SYNERGIES BETWEEN MITIGATION AND ADAPTATION TO CLIMATE CHANGE: EXPERIENCE FROM KENYA

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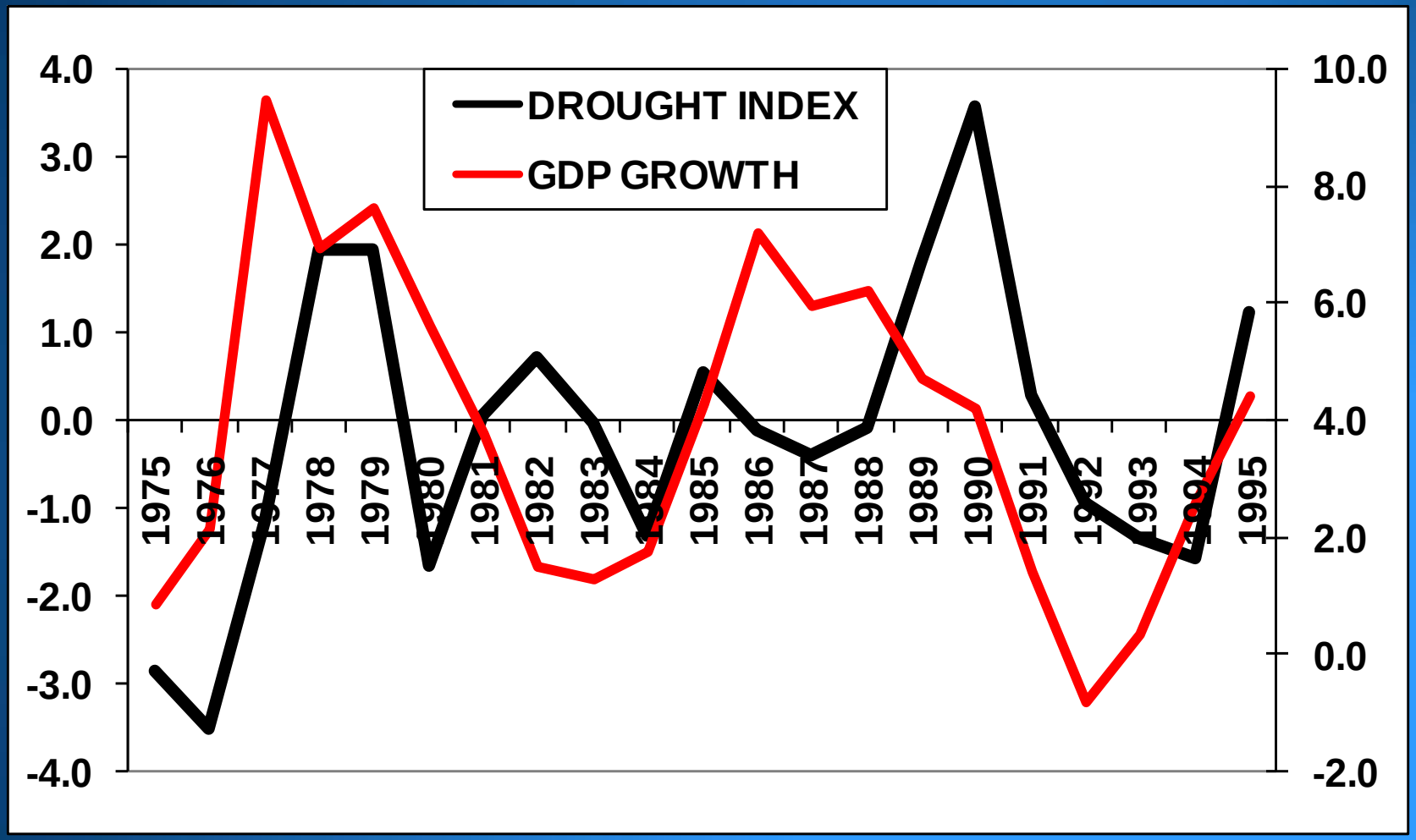
OUTLINE

1. **Impact of climate change on Kenya**
2. **Synergies between adaptation and mitigation**
3. **Farmer perceptions of adaptation and mitigation -** Preliminary results
4. **Conclusions**

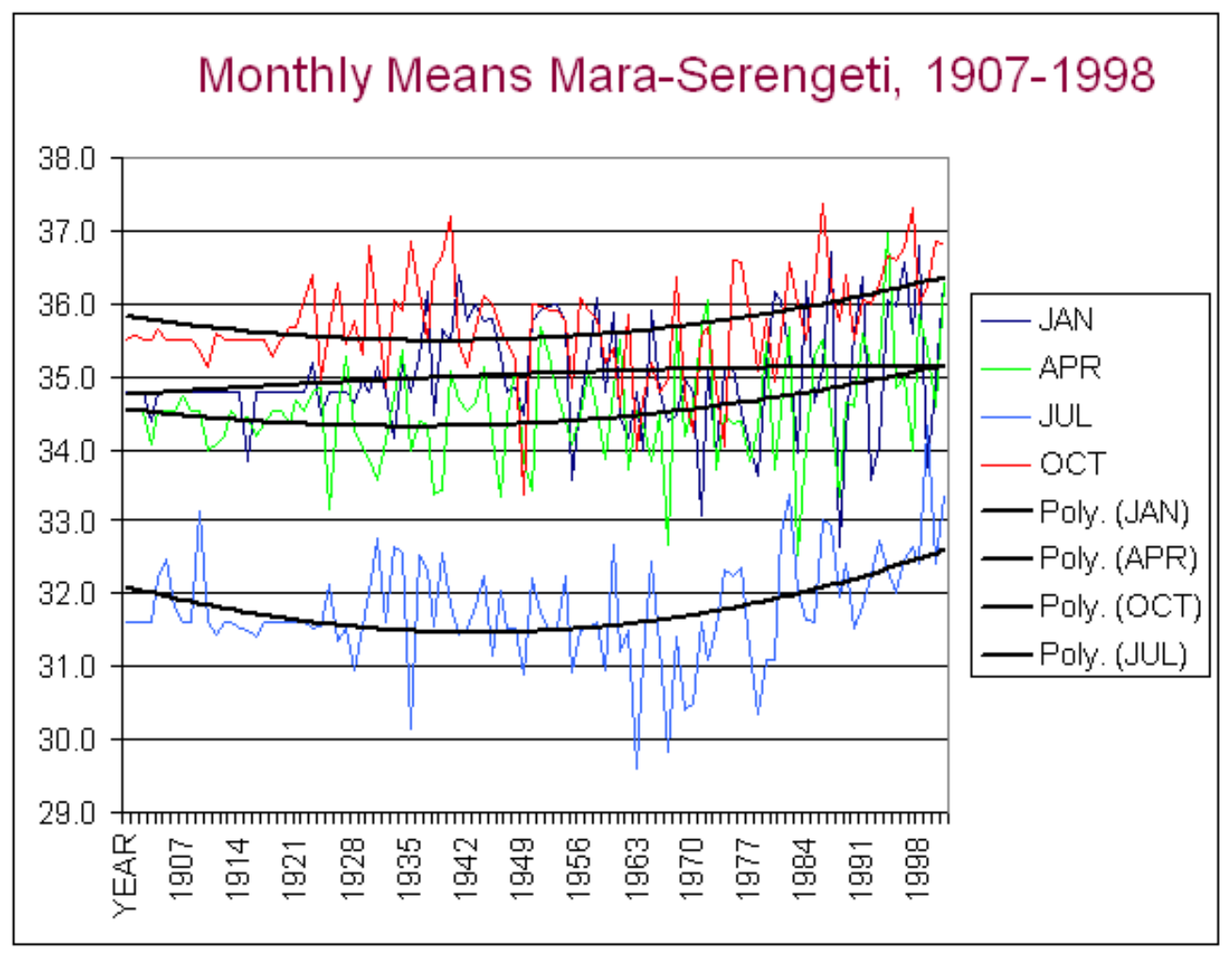
IMPACT OF CLIMATE CHANGE ON KENYA

WHY CLIMATE MATTERS FOR KENYA



Source: IFPRI

KENYA: TEMPERATURE ON THE RISE



Mostly:

