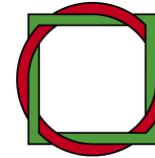




International
Resource
Panel



Center for
Environmental
Systems Research



Wuppertal Institute
for Climate, Environment
and Energy

Assessing global land use: Balancing consumption with sustainable supply

Stefan Bringezu

Director
Material Flows and Resource
Management
Wuppertal Institute

Professor
for Sustainable Resource Management

Co-chair WG Land&Soil of the
International Resource Panel

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and soil degradation post Rio+20"
European Commission, Charlemagne
Building
16 November 2012
Brussels, Belgium

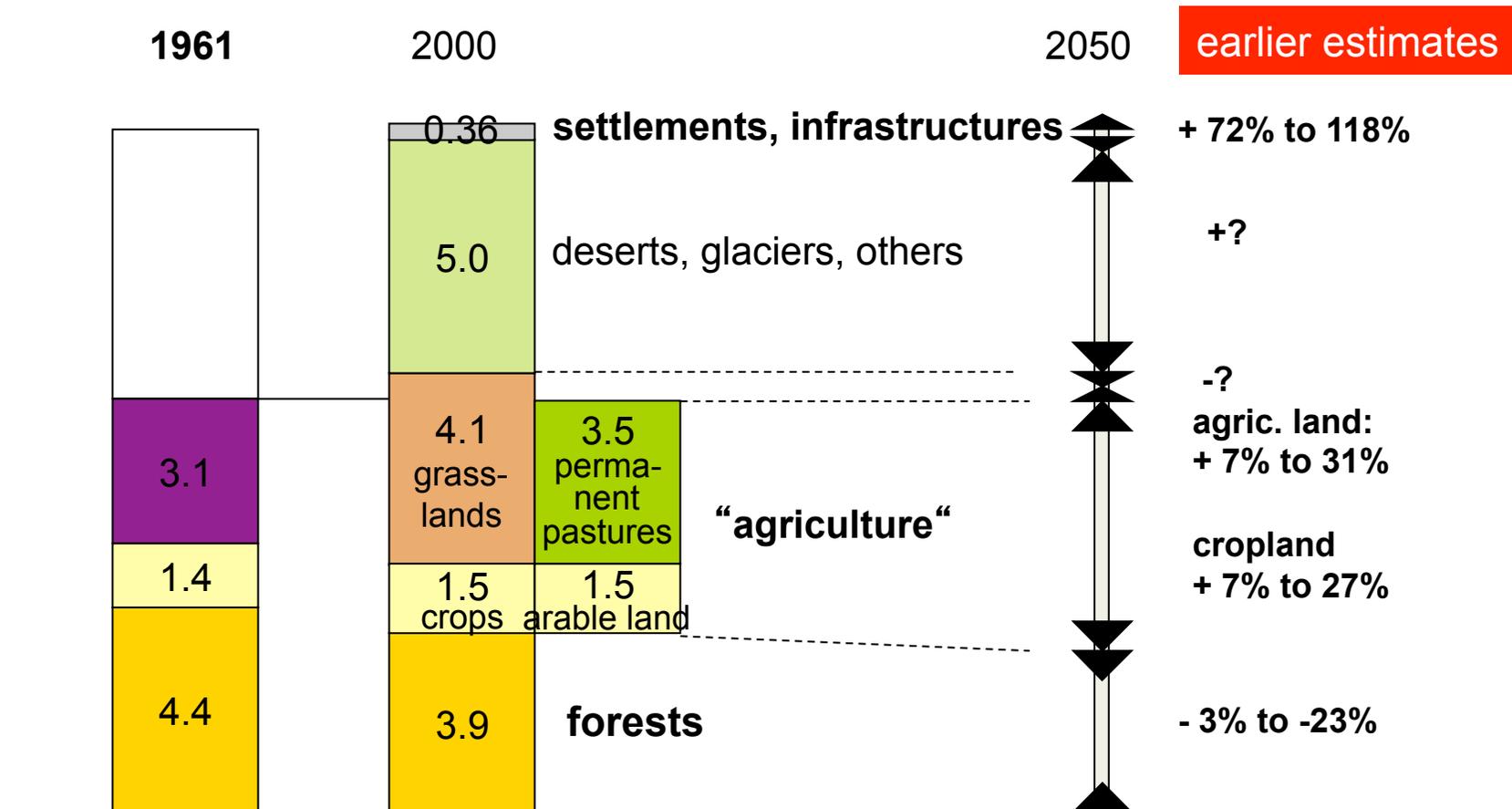
Acknowledgements

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The presentation

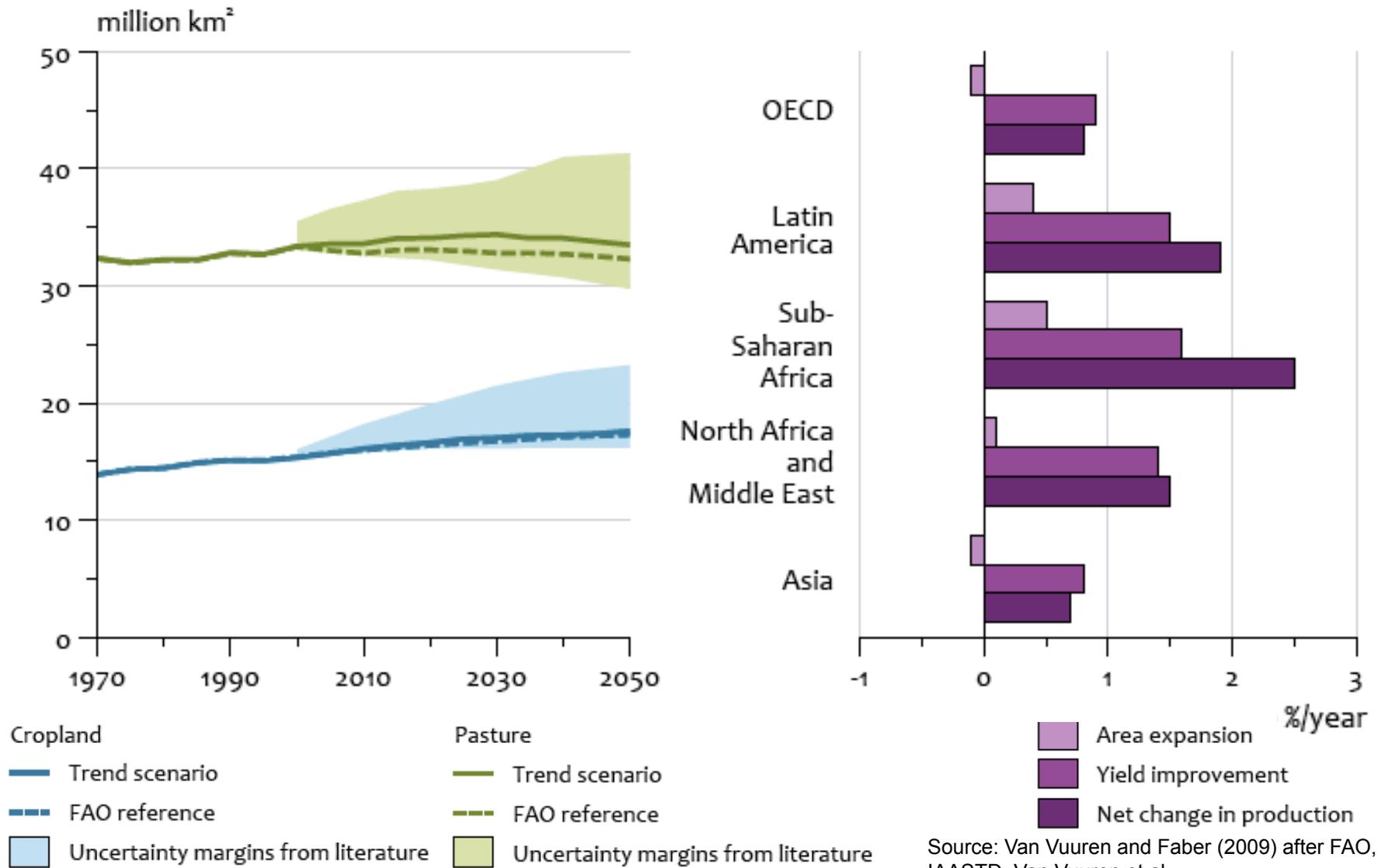
- Mega trends in global land use
- Drivers of global cropland expansion
- Expected land degradation and land conversion
- Safe operating space for global cropland
- Possibilities to adjust consumption of biomass to levels of sustainable supply

