



Using science in targets for biodiversity

Planetary boundaries and the MSA indicator

30-4-2019 | Rob Alkemade, PBL Netherlands Environmental Assessment Agency



Overview

- > The 2050 vision for biodiversity
- > Operationalizations:
 - Half earth – whole earth
 - Based on planetary boundaries for biodiversity
- > Indicators: Mean Species Abundance
- > Contributions of economic sectors
- > Down-scaling to country level



2050 vision on biodiversity

'Living in harmony with nature' where 'by 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people'



Half earth – whole earth



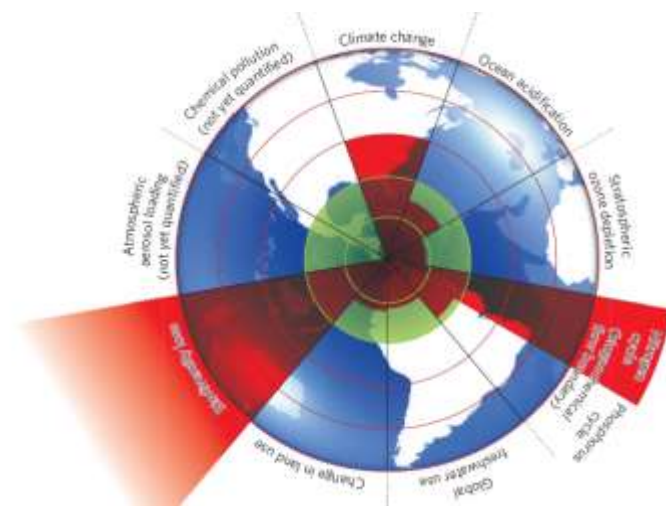
- › Nature needs half (e.g. Wilson et al., 2016)
 - Increase protected areas as to protect half of the land and sea area
 - What about the rest ?



- › Whole earth
 - Sustainable use of the whole planet

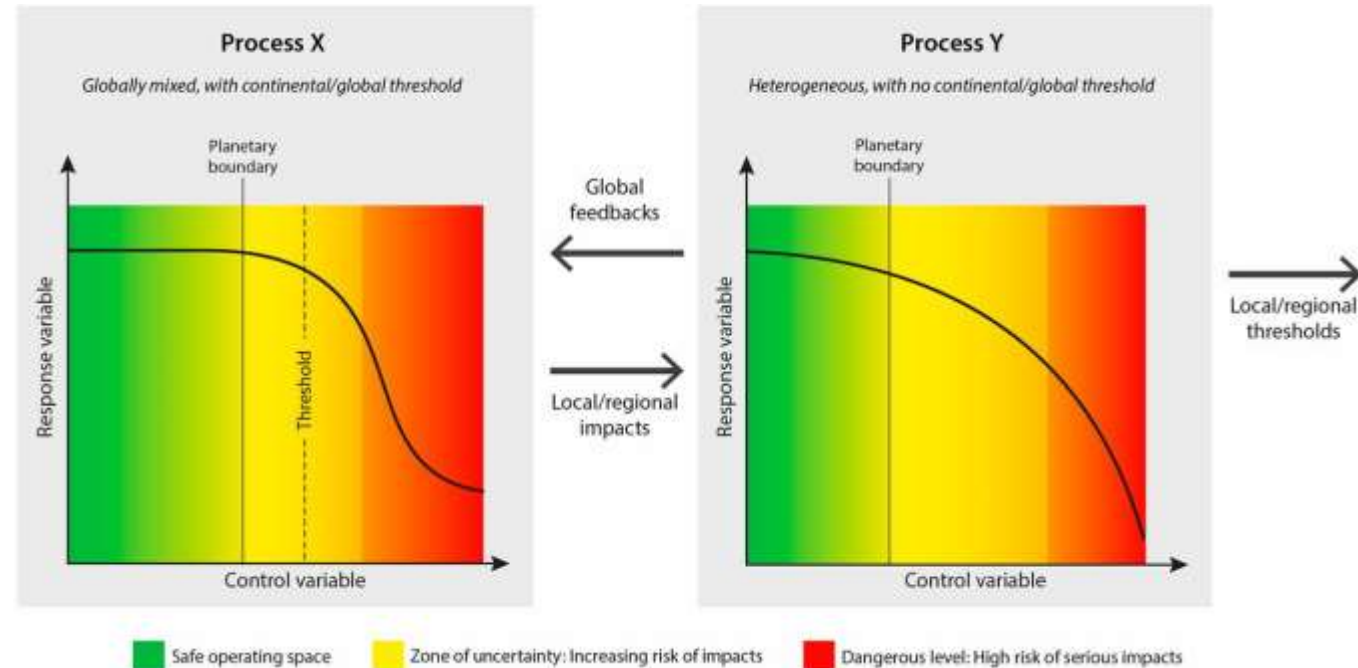
Planetary boundaries (1)

- A safe operating space for humanity (Rockstrom et al., 2009)
 - Environmental changes remain within the conditions of the 'Holocene'
 - Critical processes for the functioning of the Earth System
 - Biodiversity loss: indicated by species extinction rate



Planetary boundaries (2)

