



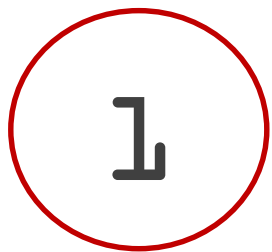
Climate-Smart Agriculture at Work

Sustainable Intensification in Uruguay

Holger A. Kray
Lead Agriculture Economist
hkray@worldbank.org



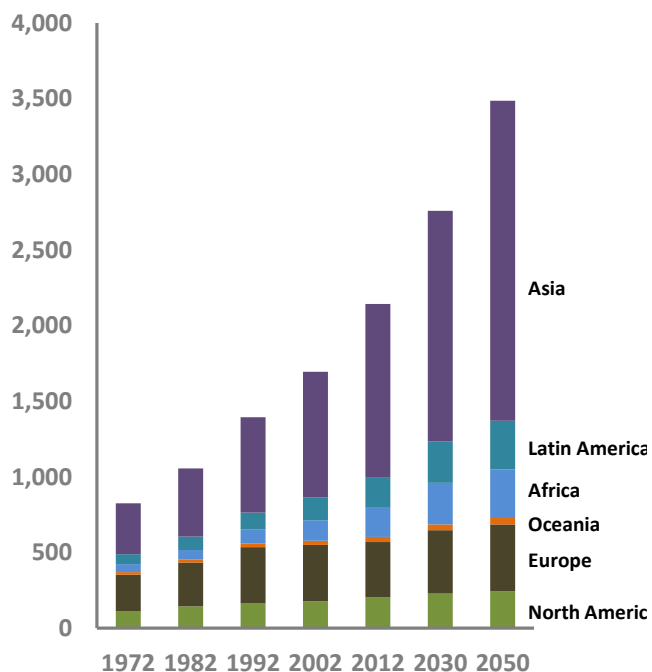
Global Challenges



PRODUCTIVITY

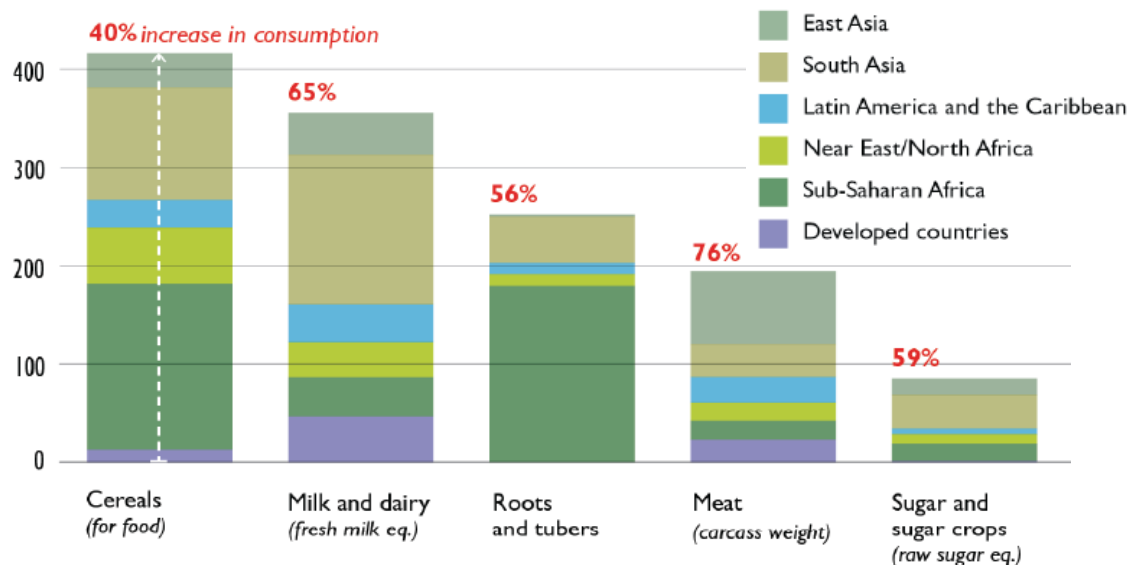
Feeding 9 Billion People in 2050

Food Production by Region 1972-2050
(Constant 2004-06 US\$)



Food Demand By Commodities in 2050 relative to 2005-07

(Billion kg per year)



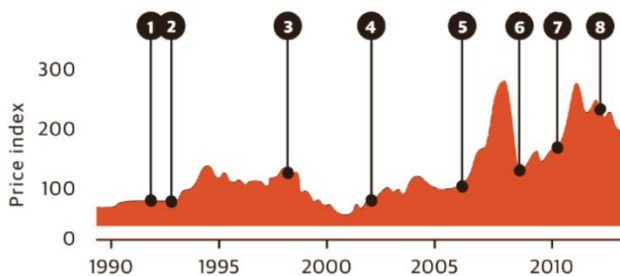
2

ADAPTATION

Climate Change Impacts on Food Systems

Problems Today: *Short Term Volatility*

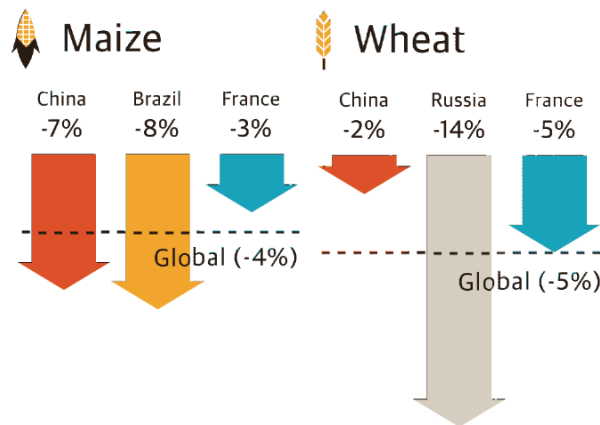
Recent price spikes for food commodities have been linked to extreme weather events



1. Australia wheat. 2. US maize. 3. Russia wheat. 4. US wheat, India soy, Australia wheat. 5. Australia wheat. 6. Argentina maize, soy. 7. Russia wheat. 8. US maize.

