



Climate Change Adaptation Framework for Agriculture in South Asia

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Presentation

- Current impacts of climate change in South Asia
- Emerging Scenario
- Key elements of the Adaptation Framework for South Asia
- Framework for Mitigation of Emissions in Agriculture
- Conclusions

South Asia

- Home to 23% of world population
- Fastest growing region
- Economy growing at 5.6% (1995-2005)
- Member states registered a GDP growth rate of 6-9% - Bangladesh, India, Pakistan and Sri Lanka
- One of the poorest regions in the world
- Wide variations exist within the region
Population for Maldives : 300,000
Population of India: More than a billion

The frequency of heavy precipitation events has increased over most land areas

94.4 centimeters (37.1 inches) on 26 July 2005 in Mumbai (India)

1 million people lost their homes



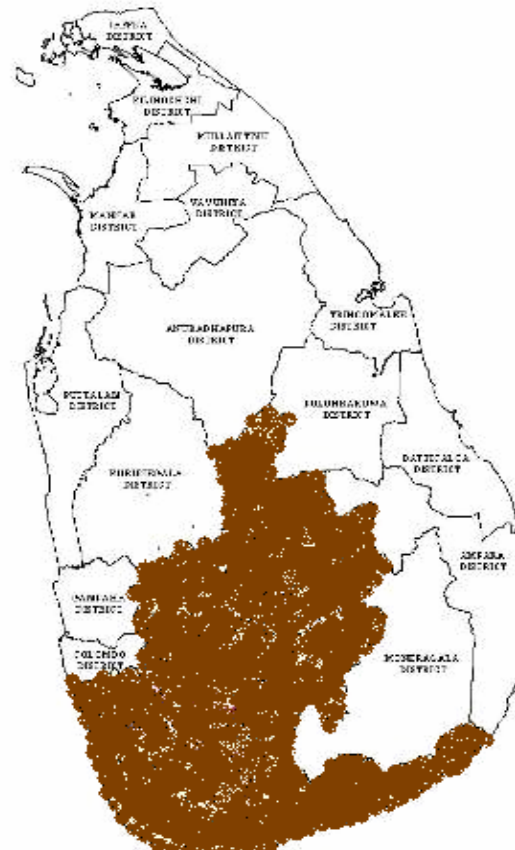


Tropical cyclones have increased in intensity over the past 3 decades
- *Cyclone Nargis in Myanmar, 2008: 100 000 estimated deaths*

Landslides

Main triggering mechanism for Landslides is exceptionally heavy rainfall.

A significant increase in Landslide occurrences



10 districts out of 25 are vulnerable to landslides.

Almost 30% of the land area in Sri Lanka

Increased occurrence of droughts



On average Sri Lanka faces drought conditions every 3-4 years. However, in the recent few decades – more and more droughts are experienced.

Water is very precious in drier parts of Sri Lanka



Coastal Erosion

Sri Lanka is presently experiencing an erosion rate of 0.30–0.35 m per year in 45%-55% of the coastline

Coastal area in Sri Lanka consists of

- 24% of the land area
- 32% of the population
- 65% of the urbanized land area
- A significant extent of agricultural land

Sea Level Rise together with increased wave heights due to Climate Change can further increase coastal erosion.



AR4 WG II - Impacts

Regional Effects: Asia

Freshwater Availability:

Decreased river flows after glaciers recede; will decrease.

