Managing the
Land nexus in the SDGs

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IIASA

Systems Analysis Applied to Environment and Health
NERC-IIASA Conference
Royal Society, 2nd December, 2016

Land & SDGs

Demand
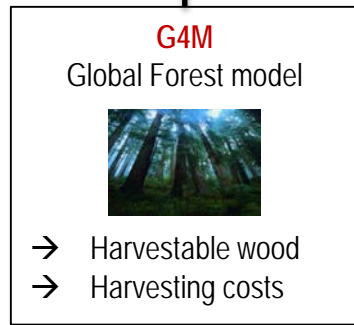
Population, GDP, preferences

| Food | Fibers | Energy | Industry |

GLOBIOM.org

Markets

ECONOMIC MARKET + Spatial equilibrium trade → **PRICES**

Production

EPIC

Rain, Snow, Chemicals

Evaporation and Transpiration

Surface Flow

Subsurface Flow

Below Root Zone

RUMINANT
Digestibility model

→ Feed intake
→ Animal production
→ GHG emissions

BIOENERGY
Processing

→ MJ biofuel
→ MJ bioelectric
→ Coproducts

G4M
Global Forest model

→ Harvestable wood
→ Harvesting costs
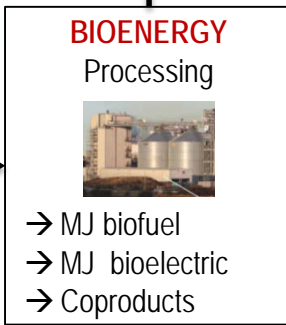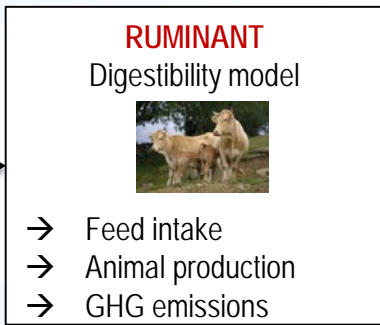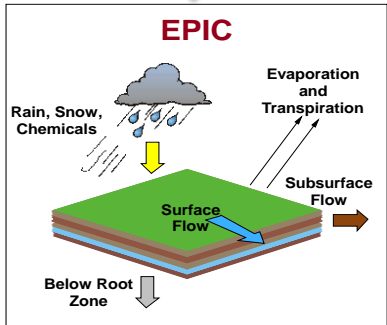
Land use

18 crops (FAO + SPAM)
Wheat, Rice, Maize, Soybean, Barley, Sorghum, Millet, Cotton, Dry beans, Rapeseed, Groundnut, Sugarcane, Potatoes, Cassava, Sunflower, Chickpeas, Palm Fruit, Sweet potatoes

3 different systems

7 animals
(FAO + Gridded livestock)

Cattle & Buffalo
Sheep & Goat
Pig
Poultry

8 different systems

Land suitable for
Poplar
Pillow
Eucalyptus

Productivity from literature

Downscaled FAO FRA at grid level

Area
Carbon stock
Age
Tree size
Species
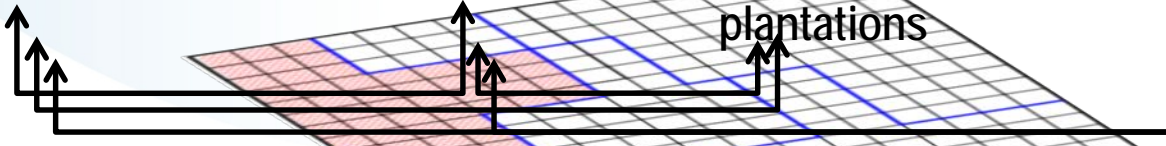Rotation time
Thinning

Land cover

Cropland

Grassland

Short rotation plantations

Managed forest

Natural forest

Other natural land

Global Land Cover 2000

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2.1 by 2030 **end hunger and ensure access by all people**, in particular the poor and people in vulnerable situations

2.2 by 2030 **end all forms of malnutrition**, including achieving by 2025 the internationally agreed targets on stunting and wasting in children under five years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women, and older persons

12.1 implement the **10-Year Framework of Programmes on sustainable consumption and production** (10YFP), all countries taking action, with **developed countries taking the lead**, taking into account the development and capabilities of developing countries