- in the cold season
- for min night temps

Source: Ogutu et al. (2007)

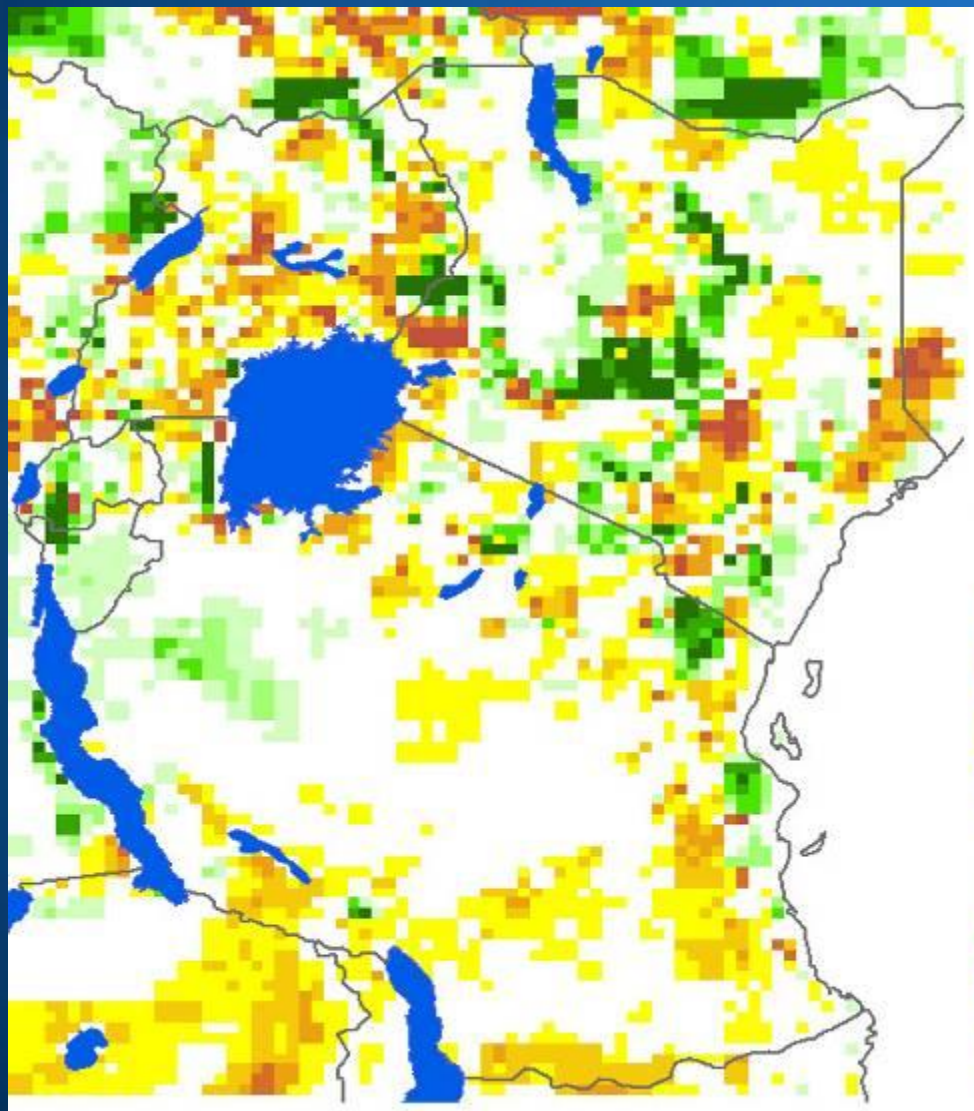
KENYA: CHANGE IN PRECIPITATION

Small increase expected in Dec-Jan

Region	Dec-Jan	Jun-Aug
Sahara	Small decrease (5-20%)	Inconsistent
West Africa	Inconsistent	Inconsistent
East Africa	Small increase (5-20%)	Inconsistent
Southern Africa	Inconsistent	Large decrease (>20%)

Source: IPCC (2007), Herrero (2009)

