

A man wearing a brown hat and a light blue short-sleeved button-down shirt is sitting in a field of rich, reddish-brown soil. He is looking directly at the camera with a serious expression. The background shows rows of green crops, possibly corn, under a bright sky. A green vertical bar is on the left side of the image, and a green horizontal bar is at the bottom left.

## **A looming conflict – competition for land, food, water and energy?**

**Rainer von Mielecki,**

Public and Government Affairs, BASF Crop Protection  
Bracknell, 30 November 2010

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# The challenge of the 21st Century

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... The beginning of the 21st century is marked not just by multimedia technology and data highways, but also by the elementary question of how we can feed nine billion people ...



  
EARTH POLICY INSTITUTE

**Lester R. Brown**  
Founder of Worldwatch Institute  
President Earth Policy Institute



# Agriculture today



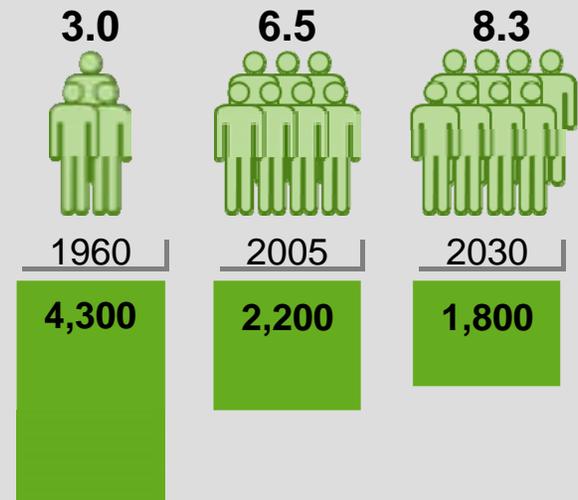
- Farmers feed 6 billion people from 2% of Earth's surface (in 2050: 9 billion)
- However, agriculture has inefficiencies:
  - ~ 20-40% of harvests are lost due to pests, weeds, diseases and other post harvest challenges
- Investment in agricultural research has declined since 1980s & annual agricultural productivity growth has decreased
- Modern agriculture under political and consumer pressure
- EU is increasingly net importer of food
- Investments are more and more cost intensive: e.g. crop protection (up to 10 years, €200 million, 800 studies)

*It is already difficult to increase yields and improve farming*

# Global trends – impact on agriculture

## Population growth

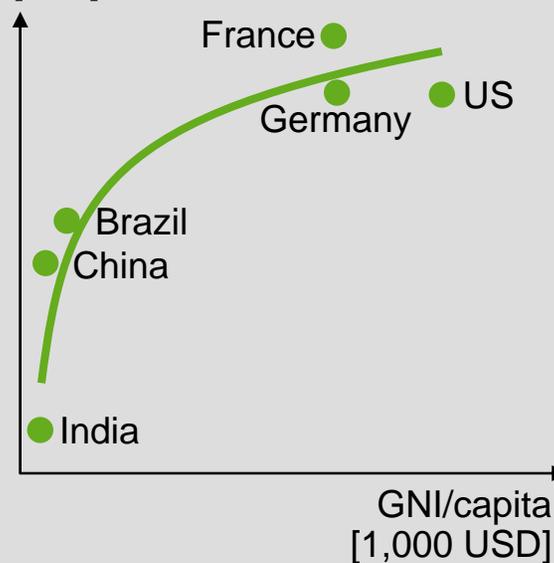
Population [billion]



Total agricultural area per capita [m<sup>2</sup>]

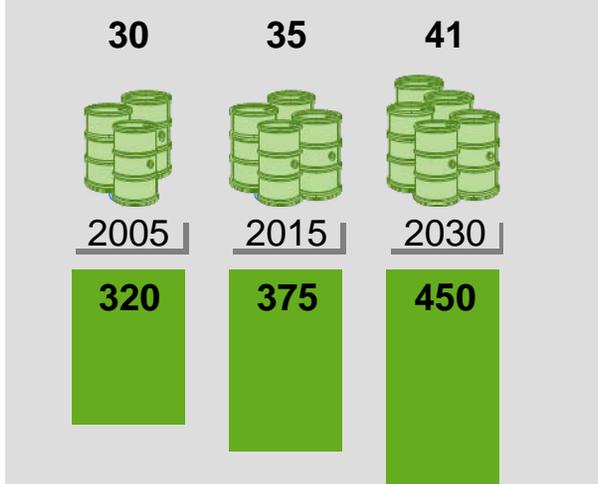
## Rising standards of living

Caloric intake of animal proteins [kcal]