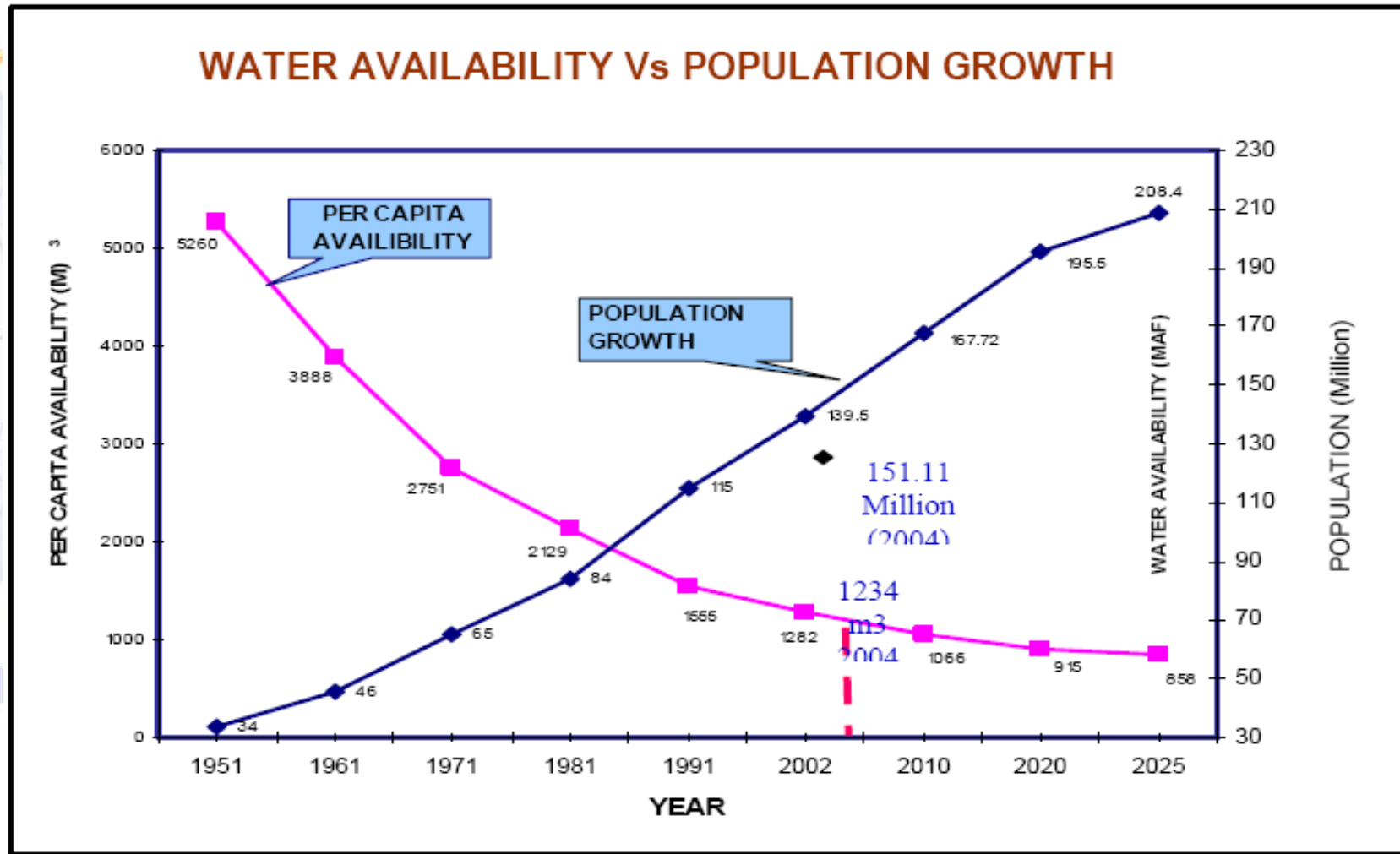
Floods:

Glacier melt in Himalayas; sea level rise in deltas

Crop yield:

Increase up to 20% in East and South East; decrease up to 30% in South and central Asia by 2050; hunger risk high

Gross per capita water availability in Pakistan will decline from ~ 1350 m³/yr in 2001 to as low as ~ 858 m³/yr in 2025



Source: WAPDA

Risk of Sea Level Rise in Bangladesh

- Presently high tide is 46 cm higher than normal in the last 20 years
- Every year 7.6 to 10.2 cm rise in high water tides
- 1 m sea level rise predicted within the next 50 years
- As a result sea level will be within 100 km from Dhaka
- Mongla port/coastal area will be submerged
- 15 to 20 million people will be affected

