What is CIMSANS?

David I Gustafson, Ph.D.
Director, CIMSANS
dgustafson@ilsi.org
+1-314-409-7123
International Life Sciences Institute Research Foundation

ILSI Annual Meeting
Southampton, Bermuda
19 January 2014
Climate Change Impacts on Nutrition Security Have Become Front Page News

The New York Times

SATURDAY, NOVEMBER 2, 2013

National Edition
Generally sunny with highs in the 50s. Clear tonight. Patches of fog and east. Lows upper 30s to 40s. Sunny to partly cloudy tomorrow. Highs in the 60s. Weather may, Page A16.

CLIMATE CHANGE SEEN POSING RISK TO FOOD SUPPLIES

Science Panel Says Output May Drop 2% Each Decade, as Demand Rises

By JUSTIN COLLIE

Climate change will pose sharp risks to the world's food supply in coming decades, potentially undermining crop production and driving up prices at a time when the demand for food is expected to soar, scientists have found.

In a departure from an earlier assessment, the scientists concluded that rising temperatures will have some beneficial effect on crops in some places, but that globally they will make it harder

The new tone reflects a large body of research in recent years that has shown how sensitive crops appear to be to heat waves. The recent work also challenges previous assumptions about how much food production could increase in coming decades because of higher carbon dioxide levels in the atmosphere. The gas, though it is the main reason for global warming, also acts as a kind of fertilizer for plants.
ILSI Research Foundation has launched a new Center to study climate change impacts on agriculture and nutrition security

- **Context of the Issue:** Three major megatrends are converging to threaten global nutrition security
  1. Global population growth and changing diets will increase food demand two-fold by 2050
  2. Current crop productivity gains and food storage losses barely keep pace with demand today
  3. Future climate change will differentially affect specific crops and regions – adaptation strategies are currently inadequate
The Central Problem

How can we proactively deal with the challenges of increased global food demand and regional impacts of climate change in a more informed, collaborative, and sustainable manner?

- ILSI Research Foundation will foster scientific collaboration, new research, and data mining by leveraging a broader array of “tri-partite” scientists, resources, and new partnerships.
CIMSANS: Current Status

- CIMSANS Advisory Council named, first met in October 2013
  - Mark Rosegrant (IFPRI) – Chair; Swapan Datta (ICAR); Mark Howden (CSIRO); John Ingram (U Oxford); James Jones (U Florida)
- Publications (three) appeared in peer-reviewed literature
- Successful round-table discussions co-hosted during FY2013
  - Rome/FAO (October 2012); Dublin (April 2013); Tällberg (June 2013)
- Conferences held and in planning for FY2014
  - Korea (Sept-2013); India (Nov-2013); Purdue (Sept-2014); Atlanta?
- Three Working Groups launched
  - Open Ag Data WG – GEOSHARE pilot project in Ghana & India
  - Improved Modeling WG – maize, cassava modeling underway
  - Sustainable Nutrition Security WG – White Paper drafted
- “Data Processing Service” under development
CIMSANS Participants ("tri-partite")

Private Sector

Academia

Governments, etc.

Center for Integrated Modeling of Sustainable Agriculture & Nutrition Security
US National Climate Assessment: Adaptation in Ag is Essential

Challenge of increasing yields of key crops to support global food demand becomes more difficult with climate change.

Significantly expanded research programs, as well as adoption of agriculture technology, are needed to drive yield gains in food crops.
Annual Rates of Yield Increases for Food Crops Vary with Technology Investment

Global rates of yield gain (1961-2011), based on data available from FAOSTAT

Impact of Reducing Food Wastage by 30%
Rate Needed to Double Yields by 2050

Maize
Soybeans
Rice
Wheat
Sweet Potatoes
Pulses
Millet
Cassava
Sugar cane
Sorghum
Potatoes

Annual Rate of Yield Gain (%)
Maize Yield Gaps Vary with Level of Ag Intensification

source: Gustafson, et al., Climate adaptation imperatives (2014)
Ag Intensification Needed in More Regions to Reduce Maize Yield Gaps

source: Gustafson, et al., Climate adaptation imperatives (2014)
## Relating Ag Intensification to National Eco-Efficiency Metrics

