Sustainable Forest Management - challenges for ecosystem services

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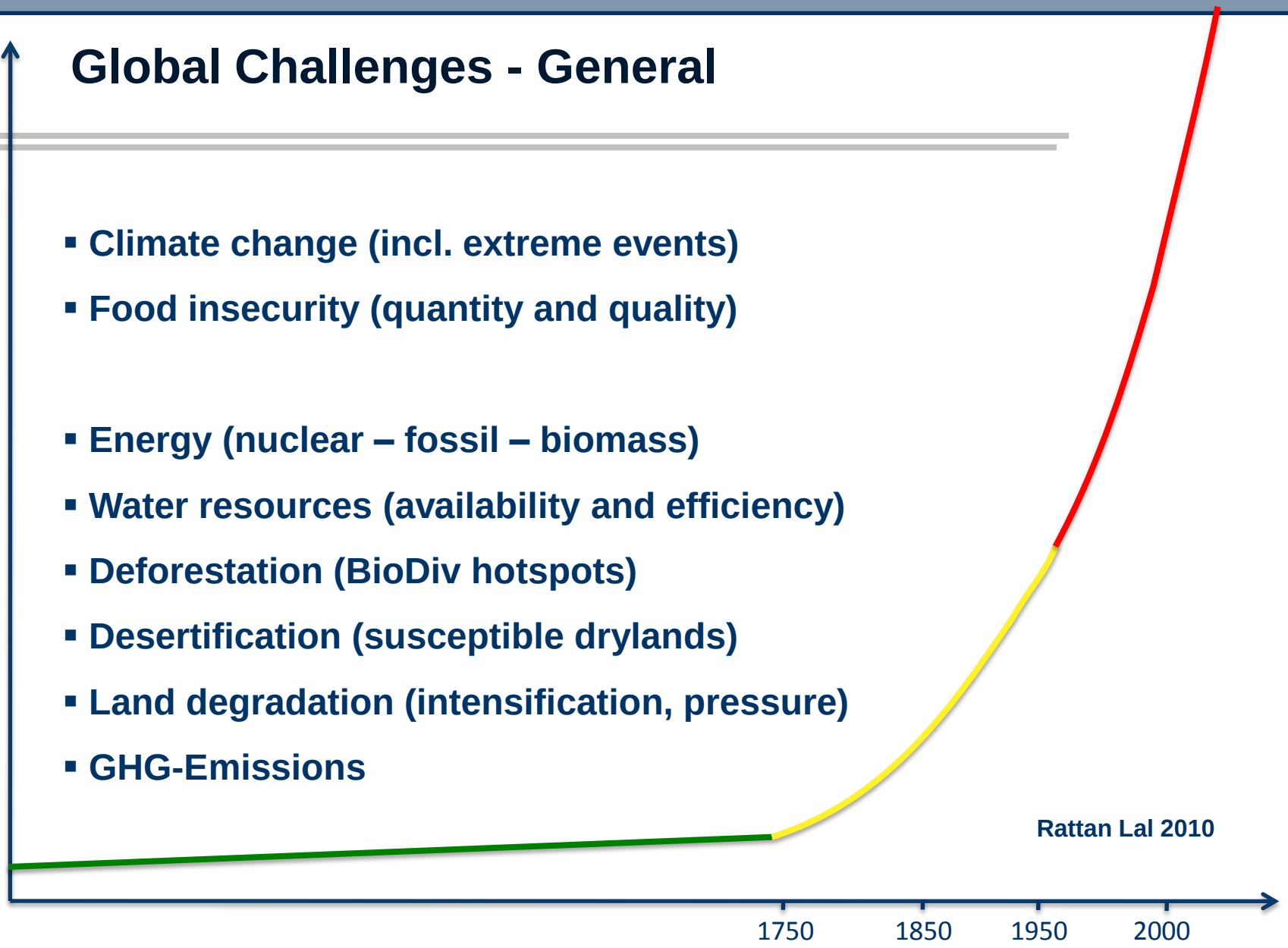
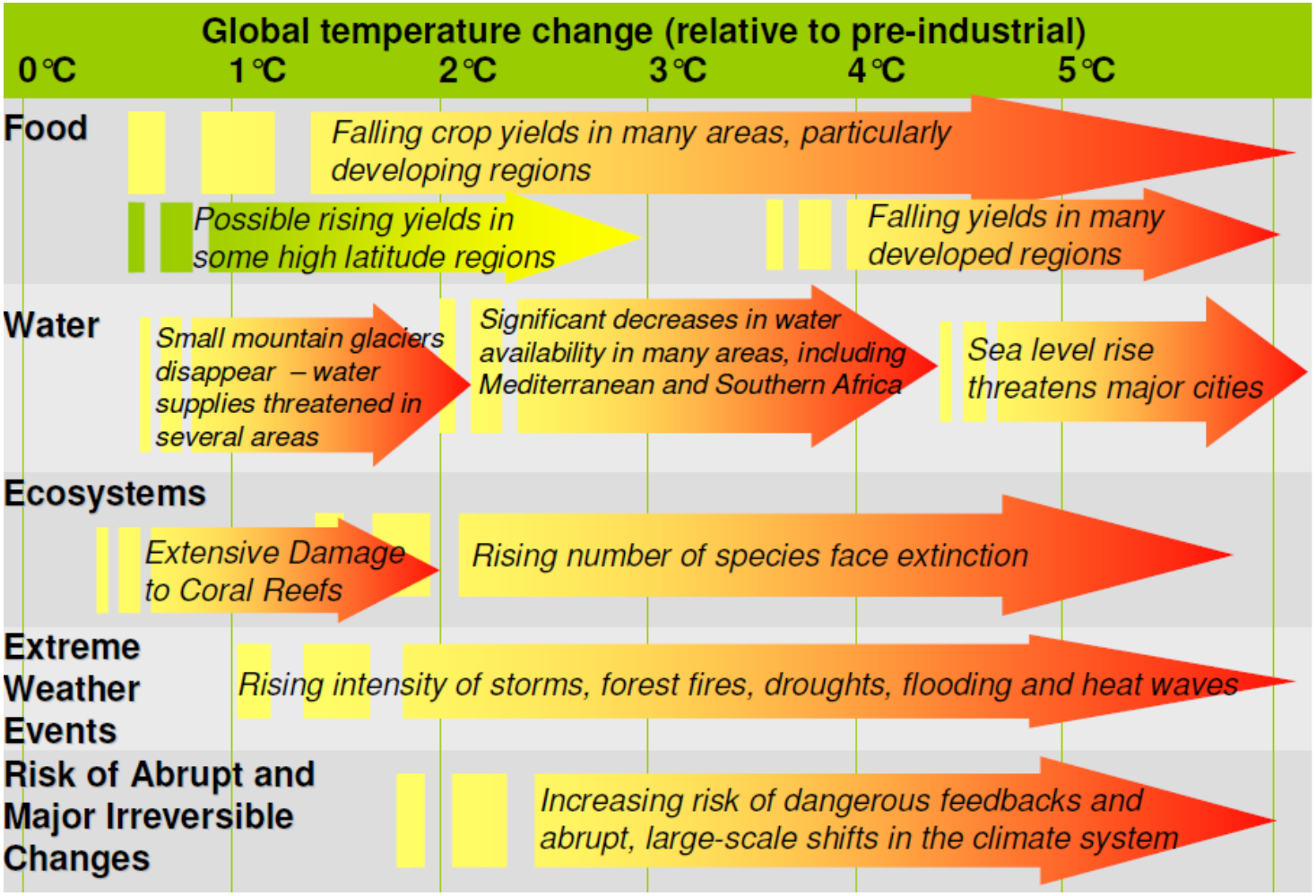
Global Challenges - General

- Climate change (incl. extreme events)
- Food insecurity (quantity and quality)

- Energy (nuclear – fossil – biomass)
- Water resources (availability and efficiency)
- Deforestation (BioDiv hotspots)
- Desertification (susceptible drylands)
- Land degradation (intensification, pressure)
- GHG-Emissions

