IEA Bioenergy ExCo 74 Workshop on Land use and Mitigating iLUC 23/10/2014 Brussels

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Possible solutions for worldwide land use change

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Land use change plays an important role in the world's development

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- Land is one of three major factors of production in classical economics, thus its use is the pillar of economy
- Land use change provides substantial economic and social benefits
- The change of land-use patterns is one of the important components of structural transformation of economies being a part of a natural process of the socio-economic development

Land use change: why care?

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- In the system of public and private landownership, the market is key to optimal allocation of land use.
- But markets will allocate land effectively between alternative uses, and between public and private uses only when each transaction and each land use change reflects opportunity costs.
- However, in reality investors take into account only small part of opportunity costs, ignoring the value of many of ecosystem services providing by different land use types.

Worldwide LUC contribution to the global GHG emissions

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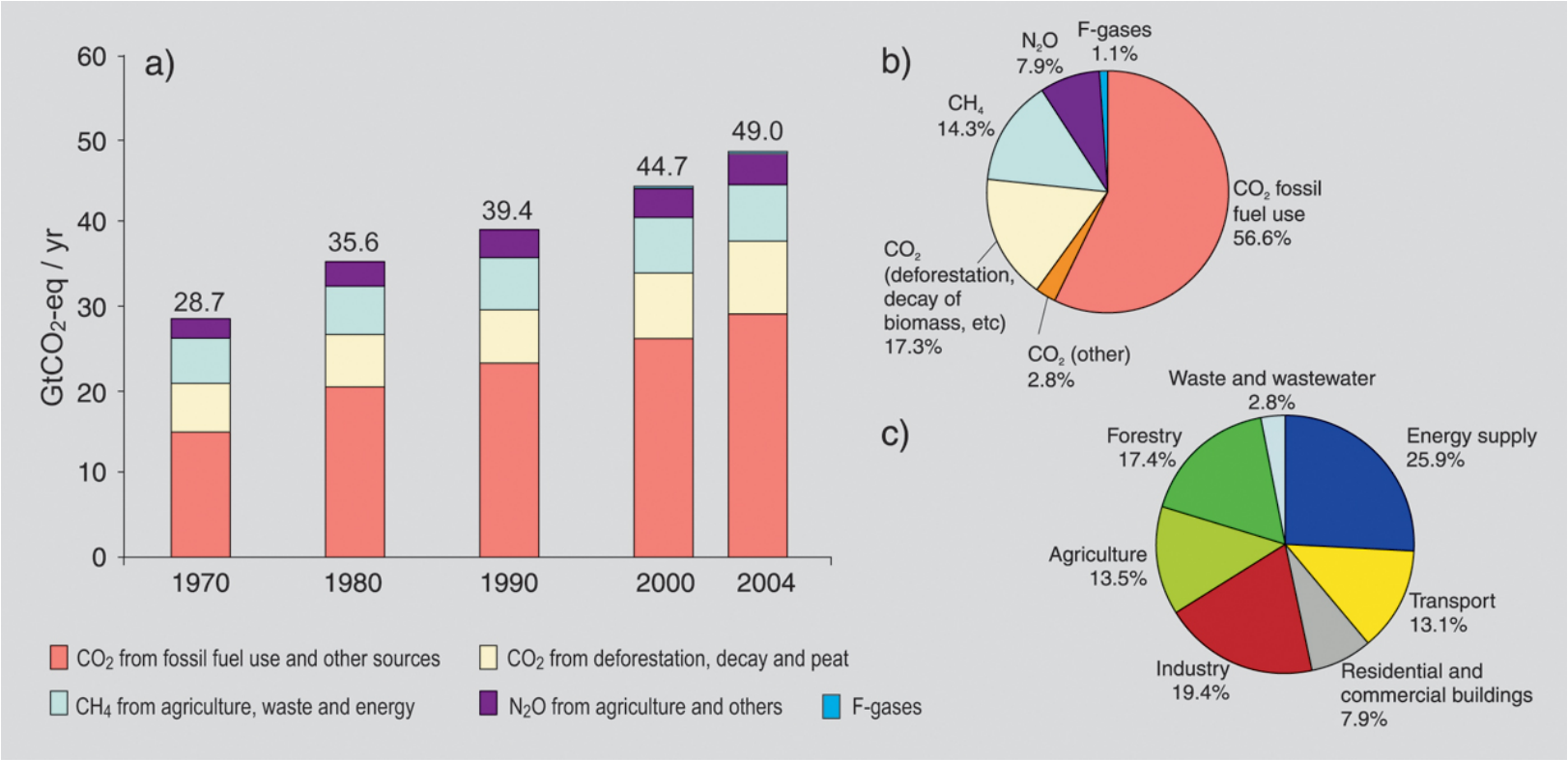
Fig. Global anthropogenic GHG emissions



Source: IPCC, 2007

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Historical worldwide land use change - the example of deforestation