DIET SHIFT

OECD
Former Soviet Union
Latin America
Rest of Asia
South Asia
Africa
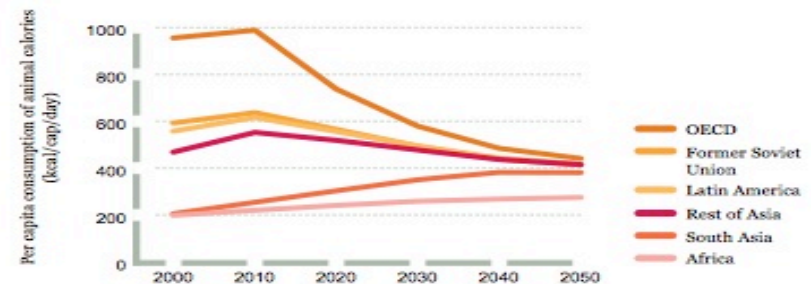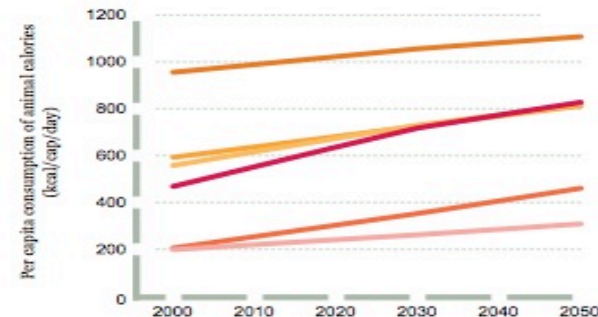
Projected animal calorie consumption per day between now and 2050 in different regions under the Do Nothing Scenario (top graph), where per capita consumption continues to follow the current path predicted by the FAO and the Diet Shift Scenario (bottom graph), where in OECD countries a gradual reduction is achieved through dietary changes and waste reduction, while allowing per capita consumption in other regions, such as South Asia and Sub-Saharan Africa, to increase.
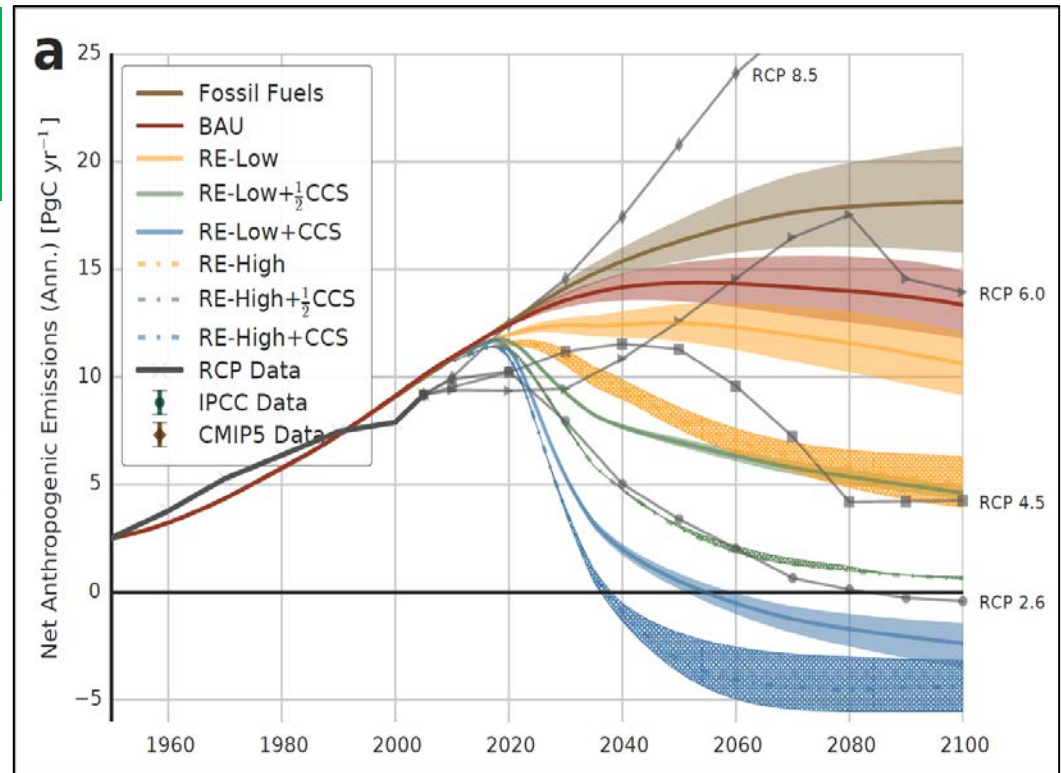
Goal 13: Climate

