

The Thin Green Line

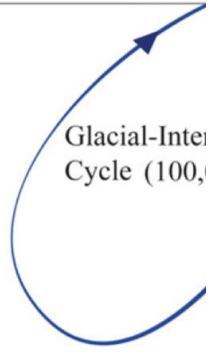
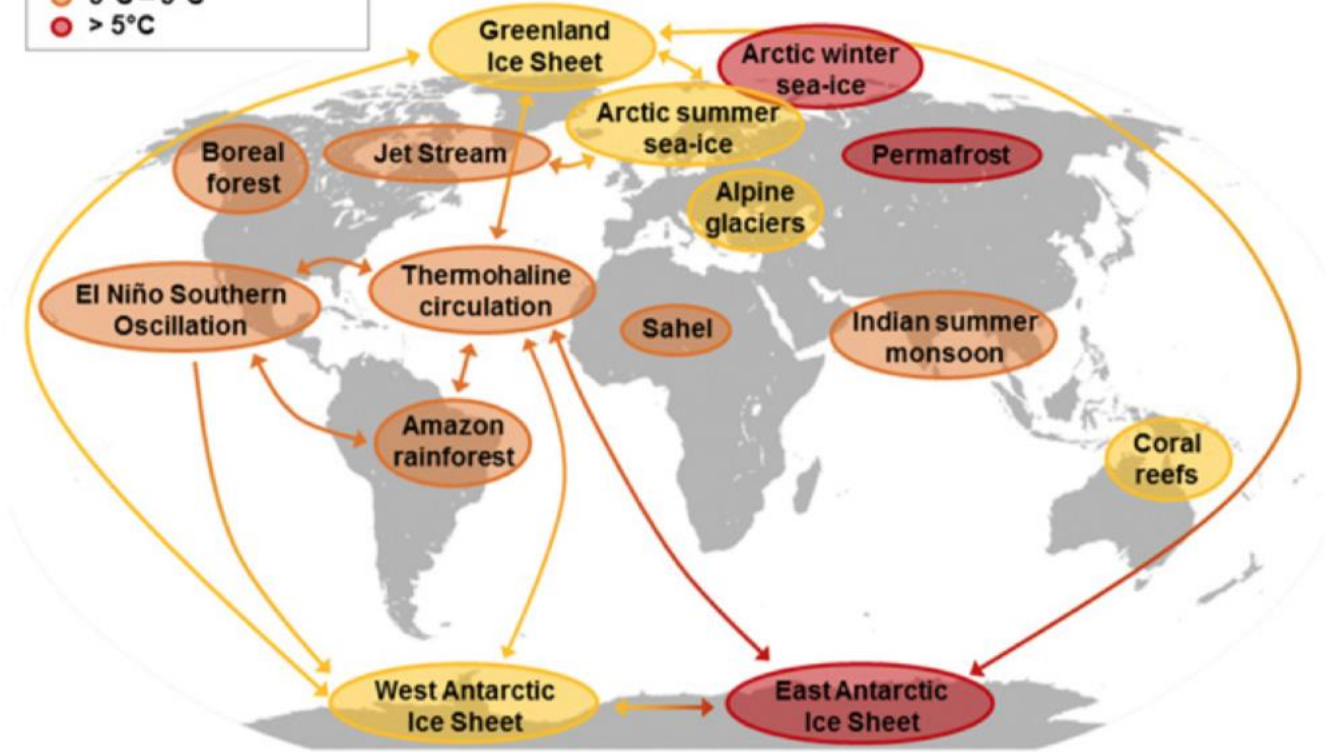
Rewired food systems **to stay within the planetary boundaries**

Bertebos Conference
Falkenberg
Aug 2018

Line Gordon, associate professor
Director, Stockholm Resilience Centre
Board of Directors EAT Foundation

Tipping elements at risk:

- 1°C – 3°C
- 3°C – 5°C
- > 5°C



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 ΔT
 20

The Great Acceleration

SOCIO-ECONOMIC TRENDS



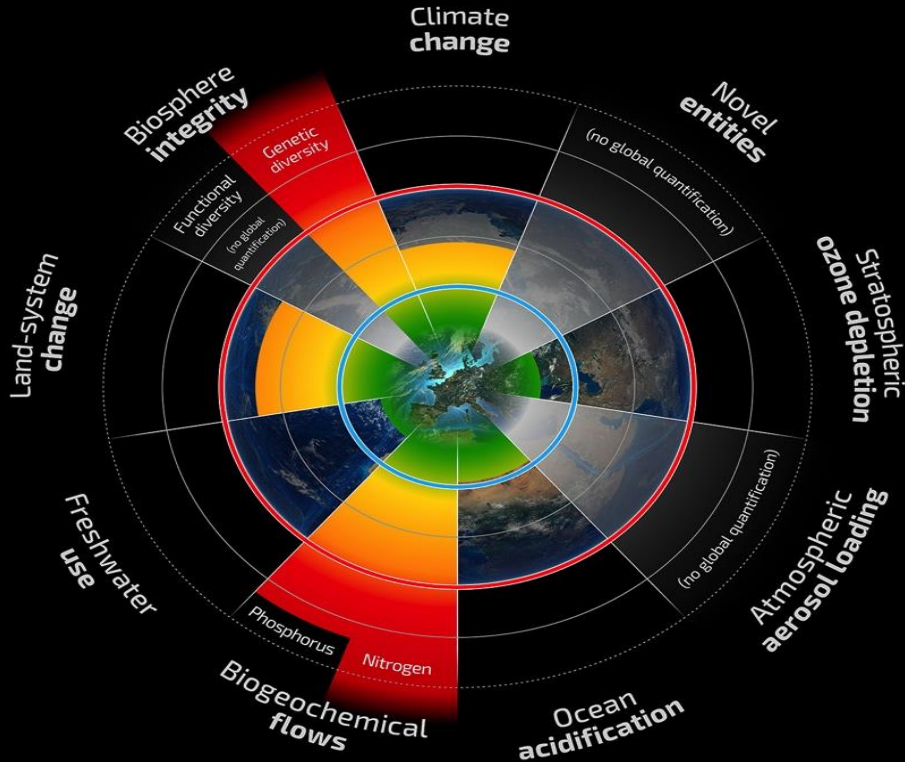
EARTH SYSTEM TRENDS



Steffen et al. 2015

Image: GLOBAIA

Planetary boundaries



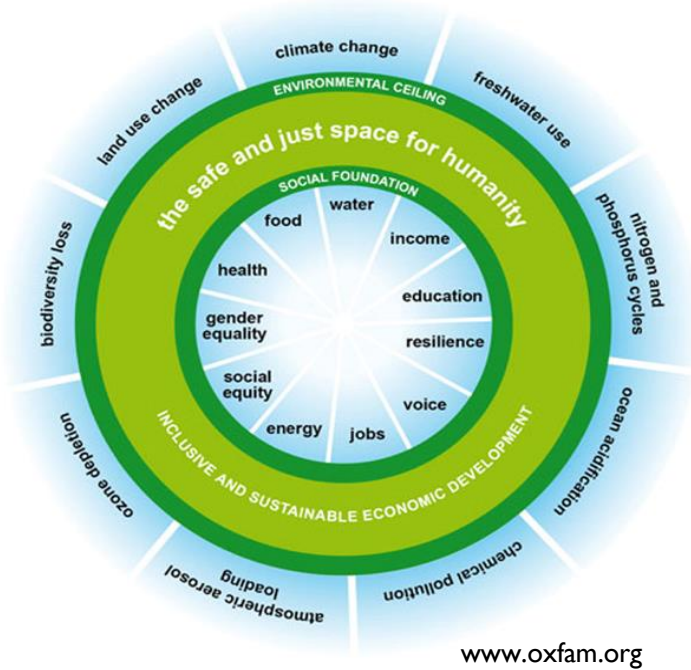
Safe Operating Space
Inside which we have opportunities for change