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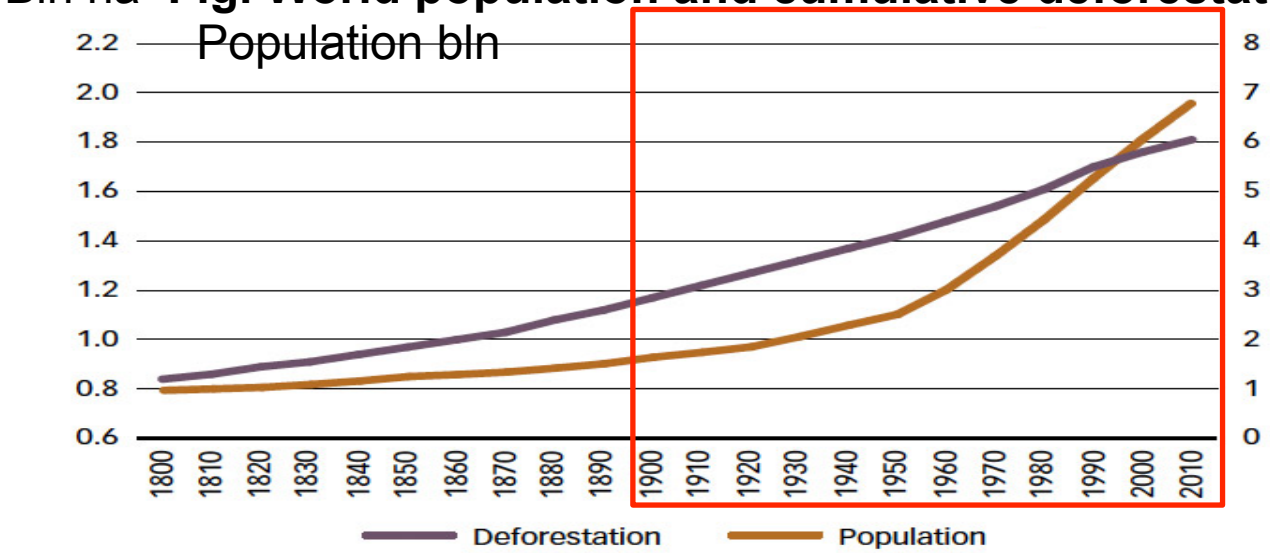
"The thinning, changing, and elimination of forests – deforestation, no less – is not a recent phenomenon; it is as old as the human occupation of the earth, and one of the key processes in the history of our transformation of its surface." Michael Williams, 2012

Fig. World population and cumulative deforestation



Sources: Williams, 2002; FAO, 2010b; UN, 1999.

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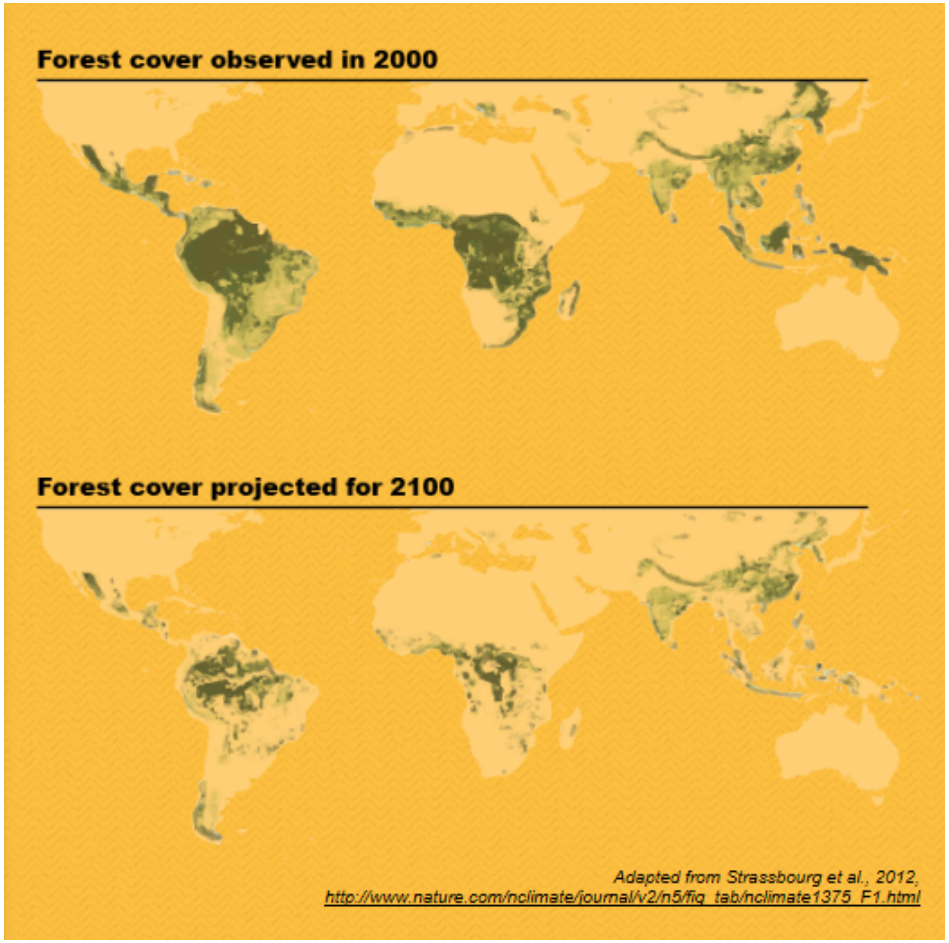
Future worldwide land use change - the example of deforestation



Agriculture is the leading cause of some 75% of global deforestation.