Global land use: settlements and agriculture expand while forests decline (10⁹ hectare)

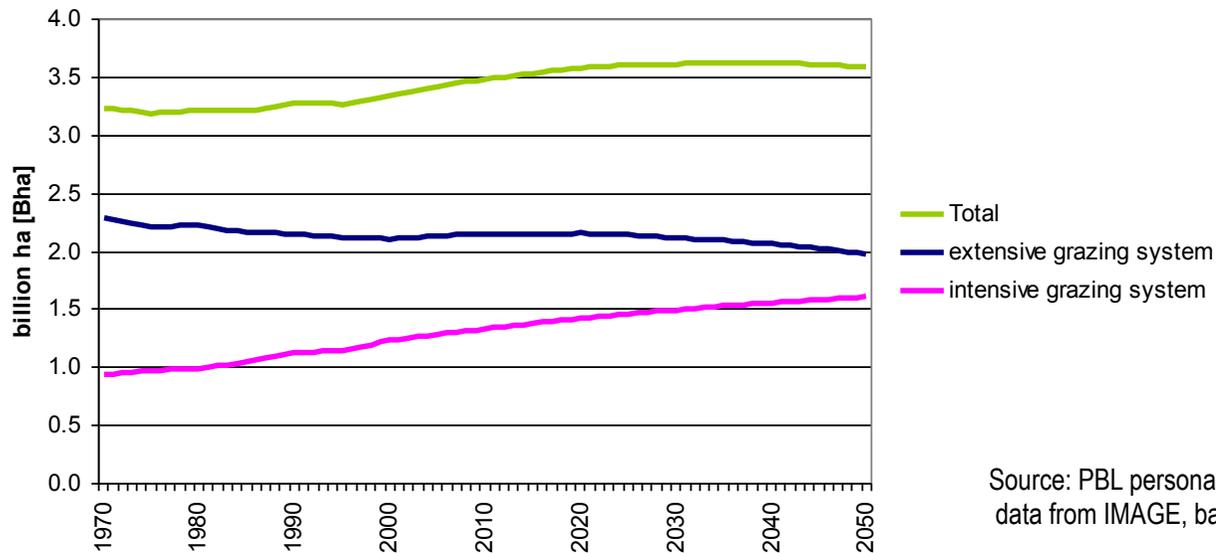
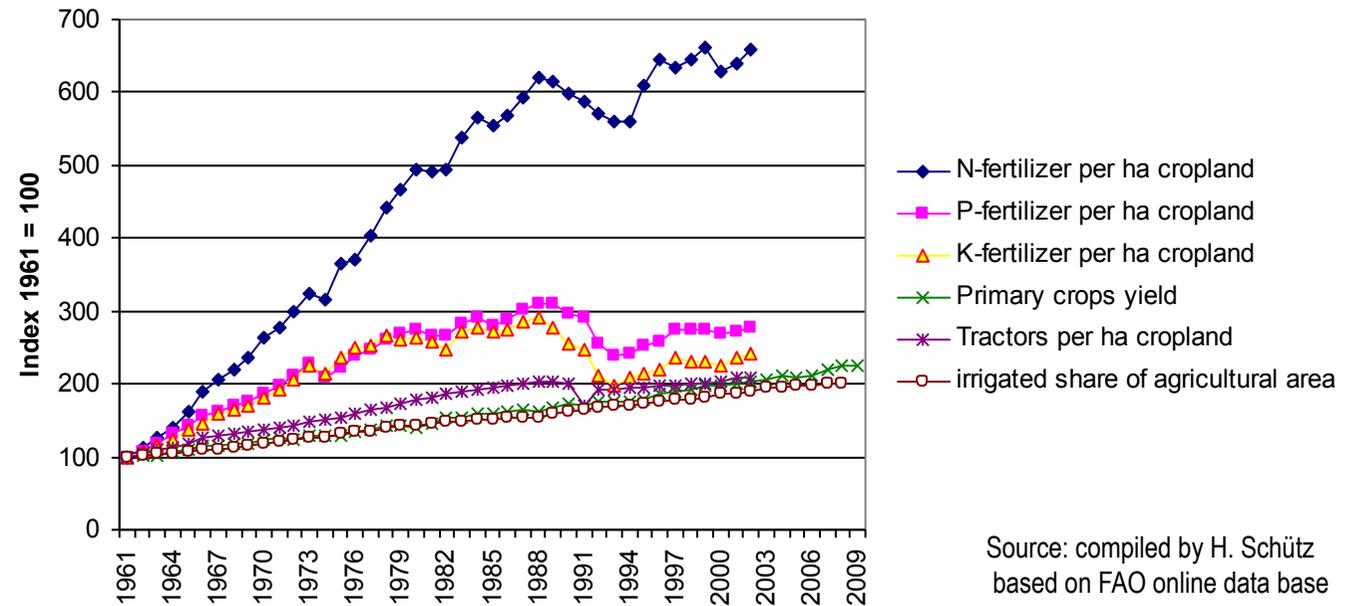


Sources: Benedikt-Kemp et al. 2002, MEA 2005, GEO 4, OECD (2008)