Zone of Uncertainty
Where we see increased risks of rapid change

Planetary Boundaries
Large risks to destabilize the biosphere

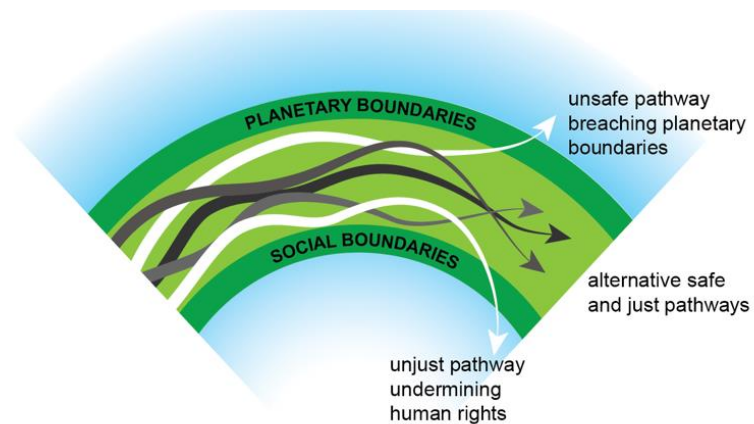
Development doughnut

- Above a social floor, below the planetary boundaries



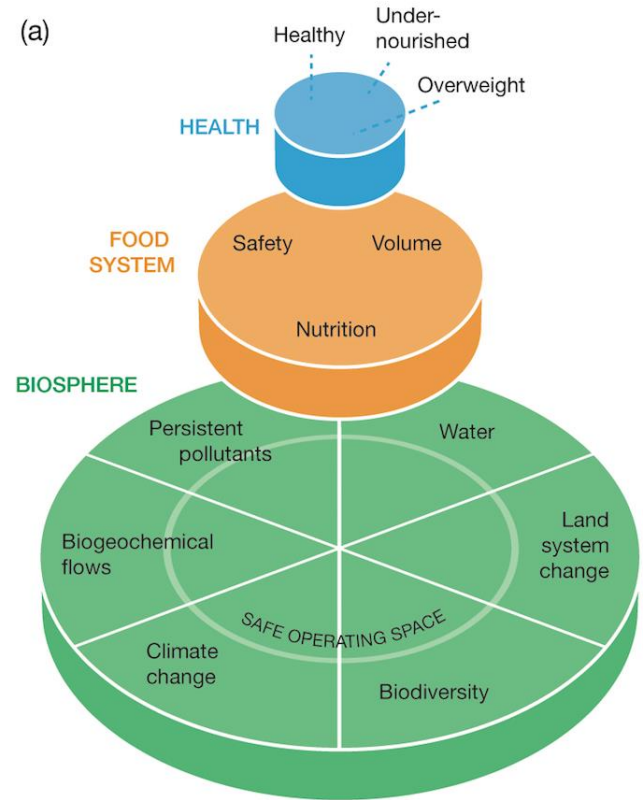
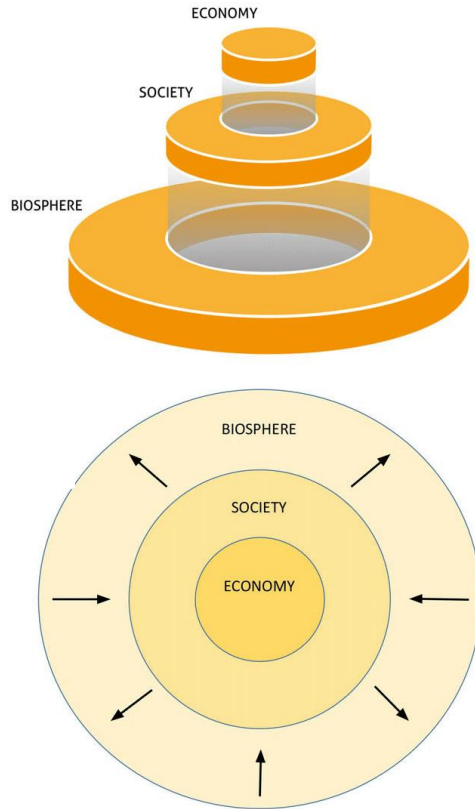
Fair, secure, inclusive,
sustainable

Need to find ways to live
within these limits



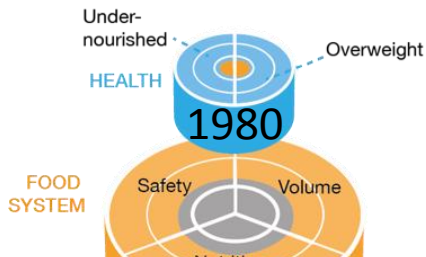
Raworth 2012

Humanity's development within the biosphere

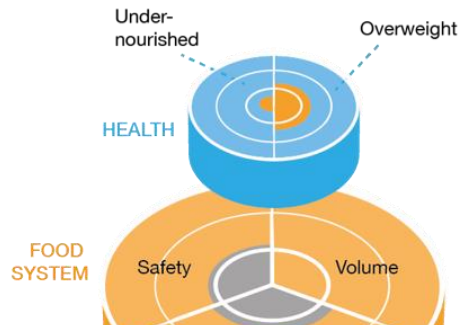


Food consumption => halved undernutrition, doubled overweight

(a)



(b)



Production:

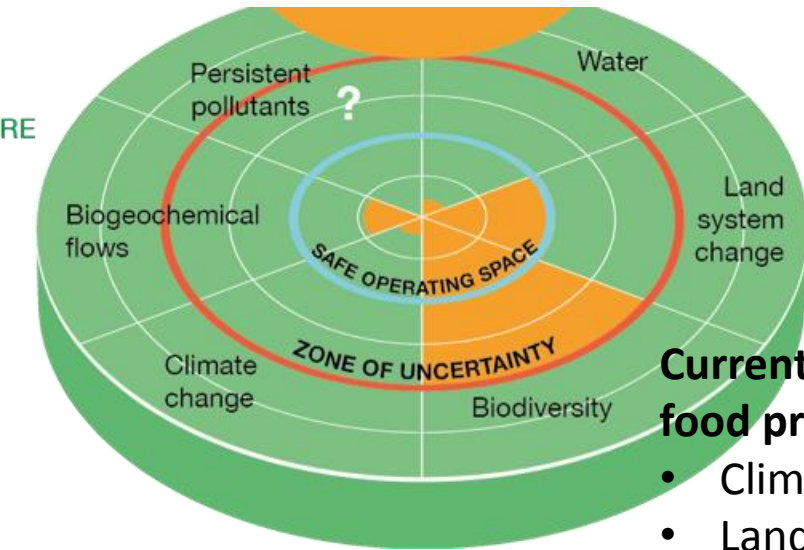
- Intensification (doubling of yields, doubling ton/animal), 8% expansion of land
- Nutritional content of food not improving
- Antibiotic resistance going up

Health:

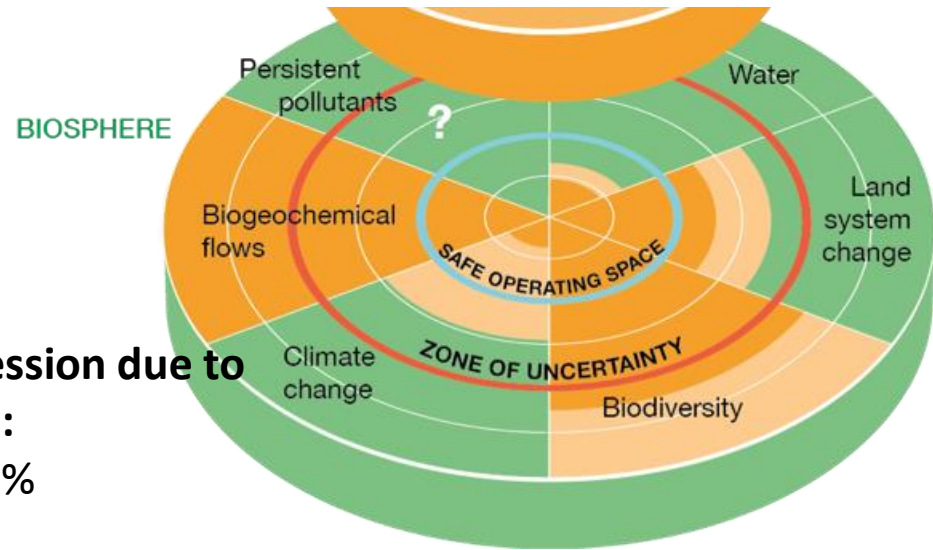
- Undernourishment 19% 1980 to 11% 2015; Child stunting 40% to 24%
- Overweight from 25% in 1980 to 39% in 1990; Obesity from 6% to 12%