If rates of deforestation continue as projected, forest will diminish dramatically by 2010.

Massive deforestation reflects the unsustainable trend of world's resource economy

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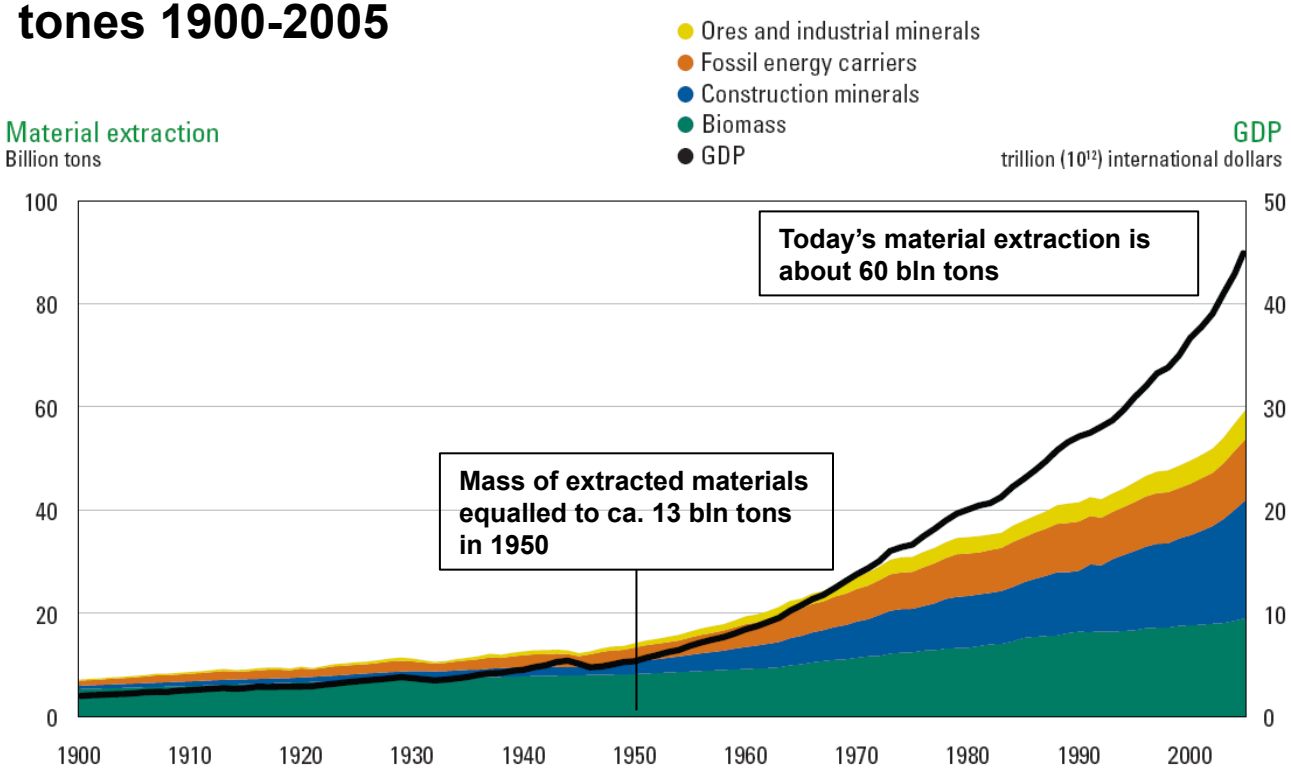
Fig. Global material extraction in billion tones 1900-2005



Source: Krausmann *et al.*, 2009

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Bioenergy offers significant potential for:

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Climate change mitigation:

- Bioenergy deployment offers significant potential for climate change mitigation

Energy security:

- It is believed that potential deployment levels of biomass for energy by 2050 could be in the range of 100 to 300 EJ (IPCC, 2011)

Economic prosperity

- By creating permanent jobs; only in the United States, the economic output of the 'renewable fuels industry' is estimated at $184 billion. It supports over 852,000 jobs and $56 billion in wages and generates about $14.5 billion in local and state tax revenue every year (US National Corn Growers Association, 2014).