Global land use – trend scenarios expect expansion of agriculture

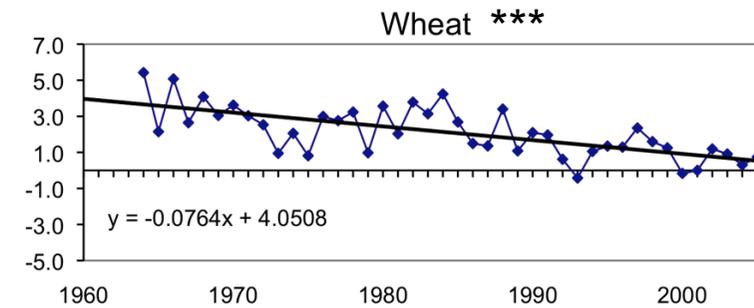
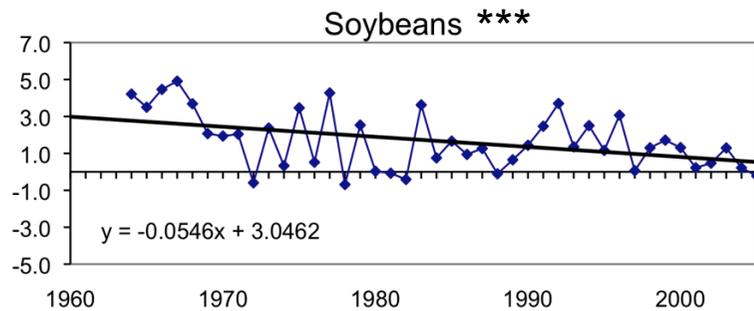
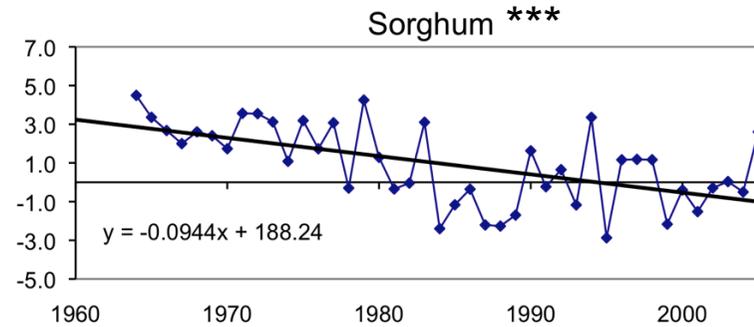
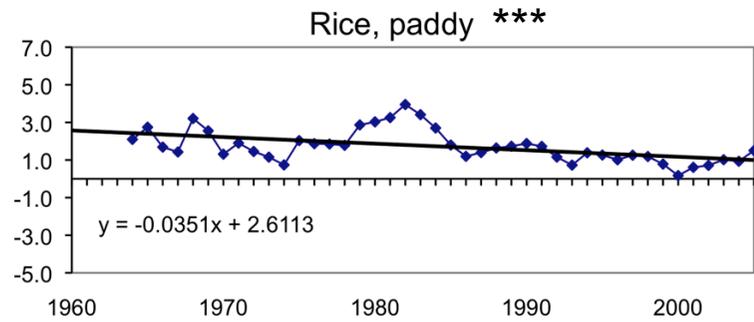
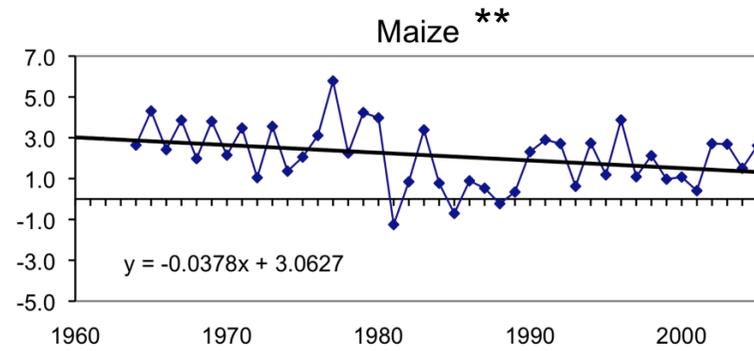
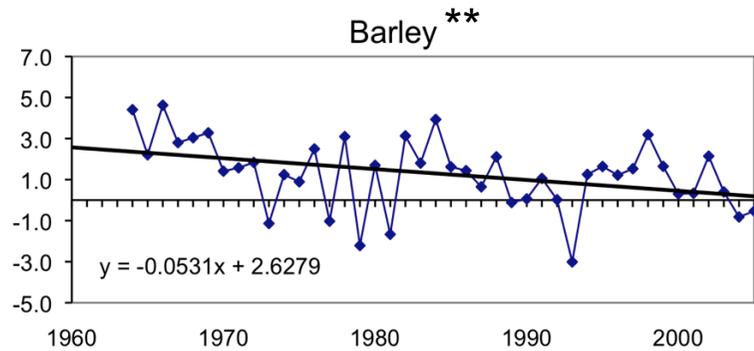


Intensification of crop and animal production increases



Global crop yields grow slower than in past

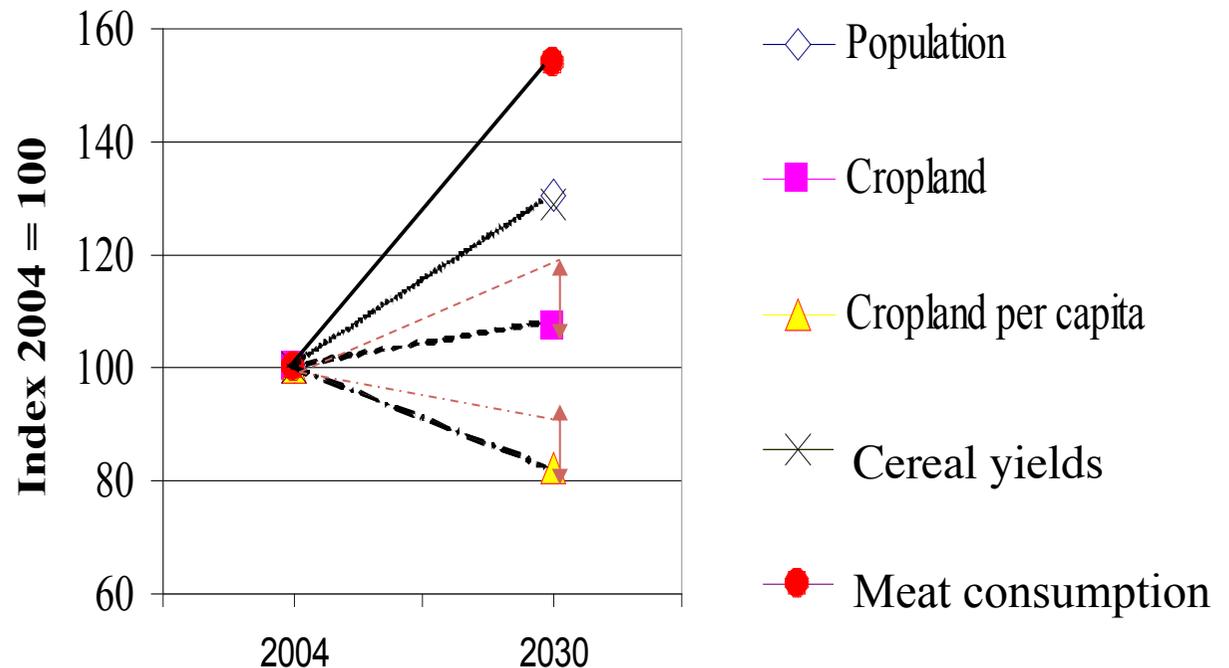
5years moving averages (%)



Significance of t-statistics: ** $p < 0.05$, *** $p < 0.01$; Data source: based on FAOSTAT online data 2008

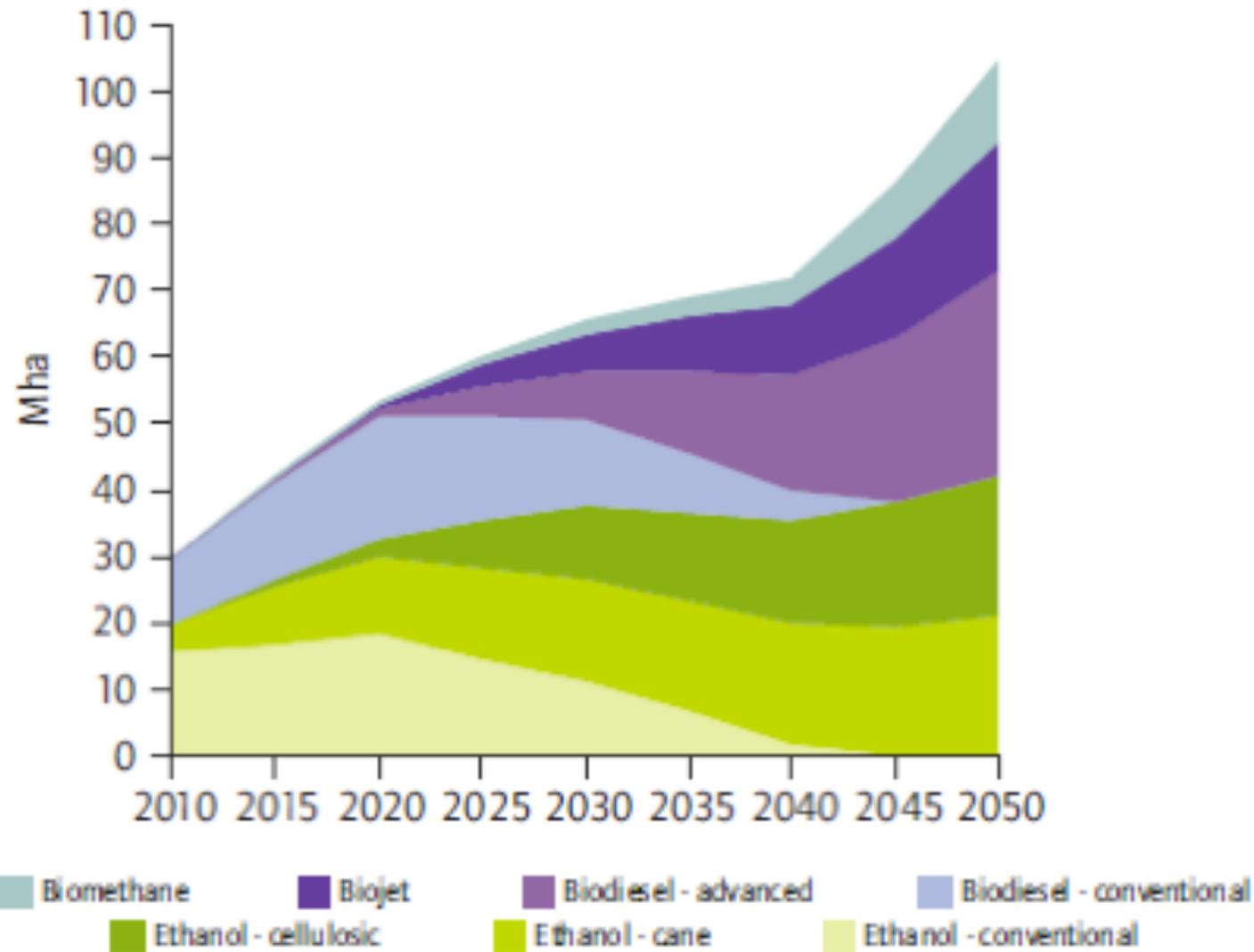
Global trends of population, yields and diet: cropland will expand for feeding the world with protein rich meals

