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Perth
August, 2007
Overview

1. World food and nutrition situation

2. New forces of change and impacts on the poor

3. Implications for policy
In poor countries:

- Cereal production increased only marginally
- Serious food shortages persist
- Food import expenditures expected to increase by 10%
- Annual food imports expected to cost 90% more than in 2000

World stocks at lowest level since 1982

Sources: FAO, USDA 2007
Hunger and malnutrition

Number of hungry people in millions

Developing world

Developing world without China

Data source: FAO 2006

provisional preliminary

Joachim von Braun, IFPRI, August 2007
## Old and new global food and nutrition problems

<table>
<thead>
<tr>
<th>Type</th>
<th>Causes</th>
<th>People affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hunger</td>
<td>Deficiency of calories and protein</td>
<td>0.9 billion</td>
</tr>
<tr>
<td>Children underweight</td>
<td>Inadequate intake of food and frequent disease</td>
<td>126 million</td>
</tr>
<tr>
<td>Micro-nutrient deficiency</td>
<td>Deficiency of vitamins and minerals</td>
<td>More than 2 billion</td>
</tr>
<tr>
<td>Overweight to chronic disease</td>
<td>Unhealthy diets; Lifestyle</td>
<td>Increasing also among the poor</td>
</tr>
</tbody>
</table>

Source: Based on data from FAO 2005a, UN/SCN 2004, Micronutrient Initiative and UNICEF 2005

Joachim von Braun, IFPRI, Dec. 6, 2005; CGIAR, AGM.
Joachim von Braun, IFPRI, August 2007
Overview

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World food equation?

\[
demand = supply
\]

\[
price
\]

Consumption = production +/- trade +/- stocks

\[
n \text{ foods} = n \text{ foods} (f \text{ of prices, inputs, resources})
\]

\[
(f \text{ of income, prices tastes}) +/- \text{ trade } +/- \text{ stocks}
\]
Forces of change

Consumption = production +/- trade +/- stocks

1. Energy scarcity, biofuels [Prod., Cons.]
2. Climate change and CO₂ [Prod.]
3. Science and technology [Prod.]
4. Economics: Globalization, growth, Urban/rural change [Cons., Prod.]
(1) Energy scarcity

- Energy consumption will rise 57% by 2030 (EIA, 2007)

- Non-OECD energy demand will surpass OECD by 2015 (EIA, 2007)

- 2 billion people have little or no access to modern energy (UNDP, 2004)

- Biofuels are competitive with petroleum in some developing countries
World food and energy prices 1990-2007

Source: IMF, 2007; OECD, 2005; World Bank, 2007

* Jan-June 2007
The biofuels boom

World ethanol and bio-diesel production, 1975-2005

Ethanol > 90% of biofuel production; Brazil & US dominate ethanol market

Bio-diesel: EU is the largest producer & consumer

Source: Worldwatch Institute, 2006
The emerging biofuel economy

Win for economic development ?
Win for energy security ?
Win for food security ?
Win for environment / climate change ?

...or some losses and some wins?
Planned annual biofuel production and capacity growth

• **Ethanol:**
  - Australia: 54%
  - Canada: 51%
  - EU: 45%

• **Biodiesel:**
  - Malaysia: 248%
  - Indonesia: 143%
  - Thailand: 70%

Source: USDA, 2006; 2007
Which of these farms may participate in biofuels production?

World’s farms by hectare

<table>
<thead>
<tr>
<th>Farm size (ha)</th>
<th>% of all farms</th>
<th>Number of farms (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2</td>
<td>85</td>
<td>387</td>
</tr>
<tr>
<td>2 - 10</td>
<td>12</td>
<td>54</td>
</tr>
<tr>
<td>10 - 100</td>
<td>2.7</td>
<td>12</td>
</tr>
<tr>
<td>&gt; 100</td>
<td>0.5</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>456</td>
</tr>
</tbody>
</table>

Source: von Braun, 2005
Opportunities for the poor

• Higher agricultural product demand can increase incomes of poor farmers

• Energy crop harvesting and processing can create more job opportunities

• Energy crops can be grown on marginal lands where many of the poor live

• New technologies may utilize crop residues in poor areas
Challenges for the poor

- **Food vs. fuel tradeoff** leading to:
  - Diversion of scarce natural resources (land, water)
  - Increased commodity prices
  - Higher food price fluctuations

- **Poor consumers and small farmers**
  - Diet deterioration and micronutrient malnutrition
  - Economies of scale not reached by small farmers
IFPRI’s IMPACT-WATER model

- Alternative scenarios for global food demand, supply, trade, income, and population

- Modified to examine the effects of biofuel expansion by 2020 on:
  - Food prices
  - Food availability
<table>
<thead>
<tr>
<th>Scenario</th>
<th>Biofuel Expansion</th>
<th>Price changes % by 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scenario 1</strong></td>
<td>Actual plans and assumed expansions</td>
<td>corn: + 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>oilseeds: +8</td>
</tr>
<tr>
<td><strong>Scenario 2</strong></td>
<td>Doubling of Scen.1 expansion</td>
<td>corn: + 13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>oilseeds: +17</td>
</tr>
<tr>
<td><strong>another scenario</strong></td>
<td>Neglect of technology and expansion</td>
<td>Corn: +20–41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oilseeds: +26-76</td>
</tr>
</tbody>
</table>
Price-effects for Bangladesh five-person household living on one dollar-a-day per person

Spend...their 5 $
3.00 $ on food
.50 $ on energy
1.50 $ on nonfood

>a 20 percent increase in food and energy prices requires them to cut 70 cents of their expenditures.

