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science for global insight

Meeting of the UNECE-FAO
Forest Communicators Network (FCN)
23rd– 26th April 2014 in Berlin

recharge green
BALANCING ALPINE ENERGY AND NATURE

UNECE FAO
Forest Communicators Network

Drivers, Trade-offs and Impacts on Future Forests

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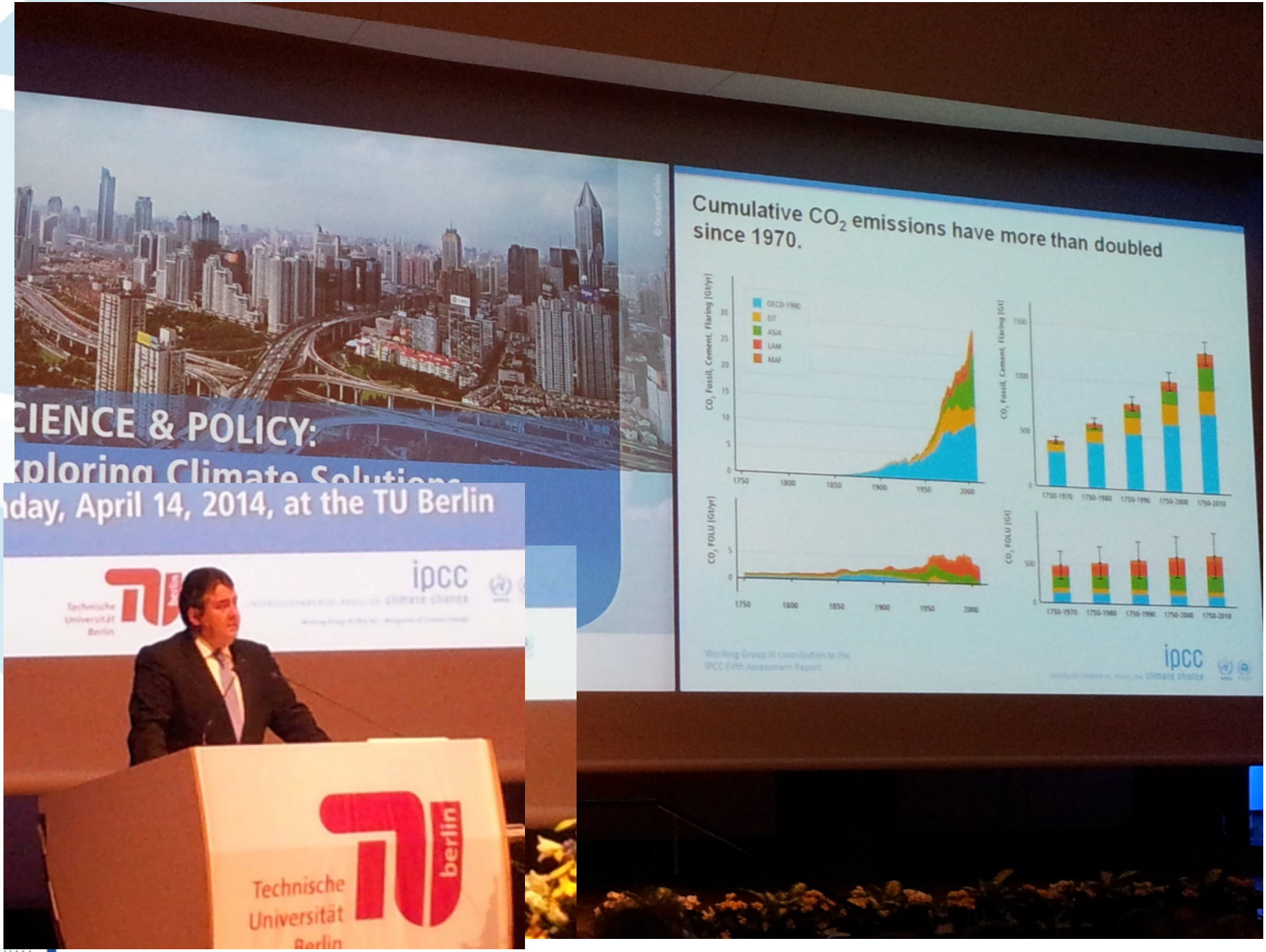
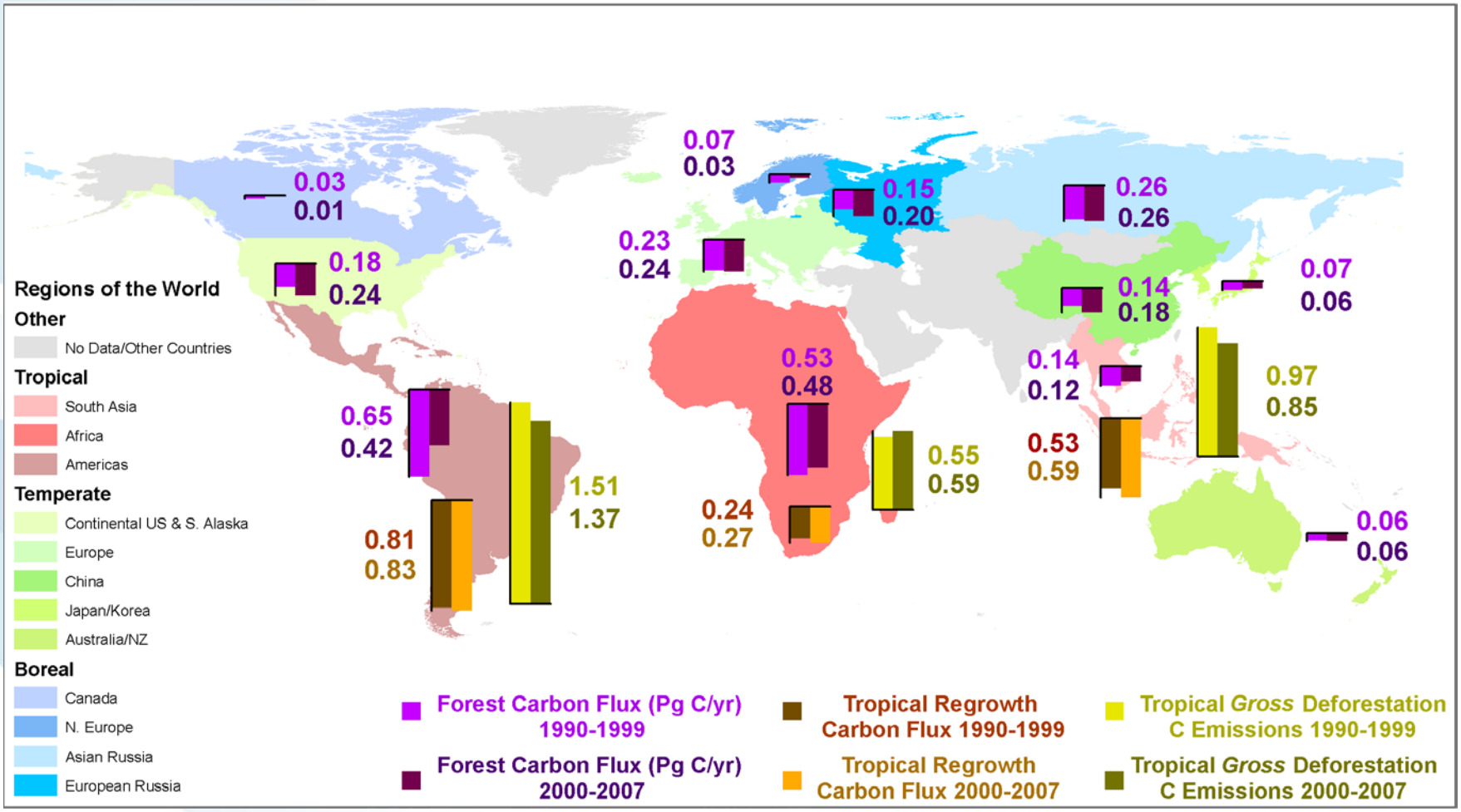
Alpine SPACE
THIS PROJECT IS CO-FUNDED BY THE EUROPEAN REGIONAL DEVELOPMENT FUND
EUROPEAN TERRITORIAL COOPERATION
Investing in your future

Effect/impact	Driver	Competing objectives
Deforestation / iLUC	agriculture	Food production/Intensification
	infrastructure	development
	energy	Clean energy
	fiber	Renewable material
	Population pressure	
	Climate change	Shifting agriculture
	Governance lack	
ESS / Biodiversity / Habitat loss	See also deforestation	Multi-functionality
Increased disturbances (pests, fire etc.)	climate	management
	population	


CIENCE & POLICY:
xploring Climate Solutions
day, April 14, 2014, at the TU Berlin
ipcc
Technische Universität Berlin
Cumulative CO_2 emissions have more than doubled since 1970.
OECD-1990
EIT
ASIA
LAM
MAF
CO_2 Fossil, Cement, Flaring [Gt/yr]
CO_2 Fossil, Cement, Flaring [Gt]
CO_2 FOLU [Gt/yr]
CO_2 FOLU [Gt]
1750
1800
1850
1900
1950
2000
1750-1970
1750-1980
1750-1990
1750-2000
1750-2010
Working Group III contribution to the IPCC Fifth Assessment Report
ipcc

