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The world's agriculture and food transformations, SDGs and Innovation

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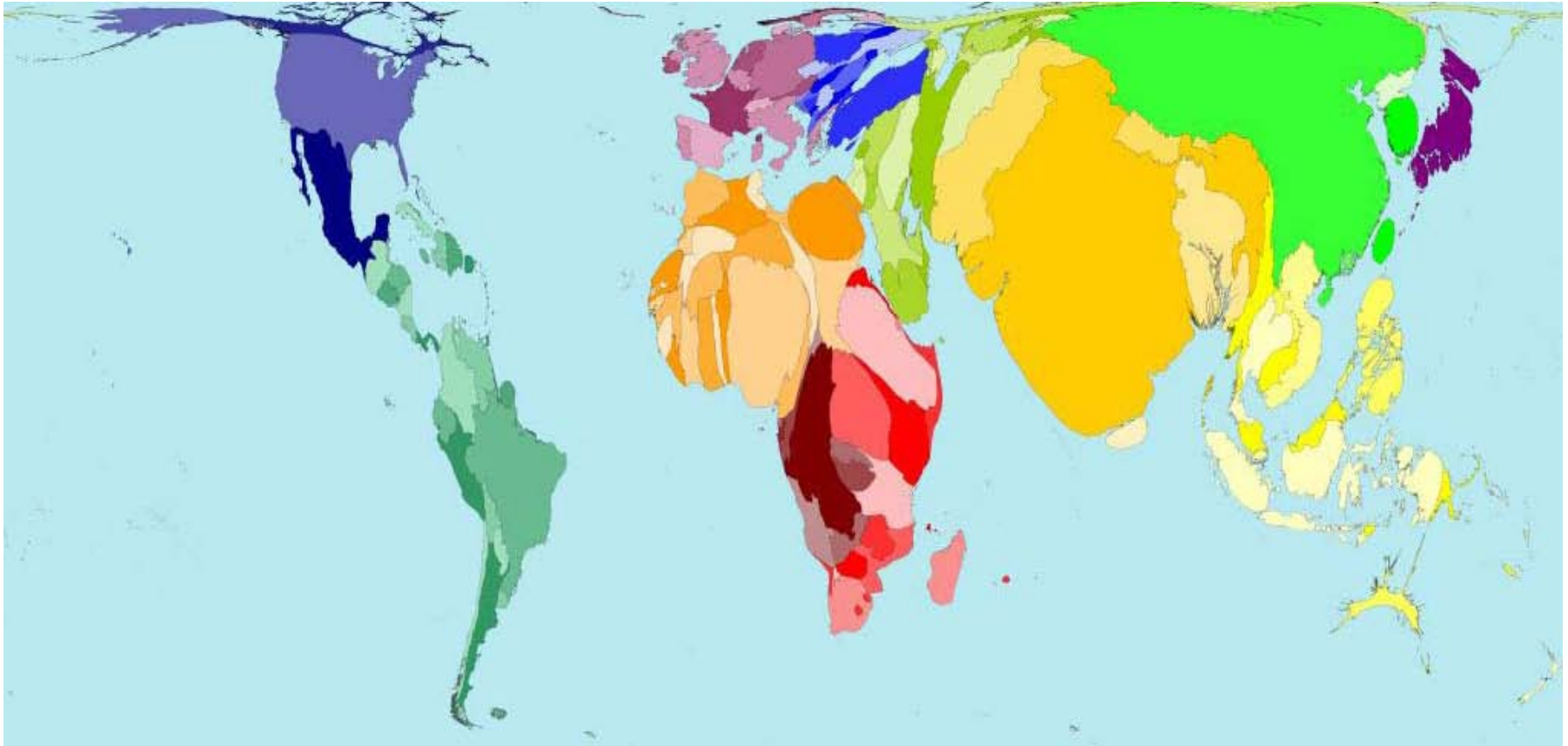
University of Bonn

Keynote at the 25th session of the Committee on Agriculture in
FAO, September 26th, 2016

Overview

- 1. Transformation of agriculture, food and rural-urban change**
2. SDGs - agriculture, food and nutrition policy
3. Innovations for sustainable transformation
4. Conclusions

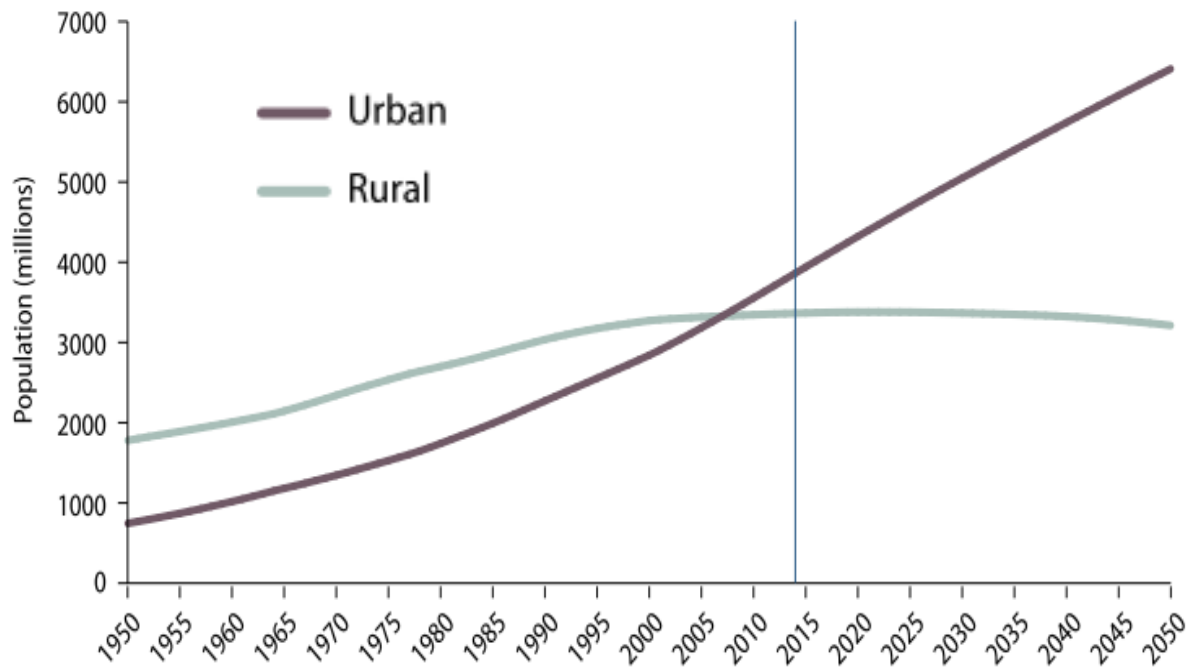
World population 2050 (from 7 to 9 billion)



Source: Worldmapper 2009.

and consuming what and how much?