Adaptation and mitigation framework: Need to consider emerging scenario

- Greater demand for (quality) food; yields need to increase by 30-50% by 2030
- Increasing urbanization and globalization
- Increasing competition from other sectors for land, energy, water and capital
- Climate change a continuous process; greater focus on short-term actions on adaptation and mitigation

Forestry sector in South Asia

- Forests account for nearly 4 billion ha globally and nearly 20% in south Asia.
- Forests provide a number of services
 - biodiversity
 - raw materials for industry
 - livelihoods to large number of forest dependent and rural communities
- Forests are critical for protection of from floods, cyclones - e.g., Mangroves
- Forests provide large mitigation potential

Fisheries and Aquaculture in South Asia

- Important sector for food and nutritional security
- Revenue-earning and employment generating
- Annual export from the region: \$ 2.6 billion
- Full-time and part-time employment for 7.5 million people
- Nutritional Dependency Index very high for Maldives (100), Sri Lanka (62) & Bangladesh (58) (DFID, 2004)

Key elements of the Adaptation Framework for South Asia

1. **Assisting farmers in coping with current climatic risks**
2. **Intensifying food production systems**
3. **Improving land, water, and forest management**
4. **Enabling policies and regional cooperation**
5. **Strengthening research for enhancing adaptive capacity**

Adaptation framework for South Asia: Assist farmers to cope with current climatic risks

- Improving collection and dissemination of weather related information
- Establishing a regional early warning system of climatic risks/disasters
- Promoting insurance for climatic risk management
- Strengthening pest surveillance and forecasting mechanisms
- Facilitating establishment of community partnership in food, forage and seed banks

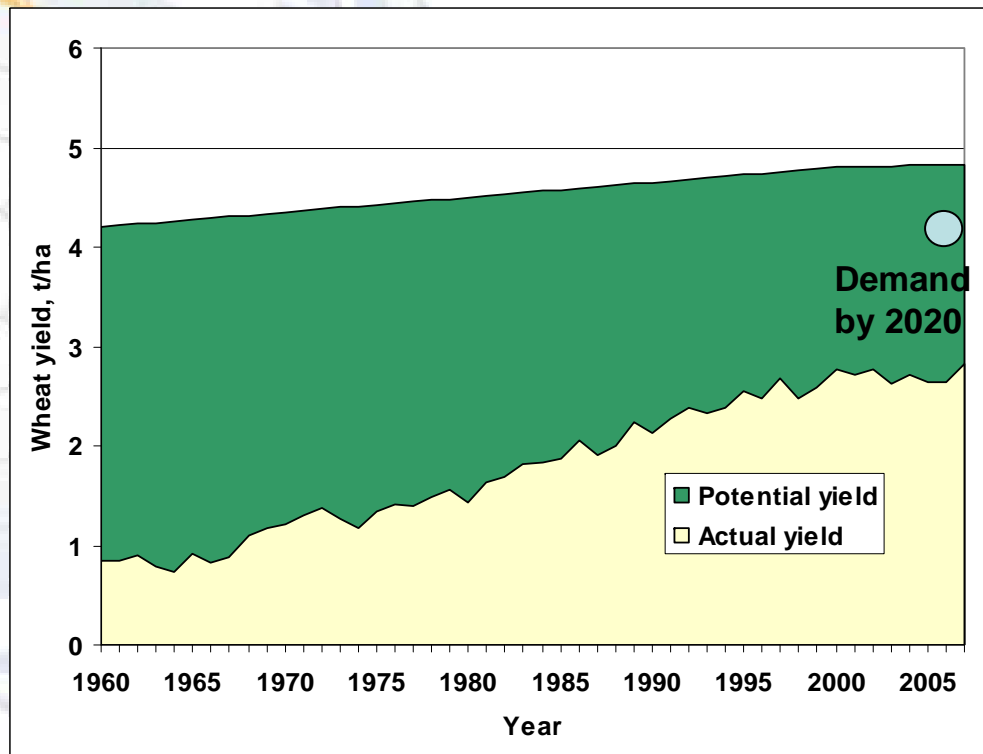
Adaptation framework for South Asia: Intensify food production systems