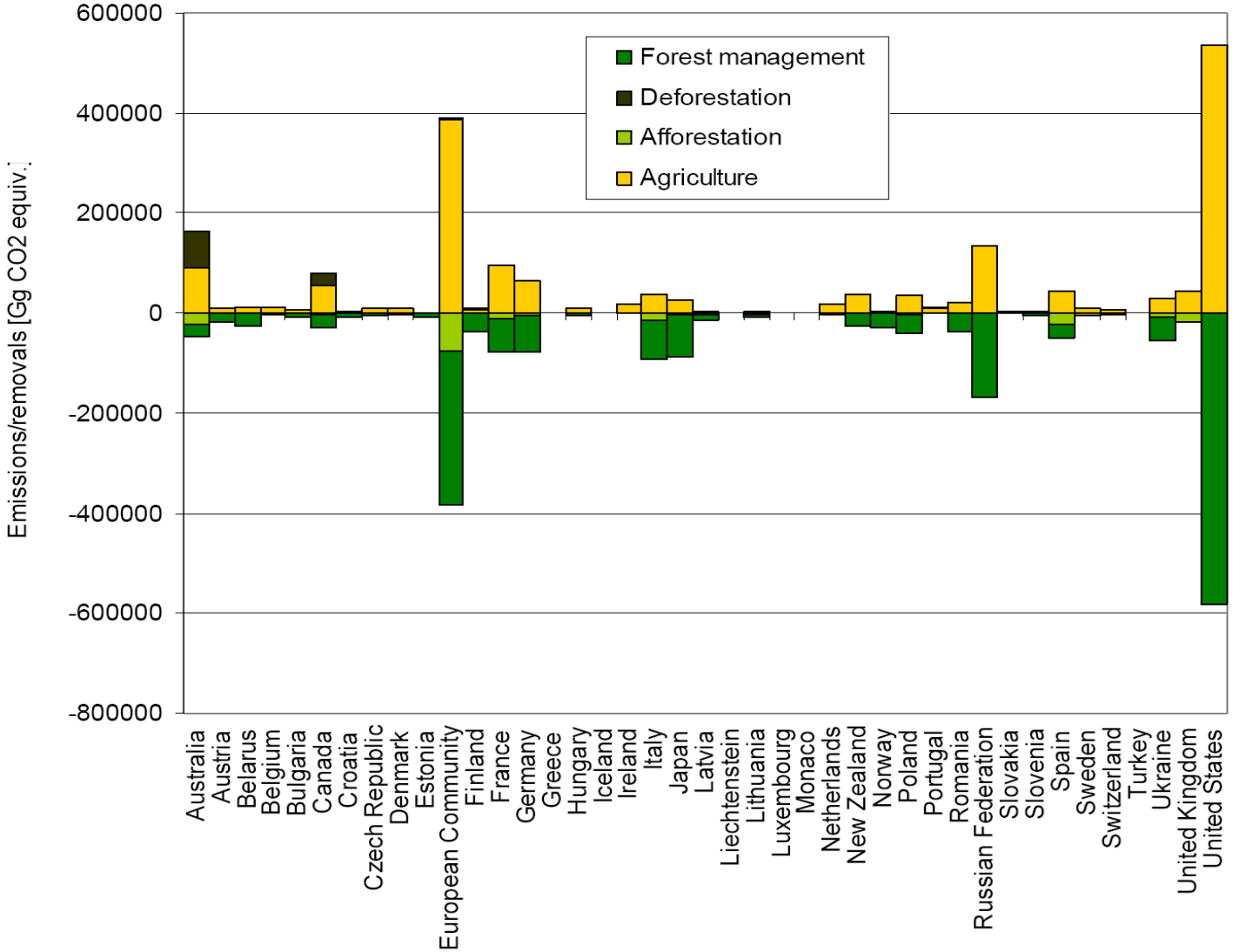
Mitigation and the 2-degree target

Global forests – major natural regulator of the Earth System

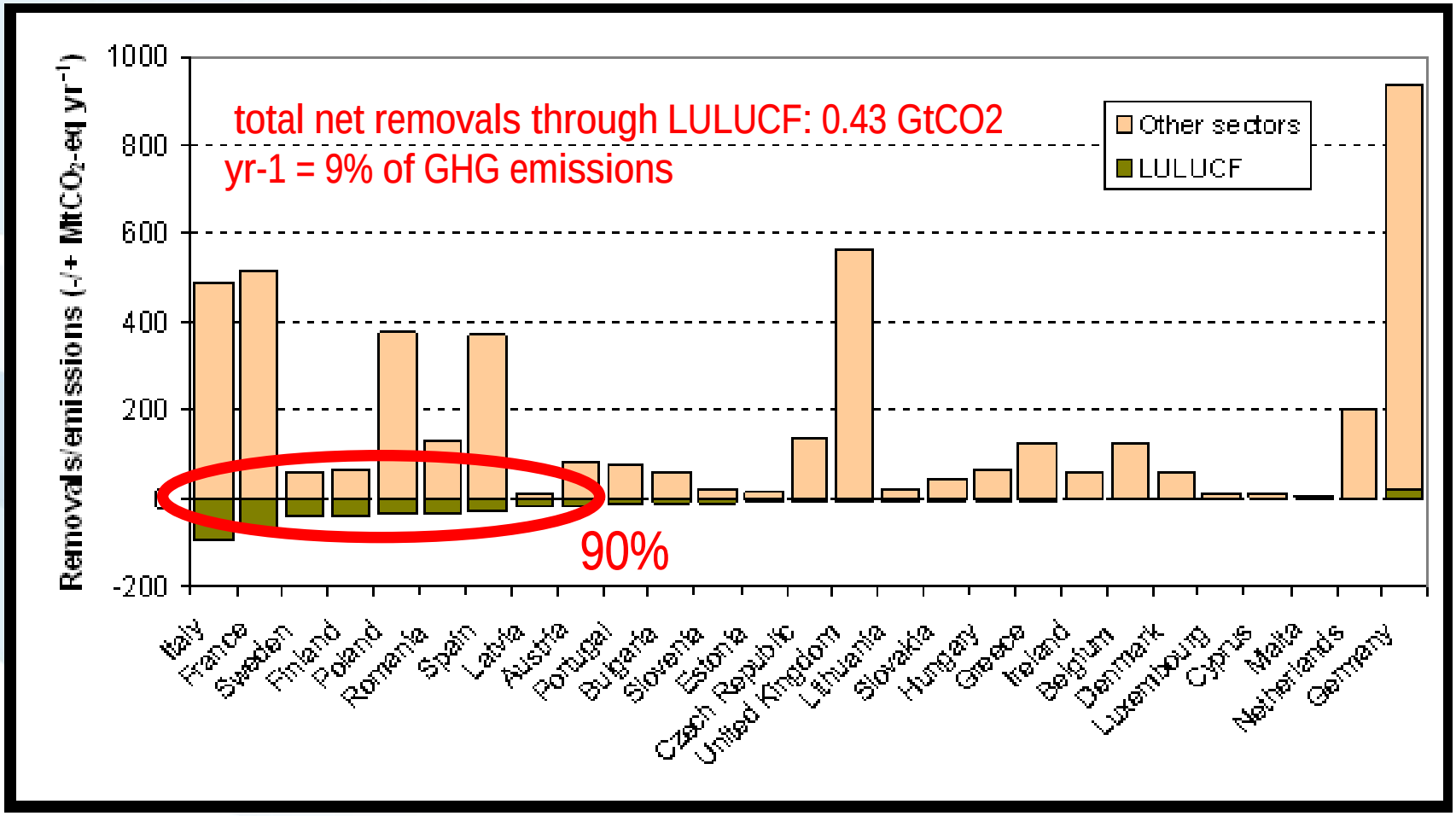


The sink in existing forests during the last decades is estimated at ~2.4 Pg C yr-1 (Pan et al. 2011)

Emissions/ removals in agriculture, AR and FM

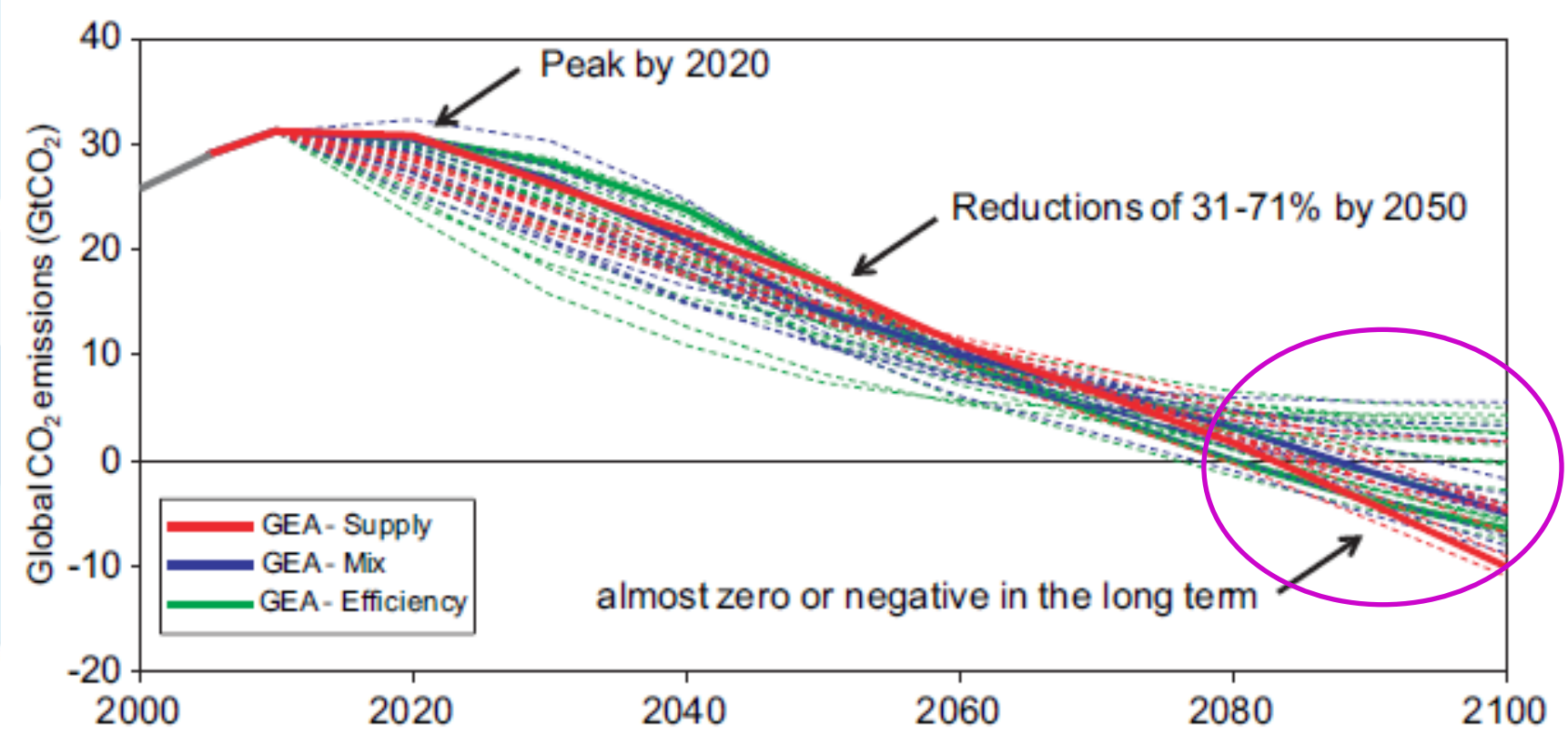


Reported GHG emissions of EU27 member states for the year 2009 emphasizing contribution due to LULUCF sector. Countries are listed in descending order of the magnitude of the removal due to LULUCF



