Stimulating Smallholder Investment in Sustainable Land Management: Neglected Role of Markets, Institutions and Policies

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Outline

1. The problem - persistence of the land degradation problem
2. Agric markets and institutions in Africa
3. Investment in SLM - conceptual framework
4. How markets, institutions & policies matter for SLM
   - Output markets
   - Input markets
   - Credit and insurance
   - Markets for ecosystem services
5. Summary and conclusions

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The problem

- Land degradation deprives the poor of key resources that underpin livelihoods
- It diminishes the capacity of poor farmers and communities to escape poverty
- The potential nexus between poverty and land degradation exacerbates the problem
- Yet, SLM remains a major challenge in many developing countries

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What We Know

- Despite efforts to promote SLM technologies, adoption has been very low and slow
- Studies identify several constraints to SLM:
  - Biophysical/farm characteristics
  - Technology characteristics
  - Household characteristics
  - Land user assets and poverty
  - Property rights – land tenure
- However, the role of input and output markets in shaping farmer decisions is not adequately understood

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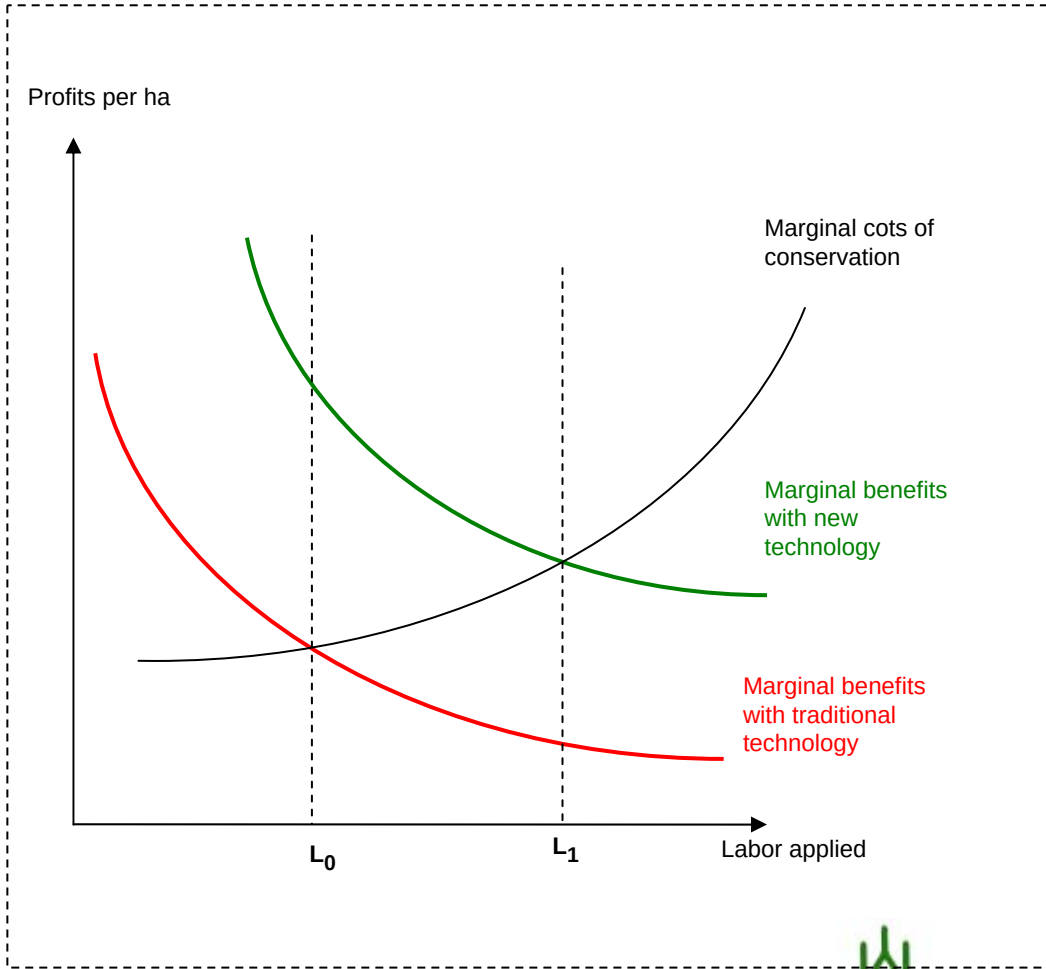
Unproductive Conservation Technology and Imperfect Markets

- Technologies promoted – largely non-profitable, non-beneficial
  - Low-cost but largely unproductive structural and few agronomic practices
  - Soil erosion control rather than focus on water management and use
  - De-linked from income generation and livelihood options
- Better agricultural technologies, modern inputs and methods for SLM exists, but adoption is low and slow
- Market imperfections, policy and institutional failures – key constraints in delivering inputs and technologies
- New technology is critical to create incentives for SLM

Technology Diffusion and Markets

- Modern varieties and inputs (fertilizer) raise productivity of land
- Higher returns from new technology reduce the average costs of conservation (terracing, drainage. stone/soil bunds, etc)
- Higher returns with new technology make sustainability investments profitable