Urbanization challenge – and rural change



Source: UN DESA. 2014.

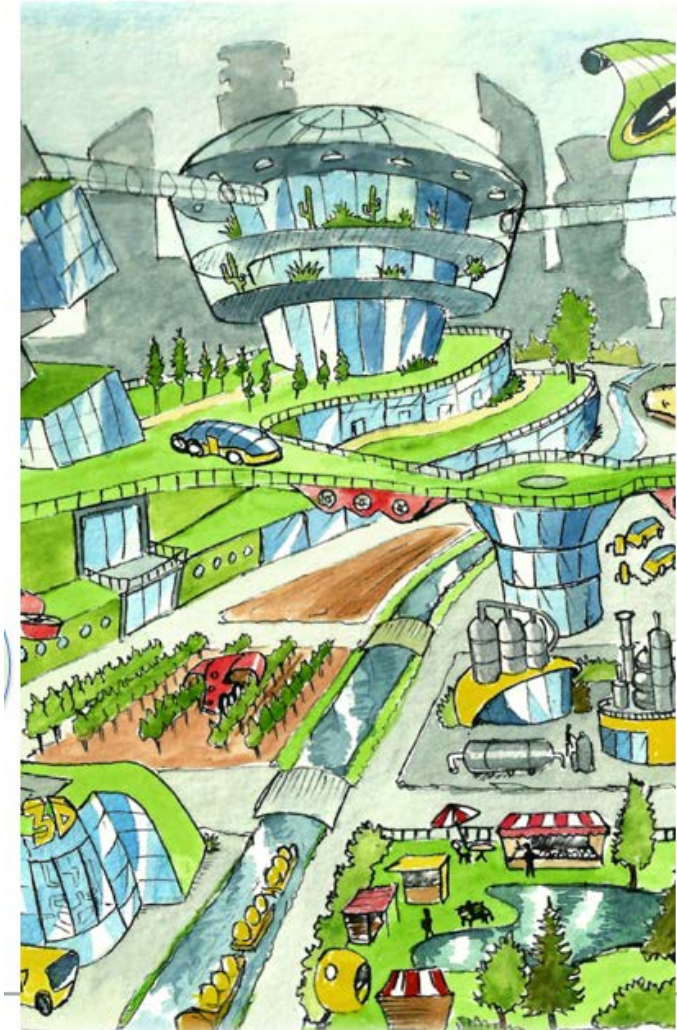


Toward a New Urbanization

- **Accelerated trend:** Rural-Urban linkages with people and resource flows
- Communications technology changes the rural-urban distinctions

Urban and rural become less relevant distinctions

Toward bio-sensitive cities



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Agriculture in sectoral transformation: Conventional view

	mid-1990s	2000	2010
Agriculture as share of GDP	8	5	4
Ag employment as share of total employment	39	36	20

Data source: World Bank Data.

**Agricultural GDP and employment shares decline as
GDP per capita rises**

Misleading focus on Agriculture GDP

- Agriculture is not just a “sector“ of production
- **Old problems:**
 - Home production in subsistence farming not appropriately accounted for
 - Environmental services and dis-services not accounted for
- **New trend:** Agriculture increasingly includes industry and services sector elements, but they are accounted for separately from agriculture

Agriculture is much bigger than GDP suggests

Agriculture Transformation: “Agricultural Sector” part of “Bioeconomy”

What is Bioeconomy?

... the production and use of biological resources, technologies, and biological intelligence in all economic sectors (agriculture, food, energy, textile, construction, chemical, pharma, etc. industries).

This new reality broadens the scope of agricultural policy and practice

Bioeconomy Policies around the World

- dedicated bioeconomy strategy
- bioeconomy-related strategy
- be-related strategy; dedicated be-strategy is under development
- dedicated be-strategy is under development



As of September 2015

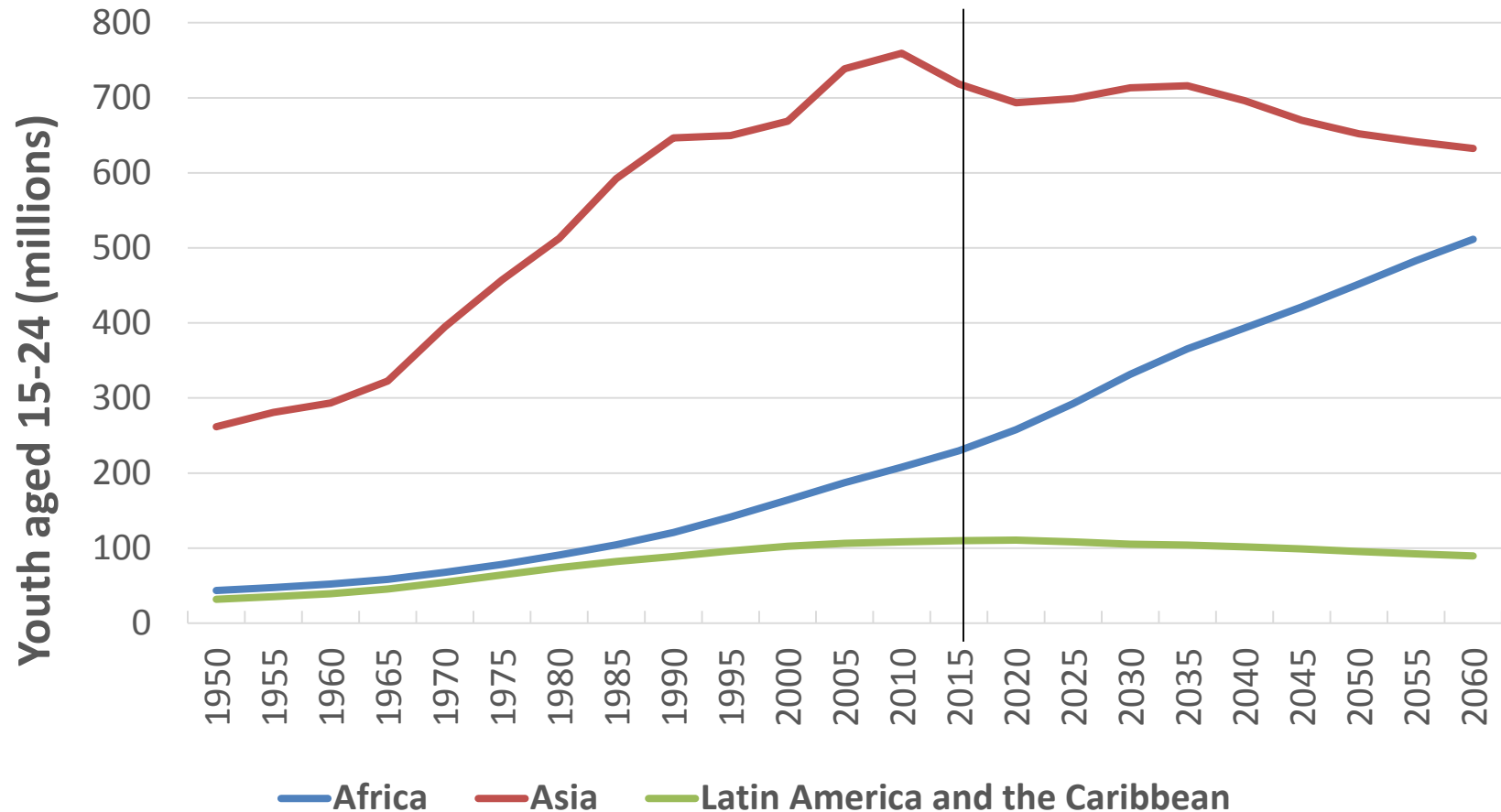
© German Bioeconomy Council
Ramon Maas/Photo.com (Flags), Jhu_21/Photo.com (world map)