Source: http://dataservice.eea.europa.eu/PivotApp/pivot.aspx?pivotid=475

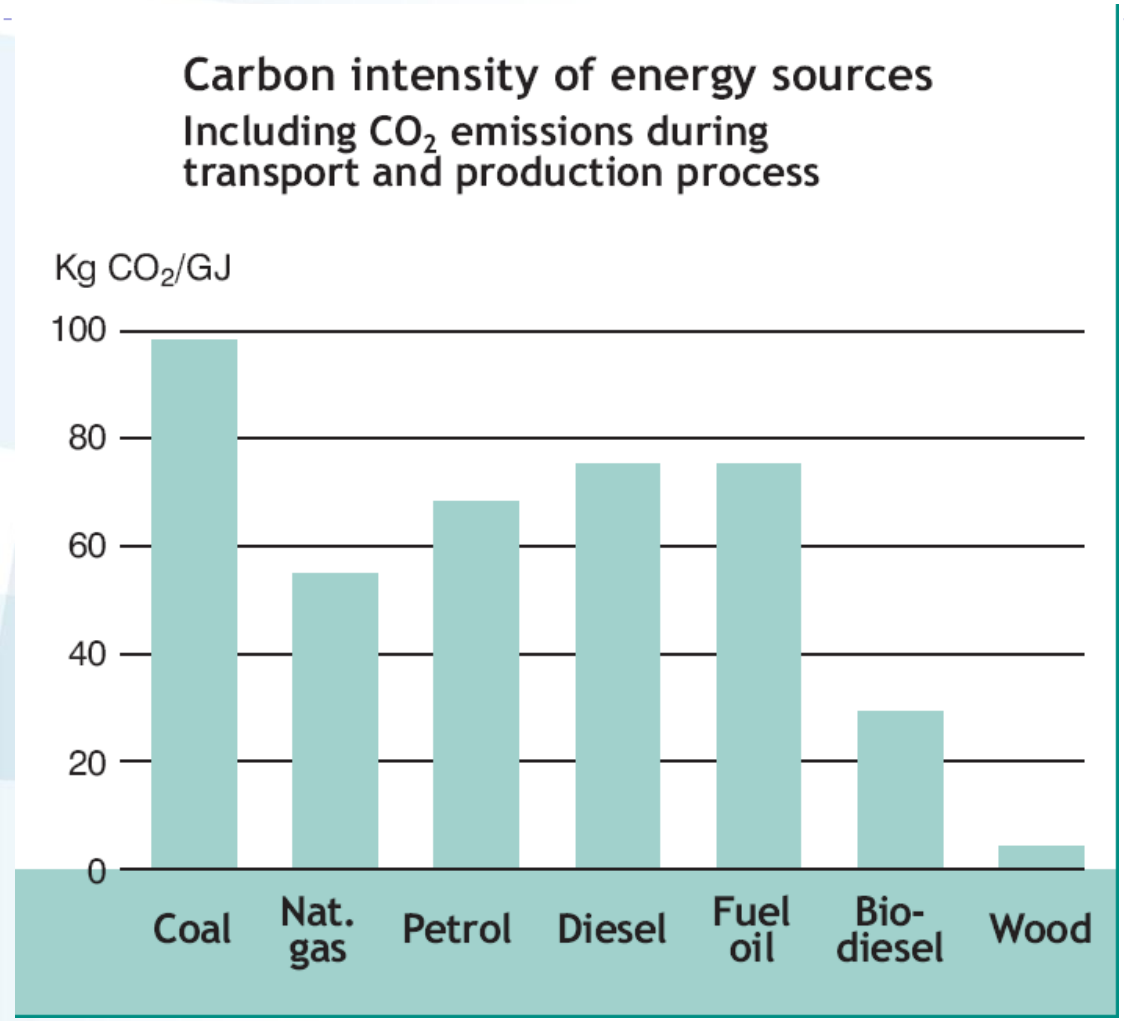
Negative emissions to reach 2°C



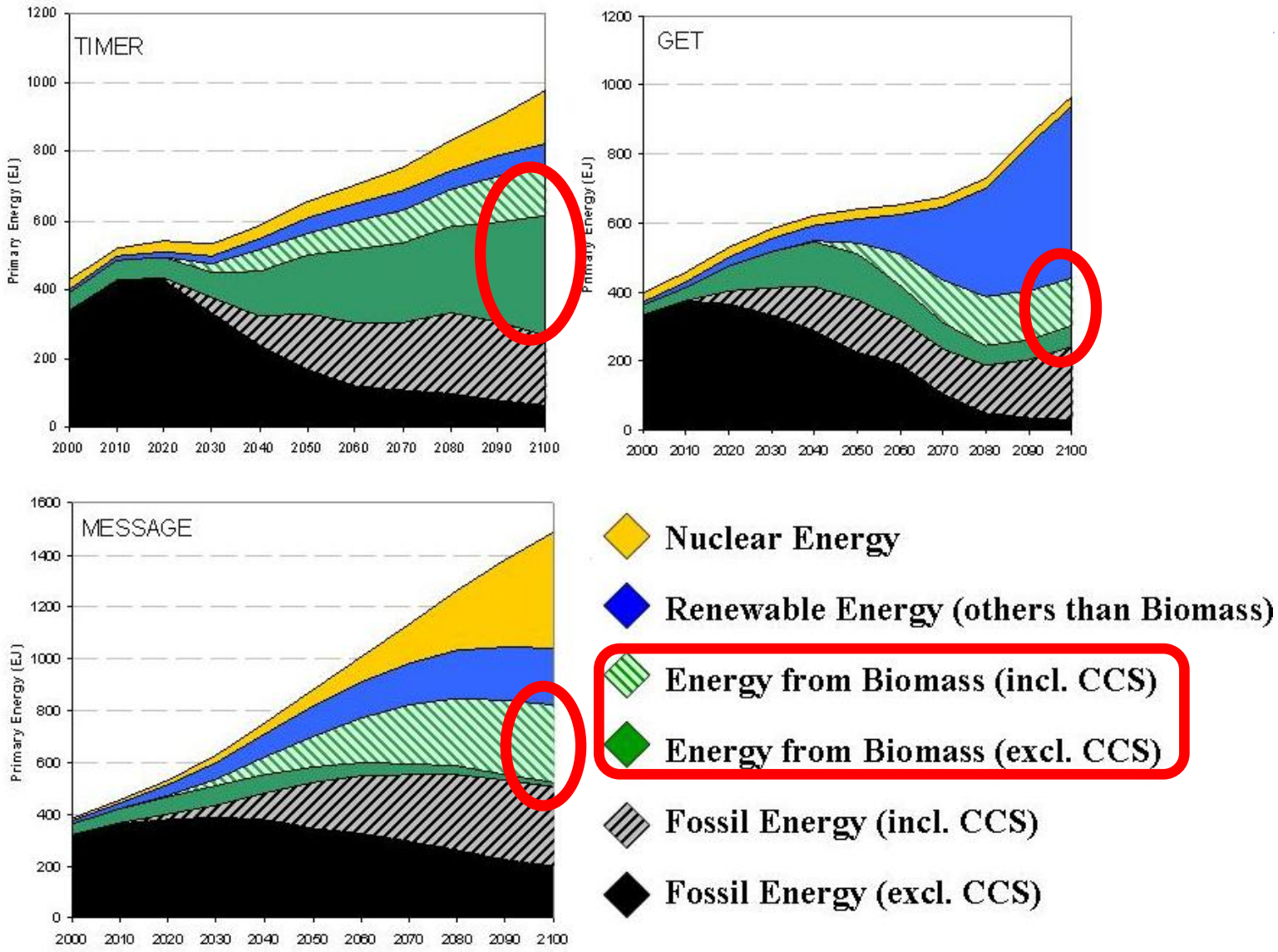
Source: Global Energy Assessment, Chapter 17, Fig. 17.37, 2012

Substitution

We shall not forget:



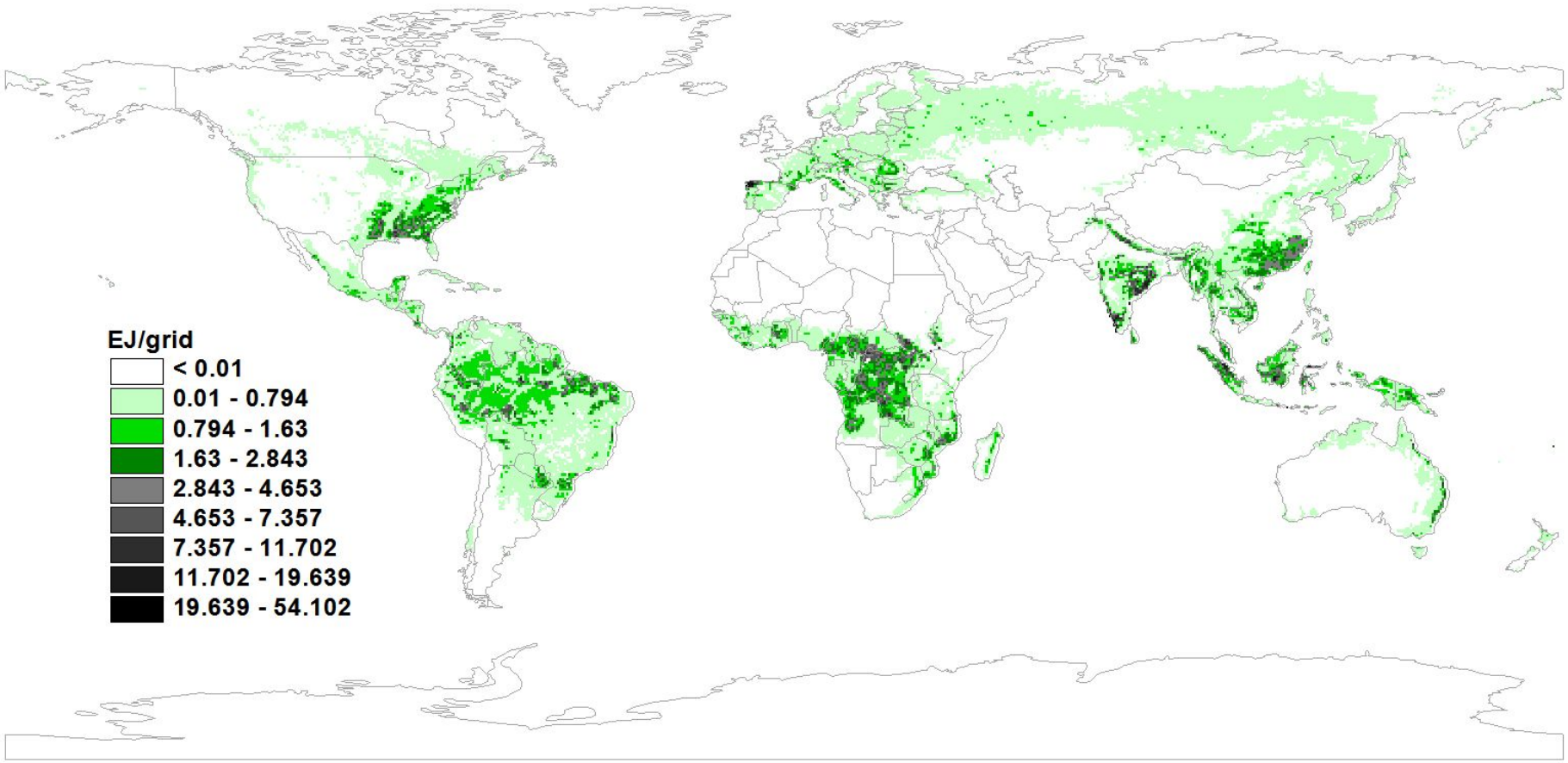
Background



Global Future Energy Portfolios, 2000 – 2100

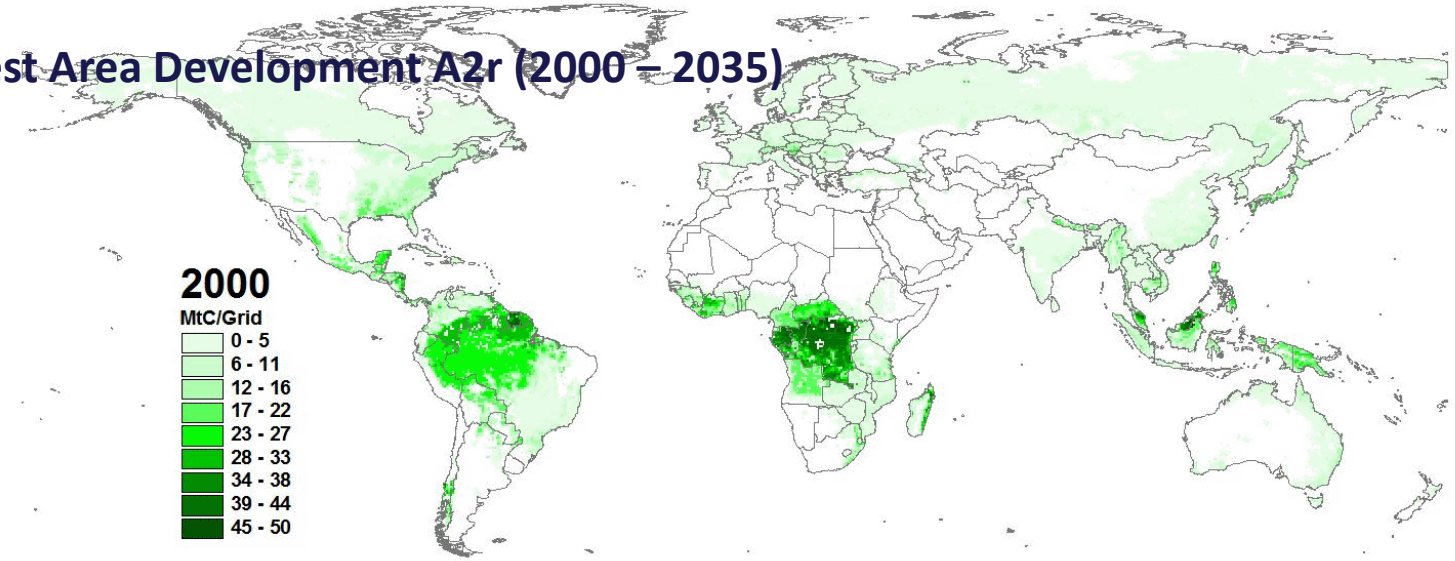
Source: Modified after Azar et al. 2011

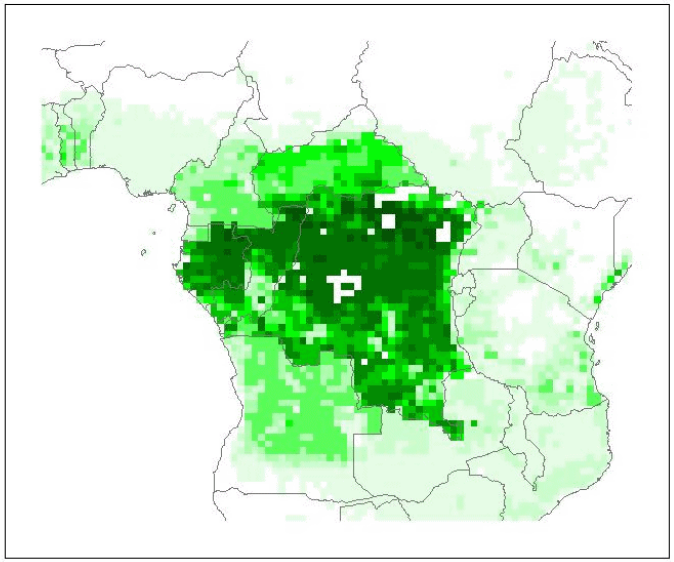
Cumulative biomass production (EJ/grid) for bioenergy between 2000 and 2100 at the energy price supplied by MESSAGE based on the revised IPCC SRES A2r scenario (country investment risk excluded).

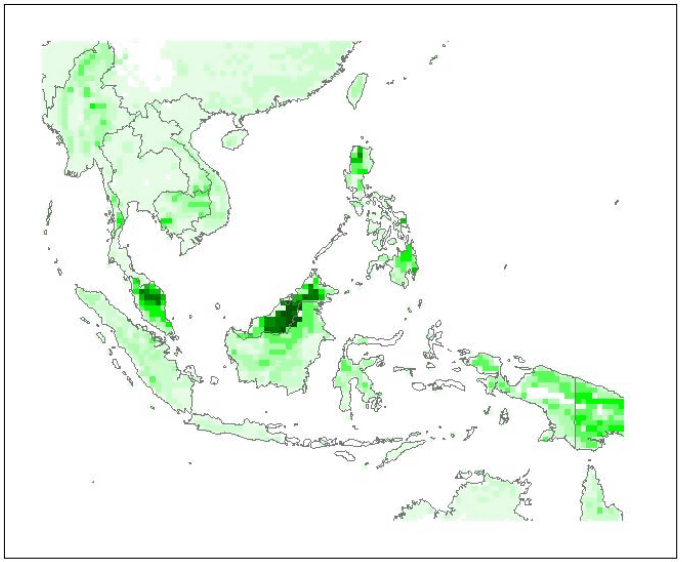


Source: Rokityanskiy et al. 2006

Forest Area Development A2r (2000 – 2035)



