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Mitigation and adaptation in African smallholder agriculture: Synergies and tradeoffs

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Side Event COP 16 „Low Carbon Development Strategies - Panacea or Placebo? “

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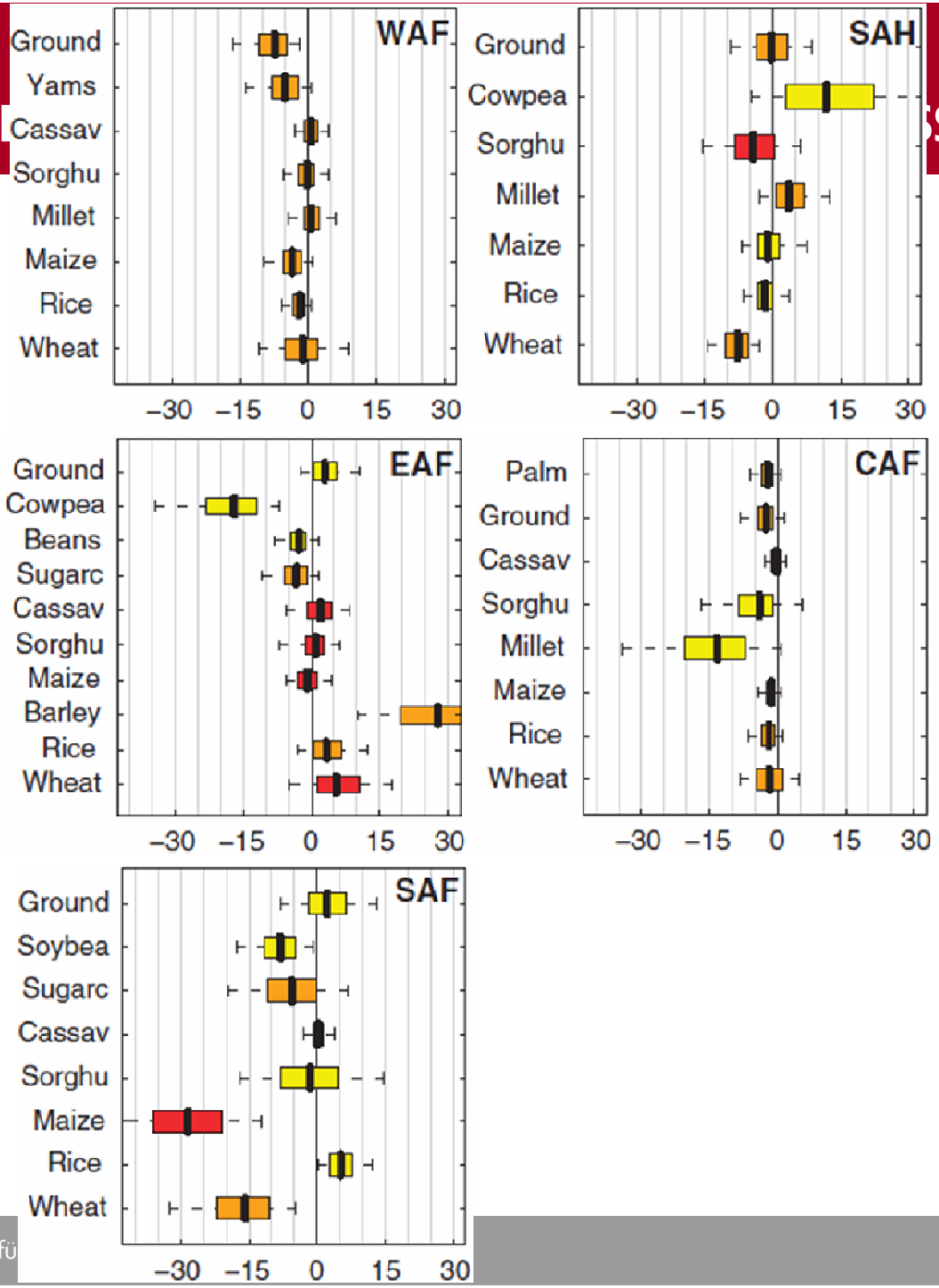
Impacts of Climate Change on SSA