IMPACT OF CC ON MAIZE YIELDS
Kenya



2000-2050

Green= ***increase*** in yields

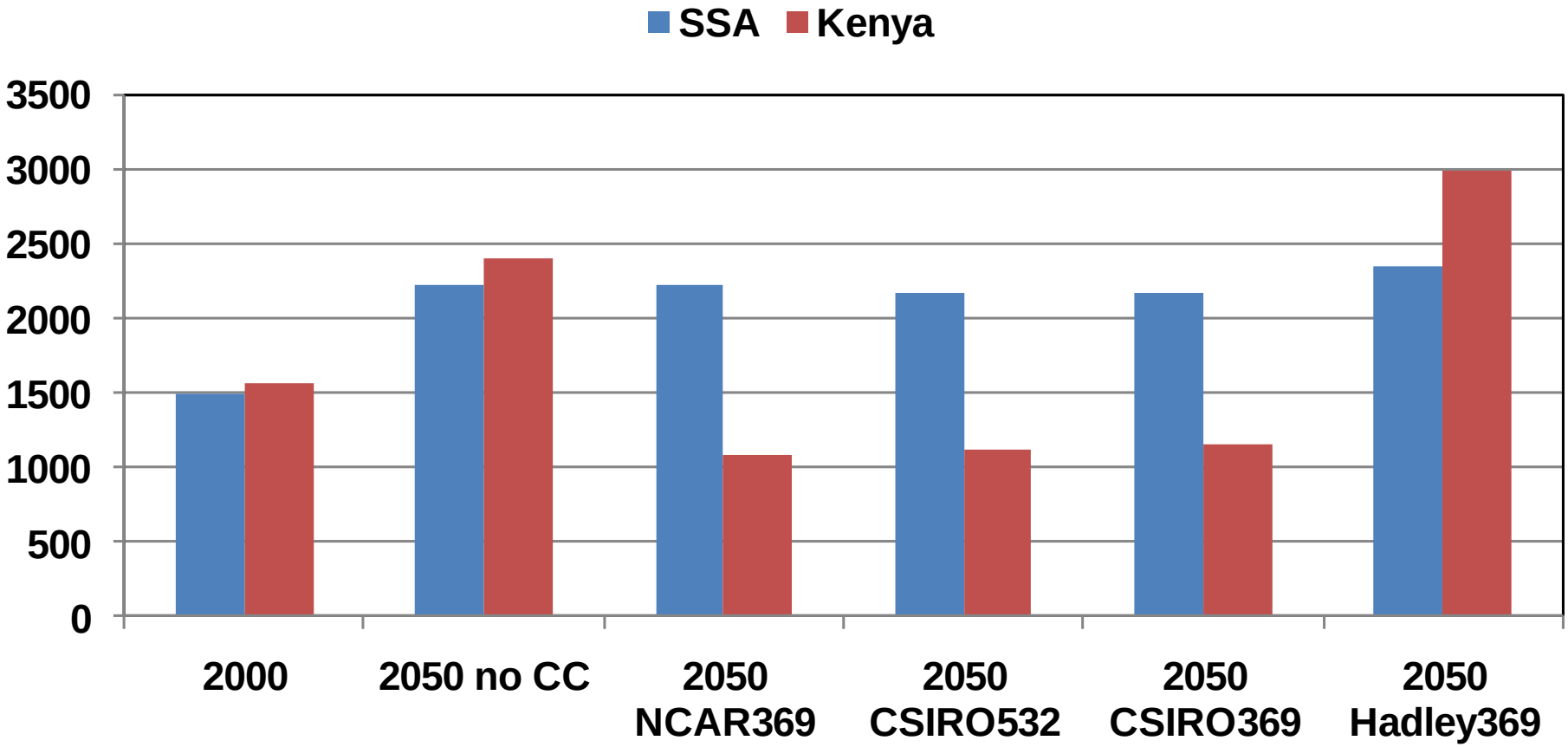
Brown= ***decrease*** in yields

difference in maize yield (kg/ha)

- < -500
- -500 to -400
- -400 to -300
- -300 to -200
- -200 to -100
- -100 to 100
- 100 to 200
- 200 to 300
- 300 to 400
- 400 to 500
- > 500

Source: Jones and Thornton (2003)

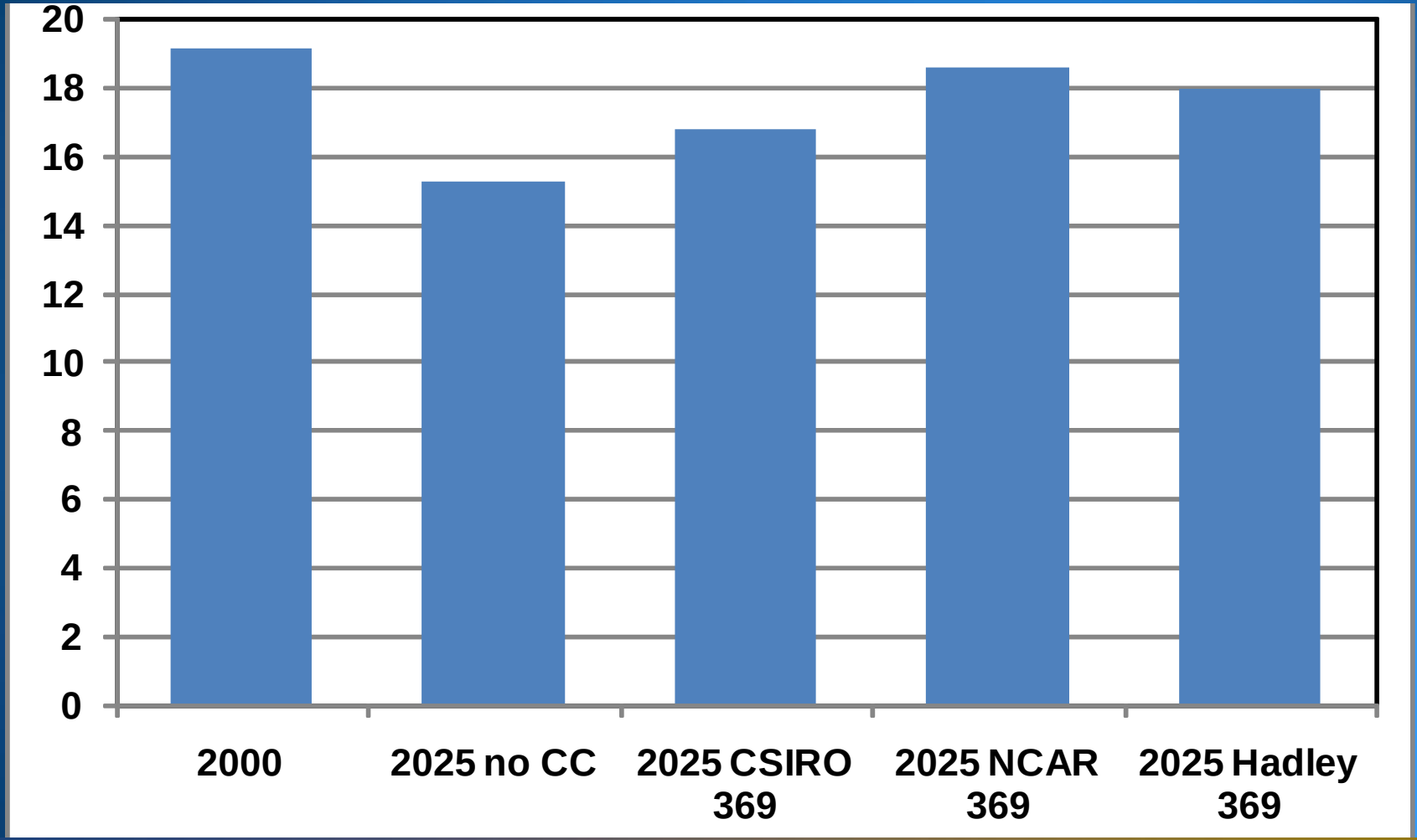
IMPACT OF CC ON MAIZE YIELDS
Kenya



Source: IFPRI

IMPACT OF CC ON CHILD MALNUTRITION (%)

