Climate Change and Natural Resource Management in Africa
– land use, forestry and water challenges -

Joachim von Braun
Center for Development Research, University of Bonn, Germany

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Theme 3: Natural Resource Management
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Impact of climate change on agriculture, forests, water...
Climate change impacts on agriculture, water and forests

Climate change...
- Reduces agricultural production
- Makes food less secure and prices high
- Makes land use more important
- Makes water more scarce
- Threatens forests at the margins
- Increases the value of forests

And all that induces policy change

and high uncertainties remain at regional levels
Climate induced change in production in 2050: Irrigated rice in Africa

Global rice production = -27%

Source: Rosegrant 2009
Climate induced change in production in 2050: Rainfed maize in Africa

Global maize production = -16%

Source: Rosegrant et.al. 2009
88% of farm households surveyed in Kenya noted that rainfall had decreased over the past 20 years.

94% said average temperatures had risen.

81% of surveyed farmers reported they had taken adaptive measures.

Source: Claudia Ringler, IFPRI 2011
The options for responding to climate change in agriculture

1. Store grain
2. Facilitate migration or job change with skills
3. Diversify and increase production
4. Store water and irrigate more
5. Trade more
6. Accelerate innovation and science capacity

Strategy: best combinations of 1. – 7. over time adjusted to country and local context
The other way round:

Impact of agriculture and forest change on climate...
Land use change in agriculture and forests impacts on climate change …

- Land use change often contributes to Green-House Gas emissions
- Livestock production adds to GHG but key for income
- Agriculture is one driver of deforestation
- Deforestation and forest degradation add to GHG
AGRICULTURE’S CONTRIBUTION TO CLIMATE CHANGE

Share of global total GHG emissions by source

- **Energy**: 60% (52% Developed Countries; 8% Developing Countries)
- **Deforestation**: 18% (11% Developed Countries; 7% Developing Countries)
- **Agriculture (excluding land use change)**: 14% (12% Developed Countries; 2% Developing Countries)
- **Industrial processes**: 4%
- **Waste**: 4%

74% of agricultural emissions from developing countries

Sources: World Resources Institute 2007; World Development Report 2008
67% of Kenyan farmers stated that they are aware that agriculture contributes to climate change.

- Extensive media reports
- Government campaigns and speeches related to climate change
- 1st Ag Carbon Mitigation project located in Kenya

Source: Claudia Ringler, IFPRI 2011
Strategy and policy
Tradeoffs between Mitigation and Food Security

<table>
<thead>
<tr>
<th>Mitigation Potential</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Overgrazing Soil nutrient mining Bare fallow</td>
<td>GW pumping Mechanized farming</td>
</tr>
<tr>
<td>High</td>
<td>Integrated soil fertility management Improved seed Low-energy irrigation Conservation tillage/residue management Improved fallow</td>
<td></td>
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</tbody>
</table>

Second-generation biofuels
Conservation tillage/residue management [when tradeoffs with livestock feed]

Food Security Prospects

Source: Adapted from FAO (2009)
<table>
<thead>
<tr>
<th>No.</th>
<th>Practice</th>
<th>Adaptation</th>
<th>Mitigation</th>
<th>Profitability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Change in crop variety/type</td>
<td>√</td>
<td>mixed</td>
<td>?</td>
</tr>
<tr>
<td>2.</td>
<td>Planting trees/agroforestry</td>
<td>√</td>
<td>√</td>
<td>?</td>
</tr>
<tr>
<td>3.</td>
<td>Soil Water Conservation</td>
<td>√</td>
<td>mixed</td>
<td>√</td>
</tr>
<tr>
<td>4.</td>
<td>Improved soil nutrient management</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>5.</td>
<td>Improved livestock feeding</td>
<td>?</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>6.</td>
<td>Irrigation</td>
<td>√</td>
<td>mixed</td>
<td>√</td>
</tr>
<tr>
<td>7.</td>
<td>Change in planting date</td>
<td>√</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

Source: Claudia Ringler, IFPRI 2011
Climate change revalues biomass and impacts on its global distribution – Africa may have advantage
Bio-economy: the emerging sector with new value chains in “Green growth”
- scope for Africa – Europe cooperation

Source: Bioeconomy Council, Germany, 2010
POLICY IMPLICATIONS

- Climate smart agriculture and land use (adapt, mitigate, profit; link to water, forest -- REDD+ -- community action in small farm and pastoralists)

- Build research capacities and graduate schools to strengthen domestic evidence-based negotiation capacity in Africa.

- Ensure that agricultural and food security policies in Africa explicitly include climate change adaptation and mitigation aspects
Climate diplomacy around natural resources

Africa – Europe

1. Europe to share climate change relevant science and to assist in building climate relevant university education capacity in Africa

2. Africa to facilitate climate-smart agriculture and forestry and sustainable production and utilization of biomass with priv. sector

3. Africa and Europe to facilitate more open trade in response to climate related market volatility
   - Carbon markets (potentials for Africa) or taxes and
   - Adaptation funds (needed in Africa) with a strong focus on land and forests (Green Climate Fund, Technology Mechanisms)