- Bridging yield gaps in crops
- Enhancing livestock productivity
- Sustaining growth in fisheries



Adaptation framework for South Asia: Intensify food production systems

Yield gaps in wheat in India



- Bridge yield gaps in crops and regions
 - Quality seed
 - Integrated nutrient management
 - Integrated pest management
 - Demonstrations of new technologies
 - Farmers training

Adaptation framework for South Asia: Improve land, water and forests management

- Implementing strategies for water conservation and use efficiency
- Managing coastal ecosystems
- Increasing the penetration of resource conserving technologies
- Exploiting the irrigation and manure potential of treated wastewaters
- Forests management

Adaptation framework for South Asia: Enabling policies and regional cooperation

- **Mainstreaming adaptation perspectives in current policy considerations**
- **Providing financial incentives for resource conservation**
- **Establishing regional food security programs**
- **Raising capacity in global climate change assessments**
- **Securing finances and technologies for adaptation**

Adaptation framework for South Asia: Secure global funds and technologies for adaptation

- **Several global funds for adaptation and mitigation; tap these funds for 'climate proofing' of food supplies in vulnerable regions**
 - **Climate stress response fund**
 - **Adaptation related infrastructure- e.g. food banks**
 - **Premiums for climate risk coverage**
 - **Payments to farmers for carbon sequestration/ environmental services**
 - **Knowledge/technology provision of adaptation strategies, including germplasm / genes**
 - **Capacity building**

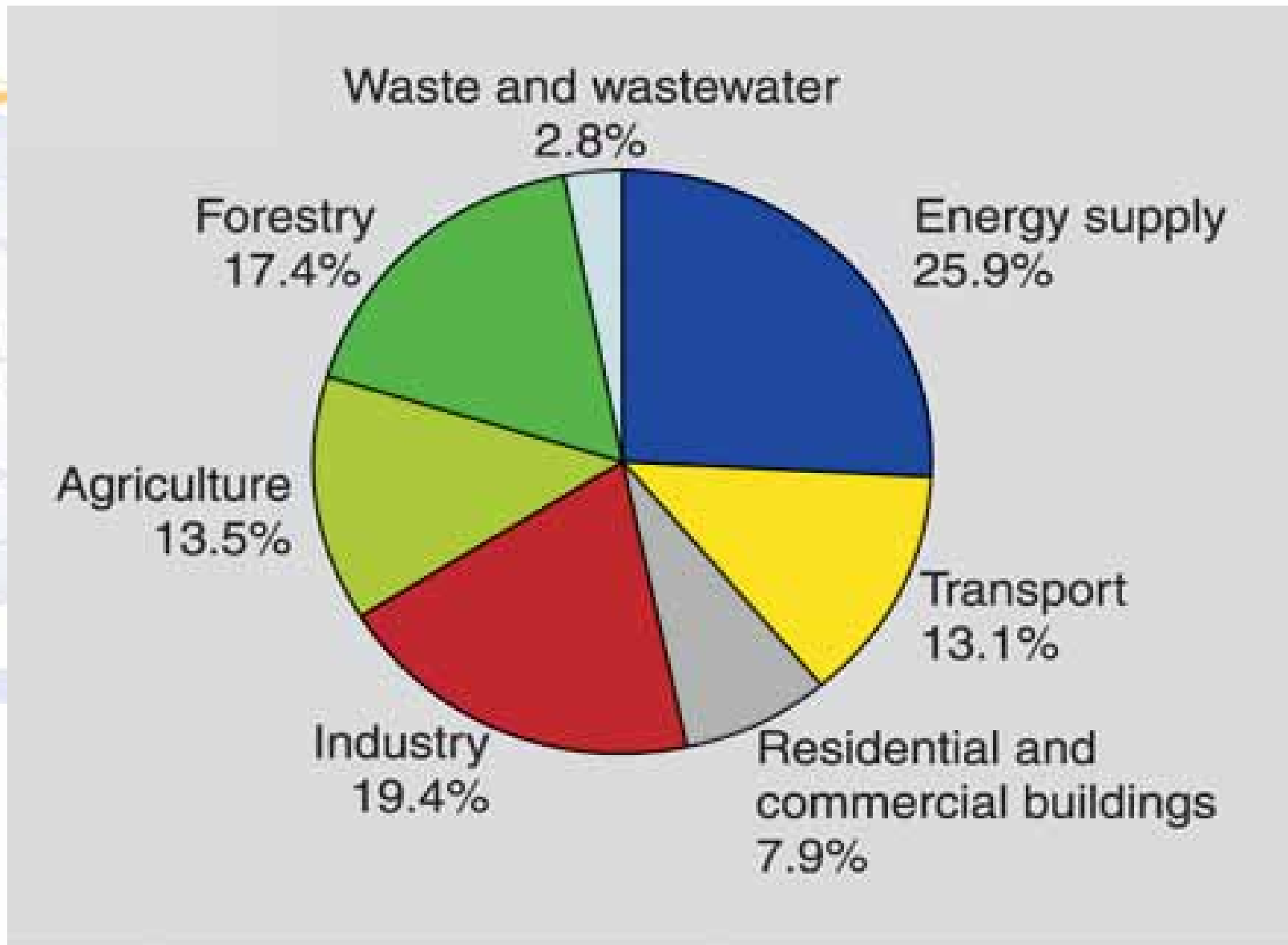
Adaptation framework for South Asia: Strengthen research on adaptation

