

# Climate Change and Food Security

Randall Purcell, Senior Advisor

# What is Food Security?

## **Food Availability**

- Agricultural productivity
- Agricultural markets and distribution systems
- Agricultural and trade policy

## **Food Access**

- Poverty reduction
- Food (processing and storage) markets

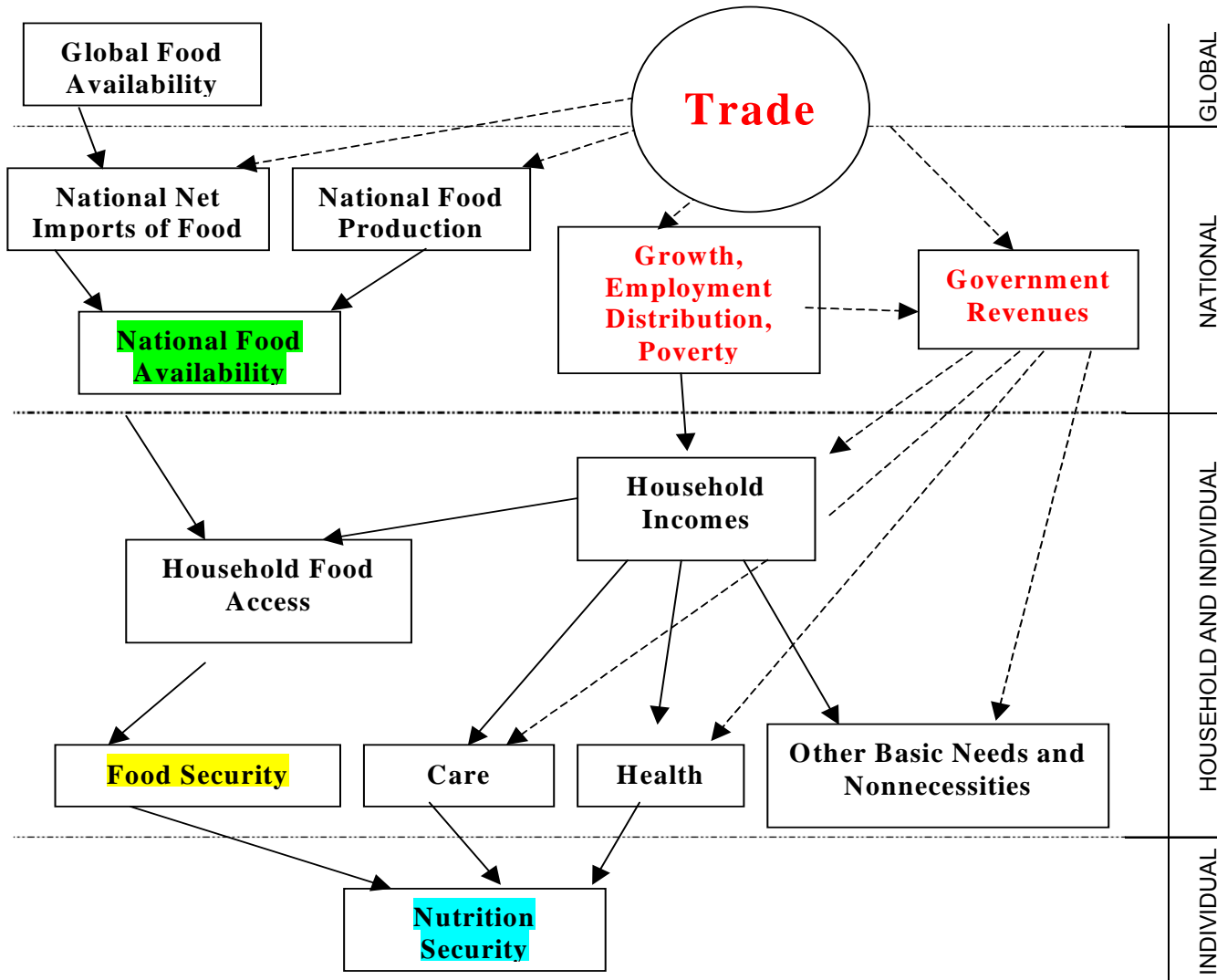
## **Food Utilization**

- Nutrition education
- Health care
- Safe water provision
- Sanitation

# Characteristics of Hunger

- 70 % of poor in developing countries are rural smallholder farmers
- Most of these are net buyers of food
- Hunger is a cause and an effect of poverty
- 950 million people in developing countries undernourished and hungry
- The hungry often suffer other MDG deficits: water, education, sanitation, environmental pollution
- Malnutrition is the major cause of disease world wide, and is related to infant mortality