- temperature increase of 3 to 4°C in 2080 to 2099 (more than global average)
- Large uncertainties with regard to overall precipitation, changes in interannual variability, and extreme weather events
- effects of cc on crops uncertain, i.a. due to CO_2 fertilization effect

Food security and food production in SSA

- absolute number of undernourished people increasing
- large increases in agricultural land up to 2050 (mostly rainfed)
- effects of cc on crops uncertain, i.a. due to CO_2 fertilization effect
- but: severe negative consequences with regard to harvests and thus economic output of agriculture

Future I SSA



Source: Lobell et al., 2008

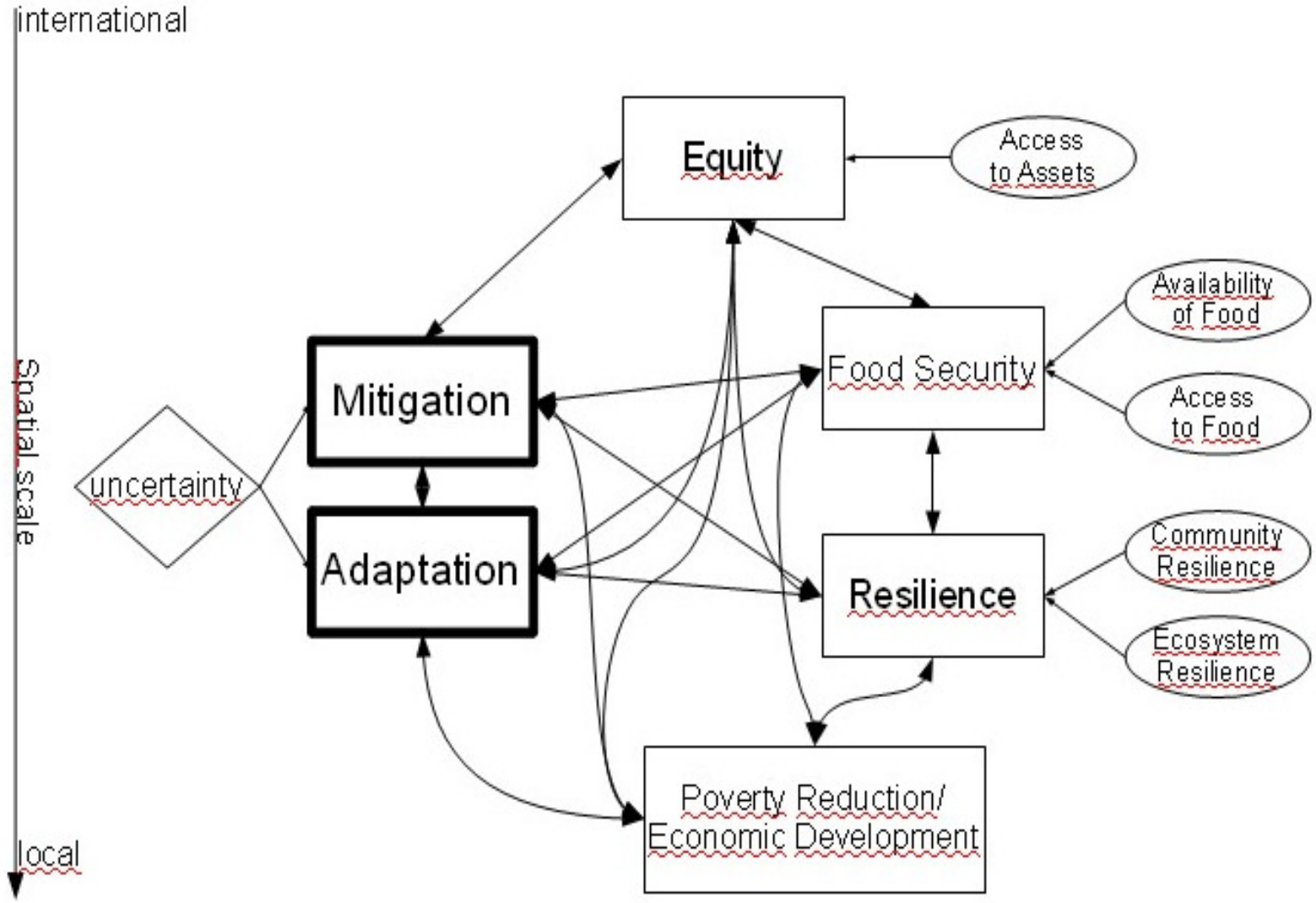
GHG Emissions from SSA agriculture

- Africa responsible for 7.8 % of global anthropogenic emissions (14 % of world population)
- in the land-use and the biomass burning category Africa's share much higher (21 and 37 %, respectively)
- largest increases in agricultural emissions expected for SSA and Middle East/North Africa

Region	N_2O soils	CH_4 enteric	CH_4 rice	CH_4, N_2O manure	CH_4, N_2O burning	Total
Sub-Saharan Africa						
Mt CO_2-eq. $year^{-1}$ in 1990	252	183	12	12	145	603
% change in 2005	39	34	81	33	−1	28
% change in 2020	102	77	172	83	−1	70

Source: Smith et al., 2007

Resilience and response capacity



Adaptation and mitigation in agriculture

- Large synergies between adaptation and mitigation
- Further benefits for other ecosystem services (e.g., water quality)
- But also trade-offs => full production cycle to be considered
- Similar to REDD: MRV, leakage, additionality, permanence
- Adaptation and mitigation mostly discussed seperately

Synergies and trade-offs between C sequestration and food security

Source: FAO, 2009

Conservation agriculture

- Minimum soil disturbance; crop rotation; permanent soil cover
- Increased soil C sequestration and yields?
- Redistribution of soil C compared to conventional agriculture
- Adverse impacts through herbicide application
- Or weeding done manually => additional work load
- Yields may decrease in the beginning
- Conflicts over crop residues

Implementing agricultural mitigation in SSA