- Global cropland expands only to feed the world
- Additional demand for non-food biomass (fuels, materials) will increase the pressure on conversion of grasslands, savannahs and forests (in tropics)



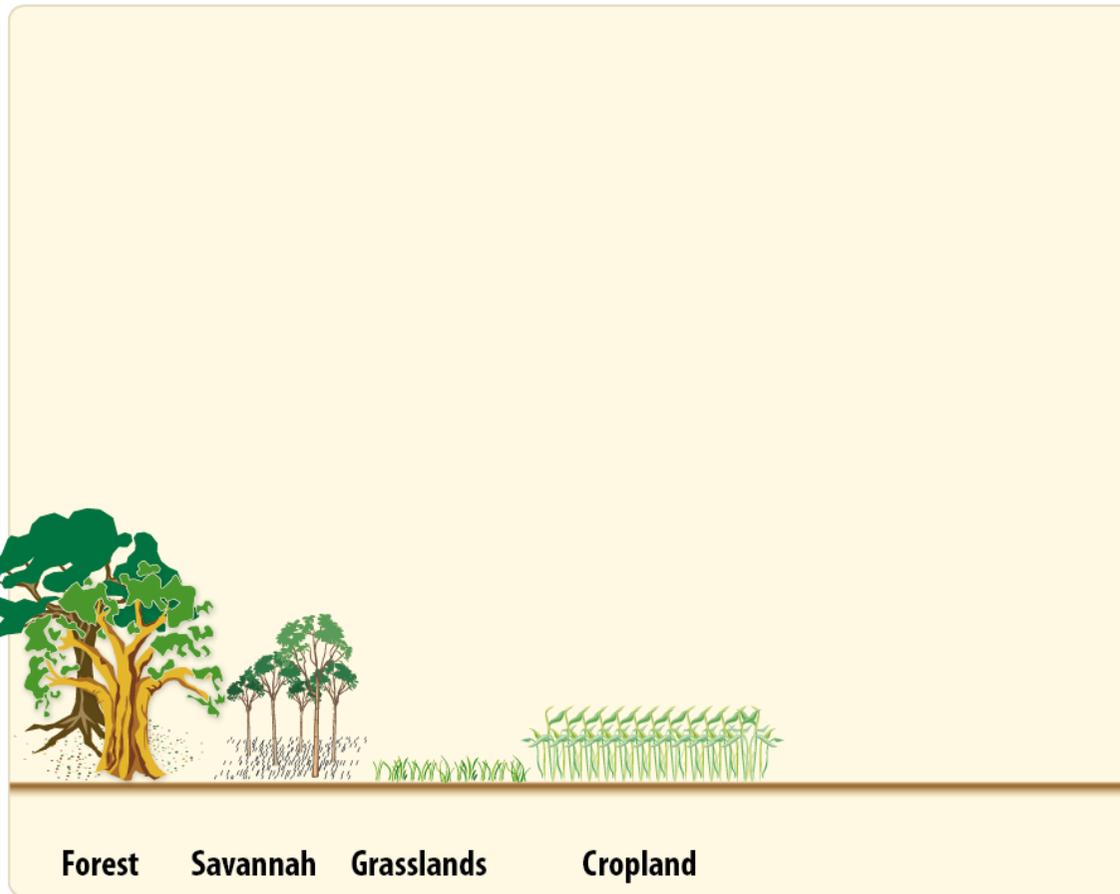
Source: Bringezu et al. (2009), after UN population statistics ; FAO (2003, 2006); estimates based on Gallagher report 2008