## Increasing energy demand

World oil demand [billion barrel]



Arable land needed to substitute 10% of total oil demand [million ha]

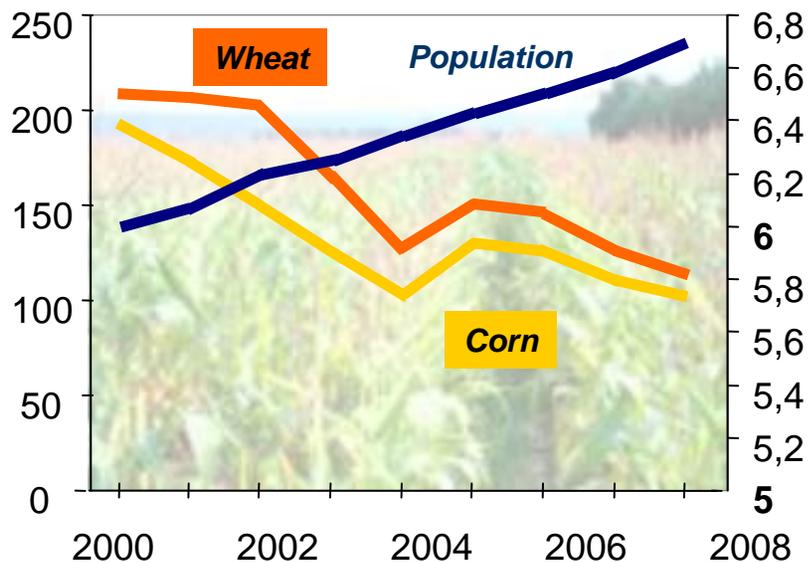
\* Global arable land = 1,4 billion hectare

*Crop demand will increase: +70% by 2050*

# Food security: Impact of growing demand

## Worldwide wheat and corn stocks and growth population

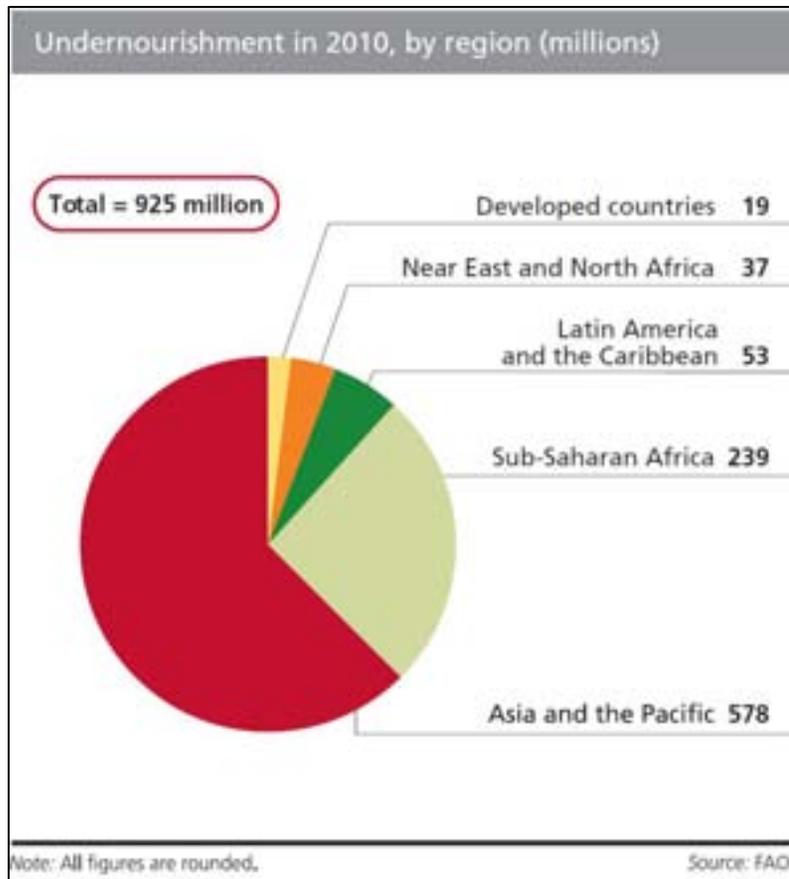
2000 – 2008 in millions of tons and billions of people



