Presentation prepared for the seminar:
Cambio Climático y Seguridad Alimentaria en América Central:
Casos de Estudio de Adaptación

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“Climate Smart Agriculture” and Food Security in Latin America

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First, Acknowledgements

• A lot of the work on which the presentation is based was undertaken with Leslie Lipper and other team members of the EPIC project, Agricultural Development Economics Division, FAO

• Additional work on Latin America and the Caribbean was done with Leonardo Corral, Inter-American Development Bank
Climate Change and Agriculture
From IPCC AR5, WG1 and WG2

– Warming:
  • Warmer in Central and South America since 1970’s (except off the Chilean coast)
  • Projections suggest continued increase in temperatures

– Rainfall:
  • Increasing trends in southeastern South America
  • Decreasing trends in Central America
  • Low confidence in projections
Climate Change and Agriculture
From IPCC AR5, WG1 and WG2

• Extreme Weather Events
  – Increase in extreme weather events such as temperature extremes (Central America, tropical South America), inundations (southeast South America), hurricanes (Central America and the Caribbean)
  – Extreme weather events projected to increase (low-medium confidence)
Climate Change and Agriculture
From IPCC AR5, WG1 and WG2

• Expected Impacts on Agriculture in LAC
  – Highland regions, with melting glaciers, face changes in water flow and availability
  – Higher evapotranspiration reducing effective water in rain-fed agriculture, and reducing efficiency of irrigation systems
  – Higher temperatures will reduce mean yields in some regions
Climate Change and Agriculture
From IPCC AR5, WG1 and WG2

• Expected Impacts on Agriculture in LAC
  – Average yields may increase in southeastern South America, but are projected to decrease in Central America, north-eastern Brazil and parts of the Andes
  – More extreme weather events will reduce yields, not just in the season affected but in the longer term
    • Farmers facing higher weather risks tend to reduce overall production and to reduce expenditures per hectare
    • They also tend to make fewer investments in land
Climate Smart Agriculture: What is it?

- Sustainably increases farm productivity and income
- Strengthens resilience to climate change and variability
- Reduces agriculture’s contribution to climate change
  - greenhouse gas emissions
  - carbon storage on farmlands

Enhances the achievement of national food security and development goals
Climate Smart Agriculture: Examples

• Most Sustainable Land Management techniques
  – “Conservation Agriculture” (minimum soil disturbance, permanent soil cover, crop rotations)
  – Many Soil and Water Conservation Structures
  – Agro-forestry

• Energy efficient irrigation systems (e.g. gravity-based)

• Intensification/reduced extensification

• Efficient fertilizer application
Food Security

• The four pillars:
  – Availability: Supply of food available, directly related to food production
  – Accessibility: Ability of people to purchase food, directly related to income and indirectly related to food production
  – Utilization: Ability to safely store and maintain nutrition of foods, avoid spoilage
  – Stability: Stable food prices and availability in market; directly related to variability in food production and volatility in food markets
CSA and Food Security

• CSA technologies and practices directly affect
  – Food Availability by increasing average yields
  – Food Stability by reducing yield variability, particularly by reducing the size of yield losses under poor weather conditions

• CSA technologies indirectly affect
  – Food Accessibility, to the extent that greater and more stable yields lead to lower food prices
CSA in Latin America

• “Conservation Agriculture”:
  – Very widely adopted in Brazil, Argentina and Paraguay, but mostly on large commercial farms
  – Barriers for smallholders
    • Higher costs of weeding outweigh reduced costs of land preparation
    • Limited access to no-till planting equipment
    • In many cases, long time period before yield benefits realized (5-15 years)
    • Permanent soil cover appears to be a main driver, but can be expensive; e.g. promotion of crop residues as soil cover conflicts with livestock feed needs
CSA in Latin America

• Soil and Water Conservation Structures:
  – Widely practiced particularly in hill/mountain regions, but evidence of abandonment/leaving to deteriorate is still a problem in many countries
  – Barriers for smallholders
    • Lack of secure tenure leads to lower incentives to invest in these structures
    • Often need to adapt to site-specific conditions, requiring a lot of detailed knowledge, makes investment risky
    • In some cases, very high labor/materials costs that smallholders cannot cover
    • Often provides positive spillovers to neighboring and downstream farms; subject to collective action failures
CSA in Latin America

• Agroforestry
  – Important across LAC, though empirical evidence is concentrated in Brazil, Mexico and Central American countries
  – Barriers for smallholders
    • Availability of seedlings suitable to local conditions; access to extension to learn about varieties
    • In many cases, long time period before yield benefits realize
    • Lack of markets for agroforestry products
    • Tenure insecurity
Still large scope to expand CSA in LAC...

- Limited information reaching farmers
- Limited availability of inputs (e.g. seeds/seedlings)
- Limited access to credit to finance up-front investment costs, especially where benefits are delayed
Still large scope to expand CSA in LAC...

• Previous slide: typical costs and barriers that can hinder adoption of both improved conventional and CSA technologies and practices

• Additional barriers that are relatively more important in understanding CSA adoption:
  – Access to insurance/safety nets
  – Farmers’ property rights and tenure security
  – Many CSA practices generate positive spillovers to neighboring farms and others downstream
Access to Insurance/Safety Nets

• Expected effects of increased access to insurance/safety nets is a bit complex
  – Almost all empirical evidence shows that farmers have lower agricultural incomes and yields as uninsured risks increase, so
  – Increased access to insurance/safety nets will expand production, and increase incentives to adopt CSA practices in many cases, except
  – In very risky environments, where CSA practices mainly reduce yield losses but have limited impacts on yields, increased access to insurance/safety nets may reduce CSA practices (even though other inputs increase)
Property Rights and Tenure Security

• Where you do not feel secure in ability to benefit in the future from investments made now, less likely to adopt
  – The greater the delay in benefits, the stronger is the disincentive
• In many areas, there are community norms on use of cultivated land post-harvest that can limit incentives to invest:
  – All fields open to grazing animals post-harvest
  – Norms on burning fields
Positive Externalities

• When individual investments generate benefits both to the farmer as well as to others, tendency to under-provide

• Many CSA practices generate positive environmental benefits

• Many examples of “payments for environmental services” to upstream farmers to improve water management to downstream users who are not typically farmers
Positive Externalities, Cont.

• But, many CSA practices actually generate positive spillovers locally to other farmers
  – Requires collective action and coordination
• Similarly, underlying hydrological and agro-ecological characteristics can lead to situations where coordinated and complimentary actions across many farmers in a watershed are necessary in order to increase resilience/ability to cope with extreme weather events
Implications for Project M&E and Impact Assessments

• Positive spillovers have implications both for the level of the intervention (community versus household) and for identifying “controls”

• Delayed benefits imply either longer times between baseline and endline, or that suitable “intermediate” outcomes can be identified

• One of the key benefits is to reduce downside losses when an extreme weather event hits; flexibility to implement “in-between” surveys may be needed instead of reliance on recall
Thank you!