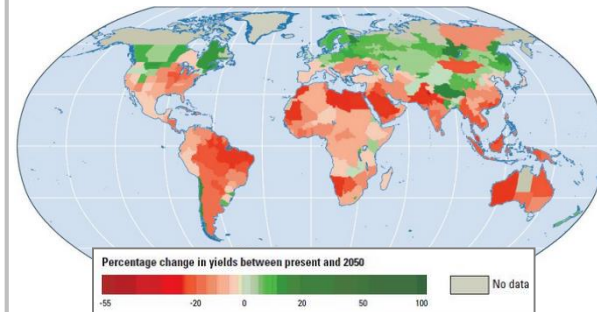
Issues Tomorrow: *Medium Term Yield Losses and Increasing Cost Structures*

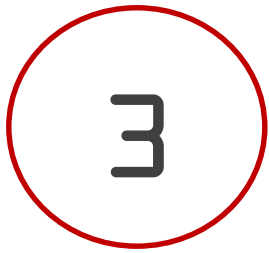
Maize and wheat yields show climate impacts



Uncertain Future: *Production Collapse in the Longer Term*

Maize and wheat yields show climate impacts

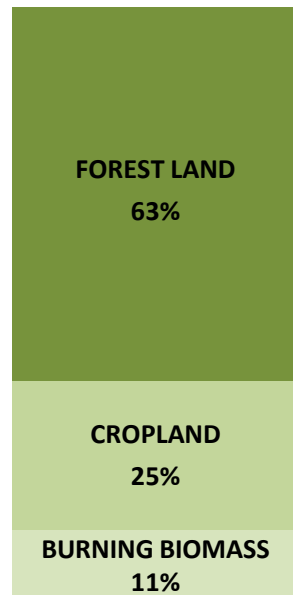




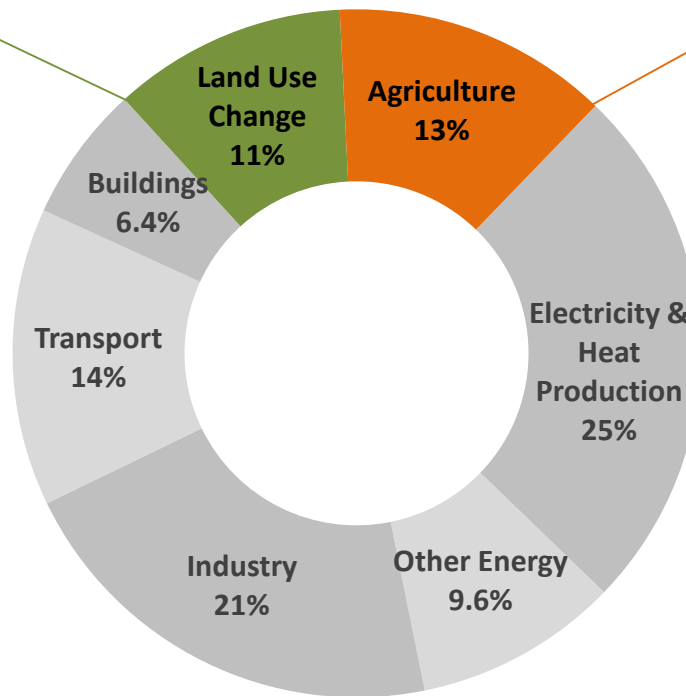
EMISSIONS

Agriculture a main contributor

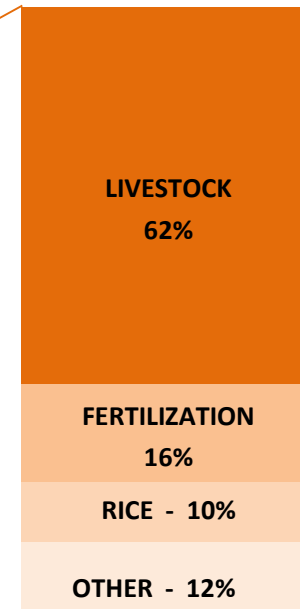
LAND USE CHANGE