Goal 13. Take urgent action to combat climate change and its impacts *
*Acknowledging that the UNFCCC is the primary international, intergovernmental forum for negotiating the global response to climate change **.**
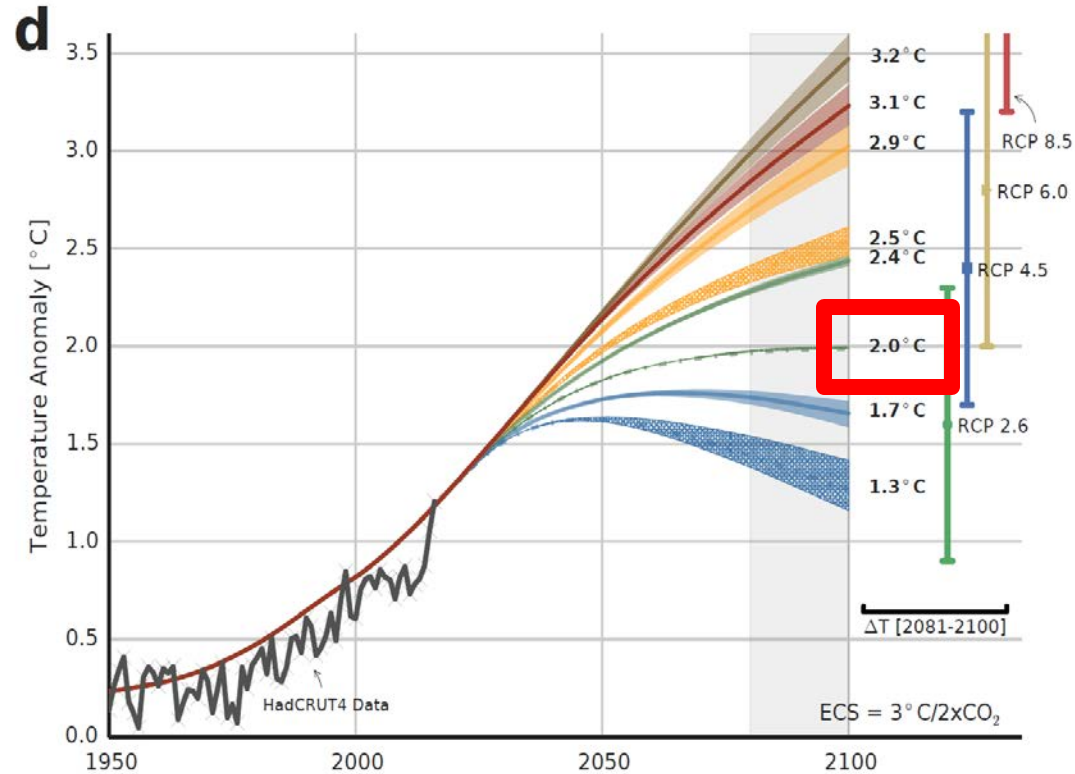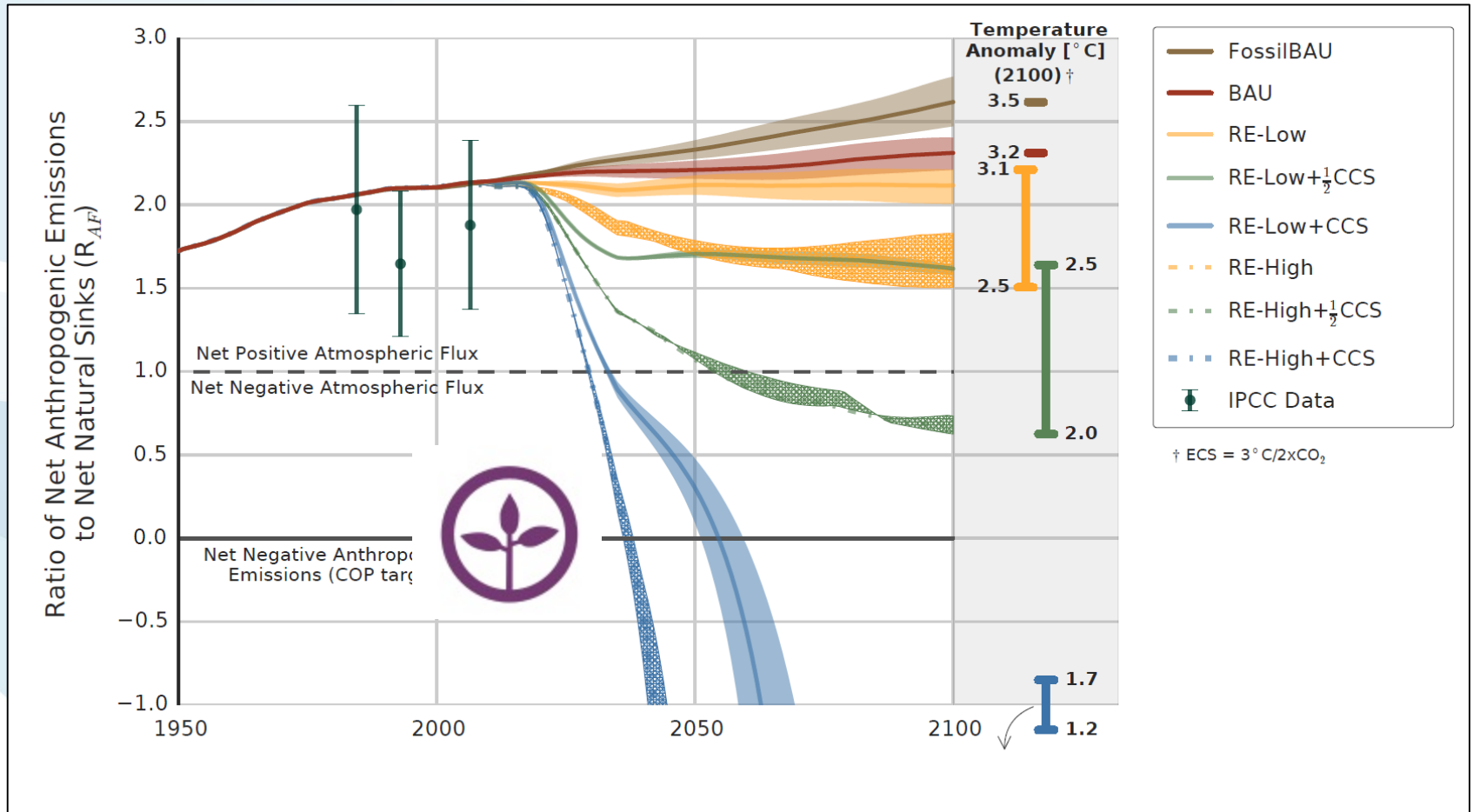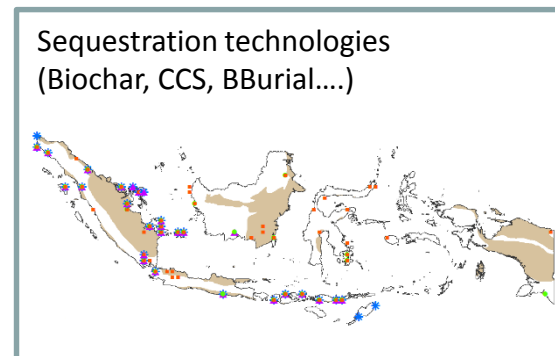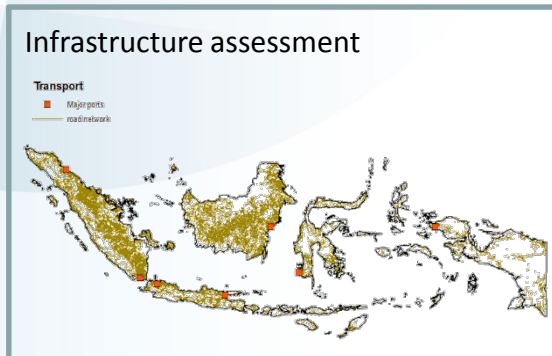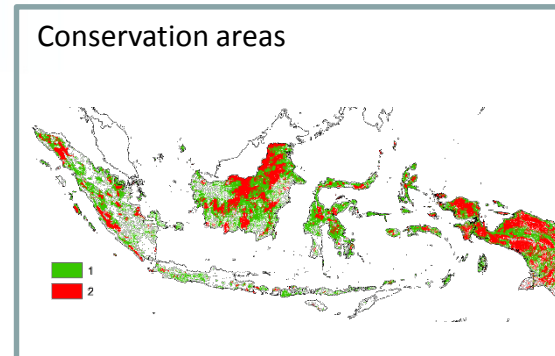
Goal 13: Climate