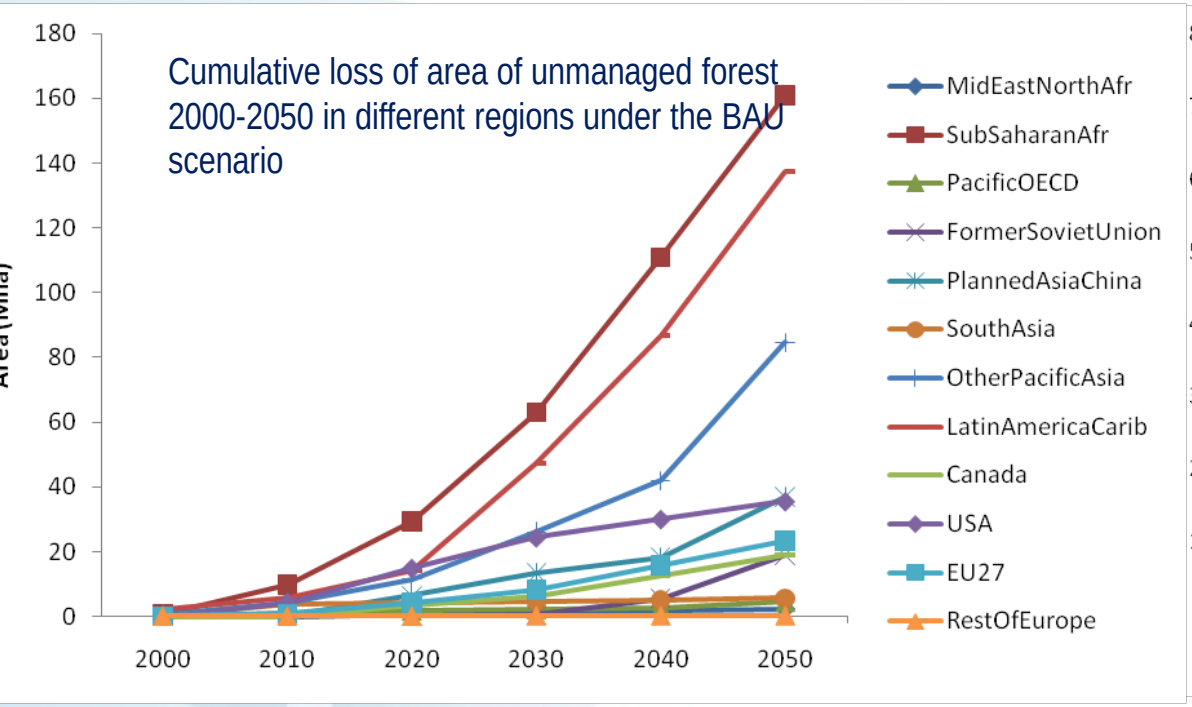


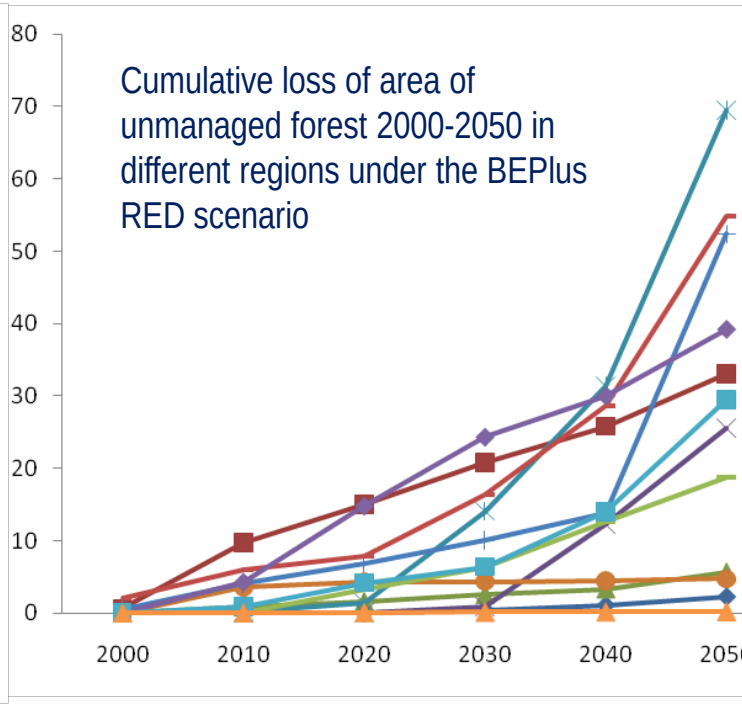


Source: IIASA, G4M (2008)

Regional Effects by Adding BE, Biodiv, RED - Unmanaged Forest rel to BAU

Loss of pristine (unmanaged) forest as a proxy for BE production on Biodiversity

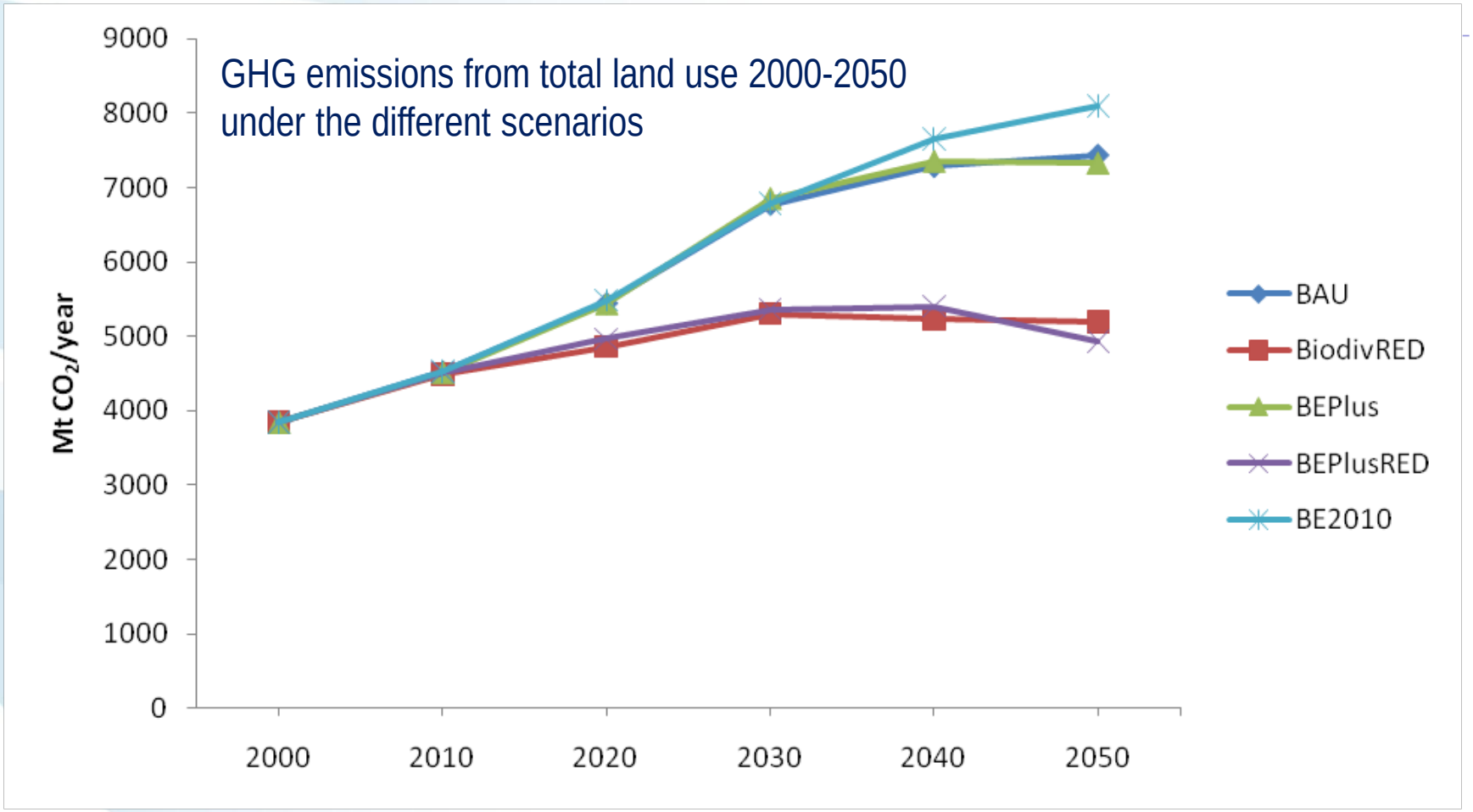




- most of the loss of unmanaged forest takes place in the tropical areas of South America, Africa and Asia
- the loss of unmanaged forest is not only considerably smaller but also more evenly distributed from a global perspective

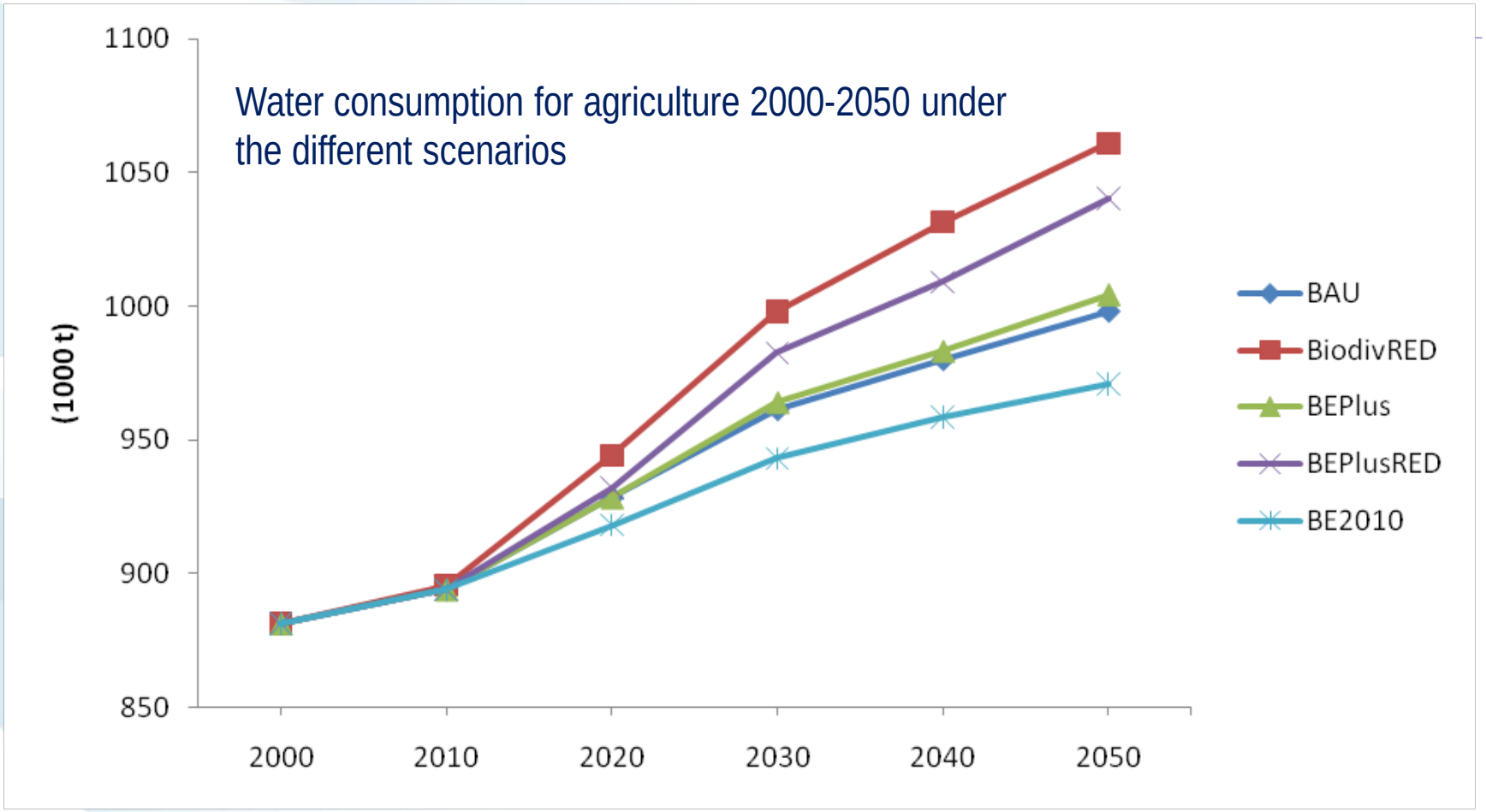
… and the trade-offs…

GHG Emissions by Scenarios



- Under the BE2010 scenario, the bioenergy use is small compared to the other scenarios, and the GHG emissions are the highest, 8,091 Mt CO2/year. The GHG emissions are lower under the BAU and BEPlus scenarios, where the bioenergy use is more extensive.
- Lowest GHG emissions can be achieved under the RED scenarios

Agricultural Water Demand by Scenarios



- All scenarios show increased demand
- Lowest restriction on forest and biodiversity conservation show less water need
- Higher restriction implies less land available for eg food production = intensification