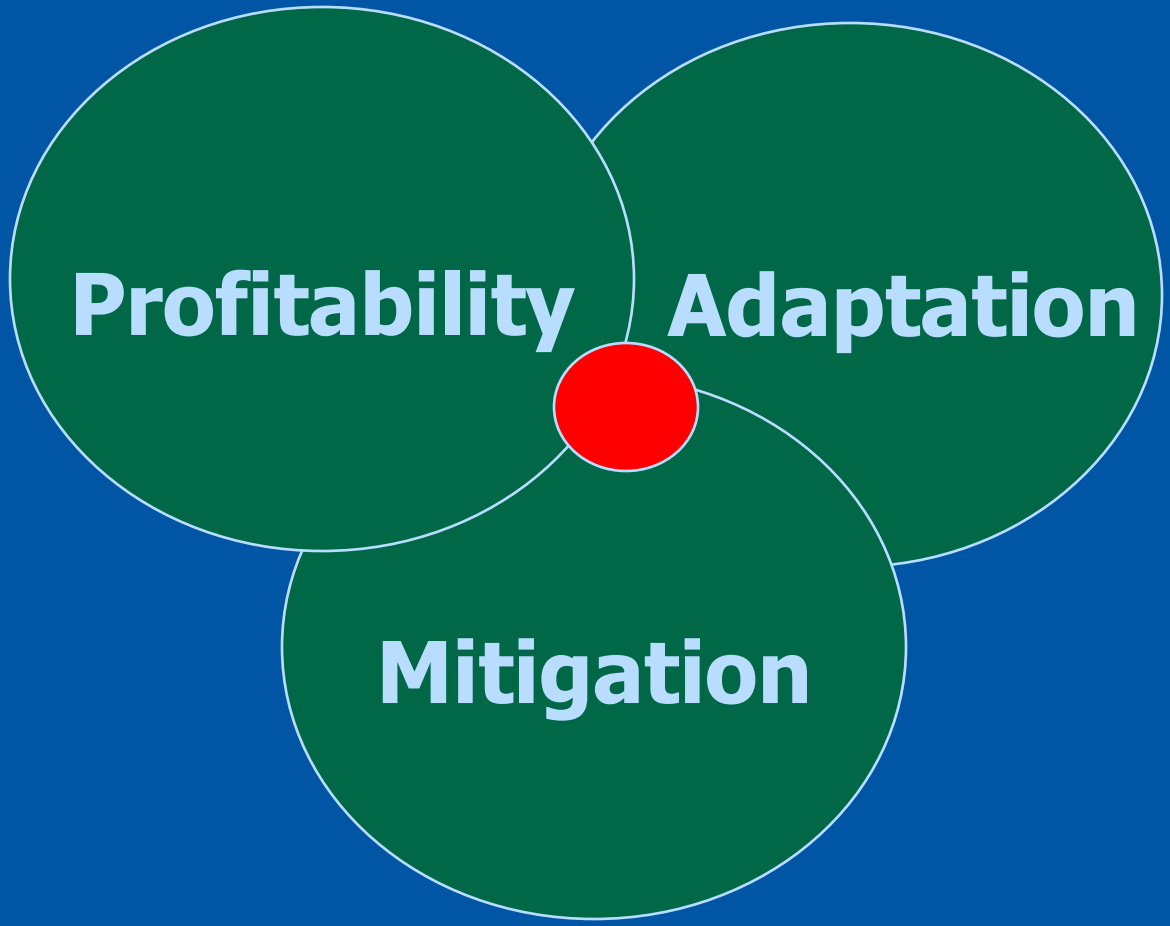
Projected to 2025



Source: IFPRI

SYNERGIES BETWEEN ADAPTATION AND MITIGATION

SYNERGIES & TRADEOFFS



MITIGATION: POTENTIAL IN AGRICULTURE

Estimated total technical and economic mitigation potential (0-20$/ton) on all agricultural land, incl. all management practices and all GHG

	Total Agric. Land (M ha)	Mitigation Potential by 2030		
		Technical (t CO2e/ha/yr)	Technical (Mt CO2e / yr)	Economic at 0-20$/ton CO2eq (Mt CO2e / yr)
East Africa	364	1.10	400	109
Central Africa	177	1.02	180	49
North Africa	113	0.80	90	25
South Africa	138	0.58	80	22
West Africa	302	0.73	220	60
Total	1093	0.89	970	265 (27%)

- Largest potential for agricultural CF projects in East Africa (41%)

Note: Estimates calculated from data provided by Smith et al (2008) (for SRES scenario B1)

MITIGATION: POTENTIAL IN AGRICULTURE

Commodity	Smallholder Livestock-Maize Systems	Maize	Biofuels	Coffee	Tea	Sugar
Area available in ha (million)	3	1.6	Semi-arid: 0.9	0.15	0.15	0.14
GHG mitigation activities	SALM: Agronomy Nutrient mgmt Water mgmt Agroforestry Set aside land	Residue mgmt.	Jatropha 1) Fuel-switch 2) AR	1) Shade trees, multiple cropping 2) Mulching 3) Fertilizer use eff	Inter-cropping no option in Kenya	1) No/ burning of residues 2) Mulching systems 3) Fertilizer related emissions
Existing extension service	-	-	-	+	++	+
Tech. GHG mitigation potential in t CO_2e/ha/y.	2 - 5	0.5	1) 1-12 2) 2.5-5.0 High bandwidth	3 – 8	-----	7.8 in 6 years
Economic mit. potential	++	?	?	++	0	+

Source: Timm Tennigkeit

SYNERGIES BETWEEN ADAPTATION AND MITIGATION

- Positive correlation between soil carbon and crop yield → Agricultural practices that improve soil fertility and enhance carbon sequestration also improve yield
- Increased fertilizer application, ideally combining inorganic with organic soil fertility types
- Increased and more efficient agricultural water management (reduces CO_2 from fuel/electricity, conserves land)
- Agricultural R&D, advisory services, and information systems→ support both adaptation and mitigation

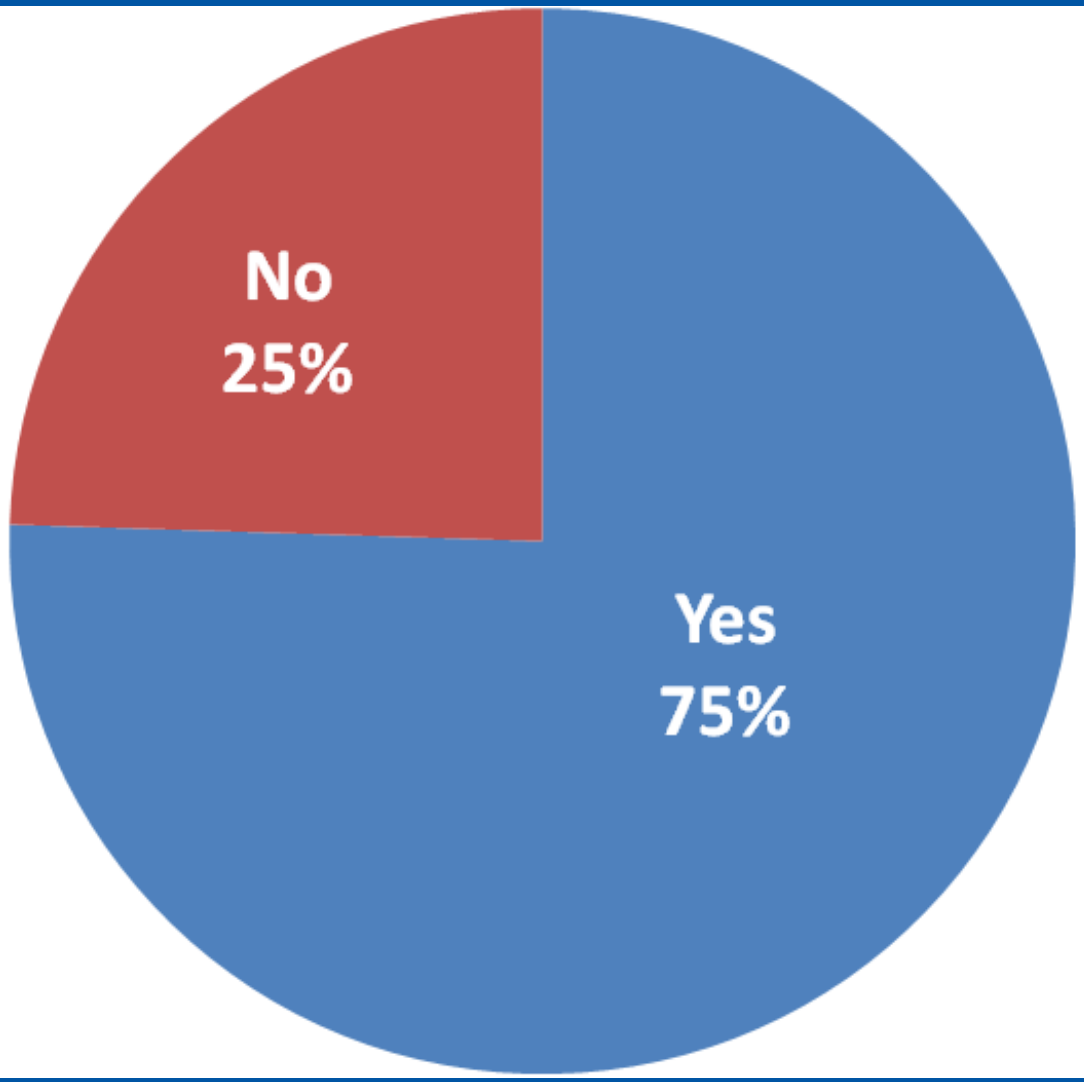
TRADEOFFS BETWEEN ADAPTATION AND MITIGATION

