

- Mitigation through Changing Cropping Patterns – Crop land management to control emissions can be done by using perennial crops and inter cropping methods with legumes crop rotation.
- Water Management – Water management is very essential to buffer the anticipated volatility of rain fed agriculture production. So government should increase investments in water storage and management through reducing nitrification of waterways and improve pasture water supply.
- Using Latest Technologies – The use of biotechnology not only helped rice to resist drought and saline conditions but also helped in mitigation of GHGs. Proper maintenance of database regarding the land cover, crop lands, grazing lands, forest cover, arid land, wet land, etc. and networking of this data between different regions is needed to control emissions.
- Restoration – Peat lands and wet lands are very important source to sequester carbon. These act as carbon pools which are under threat due to the expansion of agriculture. The reduced emissions from peat land and wetlands are also to be included in climate change negotiations. Restoration of soil is also obtained by afforestation and reforestation and the disturbance of peat land has to be stopped immediately to reduce emissions.
- Livestock Management – To improve and control the emissions proper manure management in poultries and livestock sheds are to be followed. The pasture and grazing land has to be strategically managed at farm level to avoid depletion of grazing land. Exploiting biogas from animals' residue is one of the best uses of methane emissions from the waste of animals and it also helps to minimize the dependence of fossil energy at local level.

### Conclusion

The food security in developing countries can be ensured only through improved management of GHG emission in agriculture. Therefore, agriculture should be one of the prime focuses of discussion in climate change negotiations. The undermining of agriculture in the negotiations will not only undermine food security and livelihood of huge populations in developing countries but will also adversely impact the human health, environment, and economic development in these regions. It is argued that it is in the interest of not only developing countries but also the developed countries to understand the linkage between agriculture, economic growth and trade and therefore, they must encourage broader discussion on agriculture within the UNFCCC framework. The developed countries must come up with explicit commitment of contribution to the adaptation fund, which is highly critical for sustaining investment in research and policy in developing countries.

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## BEYOND COPENHAGEN

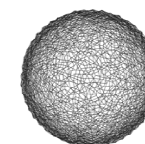
*A Collective Action against Climate Change*  
(INDIA)

*cordially invites you to*

## BRINGING AGRICULTURE IN FOCUS in Climate Change Negotiations

11<sup>th</sup> December 2009 (1445-1615 hrs)

*Halfdan Rasmussen, Bella centre,  
Copenhagen, Denmark*



COP15  
COPENHAGEN

UN CLIMATE CHANGE CONFERENCE 2009

## Why Agriculture must be focused in Climate Change Negotiations?

### Climate Change and Agricultural Crisis

Climate Change is the defining human development issue of our generation which can slow down the pace of progress towards sustainable development either directly through increased exposure to adverse impact or indirectly through erosion of the capacity to adapt. The increasing climate variability, unpredictable extremes of weather will have a dramatic impact on agriculture and food security as it may alter the balance between food demand and supply. Asia and South Africa are projected to be particularly vulnerable to these changes due to their large populations and great dependence on agriculture. Majority of the developing countries and small island states are most likely to be affected by climate-change impacts. Even with a temperature rise of 1–2½°C, the IPCC predicts serious effects, including reduced crop yields in tropical areas leading to increased risk of hunger, spread of climate-sensitive diseases such as malaria, water stress in Africa, increased risk of floods followed by drought and water scarcity for millions of people, inundation of coasts and threat of tropical cyclones worldwide, complete submergence of small island states and an increased risk of extinction of 20–30% of all plant and animal species. With impact on life and livelihoods, climate change will have far-reaching effects on the sustainable development of developing countries, including their ability to attain Millennium Development Goals by 2015.

### Impact of Climate Change on Agriculture

The consequences of climate change show unfavorable conditions for crops to grow. The modified climate shows impact on, land use, land cover, natural ecosystem, fresh and ground water supplies. The intensified heat waves and climatic shocks like cyclones, floods, and cloud bursts can damage crops very easily. The changed temperature regimes influence germination, seedling, rooting, leaf elongation, tillering, initiation of panicle, primordial panicle differentiation, anthesis, ripening, maturity dates and over all growth rate of crops.

**Major Crops at risk** – The rise of temperature due to global warming affects productivity of major crops like rice, wheat, tuber, sugarcane, and maize that are thermally sensitive and are grown in low tropical lands. At 1°C rise of temperature the production of rice is reduced by 15%. Large areas of rice, cultivated in delta regions are affected by tidal waves and salinization of fertile soil. It is expected that the production of wheat may decline by 40% due to increase in temperature and loss of precipitation primarily caused by climate change.