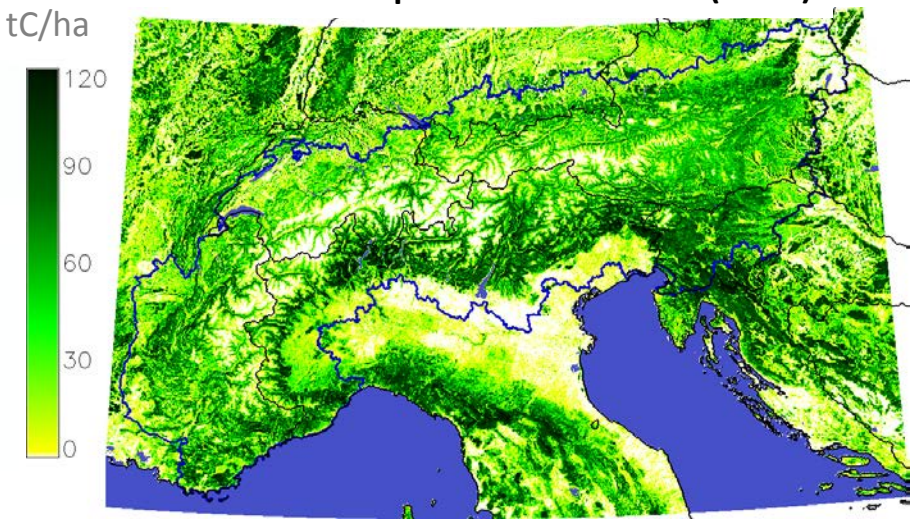
… so management is (1 of the) key…

Ecosystem trade-offs of forest areas

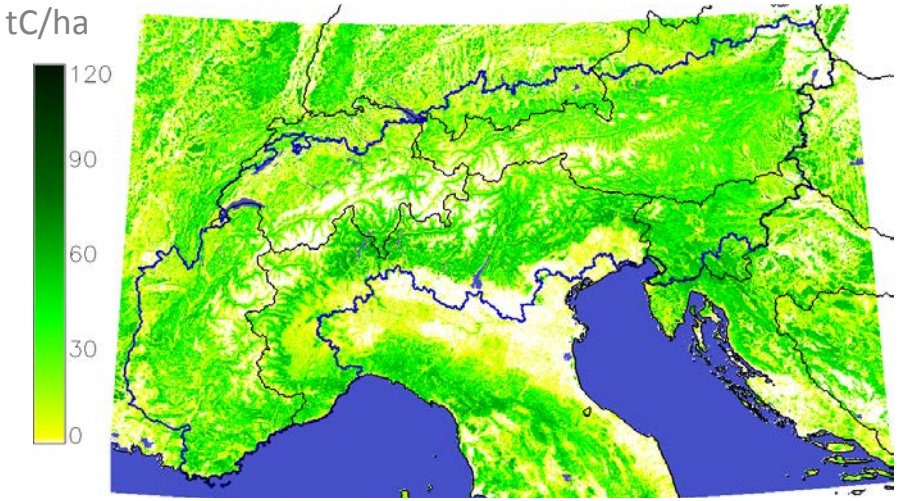
- **G4M** estimates the impact of forestry activities on carbon sequestration and supply of biomass in the Alps (258,000 km^2 total area, 115,000 km^2 forest).
- Forests managed to maximize two ecosystem values through changing the rotation period:
  - S1: Maximization of carbon stock in forests.
  - S2: Maximization of biomass production.

	S1: Carbon sequestration	S2: Biomass production
Harvest potential (Mt C /year):	11	23
Carbon stock (Mt C):	1,057	577

1: Carbon sequestration scenario (stock)



2: Biomass production scenario (stock)



Source: G4M www.iiasa.ac.at/g4m

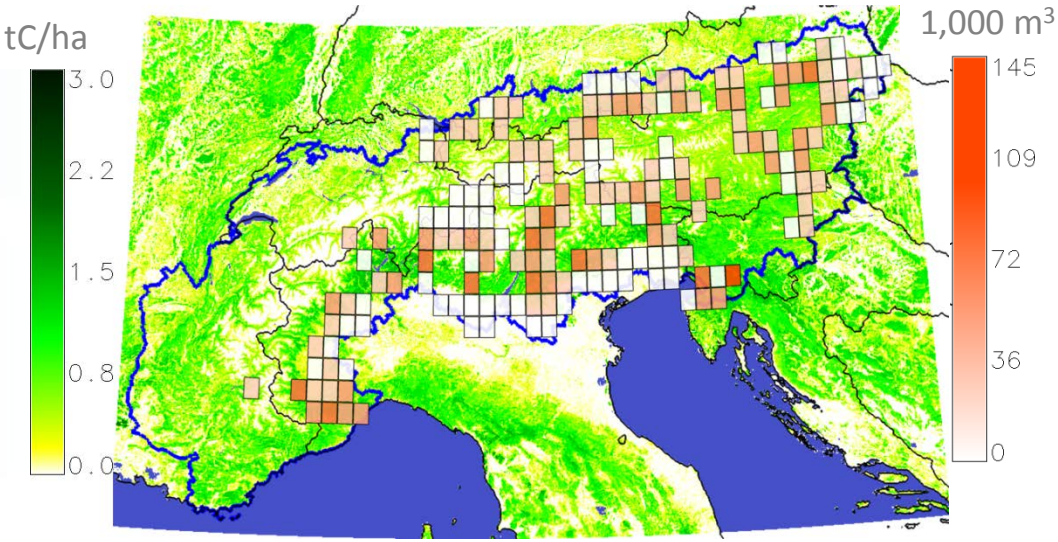
Economic bioenergy potential

BeWhere estimates the optimal allocation of bioenergy production plants and associated harvesting intensity.

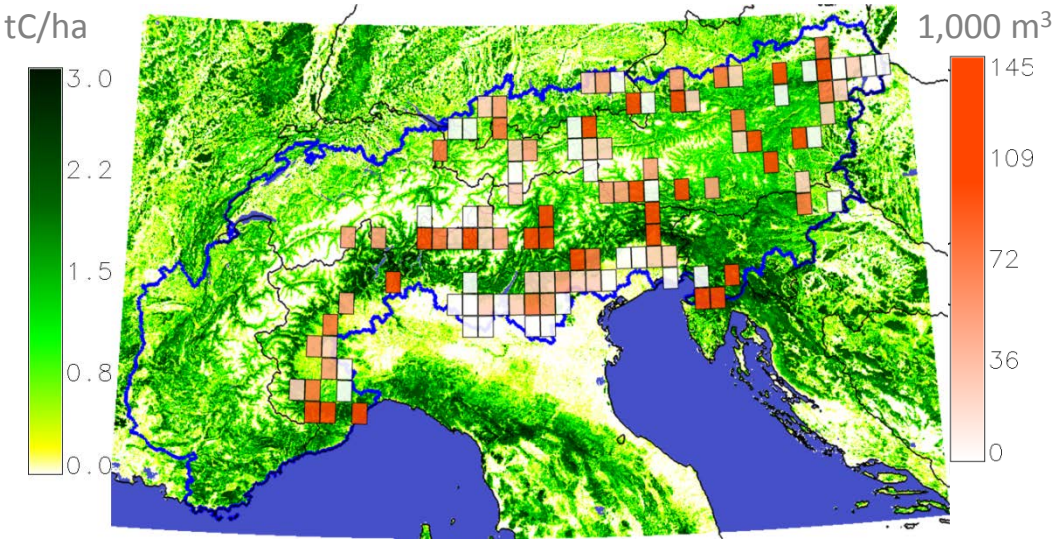
- Bioenergy is competing with other energy production types (i.e. costs of fossil fuels).
- Economic supply: 14 TWh (heat & electricity) met by both scenarios.
- Significant local difference of harvesting intensity.

Harvesting intensity/cell (1,000 m³/ yr)	Total harvested amount in S1: (1,000 m³/ yr)	Total harvested amount in S2: (1,000 m³/ yr)
0 – 12	208	88
13 – 32	1,098	498
33 – 60	2,820	1,341
61 – 87	1,851	1,194
88 – 141	478	3,290

S1: Carbon sequestration scenario (increment)

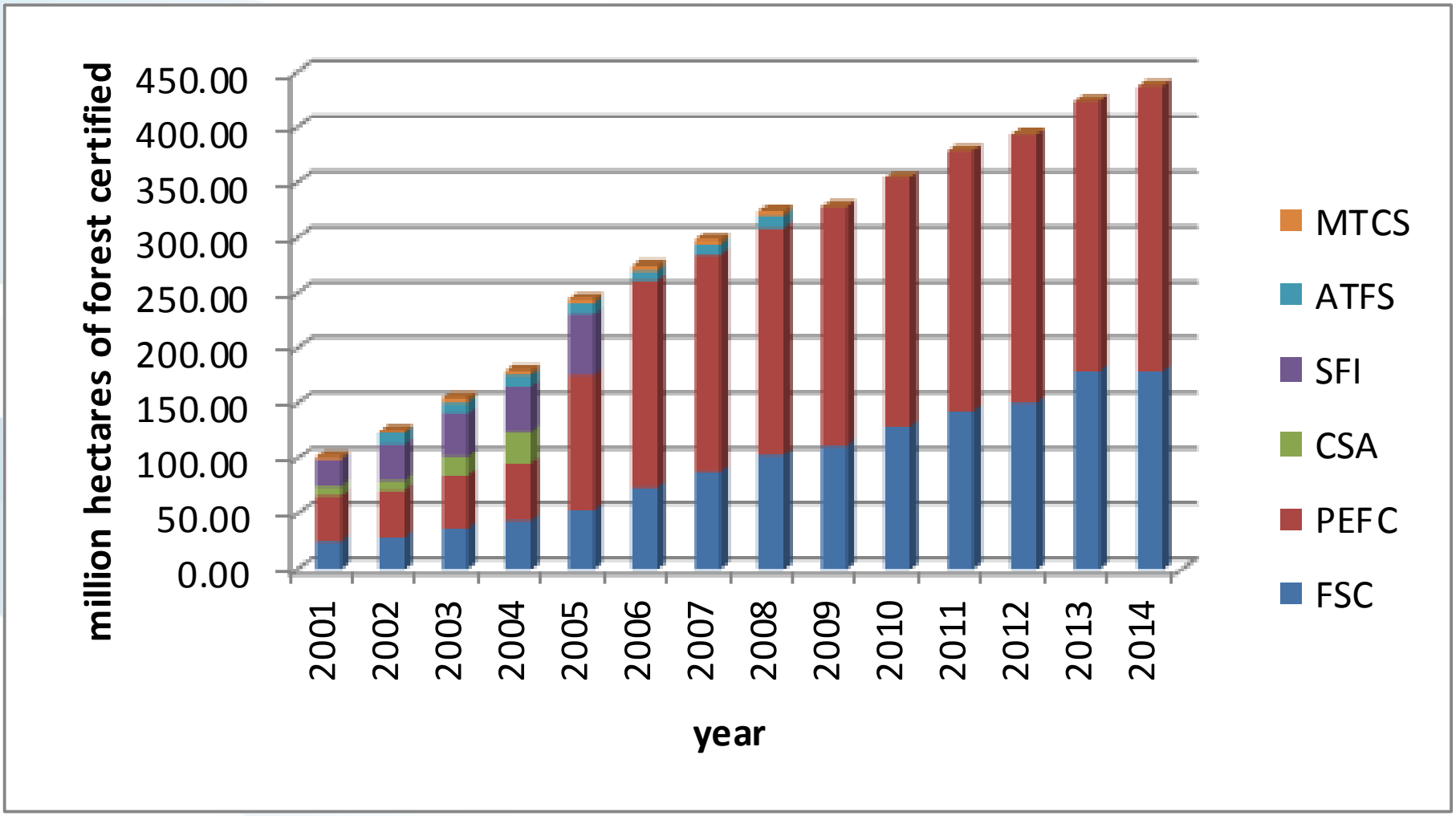


S2: Biomass production scenario (increment)



