



Climate Change and Food Security in Southeast Asia: Issues and Policy Options

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Key Issues

- High vulnerability
- Physical and economic impacts
- Food insecurity in SEA
- Impacts of climate change on food security
- Water stress and food security
- Saltwater intrusion and food security
- Impacts on the private sector & urban food security
- Non-climate stresses and food security

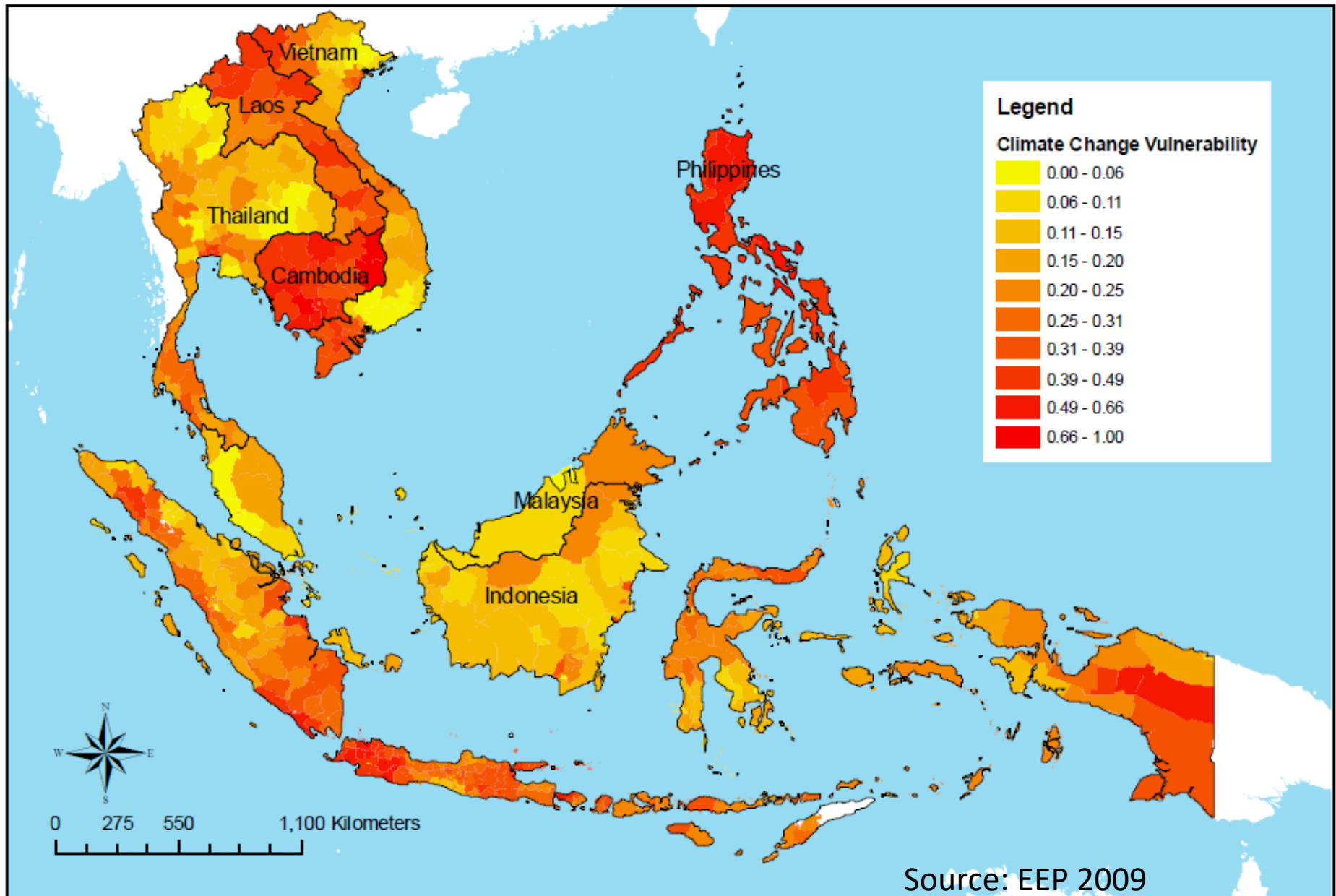
Southeast Asia is highly vulnerable to climate change

- Highly exposed areas
(islands, deltas, coastal regions, steep slopes)
- High concentration of population and economic activity in coastal areas
- High reliance on climate-sensitive sectors – agriculture, water, energy (hydro), tourism
- Millions of poor with low adaptive capacity
- Rapid urbanization and high urban population in vulnerable areas

Countries Identified as Vulnerable to Climate Change in Southeast Asia

High Exposure (temp >1.5°C; rainfall +/- 20%)	High Sensitivity (dependence on agriculture/fisheries)	Low Adaptive Capacity (income-related poverty)
Cambodia Lao PDR Indonesia Malaysia Myanmar Philippines Singapore Thailand Viet Nam	Cambodia Indonesia Lao PDR Myanmar Thailand Timor-Leste Viet Nam	Cambodia Lao PDR Myanmar Timor-Leste