- Tradeoff between crop residues and animal feeds in parts of Kenya
- Lack of application of labor-intensive soil & water fertility management practices on marginal soils (too costly/risky)
- Increased fertilizer application (in conjunction with soil fertility management) reduces soil mining and supports mitigation and adaptation, over-fertilization increases GHG

FARMER PERCEPTIONS OF ADAPTATION AND MITIGATION

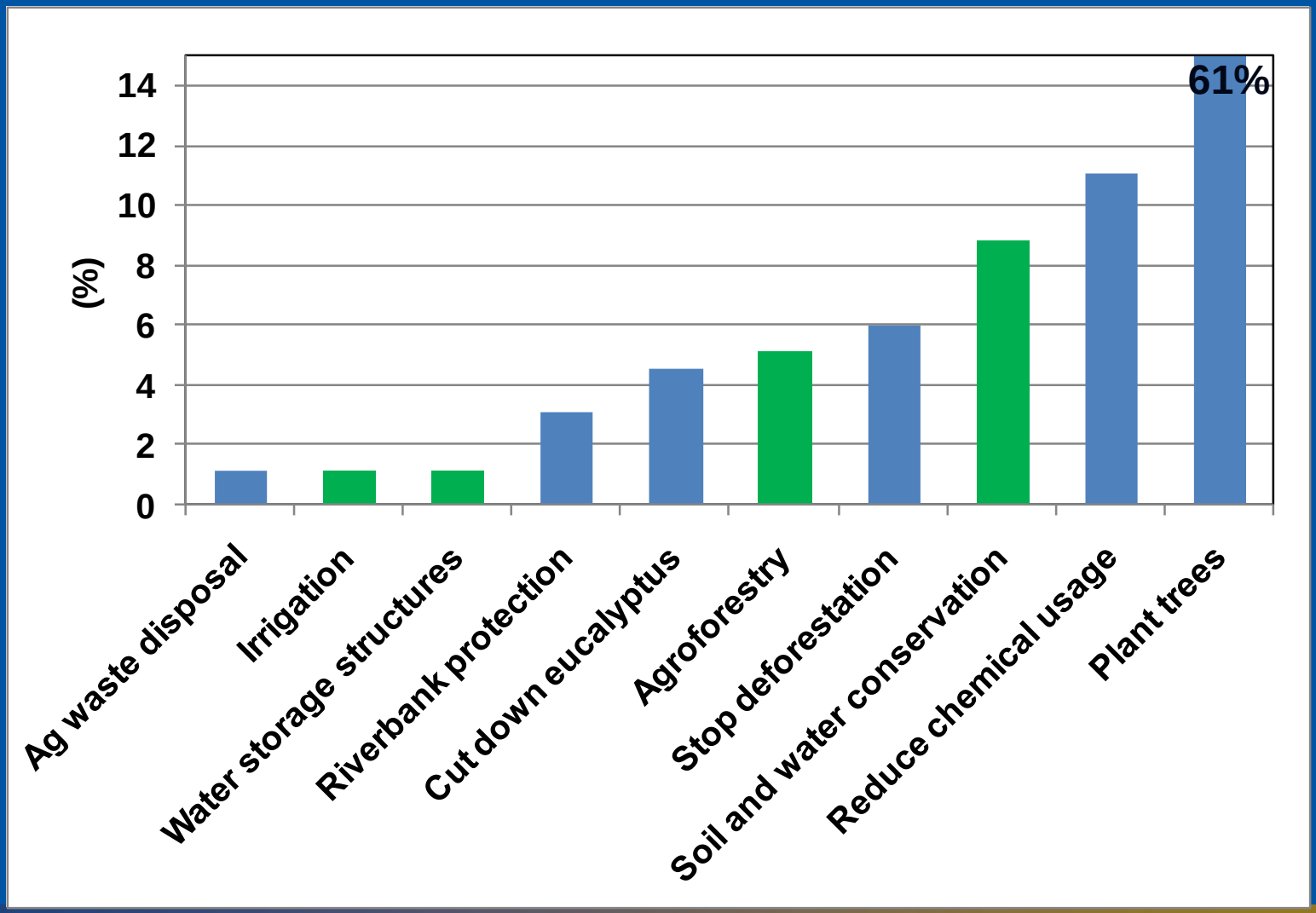
Farmers Are Aware Of The Link Between Agriculture And Climate Change

We asked farmers: "Are you aware of the link between agricultural practices and climate change"