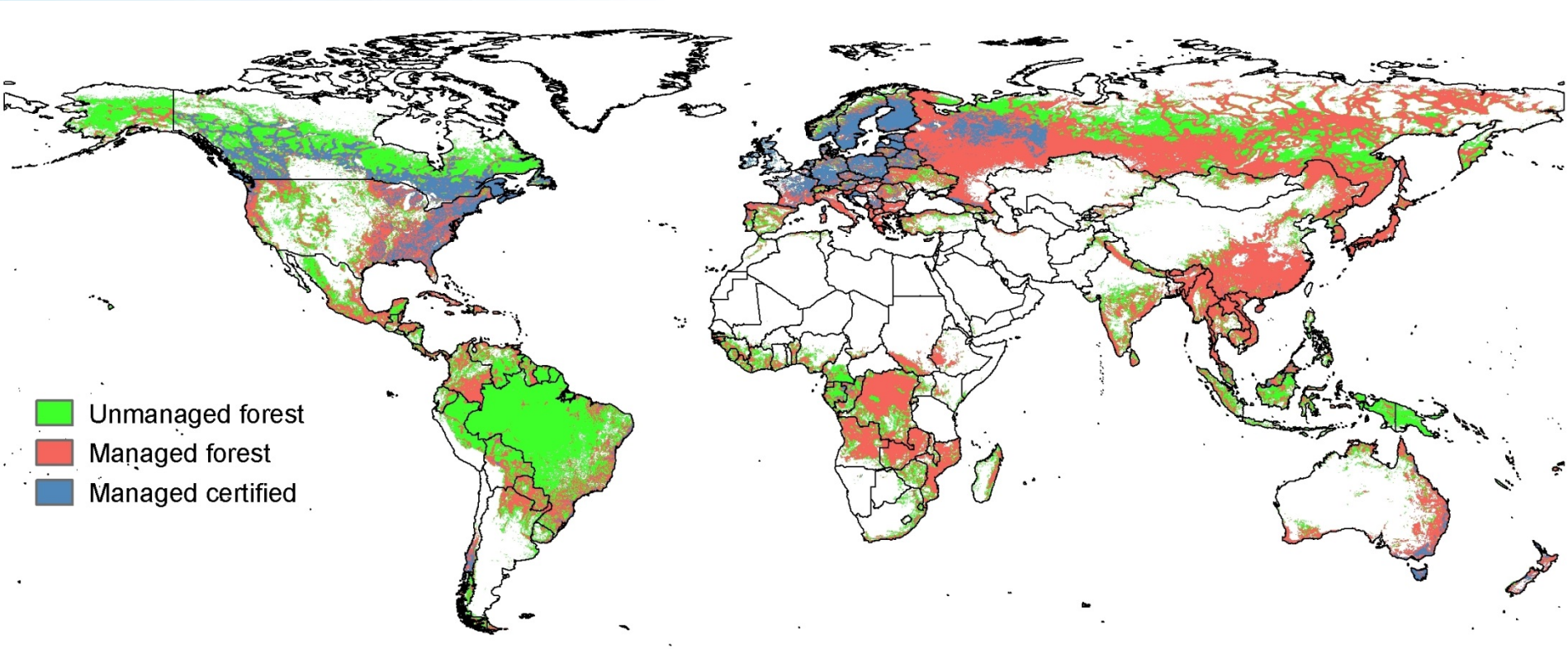
Source: BeWhere www.iiasa.ac.at/Bewhere

SFM – Forest Management Certification

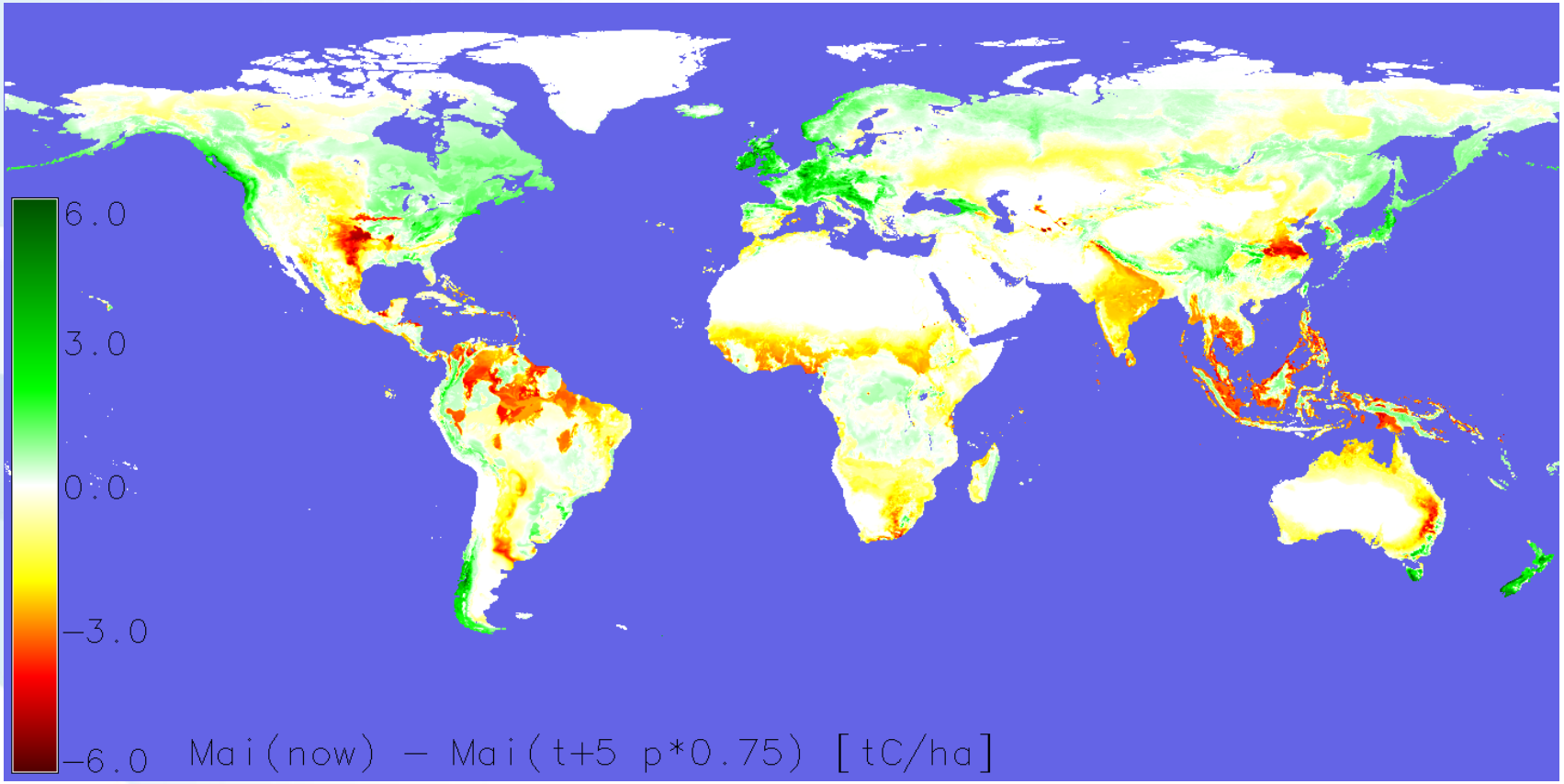


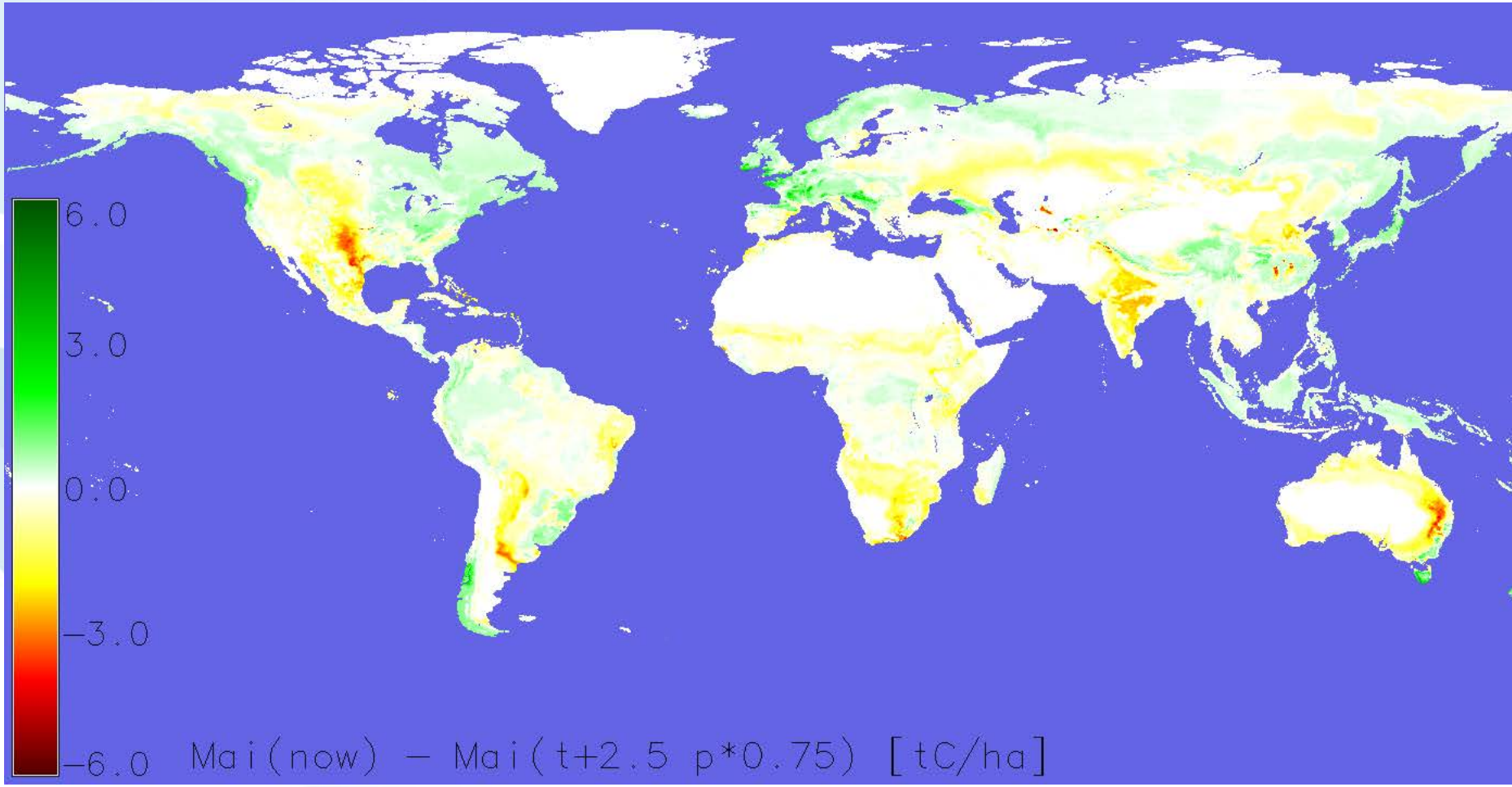
Global development of forest area under certified forest management [million ha accumulated by year and different certification scheme], Kraxner et al., 2014

The global situation of FM certification



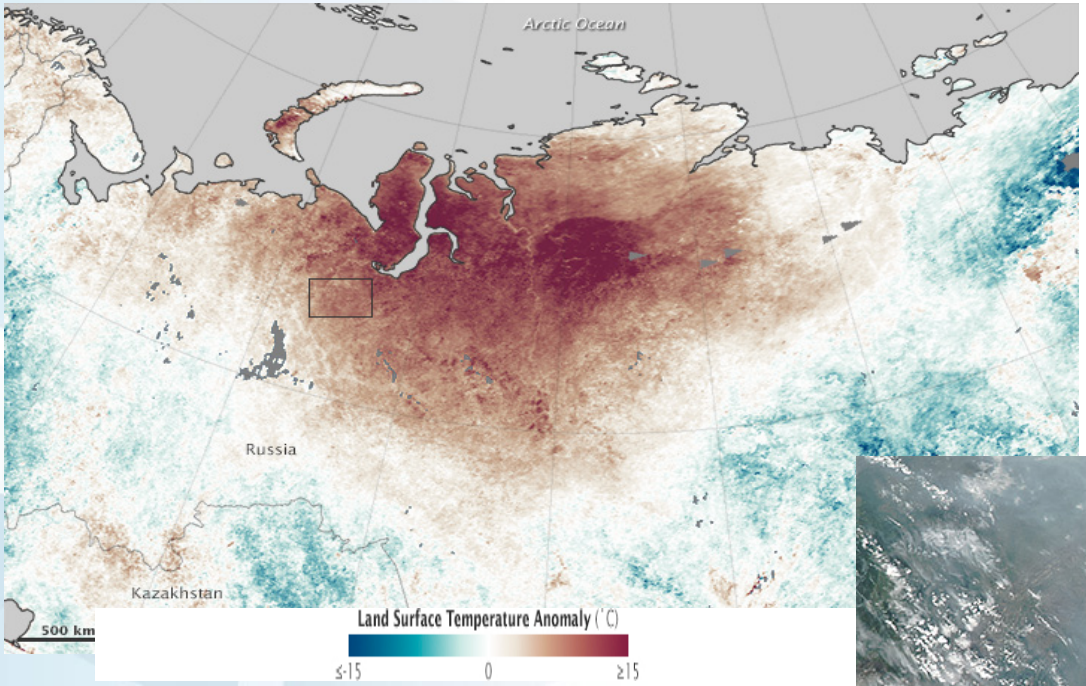
…but not that easy because:


6.0
3.0
0.0
−3.0
−6.0
Mai(now) − Mai(t+5 p*0.75) [tC/ha]


6.0
3.0
0.0
−3.0
−6.0
Mai(now) − Mai(t+2.5 p*0.75) [tC/ha]

… and unexpected events …

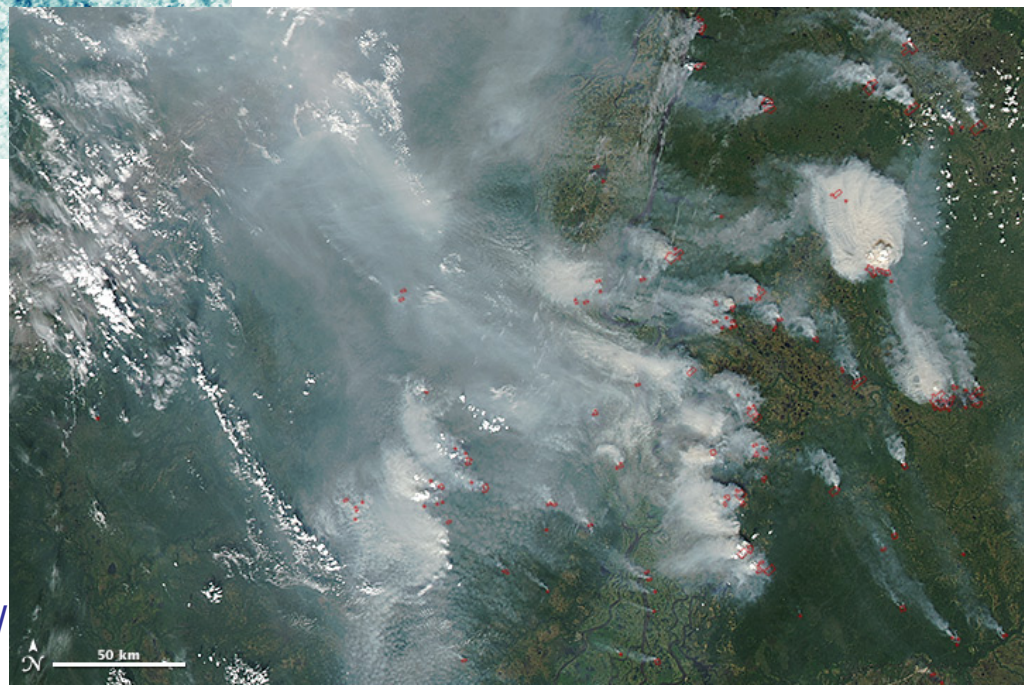
North of Siberia, July 2013, Terra MODIS



