zef
Center for
Development Research
University of Bonn

Toward Climate Resilient Food Systems and Europe's Roles

Joachim von Braun

Center for Development Research (ZEF)
University of Bonn

FOOD 2030: Research & Innovation
for Tomorrow's Nutrition & Food Systems

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Overview of Issues

1. **Food and agriculture transformation and the hunger and climate change challenges**
2. **Science and innovation policy** for food systems' adaptation to, and mitigation of climate change
3. **Governance** of science and policy cooperation for resilient global food system

4 inter-linked Transformations affecting global food & agriculture

T1: Demographic and urban – rural *change*

T2: Nutrition- and consumption *change*

T3: Farms' size and business with technological *change*

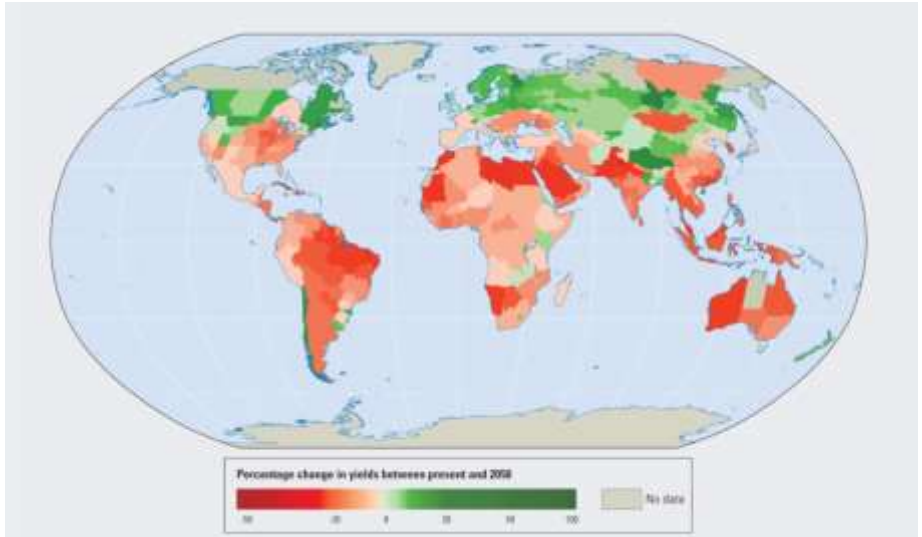
T4: Agricultural and food system *change*

and climate change stress comes on top of these

Climate variability and change exacerbates food insecurity

Impacts of climate change on the productivity of food crops in 2050

World Bank Publishers
World bank Development report 2010
http://wdronline.worldbank.org/