- Growing demand for agricultural goods already leads to a decline in worldwide stocks and a higher risk of increasing / volatile prices
- The increasing price of food has two sides:
  - For farmers and the food chain, new employment and income opportunities
  - For large parts of the population the severe threat of hunger and poverty (for the poorest, small price variations have the largest effects) -> riots

*Prices for agricultural goods become more volatile*

# Food security: The need for stable supply



- Hunger is widespread (925 million undernourished in 2010)
- World food security therefore is high on the political agenda due to potential political risk (civil unrest, migration).

*Agricultural production needs to increase, but the right framework /infrastructure is needed to fight hunger*

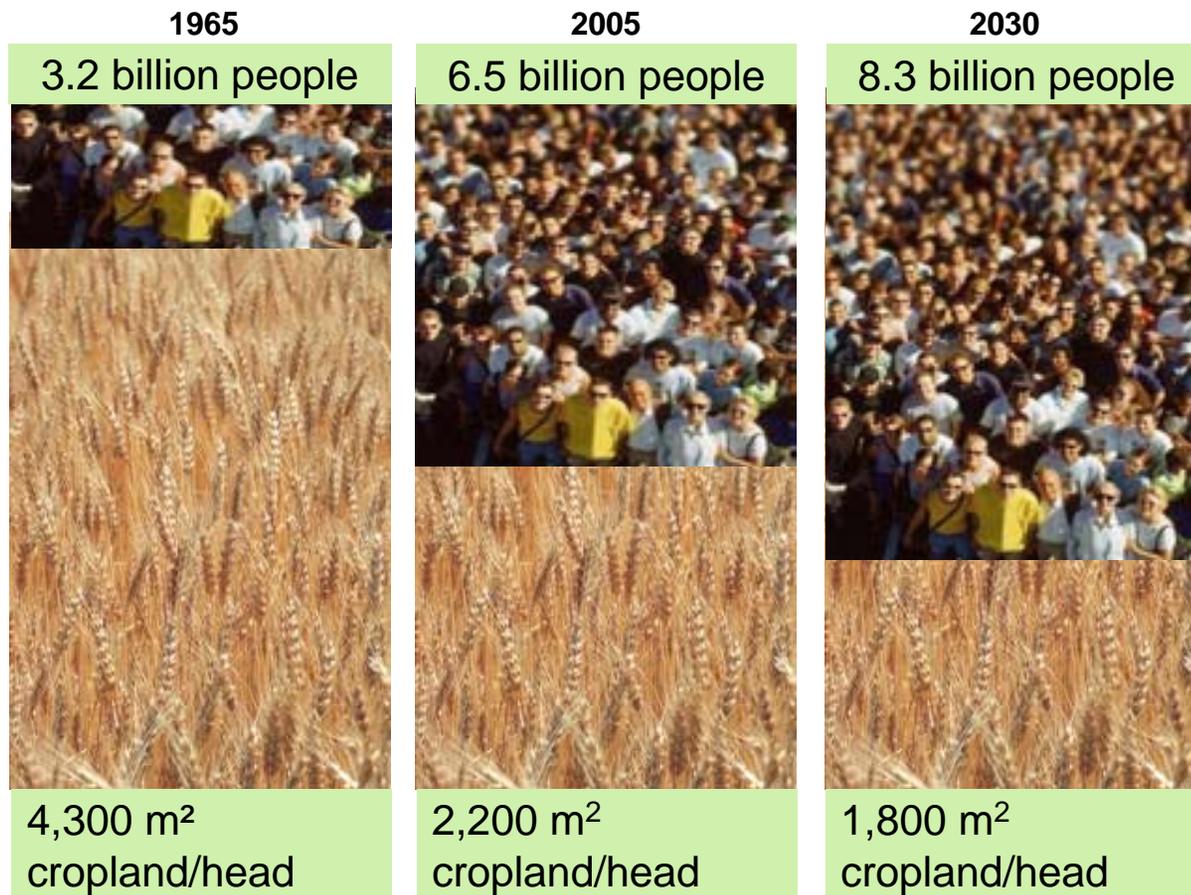
## Energy: A threat to food production?