Food **production** => crossed at least 4 out of 6 analyzed planetary boundaries

1960



2015



Current transgression due to food production:

- Climate ca 25%
- Land ca 75%
- Biodiversity ca 75-80%
- N and P ca 100%
- Water ca 70%

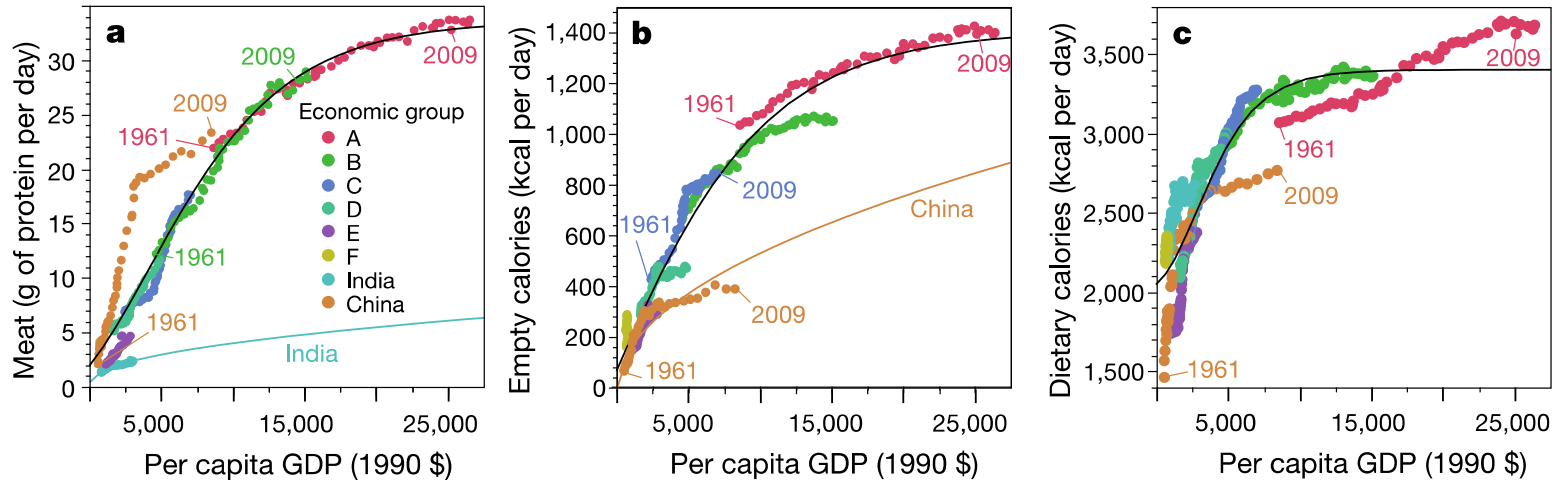
Options for keeping the food system within environmental limits



A modelling study to understand what it would take to feed a global population a healthy diet within the planetary boundaries

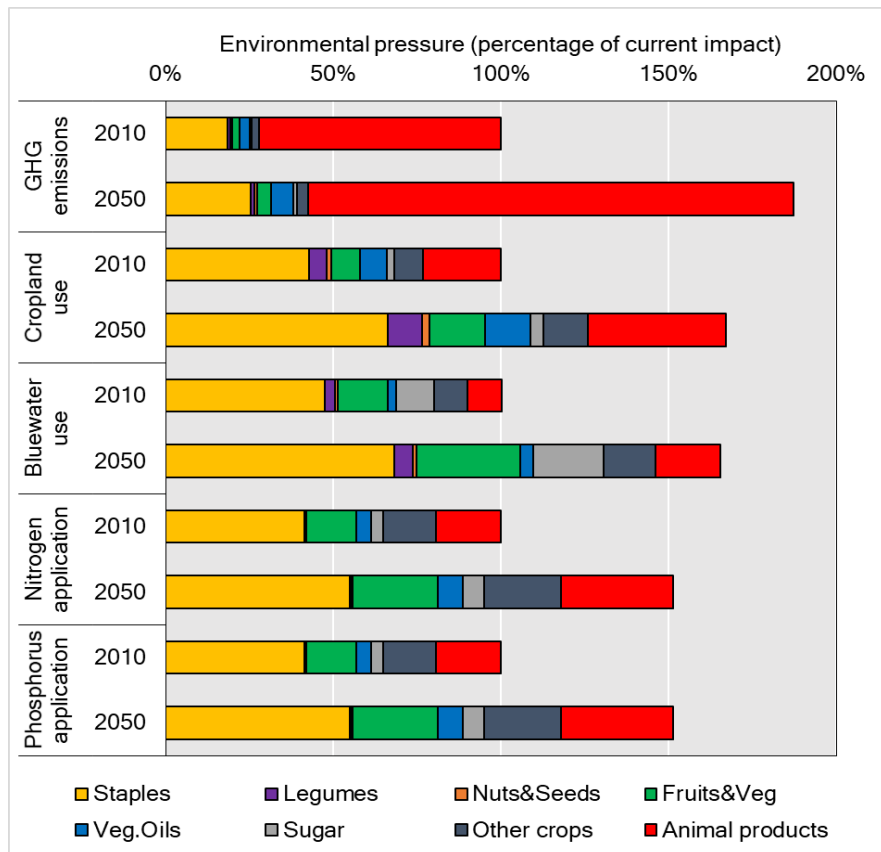
Led by *Marco Springmann* at Oxford Martin School