Bioenergy generates also significant risk for sustainability

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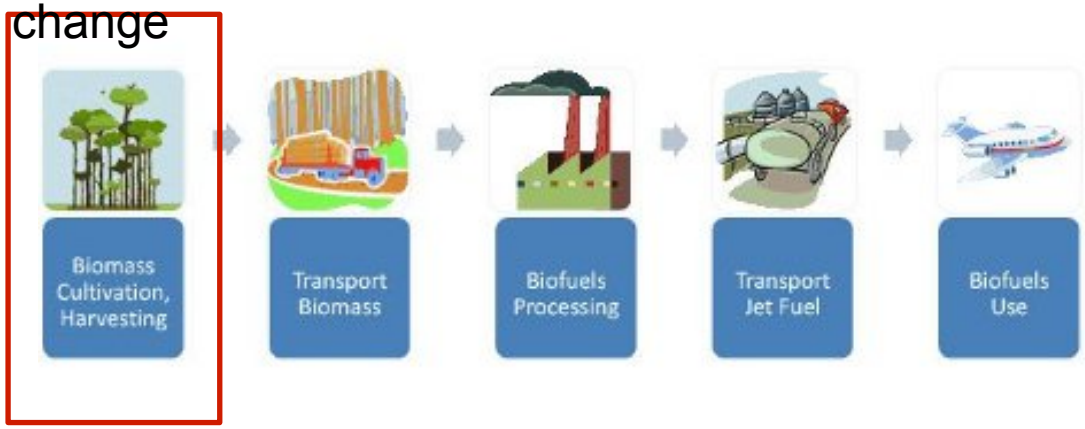
Environmental impact:

- Climate change
- Biodiversity
- Water resources
- Pollution

Societal impact:

- Food security

Land use, land use change



Source: http://www.mtu.edu/news/stories/2010/january/michigan-tech-partner-three-major-biofuel-projects.html

LUC, DLUC, ILUC

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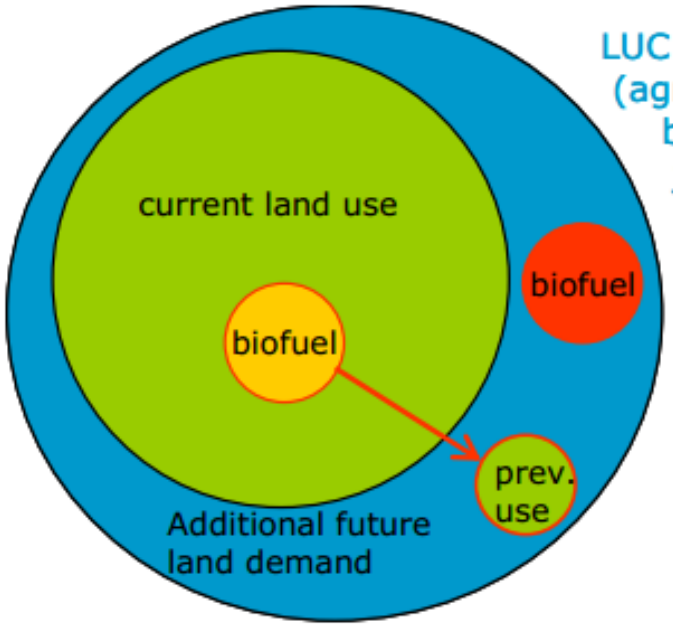
Figure 1: Principle of LUC (DLUC and ILUC) Due to Biofuel Production



LUC = additional future land demand
(agriculture-food, fodder, fibre, bioenergy
but also infrastructure,settlement…)
just a part of this is due to biofuel production

DLUC of biofuels = direct conversion of natural habitats to eliminate by proof of origin (RED Art.17, 18)

ILUC of biofuels = displacement and relocation of previous use; takes place globally

Fritsche & Wiegmann (2011)

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Nevertheless…

- Biofuels can *not* be identified as the most important or single global cause of land use change
- Projected changes in land use caused by biofuel policies are very small in comparison to other changes (Langeveld et al., 2013)
- This is why effective solution against LUC should go far beyond biofuels

Worldwide LUC mitigation solutions

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- The worldwide solutions to prevent from LUC can be included in two major type of actions:

- **Land use conservation measures (more conservation and more effective conservation)**

- **Measures mitigating land use change pressure**, which are basically the measures aiming at increasing resource efficiency on both market sides:
  - **Production side**
  - **Consumption side**