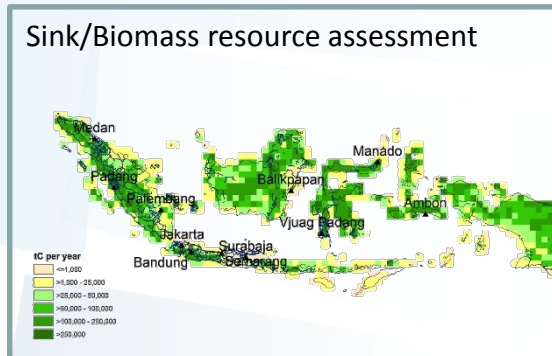**Goal 13. Take urgent action to combat climate change and its impacts ***

Emissions/Natural Sinks

Greenhouse Gas Removal: Biomass

Sink/Biomass resource assessment

Conservation areas

Infrastructure assessment

Sequestration technologies
(Biochar, CCS, BBurial….)

15.1: Conservation target

Number of overlapping global biodiversity priorities in terrestrial areas

- 0
- 1
- 2
- 3
- 4
- 5
- 6

• Alliance for Zero Extinction sites (AZEs)
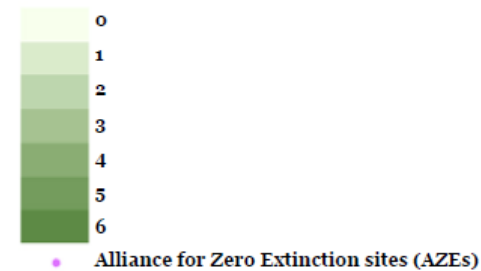