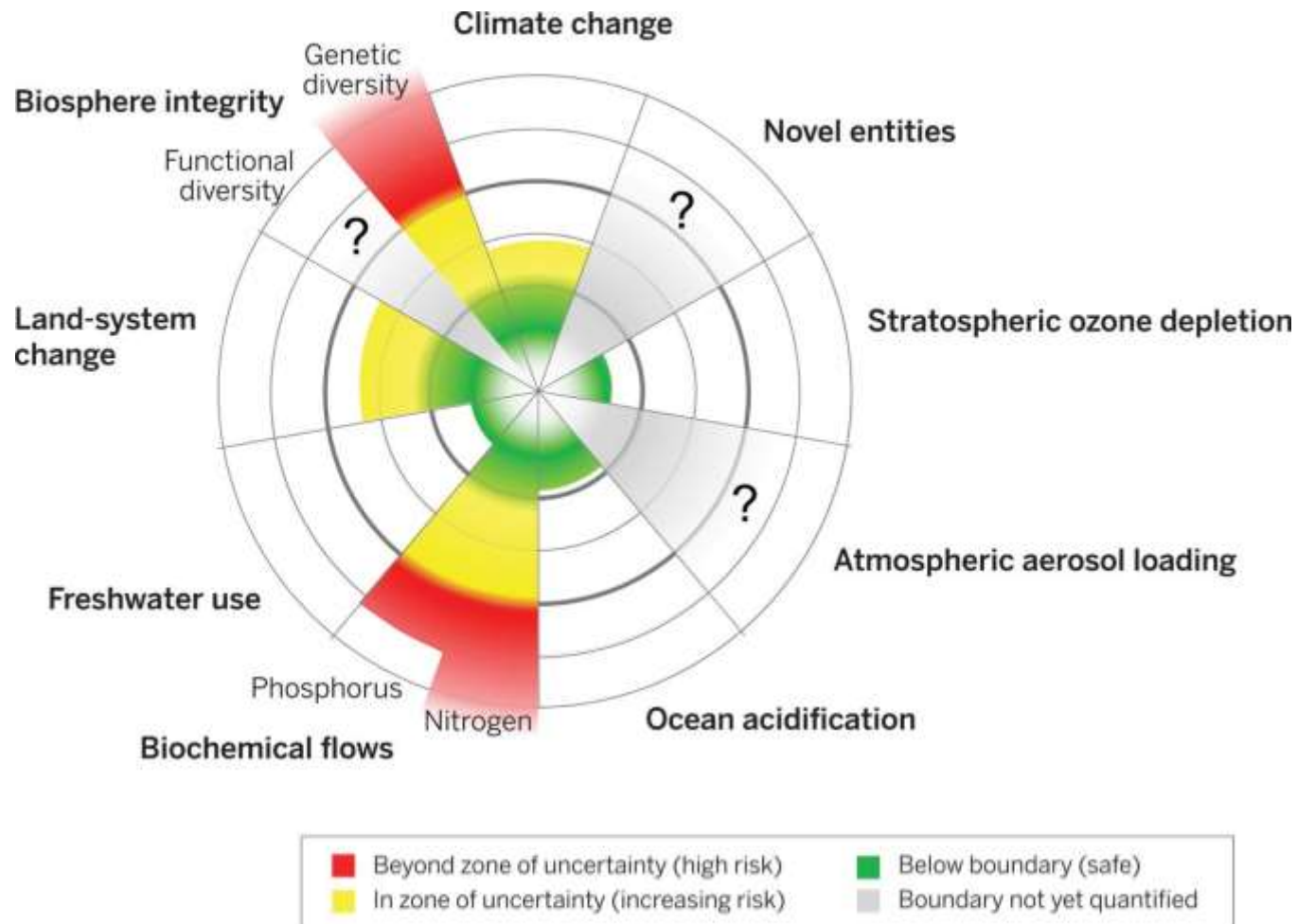
- > Crossing boundaries could generate abrupt or irreversible environmental changes
 - Precautionary limits
- > Many scientific uncertainties/discussions still ongoing
 - Boundary processes; indicators; limits; ...
 - Used as science-based targets / global resource budgets



Planetary boundaries (3)

- > For biosphere integrity:
 - Genetic diversity: Species extinctions between 10-100 E/MSY
 - Functional diversity: BII set at 90%, but with range between 30-90%

Steffen et al., Science, 2015

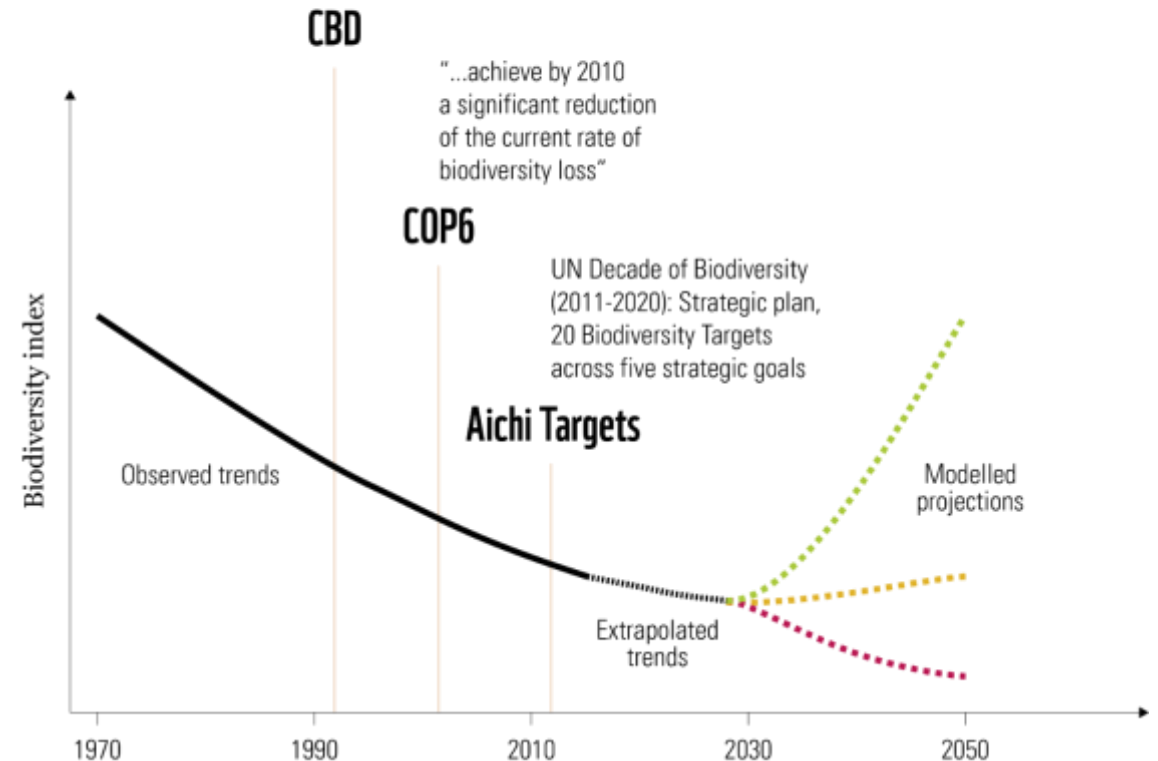


Bending the trend

Global view using scenarios

- Biodiversity decline has continued despite repeated policy commitments
- Models and scenarios can help to design Roadmaps, and find solutions
- Alternative pathways available
 - Sharing, sparing and caring
- Using complementary indicators
 - Extinction risk (BRIM, based on red list)
 - Population abundances (LPI)
 - Ecosystem integrity (BII, MSA)
 - Cover of hot-spots

"Develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity; Integrate [...] the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies"



MSA indicator

- › Mean Species Abundance (MSA) of originally occurring species
- › Comparison between populations of human-disturbed habitats and undisturbed natural habitats
- › A measure of Naturalness (Ecosystem integrity)
- › Dimensions:
 - Index (0 – 1) or
 - Quality weighted areas (MSA* km²)

Forest

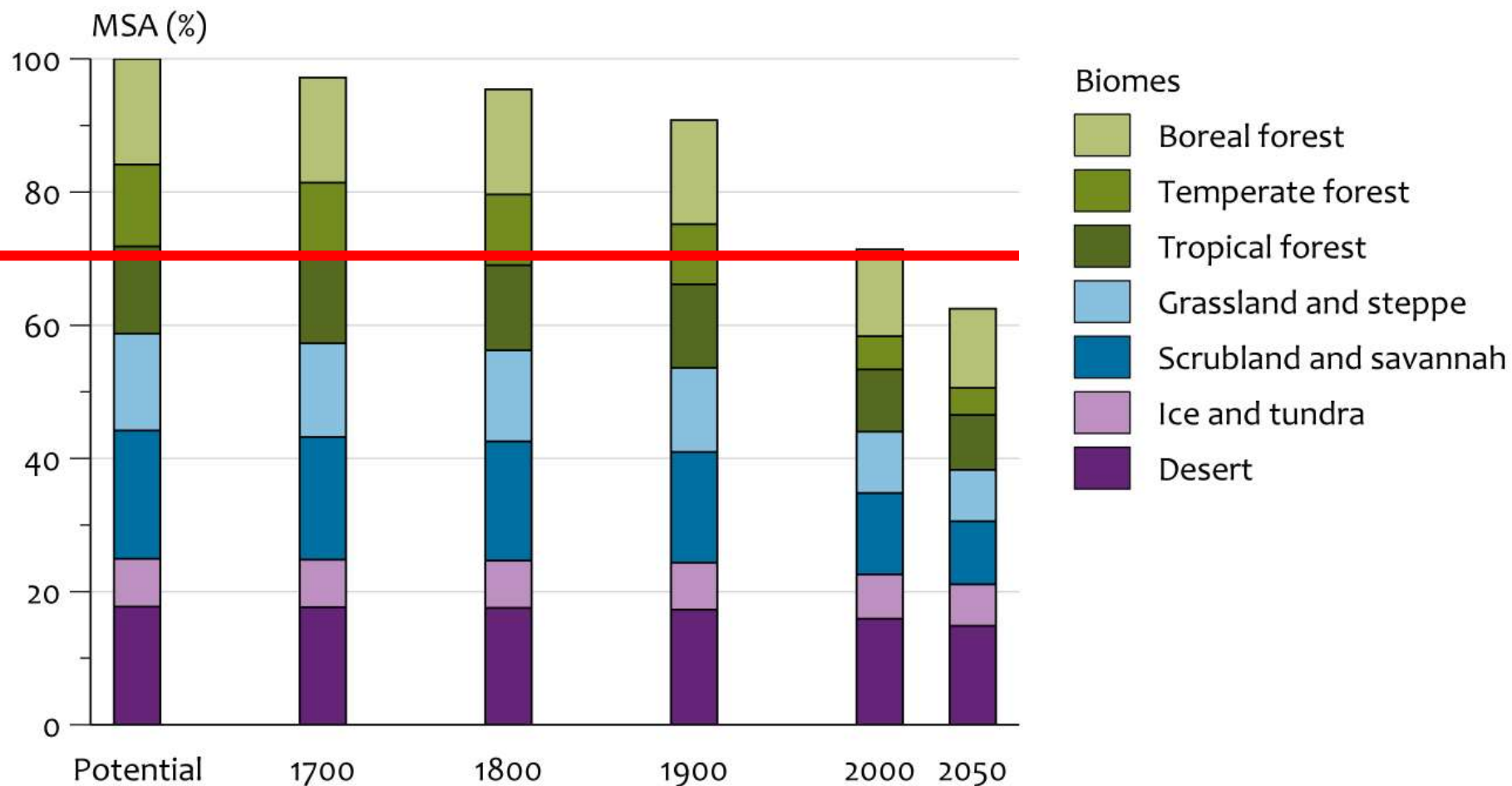


Grassland



Global MSA in baseline scenario

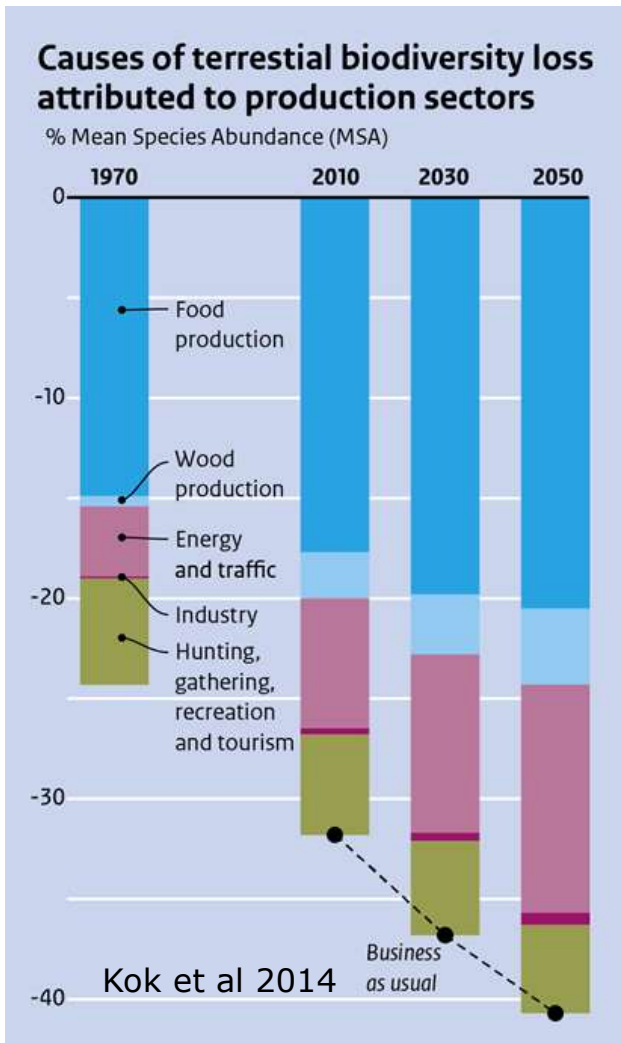
Planetary
Boundary



“Bending the curve”