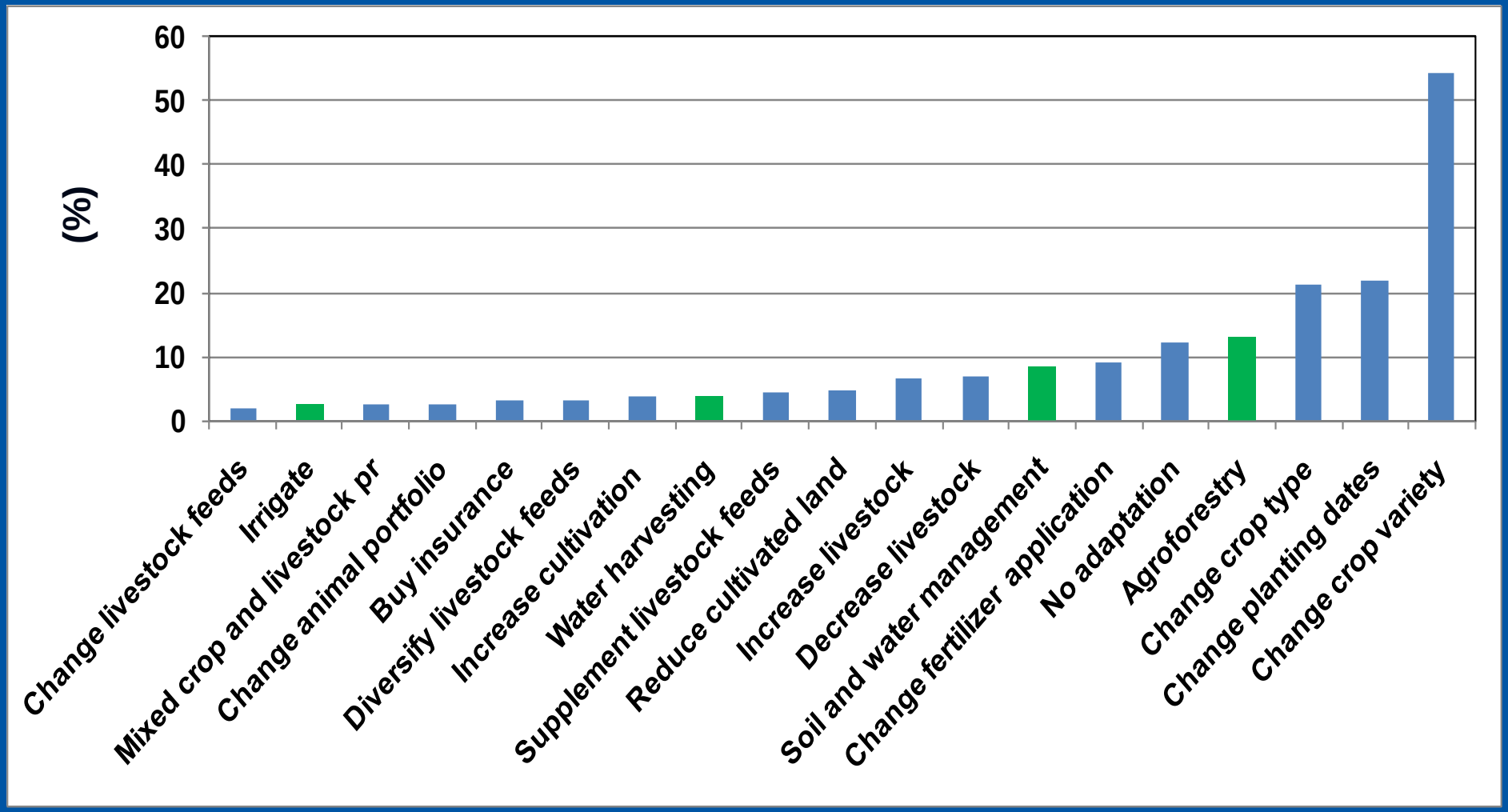
Source: KARI-IFPRI survey, n=351

"Which Agricultural Practices Can Help Reduce Climate Change?"



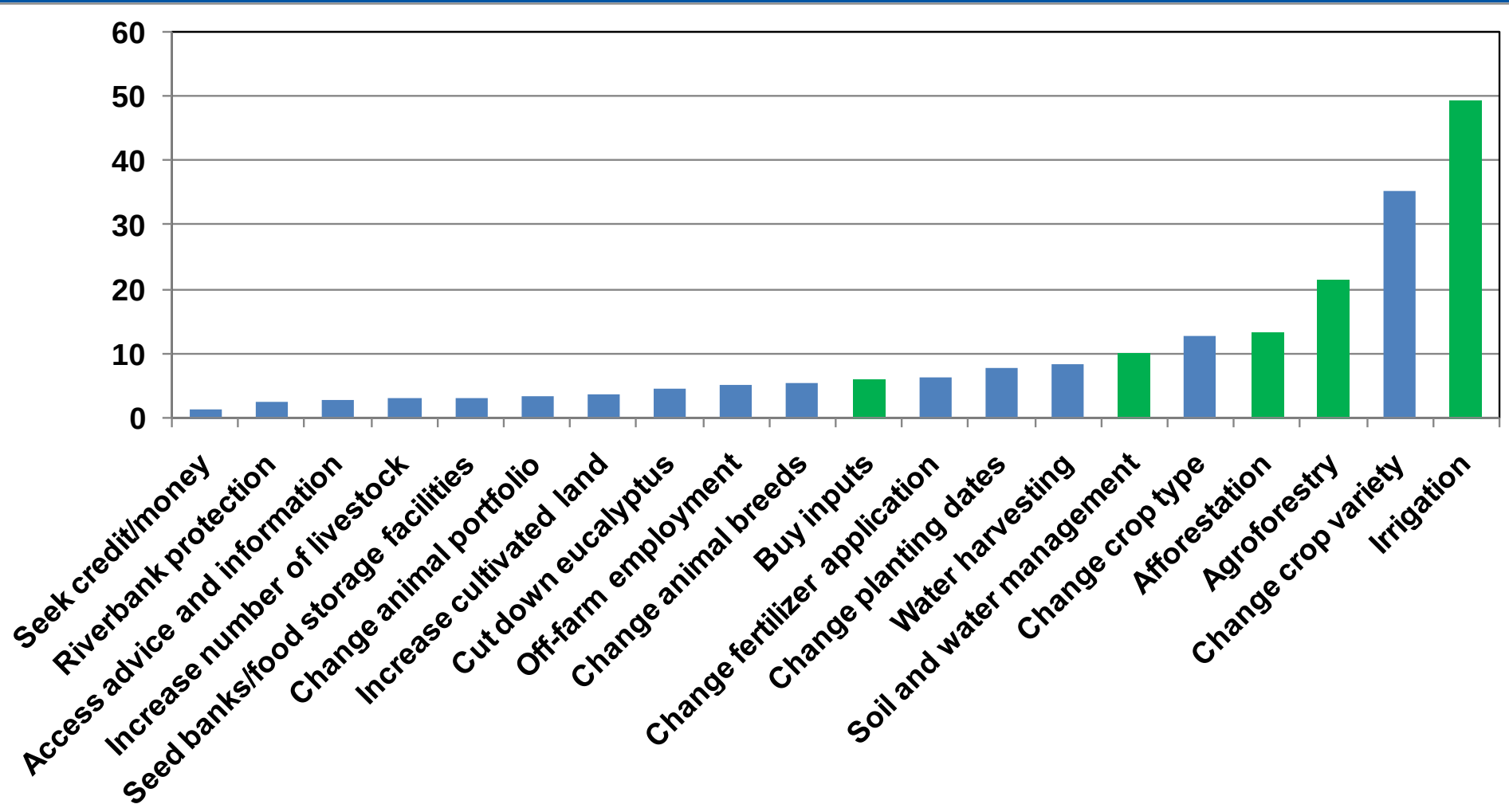
Source: KARI-IFPRI survey, n=351; multiple responses possible

"What Have You Done In Response To Perceived Climate Change?"



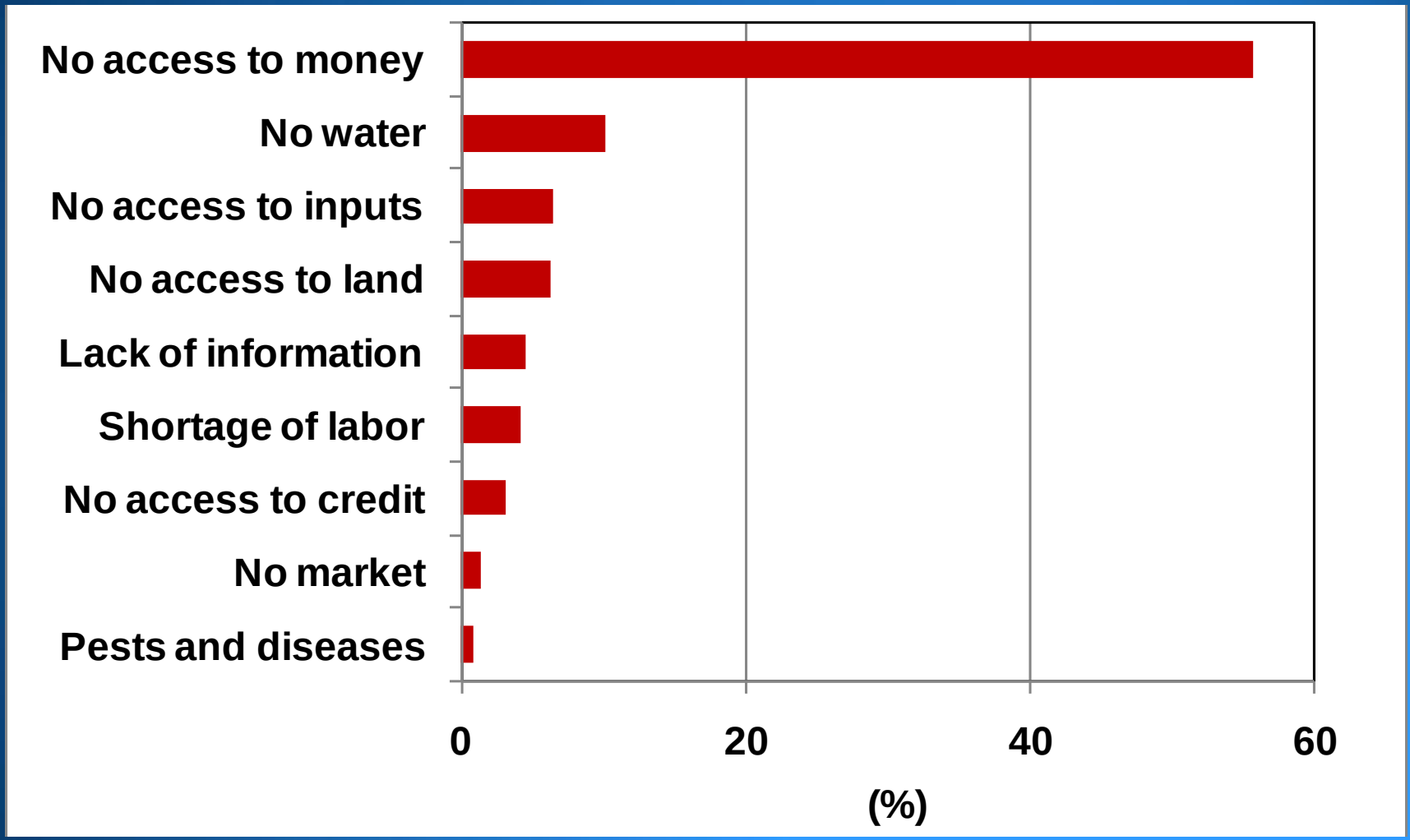
Source: KARI-IFPRI survey, n=351, multiple responses possible

