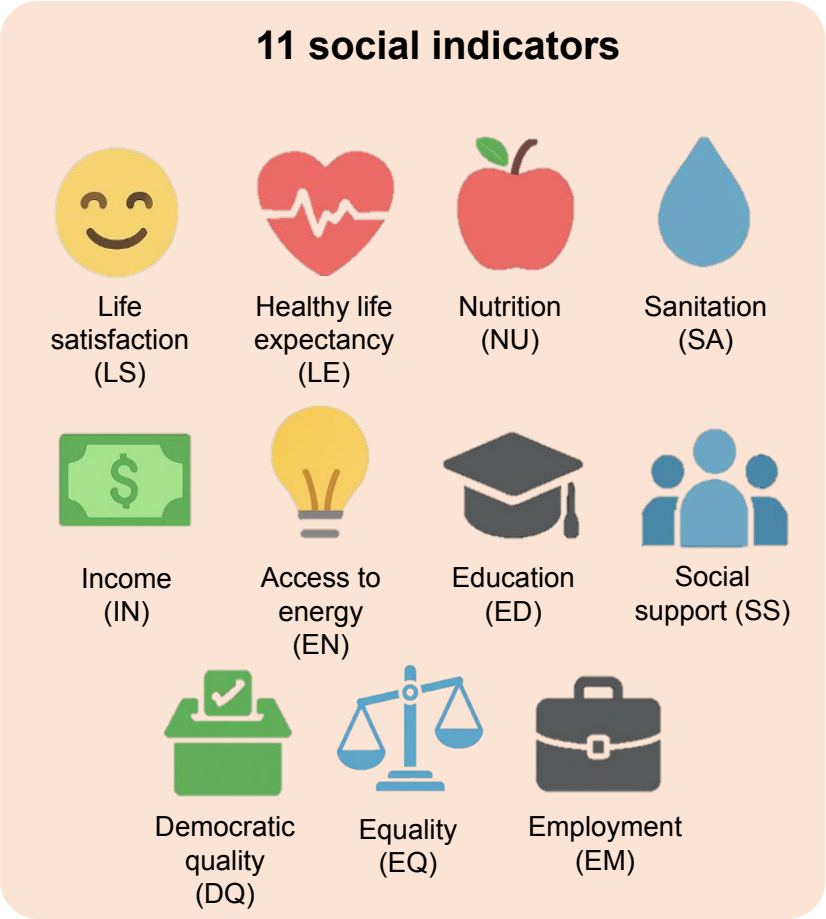
Solutions

Solutions

- Improve Provisioning Systems
  - Investing in renewable energy and longer-lasting products.
  - Reducing inequality and enhancing social support.
- Focus on Sufficiency
  - Shifting the goal from GDP growth towards well-being (degrowth, for wealthy nations)
- Equity: redistribution of resources and opportunities.

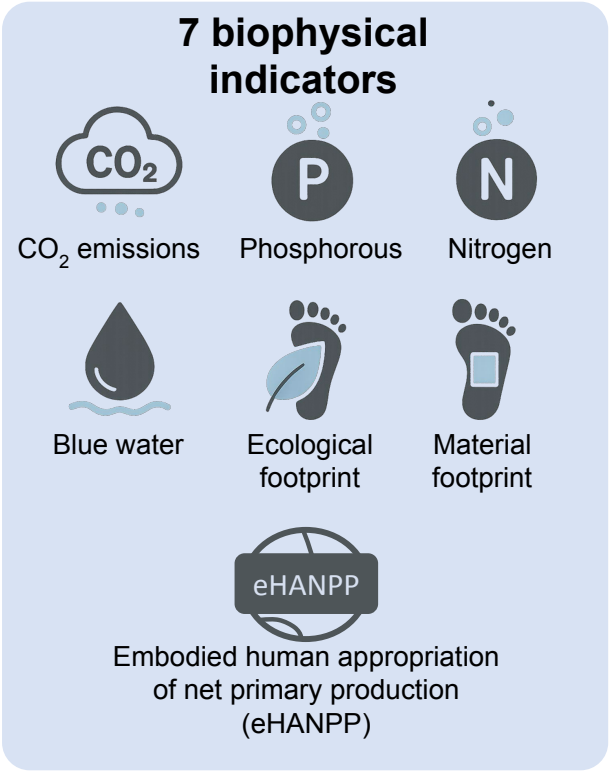
Discussion

What does a good life mean to you?