Measures mitigating LUC at production stage of land-intensive commodities

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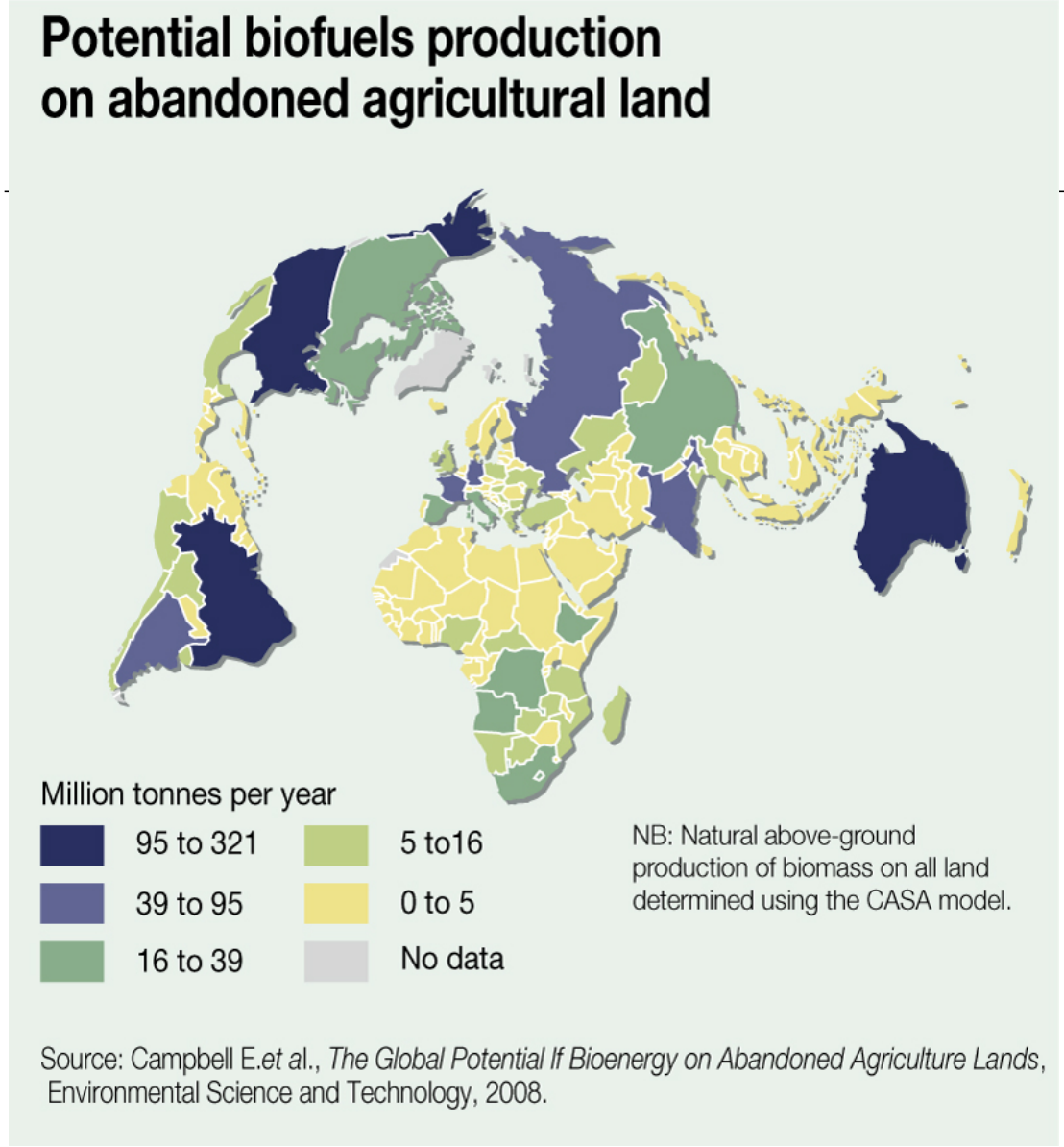
- Cropland management
  - Plant management, double cropping
- Grazing land management/pasture improvement
  - Plant management, animal management, fodder management
- Using integrated agriculture production systems
- Waste reduction
- Waste utilization
- Improving land management (use of abandoned, degraded land)

Keyword: **sustainsification** (linkage of words: sustainable intensification) **-** increasing yields by taking into the sustainable development goals



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Abandoned Land: Vision or Reality?

Source: www.grida.no/graphicslib/detail/indirect-land-use-change-induced-by-increased-biofuels-production_e9af

Measures mitigating LUC at consumption stage of land-intensive commodities

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- Reducing losses during final consumption
- Changing diets towards less land-intensive food, e.g., substitution of animal products with plant-based food, while quantitatively and qualitatively maintaining adequate protein content, in regions with high animal product consumption
- Reduction of food overconsumption in regions where this is prevalent
- Shifting towads low-land-intensive products (e.g. non-renewable sources sometimes are worth consideration)
- Bioenergy conservation