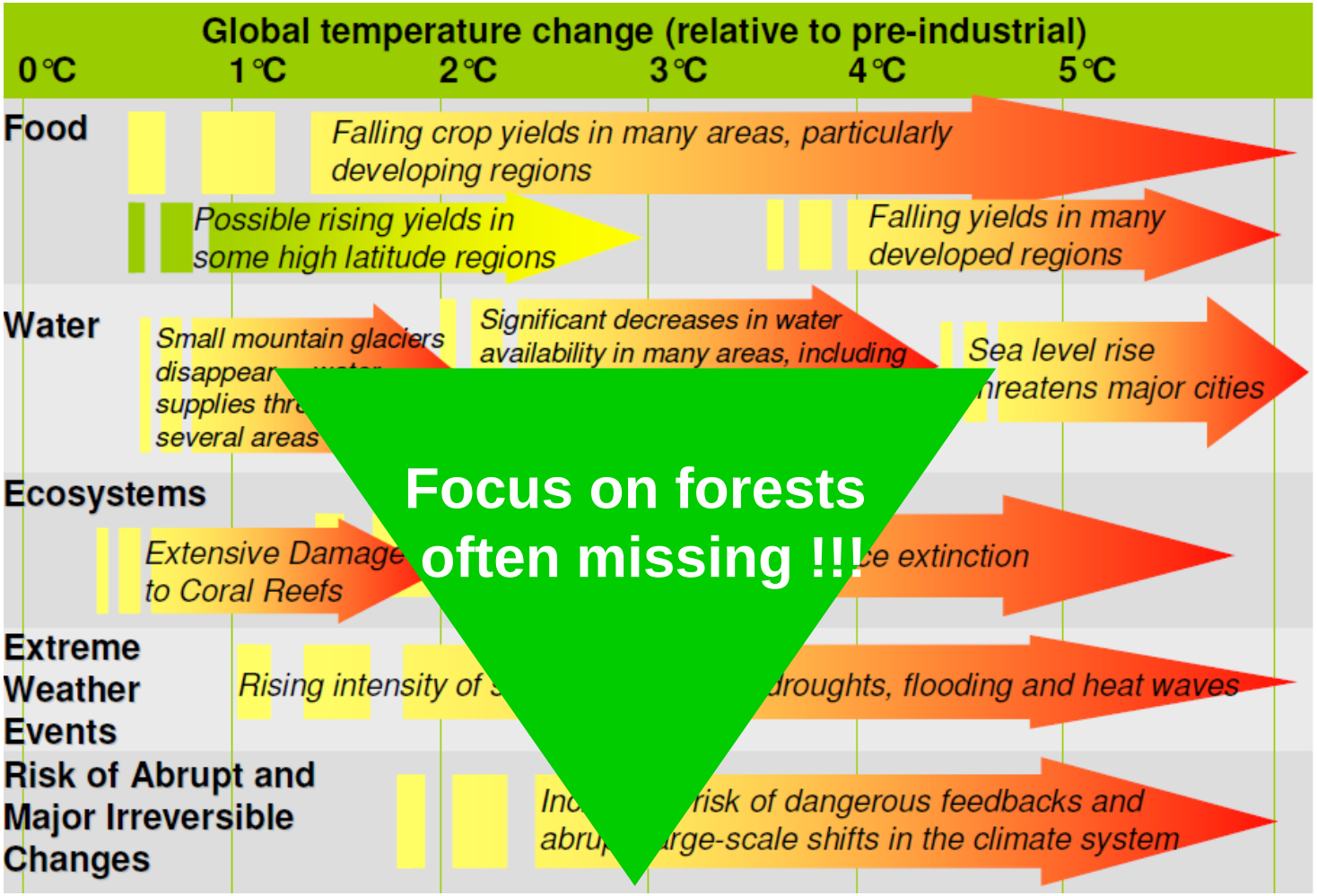


Global Challenges - Climate



Müller - FAO (2010)

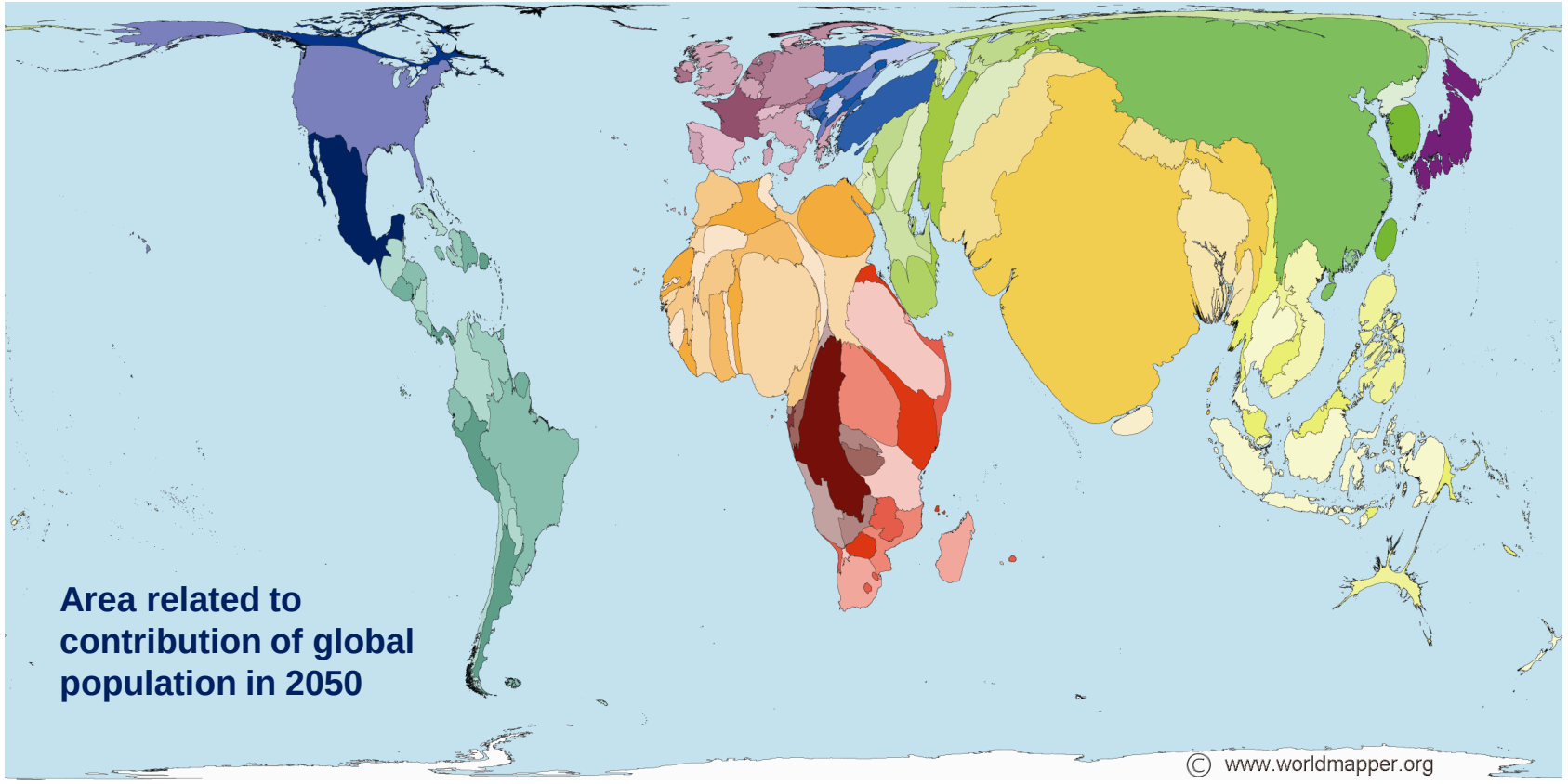
Global Challenges - Climate



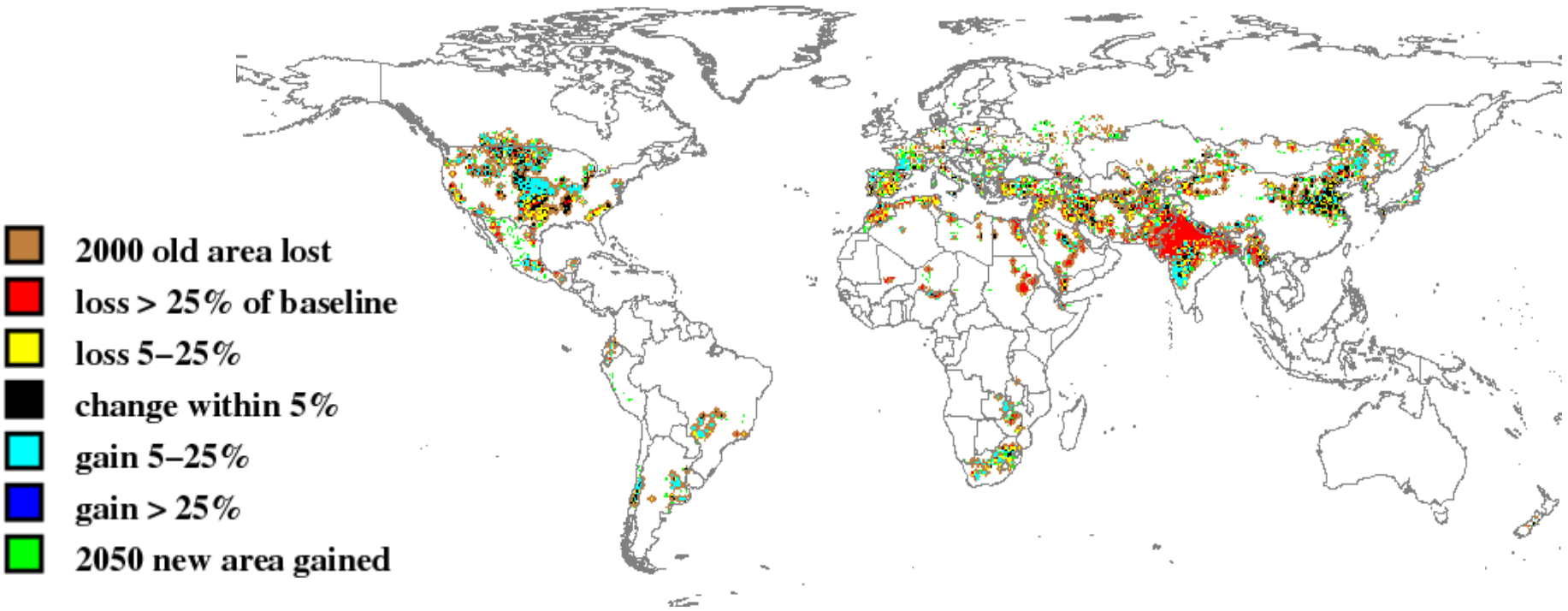
Müller - FAO (2010)