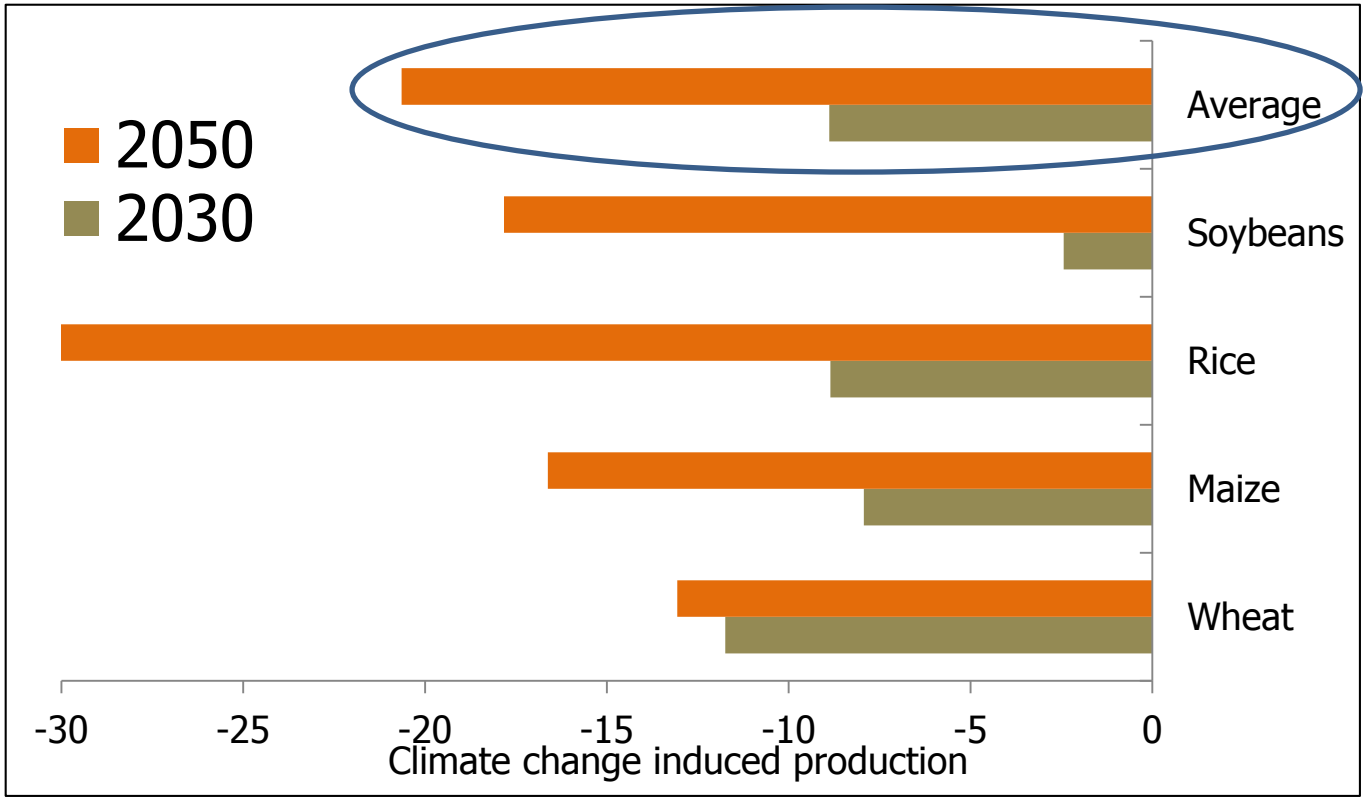


Global Hunger Index 2016

Welthungerhilfe, IFPRI and Concern Worldwide 2016
http://www.ifpri.org/ghi/2016

Wheeler and von Braun *Climate change impacts on global food security*. Science 2013 (updated)

Climate Change Reduces Global Food Availability



Source: Haile, von Braun, et al. 2016

warmer temperature and changing rainfall patterns may reduce global food production by about **10% by 2030** and by more than **20% in 2050.**

New crop modeling results: +1°C => 4 to 6% yield loss in global wheat

Source: Bing Liu et.al. 2016, Nature Climate Change

Agriculture Impacts Climate Change

GHG due to livestock and land use change (outlook 2030)