~11% OF TOTAL



TOTAL
EMISSIONS

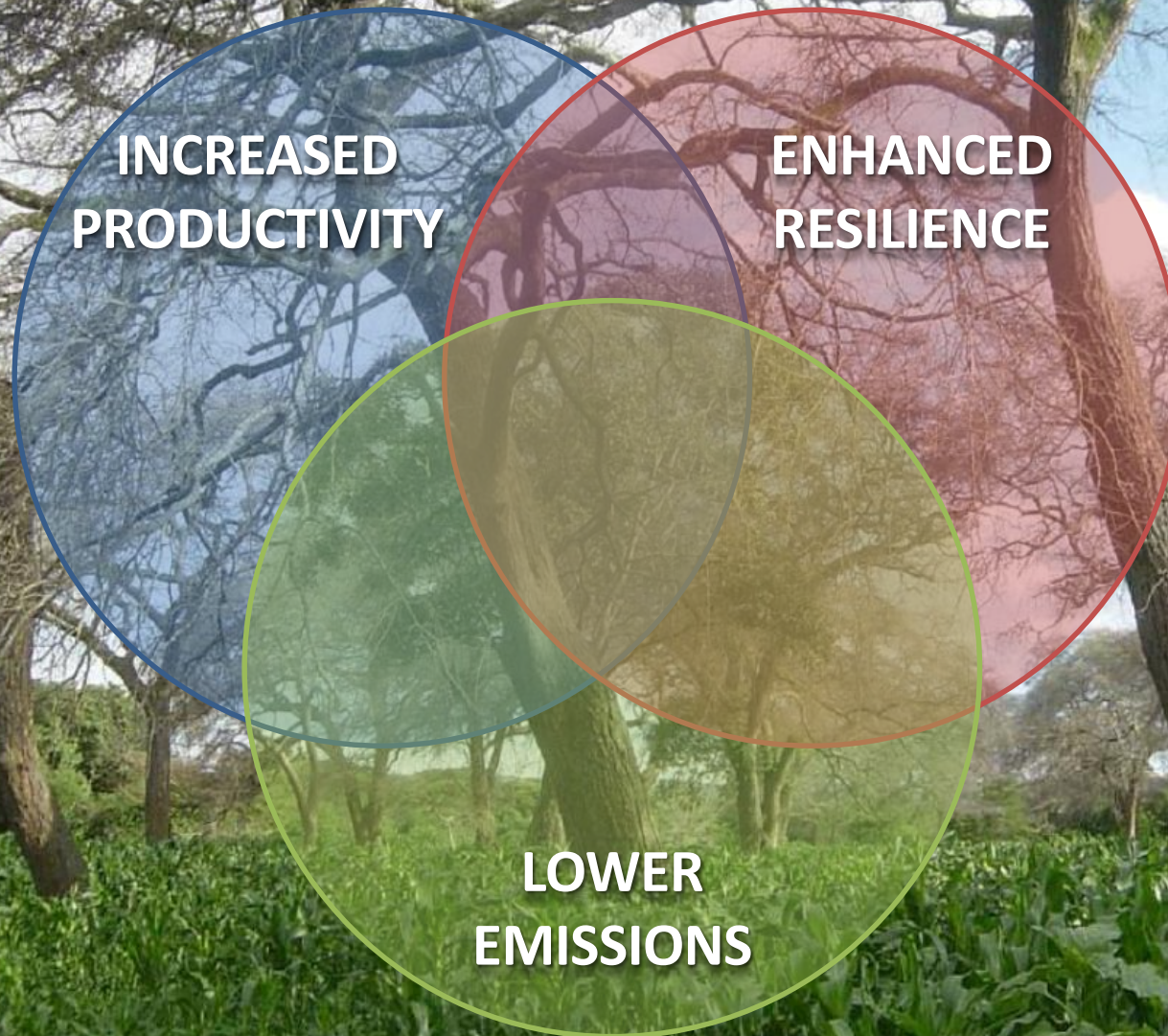


AGRICULTURE
~13% OF TOTAL



Climate-Smart Agriculture (CSA)

Delivering Solutions by Focusing on Three Outcomes

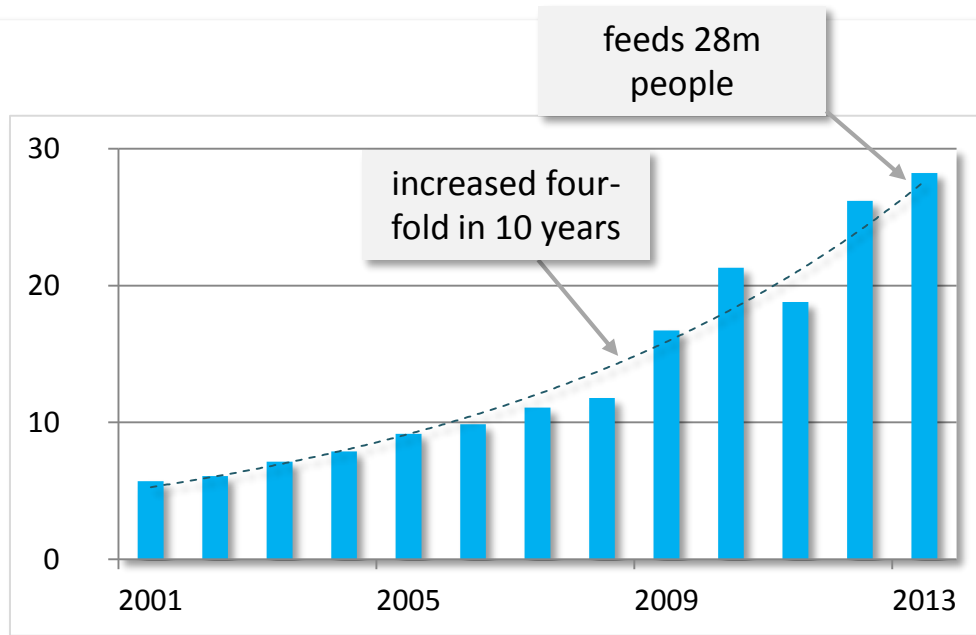


Local Challenges

The Case of Uruguay

Uruguay: Intensification at a Stunning Pace

generates simultaneous opportunities and challenges



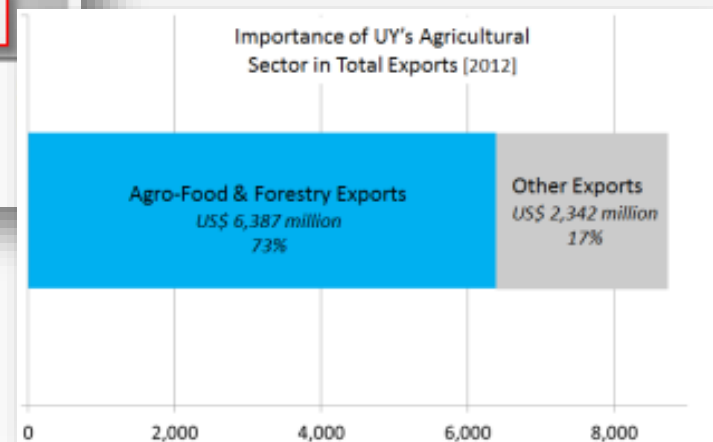
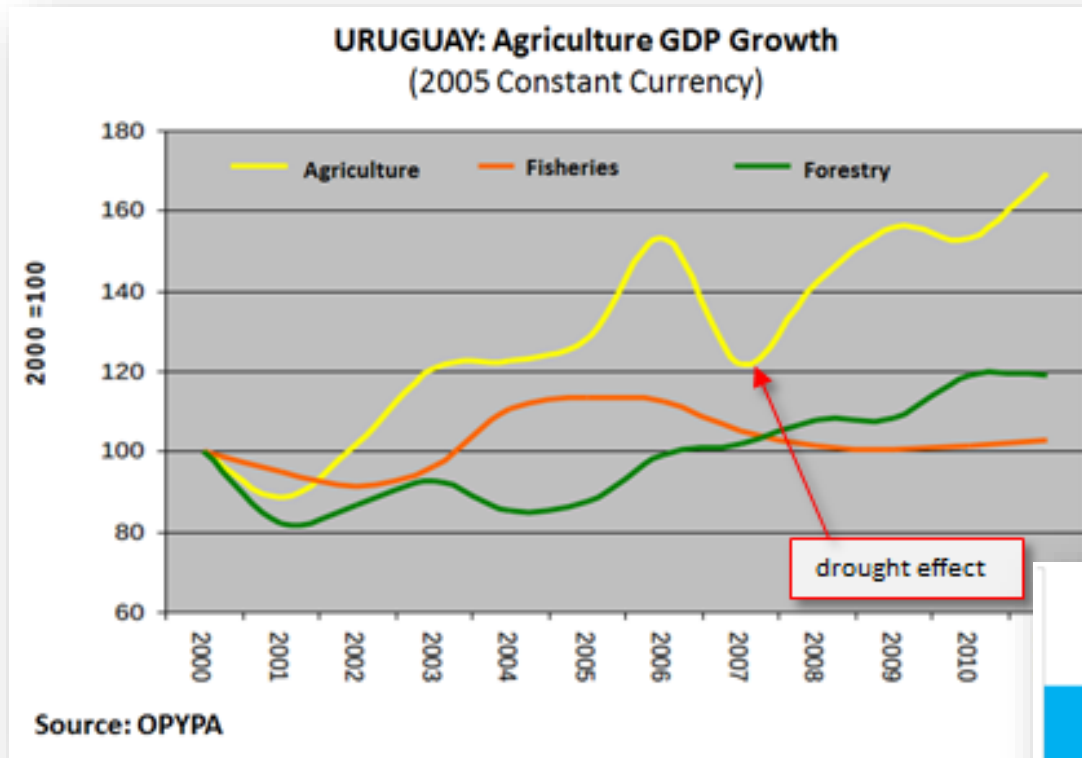
Number of People Fed By Uruguay's Agro-Food Exports