Transformation of small farms

- Of an estimated 570 million small farms almost three quarters located in Asia, 9% in SSA (Lowder et al. 2014)
- BUT:
 - Small farm transformation is dynamic
 - Small farms are competitive when markets are accessible
 - Holdings grow more with rental markets, than does land ownership
 - Part-time farming on the rise

Small farms will be with us for the long run
They are important businesses

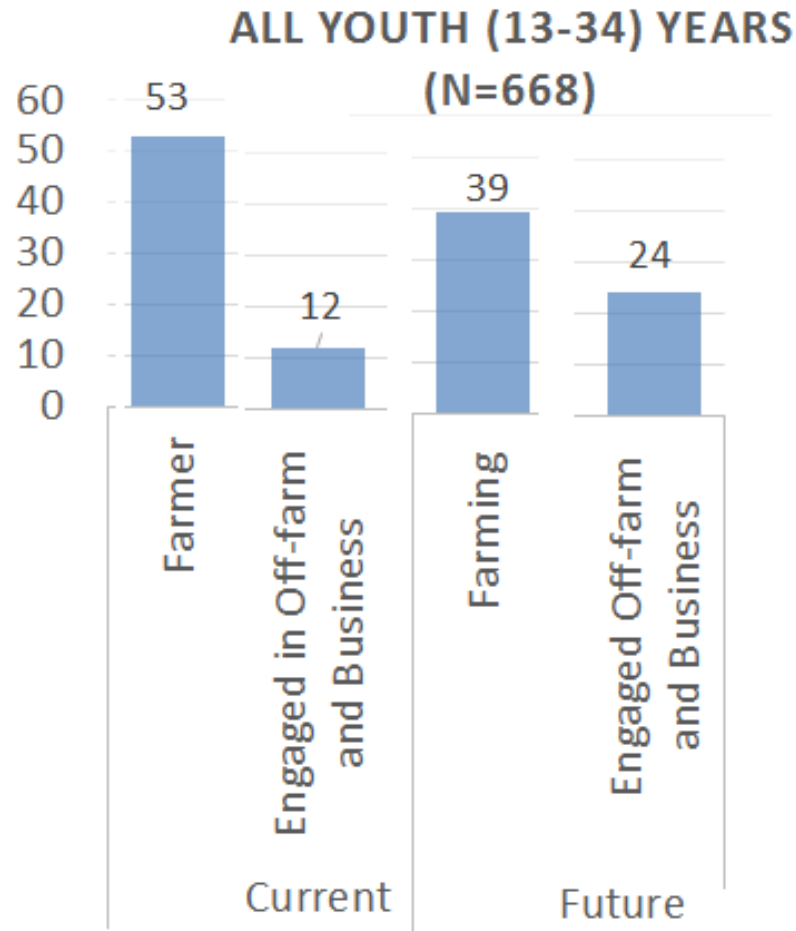
Policies for youth in agriculture define the future



Data source: UN DESA. 2015.

Youth: Are they interested in agriculture?

Occupation choices as reported by youth (%) in Ethiopia



Source: Tekalign Guta et al. ZEF, 2016.

In sum: Three inter-linked agriculture transformations and their Drivers

T1: Agriculture becoming a multi-dimensional “sector” (connecting farming with value chains, industries, and services; bioeconomy)

T2: Farms change (education, farm size structures, market access, mechanization, irrigation, energy)

T3: Technological and organizational change (crop and livestock technology, linked with information technology; training and capacity; institutional innovations)

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Not only Goal 2, but all 17 Goals relate to Agriculture