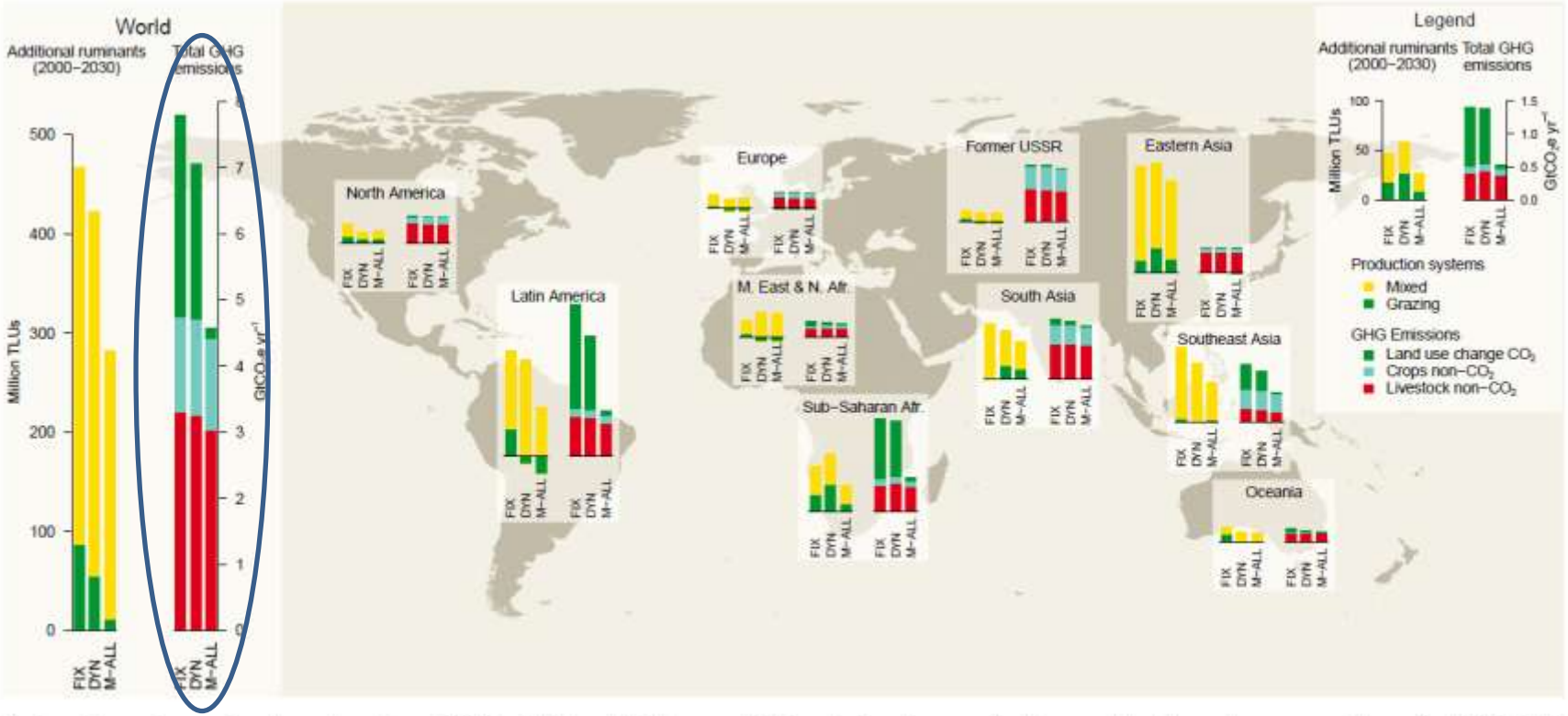


Fig. 1. Change in ruminant numbers from 2000 to 2030 and total annual GHG emissions from agriculture and land use change over the period 2010–2030 globally and by region for the fixed system scenario (FIX), the dynamic production system scenario (DYN), and the mitigation scenario with dynamic production systems and a carbon price of US$10 per tCO2e applied