[million people at world average calorie intake]

Source: MGAP OPYPA based on FAO & Trademap

Challenge 1: UY's Economy Depends on Agriculture

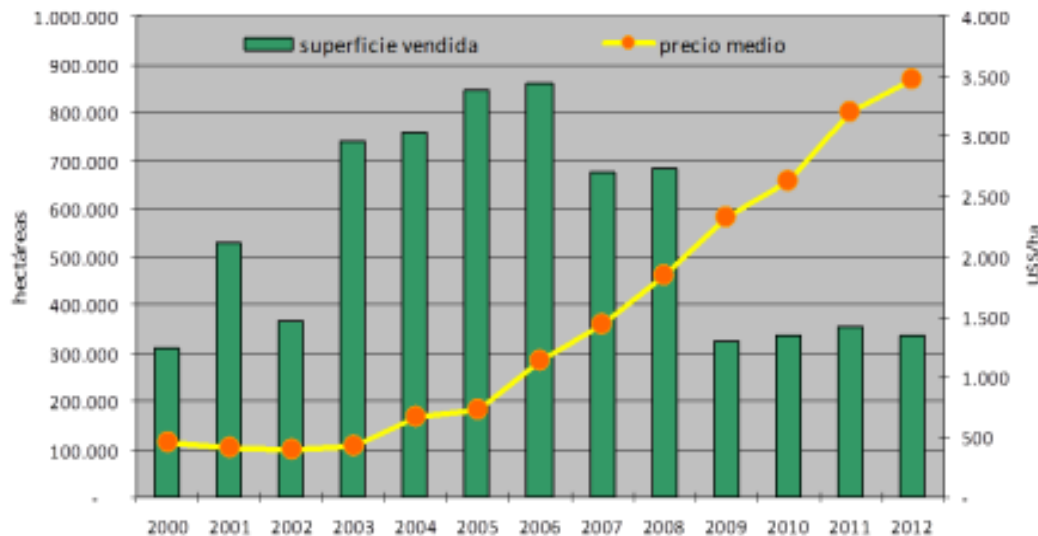
Agricultural resilience is a key determinant of overall economic resilience



Challenge 2: Agricultural Growth Puts Pressure on Natural Resources

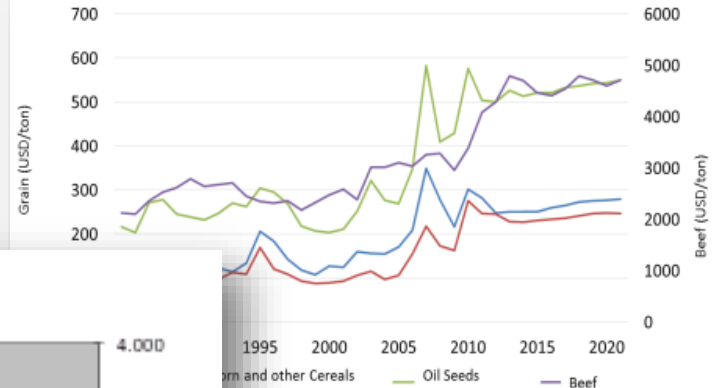
Production intensifies as consequence of increasing product and land prices

Development of UY Land Markets



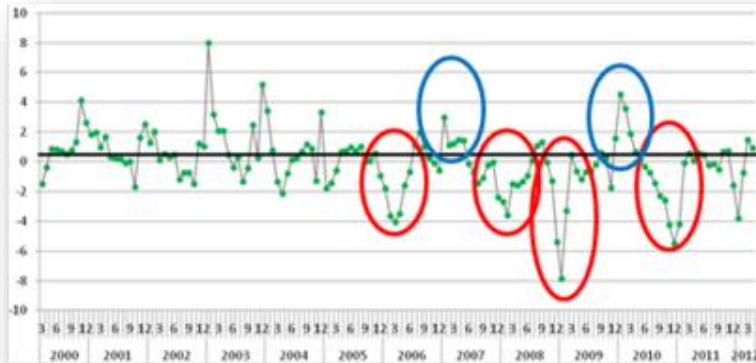
Fuente: DIEA en base a DGR

International Prices for Uruguay's Principle Exports



Challenge 3: UY is Increasingly Vulnerable to Climate Change

The country faces an unprecedented number of adverse weather events



Precipitation Record
[2000-2012]