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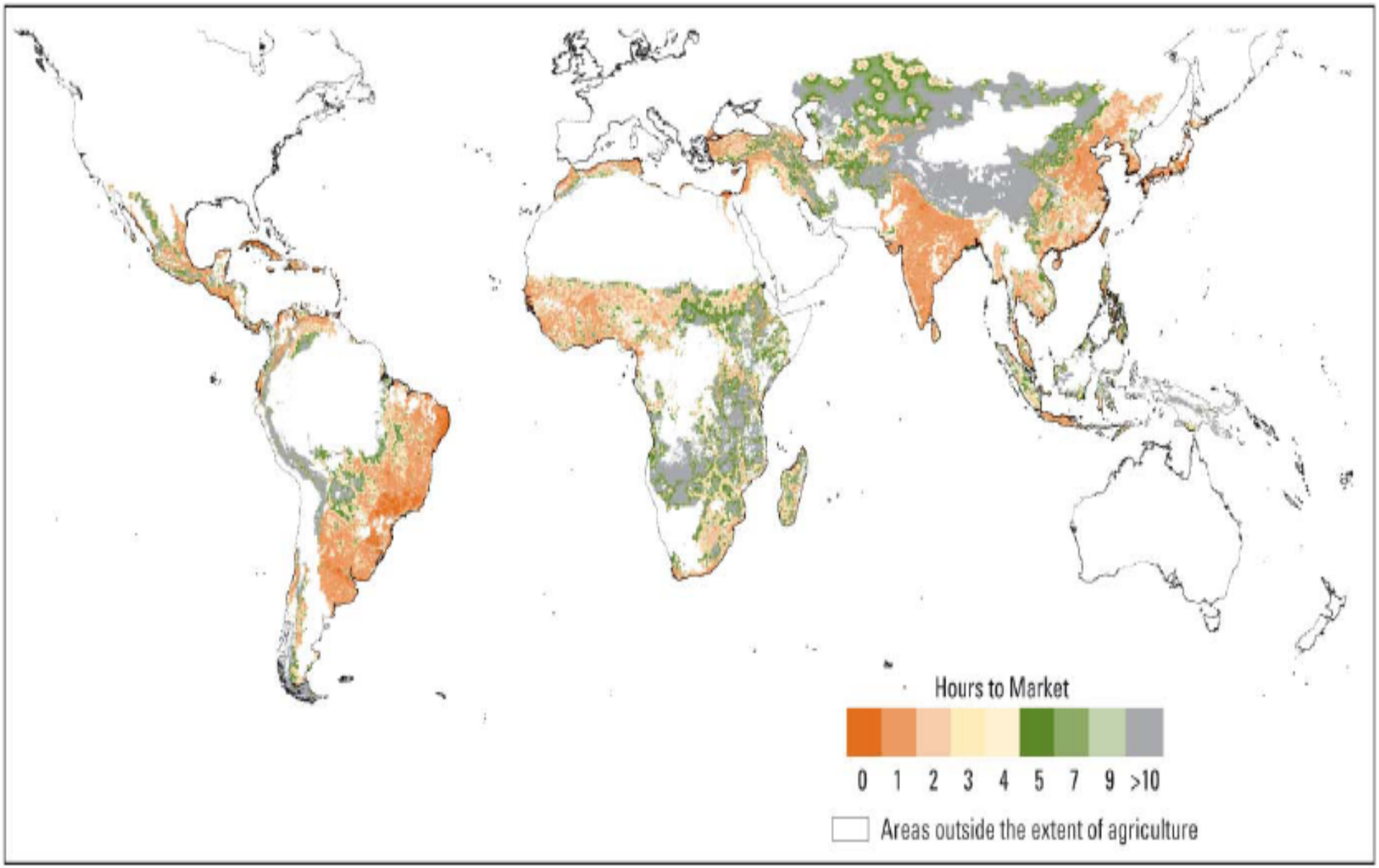
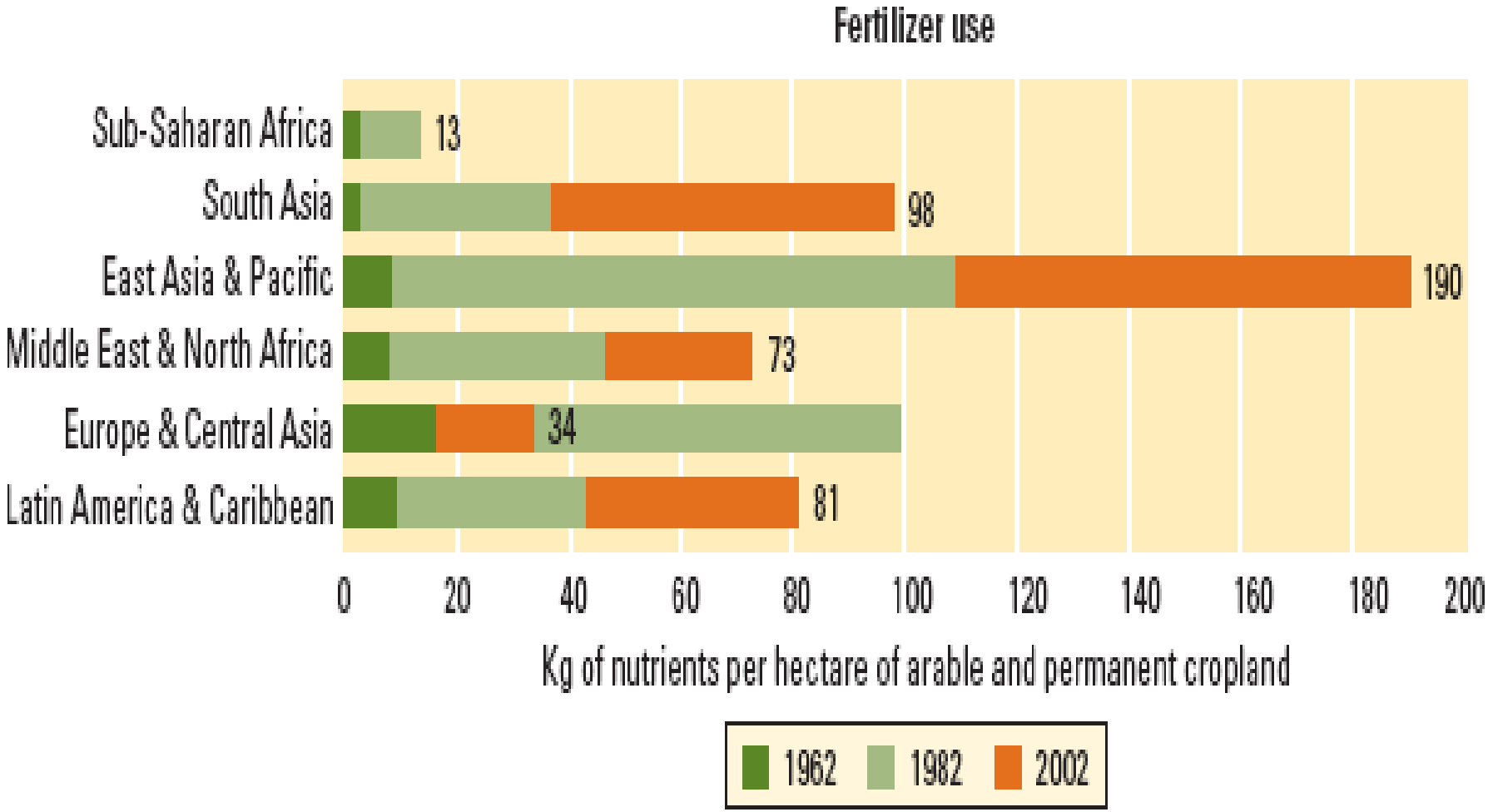
Market Access in Agricultural Areas (Africa, Asia and Latin America)