Eating habits change with economic growth



Increase with economic growth:
More meat, more empty calories, more calories in total

Current and projected environmental pressures in 2010 and 2050 on five environmental domains by food group



Greatest increase

- for GHG emissions (87%)
- demand for cropland use (67%),
- bluewater use (65%),
- nitrogen application (51%),
- phosphorus application (54%)

Staples and animal products
important groups

There are several options several options for reducing the environmental impacts of the food system



Scenarios	Medium (stated ambitions)	High (beyond expectation)
Socio-economic pathways	SSP2	SSP1
Reductions in food loss and waste	-50%	-75%
Improvements in technologies and management	Tech	Tech +
Dietary change	Dietary guidelines	Plant based flexitarian

Global food consumption (g/d) in FLX scenario

	BMK 2010	FLX	%
Wheat	117,6	86,2	-27%
Rice	126,4	64,2	-49%
Maize	33	24,9	-25%
Legumes	16,7	51,7	210%
Soybeans	4,8	25	421%
Nuts and seeds	13,3	51	283%
Vegetables	229,1	405,4	77%
Fruits	127,4	208,9	64%
Sugar	51,4	29,8	-42%
Beef	25,2	6,7	-73%
Lamb	5,3	2,7	-49%
Pork	37,9	4,5	-88%
Poultry	30,7	24,1	-21%
Fish and shellfish	21,6	35,8	66%