"What Would You Like To Do In Response To Perceived Climate Change?"



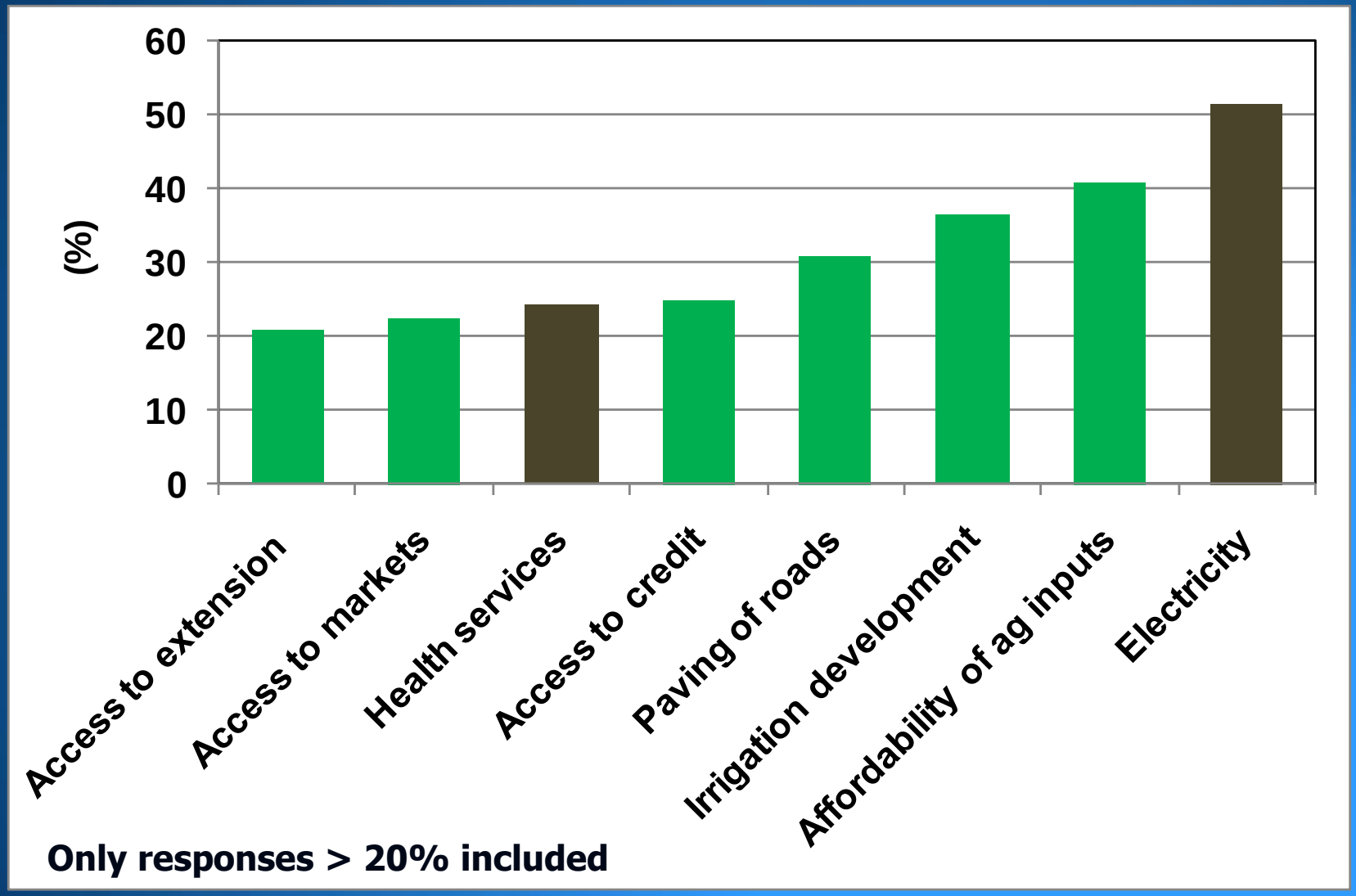
Source: KARI-IFPRI survey, n=351, multiple responses possible

"Why Are You Not Implementing Desired Adaptations?"