Current Vulnerability to Climate Change



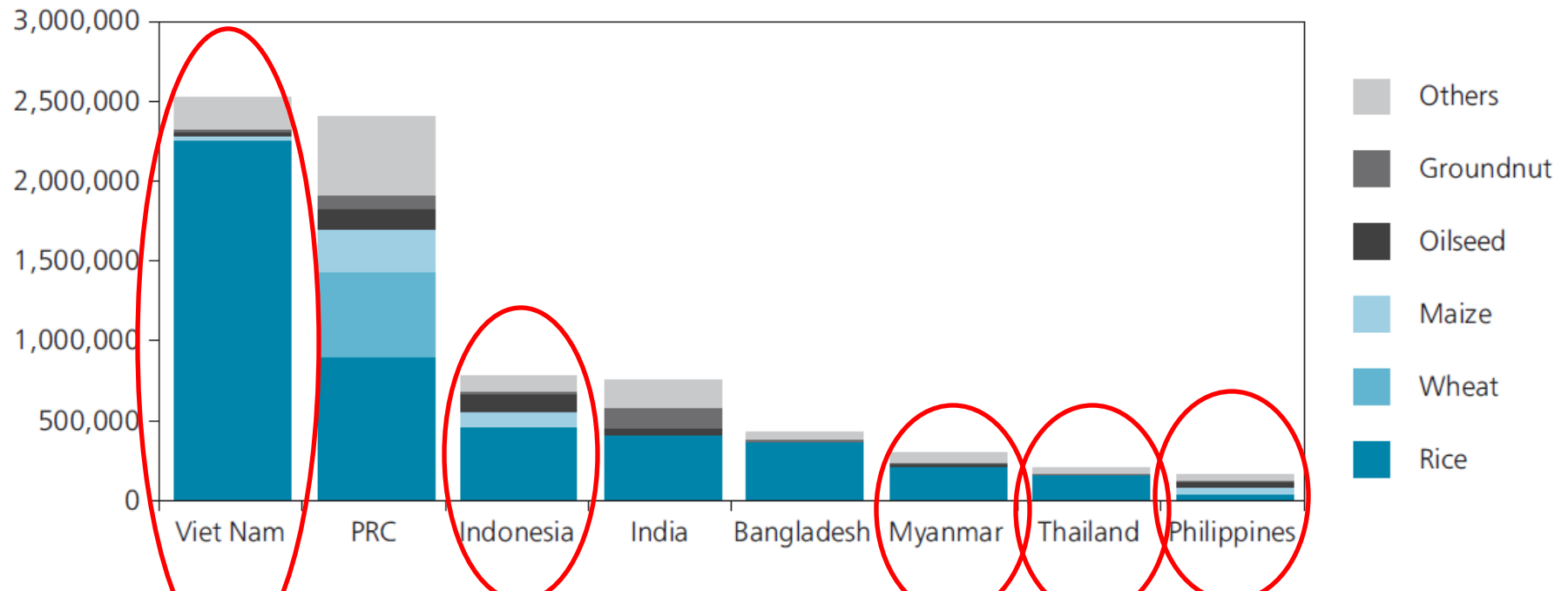
Observed Physical Impacts

- **Indonesia:** Wet season rainfall increased; dry season rainfall decreased; Number of floods/storms increased; Number of **hot days and warm nights** increased; Intensity and frequency of **heat waves and forest fires** increased
- **Malaysia:** Number of rainy days declined
- **Philippines:** Increasing intensity and frequency of events associated with El-Nino and La-Nina; Annual frequency of cyclones increased by 4.2
- **Thailand:** Decreasing rainfall; growing intensity of storms
- **Viet Nam:** Decrease in monthly rainfall (July-Aug); rapid increase in extreme events

Observed Economic Impacts

- Flood-related damages in Asia increased by 8 times in the 1990s than in 1970s;
- Direct damage costs from tropical cyclones in Asia in the 1990s increased by 35 times more than in 1970s;
- Increased food prices and civil unrest in several countries
- **Philippines:** Typhoons in 2009 alone cost ~3% of GDP
- **Thailand:** 2008 - >200,000 people affected by water borne diseases following storms
- **Viet Nam:** Typhoon 2007 - \$725m loss

Countries in Asia and the Pacific with Cultivated Crop Areas Lost in Excess of 100,000 Hectares, 1-Meter Sea-Level Rise