15.1 by 2020 **ensure conservation**, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements
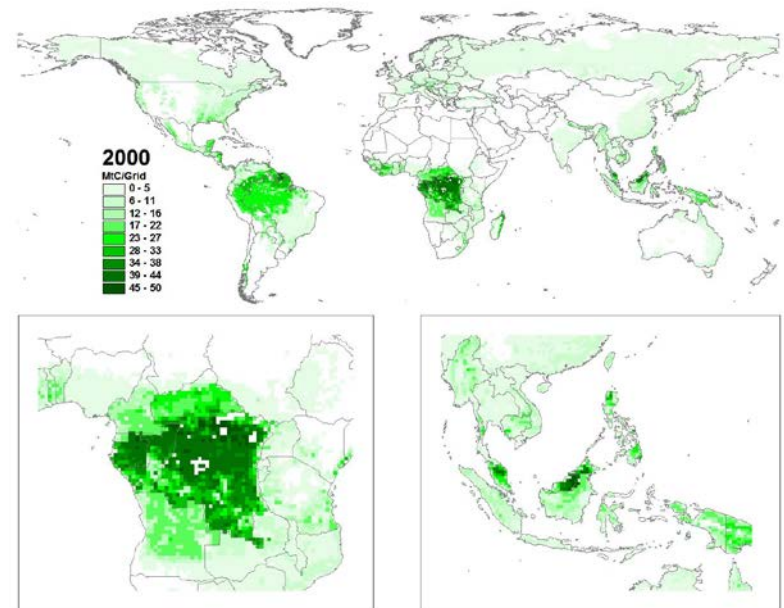
WCMC & LFR, 2011
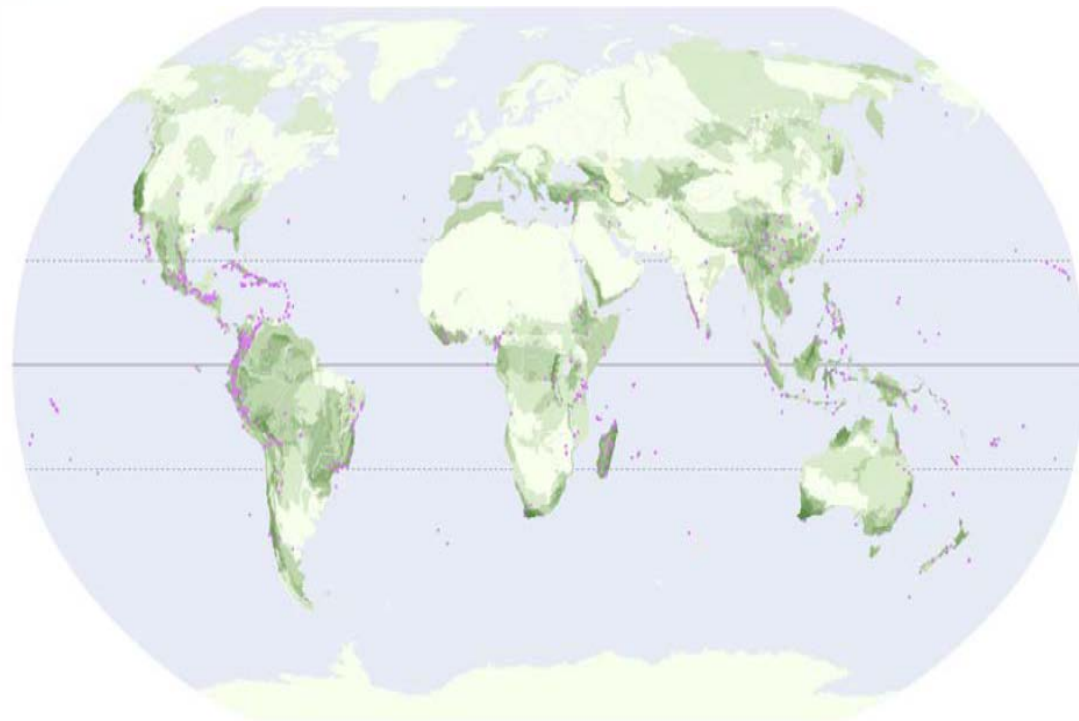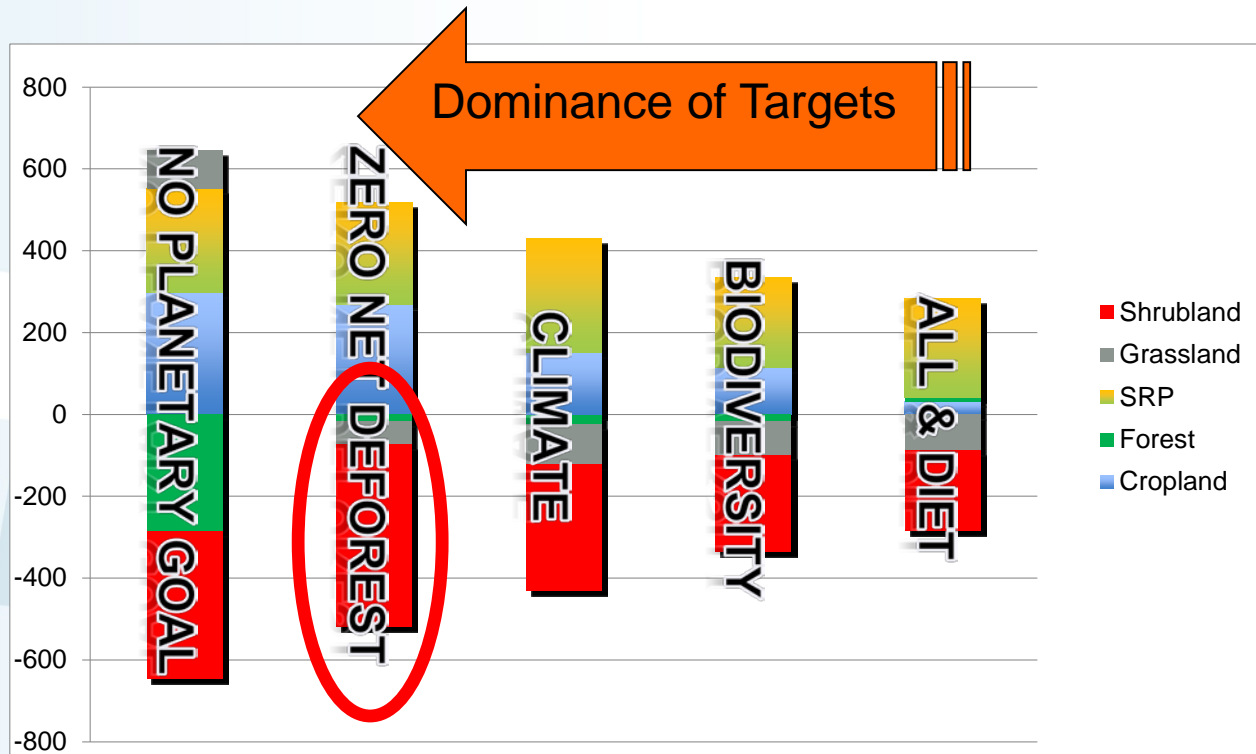
15.2: Zero Net Deforestation target

15.2 by 2020, promote the implementation of sustainable management of all types of forests, **halt deforestation, restore degraded forests, and increase afforestation and reforestation by x% globally**

2000
MtC/Grid
0 - 5
6 - 11
12 - 16
17 - 22
23 - 27
28 - 33
34 - 38
39 - 44
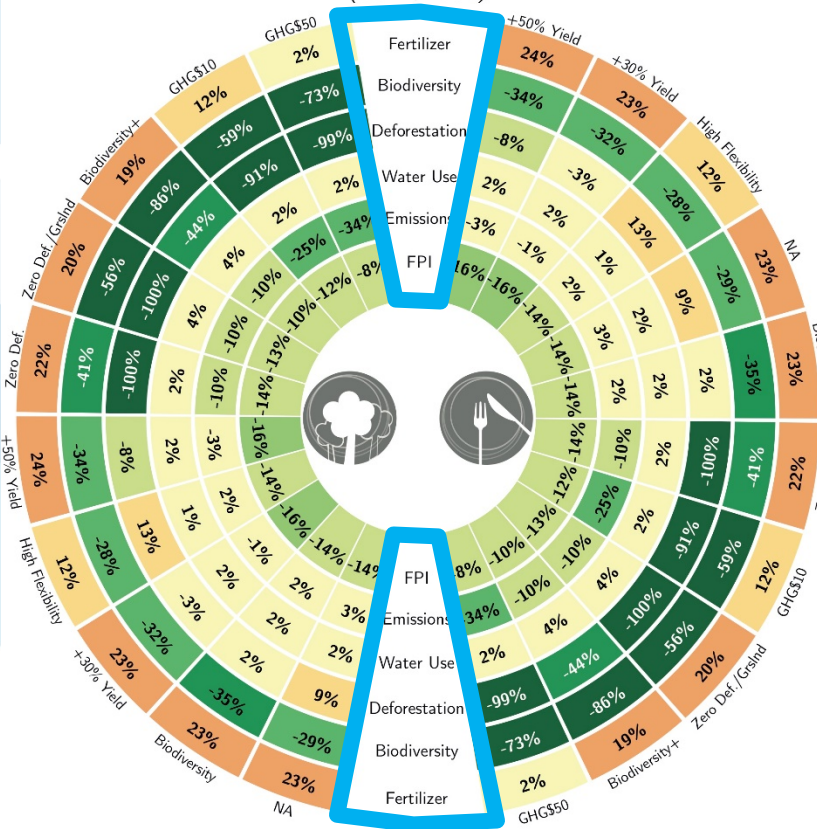45 - 50