Global Challenges – Food, water and energy demand

- 7,0 Billion in 2011 → 9,1 Billion in 2050



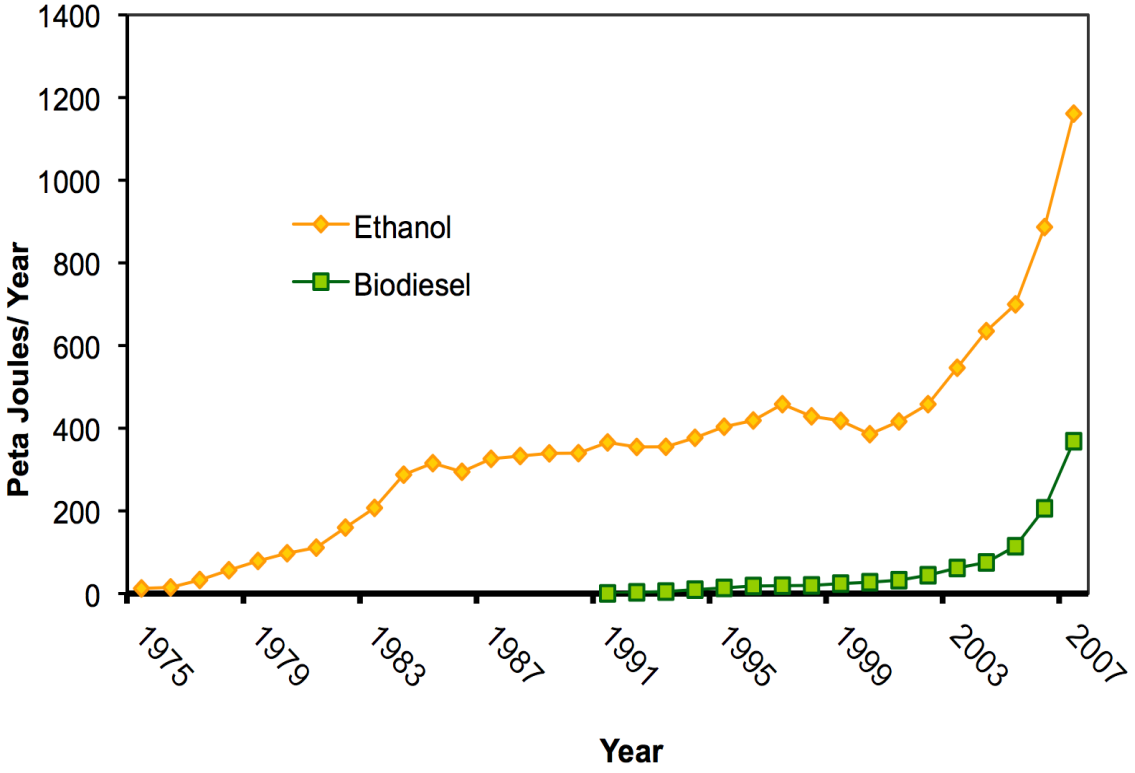
Global Challenges – Climate change

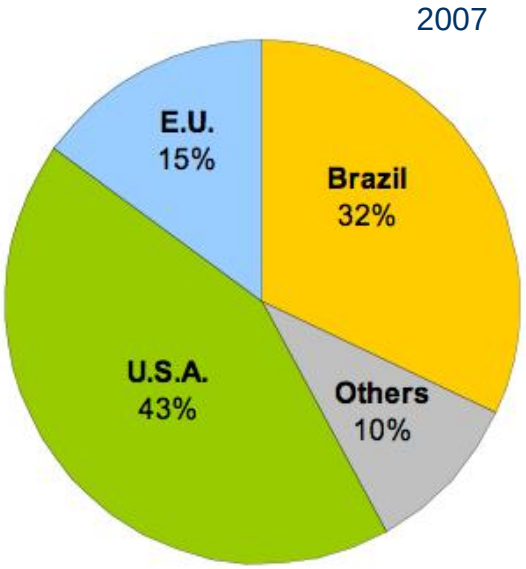


Global wheat production = - 42 %

von Braun after Rosegrant, 2009

Global Challenges – Biofuel / bioenergy





2007: 1.8% of global fuel

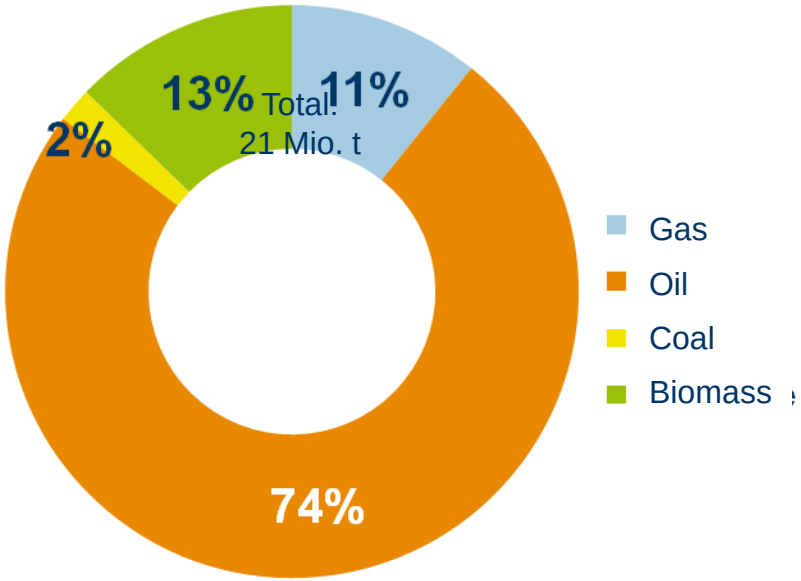
2008: ~ 3% (ethanol and biodiesel)

Source: OECD/FAO 2008; SCOPE 2009

Global Challenges – Hunger for raw material

Bio Industry – example Germany

Increase in demand for renewable resources in the chemical industry from 20-30 % by 2030



Increase from 8 % in 1991 to 13 % in 2009

Biomass	Amount [kt]
Oils and fats	1.450
Chemical sugar and starch	408
Chemical cellulose	300
Others	549
Total	**2.707**

Source: Hirth nach FNR, méo consult, VCI

Global Challenges – Raw material

⇨ 2007: 27 Mha; 2008: 36 Mha for liquid biofuels (2% gobal cropland)

⇨ Trends for expansion particular in tropical countries (high yields)

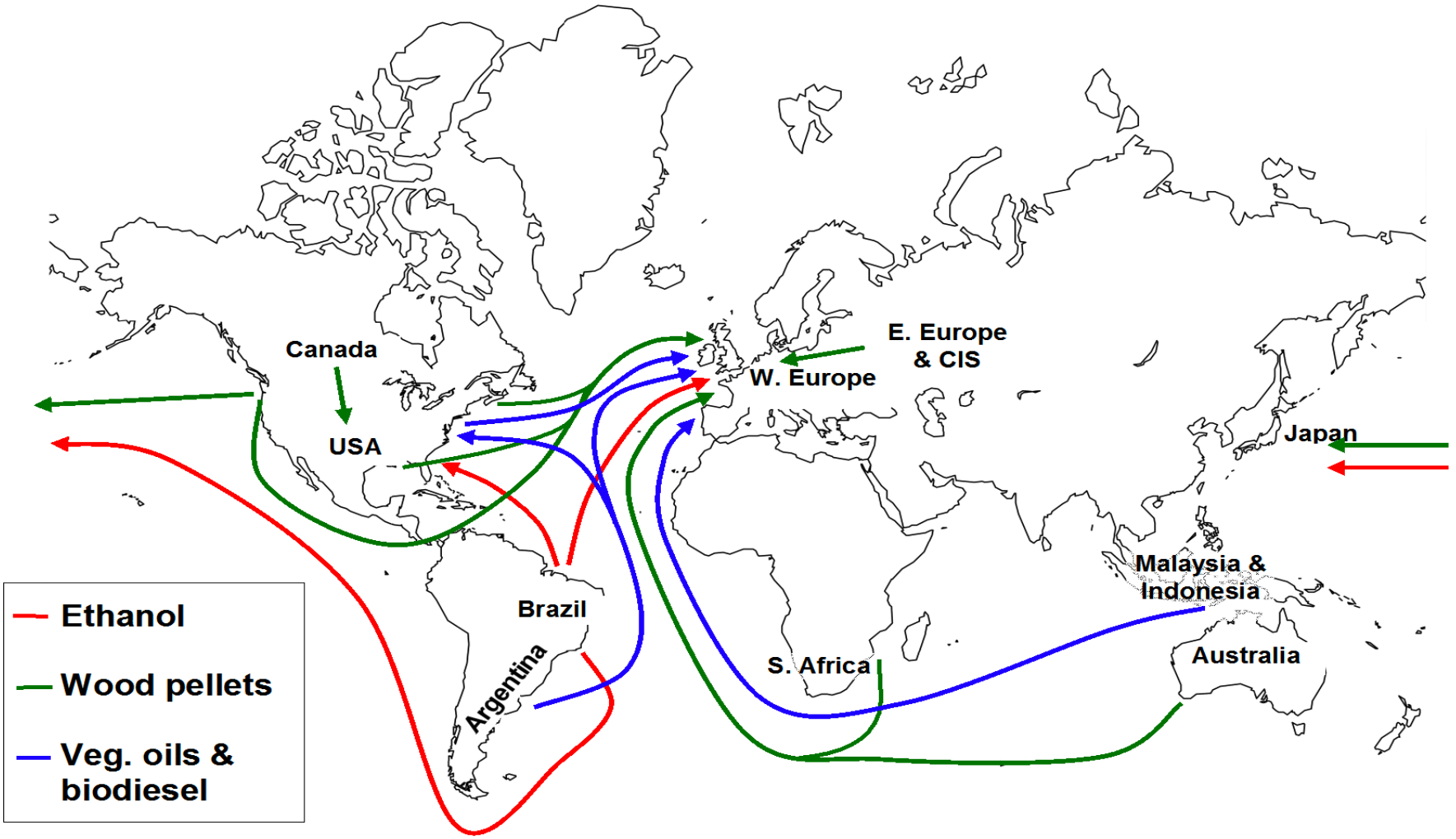
Brasil:

- Sugare cane 9 mill ha in 2008 (up 27% since 2007)
- Potential area for soybeans: 100 mill ha (23 Mha in 2005)
- expansion at the expense of grasslands, savannahs (Cerrado) and tropical forests