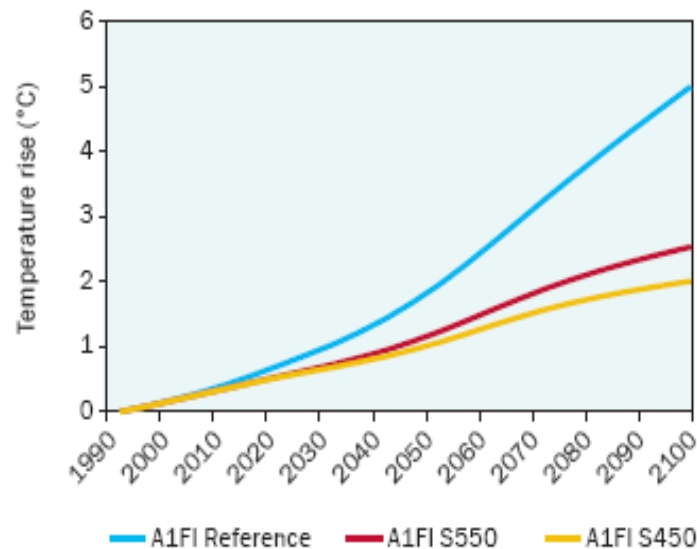


Climate Change Projections

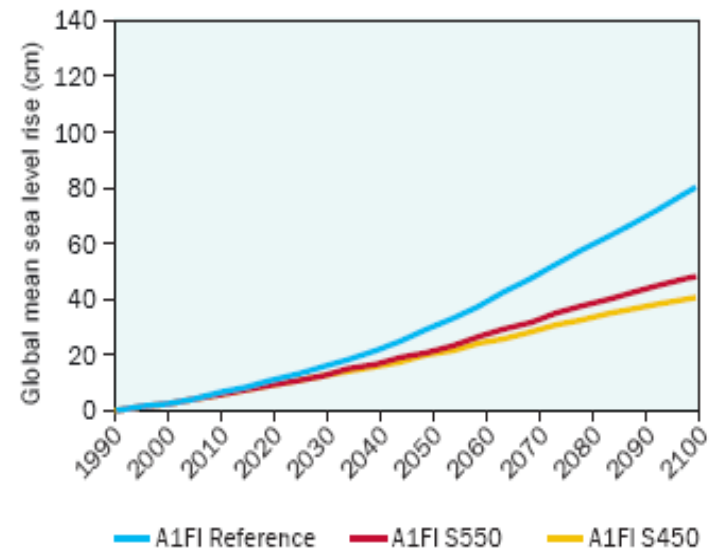
Suggest that the **worst is yet to come**.

Without urgent action, mean temperature may increase by **4.8°C** and sea level by up to **70 cm** by 2100 from the 1990 levels

Projected Annual Mean Temperature Rise
Relative to the 1990 Level in the Four Countries



Projected Global Mean Sea Level Rise
Relative to the 1990 Level

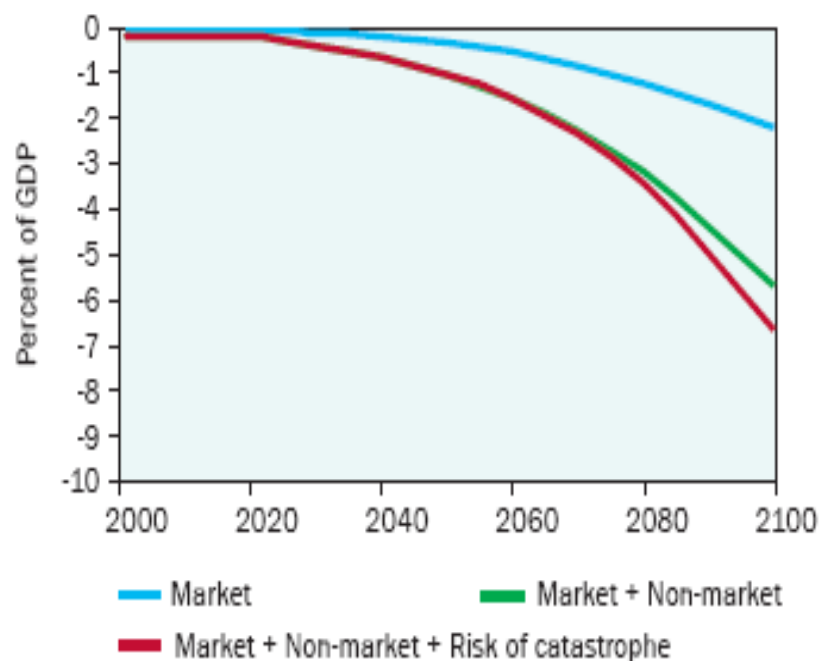


Note: Reference = business-as-usual without action; S550 = stabilization at 550 ppm; S450 = stabilization at 450 ppm.
Source: ADB study team.

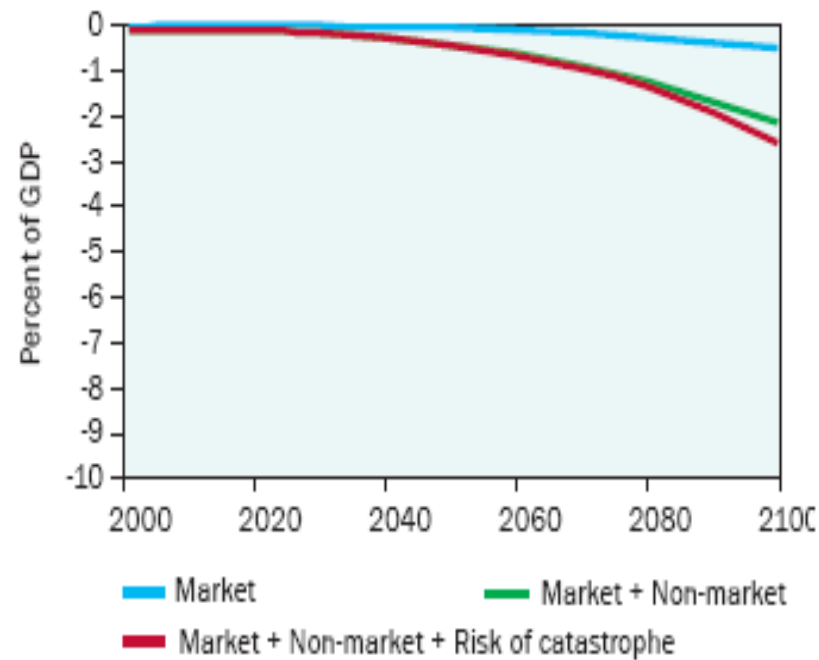
Source: ADB 2009

Potential Economic Impact could be equivalent
to losing **6.7% of GDP each year by 2100**
More than **twice the global average loss**