Source: RENARE, 2013

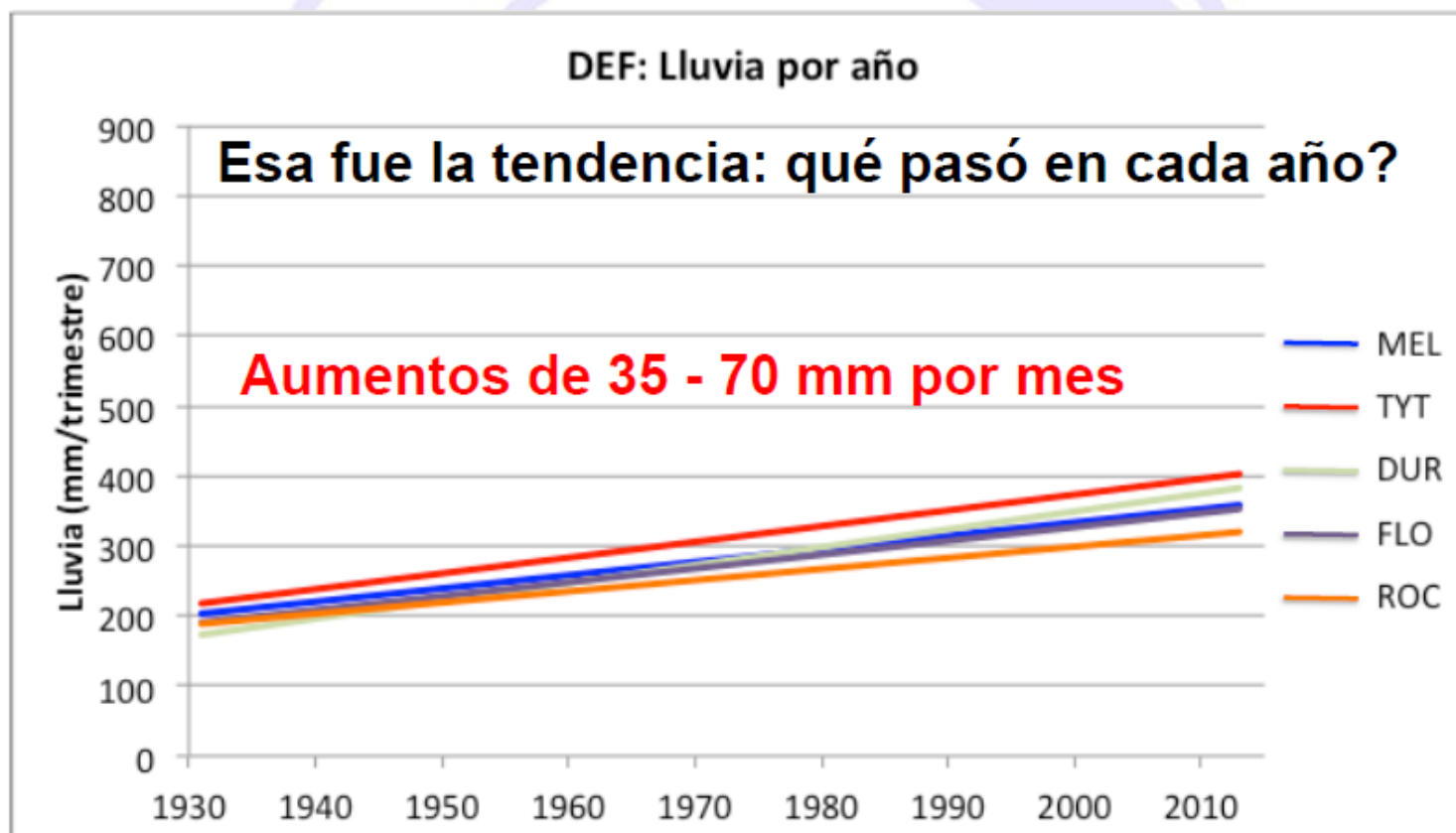
**Storm Damage to
(New) Grain Storage
Facility** [Dolores,
2013]



Source: Bank team, 2013

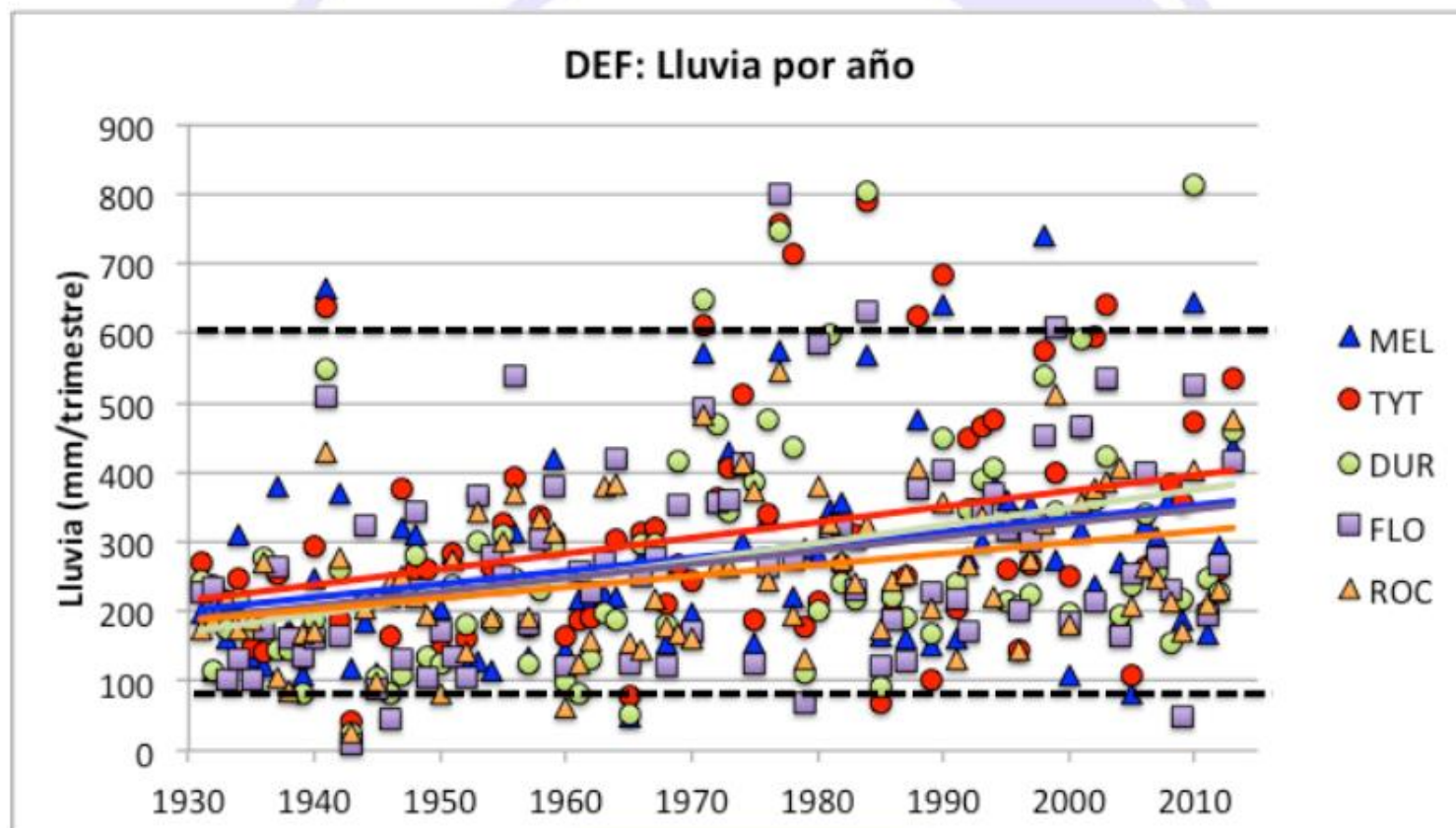
Aumentó la lluvia en Uruguay? Cambio Climático?