and there are trade offs between goals

Nutrition transformations - a challenge

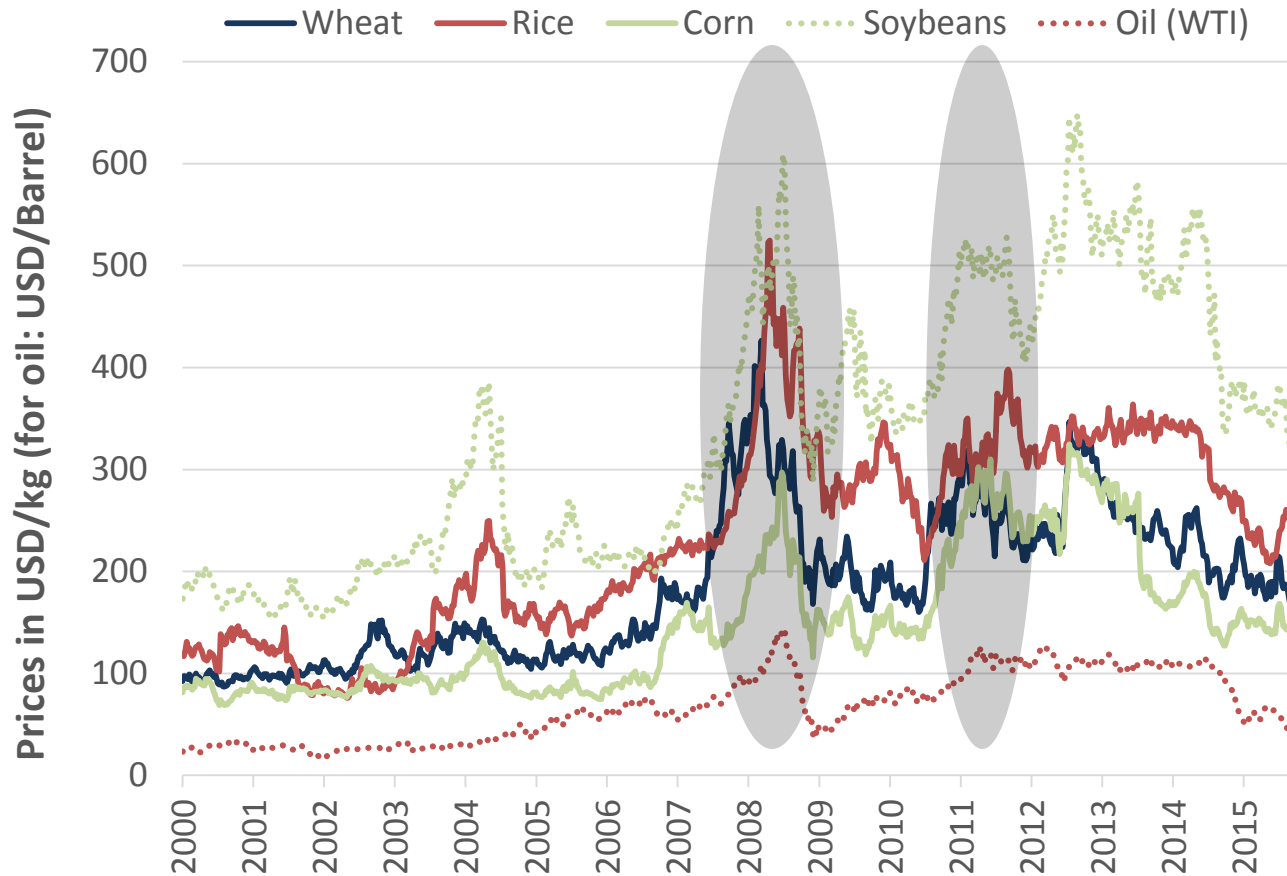
Problems	Numbers of people	Trends
Hunger (under-nutrition, calories)	ca. 0,8 Mrd.	declining
Hidden Hunger (deficiencies of micro-nutrients, vitamins, iron etc.)	ca. 2 Mrd.	Slowly declining
Children's under-nutrition (the first 1000 days)	ca. 165 Mio.	declining
Obesity and resulting chronic diseases	ca. 1 Mrd.	increasing

G20 Agriculture Ministers Meeting Communiqué, Xi'an, 3 June 2016

Selective quotes:

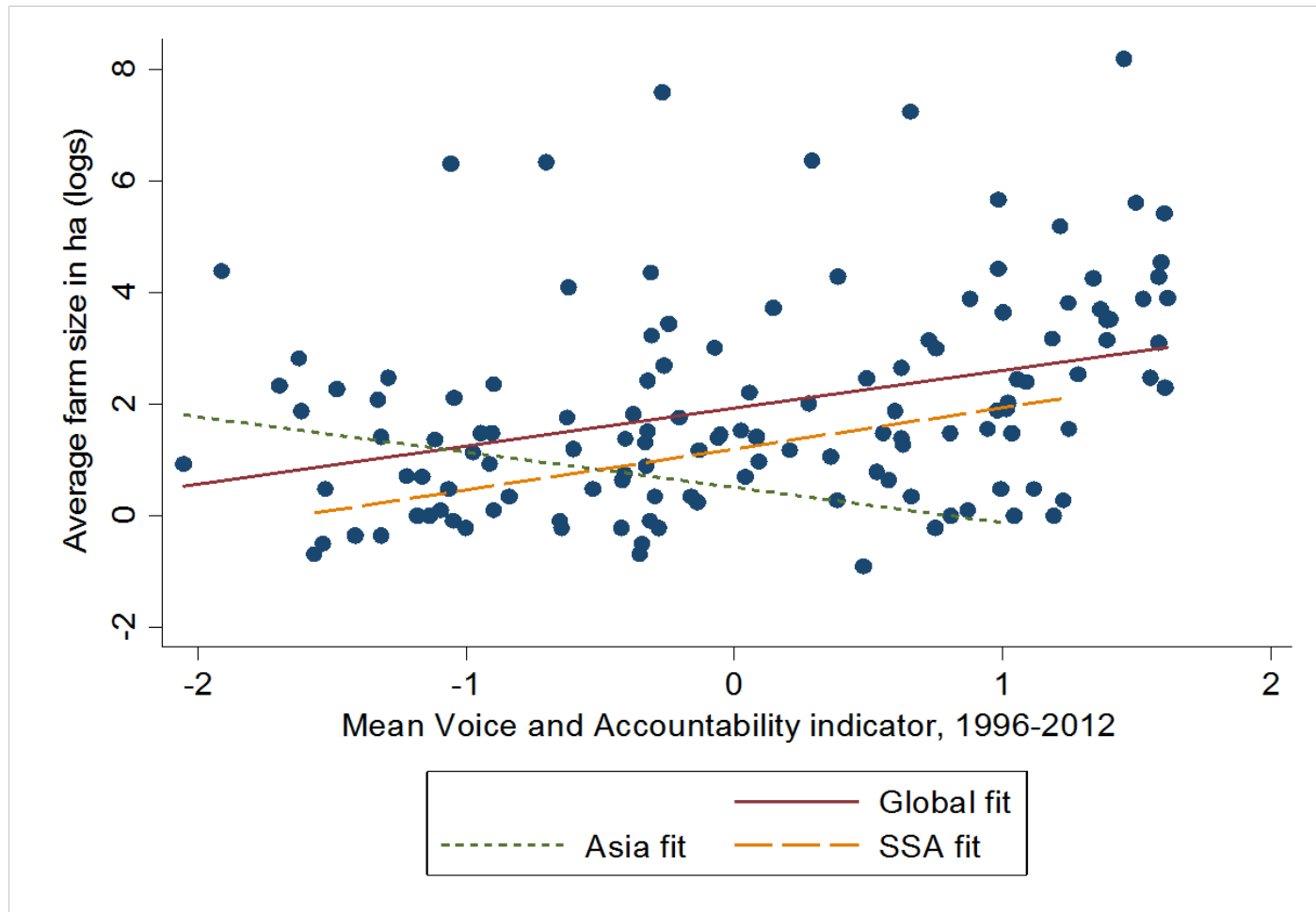
- determined to fulfill our commitments taken under the SDGs
- that food security is affected by the increasingly complex and variable factors and requires comprehensive and coordinated governance measures.
- we commit to continue to tackle the issue of price volatility. ...ensuring food security and nutrition requires global efforts with a special focus on developing countries,
- We value the fundamental significance of agricultural research and development
- harmonize urban and rural development,
- Information and Communications Technology (ICT) ... application in agriculture
- smallholder farmers face crucial challenges in addressing globalization, increasingly complex food value chains, pressures on natural resources, and the adverse effect of climate change.
- sound agricultural policies, investment and trade are important engines for sustainable agricultural development