to emissions from both agricultural and land-use change sectors (M-ALL). *y*-axis scales are the same in all graphs. TLU, tropical livestock unit (i.e., an adult animal of 250 kg weight).

Havlik et al. 2014

livestock ca. 12% and land use change ca. 14% of total GHG

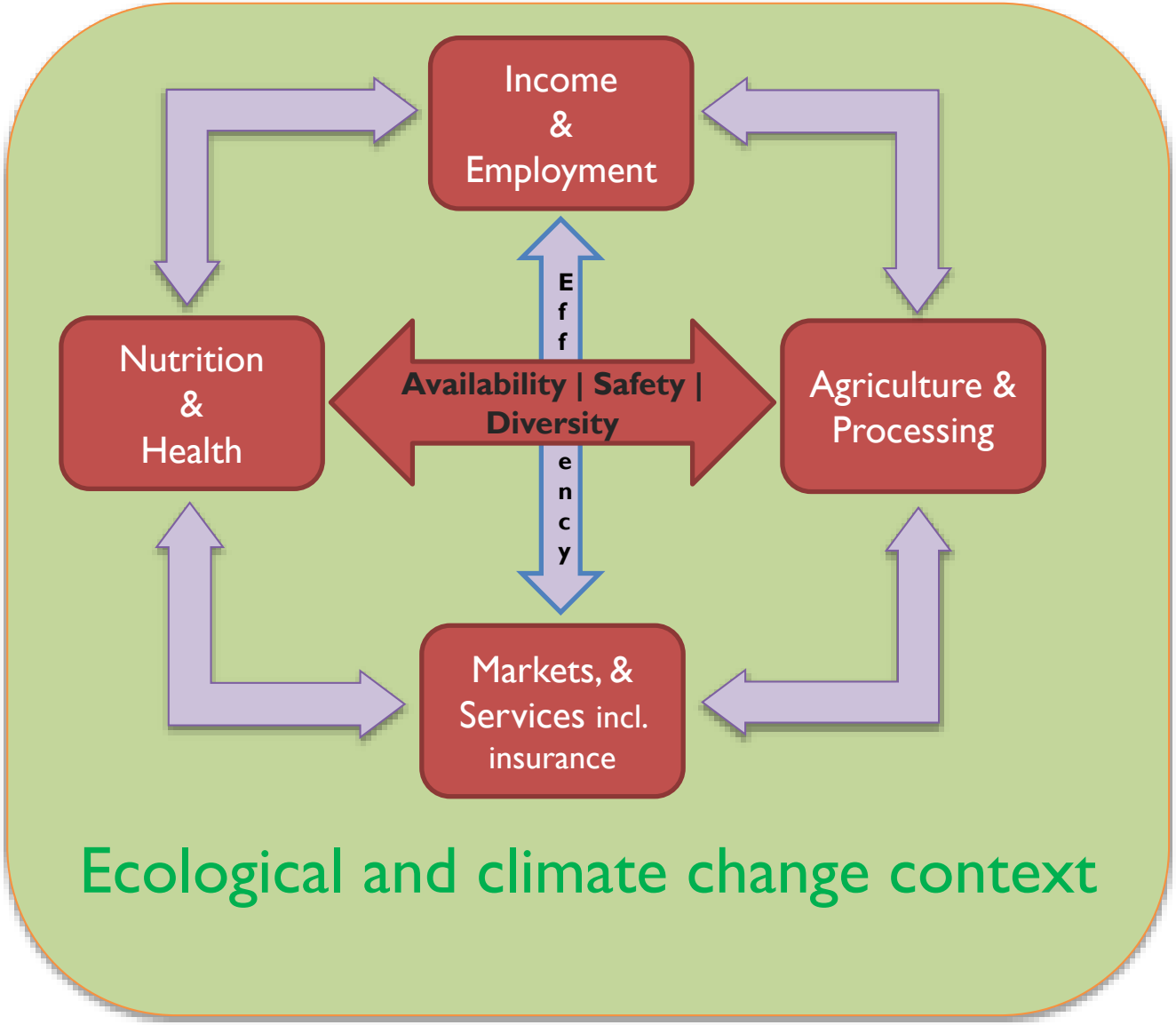
Climate Change Affects the Whole Food System – 4 points of entry for system resilience