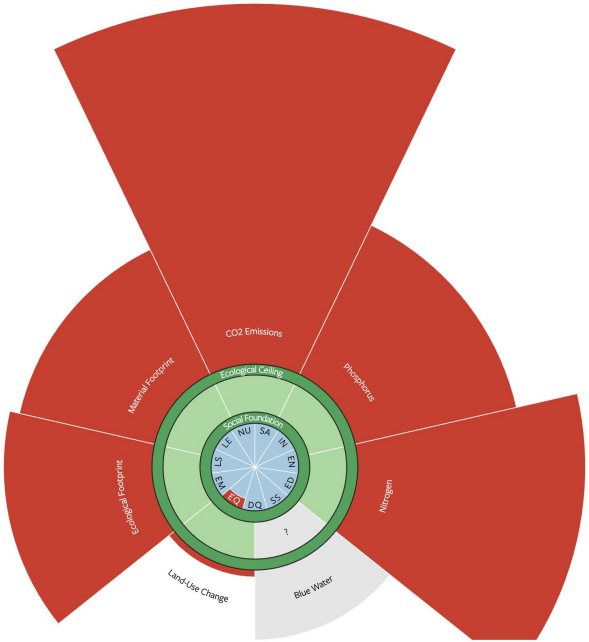


Is dividing planetary boundaries equally per person is fair.

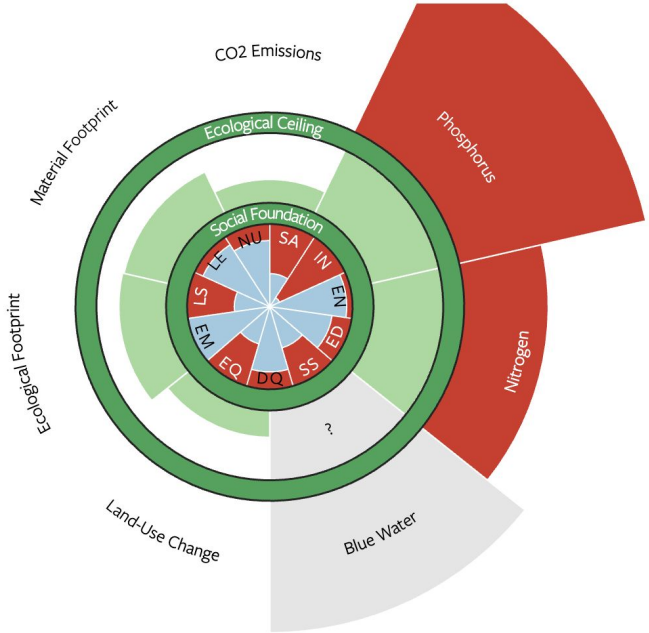
How should resources be allocated: equally, historically, or otherwise?



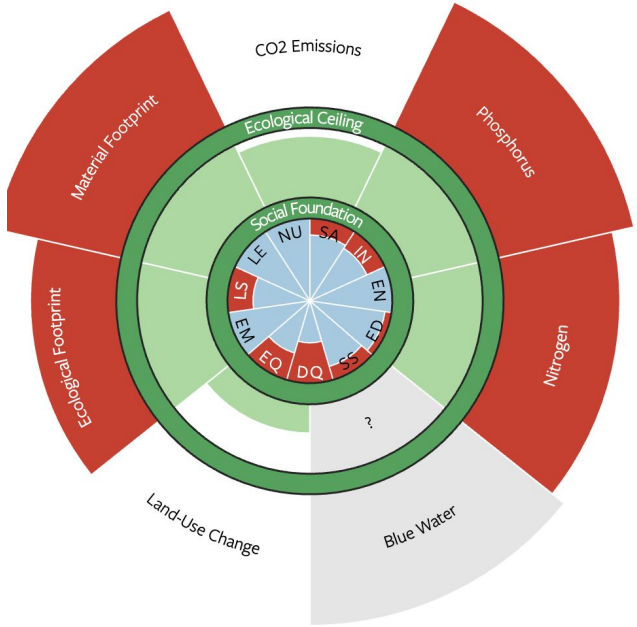
Can societies reorganize around sufficiency and redistribution?