# Determinates of Food Security



# Climate Change

The composition of the atmosphere, and the Earth's climate has changed, mostly due to human activities, and is projected to continue to change, globally and regionally:

- Increased greenhouse gases and aerosols
- Warmer temperatures
- Changing precipitation patterns – spatially and temporally
- Higher sea levels – higher storm surges
- Retreating mountain glaciers
- Melting of the Greenland ice cap
- Reduced arctic sea ice
- More frequent extreme weather events , e.g. heat waves, floods and droughts
- More intense cyclonic events, e.g. hurricanes in the Atlantic

# Impacts on Food Security

More natural disasters & extreme weather events

Rising sea levels → salinization → reduced land & water availability

Changes in rainfall patterns → reduced productivity

Decreased water quality and availability → sanitation problems, malnutrition

Conflicts over scarce resources → migration and displacement



# Result

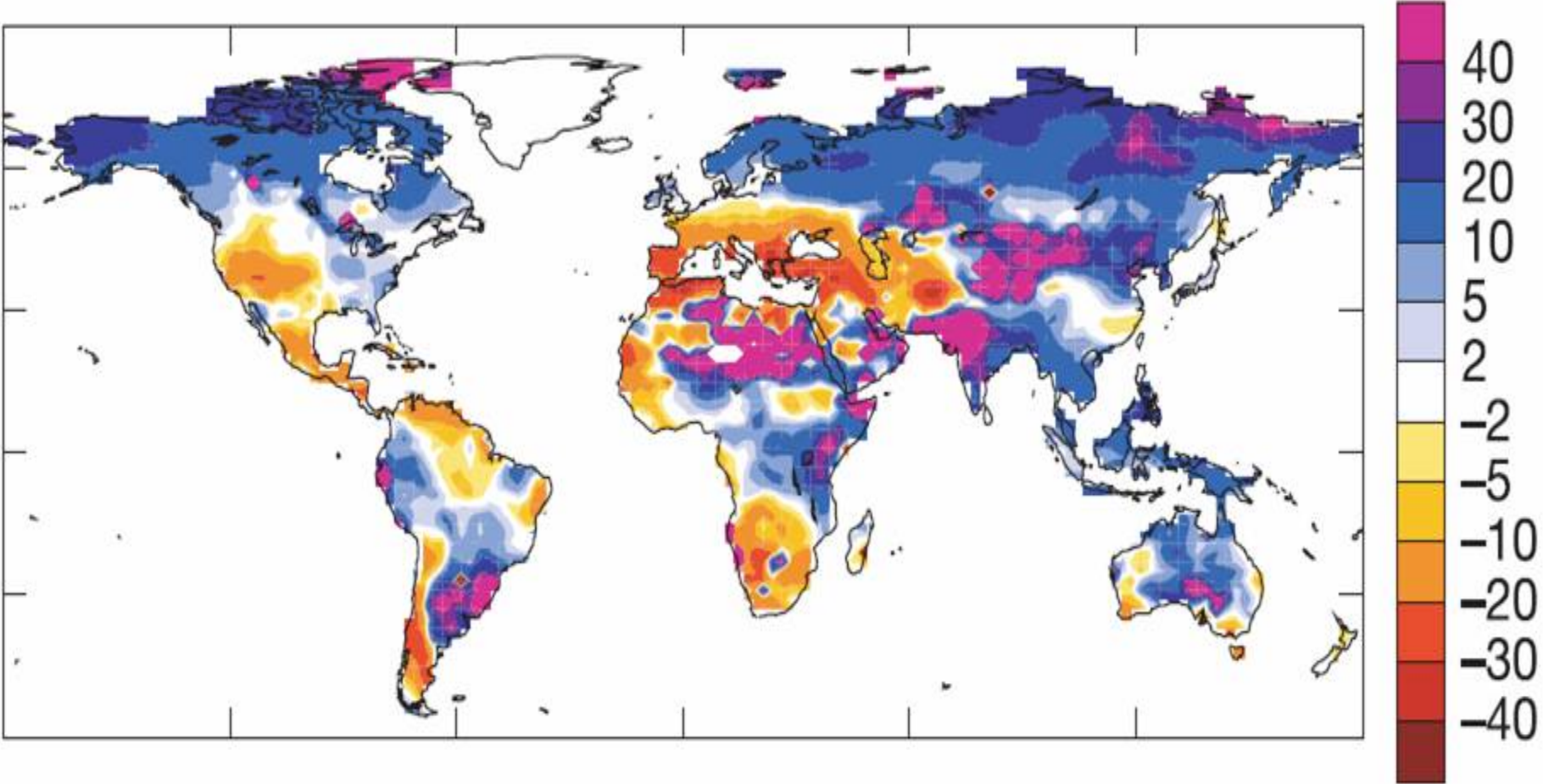
Hunger to increase by 10 – 20% by 2050.