Source: KARI-IFPRI survey, n=351

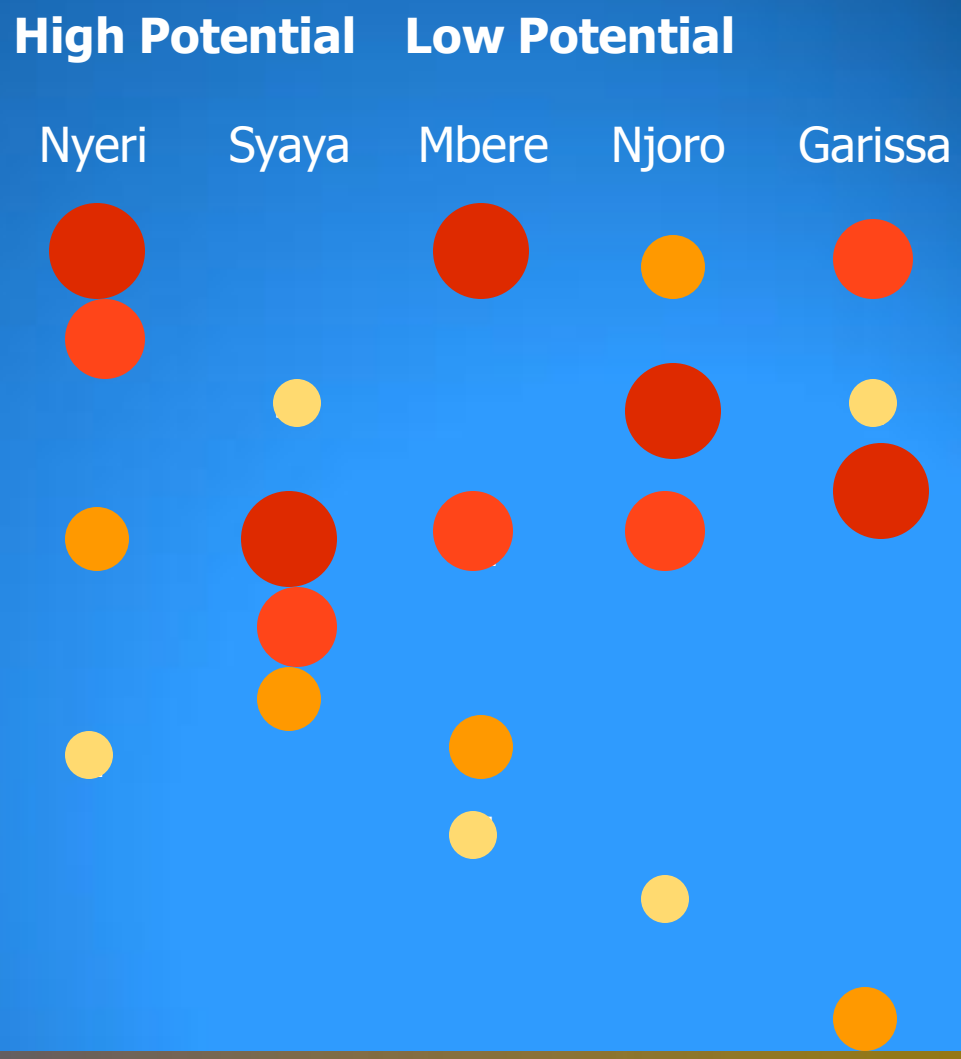
"Which Developments Do You Need Most Urgently?"



Source: KARI-IFPRI survey, n=351, multiple responses possible

"Which Solutions are Most Effective and Desirable to Deal with CC Impacts? ?"

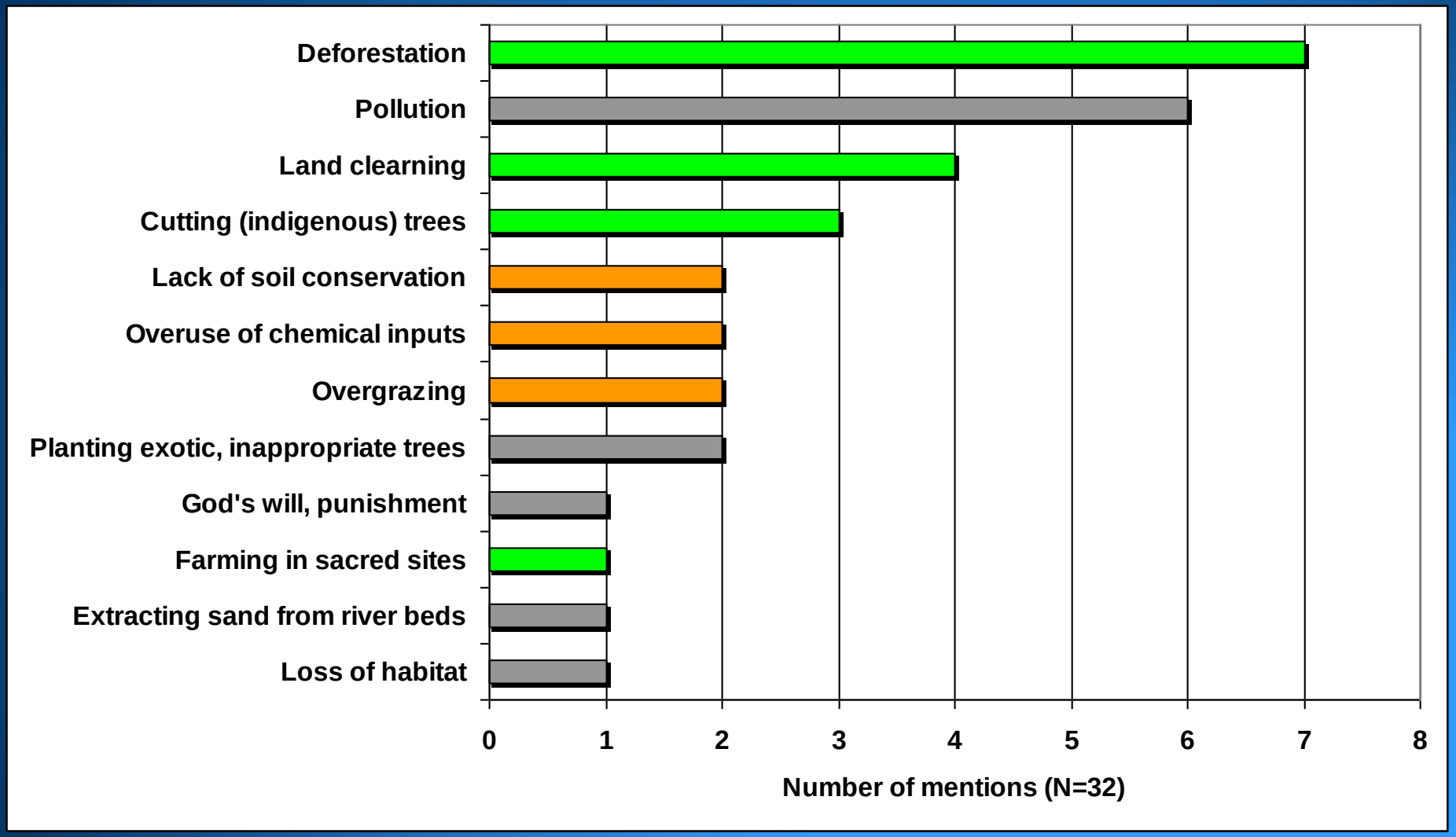
- Irrigation technology/water infrastructure
- Farmer organizations
- Training, capacity building
- Education
- Credit/capital
- Seed/seedlings provision
- Mechanization of agriculture
- Corruption eradication
- Markets, market controls
- Natural forest restoration
- Moving from pastoralism to farming



Ranking 1 2 3 4

Source: focus groups, KARI-UGA, n=69 men

"What are the causes of climate change?"



Source: focus groups, KARI-UGA, n=69



CONCLUSIONS

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- **Mitigation to climate change may yield substantial benefits for smallholder farmers in Kenya (US$2.2 billion in East Africa) that can be used to support adaptation and development efforts**
- **Given the low price of carbon offsets (US$5-20/ha) mitigation activities alone do not yield sufficient benefits: the latter need to be complemented by co-benefits from adaptation and increased productivity/profitability**
- **Therefore it is essential to focus on activities that advance all three areas: profitability, adaptation, and mitigation**

CONCLUSIONS

- Changing crop varieties/types and planting dates are among the most common adaptive strategies at the farm level
- The main constraint to implementing other adaptions is lack of access to capital and credit (ex.: irrigation is widely desired but expensive to establish and operate)
- Some of the priorities for development identified by farmers (irrigation, extension, capacity building, etc.) will support the synergies of mitigation and adaptation to climate change

CONCLUSIONS

- **Farmers are aware of the connection between agriculture and climate change and of the benefits of planting trees to mitigate climate change**

- **There is less awareness about the mitigation potential for soil and water conservation and integrated soil fertility management and their potential synergies with adaptation**