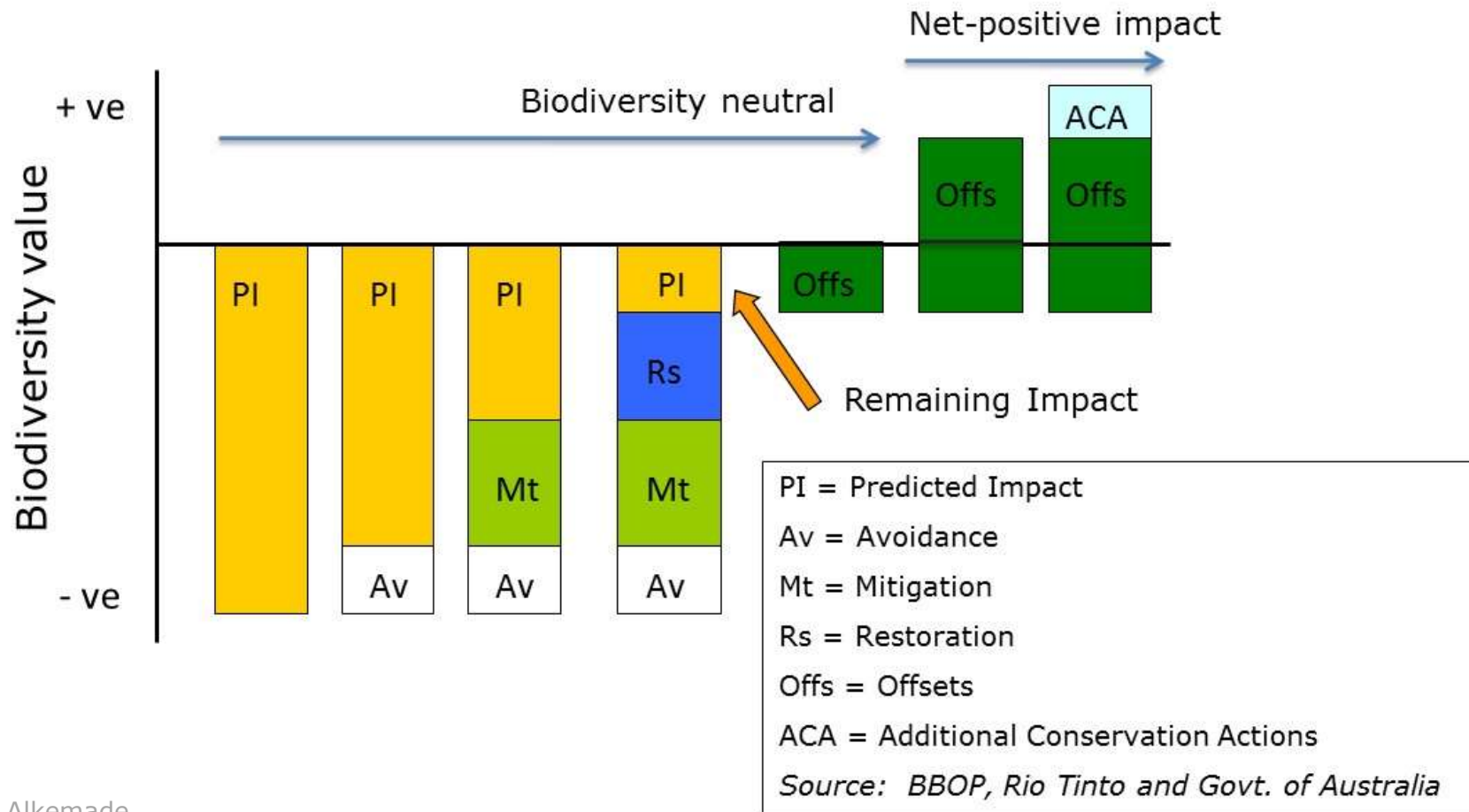
Business is part of the problem...
... and part of the solutions,