USA



China



India

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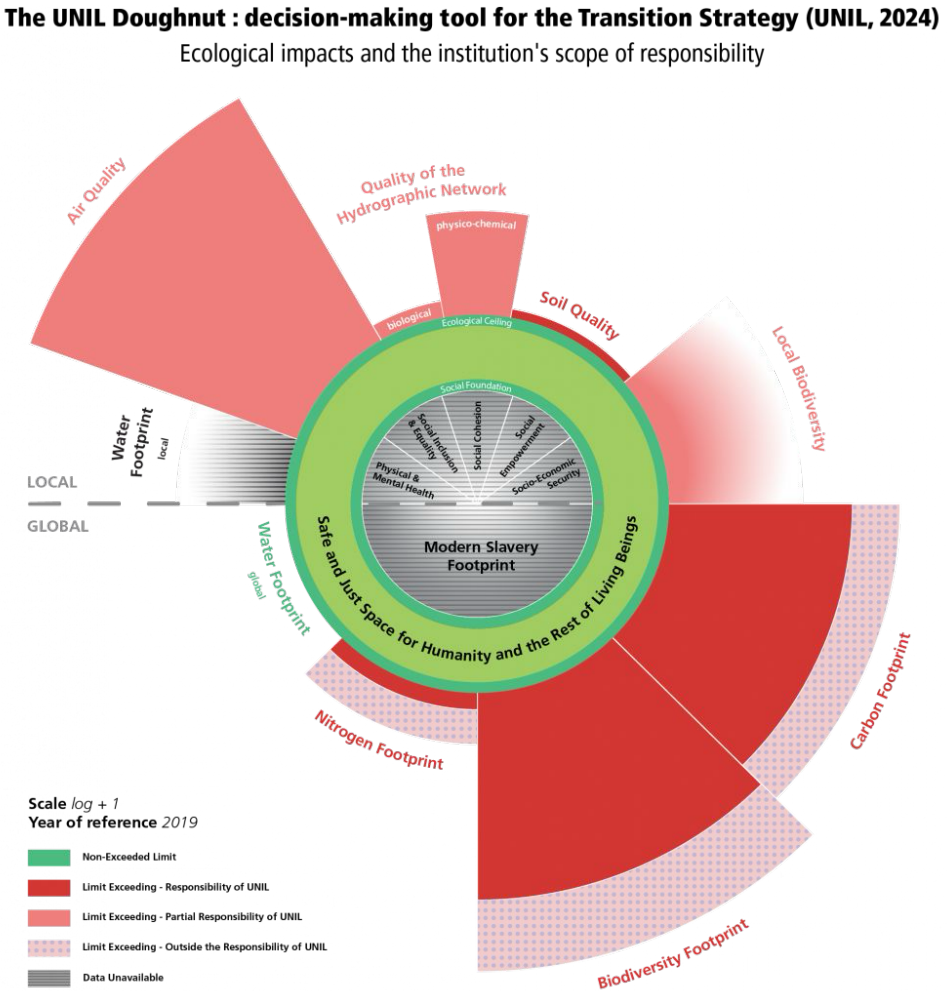
UNIL

The social floor of UNIL's Doughnut building has not yet been quantified.



Source: https://wp.unil.ch/cap2037/en/diagnostic/

Where are the leverage points?

Technology, institutions, culture, individual behavior?

Biophysical Indicators

Supplementary Table 1. Data sources for the biophysical indicators used in the analysis

Indicator	Source	Description
CO_2 Emissions	Eora MRIO database[32,33]	Consumption-based allocation of CO_2 emissions from energy and cement production.
Phosphorus	Eora MRIO database[32,33,35]	Consumption-based allocation of phosphorus from applied fertilizer.
Nitrogen	Eora MRIO database[32,33,37]	Consumption-based allocation of nitrogen from applied fertilizer.
Blue Water	Water Footprint Network[44]	Consumption and pollution of blue water related to the domestic water supply, plus virtual-water imports, minus virtual-water exports.
eHANPP	Kastner et al.[47]	Consumption-based allocation of the human appropriation of net primary production (HANPP) embodied in final biomass products.
Ecological Footprint	Global Footprint Network[56]	Biologically productive land and sea area that is needed to produce the biotic resources that a country consumes, and to assimilate the CO_2 emissions it generates.
Material Footprint	Eora MRIO database[32,33,57]	Consumption-based allocation of used raw material extraction (minerals, fossil fuels, and biomass).

Social Indicators

Supplementary Table 2. Data sources for the social indicators used in the analysis

Indicator	Source	Description
Life Satisfaction	World Happiness Report[64]	Response to the Gallup World Poll's Cantril life ladder question (0–10 scale).
Healthy Life Expectancy	World Happiness Report[64]	Number of years that an individual is expected to live in good health (without major debilitating disease or infirmity).
Nutrition	FAOSTAT[67]	Average calorific intake of food and drink per day, measured in kilocalories per capita.
Sanitation	World Bank[73]	Percentage of the population using improved sanitation facilities
Income	World Bank[73]	Percentage of the population living on more than $1.90 a day.
Access to Energy	World Bank[73]	Percentage of the population with access to electricity.
Education	World Bank[73]	Percentage enrolment in secondary school.
Social Support	World Happiness Report[64]	National average of responses to the question "If you were in trouble, do you have relatives or friends you can count on to help you whenever you need them, or not?"
Democratic Quality	World Happiness Report[64]	Average of two Worldwide Governance Indicators: voice and accountability, and political stability.
Equality	Standardized World Income Inequality Database[85]	Gini coefficient of household disposable income (i.e. after taxes and transfers).
Employment	World Bank[73]	Percentage of the labour force that is employed.