Prices: opportunity and risk for agriculture – level, trend and volatility



Data source: Bloomberg.

Policy is partly driven by voice: Smaller farmers – more or less voice?



In sum: Priority for SDGs

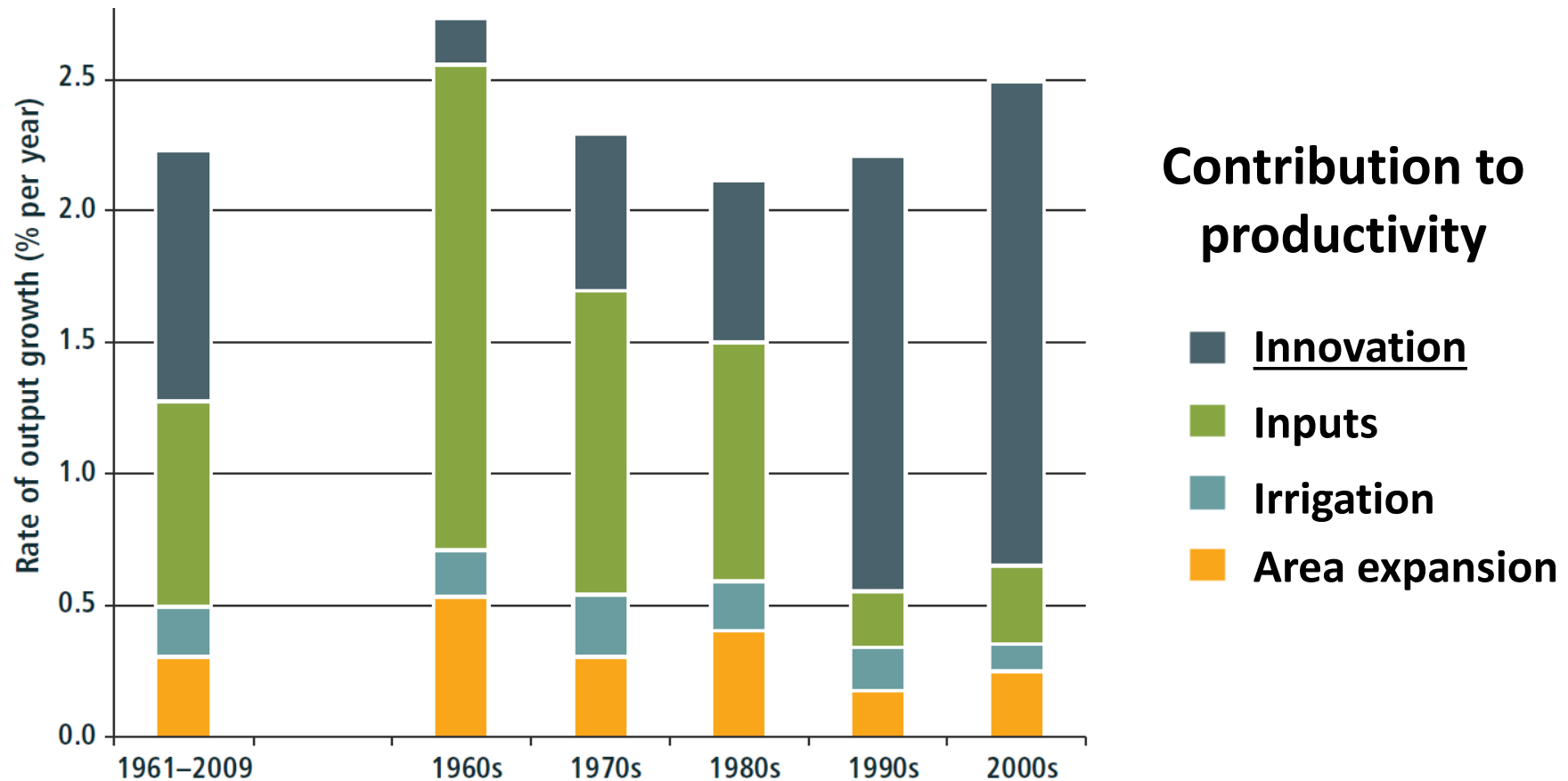
- Coherent policies cutting across goals
- Strong emphasis on hunger and nutrition
- Sound measurement of progress
- Strengthening capacities for policy implementation
- Inclusion of farming communities and their organizations