Solutions:
Coherent packages of measures
and concrete company action



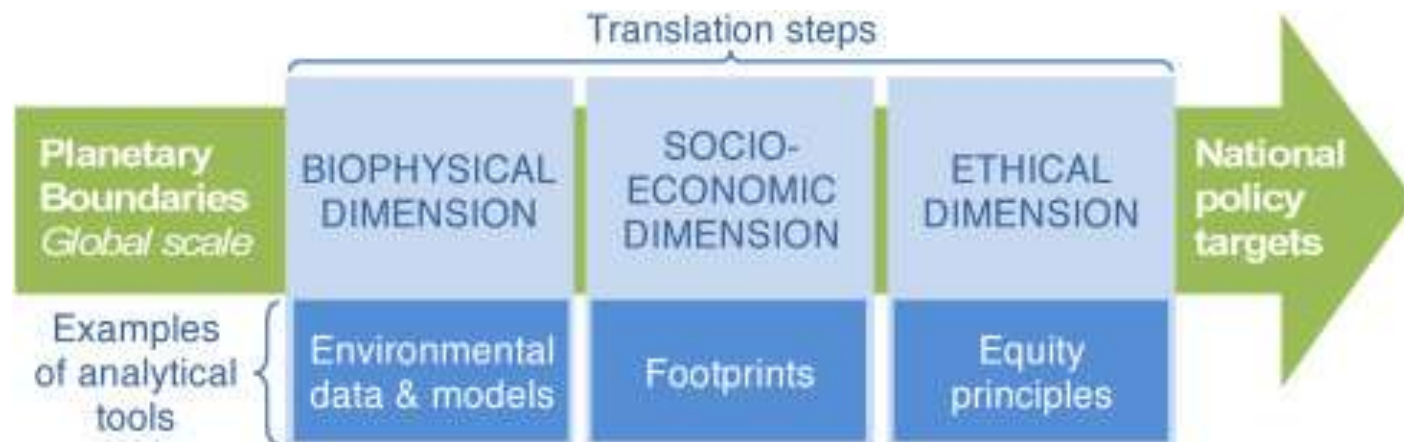
Steps towards No-Net-Loss

The principle of biodiversity compensation

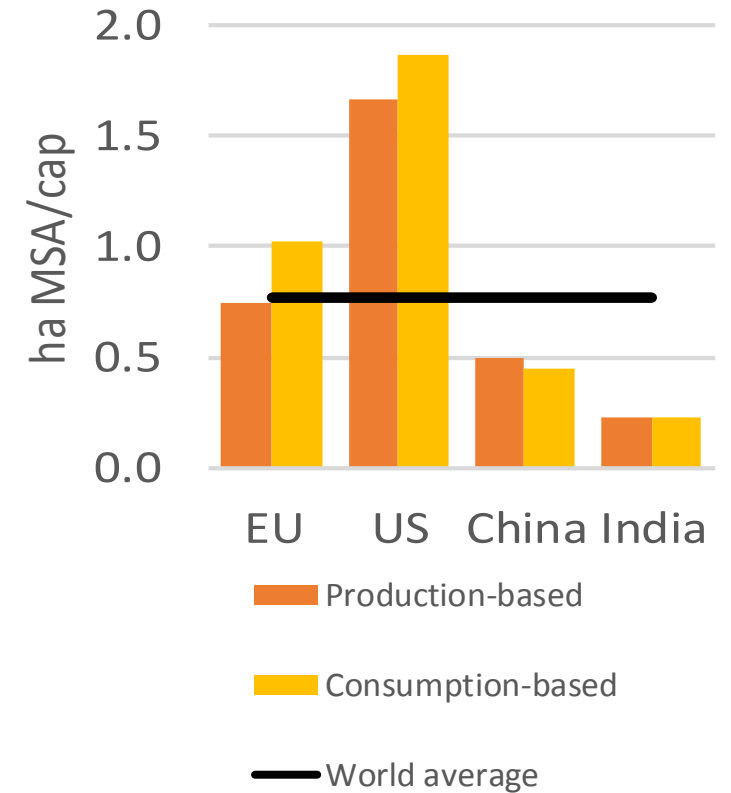
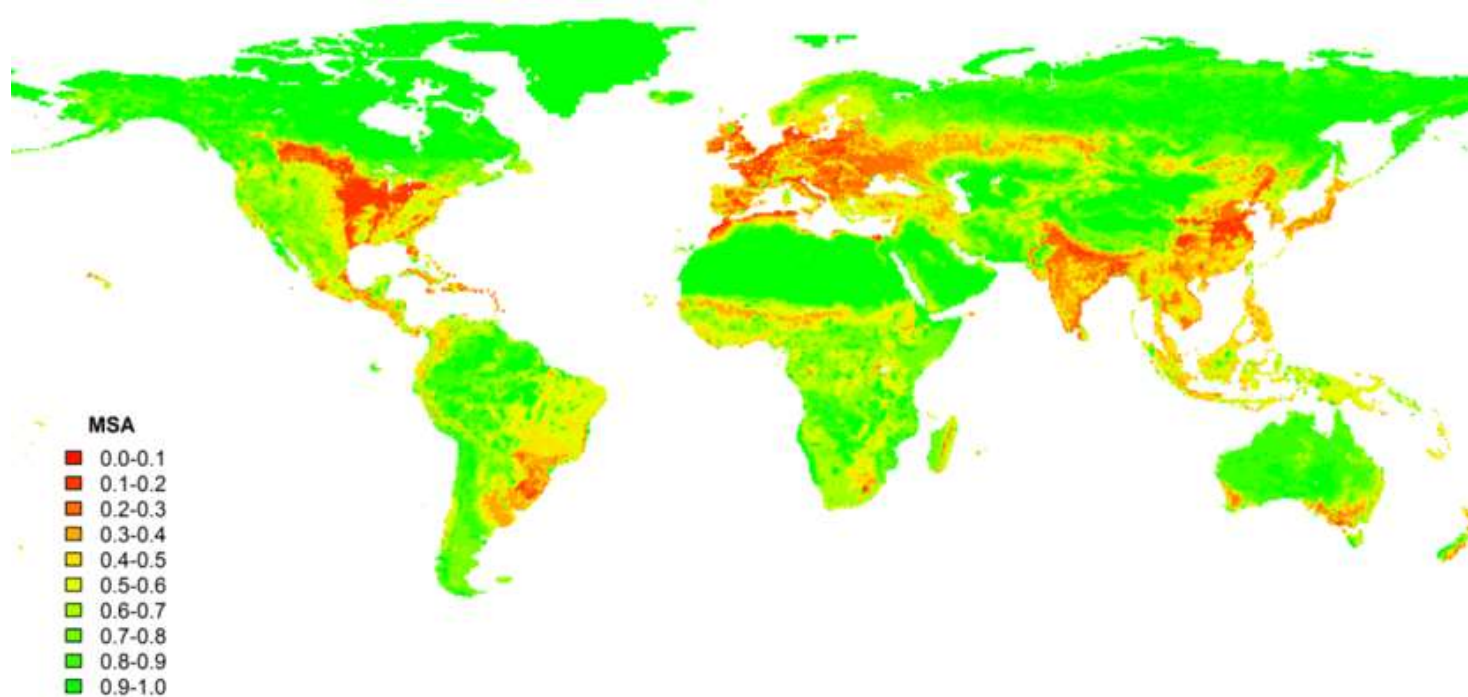


From Planetary Boundaries to national fair shares of the global safe operating space

- › Complex and dynamic interactions - Multi-scale systemic approach
- › Production and consumption - International trade
- › Equity and justice

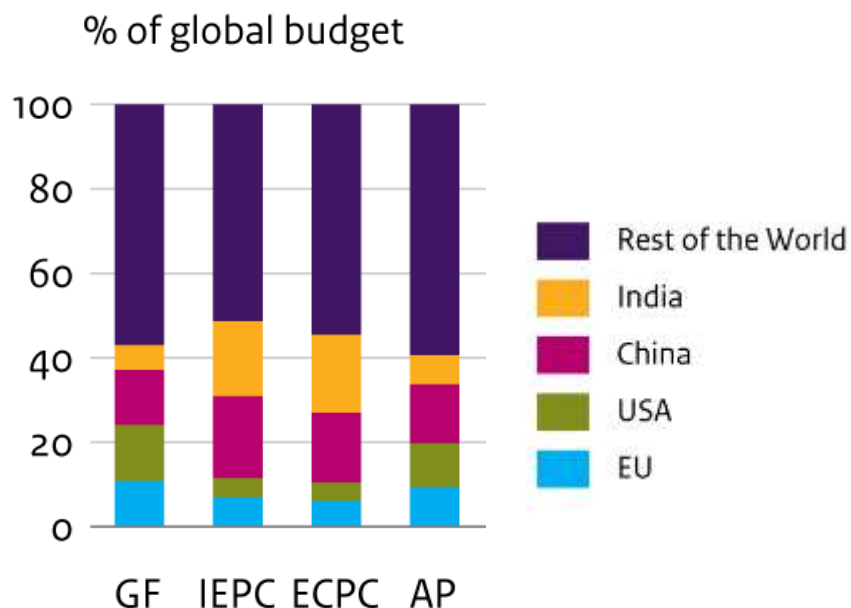


Local impacts and regional footprint indicators



Budget downscaling based on MSA

Biodiversity loss (MSA)



