Adapting agriculture to climate variability and extreme events

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The importance of local climate variability

... of major modes of variability

...And of extremes

Porter et al. (2014)
Types of changes climate and implications for extremes

IPCC (2012) SREX
Porter et al. (2014)
Extremes across temporal scales
Sub-daily, daily, sub-seasonal, seasonal and yearly

Asseng et al. (2015) NCC

GFS Resilience Taskforce (2015)

Trnka et al. (2014) NCC
Extremes across spatial scales

- Global production shocks mediated by markets, with impacts on prices
  - Global yield (t/ha)

- Local weather-driven productivity and planted/harvested area reductions
  - Percentage of harvests failing
  - Increase in LMT (°C): 0-2 (7400), 2-4 (5296), 4-6 (2096), 6-8 (168)

GFS Resilience Taskforce (2015)

Challinor et al. (2010)
Adaptation across timescales

Adapting to changes in variability and extremes

- At the local and regional scale -- forecasting

**Farmers want to:**

Identify the most appropriate planting date (with best environmental supply) for rice crop in the period May - Dec 2014.

**Where**

Agro-climatic rice productive regions

**How?**

- Implement seasonal weather forecasts + historical events of "El Niño" + mechanistic crop models
Central Colombia (Magdalena valley)

Seasonal precipitation forecast

Validating recommendations in the field (2014)

F733: 6860 kg/ha
F60: 4600 kg/ha

Barrios et al. (in prep)
Adapting to changes in variability and extremes

- The role of genotypic adaptation

Ramirez-Villegas and Challinor (under review)
Adapting to global shocks and amplifications

• Less clear, but foremost, develop understanding of changes in extremes in production (both area and yield). Both global and regional-scale models have roles to play

• Agricultural adaptation. Again both models have roles to play (e.g. Land use vs. Agronomy).

• Enhance systemic resilience in global market system (control export controls, flexibilise biofuel mandates, market monitoring)

• National resilience: strategic storage, advance contracts, dietary or import diversification