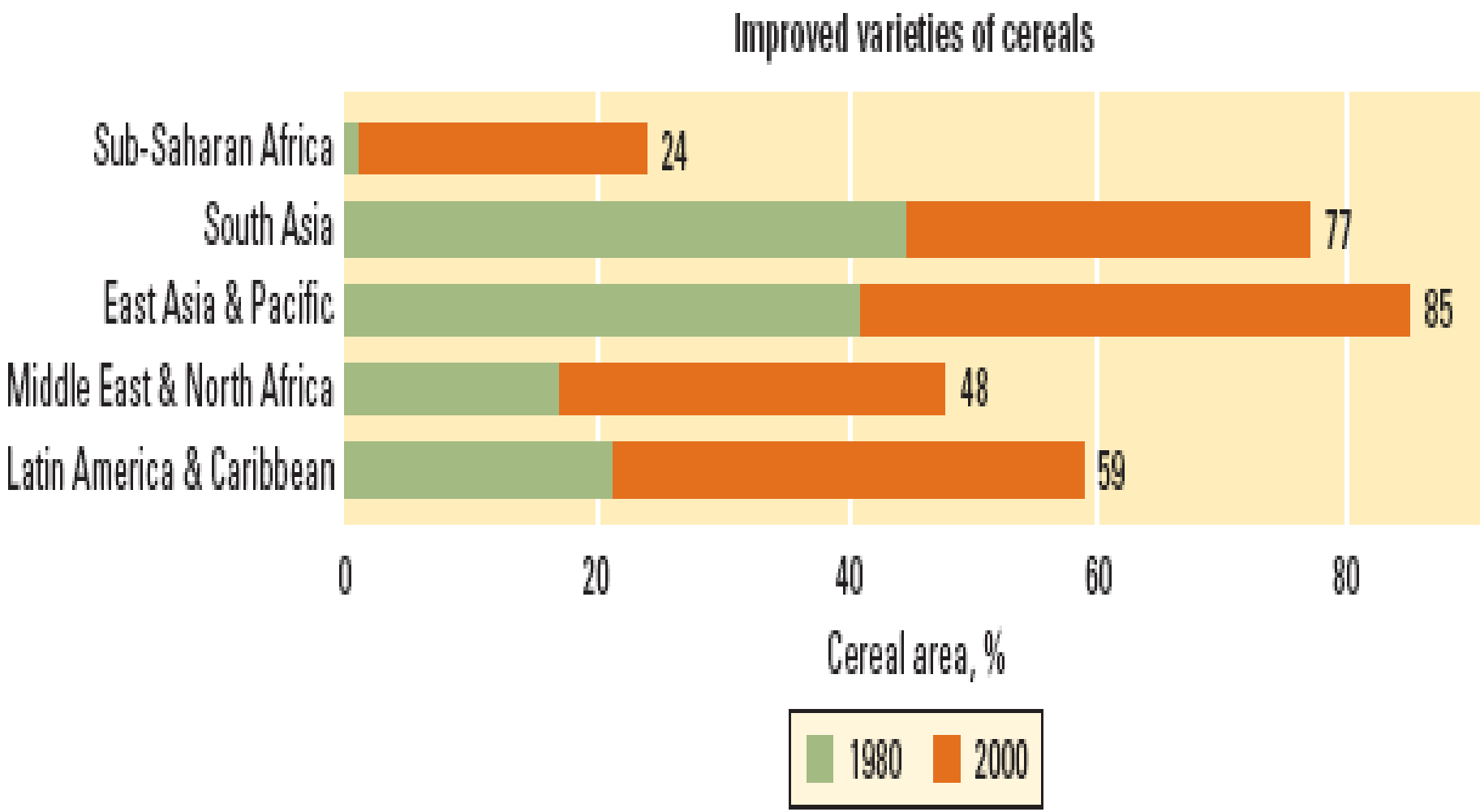


Fertilizer for SLM

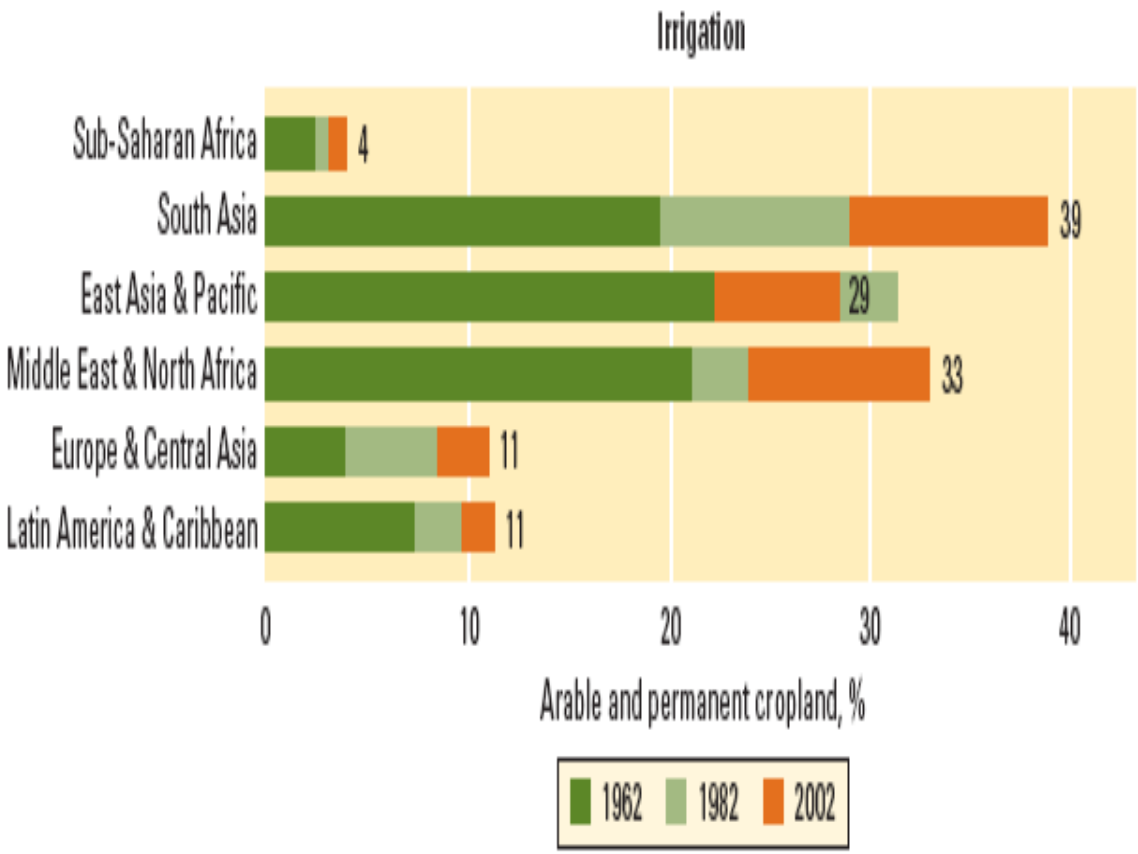


Sources: Evenson and Gollin 2003; FAO 2006a.