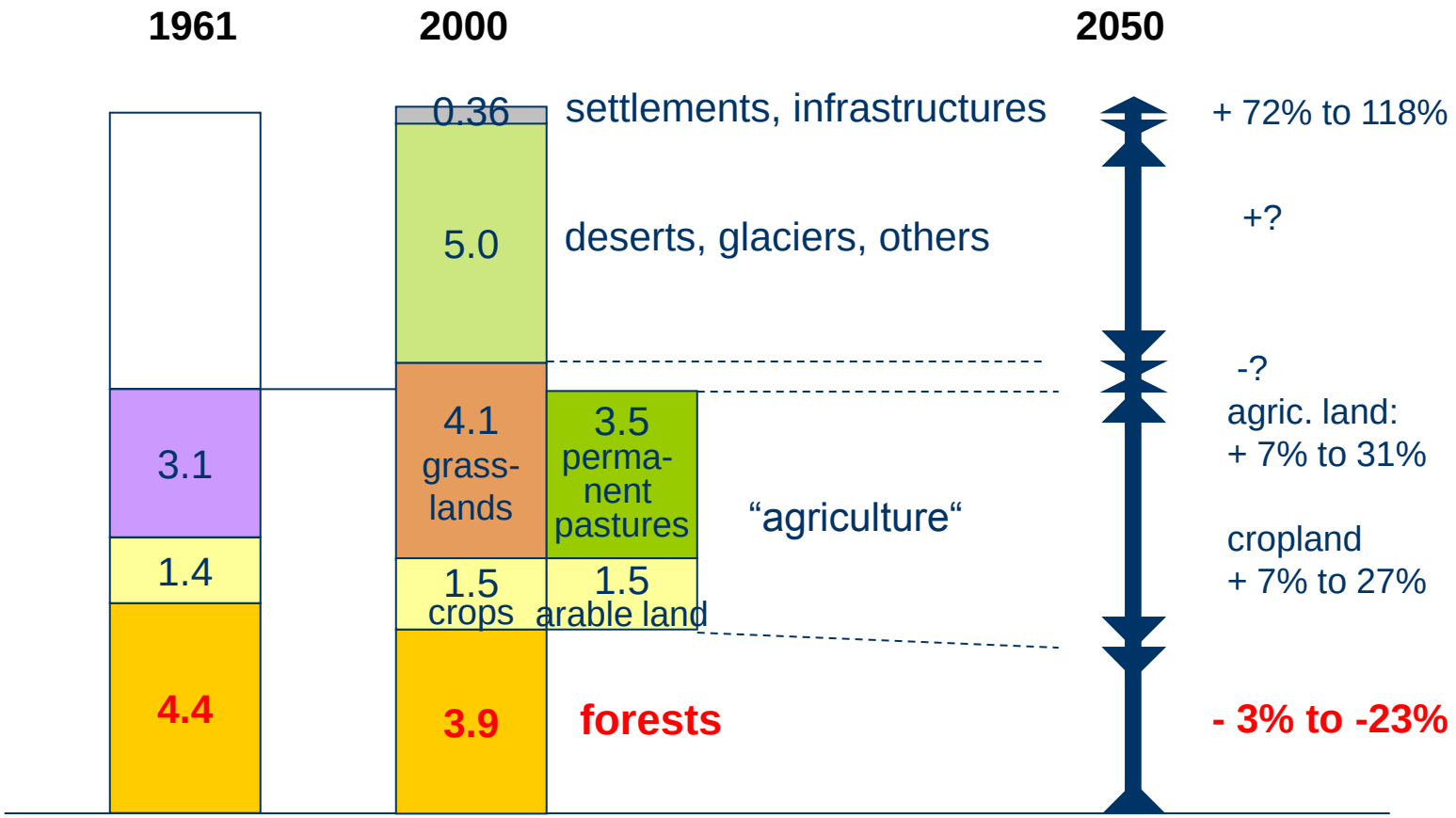
– Indonesia:

- oil palm plantations often on cleared forest land (2/3)
- applications for expansion: 6 mio ha -> 25 mio ha
- forest clearing 1/4 on peat soils

Global Challenges – Biomass fluxes

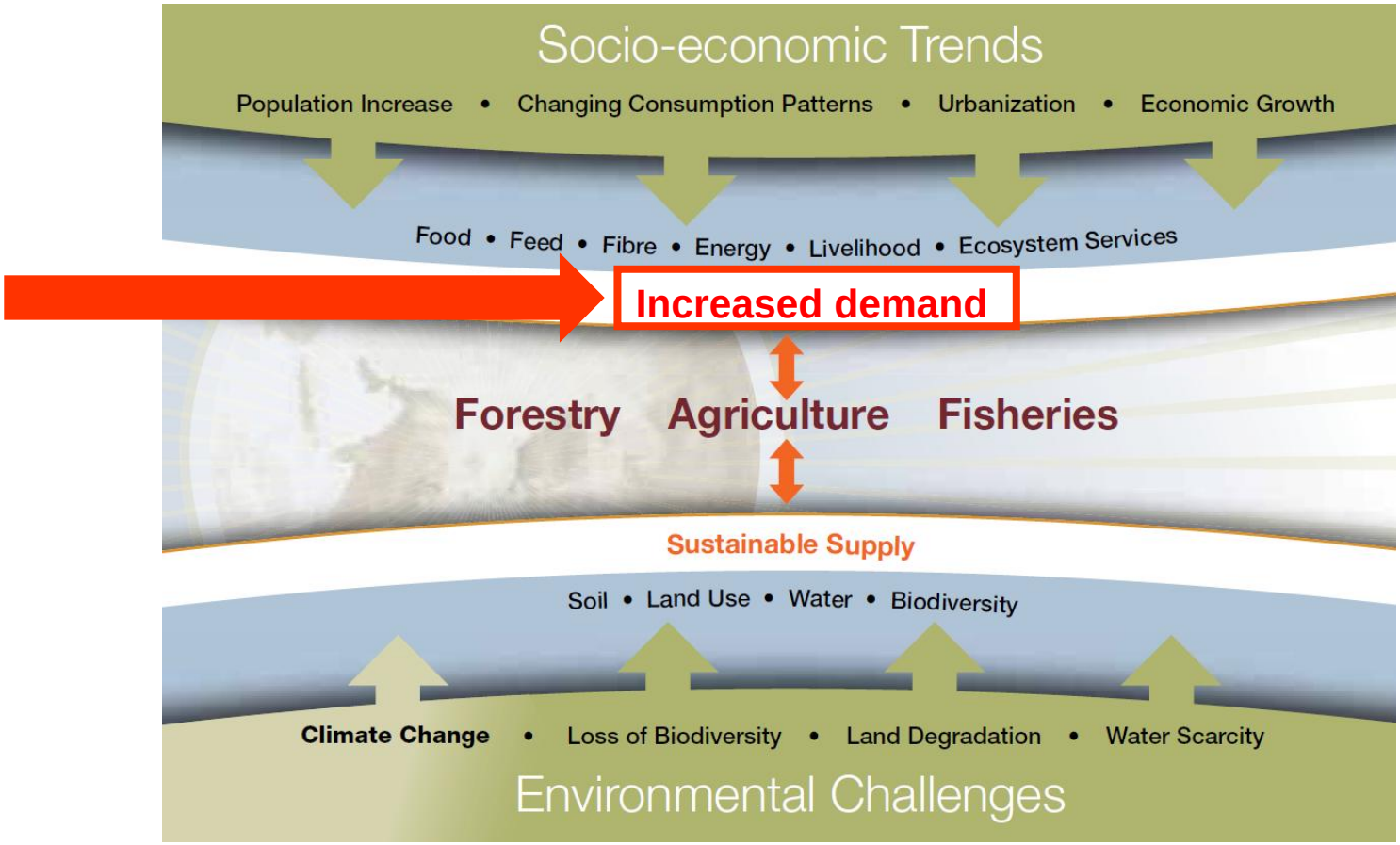


Trends in global land use (10^9 ha)

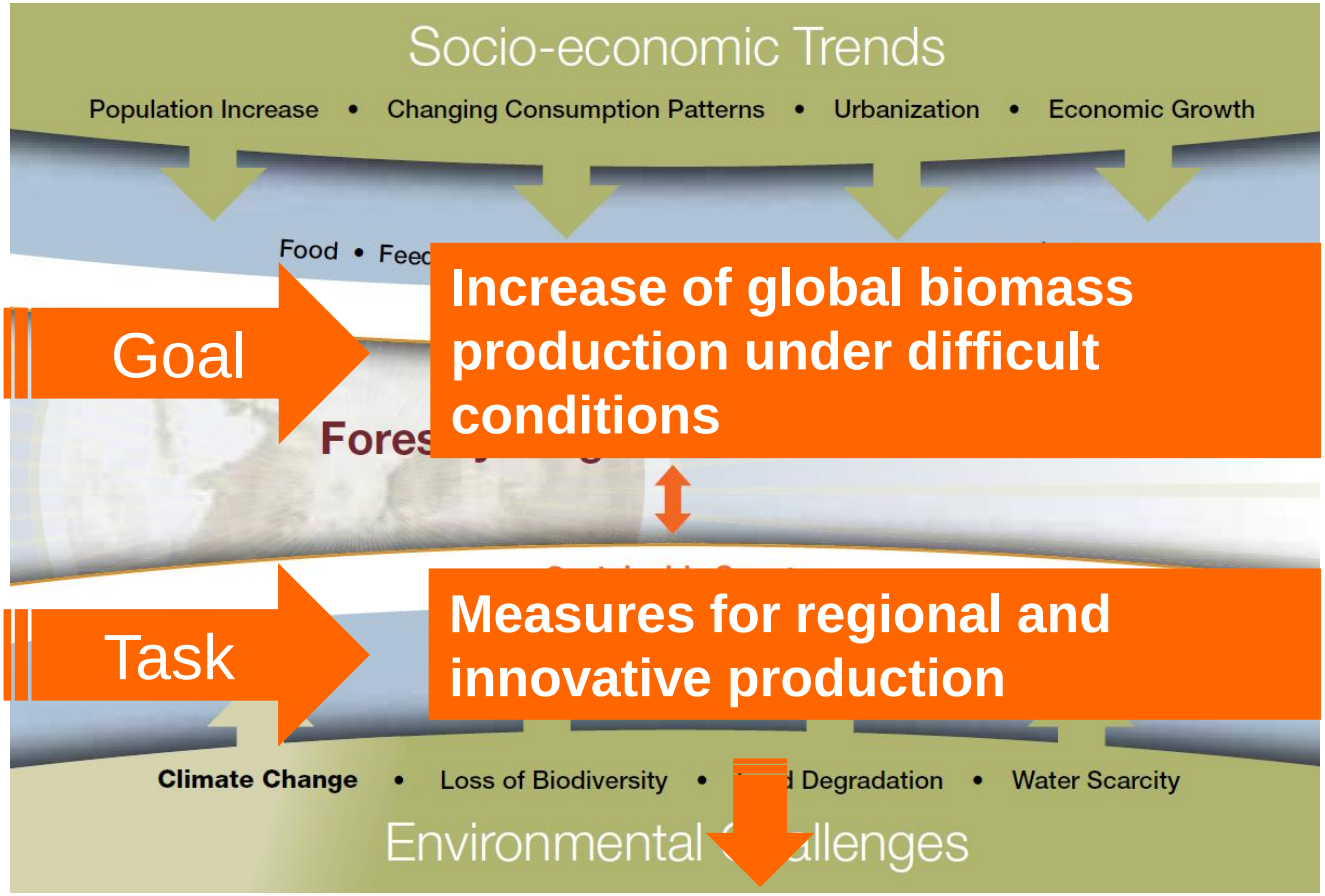


Sources: Benedikt-Kemp et al. 2002, MEA 2005, GEO 4, OECD (2008)

Global Challenges – Biomass production



Global Challenges – Biomass production



Requirements for sustainable Soil and Land Use Management

Millennium Ecosystem Assessment

The Millennium Ecosystem Assessment (MEA) is a United Nations project designed to assess the consequences of ecosystem changes for human well-being.