Lluvia de Verano (Dic-Ene-Feb) en 80 años



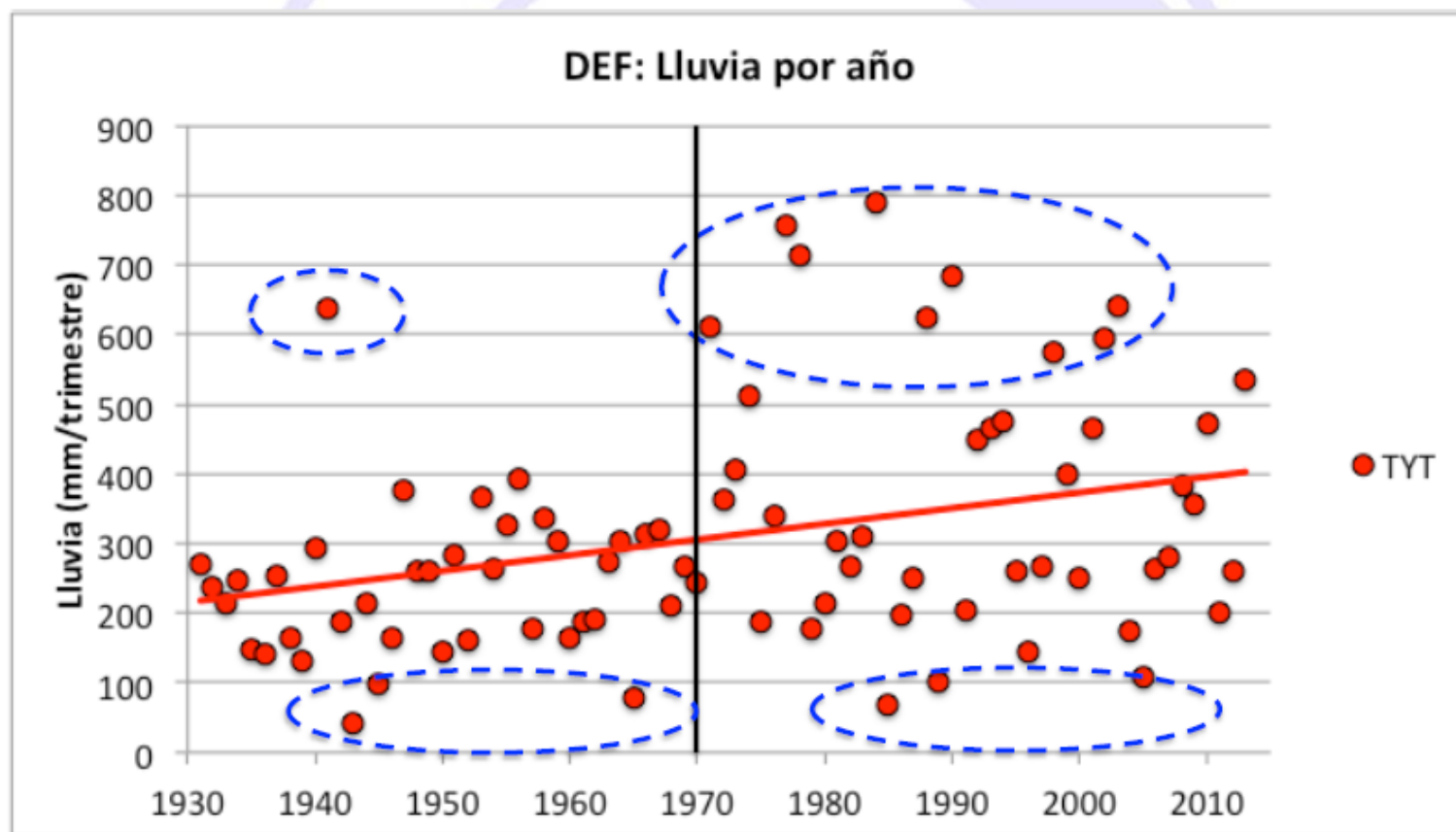
Aumentó la lluvia en Uruguay? Cambio Climático?

Lluvia acumulada en Dic-Ene-Feb (DEF) en 80 años



Aumentó la lluvia en Uruguay? Cambio Climático?