Overview

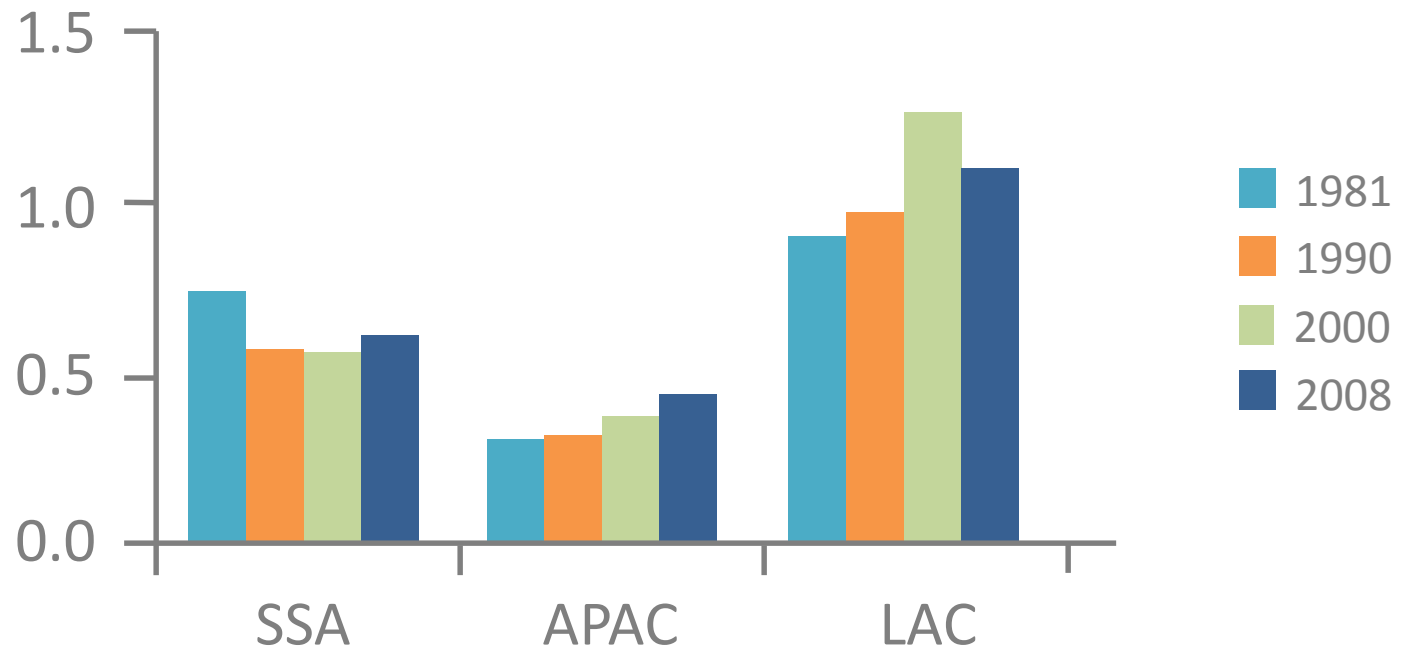
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More with less: Innovation feeds the world

Sources of productivity growth in world agriculture



More is needed: Public agricultural R&D spending as % of agricultural GDP



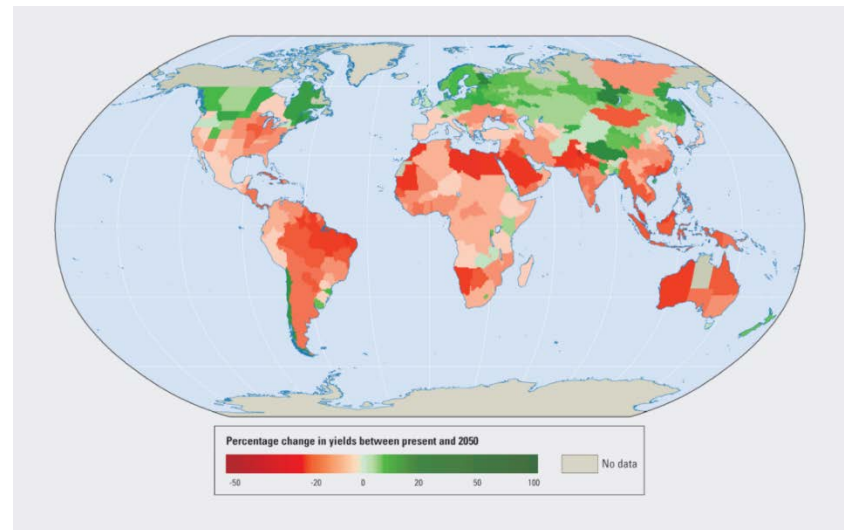
Notes: SSA = Africa south of the Sahara; APAC = Asia-Pacific countries; LAC = Latin America and the Caribbean. Regional growth rates exclude high-income countries within that region (for example, Japan and South Korea in the APAC region).

Source: ASTI & GFAR. 2012.

Climate variability and change will exacerbate food insecurity in areas currently vulnerable to hunger and under-nutrition

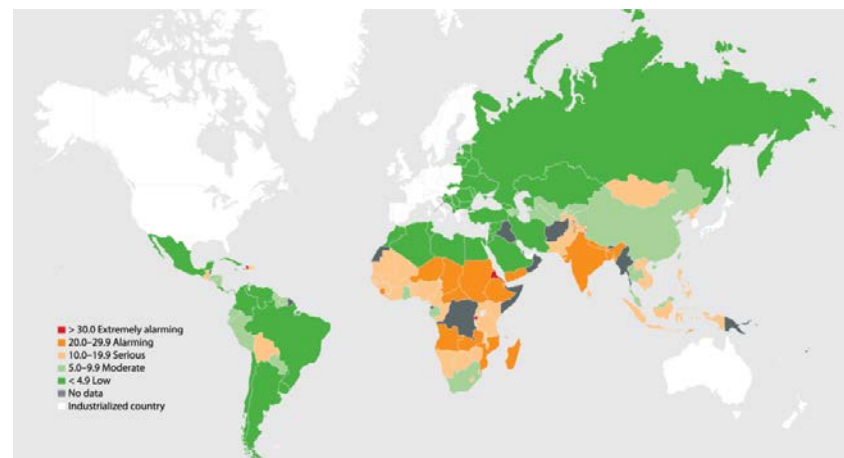
Impacts of climate change on the productivity of food crops in 2050

World Bank Development Report 2010



2012 Global Hunger Index

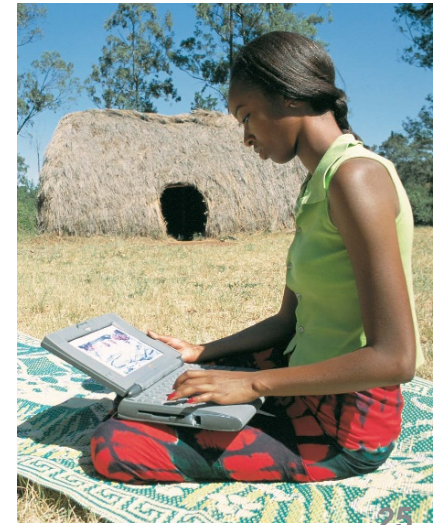
Welthungerhilfe, IFPRI and Concern Worldwide
K von Grebmer et al 2012