Land surface temperature anomalies for 20-27 July

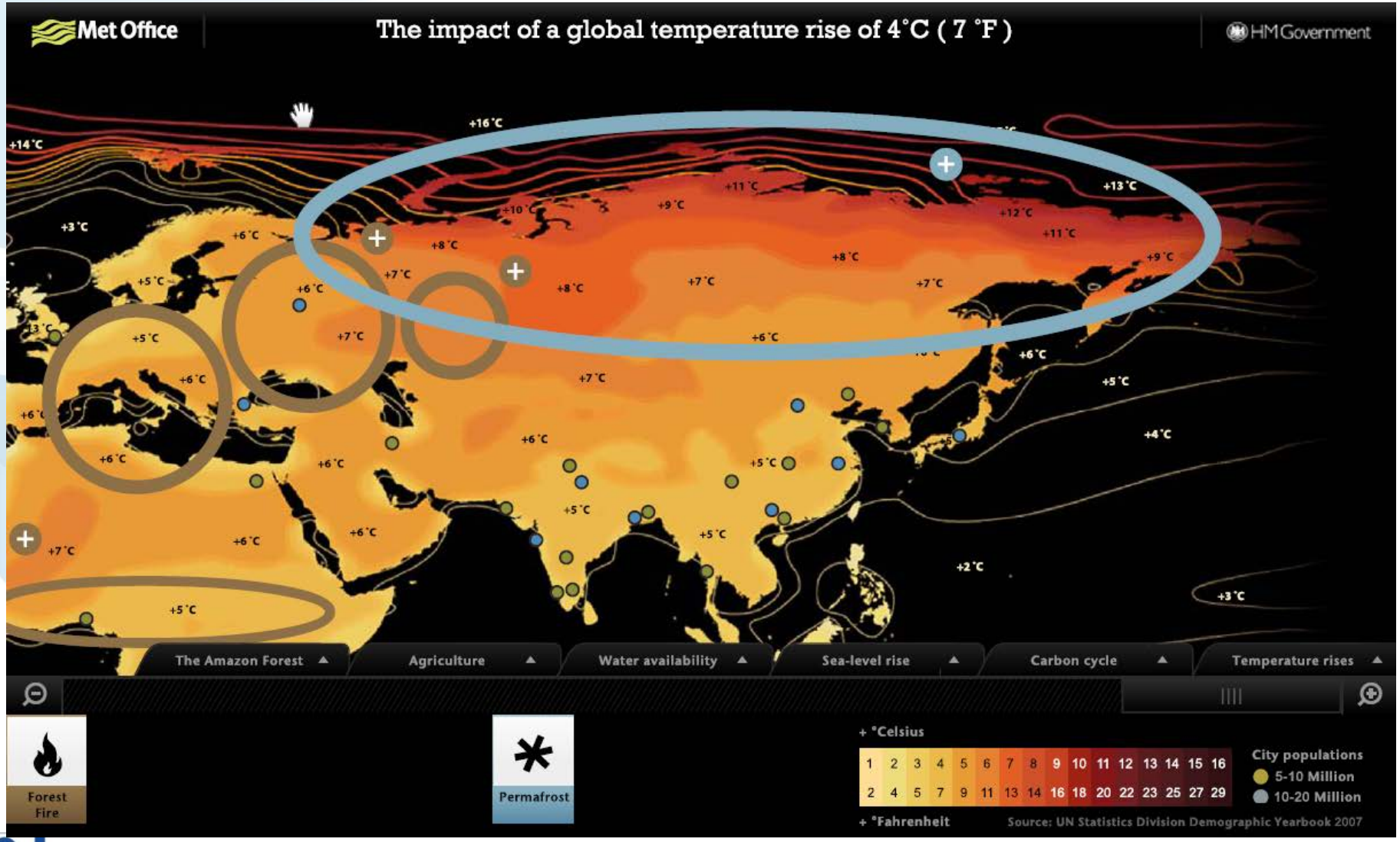
measured 32ºC

daily July average 16ºC

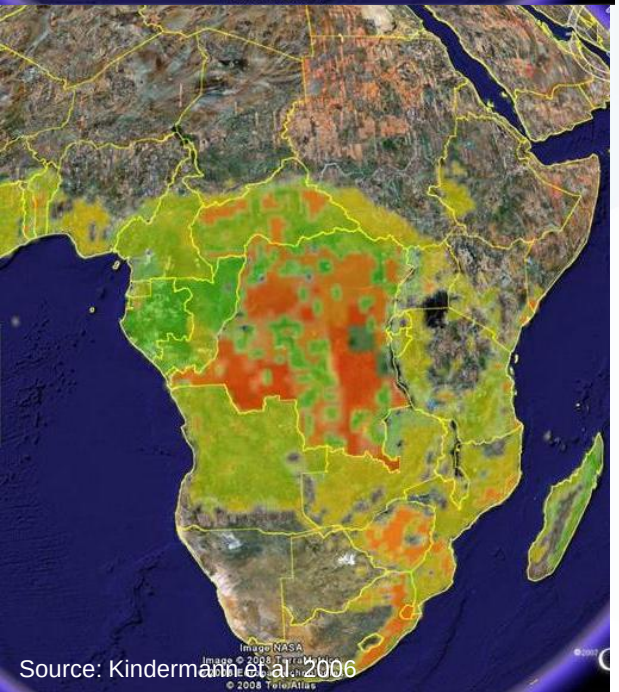


Source: http://earthobservatory.nasa.gov/IOTD/

Northern Eurasia under +4°C globally



http://www.actoncopenhagen.decc.gov.uk



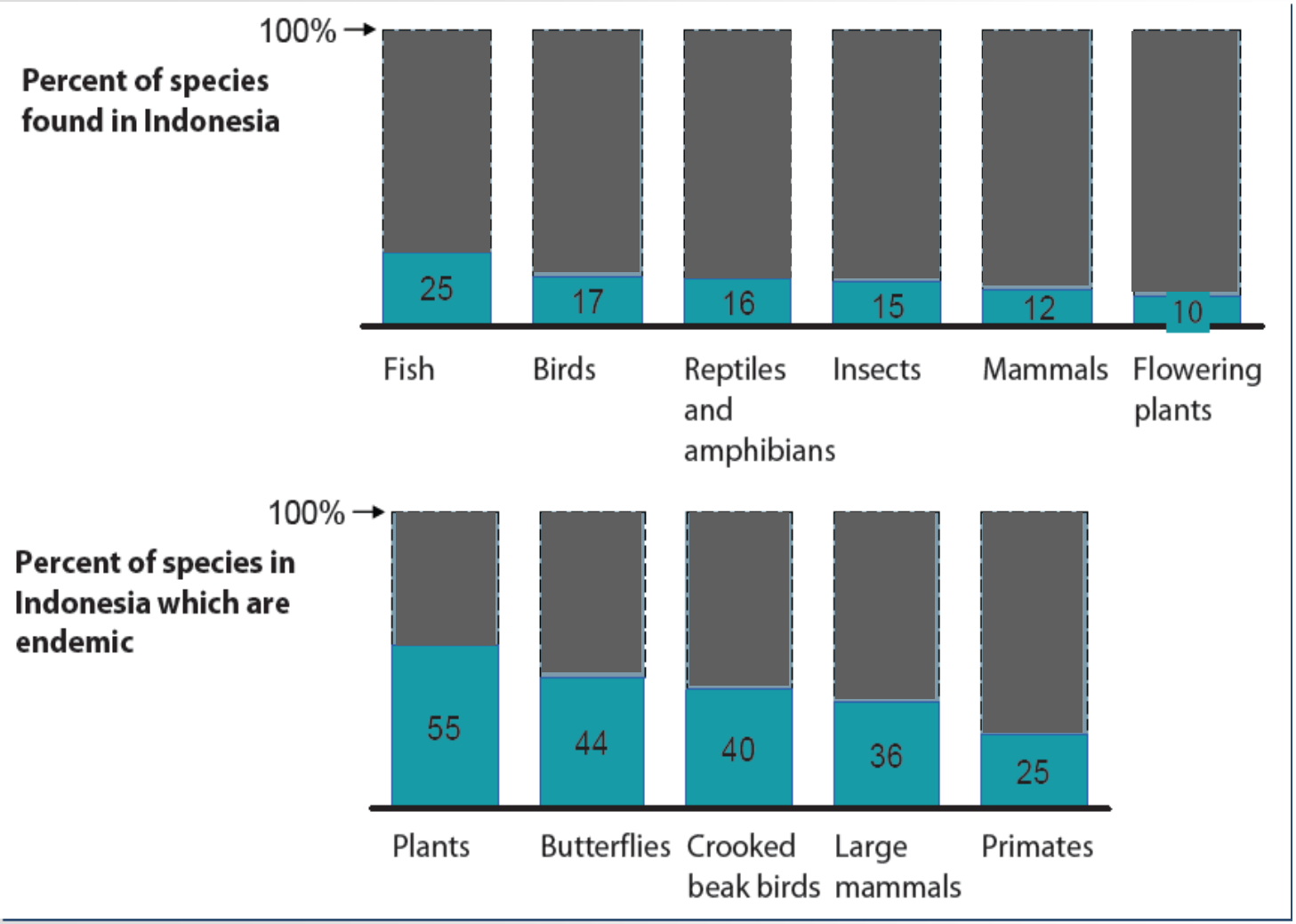
Source: Kindermann et al. 2006

Deforestation 2050 under BAU

- Losses under BAU by 2050 will be 300-500 mio ha
- Tropical deforestation is considered the second largest source of anthropogenic greenhouse gas emissions (IPCC, 2007) and is expected to remain a major emission source for the foreseeable future (MEA, 2005)
- the net effect of all deforestation is basically almost an increase of 20 per cent additional emissions from human activity going into the atmosphere and feeding into climate change.
- deforestation is to blame for about one and a half billion tons of carbon dioxide being released into the atmosphere every year for the past 15 years (GCP).
- To the left we see the picture of tropical Africa now and in 2100 under BAU (the more red the less tropical forest, www.geo-bene.eu/?q=node/1653)