- Since the 1980s, oil production exceeds the discovery of new oil reserves
- World primary energy demand will grow by 36 % between 2008 and 2035 (World Energy Outlook 2010)
  - Non-OECD countries account for 93% of the projected increase, China alone accounts for 36 %
- Uncertainty about the reach of oil reserves drives renewable energies
- A rise in the oil price increases the economic appeal of energy from biomass
- Efforts to protect the climate -> Biofuels at the centre of governmental attention: Subsidies ~ US\$15 billion in the OECD (2007)
- 30 % of global farmland would be needed in 2030 to replace only 10% of the oil demand

*Production of bio-energy should ideally use agricultural byproducts or land which is less suitable for food production*

# Land use: Availability of land per head declines

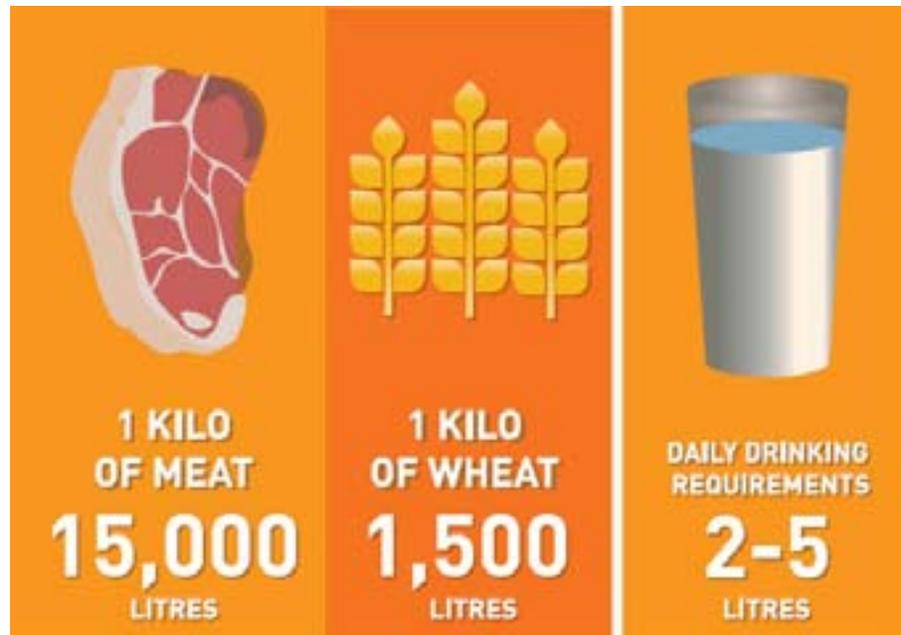


- The available area of cropland per head will decline further
- At the same time, rising food prices increase the incentives to expand cropland e.g. by deforestation
- Deforestation is a major cause of global warming and a threat to biodiversity

*Agriculture needs to become more productive on existing land*

# Water: A key factor & limiting factor for agriculture

How much water is needed to produce....