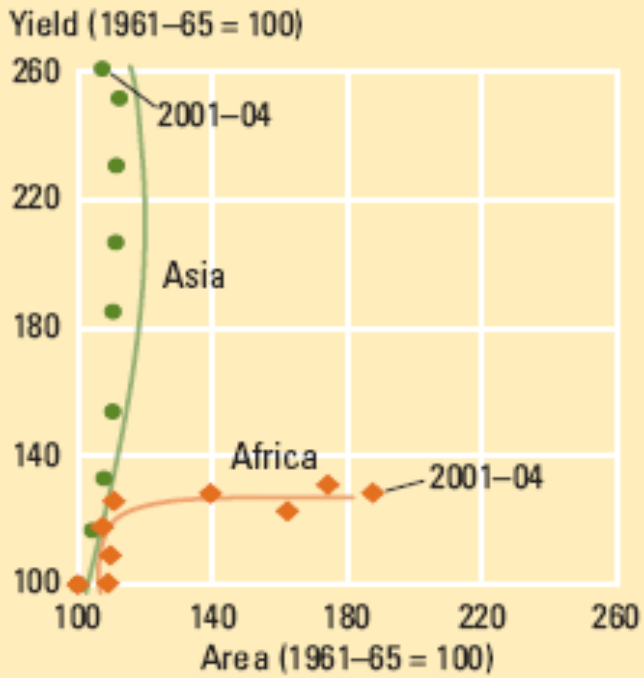
Adoption of Improved Varieties



Irrigation and Water Management



Expansion of cereal production has followed very different paths in Sub-Saharan Africa and Asia



Source: FAO 2006a.
Note: Each point represents a five-year average, starting with 1961–65 =100.

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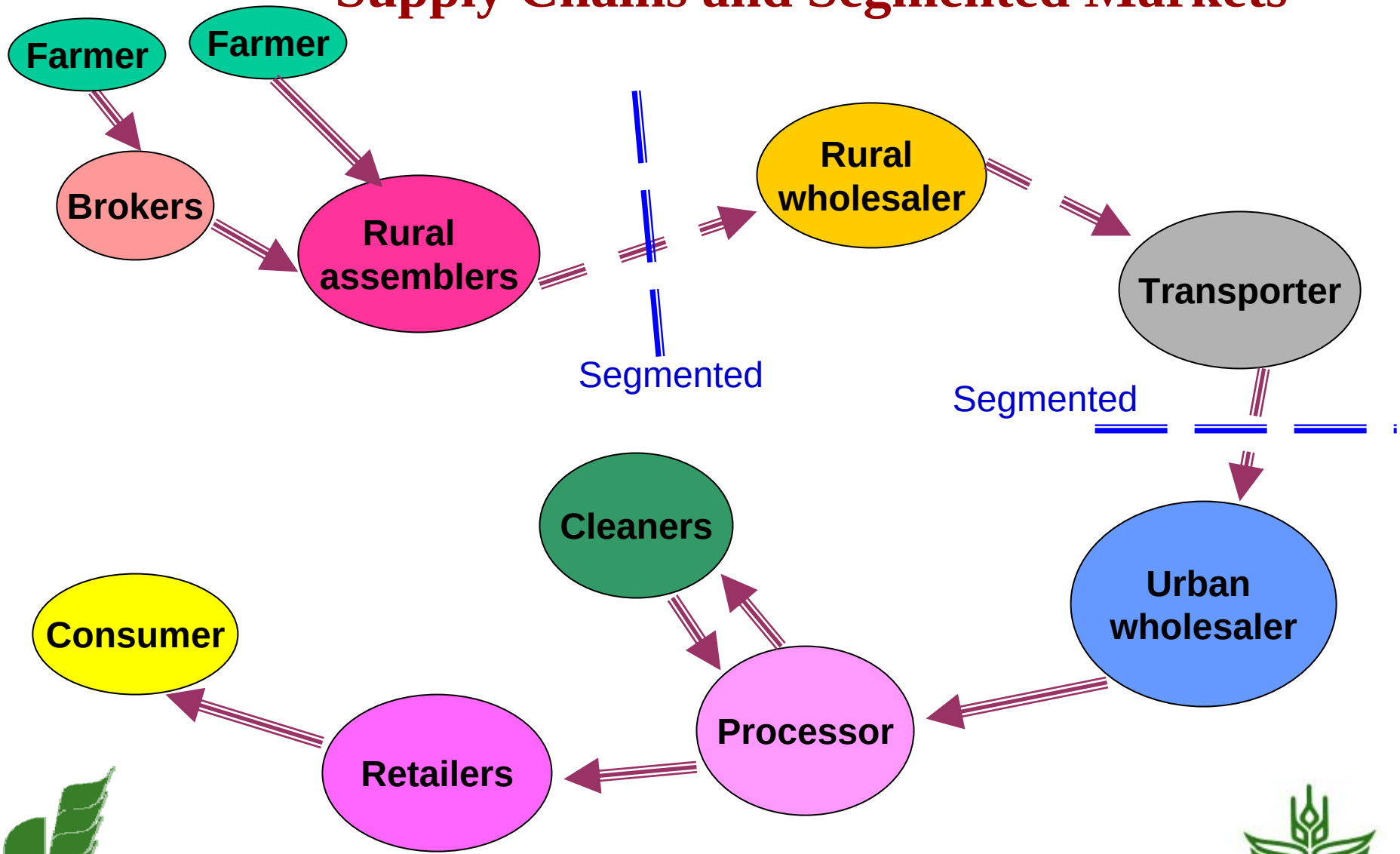
Agricultural Markets in Africa: Extended Supply Chains and Segmented Markets



