

# Greenhouse Gas Contributions and Mitigation Potential of Agriculture

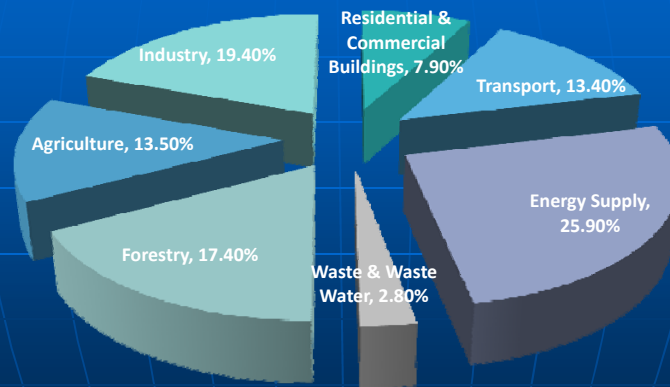
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The World Bank

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## Outline

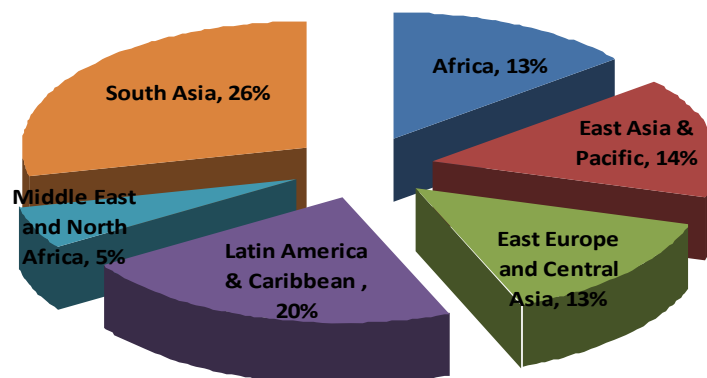
- Contributions of Greenhouse Gas Emissions by Sector
- Distribution of GHGs Emission from Agriculture
- Sources of Agricultural GHGs
- Mitigation Potential From Agriculture
- Economics of Agricultural Mitigation
- Barriers

## Contributions of Greenhouse Gas Emissions by Sector, 2004

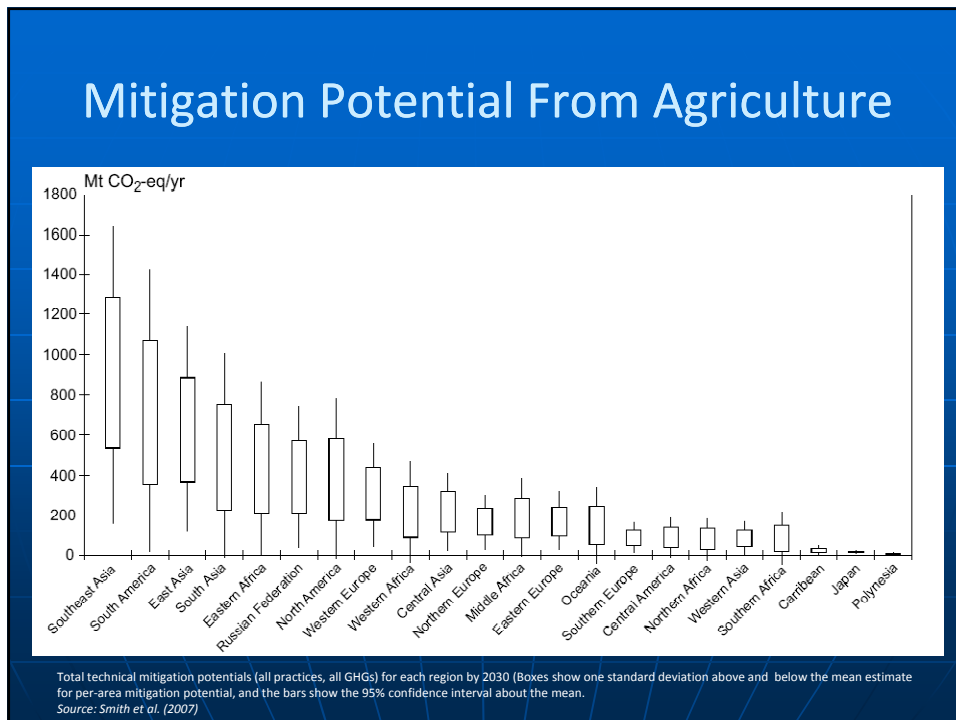
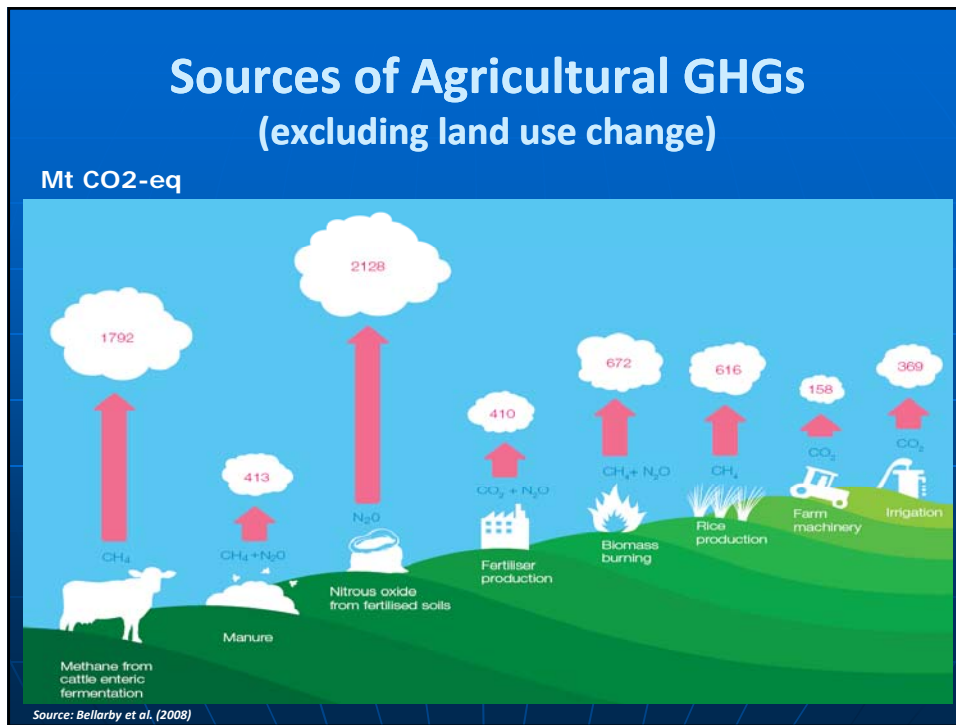


