

Agriculture and Climate Change Emissions:

Potential mitigation and adaptation measures in the agricultural sector

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Climate Change – the Role of Food and Agricultural
Trade**

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Outline of Presentation

- **Agricultural Greenhouse Gas Emissions and Mitigation Potentials**
 - **Adaptation Strategies to Climate Change**
 - **Limits and Constraints to Adaptation**
 - **Knowledge Gaps Recommendations**
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Climate Change

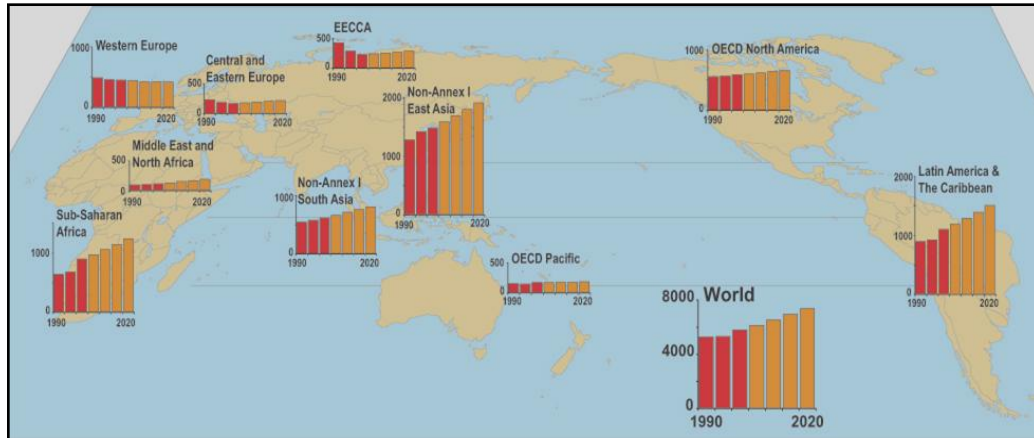
- **Problems largely caused by anthropogenic factors**
 - **Large increase in Carbon Dioxide (CO₂), Methane (CH₄) and Nitrous Oxide (N₂O) in the atmosphere**
 - **Most CO₂ from fossil fuel burning, but CH₄ and N₂O mainly from agriculture and forestry**
 - **About 30% of global greenhouse emissions from Agriculture (including forestry and landuse change)**
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Climate Change Mitigation in Agriculture (1)

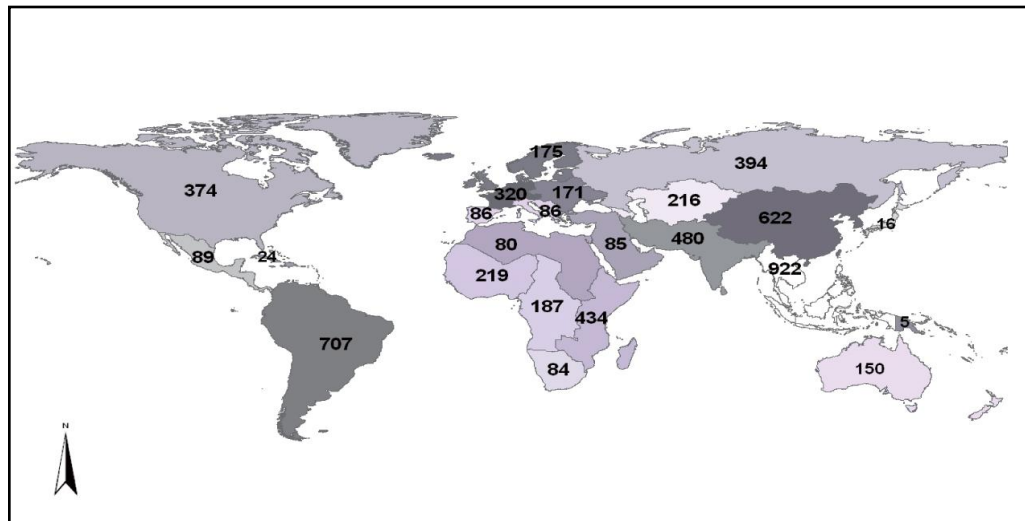
- Most of the agricultural contribution to GHG is from the developing countries
 - About 70% of economic potential for mitigation is in the developing countries
 - Mitigation Options
 - cropland management,
 - grazing land management and pasture improvement,
 - management of organic/peaty soils,
 - restoration of degraded lands,
 - livestock management,
 - manure management, and
 - bioenergy.
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Climate Change Mitigation in Agriculture (2)