- > Large range of allocation results
 - What is favorable for one country could be unfavorable for another
 - Comparison of effort between countries required
- > Allocation results differ due to
 - Level of current transgression of global budget
 - Differences in national environmental pressure
 - Equity principle used
 - If/how future generations and economic developments are taken into account



Conclusions – for discussion

- › Scenario building helps to address what is needed to achieve the CBD 2050 biodiversity vision
- › Planetary boundary for biodiversity is not (yet) fixed, but rather a gradual and uncertain space, that serves inspiration
- › Indicators like MSA provide insights in both the causes of biodiversity loss AND the contribution of sector or countries to solutions
- › They also enable measuring the potential effectivity of solutions and therefore help companies to guide actions for positive contributions to biodiversity



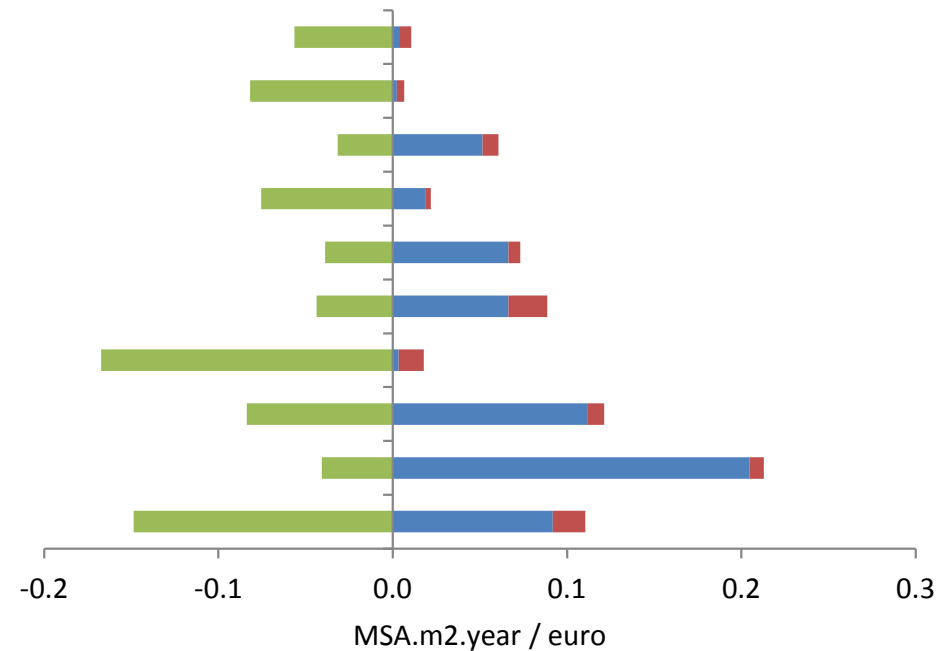
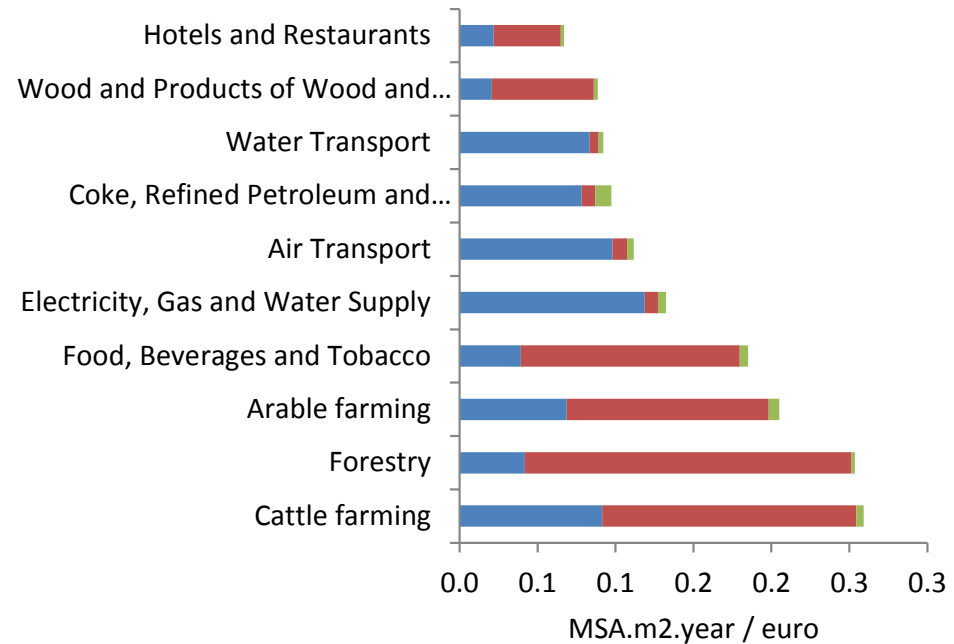
Thank you

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Dutch sectors with a highest biodiversity impact => Large international component