food availability

food access

food utilization

stability of the food system



Enough is known to act for food security and resilience under climate change

1. **Less resilient:** food security will be worst in countries and for people already suffering high levels of hunger and will worsen over time (SDGs 1,2)
2. **More risky:** Extreme weather events are likely to be more frequent and increase risks in the food system
3. **Important part of solution:** Agriculture and food are part of the problem of climate change, and part of the solution. Science is essential.

Sources: "FoodSecure" EU supported research project and other sources

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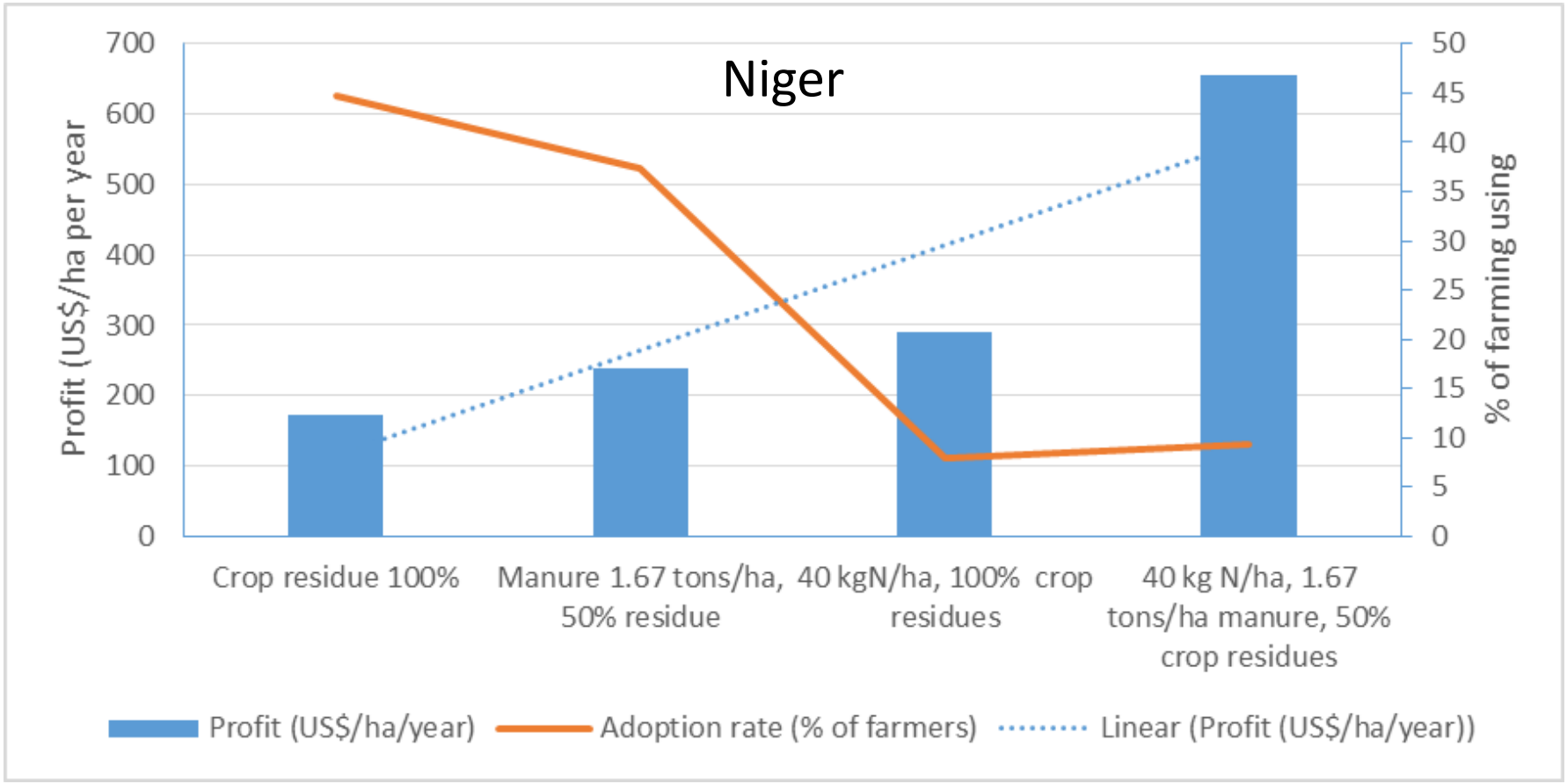
Adaptation Options for Food and Agriculture