Technologies drive transformations and vice versa



- Overcoming the hoe
- Precision farming
- Biological innovations
- ICT 4 agriculture



Facilitating equal capacity for women on farms and in rural economy

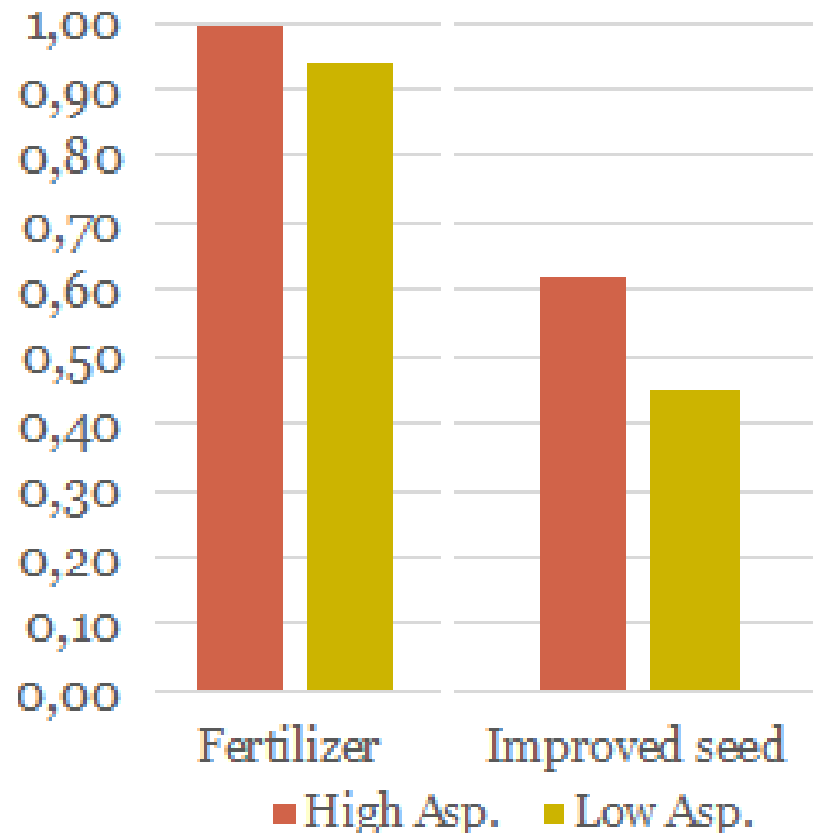
- Gender wage gap = 26% Agriculture, hunting, forestry and fisheries
- Land rights inequality
- Less access to technology and markets

Source: Africa Human Development Report 2016

Building farmer's 'capacity to aspire' is to be part of strategy for agricultural development

- people with high aspirations are more likely to adopt agricultural innovations
- Policies targeting aspirations with group and info actions can enhance the effectiveness of tech. policies

Evidence from Ethiopia (Mekonnen & Gerber, ZEF 2016): see figure



Toward formal vocational training in agriculture

- Beyond extension
- Below colleges

Toward certified vocational training

- Entry must be possible with low barriers
- Class room training on agronomy, agri-business, finance (partly using ICT)
- On-farm experience under guidance of lead farmers (clubs)
- Certification with exams
- Ready for farm and diverse rural labor market

In sum: Innovation support

- Accelerated investment in science and technology and research
- Fostering farmers own innovations through innovation awards and leading farmers groups
- Innovation to deal with climate change, land and water problems

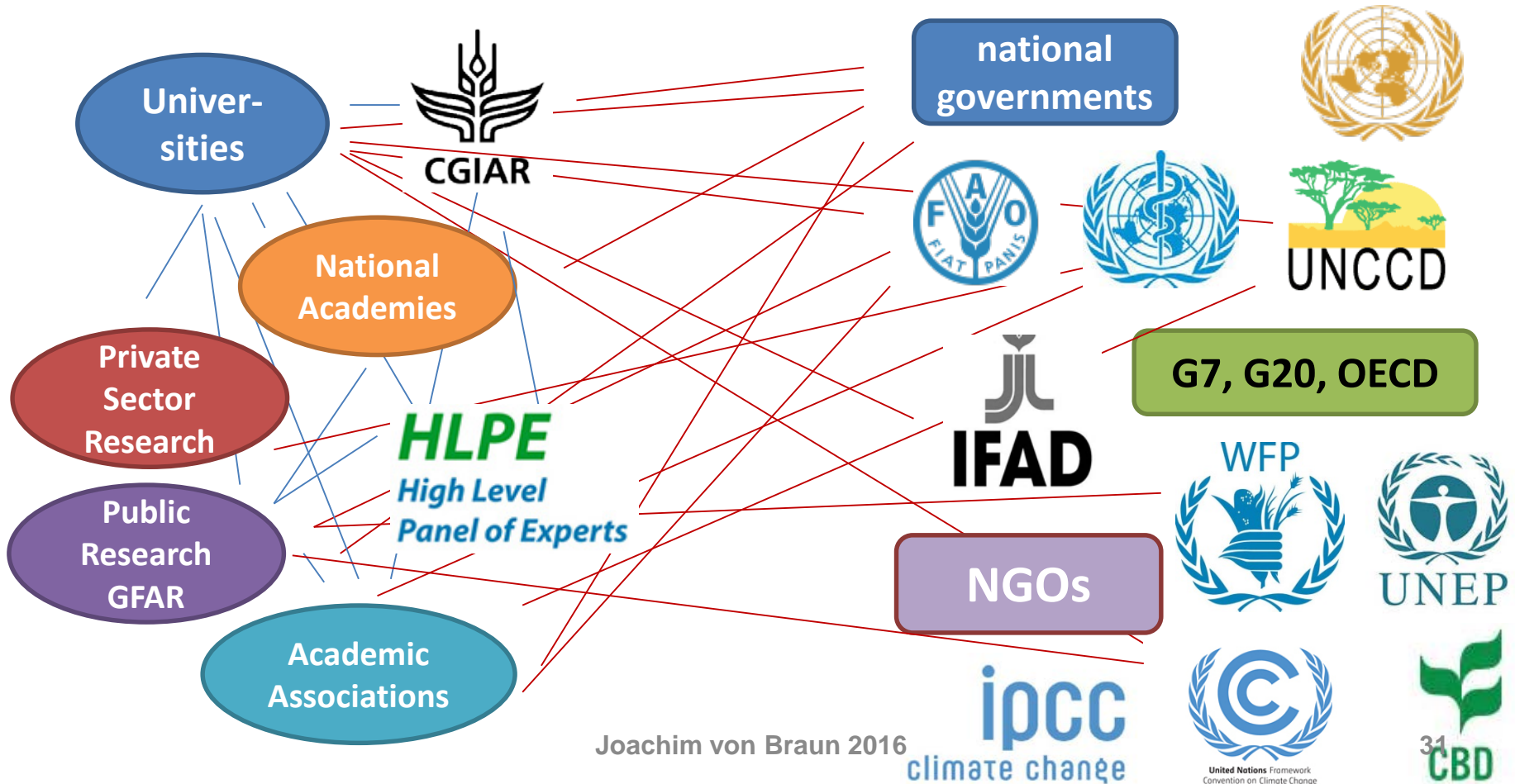
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Science System transformation: The current system on food, nutrition, agriculture R&D needs re-design