Source: Davis (2008)

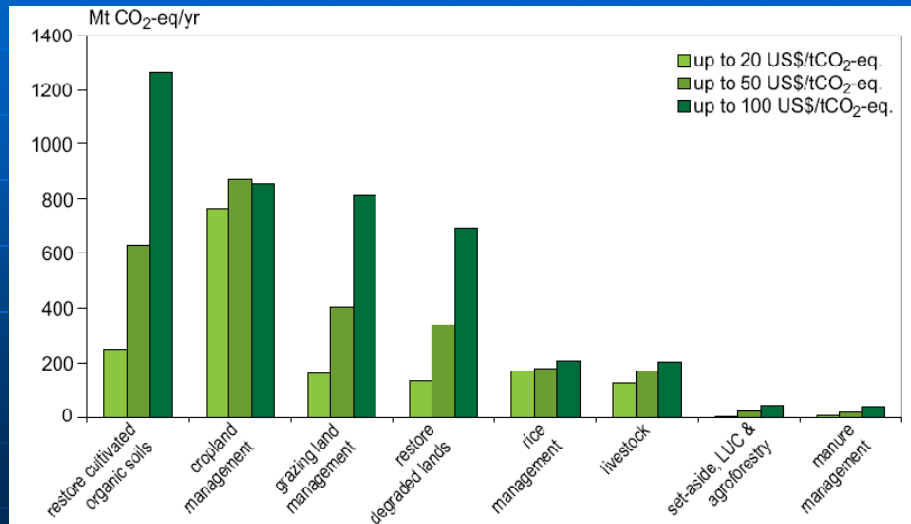
## Global Distribution of GHG Emissions from Agriculture



Source: World Bank (2008)



## Economic potential for GHG mitigation



Economic potential for GHG agricultural mitigation by 2030 at a range of prices of CO<sub>2</sub>-eq.  
Source: Smith et al. (2007)

## Overcoming the Barriers

- Adoption of mitigation practices is not only a technical but a complex development issue
- There are primarily three main barriers:
  - (1) **Technical and Information**
    - Technical expertise and access to information
  - (2) **Economic**
    - High start-up and transaction costs
  - (3) **Institutional**
    - Social Capital
    - Land Tenure

## Technical & Information

- **Lack of Knowledge about new practices and technology**

The majority of smallholder farmers in Sahel region do not have the needed skills to participate in C offset schemes efficiently (Tschakert, 2007)

- As majority of farmers in the developing countries are illiterate, they may not always be aware of the incentives of engaging in carbon sequestration measures.

## Economic Barriers

- Contracting, verifying, and monitoring carbon sequestered in small farms that are often dispersed impose high transaction costs. The payments that poor farmers will receive after the deduction of brokerage costs may be insufficient to induce poor farmers (Graff-Zivin and Lipper, 2008).
- The brokerage cost of crop insurance alone could amount to 25% of the market price if it requires grouping of many farmers and selling it to one insurance agent (Smith et al., 2007).
- Estimates of per hectare costs of monitoring 1,000 hectare of soil carbon projects are between \$5 to \$8 (Mooney et al., 2004).

## Institutional Barriers

- **Social Capital**
  - Farmers' ability to benefit from soil carbon projects will depend upon their capacity to organize themselves and act as pressure groups for collective action and bargaining with Carbon traders and with state structure that will mediate or regulate carbon trading (Pagiola et al., 2005).
- **Land Tenure**
  - Land tenure security has positive effect on the adoption of improved management practices (Ståhl, 1993; Pattanayak et al., 2003; Soule et al., 2000)
  - Farmers that own land or have secured rights are more likely to invest in the best management options (Nhemachena et al., 2008)
  - In the absence of well defined land rights, it is difficult for suppliers to make credible commitments to supply carbon offsets (Gutman, 2003).

## Conclusions

- Agriculture has potential for crucial early action on mitigation
- To avoid 4 degree scenarios mitigation from agriculture is critical.
- Agricultural Mitigation actions can have high co-benefits for food security, poverty reduction and enhanced resilience of agricultural production systems in areas where agricultural productivity has been stagnating or where large share of the population or economy depends upon it.
- Formidable barriers exist that extend beyond technical issues and include major economic and governance challenges.

Thank you for your attention!