Land embedded in food products

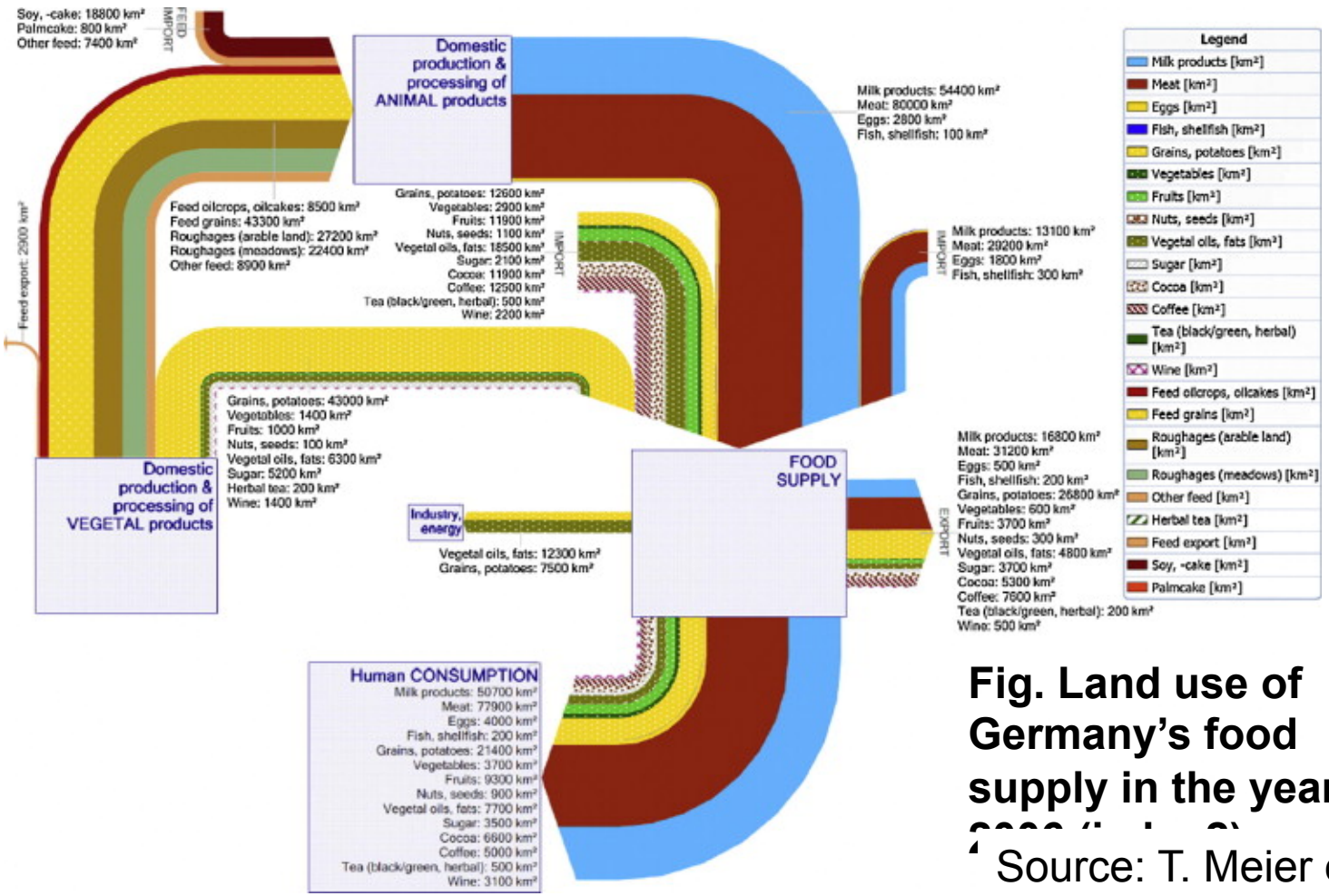

Fig. Land use of Germany's food supply in the year

Source: T. Meier et al., 2013

Supporting measures

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- Improving information systems (including certification schemes)
- Product standards
- Programmes for economy-wide sustainable resource management
- Economic instruments to trigger sustainable supply and demand, e.g. a “subsidy to sustainability” approach to fostering long-term soil productivity
- Programmes that foster a greater use of residues— after taking into account soil fertility needs —and the use of biowaste to help reduce the demand for land
- Programmes promoting a healthy and balanced diet in high-consuming countries

Good Governance

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EU/D Political Targets for Biofuels

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- Renewable Energy Directive **RED**: sets as target an **energetic share of 10 %** for renewable energies in the whole transport sector for all member states of the EU

- EU fuel quality directive **FQD :** target for **net GHG-savings of 6 %** for the road transportation sector for all member states until the year 2020 (in D: 7 % GHG-target for biofuels).

Will biofuel targets trigger biomass/biofuel imports?

Will imports induce LUC and increase GHG in producer regions?

Many studies, but up to now no focus on regional governance as to mitigation perspectives for LUC!

The Project *GoViLa*

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FNR Fachagentur Nachwachsende Rohstoffe e.V.