Mean Impact in the Four Countries



Global Mean Impact

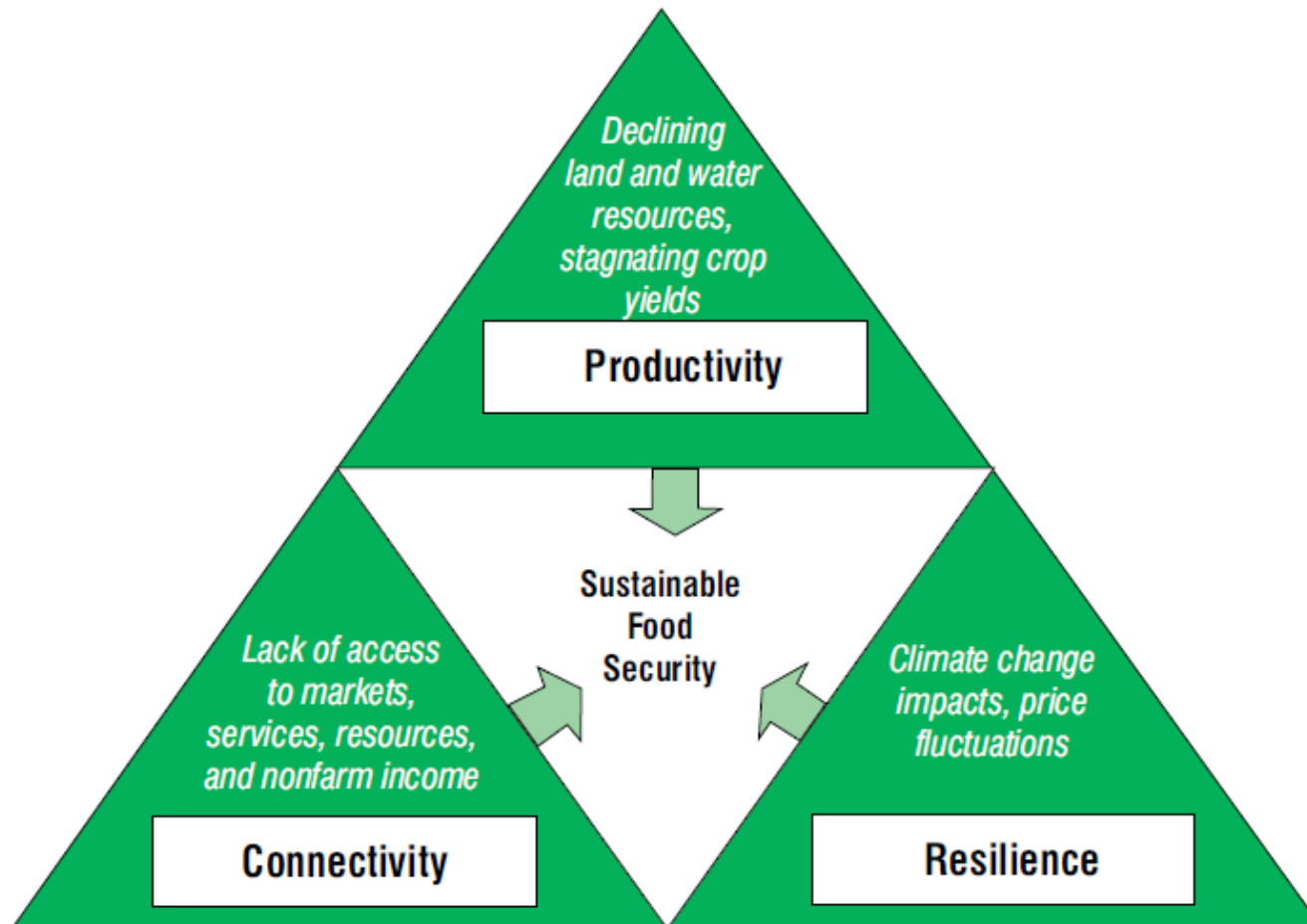


Note: The results are based on the A2 reference scenario without action.

Source: ADB study team.