Projected land demand for biofuels

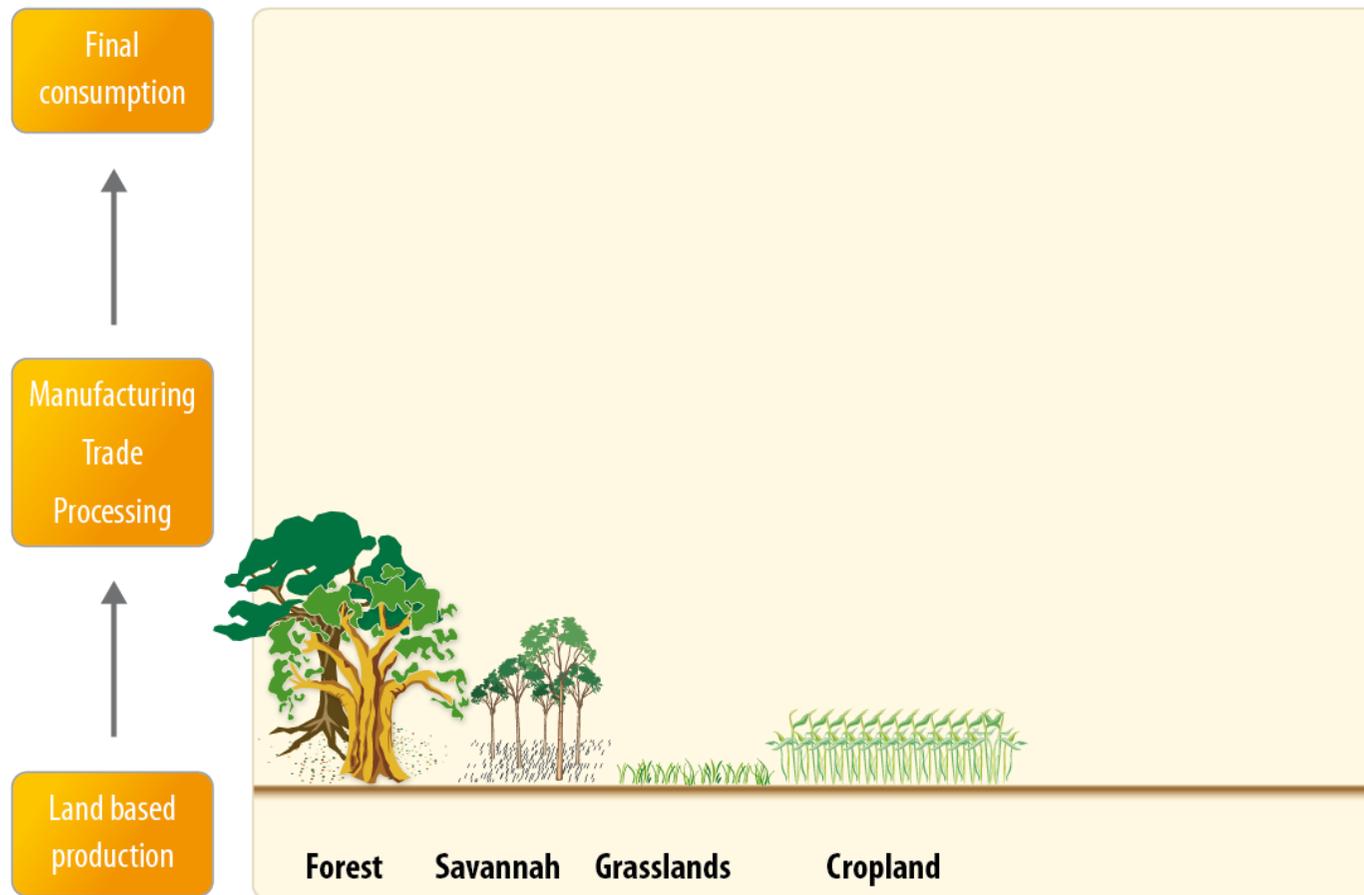


Source: IEA, 2011

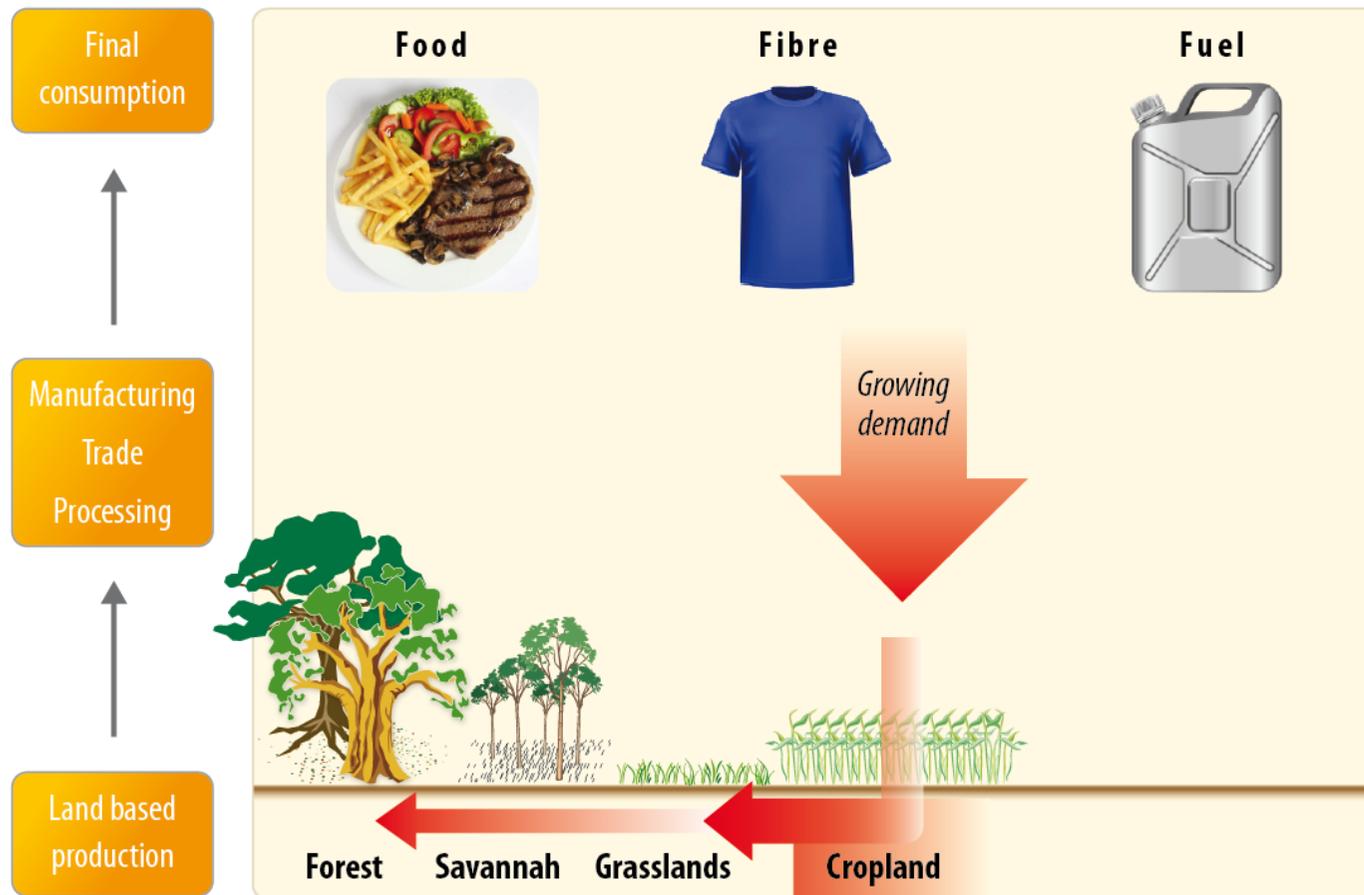
Global land use



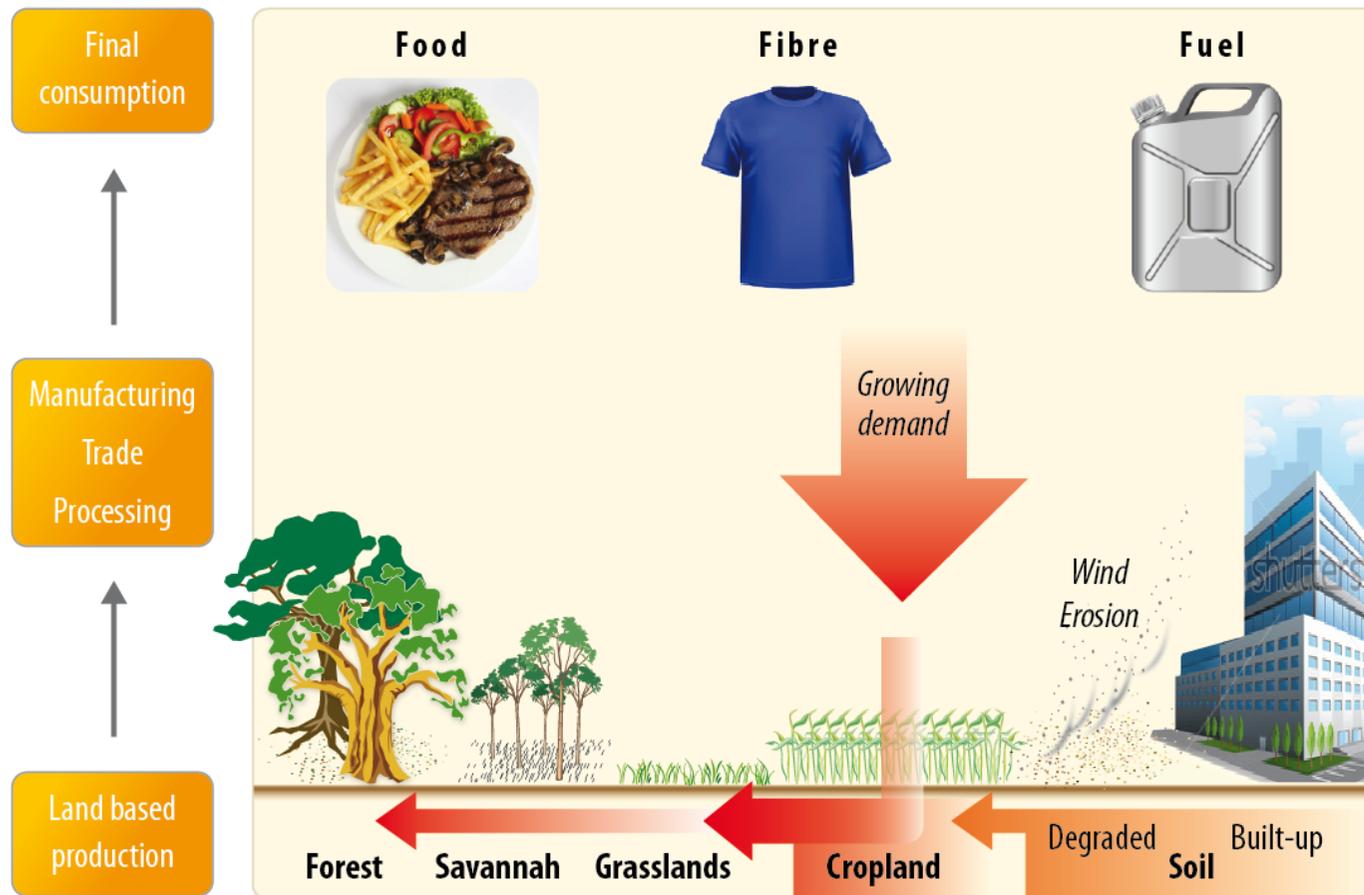
Global land use for biomass products



Global land use changes driven by rising demand



Global land use changes driven by rising demand and aggravated by soil degradation due to erosion and expansion of built-up land

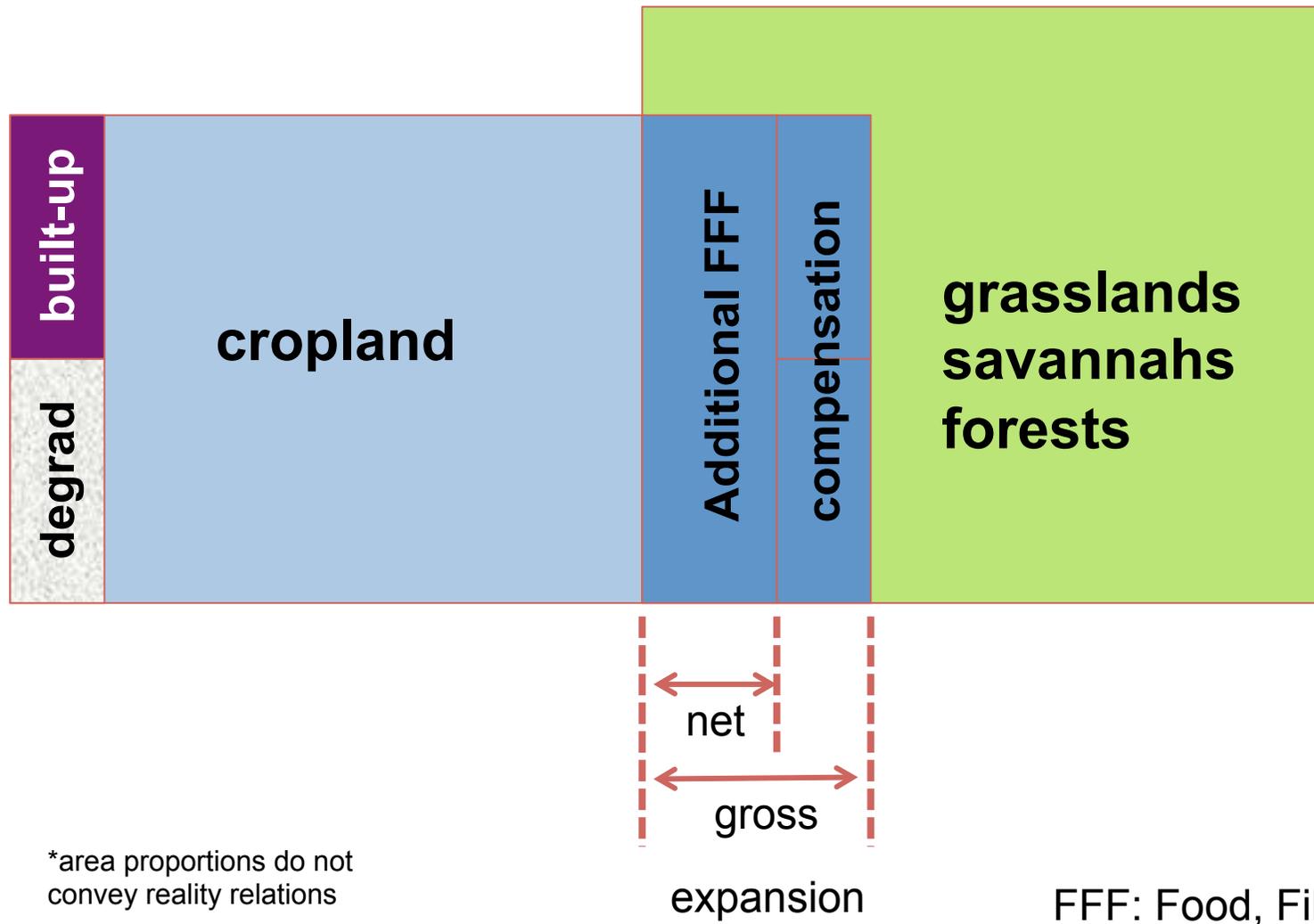


Land degradation by soil erosion

- More than a billion ha affected worldwide
- Millions of ha severely degraded every year
- Data and effects with high variability



Effect of cropland demand
Simplified scheme*



*area proportions do not convey reality relations

Global cropland requirements under business-as-usual trends until 2050 (preliminary data)

Mha	Low	High
Food supply	71	300
Biofuel supply	48	80
Biomaterial supply	20	139
<i>Net expansion</i>	139	519
Compensation for built environment	107	129
Compensation for soil degradation	90	225
<i>Gross expansion</i>	336	873

22 – 57 % of cropland
in 2005 (1.530 Mha)