The MEA addresses following key questions:

How have ecosystems and their services changes?

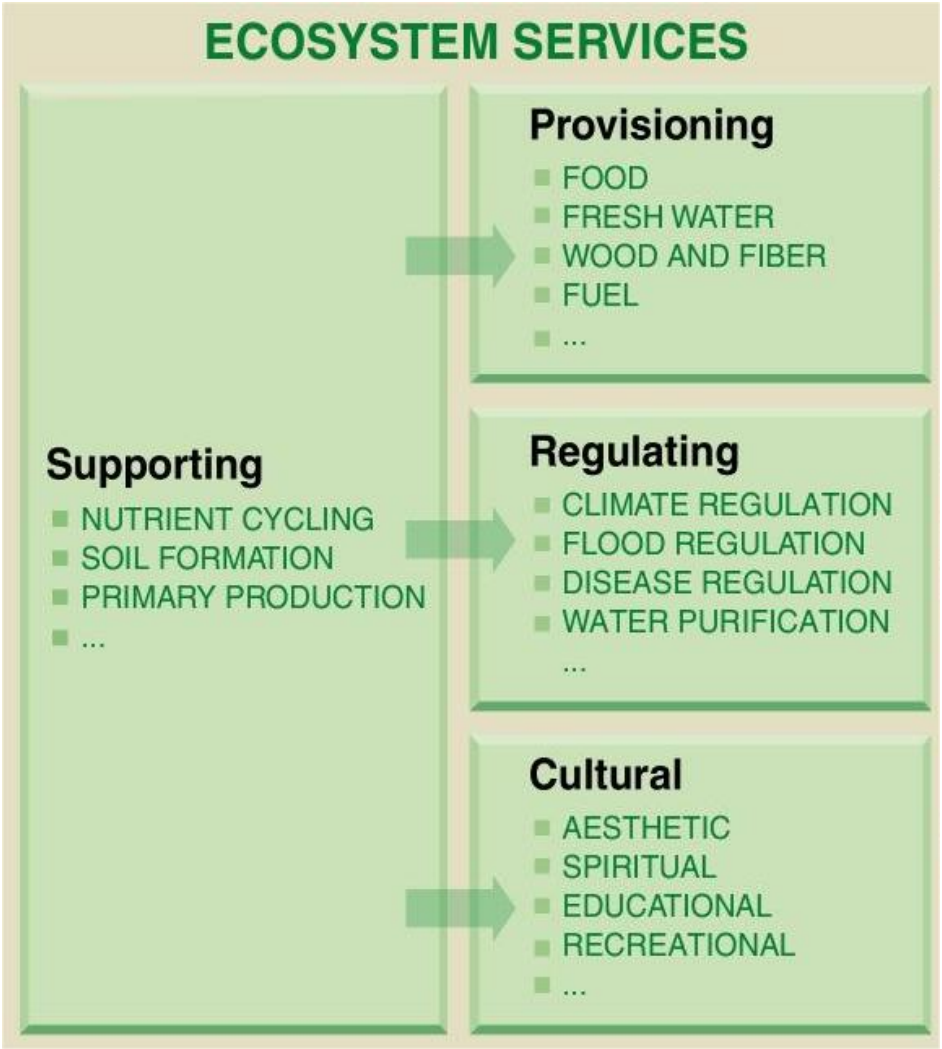
What has caused these changes?

How have these changes affected human well-being?

How might ecosystems change in the future and what are the implications for human well-being?

What options exist to enhance the conservation of ecosystems and their services to human well-being?

Millennium Ecosystem Assessment & ESS



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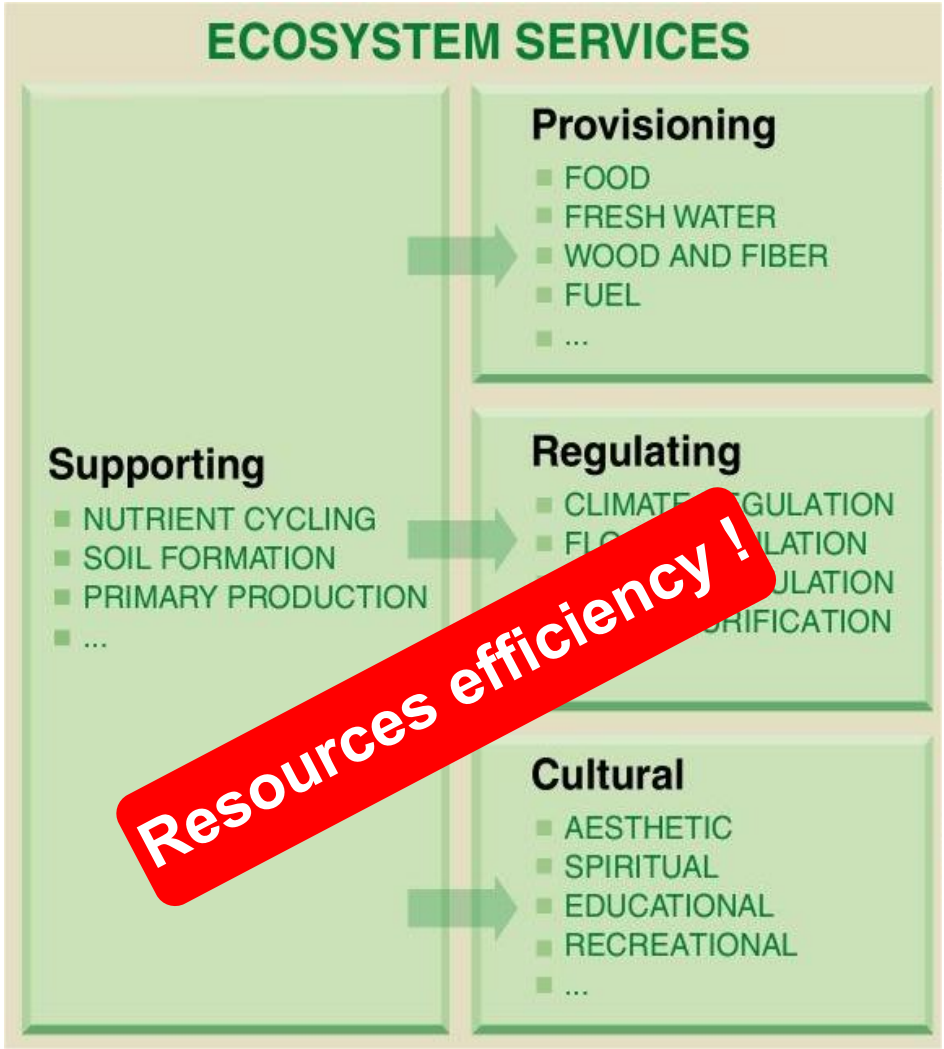