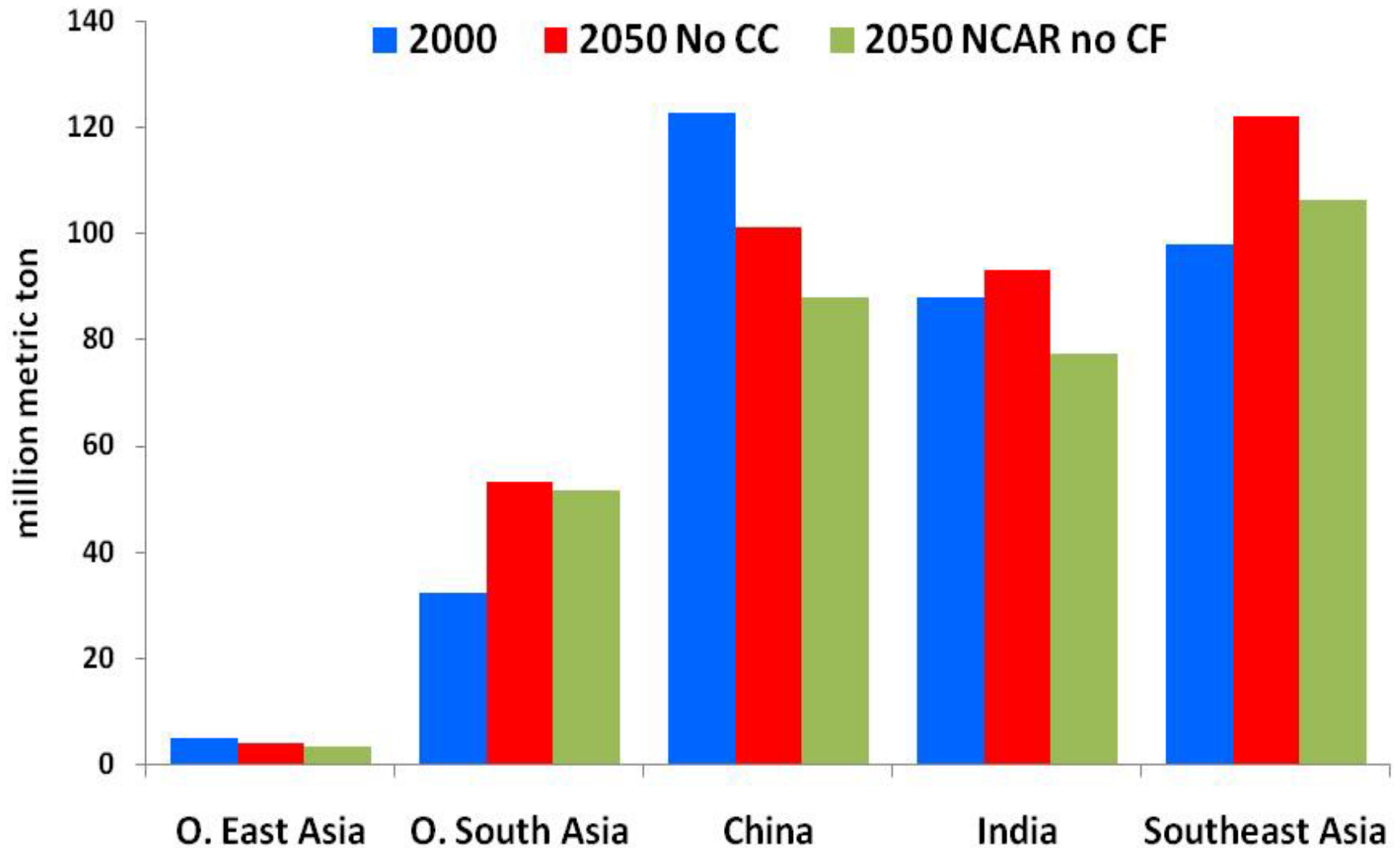
Source: ADB 2009

Three Dimensions of Sustainable Food Security

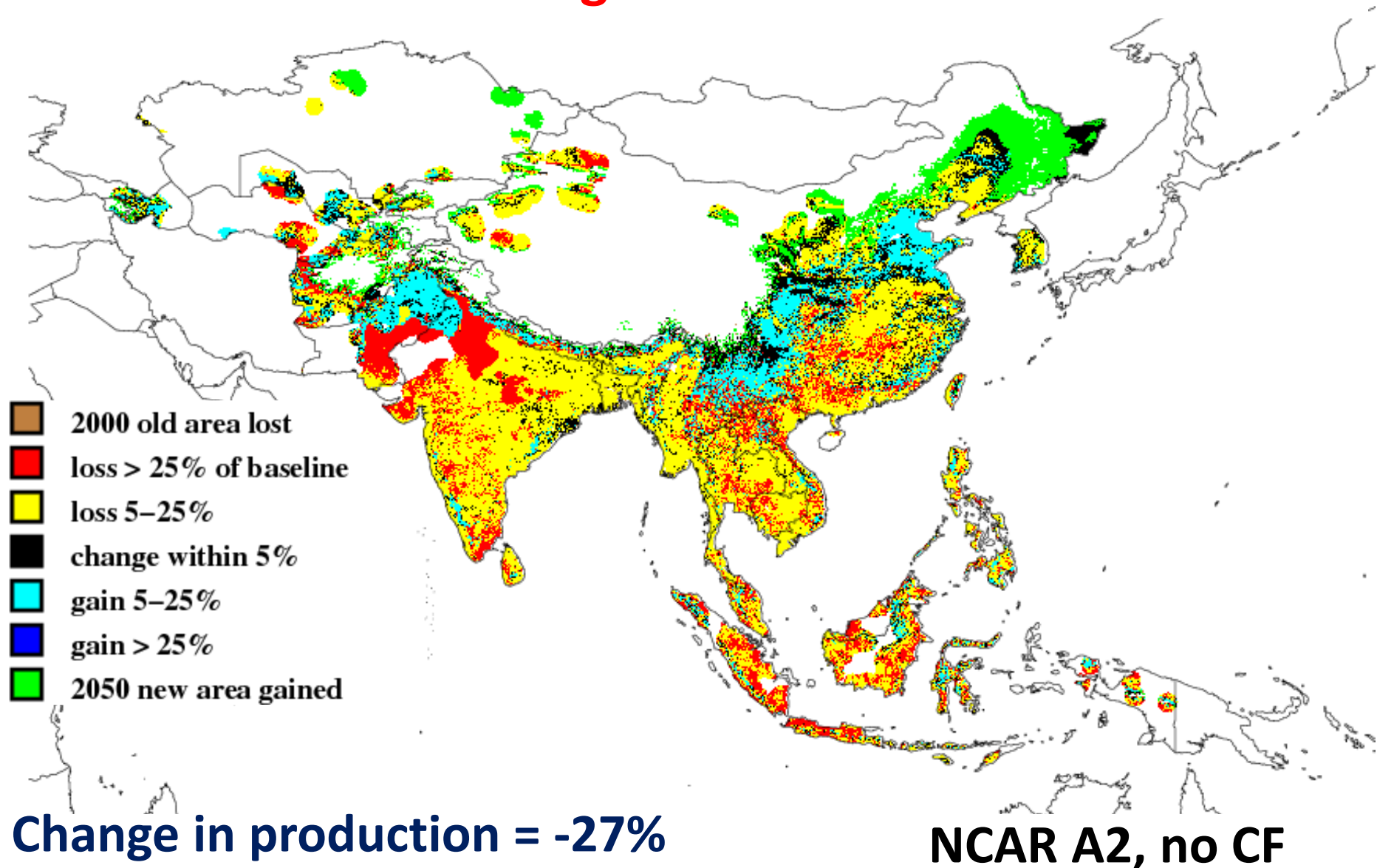


Source: Regional and Sustainable Development Department–Agriculture, Rural Development and Food Security Unit.