Uncertainty by climate change: 10% of low and high values

Source: IRP WG L+S based on various references

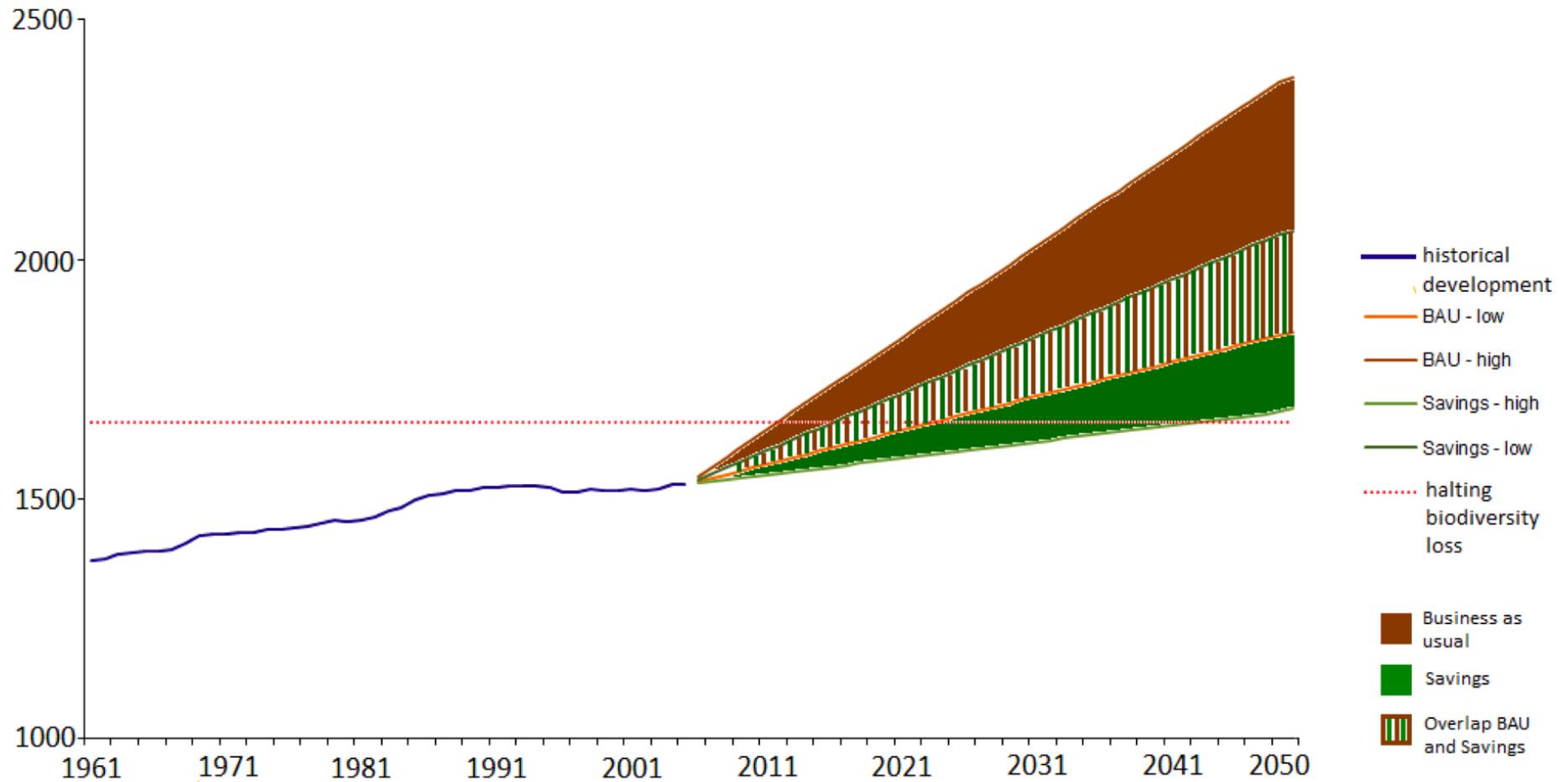
Would such an expansion be in acceptable range?

- Rockström et. al (2009): plus 400 Mha would be "safe operating space"
- However,
 - a significant part of natural savannahs would be converted (e.g. large parts of Cerrado → loss of biodiversity)
 - multiple demands for fertile land not fully considered (table !)



- **If the loss of biodiversity due to the expansion of global cropland were to be halted until 2020**
 - this would lead to a level of 1.66 billion ha (reference value)
 - and allow gross change up to **ca. 130 Mha** more from 1.53 bill ha in 2005
- the "room" for expansion and the "global threshold" might be significantly smaller than BAU would lead us

Expansion of global cropland - Preliminary Review of the International Resource Panel -



Possible savings by more responsible consumption [Mha] Preliminary data



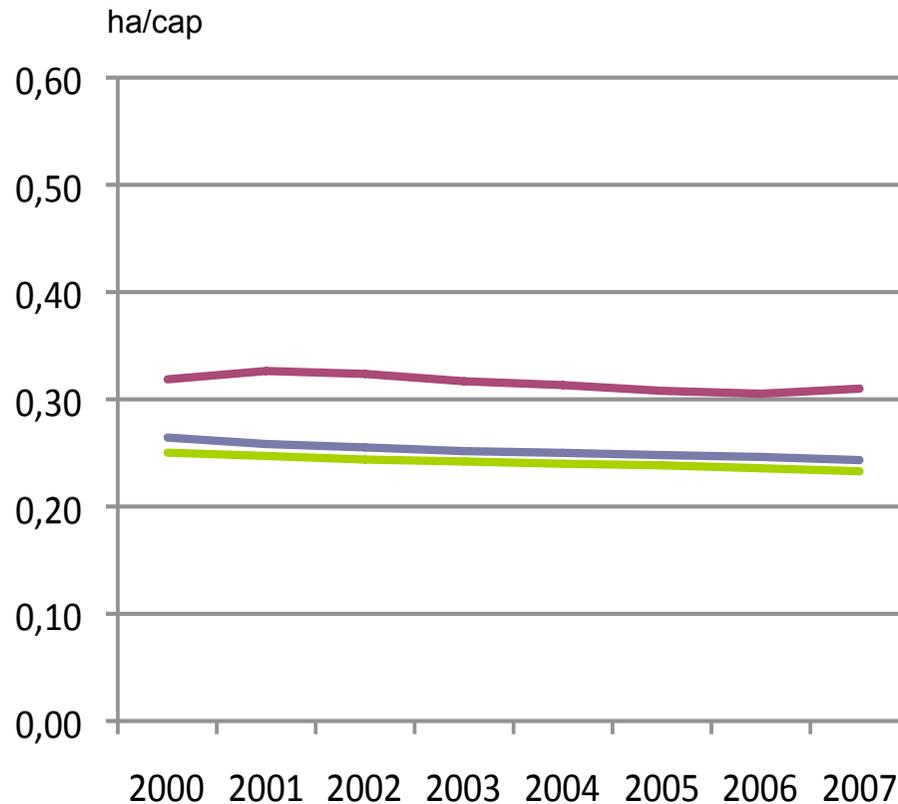
BAU expansion	Low	High	Savings by	Low	High		
Food	71	300	Improving diet and reducing waste	96	135	Low: Wirsenius et al. 2010b: 6% (of 1530 Mha + 71Mha); High: Stehfest et al.	!
Biofuels	48	80	Halving biofuel targets	24	40		☑
Biomaterials	20	139	Controlling biomaterials demand	20	70	High value halved	!
<i>Net expansion</i>	139	519		140	245		
Compensation for built environment	107	129	Land use planning	11	13	10% avoidance of building on fertile cropland	!
Compensation for soil degradation	90	225	Investment programmes to regenerate degraded land	30	74	Restoration of 1/3 of degraded and abandoned land	!

Gross expansion 336 873  180 332

remaining expansion **156 – 541 Mha**

→ required savings can only be attained by addressing all uses of biomass as well as land use planning and rehabilitation of degraded land