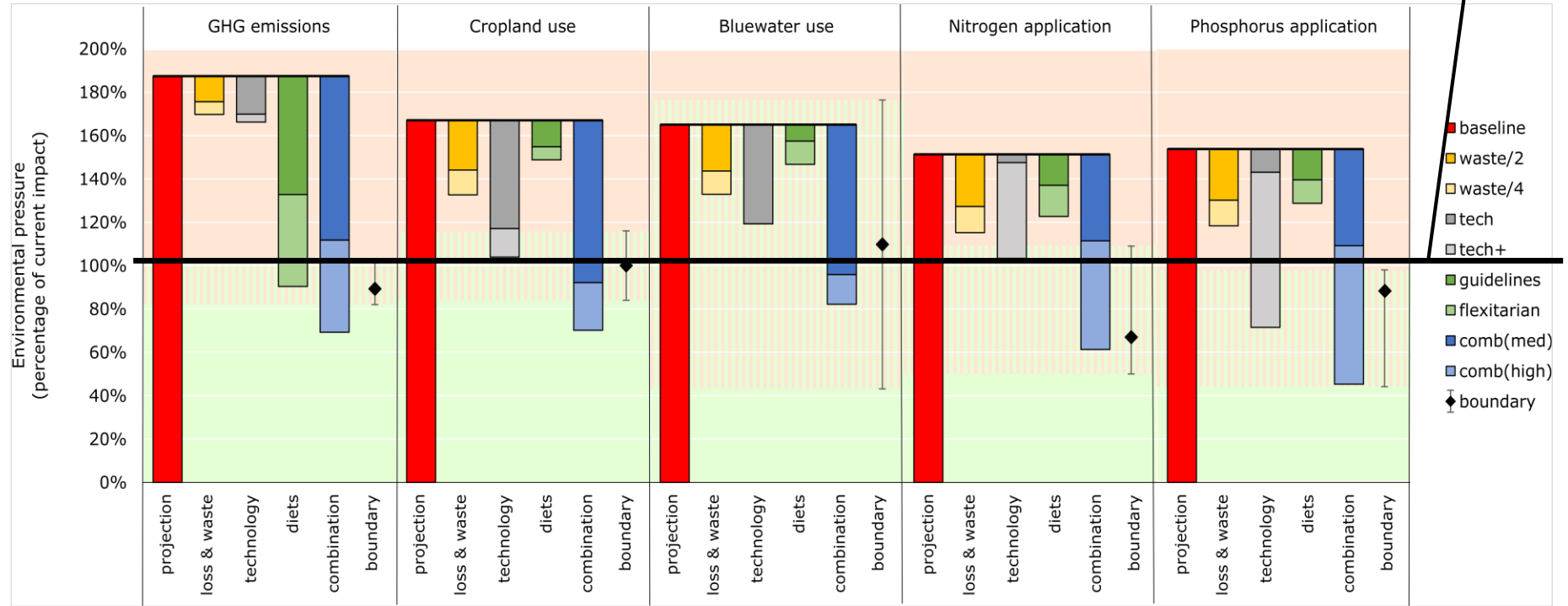


50 g per week



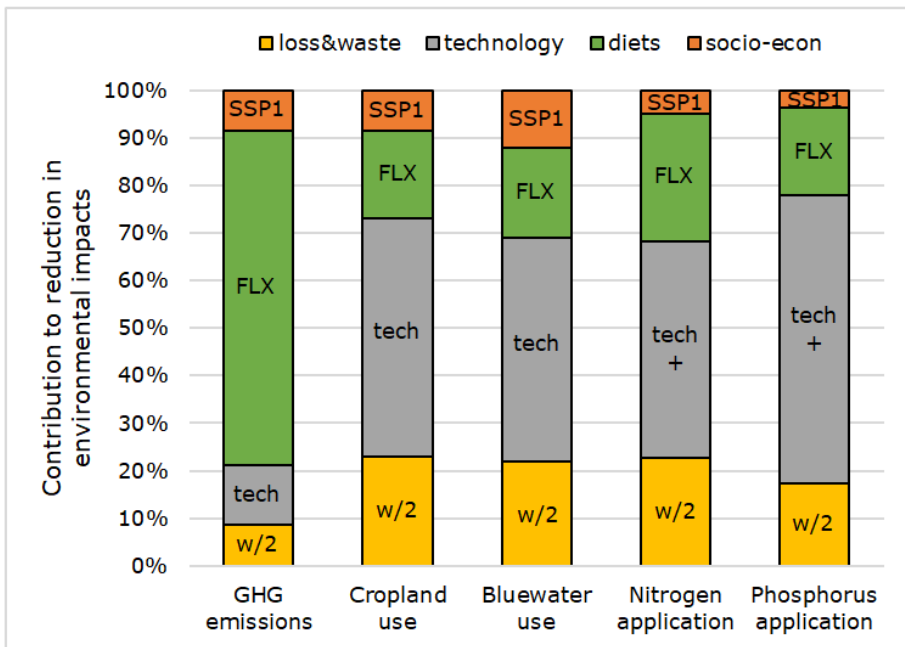
Impact on planetary boundaries 2050 in different scenarios

Today





Combination of mitigation measures to stay below the planetary-boundary range



Dietary change most important for GHG emissions

Tech change most important for other variables

But combination needed across scenarios

Uncertainties

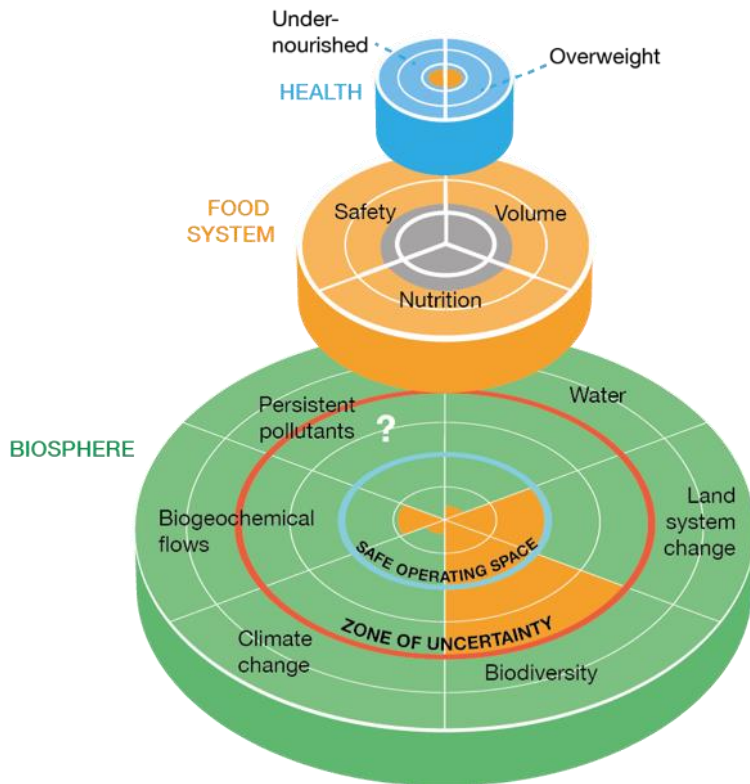
- Planetary boundaries themselves
- Set-up of modelling framework
- Uncertainty of scenario analysis

Needed shifts

(a)

(b)