■ GHG emissions ■ Land use direct ■ Land use indirect

■ Via imports ■ Direct on-site ■ Domestic suppliers

global biodiversity loss per euro of sector output

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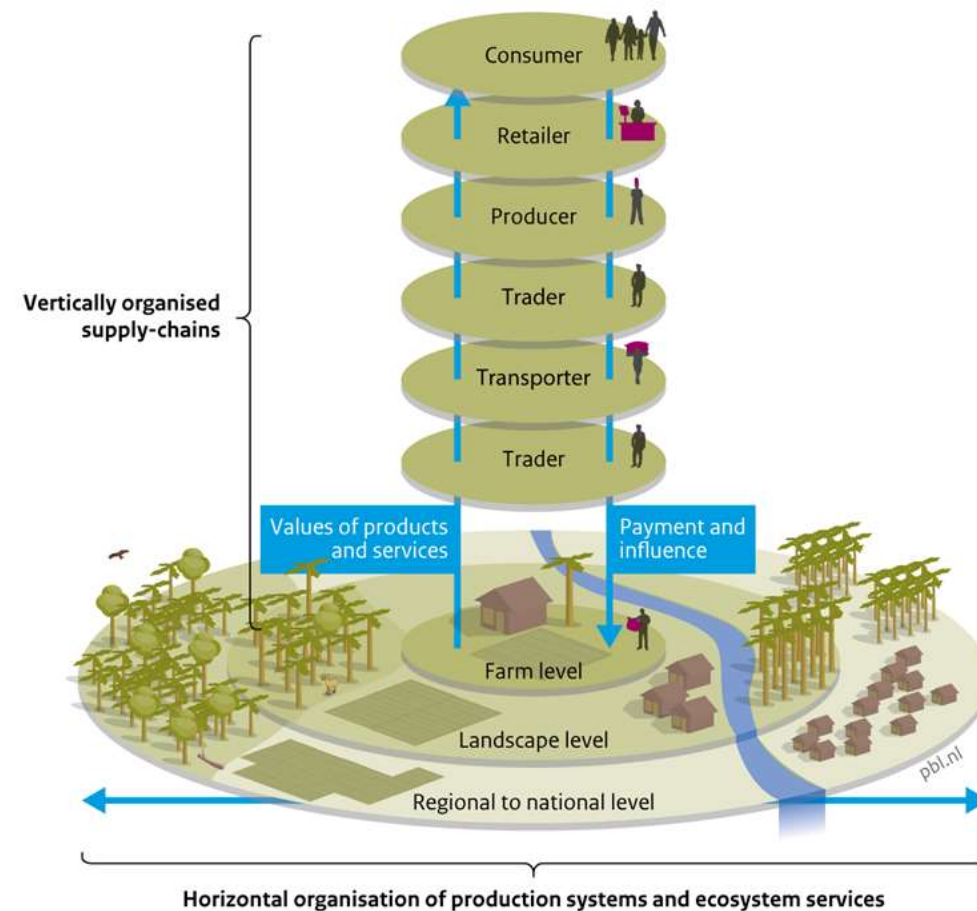
Wilting & van Oorschot 2017

NNL as a connecting principle for the supply-chain

Entry-points for cooperative effort

- Demand from sustainable consumption
- Shared supply-chain responsibility
- Sustainable production landscapes

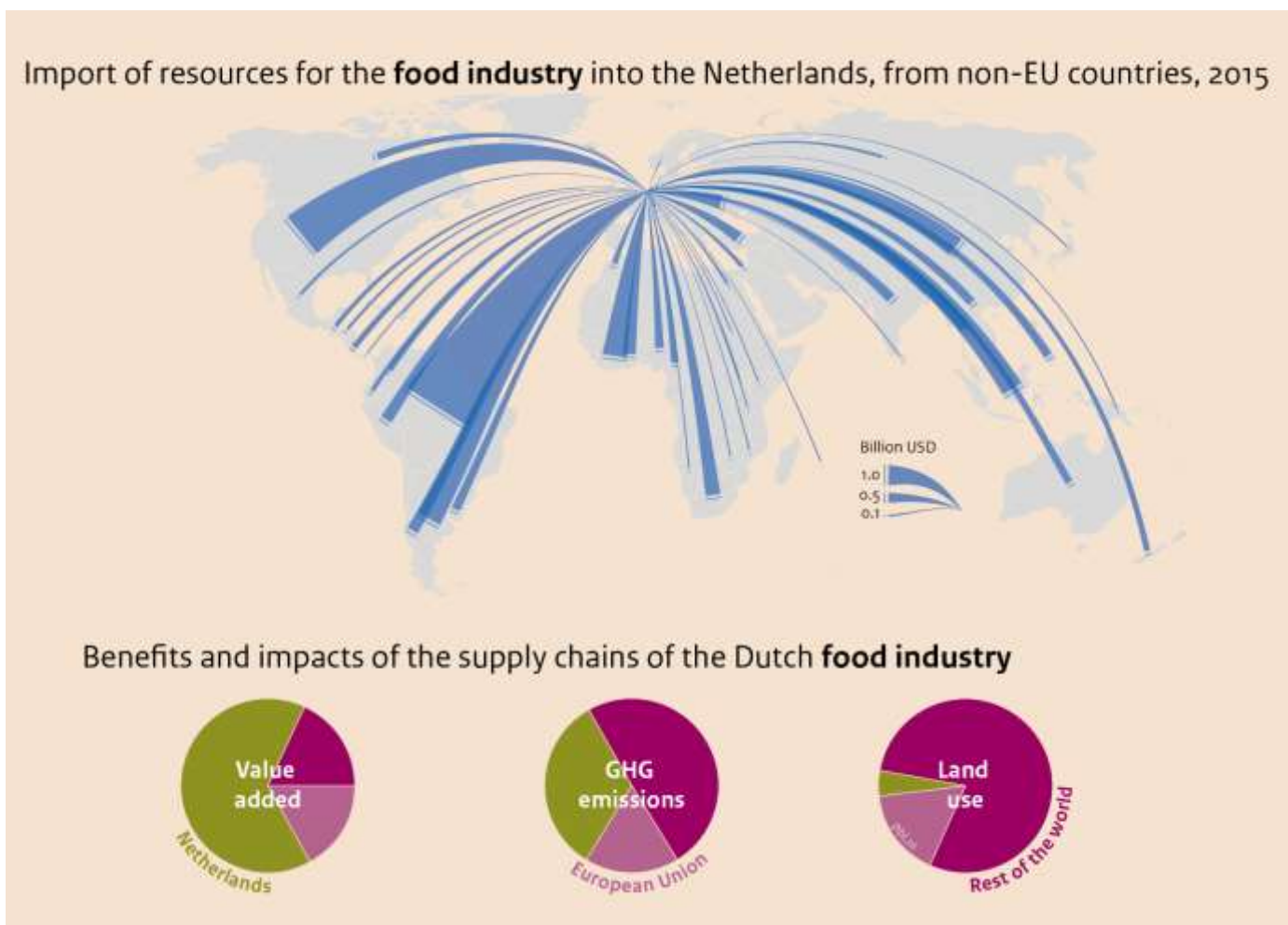
Interaction between supply-chain and integrated landscape approach