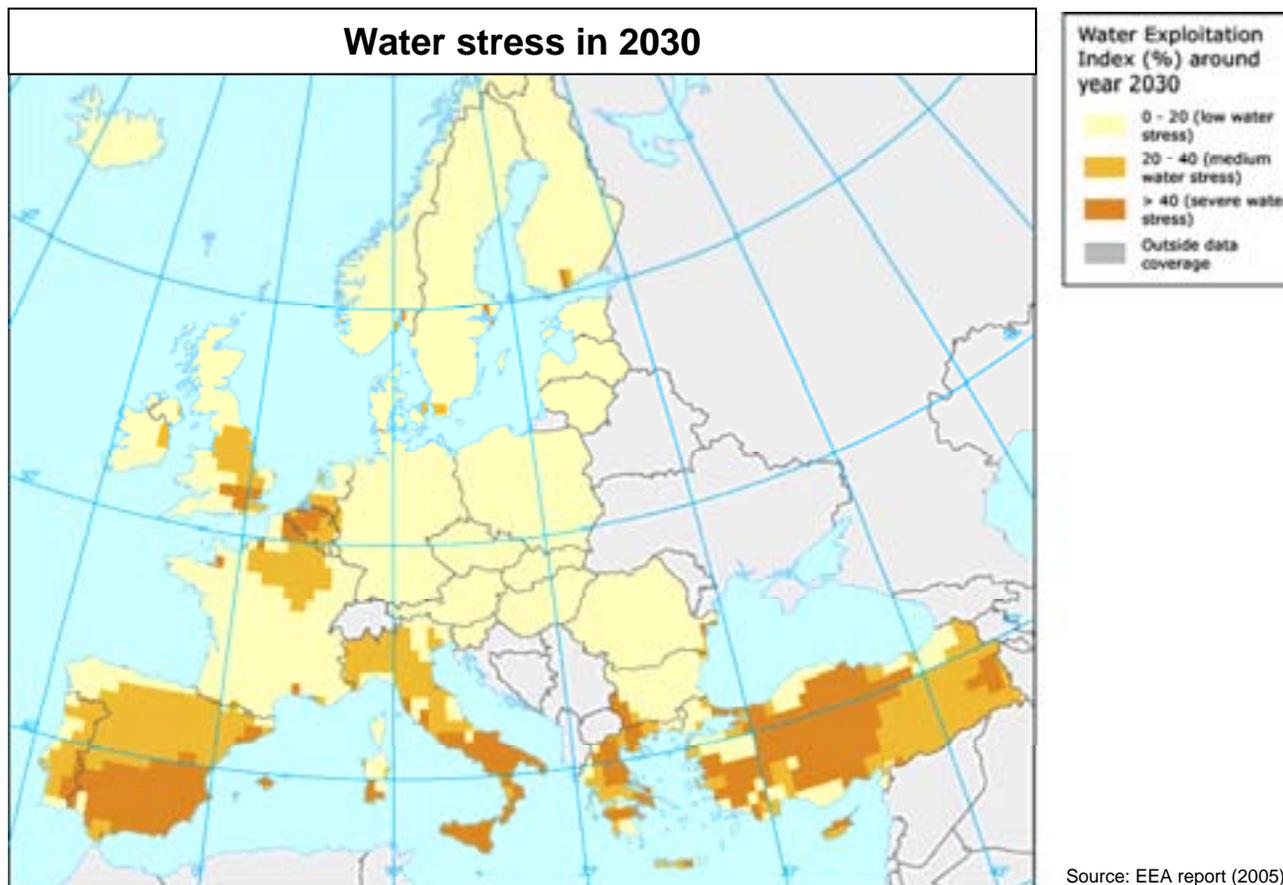


Source: FAO

- ❑ Most freshwater is used for agricultural (70%) and industrial (22%) purposes; domestic usage accounts for only 8%
- ❑ Water scarcity is often a limiting factor for agriculture
- ❑ The daily drinking-water requirements per person are 2-4 litres. However, it takes 2 000 - 5 000 litres of water to produce a person's daily food requirements
- ❑ The more animal protein (dairy products, meat) a diet includes, the more water is needed for nutrition