Infeasibilities of Targets:SSP2

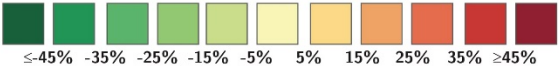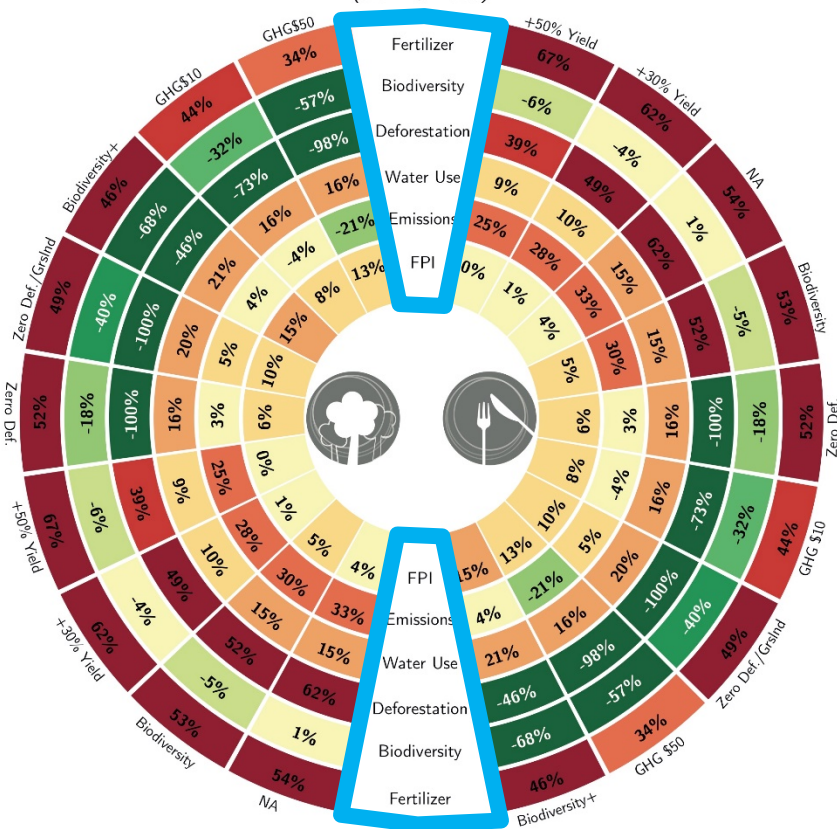|	feasibility in 2030	feasibility in 2030 if agriculture shifts	feasibility in 2050	feasibility in 2050 if food commodity index increases capped at 10%	
target	✓				
target with pro-nature		✗	✓	✗	
target with pro-nature plus		✗	✗	✗	
target with bioenergy plus	✓				
target with diet shift	✓		✓	✓	
target with diet shift and pro-nature	✓	✓	✓	✓	
target with diet shift and pro-nature plus	✓	✓	✓	✓	

2050 – Land Conversion (Million hectares)