Under-

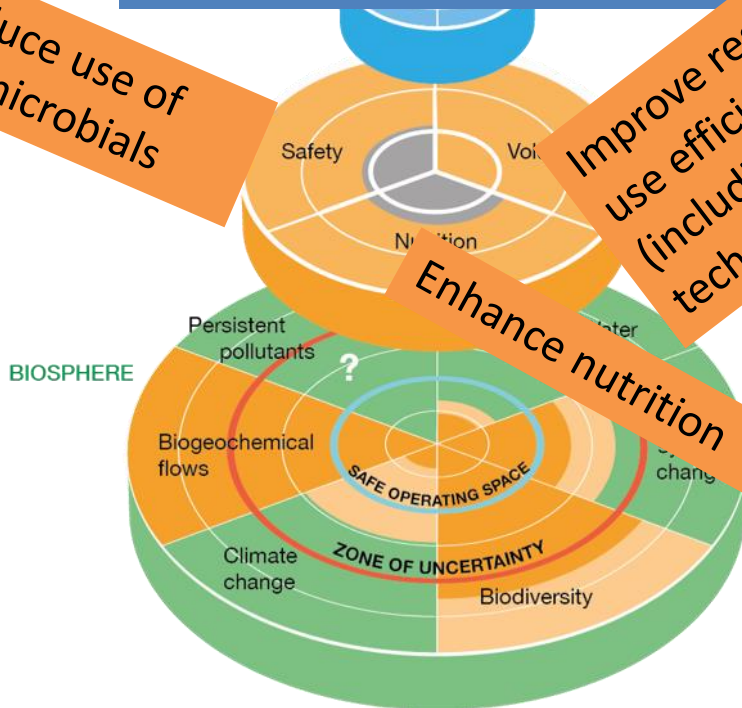


Diets that are both healthy and sustainable

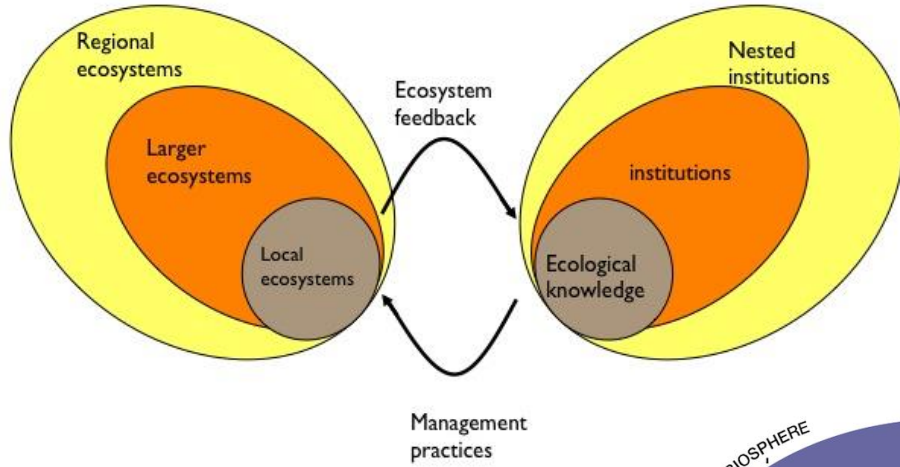
Reduce use of antimicrobials

Improve resource use efficiency (including waste and technology)

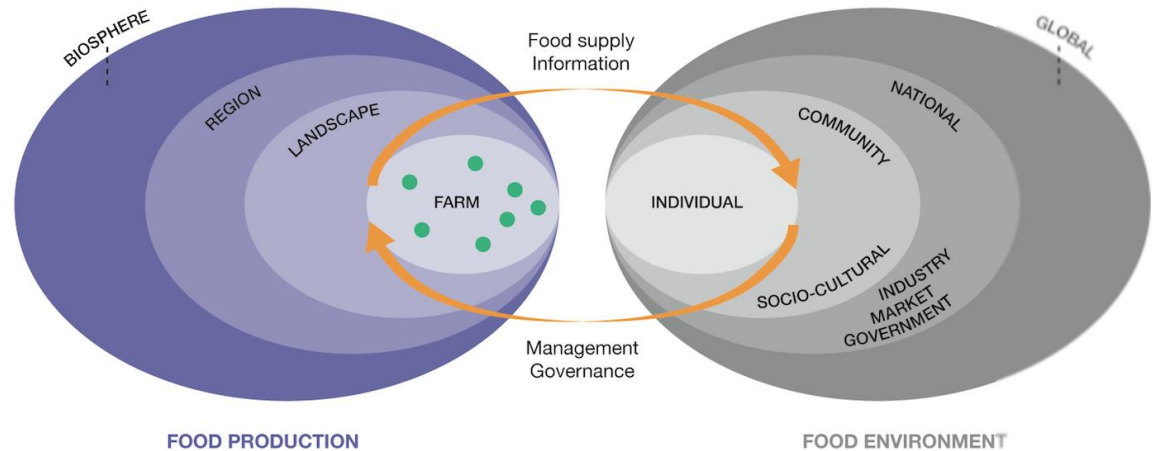
Enhance nutrition



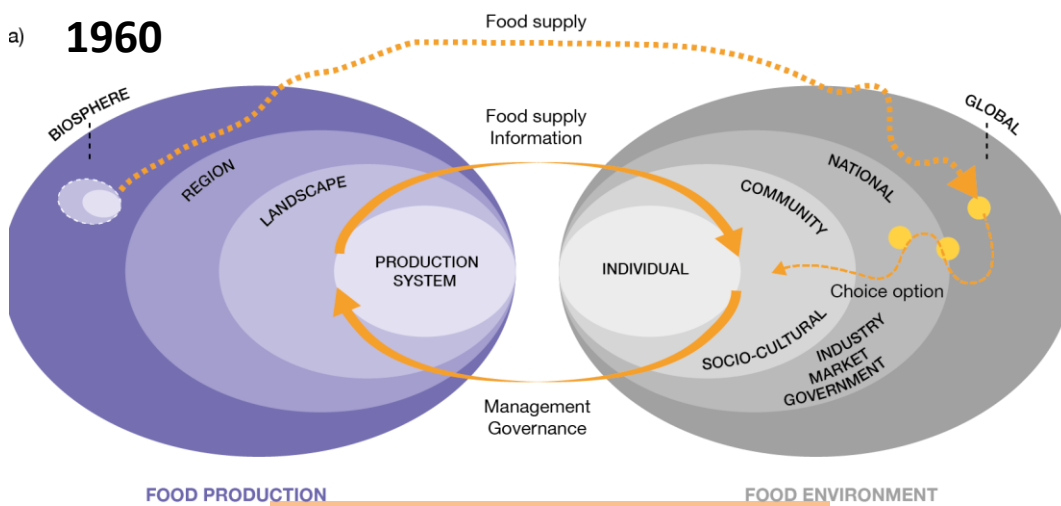
Change in relationships between consumption and production of food