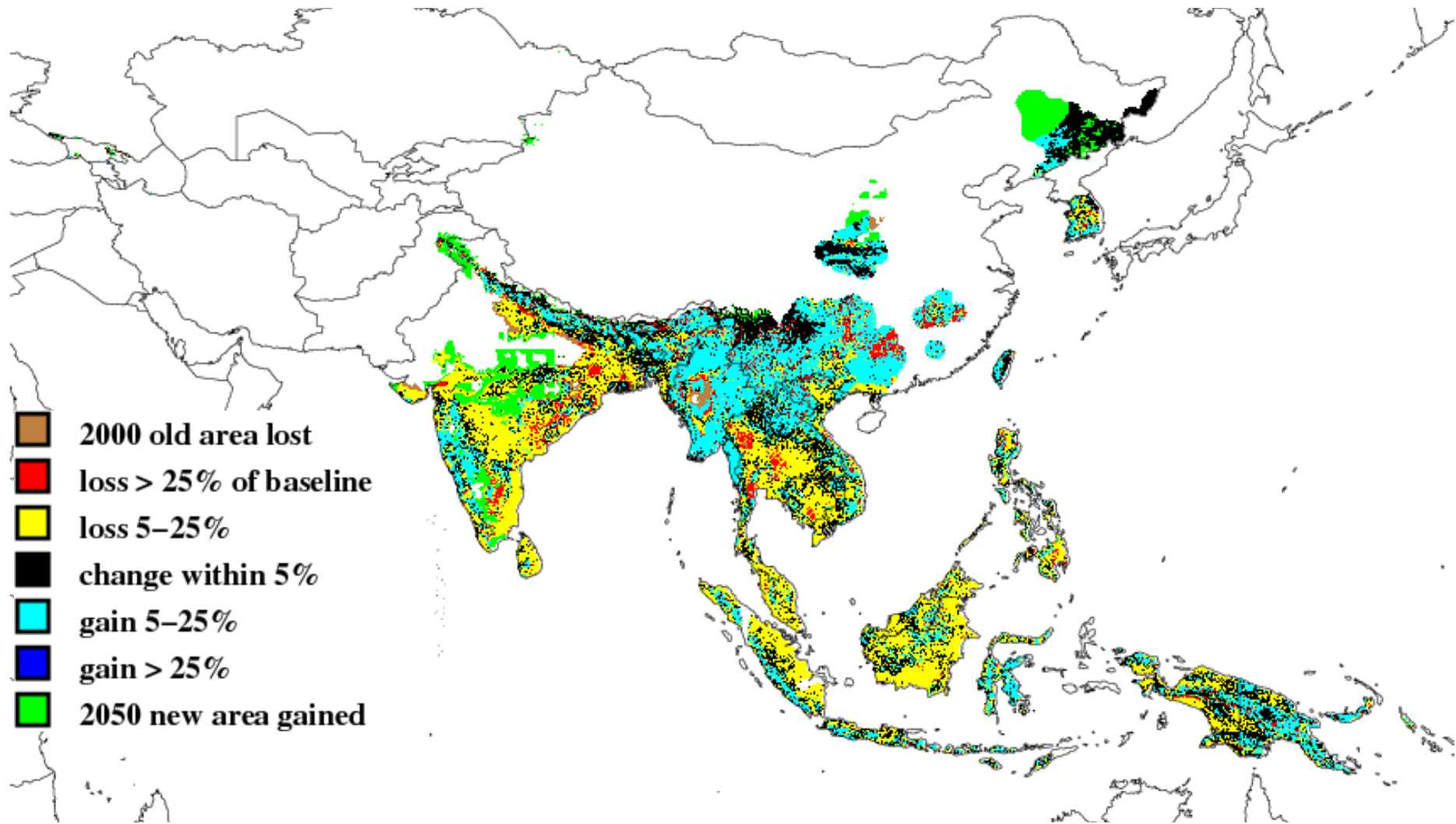
Impact on Rice Production



Climate induced percentage change in production in 2050: Irrigated Rice in Asia