- Diversify and increase production.
- Trade more, not less, and facilitate finance
- Better food storage and prevention of losses
- Improve food processing
- Water storage, and more and better irrigation
- Facilitate job change with skills
- Institutional strengthening (e.g. farm women's groups)
- Accelerate science capacity and internat. science sharing

Research: what optimal combinations of these options?
Methods: joint agronomy, economics and climate models

Barriers to adoption of climate smart agr. practices need to be tackled

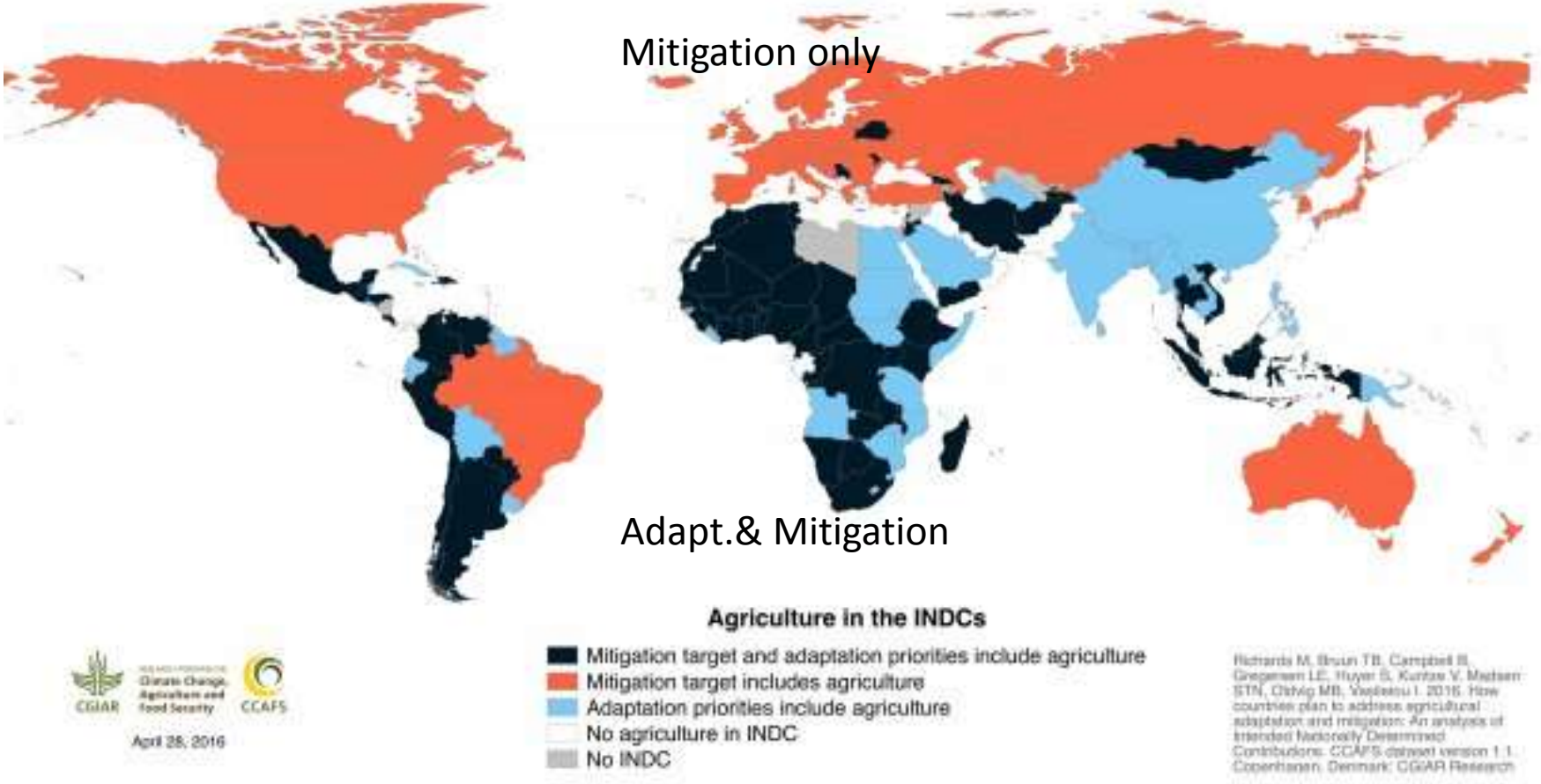


Most profitable practices are adopted the least

Lack of availability of rural services, extension, vocational traning

Source: Moussa et al. (2015).

Climate Change Mitigation and Adaptation Priorities in Agriculture (Intended Nationally Determined Contributions)



Mitigation Options for Agriculture Fall Short of Meeting the Paris Climate Agreement

- Agriculture must reduce emissions by CO_2 equivalent of 1 Giga-ton per year in 2030 (current only 21- 40% of this goal)

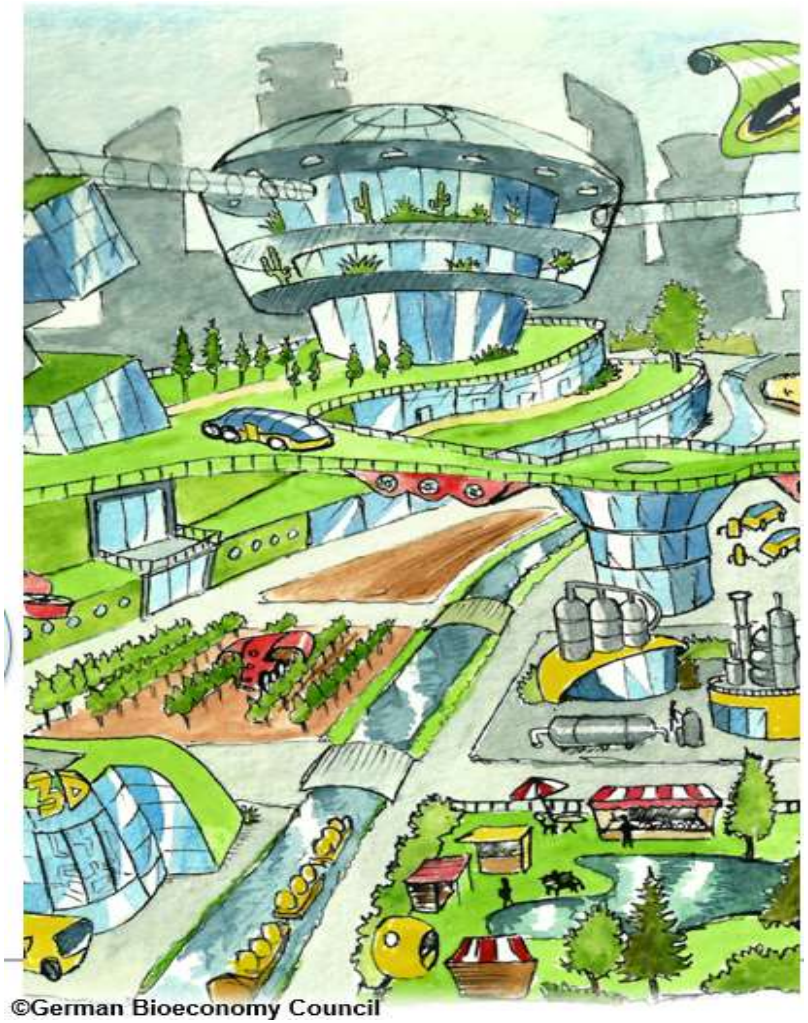
  Wollenberg et al. 2016 in *Global Change Biology*