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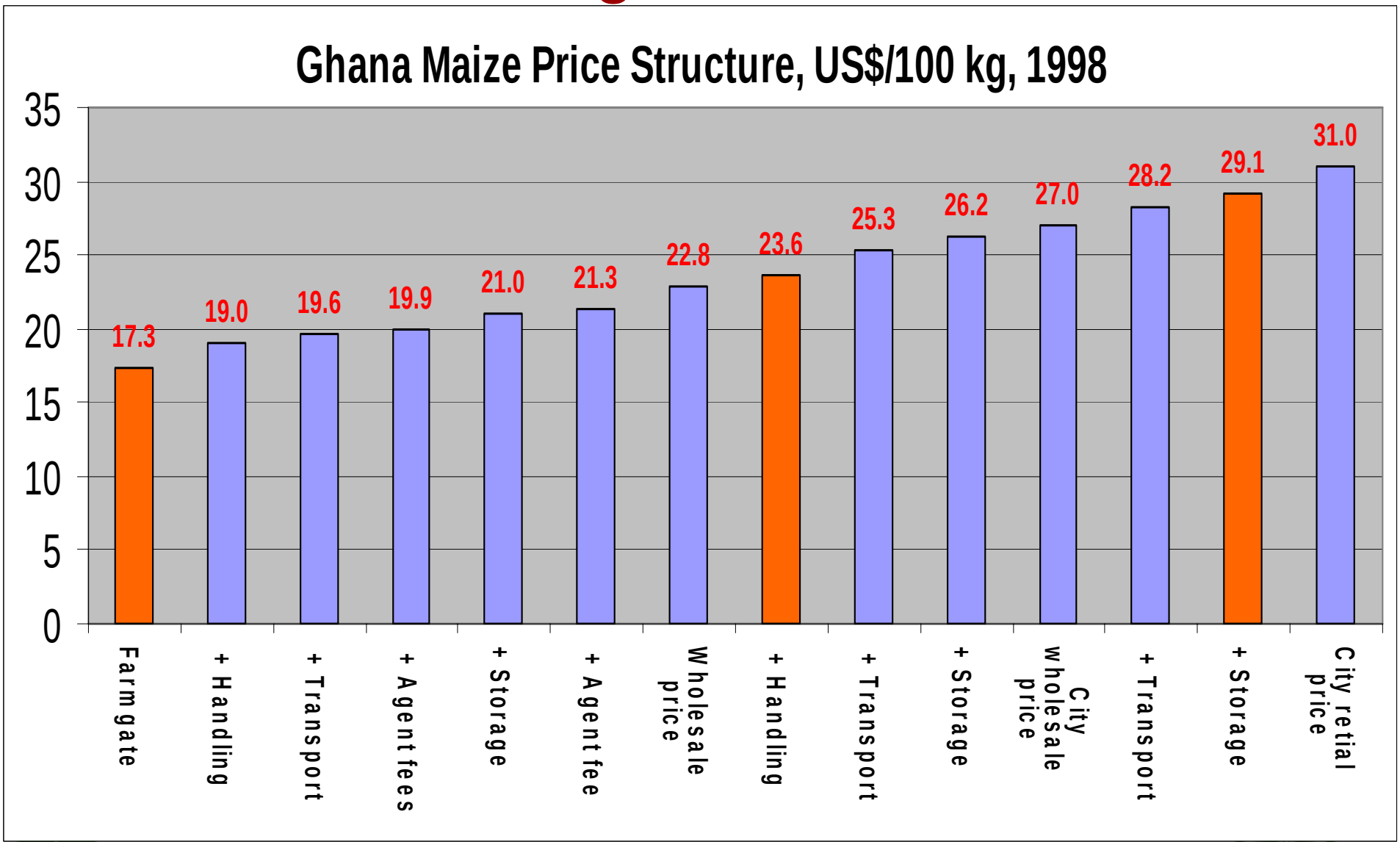
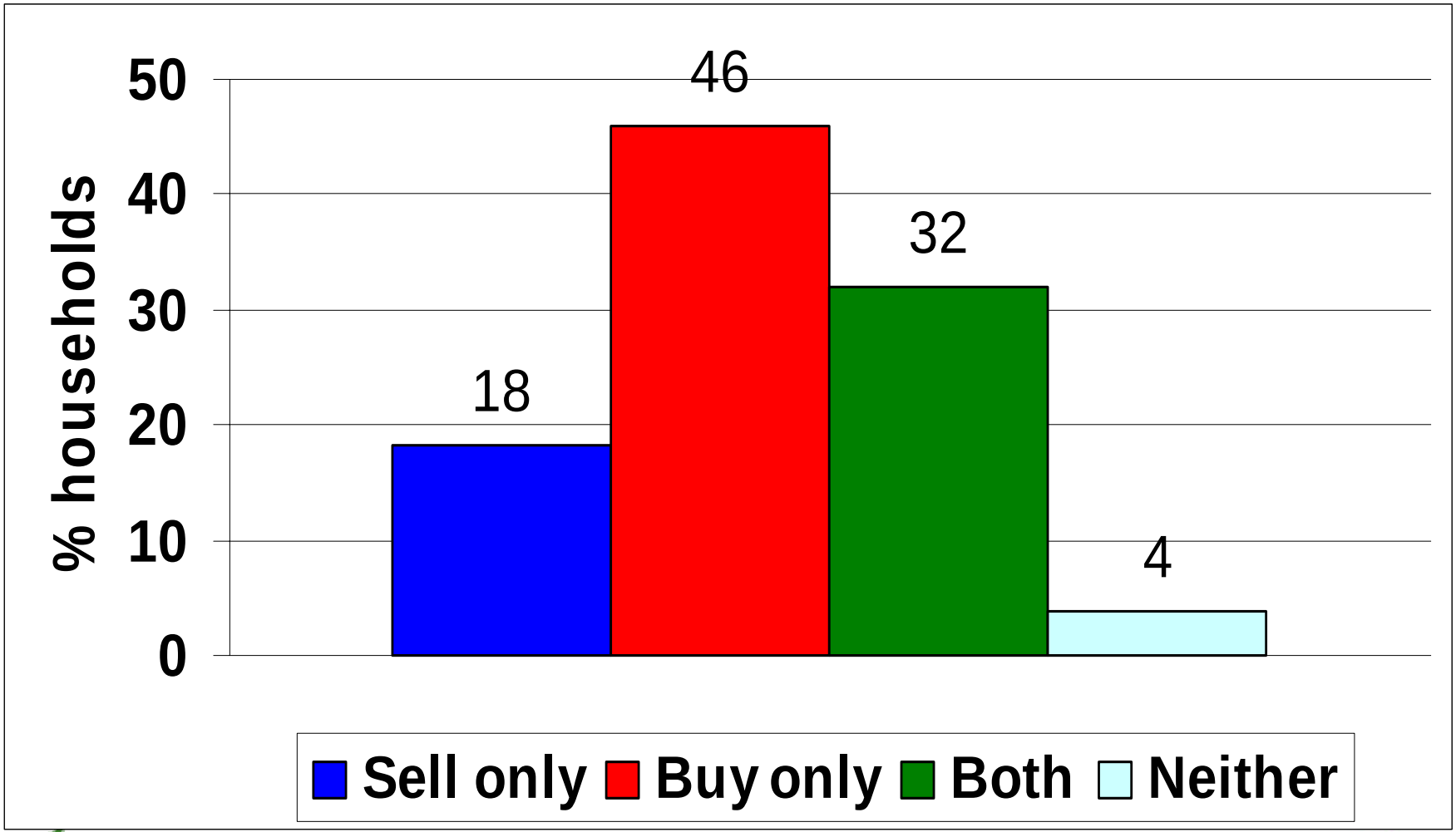
High Marketing Costs: Low Producer Price and High Consumer Price