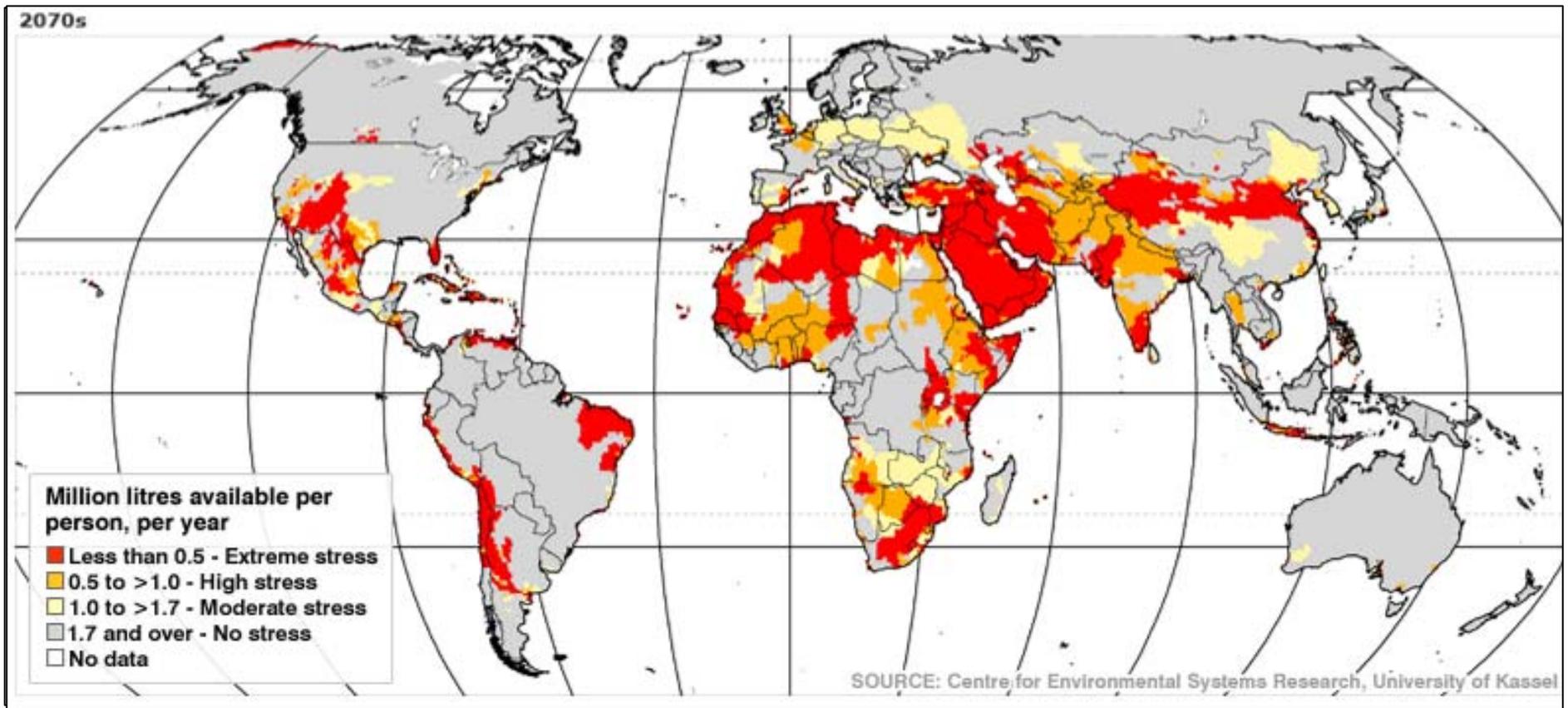
*Water availability is limited and influenced largely by consumption of “virtual water”*

# Outlook: How water availability will change in Europe



*Medium or severe water stress will affect large parts of Europe*

# Outlook: How water availability will change globally



*The UN predicts that by 2025, two out of three people will live in drought or water-stressed conditions*

## Consequences due to the lack of (clean) water



- ❑ 6.000 people die everyday due to dirty water and a lack of hygiene, and 80 percent of all diseases in developing countries are water-borne
- ❑ Water is a key ingredient to food security: People who have better access to water tend to have lower levels of undernourishment. Lack of it can be a major cause of famine and undernourishment
- ❑ Agriculture must achieve more „crop per drop“ through improving the efficiency of crop production, and the modernisation of irrigation technology
- ❑ As agriculture can be a water polluter, often with increasing intensity of production, water quality needs to be safeguarded at the same time

*The efficient use of water resources, especially in agriculture, is necessary*

# Global Warming: An additional challenge

## Consequences of Global Warming for European Agriculture

- ↑ winter rainfall (floods)
- ↑ sea levels
- ↑ hotter and drier summers
- ↑ crop yields vary

- ↑ temperature
- ↓ annual rainfall, water availability
- ↑ drought risk, heat stress
- ↓ crop yields
- ↓ suitable crop areas

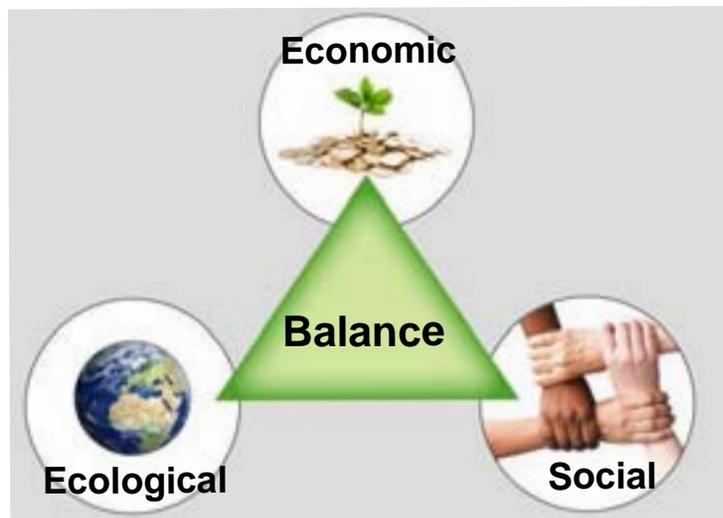
### Consequences of a temperature increase on agriculture