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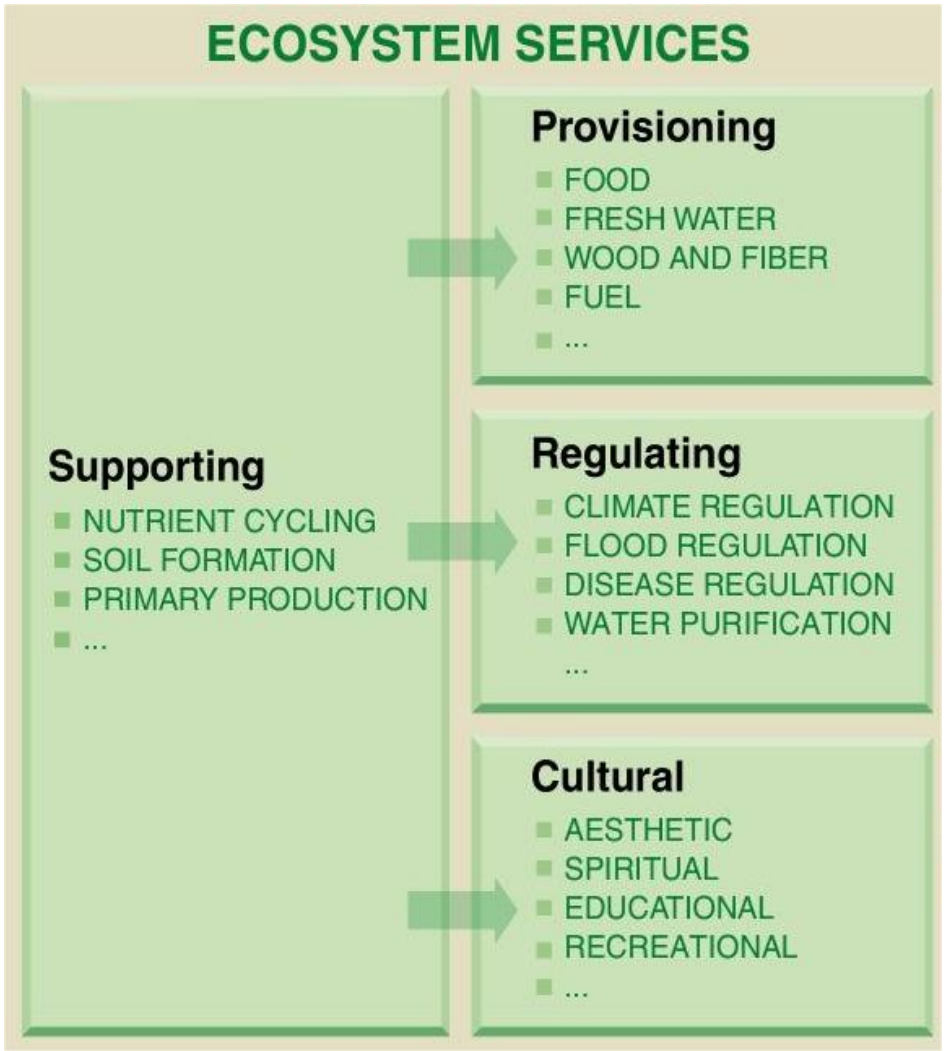
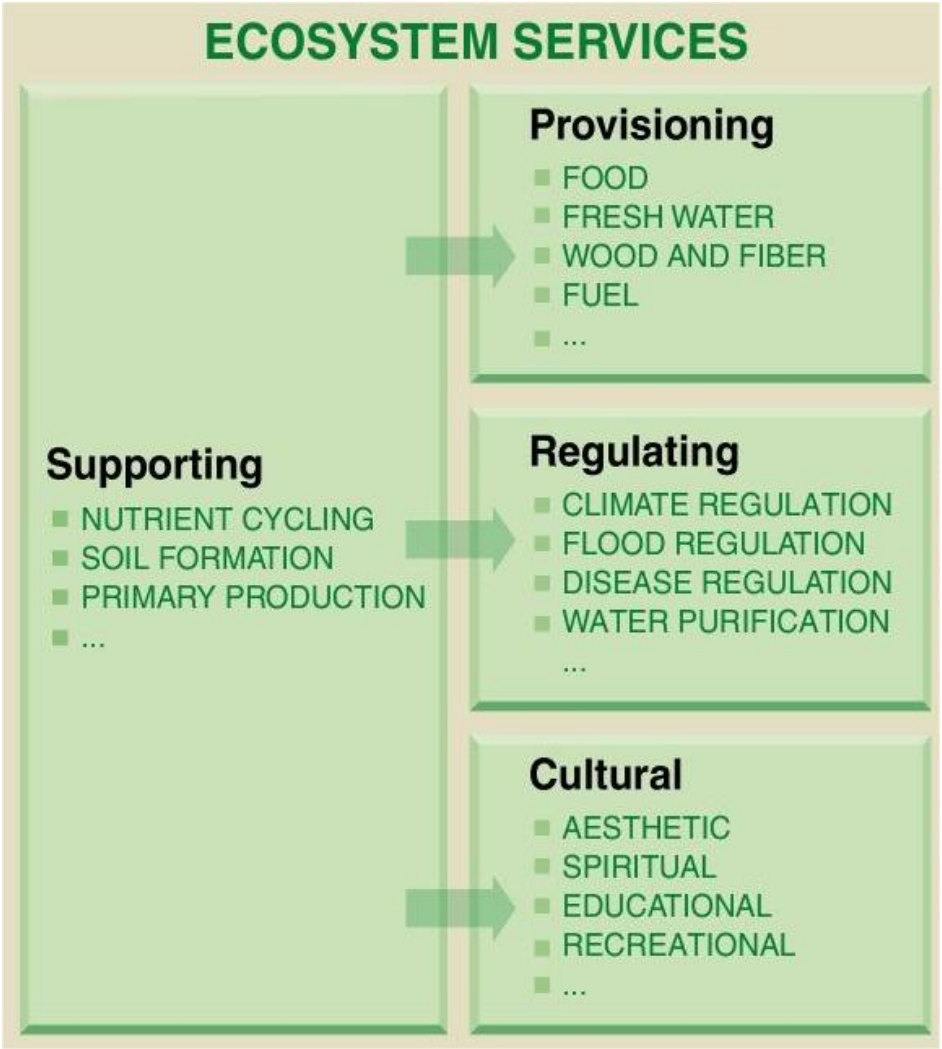


Supporting (examples):

- **Soil formation & retention**
- **Nutrient cycling**
- **Water cycling**
- **“Production” of habitat**

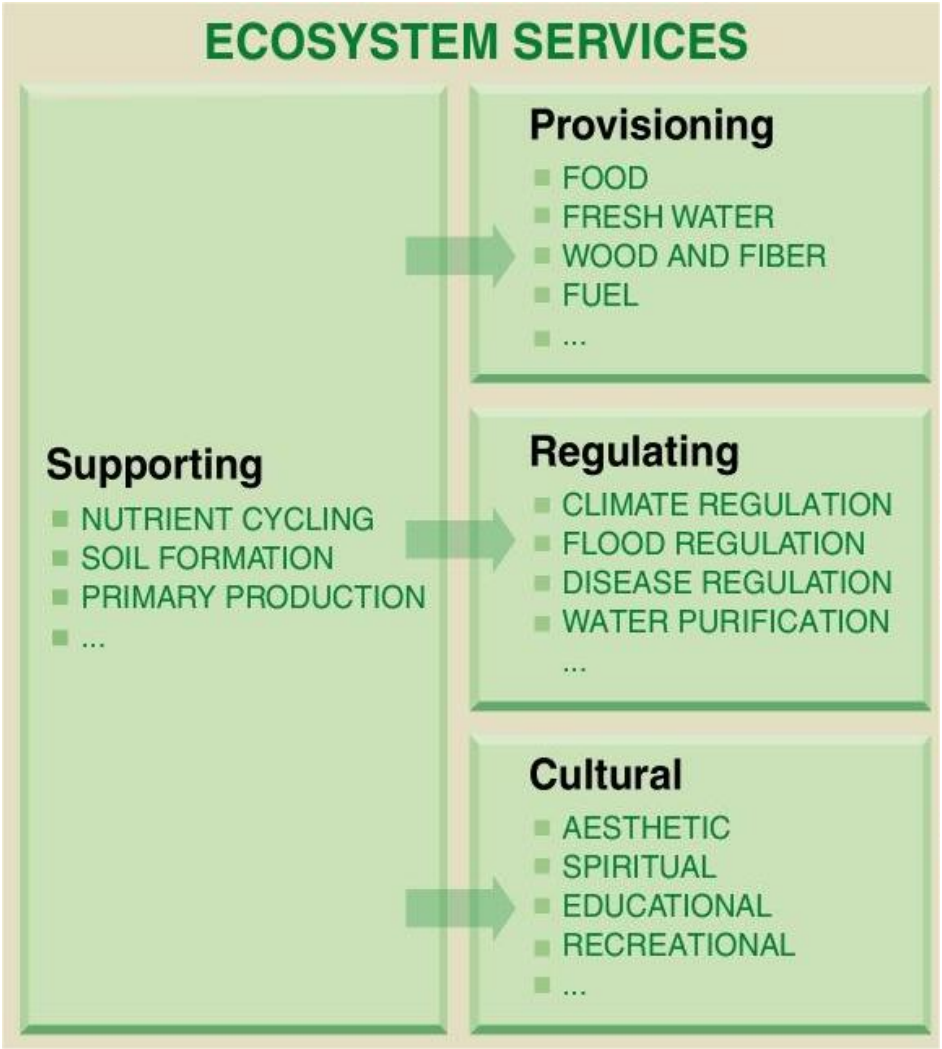
Millennium Ecosystem Assessment & ESS



Provisioning (examples):

- **Amount and quality of biomass**
- **Genetic resources**
- **Ornamentals (non timber products)**

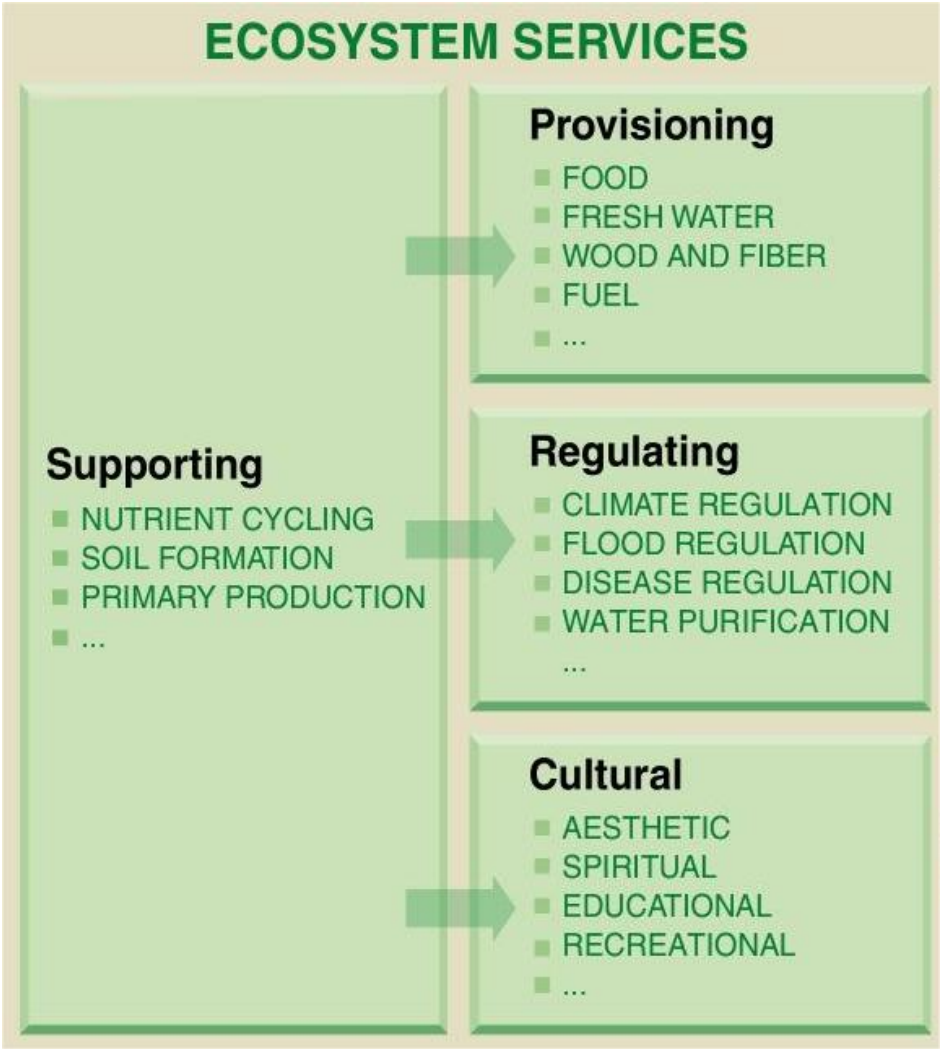
Millennium Ecosystem Assessment & ESS



Regulating (examples):