- Many of the options have win-win outcomes in higher productivity, better management of natural resources, or the production of valuable by-products such as bio-energy
 - Incentives required to encourage mitigation in developing countries
 - Carbon trading
 - Expansion of CDM to include afforestation & reforestation
 - Investment in science and technology for low carbon emission technology
 - Mitigation Trade-Offs
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Regional Contributions of Agricultural Greenhouse Gases (Smith et al., 2007)

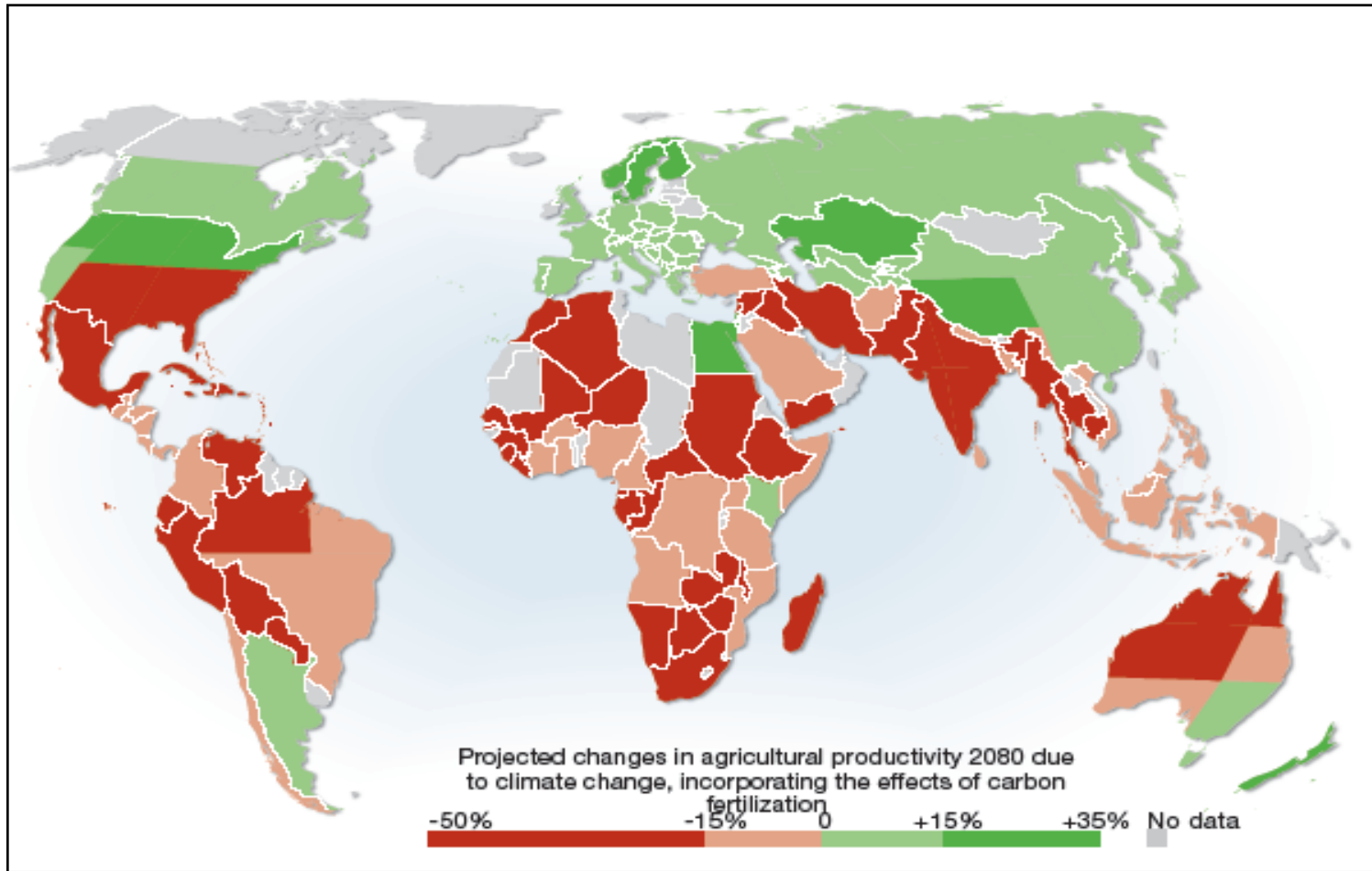


Regional Distribution of Economic Potential (at US\$ 100/tCO₂-eq) by 2030 (Smith et al., 2007)