SDG: INDICATORS

Science Advances, 2016

SDGs: (De-) Pressure

SDGs: Environment first

Science Advances, 2016

SDGs: Food first

Science Advances, 2016
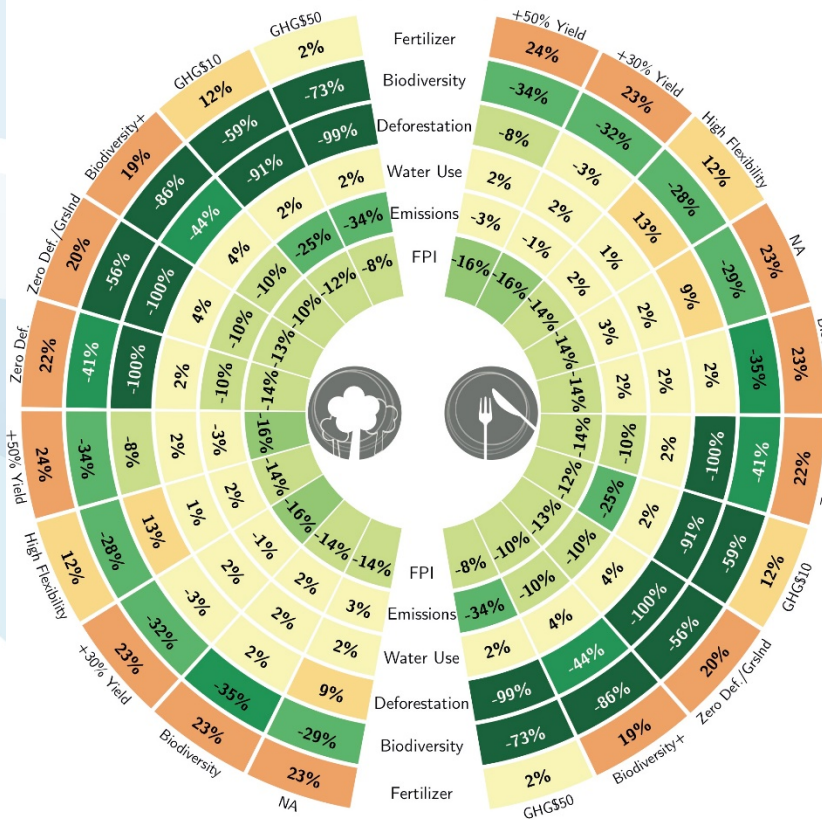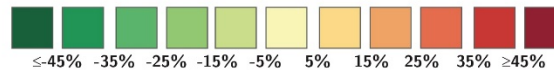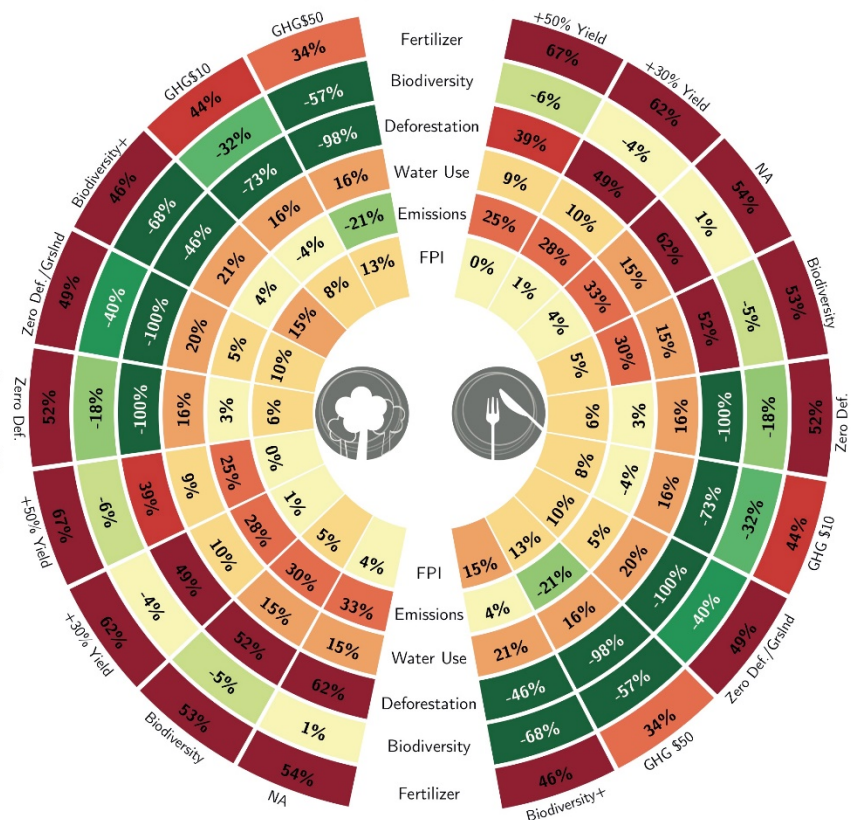
SDGs: Trade-offs WITHIN a policy

Science Advances, 2016
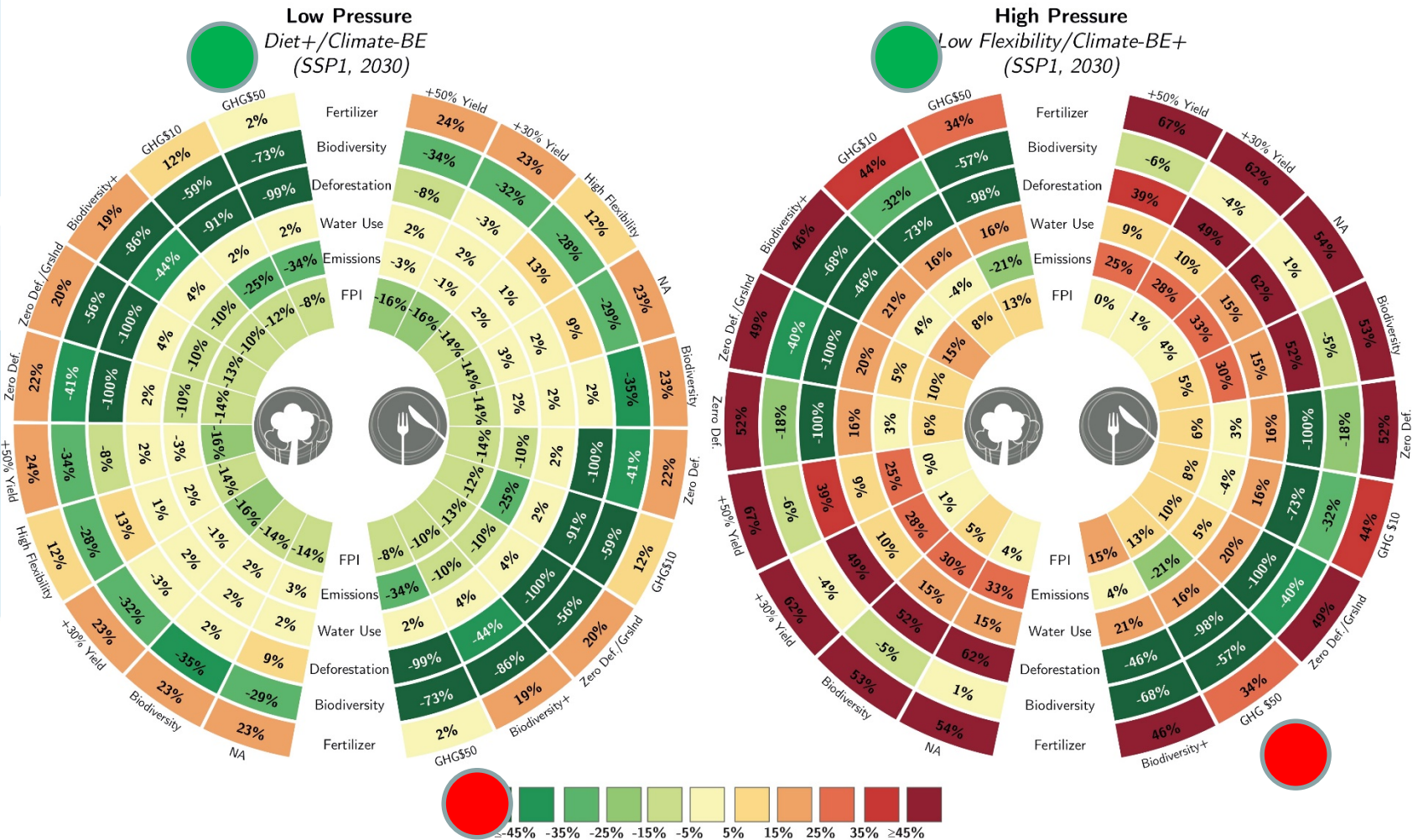
SDGs: Trade-offs BETWEEN policies