- **Air quality maintenance**
- **C-sequestration**
- **Water (runoff, purification)**
- **Erosion (off-site effects)**

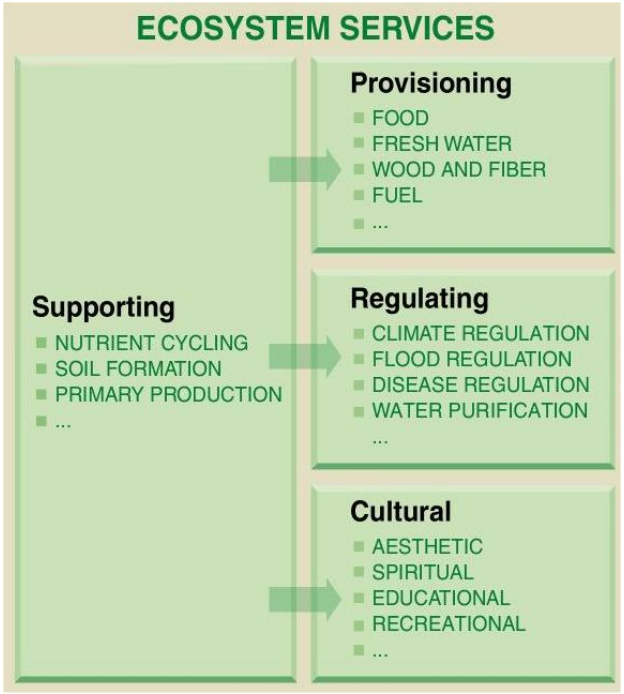
Millennium Ecosystem Assessment & ESS



Cultural (examples):

- **Spiritual & religious value**
- **Social relations**
- **Aesthetic value (“well feeling”)**
- **Tourism**

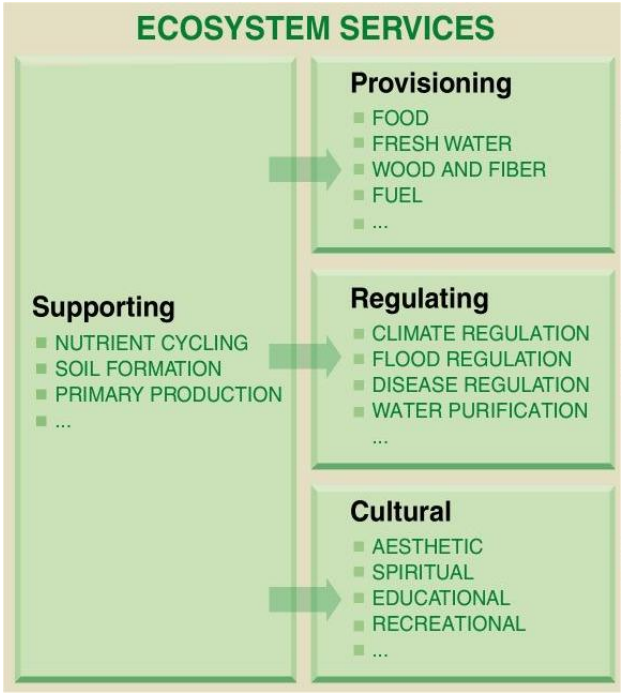
Millennium Ecosystem Assessment & ESS



Challenges

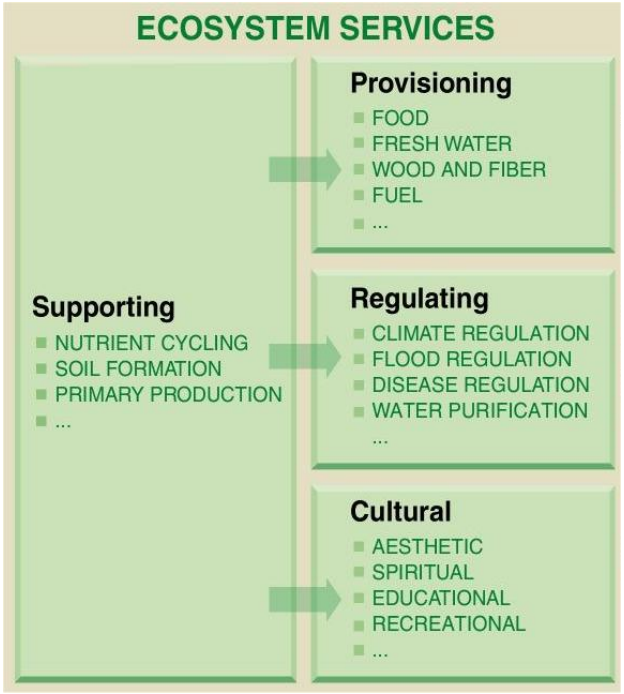
Climate change	⇨	extreme events
Food insecurity	⇨	land use pressure
Energy	⇨	biomass & bioenergy
Water resources	⇨	availability & quality
Deforestation	⇨	biodiversity hotspots
Desertification	⇨	land use pressure
Land degradation	⇨	intensification, pressure
GHG-Emissions	⇨	buffer ecosystem, carbon

How to value Ecosystem Services (methods & tools)



- **Environmental Impact Assessment EIA**
- **Strategic Environmental Assessment SEA**
- **Life Cycle Analysis LCA**
- **Risk Assessment**
- **Cost-Effectiviness Analysis**
- **Multi Criteria Analysis MCA**

How to value Ecosystem Services (methods & tools)



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- **Cost-Effectiviness Analysis**
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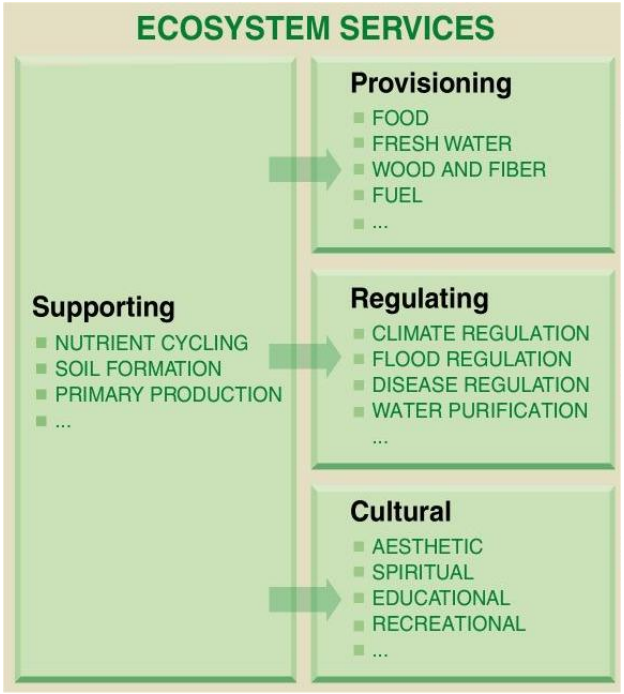
⇨ **Sophisticated procedure**
⇨ **Time and money consuming**
⇨ **Still lack of knowledge for quantification (research)**

How to value Ecosystem Services (methods & tools)

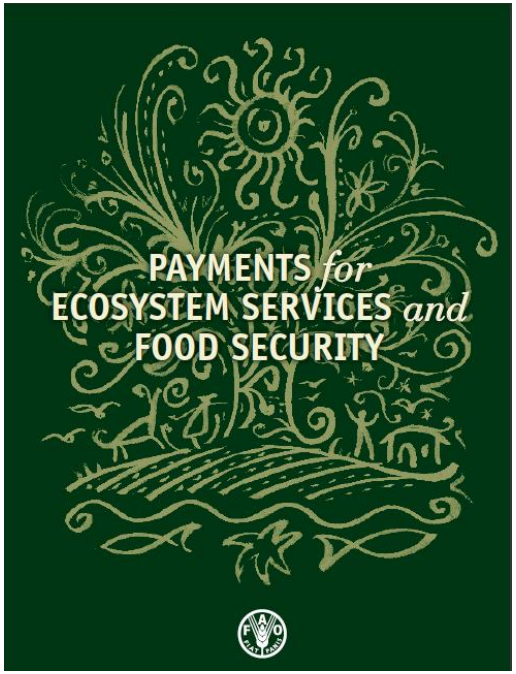


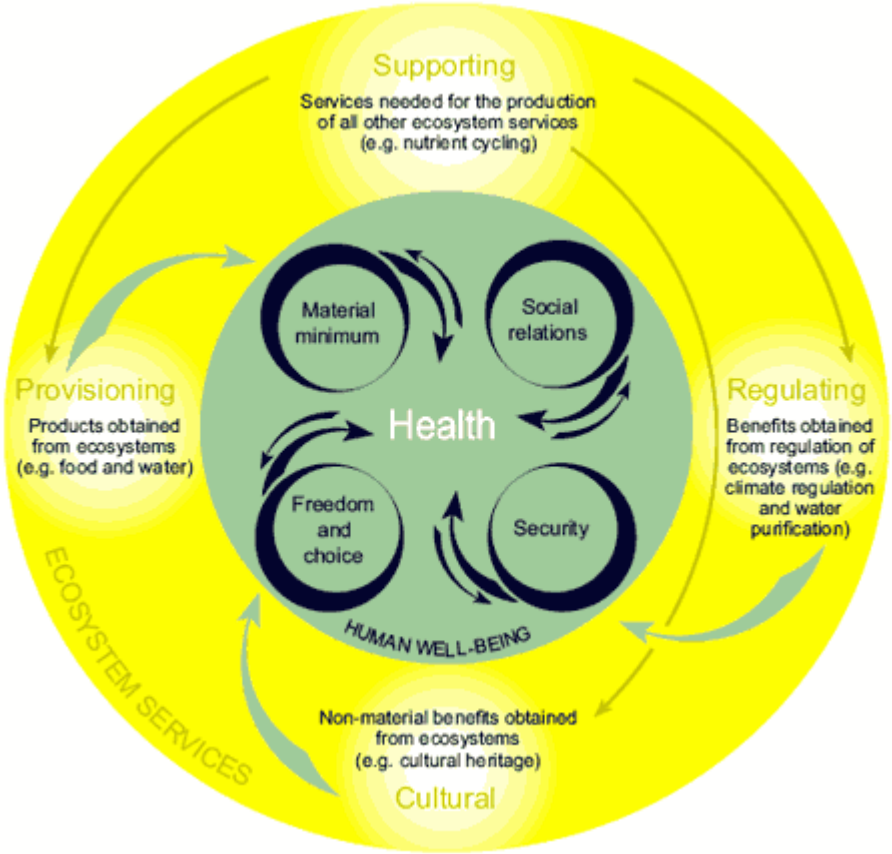
Value in Great Britain in 2006:

• Recreation	~ 420 Mill €
• Biodiversity	~ 410 Mill €
• Landscape	~ 180 Mill €
• C-sequestration	~ 105 Mill €
Total:	~ 2.1 Bill €

Notice: values without biomass production !

