Modeling for Policy Impact
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Draws upon World Bank-funded research on ENSO impacts and responses in the Philippines by Mark W. Rosegrant, Jawoo Koo, James Thurlow, Rowena Valmonte-Santos, Ricky Robertson, Leocadio Sebastian, and Angga Pradesha.
Entry points for model-based approaches – when are models useful? Or, how do you make models useful?

Primary strategies for abating food shock crises

Decision contexts – interventions/investments/policies for response or resilience?

Types of information and tools used, additional information and tools desired

Example: Assessment of ENSO impacts and policy responses in the Philippines
# Making Models Useful for Policy Analysis and Impact

<table>
<thead>
<tr>
<th>CHALLENGES</th>
<th>RESPONSES</th>
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<tbody>
<tr>
<td>Asking the right questions</td>
<td>• Find out the needs and intentions of the stakeholders (Philippine National Economic and Development Authority, Department of Agriculture, World Bank)</td>
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| Modeling design useful to policy- and decisionmakers | • Improve modeling design  
  • Integration of biophysical-hydrology-economics  
  • Multi-scales – local, national, regional  
  • Consistent upscaling and downscaling across levels  
  • Greater spatial disaggregation to address sub-national issues |
| Information for enhanced understanding           | • Better description and presentation  
  • Use of interactive models                                                                                                                                                                           |
| Transparency, training, transfer, and open access | • Seek to transfer models to stakeholders  
  • Encourage transparency through open access for effective policy outreach                                                                                                                           |
1 Measuring Economic & Social Impacts
Spatial Agriculture-Economy Models

Weather & Climate
- Rainfall
- Temperature

Crop Management
- Seed varieties
- Chemical fertilizer
- Irrigation
- Crop calendar

Livestock & Fisheries
- Stock deaths
- Ocean capture

Infrastructure
- Roads, ports
- Agricultural capital

Policies
- Seed varieties
- Irrigation infrastructure
- Trade policy
- Price policy (subsidies)
- Social nets

Crop Production Impacts
- Spatial crop models (DSSAT)

Biophysical Outcomes
- Crop yields by region

Economywide Impacts
- Spatial CGE-microsimulation model

Economic Outcomes
- GDP and poverty by region

Temperature Humidity Index

Luzon
Mindanao
Visayas
Agriculture shocks spillover to broader food system and economy

Agri-Food System GDP and Employment, 2011

- **GDP**:
  - Trade & transport (agri-food related): 30.3%
  - Input production (agri-food related): 9.6%
  - Agro-processing (manufacturing): 12.5%
  - Agricultural sector: 32.5%

- **Employment**:
  - Trade & transport (agri-food related): 6.2%
  - Input production (agri-food related): 32.5%
  - Agro-processing (manufacturing): 44.4%
  - Agricultural sector: 0%

Source: 2011 Philippines Social Accounting Matrix
ENSO Impacts on Crops

- Predicted yield impacts vary by crop and region
- Yields fall during El Niño and rise during La Niña
- La Niña yield gains are smaller than El Niño losses

Source: Gridded DSSAT crop model simulations weighted by IFPRI’s spatial agricultural production database
GDP Falls During El Niño

Average GDP Losses During El Niño Relative to Non-ENSO year
(US$ billions or % reduction)

<table>
<thead>
<tr>
<th>National economy</th>
<th>National AFS</th>
<th>National agriculture</th>
<th>National</th>
<th>Luzon</th>
<th>Visayas</th>
<th>Mindanao</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3.3</td>
<td>$2.7</td>
<td>$1.8</td>
<td>$1.6</td>
<td>$0.8</td>
<td>$0.3</td>
<td>$0.6</td>
</tr>
<tr>
<td>1.6%</td>
<td>4.2%</td>
<td>7.0%</td>
<td>8.0%</td>
<td>9.3%</td>
<td>7.3%</td>
<td>7.0%</td>
</tr>
</tbody>
</table>
Poverty Rises During El Niño

Poverty Rises During El Niño
(Millions more poor people or %-point increase in poverty rate)

National: 5.1%
Luzon: 3.2%
Visayas: 0.8%
Mindanao: 1.1%

(0.0% - 600.0%)
Policies to Reduce Economic Costs
Range of Policy Interventions

- **Drought-tolerant seed varieties**
  - 3% smaller yield losses during El Niño years

- **Additional irrigation**
  - 5-8% more land is irrigated in each region

- **Subsidize food imports during shock**
  - 25% price subsidy on cereals, 100% subsidy on processed foods

- **Remove rice import quotas**

- **Distribute stored grains**
  - 500,000mt rice and 100,000mt maize distributed through markets

- **Cash transfers for poor households**
  - US$15 per person in poorest three income quintiles
Offsetting GDP and Poverty Impacts

Policy Curbs GDP Losses and Poverty During Strong El Niño Event
(US$ billions lost or millions more poor people)

| Policy                  | Impact
|-------------------------|--------
| El Niño                | $3.3   |
| Drought-tolerant seeds | $3.1   |
| Irrigation             | $3.0   |
| Subsidize food imports | $3.2   |
| Remove rice quotas     | $2.5   |
| Stored grains           | $3.1   |
| Cash transfers          | $3.3   |
| Combined               | $1.9   |

-5.1  4.8  4.5  4.7  4.8  4.5  1.2  -1.9

Chips: 3.3  3.1  3.0  3.2  2.5  3.1  3.3  1.9
Summary of Policy Options

- Philippine economy and its people are vulnerable to El Niño
  - GDP declines by US$3.3 billion during a strong event
  - 5.1 million more people fall below the poverty line

- Policies can reduce some of the damages caused by ENSO
  - But no single type of policy can protect all people in all regions

- Need a portfolio of on-farm, market and social policies
  - On-farm policies directly offset GDP losses
  - Market interventions often benefit consumers more than producers
  - Social policies directly target the poor

- Need to offset short-term losses and build long-term resilience
  - Market and social interventions are shorter-term emergency responses
  - On-farm investments contribute to resilience and development
3 Actions to Enhance Resilience to ENSO
Improving ENSO Preparedness—Less Amenable to Modeling, Need Qualitative Analysis

- **Enhance Forecast and Early Warning Systems**
  - **Challenge:** EWS not early/detailed enough to fully benefit local farmers
  - **Goal:** Exploit El Niño’s slow onset to give extension agents and farmers time to respond/adapt

- **Strengthen Local Government Capacity**
  - **Challenge:** Delays in aid delivery blamed for 2015/16 violence in Kidapawan
  - **Goal:** More timely and effective delivery of aid and services in emergency

- **Improve ENSO Financing Mechanisms**
  - **Challenge:** Fast-track funding for El Niño responses delayed in 2015/16 by Senate and disbursement rules
  - **Goal:** Speed up investments in preparedness and responses to ENSO impacts
Enhancing Food System Resilience—Addressed by Modeling

- **Invest in Farmers’ Awareness and Adaptive Capacity**
  - **Goal**: Promote crop diversification, drought-tolerant seed varieties, and cost-effective irrigation rehabilitation/expansion

- **Improve Rural Infrastructure**
  - **Goal**: Invest in and maintain roads, bridges, and other infrastructure to remove bottlenecks and increase markets’ ability to respond to ENSO events

- **Remove Rice Import Quotas, Store More Grains**
  - **Goal**: Use markets to smooth price fluctuations for consumers

- **Strengthen Social Safety Nets**
  - **Goal**: Mitigate immediate welfare costs of ENSO shocks