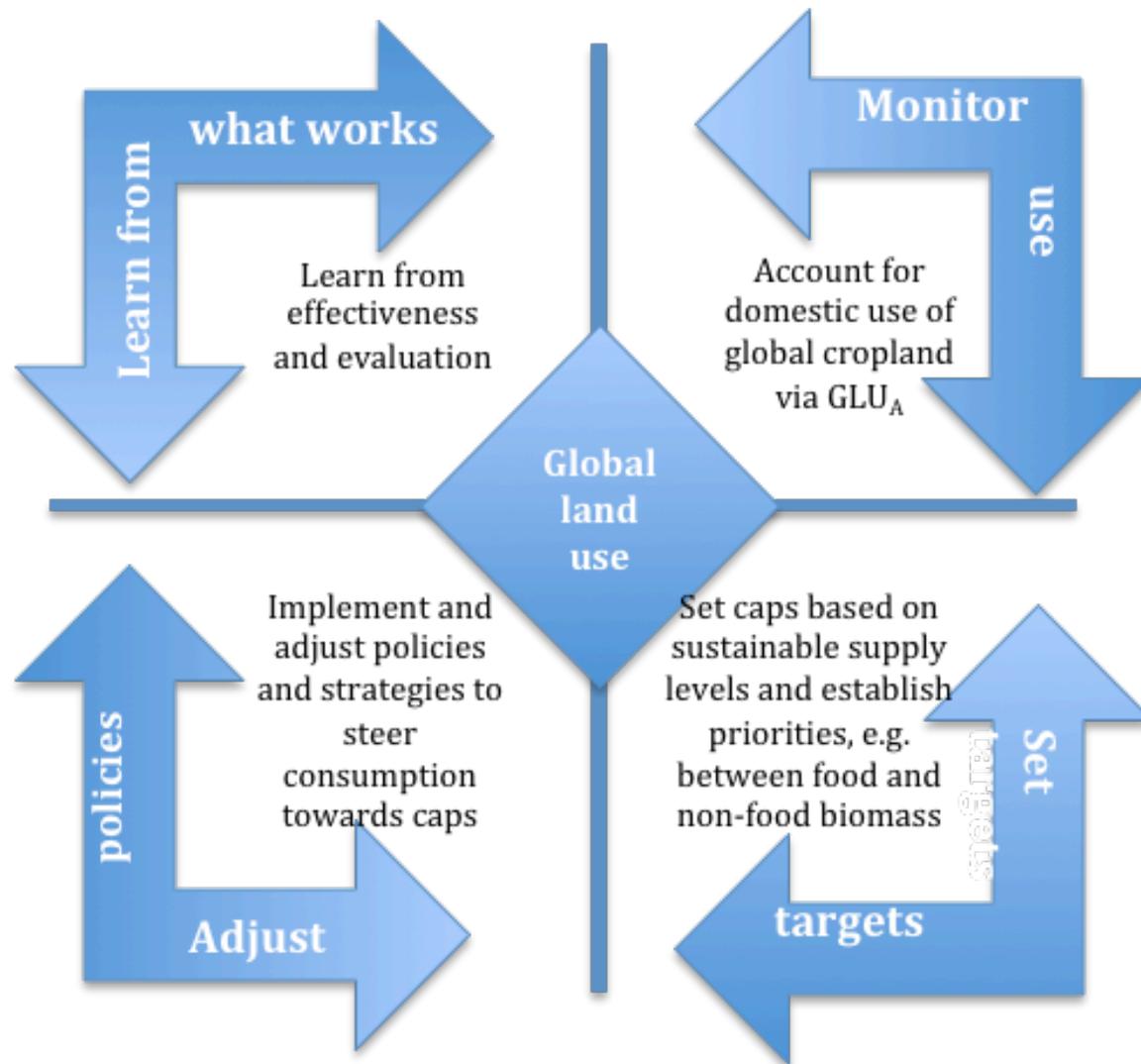
Global land use for domestic consumption in EU-27



Source: Bringezu et al. 2012

- Example how global land use can be attributed to domestic production and consumption activities
 - EU27 Domestic cropland
 - EU27 GLUA cropland
 - World cropland
- Accounting according to ew-MFA conventions (as used by OECD and ESTAT a.o.)
- Shows that EU consumes land based products above average and beyond 0.20 ha/cap

The transition cycle for global land use applicable at the national and regional level



Policy options

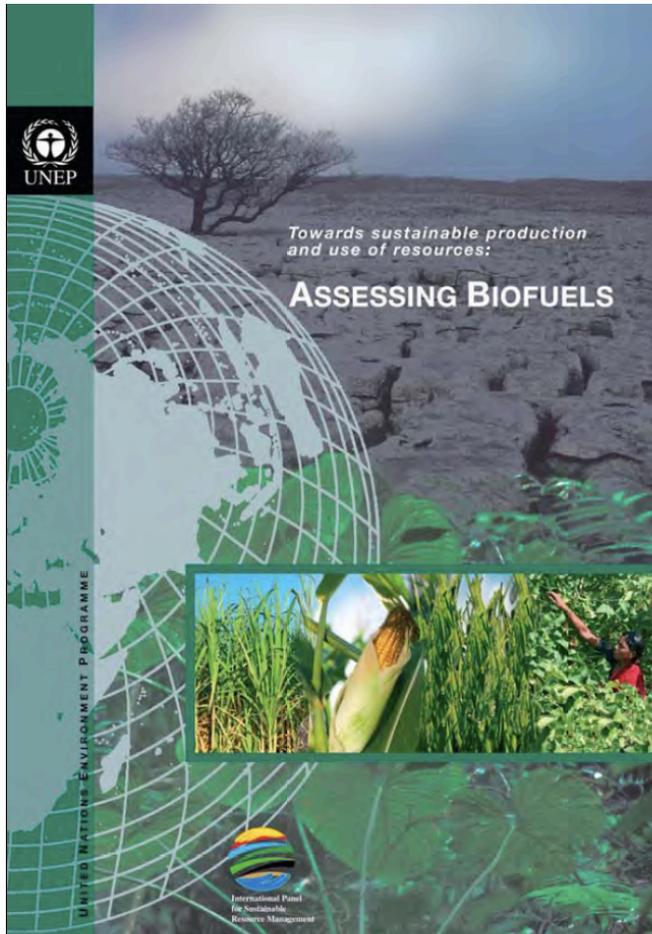
- Capacity building at the farm level
- Supporting resource management in regions and cities
- Manufacturers informing retailers and consumers on sound origin of products
- Setting the framework for resource management by countries
 - improved knowledge base
 - land use planning
 - programmes for SRM
 - economic instruments
 - improved targeting of public investments
 - increased legal safety for land users
 - reducing food waste
 - making use of waste and material cascading
 - programmes for more healthy diet in overconsuming countries
 - family planning programmes
- Supporting global resource management by international institutions
e.g. ISRIC; soil restoration fund;
cooperation with Global Soil Partnership, Land 2050 initiative

Major messages for the "soil discussion"

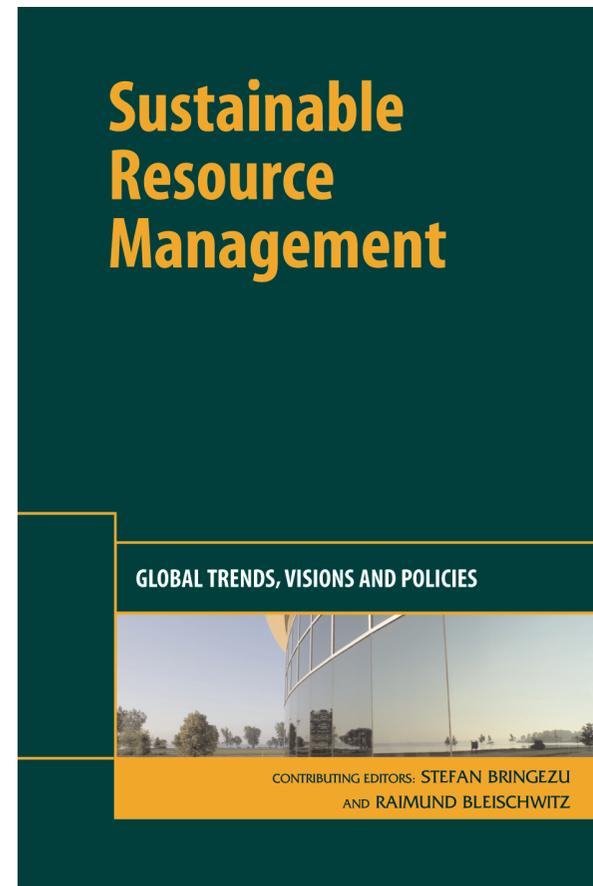
- Growing demand for food and non-food biomass will lead to increased pressure on cultivated soils and expansion of global cropland (BAU).
- Changing consumption provides high untapped potentials for relief
- Large areas with degraded soils need restoration and land use planning need to avoid building activities on fertile land
- Certification of selected products cannot effectively control global degradation and expansion of cropland
- A more efficient use of biomass and its substitutes is necessary and possible, esp. by reducing food waste, shift to more vegetal diet, and fuel car fleets consuming less fuel
- Countries should monitor and control their global land use for their domestic consumption

Many thanks for your attention !

stefan.bringezu@wupperinst.org



www.unep.fr/scp/rpanel/biofuels.htm



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