Smallholder Market Participation



Source: ICRISAT Data, 2005, Eastern Kenya (N=400)

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Role of Collective Action Institutions

- Collective action crucial when:
  - Landscape-wide interventions
  - Resource use interdependence (reciprocal externalities)
  - Remedy market imperfections
- But producer organizations can be costly and difficult to organize
  - Elite capture
  - Conflicting interest groups
- External intervention and supportive policies may be needed to
  - Organize users
  - Define ‘rules of the game’
  - Ensure equity in benefit and cost sharing

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Conceptual framework

- The framework we use is broad and holistic. It captures:
  - Intertemporal investment decisions
  - On-farm resource investment possibilities
  - Consequences of different livelihood strategies on quality of resource base
- This framework expands the Livelihood Framework and recognizes the role of market and policy failures

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Conceptual framework contd…

- **Elements of the extended conceptual model:**
  - **Elements of theory of farm household behavior (de Janvry et al., 1991)**
  - **Economics of rural organization (Hoff et al)**
  - **The role of economic policies (Heath and Binswanger)**
  - **Institutions and institutional change (North)**
- **Household SLM investment decisions conditioned by the context of evolving markets, policies and institutions**

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Conceptual framework contd…

- We assume the farmer makes investment decision each period so as to maximize livelihood benefits subject to:
  - Existing technologies
  - Existing resource assets
  - Expected shocks
  - Market conditions
  - Policy and institutional environment

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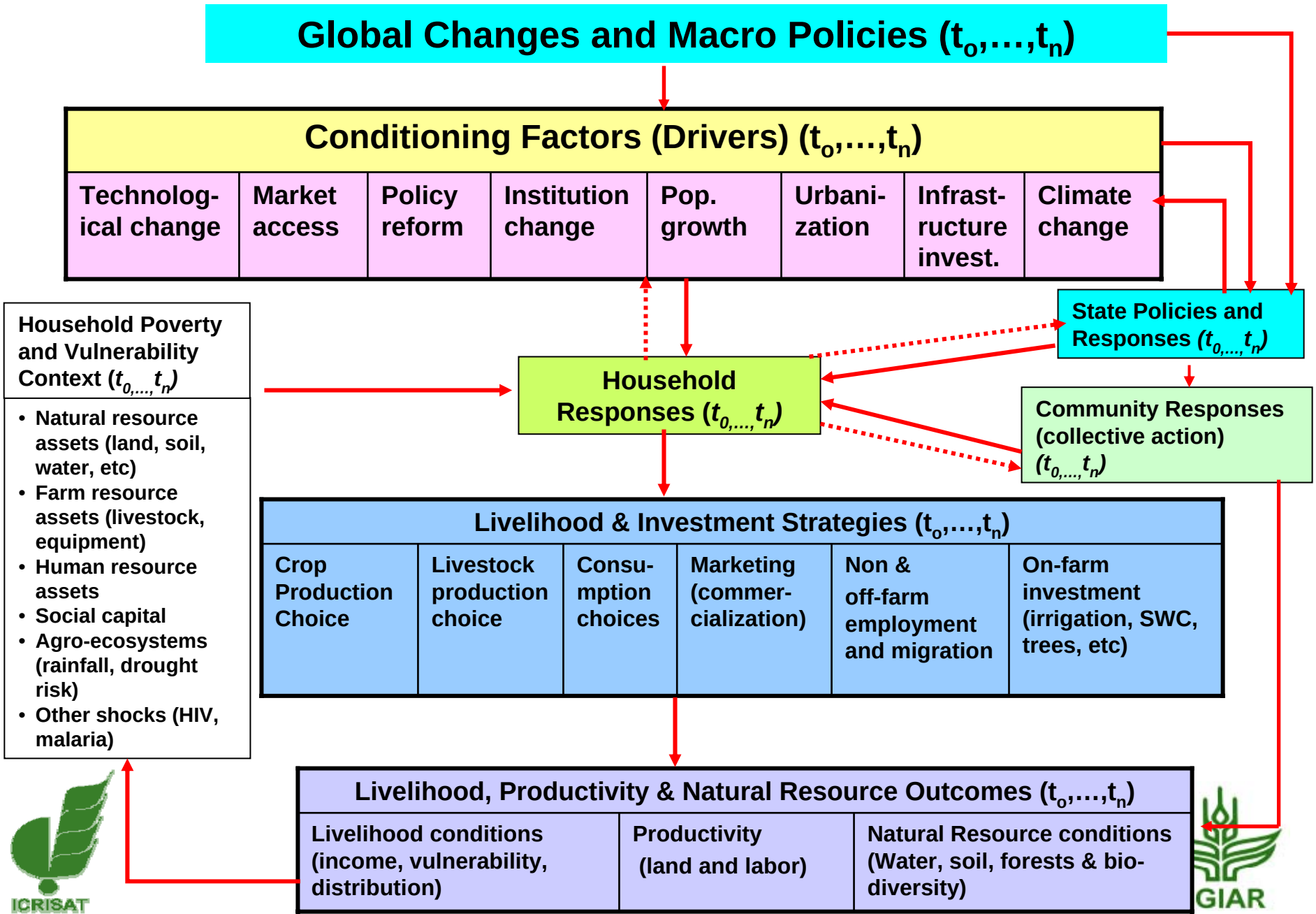
Conceptual Framework



Conceptual framework contd…

- This analysis shows that adoption and adaptation of SLM is driven by right mix of:
  - Technologies
  - Market access (input + output)
  - Institutional arrangements
  - Policy environment
- Lack of such mix can push farmers to practice exploitative farming

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Role of markets: output price

- Markets affect SLM technology adoption via
  - Relative input and output prices
  - Market access (transaction costs)
- Increase in output price has an ambiguous effect on adoption of SLM
- Ambiguity caused by the countervailing incentives of output price increase, i.e.,
  - Higher output prices raise returns to land and labor in the short run
  - Create incentives to use improved inputs
  - High prices for erosive crops may increase degradation

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Output price contd…

- An increase in price of land-degrading crop:
  - Masks the costs of land degradation
  - Promotes use of erosive production practices
- But output price increase can also lead to SLM
  - Common where conservation leads to productivity gains – beneficial conservation