Climate Change and Agriculture

– Biophysical Impacts

- Decrease in yield in seasonally dry and tropical regions,
 - Reduction in agricultural productivity from increased frequency of climate extremes such as droughts and floods
 - Increased incidences of agricultural pests and diseases,
 - Changes in land availability for agriculture (expansion in some areas and a reduction in others),
 - Possible local extinctions of particular fish species, increased global food insecurity.
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Projected Changes in Agricultural Productivity by 2080 as a Result of Climate Change

Climate Change and Agriculture

– Socio-Economic Impacts

- **Global Cereal Production and Agric GDP**
 - Increase in northern latitudes and decline in lower latitudes
 - Up to 20% increase in agricultural prices in short and medium term
 - Increase in agric GDP up to 2.6% in high latitudes and decline of up to 1.5% in others.
 - **Food Security**
 - By 2080, about 768 million people malnourished
 - By 2030, additional 10 million Africans at risk of hunger
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Adaptation to short-term Variability

- ❑ **Farm level decisions and adjustments**
 - implementation of agronomic practices
 - Nutrient management
 - Tillage / residue management
 - Water management
 - Rice management
 - Agro-forestry
 - Land cover (use) change
 - ❑ **Insurance and other financial mechanisms**
 - ❑ **Temporary migration**
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Adaptation to Long Term Climate Change

- **Still in infancy, often implemented as planned adaptation**
 - **Development of new technologies to build resilience**
 - **soft technologies - information systems, management practices, development of new crop cultivars, etc,**
 - **hard technologies - development of equipment for irrigation, conservation tillage, and integrated drainage systems.**
 - **Insurance**
 - **Caribbean Catastrophic Risk Insurance, Index Insurance**
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From Adaptation to Adaptive Capacity

- **Climate change is a ‘moving target’, hence the emphasis on adaptive capacity**
 - The presence of adaptive capacity is a necessary condition for the design and implementation of effective adaptation strategies
 - **Determinants of adaptive capacity**
 - Education, income, health, institutions, knowledge, technology and levels of national development
 - Differential adaptive capacity in developing Countries
 - **Enhancing Adaptive Capacity**
 - Current Programmes and Initiatives – NAPA, MACC, etc
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Limits and Barriers to Adaptation



- Financial barriers
- Physical and ecological Limits
- Informational limits
- Technological limits
- Social and cultural barriers

Integrating Mitigation & Adaptation

- **Agriculture & forestry contribute 50% of the global emissions of NO₂ and CH₄, and about 30% of total GHGs emissions.**
- **Agriculture contributes to reduce carbon sequestration through deforestation and land use change**
- **Agriculture offers excellent opportunities for reducing GHGs. Most of the agricultural contribution to GHG is from developing countries; about 70% of the economic potential for mitigation is in the developing countries, predominantly in ACP**
- **Many mitigation strategies in agriculture have win-win outcomes in higher productivity, better management of natural resources, or the production of valuable by-products, such as bio-energy**

Examples of Mitigation and Adaptation Strategies

- ❑ Nutrient management by improving efficiency of Nitrogen with appropriate fertilizer application rates.
 - ❑ Reducing nitrogen fertilizer use can improve water quality and reduce nitrous emissions.
- ❑ Agro-forestry: Establishment of shelter belts and riparian buffer strips with woody species.
 - ❑ Providing riparian buffers can enhance wildlife habitat, improve water quality, and increase carbon storage.
- ❑ Reducing Emissions through Avoided Deforestation and Degradation (REDD).

Matters Arising from Mitigation and Adaptation

- **Food Miles**
 - Lop-sided argument
 - Should consider entire market chain
 - Recognise impacts on African economies
 - **Virtual Water and Ghost Acres**
 - Climate change and political implications
 - **Carbon Leakage and Embodied Carbon**
 - Transferring consequences to developing countries?
 - Need to quantify carbon associated with international agricultural trade
 - **Biofuels**
 - Ethical issues: Food versus Fuel?
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Thank you