- Assess regional impacts on crops, livestock, fisheries, pests, and microbes
- Evolve 'adverse climate tolerant' genotypes and land use systems
- Evaluate the biophysical and economic potential of various adaptation strategies
 - Study dynamics of pest movements and virulence
 - Re-examine water and fertilizer management for adaptation and mitigation
- Compile a compendium of indigenous, traditional knowledge and explore its suitability for climate change adaptation



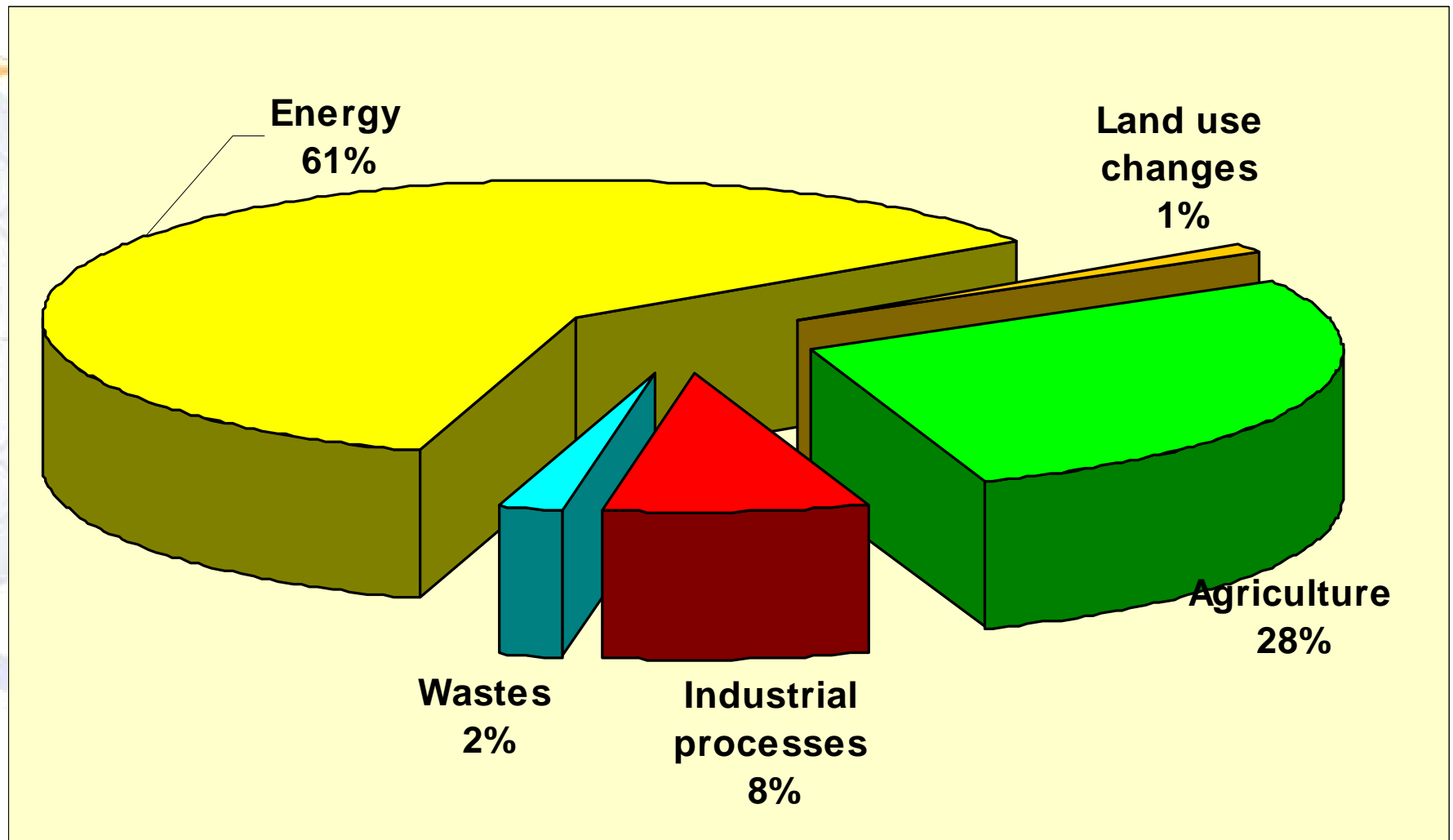
A FRAMEWORK FOR MITIGATION OF EMISSIONS IN AGRICULTURE

Contribution of different sectors to climate change. (Sources of Greenhouse Gas emissions)



What is the contribution of different sectors in India to climate change?

(Sources of Greenhouse Gas emissions in India)



Sequestering soil carbon and mitigating GHGs

- Addition of organic manures, minimal tillage, residue management, agro-forestry, water and nutrient management, and restoration of degraded soils
- Midseason drainage or alternate drying in irrigated paddies
- Appropriate crop management practices, which lead to increase nitrogen use efficiency
- Improved efficiency of energy use by increasing fuel efficiency in agricultural machinery, use of wind / solar power, and laser levelers
- Improved management of livestock diet

These strategies have costs and other implications

Facilitating mechanisms for payments to farmers for carbon sequestration

- CDM does not specifically include carbon sequestration and mitigation in agriculture
- Agricultural GHG mitigation options are cost-competitive
- If included in future agreements, would also lead to better soil fertility and higher income for the farmers in addition to the primary goal of carbon sequestration.
- Methodologies are needed to upscale the carbon sequestered/mitigated in individual farms.

Conclusions

- **Climate change may constrain attainment of future food production targets in South Asia**
- **Several options for adaptation are available. These need research, policy, and financial support**
- **Adaptation practices take time to become effective**
- **Costs of adaptation are unknown but likely to be high; costs of inaction could be even higher**
- **Priority for actions that maximize synergies between adaptation, mitigation, food production and sustainable development**
- **Regional cooperation through SAARC**

**World Meteorological
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Thank You!

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