- deficencies in agricultural knowledge, low degree of mechanization, low input of improved seed varieties and fertilizers => low productivity

- large diversity of agroecosystems (=> green revolution)

- poor access to input and output markets

- education => diversification => more investment in sustainable agricultural practices => mitigation

- Intensification on existing agricultural land or expansion to previously unused land?

Agricultural mitigation in the UNFCCC

- Agriculture largely excluded from CDM

- High fragmentation, high transaction costs

- Unclear property rights and access to land

- Up-front costs for additional investments => widening the gap between poor and wealthier groups

- NAMAs to explore „low-hanging fruits“

- No linkages between NAPAs and NAMAs

Agricultural mitigation in NAMAs

Country	Livestock	Crop land	Waste	Peat land
CAR	-	Crop improvement	Crop res., animal waste	-
DR. Congo	-	1.Conservation farming 2. N-fixing species 3. Irrigation	-	-
Ivory Coast	-	Conservation farming	-	-
Ethiopia	-	1. Agroforestry 2. Soil C-sequestration	-	-
Eritrea	-	Soil C-sequestration	-	-
Ghana	-	1. Conservation tillage 2.Efficient fertilizer app 3.Crop improvement	Crop res. and animal waste	Improved mgt.
Madagascar	1. Improved livestock mgt. 2. fodder crops	1.Efficient fertilizer appl. 2.Crop improvement	-	-
Sierra Leone	-	1. Conservation farming 2. Agro-forestry		

Conclusions and recommendations

- need to deal with complexity - multiple hierarchical levels; large number of stakeholders; linkages within the system
- large importance of agriculture for poverty reduction
- Go for comprehensive agricultural strategies
- Collaborative adaptive management and social learning
- Higher priority of agriculture is needed
- Capacity building for flexible institutions (horizontal and vertical)

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C. Ifejika Speranza:: Resilient adaptation to climate change in African agriculture

B. Horstmann: Framing adaptation to climate change: a challenge for building institutions

Thank you for your attention!

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