Treinta y Tres: Lluvia acumulada en Dic-Ene-Feb (DEF)



Local Solutions

The Case of Uruguay

Widening Acceptance of Resource-Adapted Production Techniques

Focus on Quality & Conservation Agriculture



Baseline scenario for hay production:



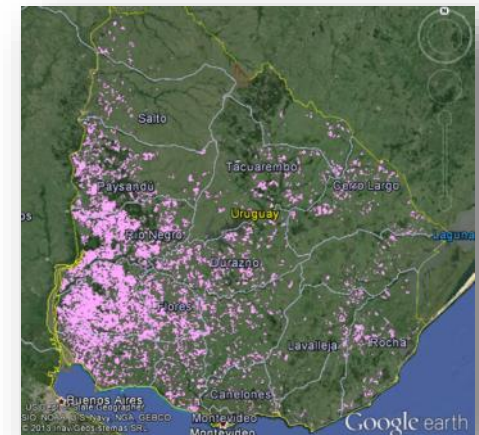
Scenario for better hay production with better management



Soil-Use Planning

[illegible]

**Area covered by
Farmer-Submitted
Soil Use Plans [2014]**

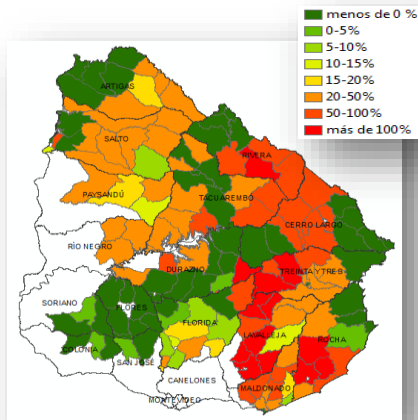


Source: RENARE, 2014

Refining the Agricultural Information System



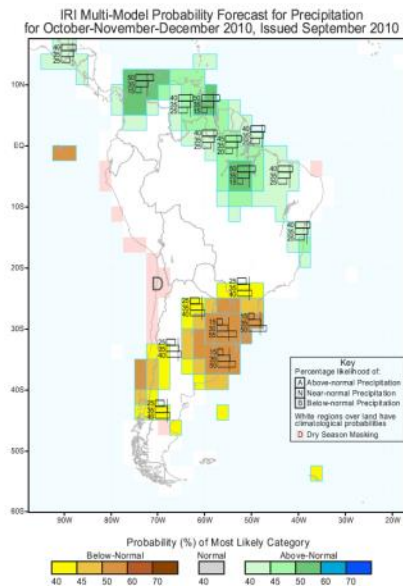
- **Identification of vulnerabilities and opportunities**
 - Which (sub)sectors, systems, components?
- **Understand, quantify and reduce uncertainties**
 - Understand the Past; Monitor the Present; Provide information for the Future
- **Identify technologies that reduce vulnerability**
 - Diversification; irrigation, storage and efficiency enhancement in water use; genetics; etc.
- **Identify institutional rules and interventions through policies that reduce/transfer risks**
 - Early Warning and Early Response Systems
 - Insurance (incl. Index-based); financing mechanism
 - Institutional framework and policies



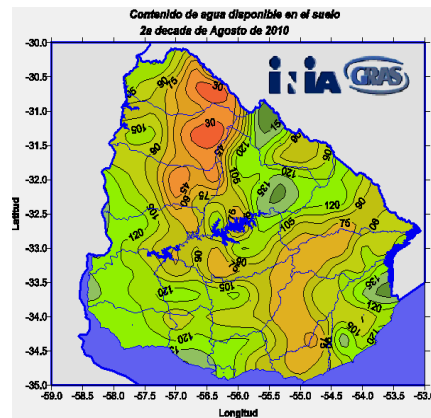
**Actual Land Use
relative to
Sustainable Carrying
Capacity [%]**

Example: Better decision making in Climate-adapted Policy and Enterprise Decisions

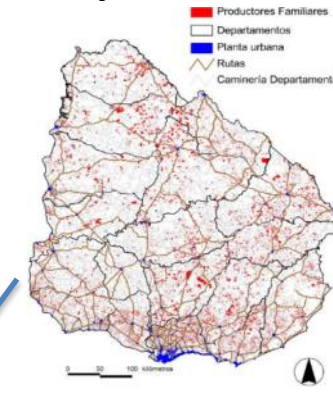
Climate Modeling
from leading
research universities