… at the same time we have to consider…

…the Importance of its Biodiversity

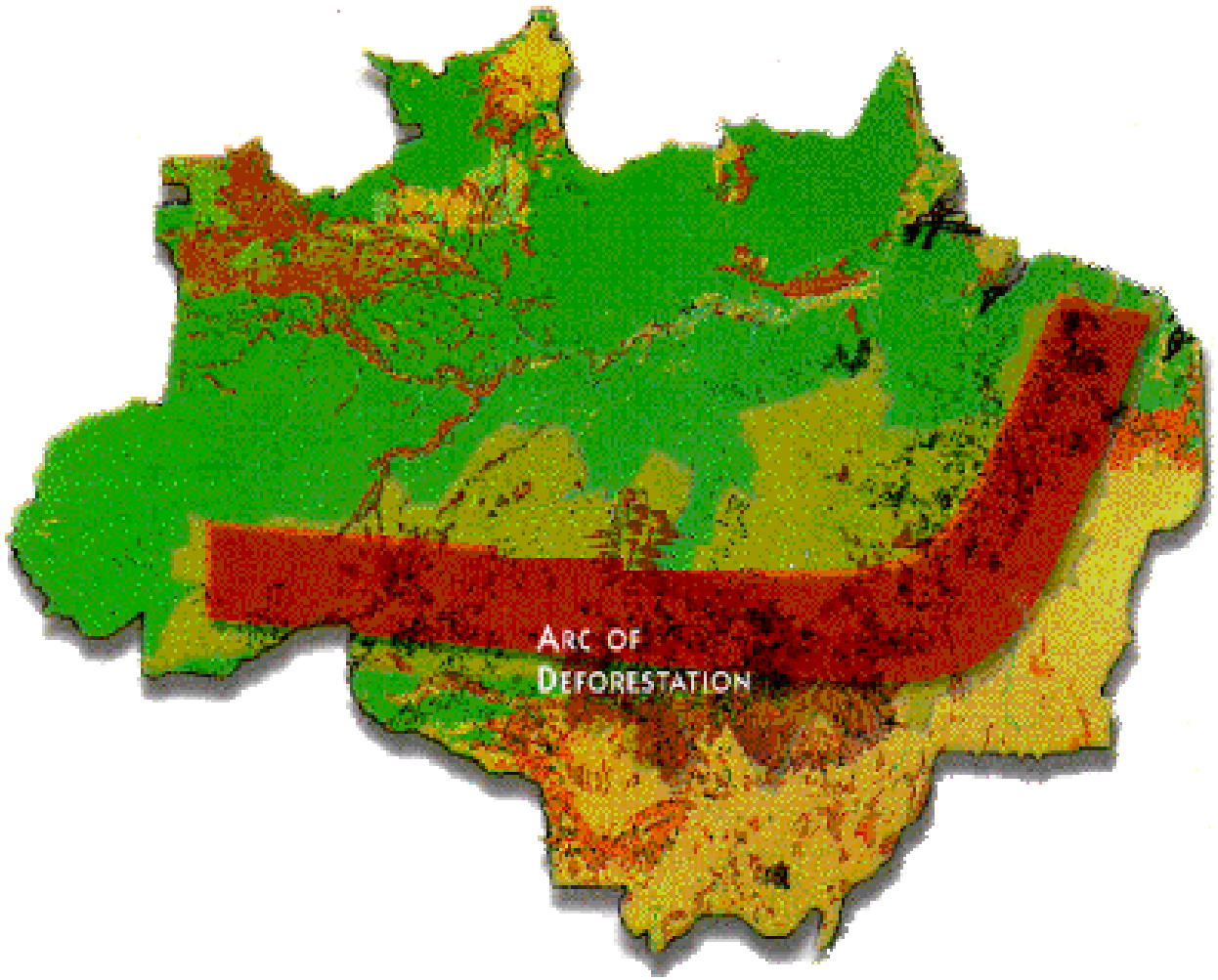


Rate of Forest Loss

every 2 days

every second

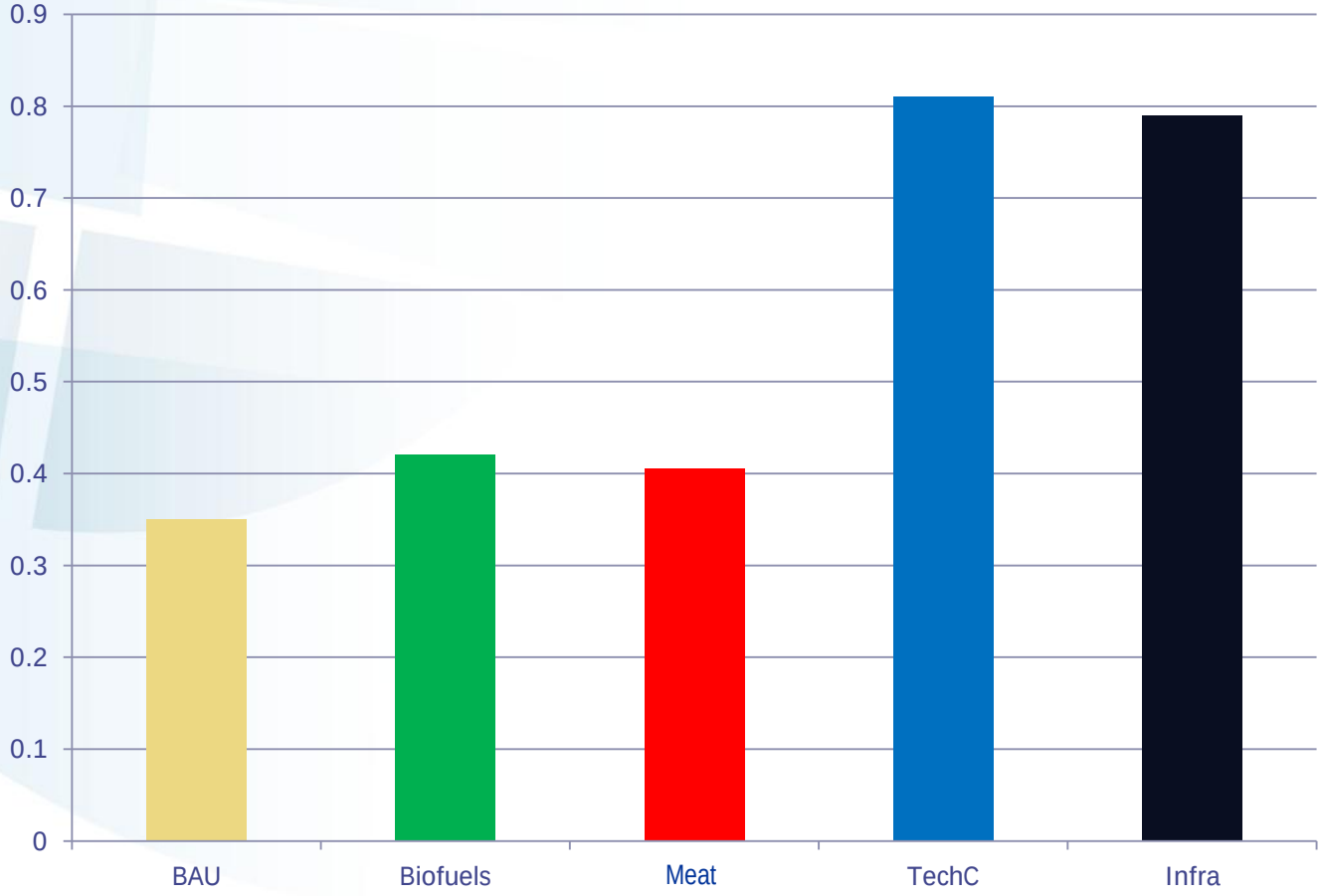
Arc of Deforestation



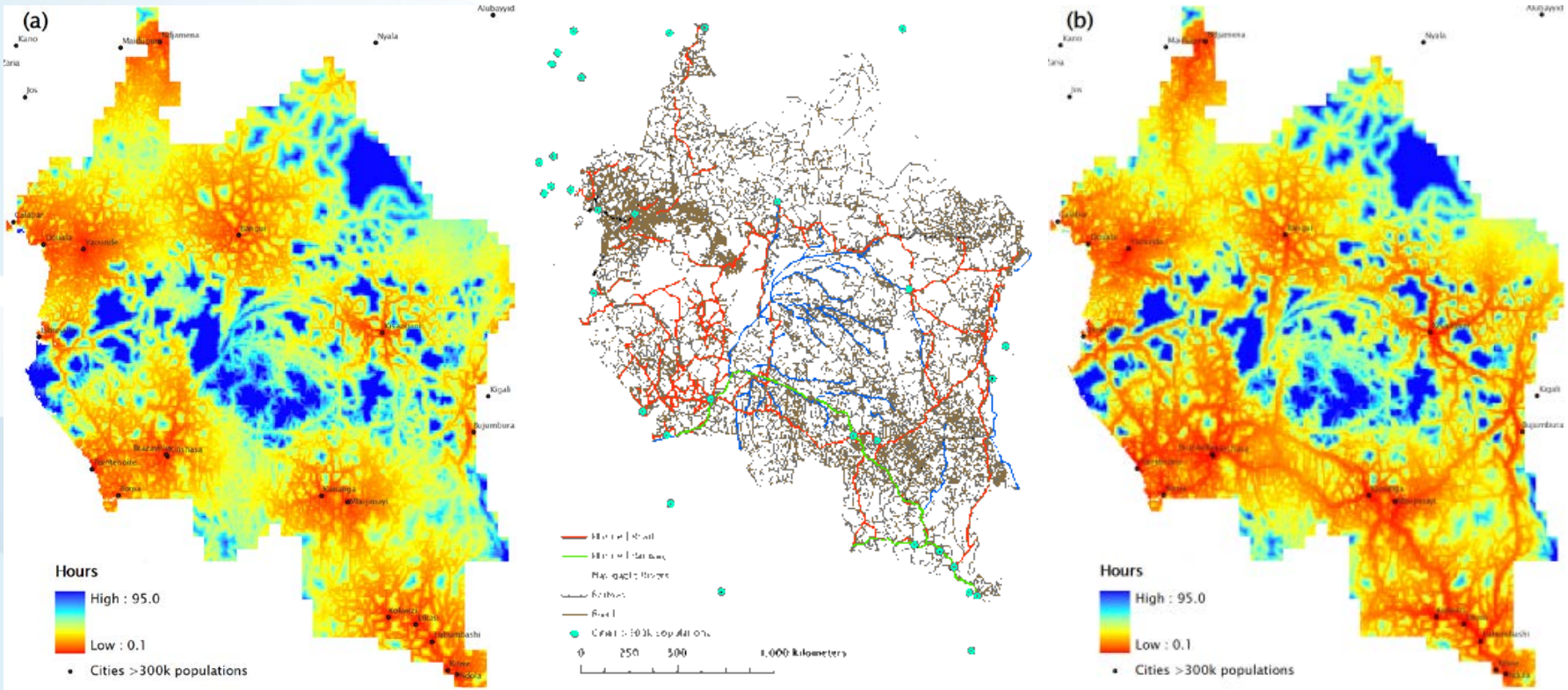
Source: FAO

Deforestation Impact/Driver Analysis

- Deforested area in Congo Basin in 2030 (Mio. Ha)



REDD in the Congo Basin



Transport time with existing infrastructures (Circa 2000)

Transport time with new infrastructures

Source: National Ministries, World Bank

Effect/impact	Driver	Competing objectives
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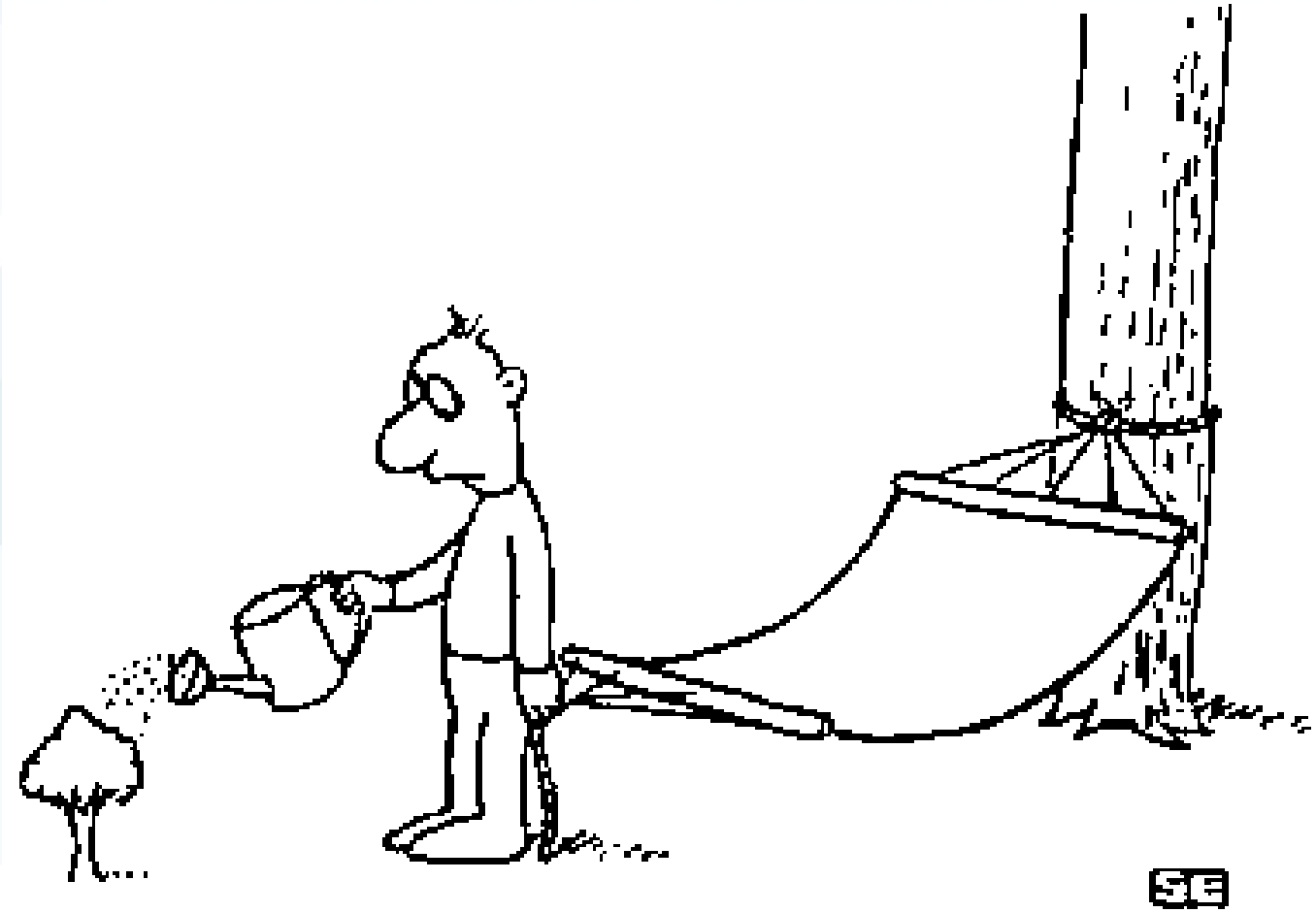
	infrastructure	development
	energy	Clean energy
	fiber	Renewable material
	Population pressure	
	Climate change	Shifting agriculture
	Governance lack	
ESS/Biodiversity /Habitat loss	See also deforestation	Multi-functionality
Increased disturbances (pests, fire etc.)	climate	management
	population	

High hopes…



Questions & Contact

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