Umwelt Bundes Amt Für Mensch und Umwelt

IFPRI

UNIKASSEL VERSITÄT

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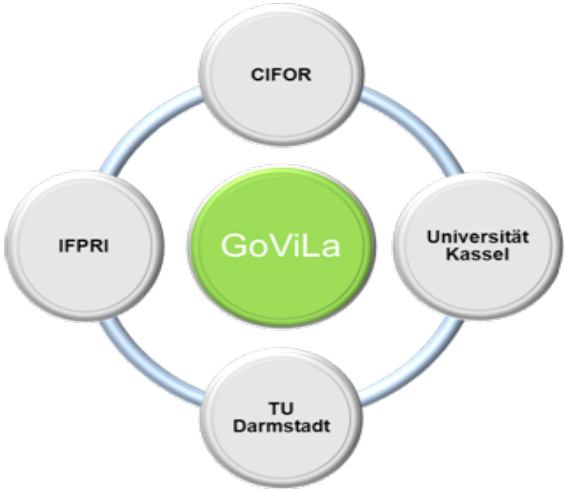
CIFOR

Gefördert durch: Bundesministerium für Ernährung und Landwirtschaft aufgrund eines Beschlusses des Deutschen Bundestages

Gefördert durch: Bundesministerium für Wirtschaft und Energie aufgrund eines Beschlusses des Deutschen Bundestages



GoViLa – „Using policy scenarios to identify room for maneuver to reduce iLUC"

Sponsor: *BMELV, BMU*

Duration: *12.2012 – 12.2014*

Project partners: *TU Darmstadt, IWAR*

Universität Kassel, CESR

International Food Policy Research Institute (IFPRI)

Center for International Forestry Research (CIFOR)

www.govila.de

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GoViLa: Working Process

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Regional investigations (Country reports)

Scenarios
- Demand
- Regional Governance

Modeling
- iLUC
- Carbon flows

12/2012

12/2014

State for 10/2014

„Hot-spots“ of deforestation

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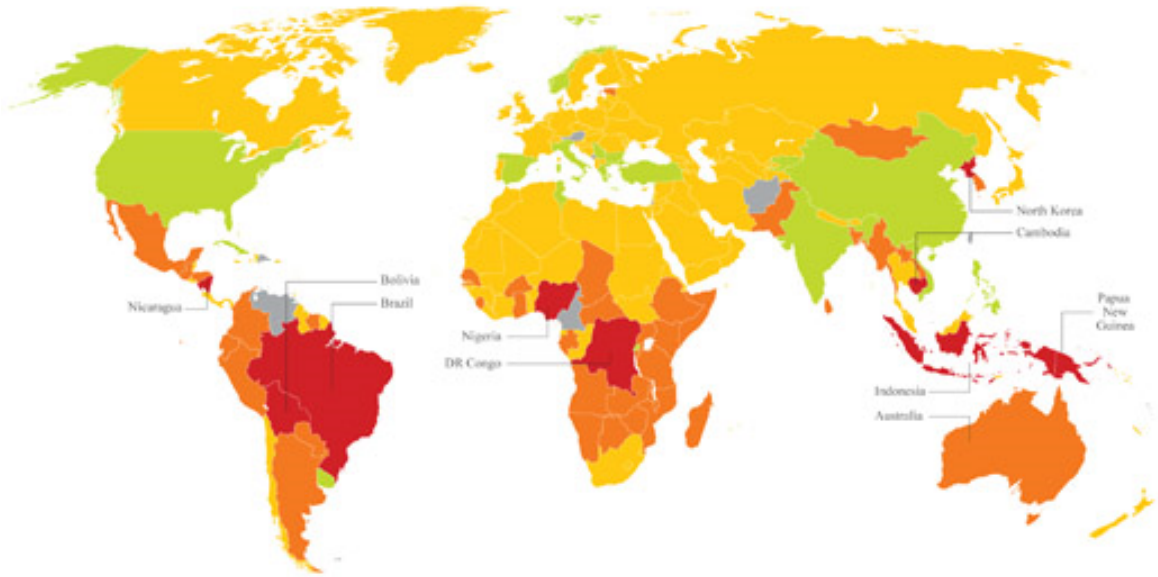
Deforestation Index 2012



Legend	
Extreme risk	
High risk	
Medium risk	
Low risk	
No Data	

Rank	Country	Rating
1	Nigeria	Extreme
2	Indonesia	Extreme
3	North Korea	Extreme
4	Bolivia	Extreme
5	P.N.G.	Extreme

Rank	Country	Rating
6	DR Congo	Extreme
7	Nicaragua	Extreme
8	Brazil	Extreme
9	Cambodia	Extreme
10	Australia	High

Source: http://maplecroft.com/about/news/deforestation.html

GoViLa: Regional Investigations

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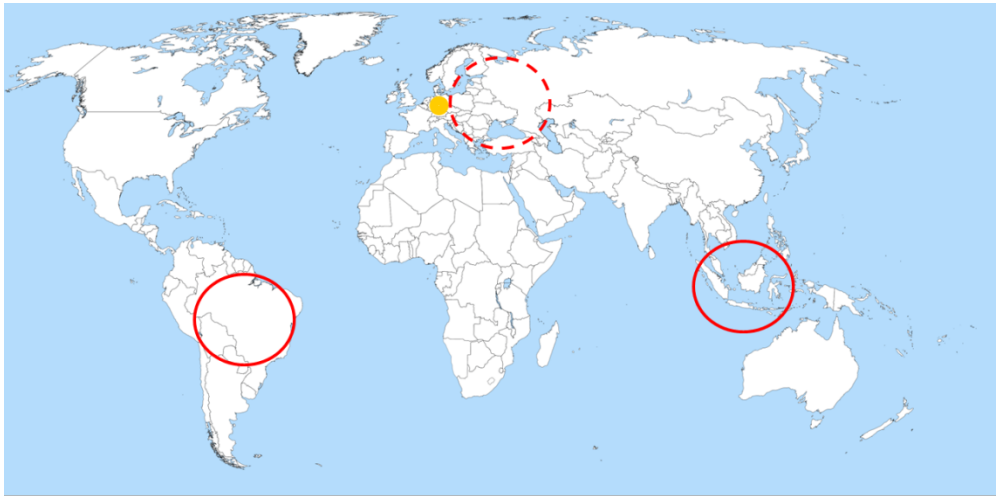
„Countries of concern“/ „Countries of interest“:

- 75 % of today‘s ILUC covered
- High improvement potential of governance expected

  - **Indonesia**
  - **Brazil**
  - **Ukraine**



http://www.weltkarte.com/welt/weltatlas/weltkarte-blank-vektorgrafik.htm

Brazil:
Highlights and Issues for Good Governance

- Policy measures, market changes and public awareness led to a major decrease in deforestation in Amazon, but not in Cerrado (Brazilan Savannah)
- Crop expansion (both sugarcane and soybean) on pasture lands leads to cattle displacement to Amazon
- High potential of yield increase, both livestock (cattle intensification) and agriculture (double cropping).

http://www.weltkarte.com/suedamerika/brasilien/brasilien-karte.htm

Issues for „good governance“

- **Enlargement of advanced control measures (remote sensing) /better special planning/more awareness for Cerrado**
- **Better access to financial schemes promoting good land management**

Population: 201 M
Area: 851 M ha
GDP: $ 2,245 Billion

Indonesia:
Highlights and Issues for Good Governance

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- Oil palm expansion has been a key driver of deforestation over last years
- Current moratorium on clearing primary natural forests and peat lands might allow time to develop processes for land-use planning and permitting
- 27.2 million hectares of degraded land (Indonesian Ministry of Forestry 2012), but there is no single definition of degraded land in Indonesia
- Major problem: No consistent reliable map of Indonesian territory – high uncertainty as to land ownership, overlapping permits for land use etc.

Population: 246.9 M
Area: 190.5 M ha
GDP: $ 868 Billion

Issues for „good governance“:

- **data collection and information systems (“one-map-policy”)**
- **development of REDD+ projects**

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Ukraine:
Highlights and Issues for Good Governance

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- Significant increase of soybean and rapeseed production in recent years due to higher demand for biofuels in EU
- Agricultural yields are far below the West European level
- Slowly growing interest in domestic biofuel consumption and production – no information on production capacities
- Abandoned land to be approximately 3.5 Mha; 1-2 Mha would be suitable for biomass production, but: No information as to status and carbon content

Issues for „good governance“:

- **Implementations of DCFTA (Deep and Comprehensive Free Trade Agreement) conditions → improvement of competition on EU-level, increase of foreign trade**
- **Ukraine needs FDI (Foreign Direct Investments) for investment in agriculture**
- **practical based education system: a better know-how for higher yields**

Population: 44.3 M
Area: 60 M ha
GDP: $177 Billion

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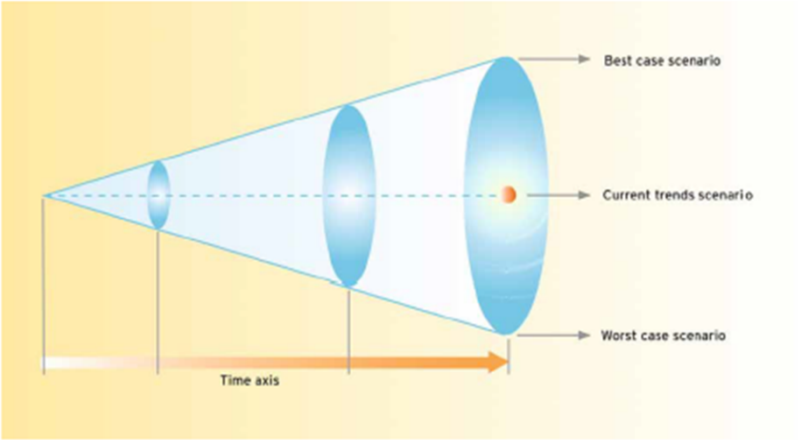
GoViLa: Outlook

Assessing LUC and GHG resulting **from D/EU biofuel targets**

- based on **Governance Scenarios from regional field investigations**
- by use of **a model toolset: Mirage (IFPRI) + LandShift (UniKassel)**

➢Model results to be used to evaluate effectiveness of different governance options to mitigate LUC/ILUC and related CO_2-emissions



Source: http://www.bmu.de/files/pdfs/allgemein/application/pdf/klima_engl_gesamt.pdf

Scenarios and the notion of „possible futures“

Thank you for your attention!