Berkes, Folke, Colding. 2003 Navigating social-ecological systems

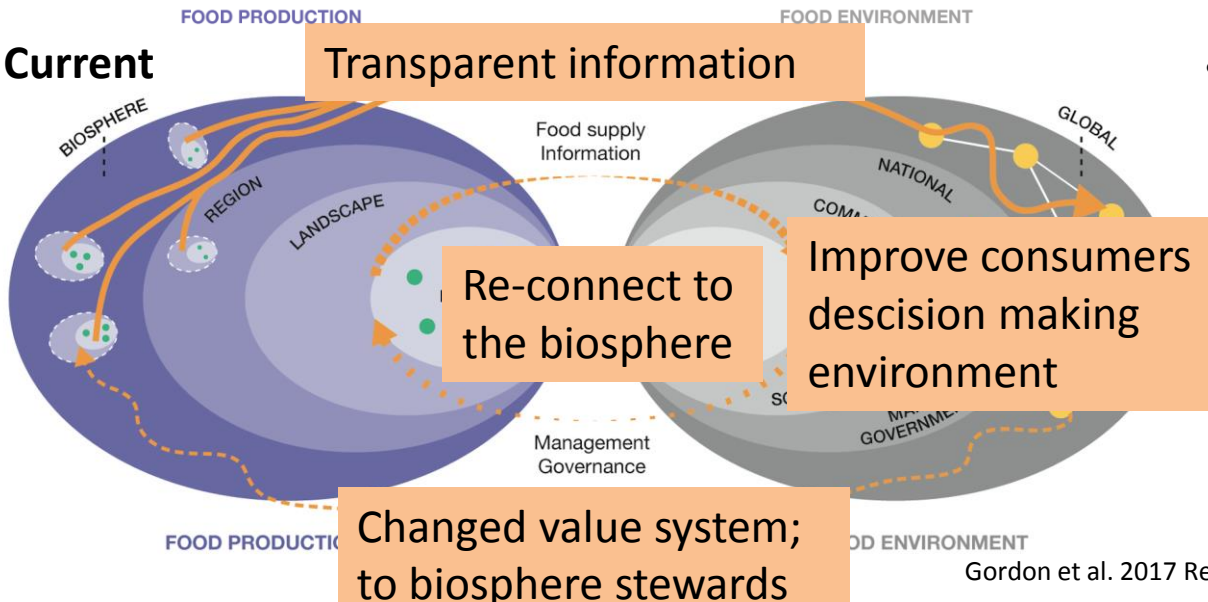


a) 1960



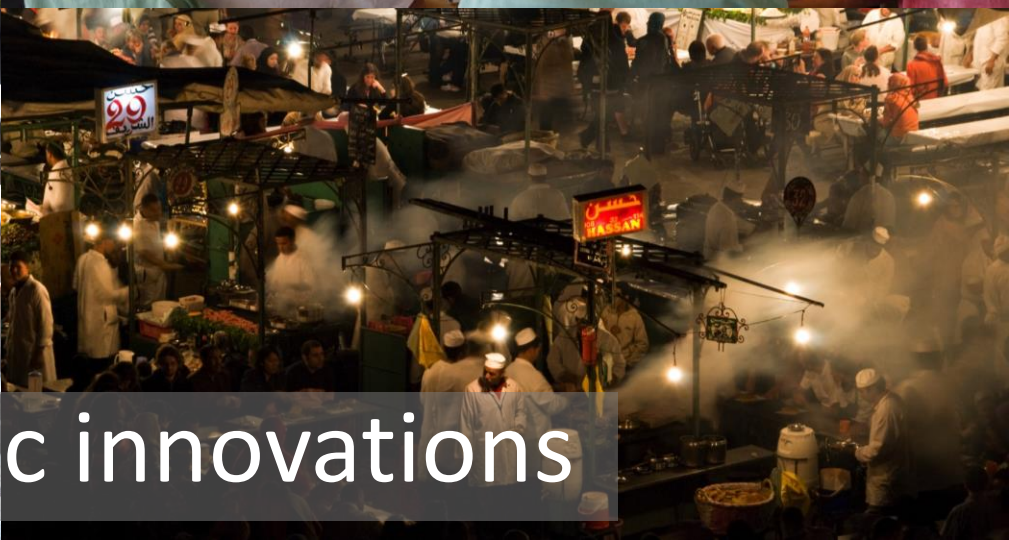
- More distant production
- Reduced transparency
- Growth of a few global actors
- Changed food environment for consumers
- "De-coupling" between producers and consumers

Current





Culture & Stewardship



Gastronomic innovations



Thanks!
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Photo: O.Henriksson/Azote