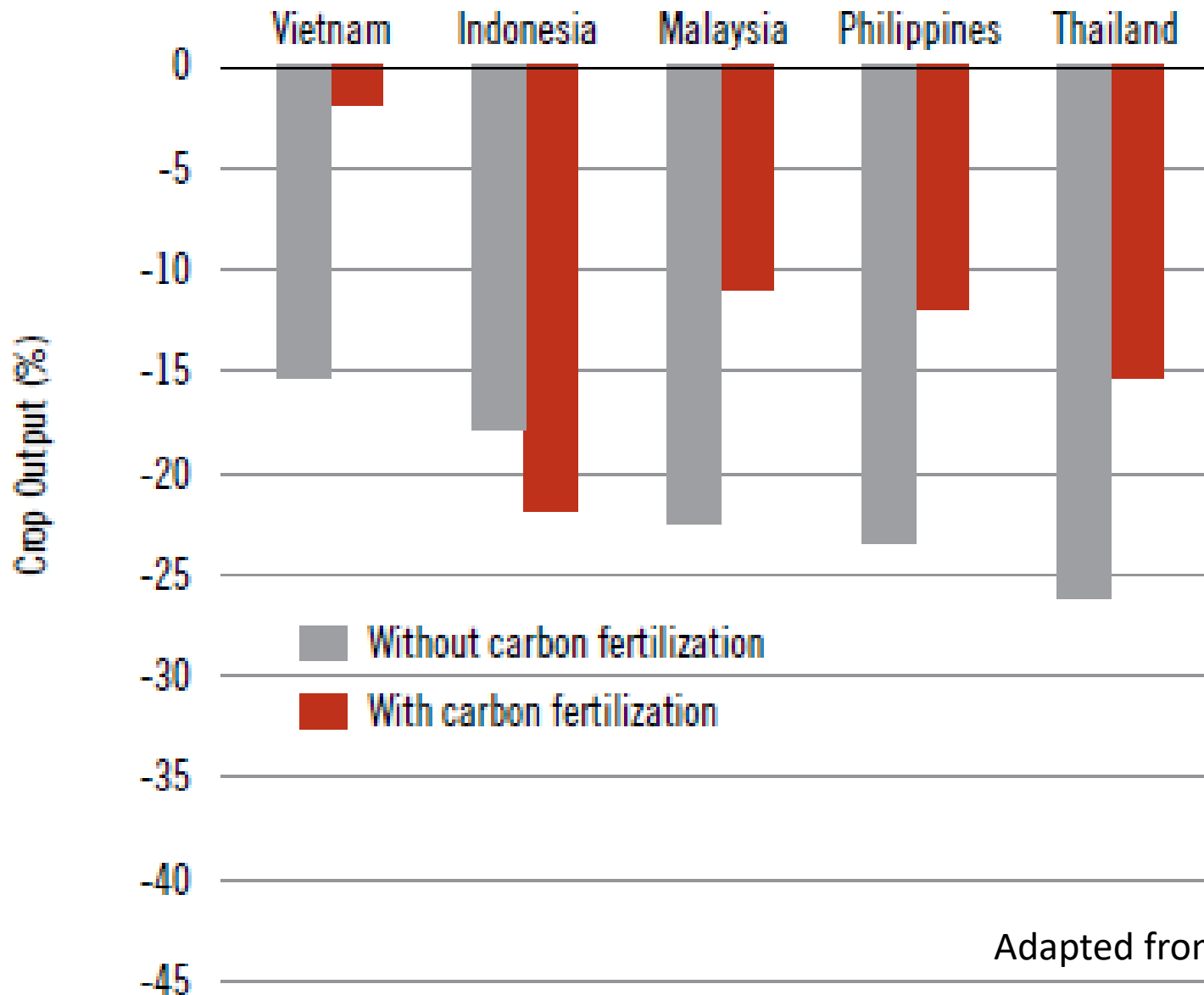
Climate induced percentage change in production in 2050: Rainfed Rice in Asia