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Role of markets: Input price

- Affects SLM via price farmers pay for inputs that constitute SLM (e.g., labor, fertilizer, water, seed)
- High prices for labor input increase the cost of labor-intensive SLM adoption
- High costs for fertilizer may encourage soil mining but could also create incentives for adoption of FYM and other conservation
- High prices for irrigation water could create incentives for adoption of water saving innovations

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Role of markets: Access

- Transaction costs (TCs) of reaching markets with outputs
  - The lower the TCs the more likely farmers will adopt SLM
- Transaction costs in input markets (seed, fertilizer, etc)
  - Increase input prices
  - Reduce profitability of inputs
  - Labor-intensive intensification
- Improved market access is good for SLM
  - Improve supply of inputs at competitive prices
  - Reduces self-sufficiency
  - Creates incentives for use of commercial inputs

- Powerful case is the Machakos "miracle"
- Proximity to markets and availability of new technology has:
  - Led to commercialization
  - Increased returns to land and labor
  - Greater investment in SLM
- Reversal or control of land degradation

Markets and SLM: two-way link

- Fertilizer use, improved seeds and irrigation increase production and enhance profitability of SLM
- Water use reduces risks and enhances productivity
  - Productivity growth and generation of marketed surplus
  - Stability of supply - reduced prod risk
  - Stability of prices - reduced market risk
- Incentives to invest in productive inputs and intensification of production
- Shift towards high-value products
- Incentives for market development and private sector participation ➔ Commercialization

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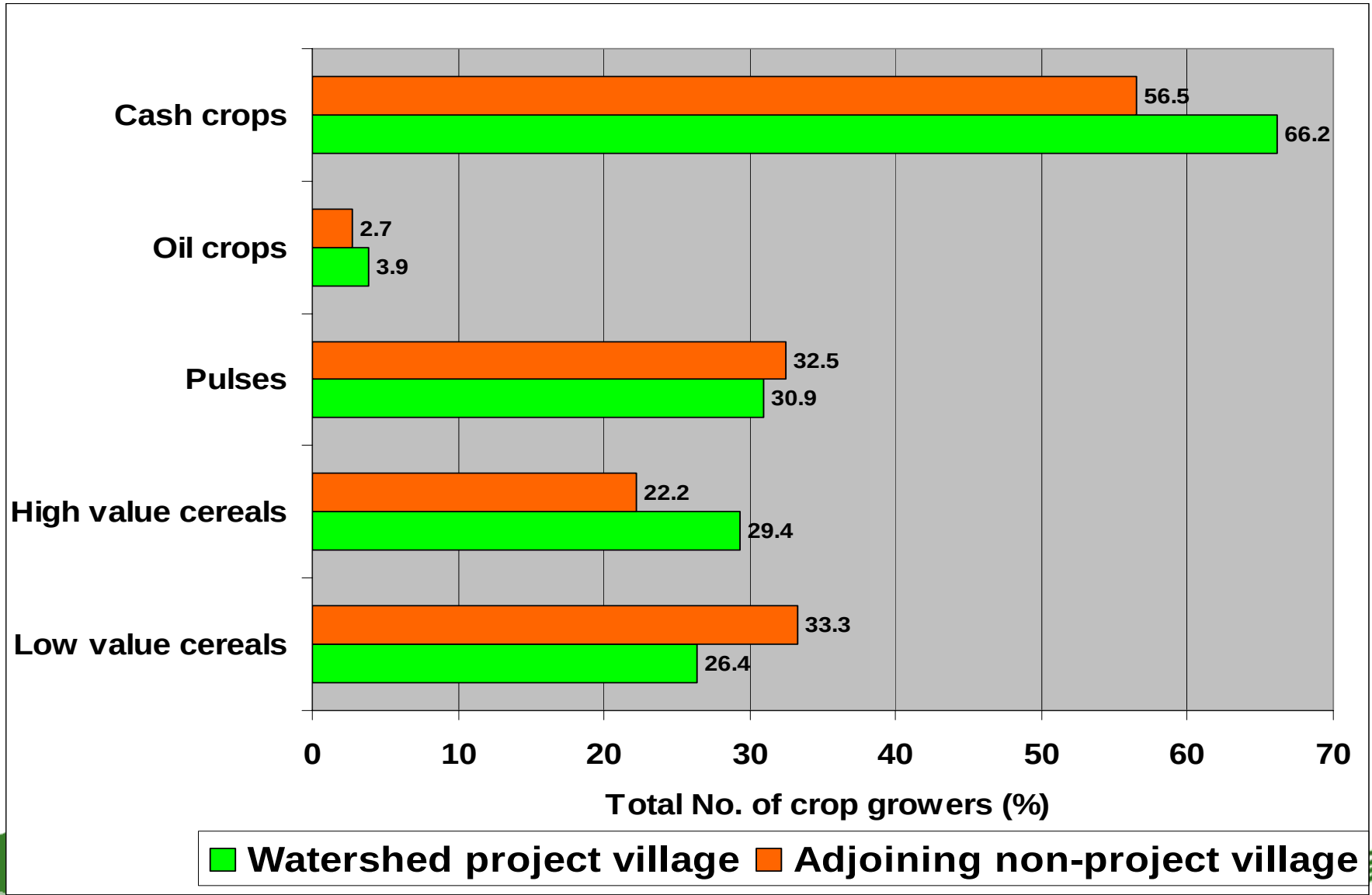
Example: Effect of watershed management on commercialization of production in India



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Effect of IWM on agic-commercialization

Variables	IV model	
	Est. coeff	P-Value
Dependent variable: value of marketed surplus (Rs 1000)		
Drought year (2002)	-7.264	0.003
Male household head (=1)	2.757	0.524
Watershed village	**3.551**	**0.062**
Variable costs (Rs 1000/ha)	*1.687*	*0.077*
Owned irrigable land (ha)	11.245	0.000
Owned rainfed land	5.421	0.000
Hhousehold education (yrs)	0.361	0.000
Family male workforce	-3.311	0.010
Family female workforce	-1.751	0.200
Livestock wealth (Rs 1000)	0.245	0.038
Value of motorized hh assets (Rs 1000)	-0.345	0.719
Value of other hh assets (Rs 1000)	0.008	0.620
Inverse Mills Ratio	3.387	0.110
Constant	-5.904	0.166