Water Monitoring

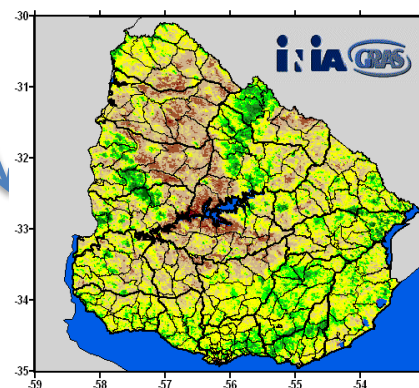


Family farmers

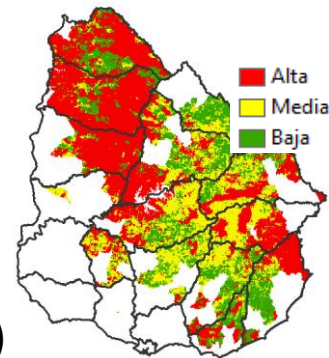


Early
Warning on
drought,
production

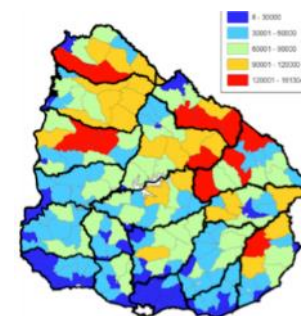
Grasslands Monitoring



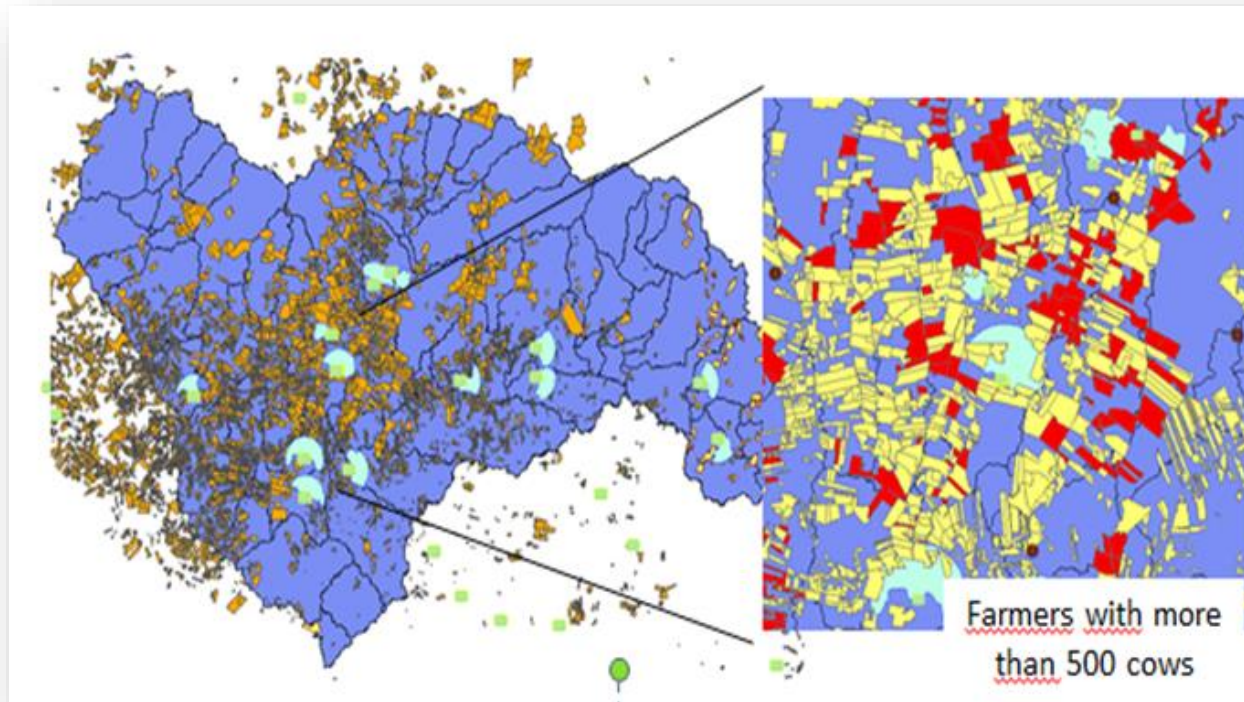
Risk Mapping



Livestock
registration
system (SNIG)

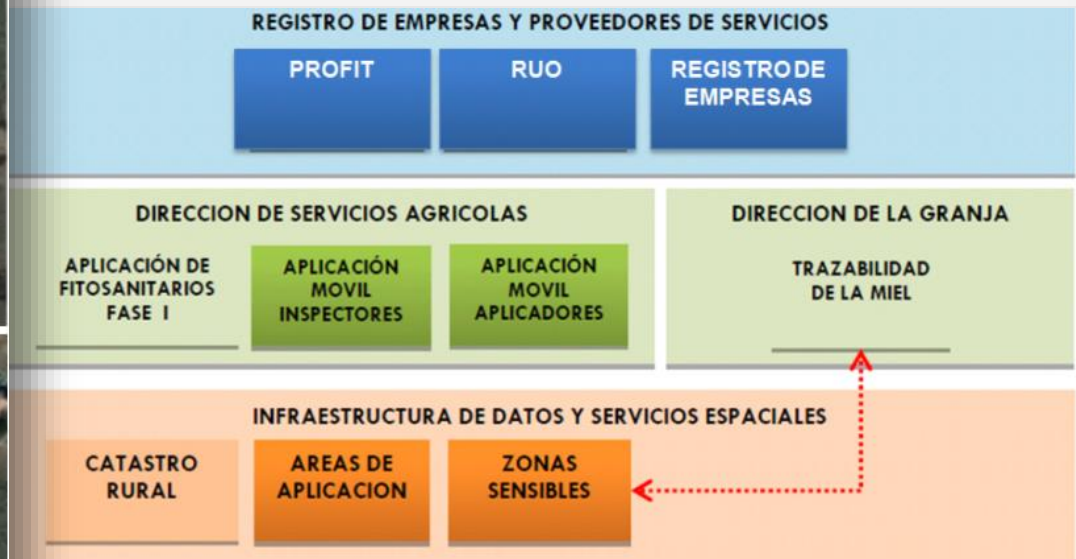


Example: Better decision making in Water Resource Protection



- Identification of water sources with potential problems
- Elaboration of monitoring indicators
- Facilitation of inspection of enterprises
- Support to the identification of mitigation options

Example: Better decision making in Resources Protection and Traceability



Global Solutions

The Approach of the World Bank

1 CLIENT COUNTRY ENGAGEMENT

Advising clients and designing projects to increase productivity, build resilience and reduce emissions.

2 MAINSTREAMING

Applying a 'Climate Lens' to our work across sectors, both from adaptation and emission reduction perspectives.

3 METRICS & TARGETS

Of the current World Bank agriculture portfolio:

- *75% of projects improve productivity.*
- *31% build resilience.*
- *20% reduce emissions.*
- *12% are fully climate-smart, working towards all three goals:
\$850 Million in the fiscal year 2011/2012*

Opportunities to Deliver Climate-Smart Agriculture Solutions

NORTH AMERICA & EUROPE

- Biodigesters
- Fertilizer Mgmt (also: new types)
- Supply Chain Mgmt

ASIA

- Rice (AWD+)
- Livestock Efficiency
- Biodigesters
- Fertilizer Mgmt
- Degraded Land Restoration

AFRICA

- Agroforestry
- Pasture Management
- Fertilizer Application

LATIN AMERICA

- Livestock Efficiency
- Agroforestry
- Rice (AWD+)
- Pasture Mgmt
- Fertilizer Mgmt
- Zero Till

P - Productivity
R - Resilience
E - Emissions