**Reduction in Soil Fertility** – Due to global warming the desertification of fertile land is increasing gradually in tropical regions. Repeated floods results in erosion and removal of top soil.

**Unusual Pest Attacks and Diseases** – The variations in temperature lead to new regimes in pest attacks, disease attacks, weed attacks and modification of microbial population in soil, air, and water. The rise in temperature leads to the high probability of new zoonotic diseases entering into food chain. Heavy rainfall in short span of time initiates fungus development in crops which increases the pesticide cost.

**Problem of Food Security** – IPCC Fourth Assessment Report shows a significant impact on food security and malnutrition due to climate change. Stability on food security is adversely affected due to price fluctuation, human induced disasters and political factors. The new patterns of pests and diseases will pose new treat to food security, food accessibility, food stability, and under utilization of yield.

**Loss of Agro-diversity** – The extinction of wild and traditional varieties due to continuous drought conditions in the dry land ecosystems will create more problems in India as majority of poor people live in drought prone regions. In Himalayan region flower and fruit plantations are affected due to thawing of glaciers, which will take away the livelihood of the indigenous people. The loss of agro biodiversity, land degradation results in stress on food production system. Around 20-30% of plants and animals species are likely to extinct with a rise of 1½–2½° Celsius.

**Impacts on indigenous populations** - Indigenous people, particularly of Himalayan region, who depend on traditional food, fuel and medicines are worst affected due to climate change as it reduces their territories and force them to migrate. Global warming is also affecting the natural zones of fishing activity where the fisherman's livelihood is at risk, as spatial distributions of fish stock are changing rapidly.

**Livestock problems** – The livestock occupies 45% of global surface area and support 800 million poor farmers. It contributes 18% of global anthropogenic GHG emissions. The heat stress deteriorates animal health, animal growth, and animal reproduction and also paves way for easy diseases attacks.

**Impact on Water Resources** – The contamination of water bodies, like rivers, fresh water lakes by floods mixes the nearby industrial waste, chemicals, pollutants, sewage, etc. is proved danger to soil and crops. In the same way heavy rains are also expected to increase the pollutants (pesticides, fertilizers, organic matter, heavy metals, etc.) to flow in the fertile lands. Due to climate change dry land agriculture areas are unable to grab and retain water so every year world wide lot of tons of carbon is lost into atmosphere due to desertification.

## Why Agriculture must be focused in Climate Change Negotiations?

Globally, 1.7 billion farmers depend on agriculture, the proportion of which is substantially large in developing and least developed countries. However, in the climate change discourse agriculture is being seen as a part of the problem. It is alleged that Agriculture (excluding land use changes and deforestation) contributes to 14% of total GHG emissions. The low land agriculture and deforestation of upland, lands slash and burn shifting cultivation are major contributors of GHGs. The methane emission depends on components like water regime, organic inputs, soil type, weather, tillage management, residues, fertilizers, and type of rice cultivation. The GHGs are also emitted by poor keeping of livestock.

### Potential of Agriculture to Reduce GHG Emission

Agriculture offers promising opportunities for mitigating 20% GHG emissions through carbon sequestration, soil and land use management, and biomass production. If GHG emission have to be controlled and food security for the world population to be ensured, focused efforts are required in agriculture. There are a number of mitigation and adaptation techniques available through which GHG emissions can be reduced in agriculture. These are:

- **Agriculture helps Sequester Carbon** – Agriculture and forestry is the only sector that can remove GHG from the atmosphere. The IPCC report also states that 90% of technical potential for direct mitigation is possible through sequestration of soil carbon in developing countries particularly in South-east Asia, South America, East Asia, and Eastern Africa where large agriculture dependent population lives. The IPCC Fourth Assessment Report also considered approximately 60 ways of mitigation options in agriculture but region based assessment is also needed to develop the techniques.

- **Rice field management** – The Improved water-rice management helps in reducing emissions of methane. The rice growing farmers should practicing low input agriculture like usage of traditional varieties and organic fertilizers to reduce emissions in the field.

- **Better Fertilizer Usage and Soil Management** – Maintaining permanent organic cover over the soil stops emission of carbon dioxide from the bare lands. Practicing methods like minimizing soil disturbance fixes carbon efficiently. Practicing crop rotation for organic matter and restoration of organic soil helps to retain carbon in soil. Usage of organic nitrogen sources like animal manure, crop residue; nitrogen-fixing crops help in controlling emissions to maximum extent.