- Mitigation options
  - new technologies (e.g. methane inhibitors)
  - land use practices / precision farming / range land
  - incentives for carbon reductions (incl. soil carbon)
  - consumption adjustment, waste reduction

Thinking mitigation and adaptation is not enough:
Fundamental Transformation toward Bioeconomy

- Transformation of **whole economy** to sustainablity
- Sustainable food system and **rural - urban** links
- Bio-sensitive **cities**
- Sustainable **consumption**
- **Science agenda**

Sustainable production and use of biological resources, technologies, and biological intelligence



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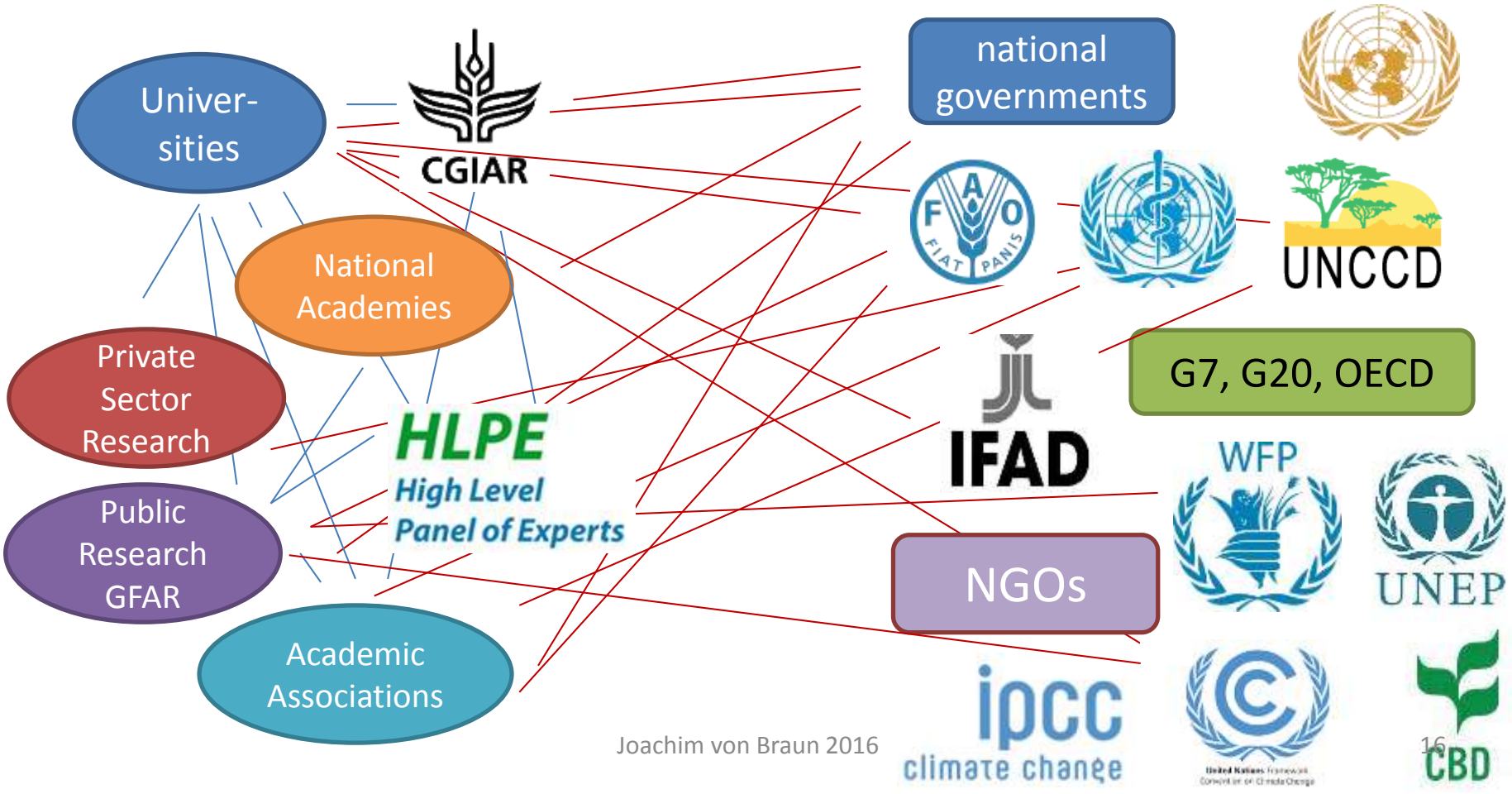
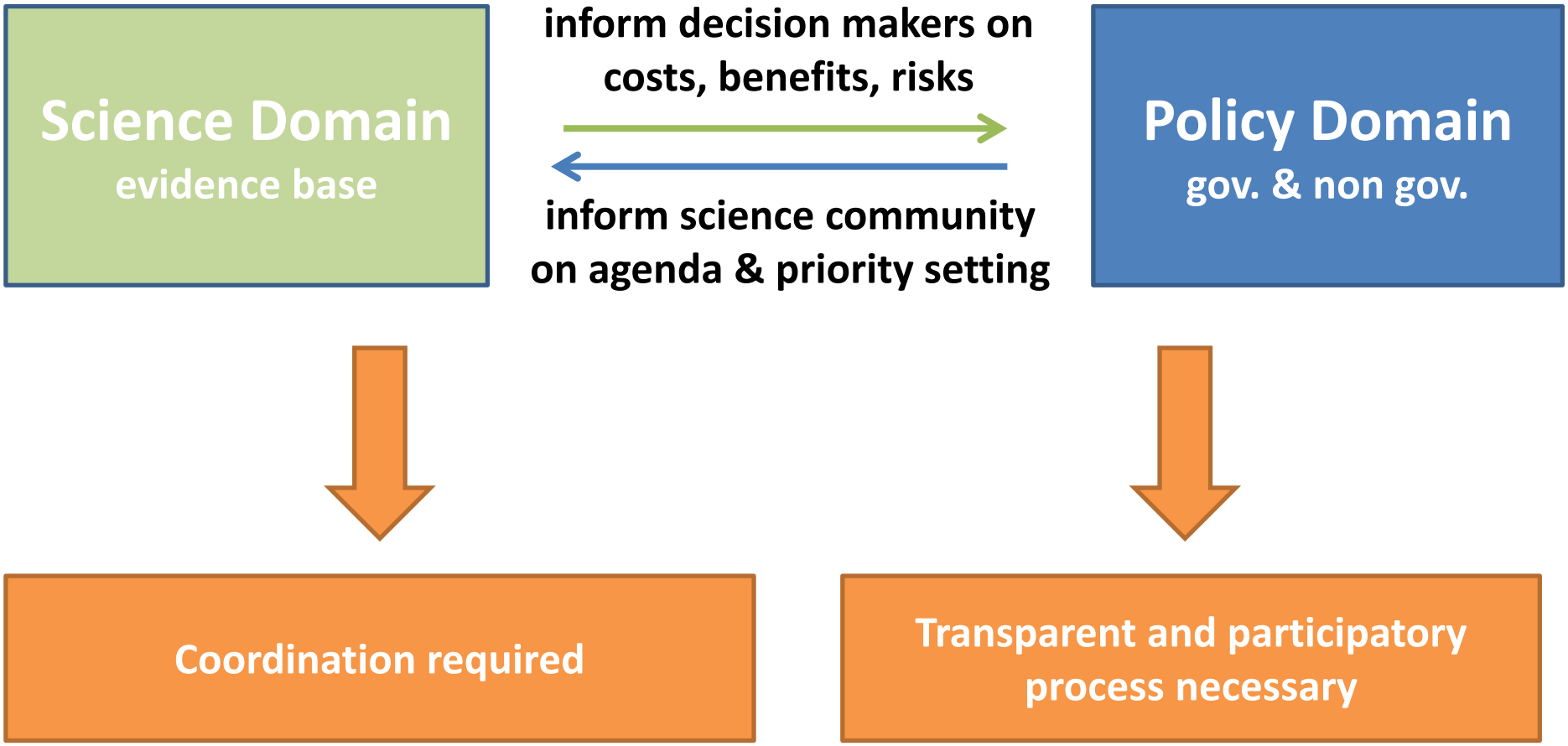
The System of Science and Policy Cooperation in food, nutrition, agriculture needs re-design

Many clusters of supply

Many clusters of demand



Toward an "International Panel on Food, Nutrition & Agriculture"(IPFNA)



Source: von Braun & Birner 2016, von Braun, Kalkuhl. ZEF, 2015.

Conclusions and EU roles

1. **Agriculture and food system transformations, plus climate change challenge. *EU*** to assist with coherent CAP, development-, and climate-policies.
2. **Climate-smart food system**: Whole food system needs to adjust and innovate, incl. trade, industries, nutrition and social policy; in bioeconomy context; ***EU*** key strategic role.
3. **Governance:** Establish **International Panel on Food, Nutrition, Agriculture** (IP-FNA) to better relate science and policy for food system innovation and resilience. ***EU*** to lead.