- ↑ sea/lake levels
- ↑ storms, floods
- ↑ hotter and drier summers
- ↑ growing seasons
- ↑ crop potential
- ↑ pests
- ↑ permafrost thaw

- ↑ winter rainfall (floods)
- ↓ summer rainfall
- ↑ drought risk
- ↑ soil erosion risk
- ↑ growing season length
- ↑ crop yields and range

# What business can do: Solutions for sustainable agriculture



**Sustainability in agriculture means achieving higher yields from less land with less water and energy**

**while...**

- Ensuring the profitability of farming
- Caring for the environment
- Meeting the expectations of society

*Measuring sustainable agriculture will be a prerequisite to successful implementation and public support*

# What business can do: Meeting the needs of farmers worldwide

In a challenging  
farming environment



We need to find new and  
additional solutions to

**increase**

- Quality
- Yield per hectare

**optimize**

- Land use
- Fuel consumption
- Soil conservation
- Water management
- Waste management
- Farm financing



➔ **through innovation from the private sector**

*Private agricultural research and technology need to be publicly encouraged*

## What business can additionally do: Foster stakeholder dialogue



- ❑ The Humboldt Forum for Food and Agriculture is a politically independent multi-stakeholder community
- ❑ The HFFA focuses on proposals helping solve global challenges of agriculture and food
- ❑ Since 2009, the HFFA has focussed on:
  - ❑ Sustainable World Food Security
  - ❑ Water and Food Security

*Together with all stakeholders, agriculture can be enhanced*

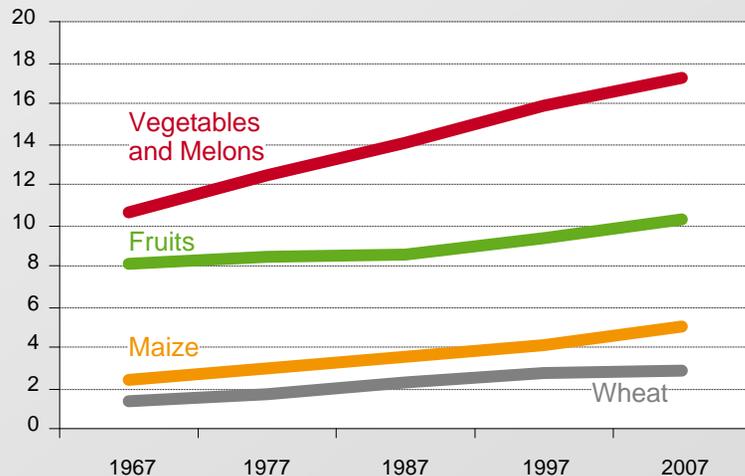
# With innovation, agriculture has met the challenges of the past...

Thomas Robert Malthus, 1798:

*"The power of population is indefinitely greater than the power in the earth to produce subsistence for man."*

Why he was wrong:

Worldwide increasing yield in tonnes/ha



Development of human population (billion) vs. global cropland (Mha)

1961	3.1	1280
1993	5.5	1403
2000	6.1	1400
2005	6.5	1421
2007	6.7	1411
<b>Increase (1961-2007)</b>	<b>111%</b>	<b>10%</b>

*Research and technology have proven Malthus wrong*

## .. and by encouraging innovation agriculture will meet the challenges of the future



- Strong private and public research
- Stimulation of innovation and start-ups in agriculture to develop new technologies and solutions
- Innovative and creative solutions for a changing environment
- Societal discussion and support for science in agriculture
- Balanced regulation and legislative framework

*Agriculture can successfully meet the demand for more production of food, feed and fuel sustainably – provided it approaches the challenges in an integrated way and increases innovation*

**Thank you!**





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