Science Advances, 2016
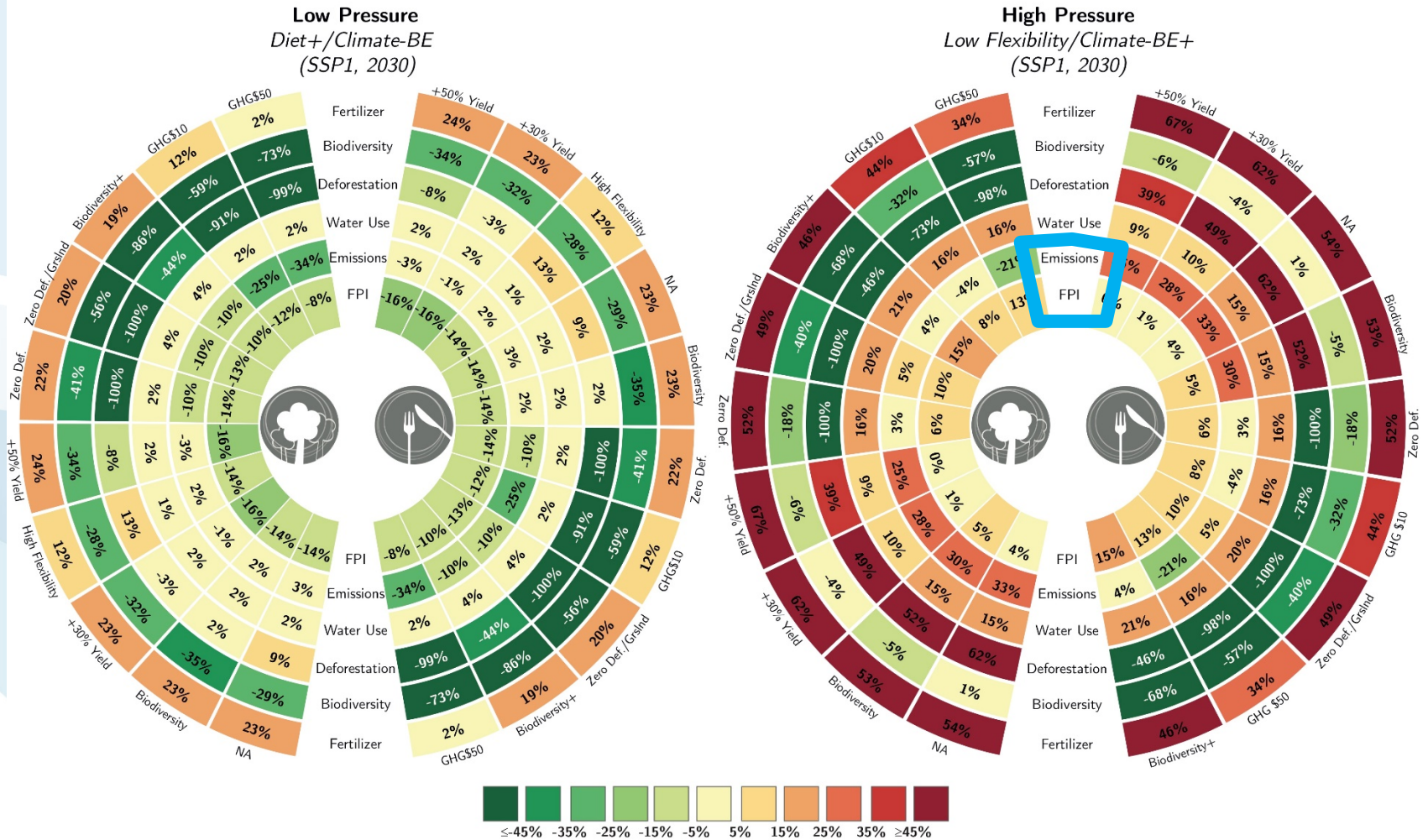
Conclusion

- SCP is a key, but non-sufficient depressure element
- Multiple goals need to be addresses by smart portfolios of policy instruments
- Trade-offs are inevitable, but fun to solve!!
- Systemic Transformation
- Global consistency of National SDG strategies

Science-Policy Interface