<table>
<thead>
<tr>
<th>Crop</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canola</td>
<td>Canada, US</td>
<td>Australia</td>
<td></td>
</tr>
<tr>
<td>Corn (maize)</td>
<td>Argentina, Brazil, South Africa, US</td>
<td>China, India, Mexico</td>
<td>Ethiopia, Nigeria, Tanzania</td>
</tr>
<tr>
<td>Cotton</td>
<td>China, India, US</td>
<td>Argentina, Pakistan</td>
<td>Uzbekistan</td>
</tr>
<tr>
<td>Soybeans</td>
<td>Brazil, US</td>
<td>Argentina, China, India</td>
<td></td>
</tr>
</tbody>
</table>

*source: Gustafson, et al., Climate adaptation imperatives (2013)*
Much Greater Eco-Efficiency Gains for High Intensification Countries (2000-2010)

Eco-efficiency gains for land, water, energy and GHGs for the period 2000-2010

-5% 0% 5% 10% 15% 20% 25% 30%

Canola, Cotton, Maize, Soybean

Level of Intensification
HIGH
MEDIUM
LOW

source: Gustafson, et al., Climate adaptation imperatives (2013)
“Sustainable Nutrition Security: its fundamental role in food security”

- **White Paper** drafted and under final review
  - **Convening Lead Authors**
    - Barbara Schneeman (UC Davis, ex-US FDA)
    - Jessica Fanzo (Columbia University)
    - Tara Acharya (Pepsi Co)
  - **Twenty Lead Authors**
    - Academia
    - CGIAR experts
    - Private sector
Goal: Sustainable Nutrition Security

Insufficient cals
Insufficient nuts
~ 1 billion

Sufficient cals
Insufficient nuts
~ 2 billion

Sufficient cals
Sufficient nuts
~ 3 billion

Excess cals + Excess nuts
Excess cals + Insufficient nuts
~ 1.5 billion

Constraints on dietary choice and diversity
affordability, preference, allocation, convenience, cultural norms, …

=> Consumption by Sub-populations and Sustainability Metrics

Access: disposable income, allocation, health

Behaviour: education, preferences, waste

‘Post-farm gate’ Food System Activities
processing, packaging, shipping, storing, losses, advertising, preparing, consuming, …

=> Final Nutrient Availability, Price and Sustainability Metrics

Local, Regional & Global Production Activities
farming, animal husbandry, aquaculture, fishing, hunting, gathering, …

=> Basic Nutrient Availability, Price and Sustainability Metrics

Economic Models

Quantity

Crop, Livestock and Fisheries Models
Regional/global production

Nutrient Composition Databases

Quality
CIMSANS Growth Opportunities

• Bill & Melinda Gates Foundation
  – Have agreed to partner on a “Model Improvement Summit”
  – Conversations started on funding the proposed “Data Processing Service”

• Horizon 2020 (EU Framework Programme for Research and Innovation)
  – Collaborating through Oxford on large Wageningen proposal

• Insurance Industry
  – Lloyd’s of London is now estimating total cost (insured/noninsured) of 1-in-200-yr multiple breadbasket failure
  – Material impact on insurance industry likely to result, spurring keen interest in improving the underlying methodologies
“Call to Action” on Climate and Food Security (Proposed)

ILSI-RF partners with IFPRI and others to convene a Call to Action at The Carter Center in Atlanta kicked-off by former President Jimmy Carter, a farmer himself.

Among those invited to attend would be former Presidents George W. Bush and Bill Clinton, former Prime Minister Tony Blair, Bill Gates, Howard Buffett, Ted Turner, Kofi Annan, Bono, George Clooney, and governmental leaders from around the world.

The event would leverage strong media opportunities in the home city of CNN in a respected venue attended by a critical mass of individuals and organizations that can take bold and meaningful action.

Up to 200 stakeholders from around the world assemble to create new partnerships to help adapt to climate change and meet the world’s growing food and nutrition needs in more sustainable ways.
Who is CIMSANS? What is CIMSANS?

- Anne Roulin (Nestlé)
- Jim Jones (U Florida, AgMIP)
- John Ingram (U Oxford)
- Paul Hendley (Phasera)