8 clusters of supply

15 clusters of demand



An enhanced global agr. R&D policy system

Toward an International Panel for Food, Nutrition and Agriculture (IP-FNA) mapped along IPCC design

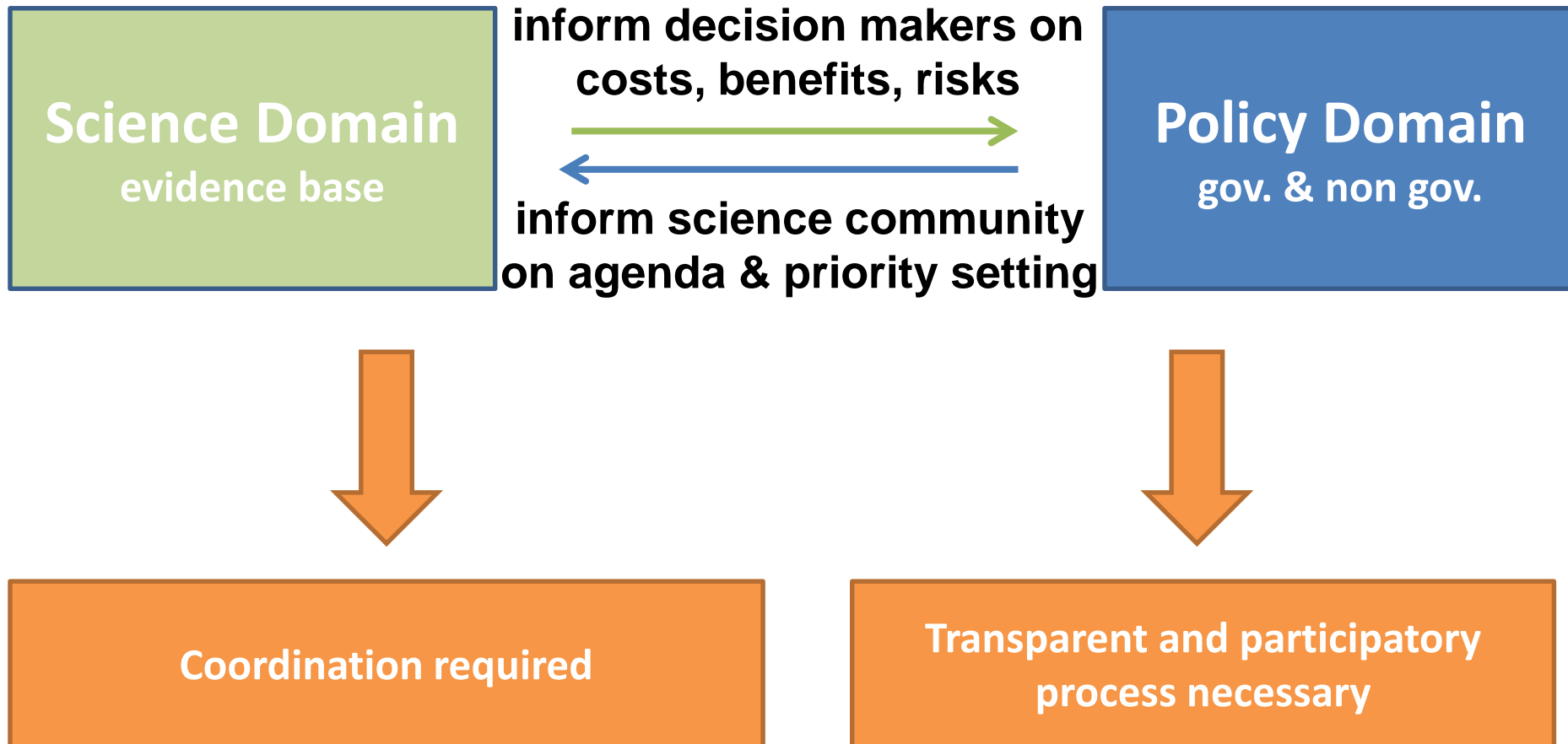
Details see:

- von Braun, J. and M. Kalkuhl. 2015. International Science and Policy Interaction for Improved Food and Nutrition Security: Toward an International Panel on Food and Nutrition (IPFN). (ZEF Working Papers 142)

http://www.zef.de/uploads/tx_zefportal/Publications/WP142_final.pdf

- von Braun, J., R. Birner 2016. Designing Global Governance for Agricultural Development and Food and Nutrition Security. Review of Development Economics (2016). <http://onlinelibrary.wiley.com/doi/10.1111/rode.12261/abstract>

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



Conclusions: toward agricultural transformation serving people

1. Size and scope of agriculture are **undervalued** today
2. Agriculture is being **redefined** in transformation due to its new links with industry and services in an emerging bioeconomy
3. Agriculture must play critical role to address **climate change** and to cope with it
4. The redesign of S&T, innovation system is needed: toward an **International Panel on Food, Nutrition, Agriculture (IP-FNA)**
5. **Managing agricultural transformation well at national and global levels** is the development opportunity, and is needed to prevent poverty, marginality, forced migration, and conflicts