Toward Climate Resilient Food Systems and Europe’s Roles

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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

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


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

Source: Bing Liu et.al. 2016, Nature Climate Change
Agriculture Impacts Climate Change
GHG due to livestock and land use change (outlook 2030)

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

Ecological and climate change context
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 training

Source: Moussa et al. (2015).
Climate Change Mitigation and Adaptation Priorities in Agriculture (Intended Nationally Determined Contributions)

- Mitigation only
- Adapt. & Mitigation

Agriculture in the INDCs

- Mitigation target and adaptation priorities include agriculture
- Mitigation target includes agriculture
- Adaptation priorities include agriculture
- No agriculture in INDC
- No INDC
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 sustainability
- 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

Universities
Private Sector Research
Public Research GFAR
National Academies
Academic Associations

Many clusters of demand

CGIAR
HLPE High Level Panel of Experts
GFAR

national governments
UNCCD
G7, G20, OECD
WFP
UNEP
IPCC climate change

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

Science Domain
- evidence base

Policy Domain
- gov. & non gov.

Informat decision makers on costs, benefits, risks
Informat science community on agenda & priority setting

Coordination required

Transparent and participatory process necessary

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.