How to value Ecosystem Services (methods & tools)





How to value Ecosystem Services (methods & tools)

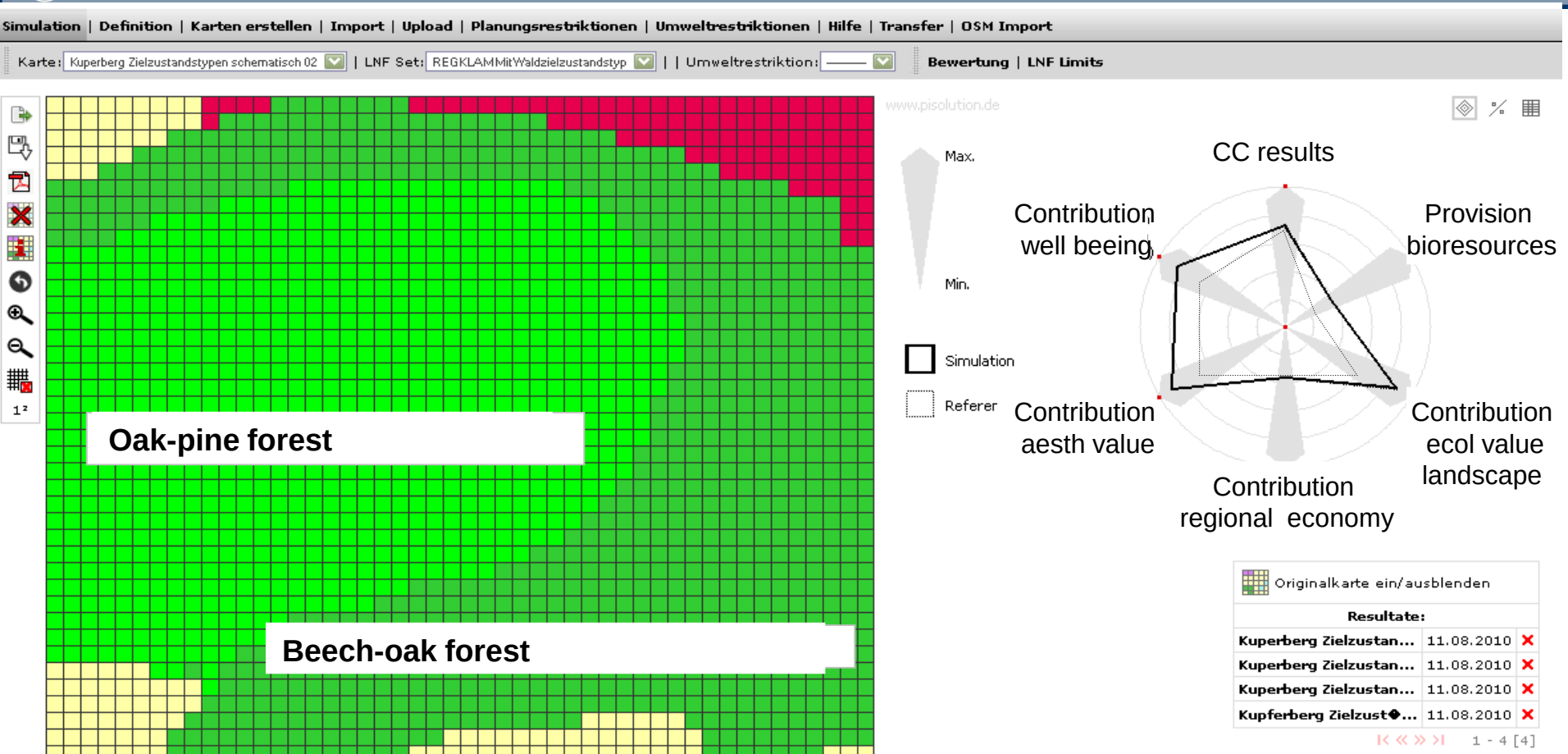
Challenges

⇨ **Feasible, systematic, and accepted regional approaches for different ecosystem categories / clusters**

⇨⇨**Aims: multi-purpose approach (anthropogenic focus)**

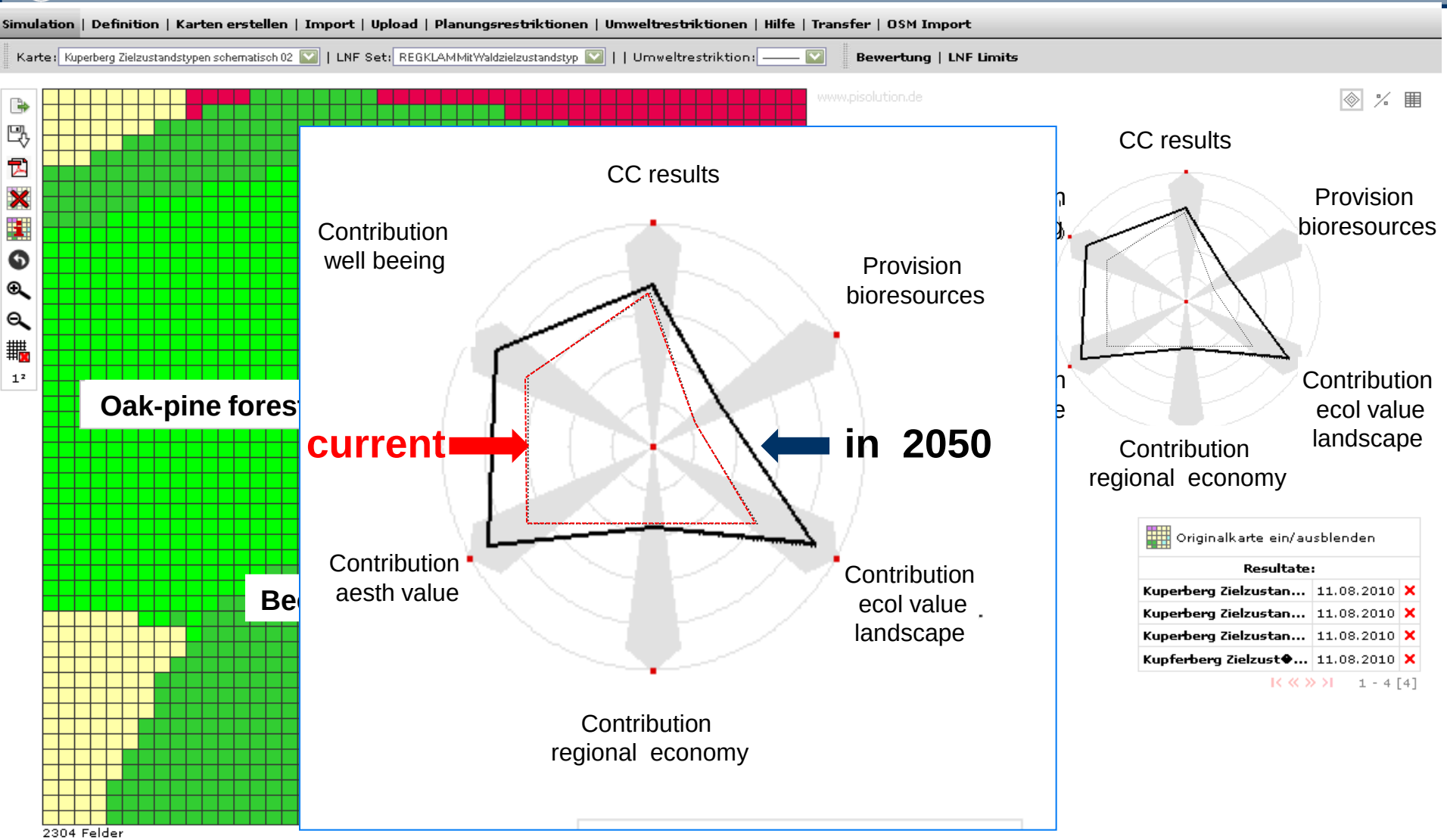
⇨ **Integrated approaches including participation of key target groups**

⇨ **Appropriate tools for upscaling from site to landscape**



Fürst, Lorz & Makeschin 2011 (in print):
J. Biodiversity, Science & Management

Frank, Fürst & Makeschin 2011: in print
Ecol. Indicators, ECOLIND-1365R2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Karte: Kuperberg Zielzustandstypen schematisch 02 | LNF Set: REGKLAMMitWaldzielzustandstyp | Umweltrestriktion: | Bewertung | LNF Limits
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Management influences ⇨ValWood project

- Soil preparation
- Fertilisation
- Undergrowth removal
- Thinning
- Harvesting

www.yourforestmanaged.com

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We are on a good way –

let us continue !