Cuts will be made most in food expenditures:
>reduced diet quality, and
>increased micronutrient malnutrition
(2) Climate change: Temperature increases

Source: IPCC, 2007
Impacts on agriculture

Source: IPCC, 2007

- **WATER**
  - Increased water availability in moist tropics and high latitudes**
  - Decreasing water availability and increasing drought in mid-latitudes and semi-arid low latitudes**
  - Hundreds of millions of people exposed to increase water stress**

- **ECOSYSTEMS**
  - Up to 30% of species at increasing risk of extinction**
  - Increased coral bleaching**
  - Most corals bleached**
  - Widespread coral mortality**
  - Significant extinctions around the globe**
  - Terrestrial biosphere tends toward a net carbon source as: ~15%**
  - ~40% of ecosystems affected**
  - Ecosystem changes due to weakening of the meridional overturning circulation**

- **FOOD**
  - Complex, localised negative impacts on small holders, subsistence farmers and fishers**
  - Tendencies for cereal productivity to decrease in low latitudes**
  - Productivity of all cereals decreases in low latitudes**
  - Tendencies for some cereal productivity to increase at mid- to high latitudes**
  - Cereal productivity to decrease in some regions**

- **COASTS**
  - Increased damage from floods and storms**
  - About 30% of global coastal wetlands lost**
  - Millions more people could experience coastal flooding each year**

- **HEALTH**
  - Increasing burden from malnutrition, diarrhoeal, cardio-respiratory, and infectious diseases**
  - Increased morbidity and mortality from heat waves, floods, and droughts**
  - Changed distribution of some disease vectors**
  - Substantial burden on health services**

Source: IPCC, 2007
Increased risk of droughts

Percentage change in average duration of longest dry period, 30-year average for 2071-2100 compared to that for 1961-1990.

Source: Holdren, 2007
(3) Science and technology

• Rapid expansion of R&D spending:
  - China: 2007 = No. 2
  - India: fast growth
  - Africa’s new policy (AU Summit)

• Agriculture science and R&D?
  9 of 17 innovations scoring highest in the 2006 RAND assessment relate to agriculture

• China, India, Brazil go global with their innovation systems in agriculture
Global public agricultural R&D: 1981 and 2000

1981 $15.2 billion*  
2000 $23.0 billion*

- Middle East-North Africa
- Latin America-Caribbean
- Other Asia-Pacific
- India
- China
- Sub-Saharan Africa
- Developed

Source: Pardey, 2006
* in 2000 international prices
Changing environment for innovation

• Patent rights for agricultural inventions under TRIPS agreement

• Bio-safety regimes and reduced exchange (e.g. genetic resources)

- Technology spillover pathways to developing countries for productivity enhancement reduced

- Less global public goods research when more is needed (climate, etc.)
Global integration—across national borders—of production, processing, marketing, retailing, and consumption of agriculture and food items

Source: von Braun and Diaz-Bonilla, 2007
Key drivers of globalization

1. Markets and trade
2. Investment and capital flows
3. Information and innovation

... and impacts on poverty
The world food system globalizes: global value added and competitiveness?

**Agricultural input industry**
- top 10: $37 bln
  - Syngenta
  - Bayer
  - BASF
  - Monsanto
  - DuPont

**Farms**
- Agricultural value added: $1,315 bln
  - 450 million
    - >100 ha: 0.5%
    - < 2 ha: 85%

**Food processors and traders**
- top 10: $363 bln
  - Nestle
  - Cargill
  - Unilever
  - ADM
  - Kraft Foods

**Food retailers**
- top 10: $777 bln
  - Wal-Mart
  - Carrefour
  - Royal Ahold
  - Metro AG
  - Tesco

**Consumers**
- $4,000 billion

Source: von Braun, 2005
## Global economy’s fast growth

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>SSA</td>
<td>2.2</td>
<td>4.1</td>
<td>5.9</td>
</tr>
<tr>
<td>CEE</td>
<td>1.7</td>
<td>3.2</td>
<td>6.0</td>
</tr>
<tr>
<td>C Asia</td>
<td>-4.2</td>
<td>6.5</td>
<td>7.6</td>
</tr>
<tr>
<td>Developing Asia</td>
<td>7.6</td>
<td>7.1</td>
<td>9.1</td>
</tr>
<tr>
<td>Middle East</td>
<td>4.0</td>
<td>4.5</td>
<td>5.6</td>
</tr>
<tr>
<td>LAC</td>
<td>3.4</td>
<td>1.1</td>
<td>5.4</td>
</tr>
</tbody>
</table>

Source: IMF, 2007
Changing hunger - income linkages?

Hunger and GDP/capita in developing countries

Source: von Braun, regressions based on data from World Bank (2005) and FAO (2005)

Joachim von Braun, IFPRI, August 2007
Towards urbanization of poverty?

Urban and rural share of the poor (%)

1993

- Urban share of the poor: 18.88%
- Rural share of the poor: 81.13%

2002

- Urban share of the poor: 24.67%
- Rural share of the poor: 75.33%

Source: Ravallion et al., 2007

Note: Poverty line is set at $1.08/day
Overview of presentation

1. The world food situation
2. New forces of change
3. Implications for policy
3 Pillars supporting pro-poor change

1. Science and technology policy
2. Markets and trade policy
3. Insurance and social protection strategy
Science and technology policy

- Need to scale up agriculture research
- Enhancing pro-poor global innovation systems with ICT
Markets and trade policy

- Facilitating capital and aid flows
- Creating a global system for markets and trade with:
  - Low transaction costs
  - No distortions
  - Transparent standards
Insurance and social protection strategy

- Decreasing food insecurity among the poor through:
  - Employment programs
  - Conditional and unconditional cash transfers
  - Age-specific social security systems
  - Targeted nutrition interventions
Forces of change

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