Bron: PBL

Trade connects

**High resource dependence ...
with remote impacts**



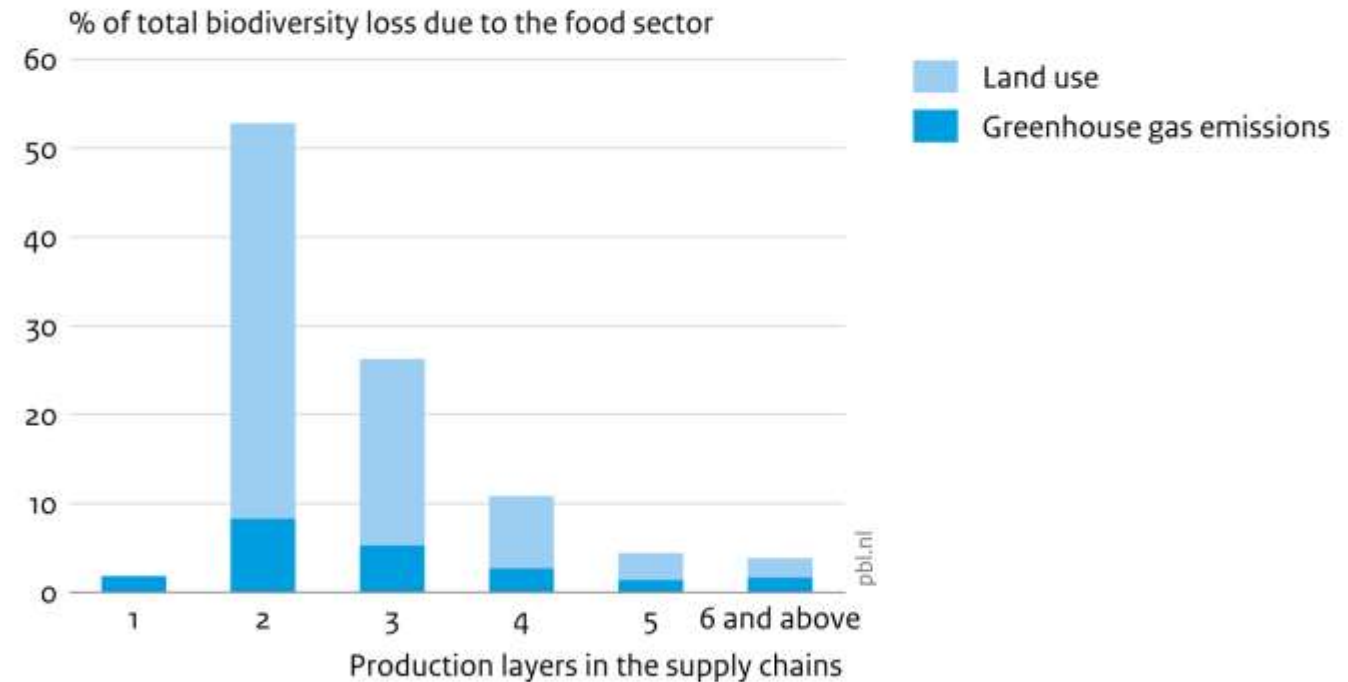


Be aware of the “Hidden impact”

Ask your suppliers about their suppliers!



Shares of biodiversity loss per production layer in the supply chains of the Dutch food sector

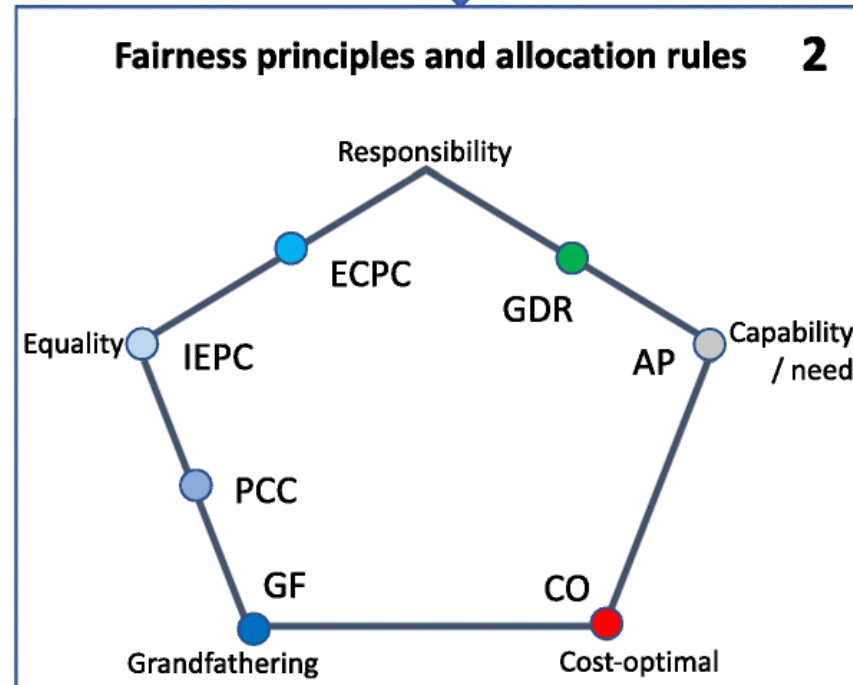


Source: PBL 2017

Global emission scenarios

Information on carbon budgets and emission pathways consistent with the Paris Agreement from a set of global models

1



Emission pathway approach

- Based on dynamic, scenario dependent allocation factors
- Can be easily applied to all GHGs
- Uses time-profile for emissions
- Budgets can be derived by calculating integral over emissions

Carbon budget approach

- Based on static allocation factors
- Best applicable to long-lived GHGs
- Time-independent: allows for decisions within region
- Profiles can be derived by regional modelling or using stylized assumptions

Dutch case-studies on nature-inclusive business initiatives

Many parts of the NNL-puzzle available

Businesses are differently positioned:

- soil bound
- resource bound
- principle bound

Cooperation with stakeholders is key:

- demand
- incentives
- knowledge

Need to combine efforts

- across sectors
- national and multi-national

Characteristics of nature-inclusive company initiatives