Change in production = -12%

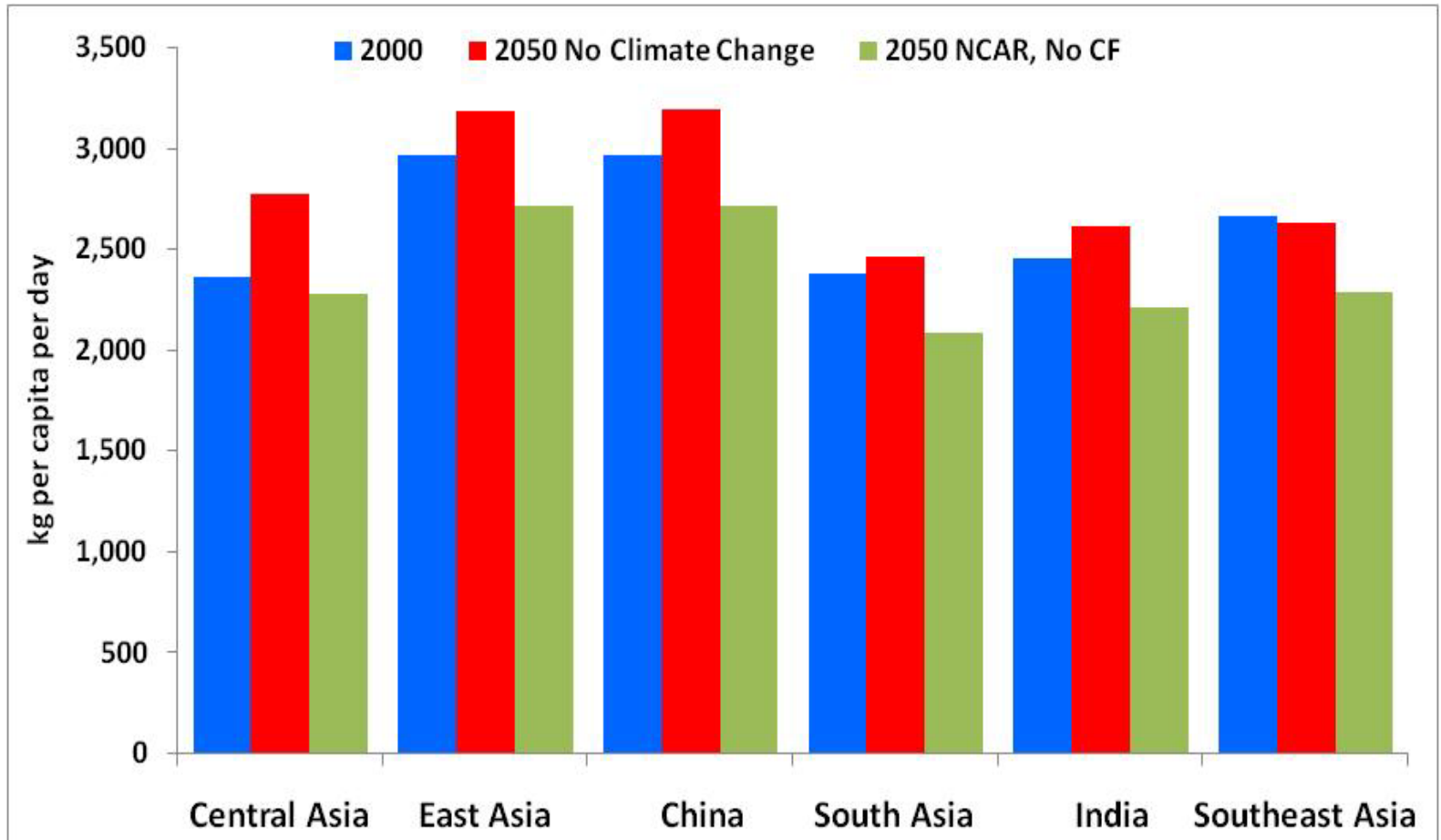
NCAR A2, no CF

Estimated % Declines in Crop Yields due to Climate Change by 2080



Adapted from Cline 2007

Impact on Calorie Availability



18% decline in calorie availability in Asian developing countries due to climate change

Impacts on Food and Beverage Sectors

- Declining crop/animal yields & High prices for agricultural inputs (water, chemical inputs) → High agricultural commodity prices/price volatility
- Increasing water scarcity → Adverse impacts on operating efficiency/processing costs
- Growing concerns on food safety and community relations → Increasing reputational and legal risks
 - Shrimp farming in Thailand – Growing conflicts among sectors
 - Oil palm industry in Malaysia – New regulations on expansion
 - Vinamilk (Viet Nam Dairy) – Increasing variability in milk supply

Impacts of climate change on Food and Beverage sub-sectors

	AGRICULTURAL INPUTS		OPERATING EFFICIENCY	REPUTATION	
	Agricultural Crop Prices	Animal Yields	Processing Costs	Food Safety Problems	Community Relations Issues
Aquaculture					
Beverages					
Confectionary					
Dairy/Poultry					
Edible Oils					
Starch					
Sugar					

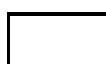
Source: WRI

Notes: See Section V for further information by subsector. Please refer to the appropriate subsector discussion in this report for what products are considered under each of the categories.

Potential Magnitude of Financial Impact



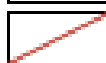
High



Low



Medium



Not applicable

Policy Options

- Mainstreaming climate concerns
- Research on climate change and food sec.
- Food-water-energy nexus
- Adaptation technologies and investments
- REDD+ strategies
- Mitigation-Adaptation synergies
- Regional cooperation & Trade liberalization



Thank you.