N=240: F(13, 226)=42.24 Prob > F = 0.0000, Adj R^2 = 0.688

Role of Non-Agric Diversification and Off-farm Employment

- Mixed evidence on effect of off-farm labor markets on SLM
- Availability of off-farm employment competes with SLM for household labor
  - Off-farm employment overlaps with slack season conservation activities
  - High opportunity costs of labor used in SLM
- Off-farm income can be used in SLM investments
  - Finance SLM investments (fertilizer, seeds, conser agric)
  - Reduce land use pressure – allow land to recuperate

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Role of Credit and Insurance Markets

- **Investment in modern inputs and technologies for SLM and agriculture require credit**
  - **Seasonal, medium and long-term finance**
  - **Classic problems of asymmetric information & high transaction costs**
  - **Credit markets largely missing for SLM (except for fertilizer use)**
  - **Producer organizations – peer monitoring and collective action**
  - **Inventory credit or warehouse receipt systems**
  - **Loan guarantee schemes**
- **Pervasive risk – but limited opportunities for managing risk**
  - **Land degradation**
  - **Climatic variability**
  - **Insecure tenure**
  - **Poor market access**
- **Markets for risk management**
  - **Crop insurance – e.g. weather-indexed crop insurance**
  - **Interlinking credit insurance markets**
  - **Mobile and flexible saving programs (MPESA – Safaricom in Kenya)**

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Evidence on Role of Markets for SLM
(Castano et al., Ag Econ 2005)

Table 7
Institutional components extracted from explanatory variables in Cabuyal[a]

	Good access to (market) services	Market proximity	Entrepreneurship	Commercial orientation on VR	Noncoop link
Subsidy	0.53	0.21	0.04	0.14	0.27
GO	0.71	−0.31	0.16	−0.04	0.03
NGO	0.75	−0.17	−0.01	−0.31	0.04
Distance	−0.33	−0.75	0.04	0.29	0.01
Road access	0.32	0.80	−0.29	−0.10	−0.12
Market orientation	0.20	0.20	0.68	−0.23	−0.10
Market information	0.19	−0.31	−0.69	0.38	0.36
Commercial orientation	0.06	0.03	0.27	0.67	−0.13
Cooperative link	0.32	−0.08	0.08	−0.14	**−0.90**
Vertical integration	0.43	0.25	−0.15	0.51	0.07
Sales to starch processors	0.06	−0.35	−0.10	−0.56	0.11
Services by institutions	0.62	−0.07	0.06	0.11	0.08
Links to any institutions	0.79	−0.39	0.05	0-07	0.19

[a]Component loadings larger than 0.50 in absolute value are written in bold, since they are used for the interpretation of that component (see, e.g., Hair et al., 1995).

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Evidence on Role of Markets for SLM (Castano et al., Ag Econ 2005)

	Soil disturbance control	Soil protection	Runoff control
Good access to marketing services	-0.09 (0.13)	0.32 (0.00)	-0.09(0.2)
Market proximity	-	0.1 (0.15)	-
Entrepreneurship	-0.12 (0.02)	0.16 (0.01)	-
Vertical integration	0.13 (0.02)	-	-
Lacking coop link	-	-0.16 (0.01)	
Adj R^2	0.53	0.28	0.06

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Payment for environmental services (PES)

Service provider

- SLM generates positive externalities (ecosystem services)
  - Reduced runoff and siltation of dams
  - Enhanced water flow
  - C-sequestration
  - Watershed protection
  - Wildlife habitat
  - Biodiversity
  - Aesthetic topography

Service taker/buyer

- Theoretically beneficiaries could pay for such services
  - Hydro-power
  - Domestic water supply
  - Irrigators
  - Eco-tourism operators
  - Biofuels processors
  - CDM – carbon financing

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PES – Experiences

- Widely used in Central America (Costa Rica, Mexico) on forest conservation
- Food-for-work and cash-for-work used in Africa
- FFW and CFW did not lead to SLM and cannot provide sustainable markets
  - **Used in low potential areas to promote SLM but top-down and command-and-control approaches limit its effectiveness**
  - **Viewed by poor farmers as government subsidy to improve livelihoods (safety-net)**
  - **Degrading high potential areas often neglected**
  - **If the support ('market') is linked with proper management of resources that ensures flow of ecosystem services, government and other agencies can be potential 'buyers' of SLM**

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PES - Challenges

- Lack of clearly defined service providers
- Lack of clear property rights
- Dispersed providers and users – high transaction costs
- Poor measurability and attribution of service to SLM
- Sustainable flow of ecosystem services requires long-term contracts – difficult to enforce
- Lack of successful pilots in Africa
- Marginal social benefits of ecosystem services should be higher than marginal cost of provision

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PES – Best practices

- Exploit local markets (hydropower, drinking water, bottling factory, etc)
- Mutually beneficial and self-enforcing contracts (market based)
- Leverage local institutions for collective action (producer/community organizations) to reduce costs and enhance compliance
- Capacity enhancement for farmers (technology, production, measurement, pricing, etc)
- Support eco-labeling and certification programs to stimulate markets for ecosystem services

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Agricultural policy: subsidies

- The major policy issues in SLM: output pricing and input subsidies (e.g., water, fertilizer, seed, credit, etc)
- Subsidies can have 3 major drawbacks:
  - Cause illusive unsustainable increase on returns
  - Distort investment incentives for land users
  - May shift cropping to erosive crops or land use
- Bur targeted subsidies that offer higher social benefits than costs can induce SLM
- Cross-compliance of input subsidies with SLM to enhance efficiency

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Making policies work for small farmers

- Removal of subsidies for resource-degrading and low value crops
- Marketing and price support for water-saving and land-augmenting technologies (e.g. tree crops, drip irrigation)
- Diversification out of staples to high value and eco-friendly production systems
- Credit services for SLM investments

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Summary

- Smallholders face major challenge in adopting and adapting SLM
- They are constrained by:
  - Lack of profitable (beneficial) conservation options
  - Inadequate policy support for diversification into high value and eco-friendly crop-tree-livestock systems
  - High opportunity costs of conservation labor
  - Poverty and lack of investment credit for SLM
  - Inadequate property rights systems
  - Weak institutional and organizational arrangements
- Role of input and output markets for SLM is under recognized
  - Markets facilitates access to new technology and profitable inputs that motivate SLM
  - Markets access is necessary but not sufficient for SLM

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Summary contd…

- When property rights are clearly defined to reflect the user costs, market access generally promotes adoption of land-augmenting technologies and spurs commercialization that reduces poverty
- Strong synergies between SLM and market development
- Payment for environmental services and targeted subsidies can be leveraged to enhance SLM investments
- Inter-linked policies to reduce undesirable tradeoffs from market-led intensification
- Investments in SLM by smallholders require improved market, policy and institutional arrangements

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Thank You