Worst impacts expected on the poorest & most food insecure

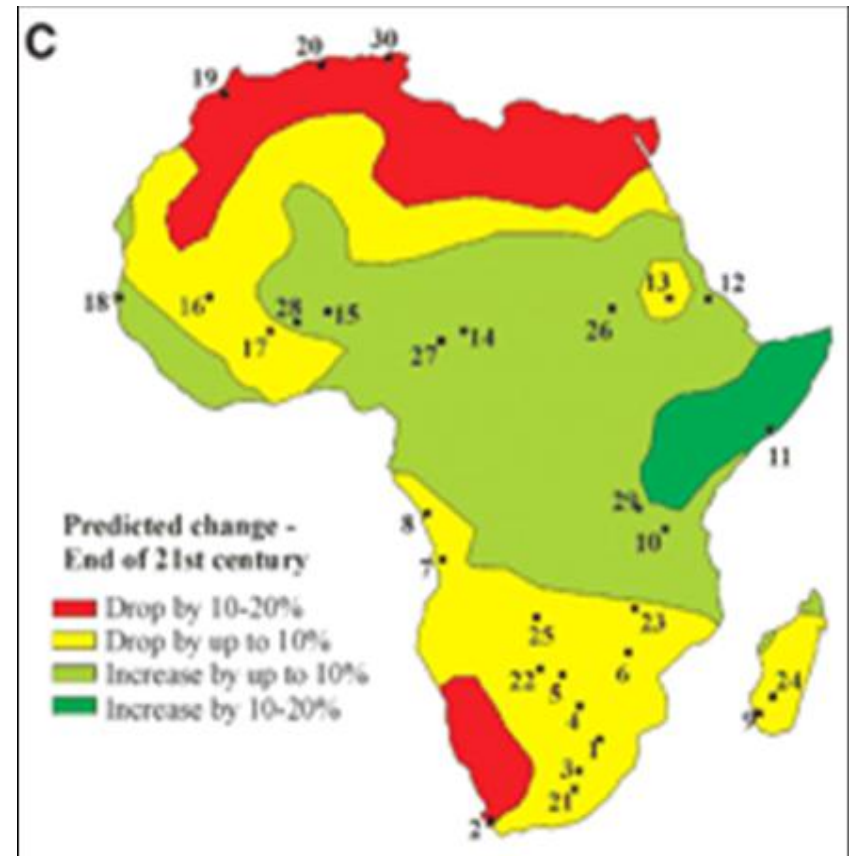
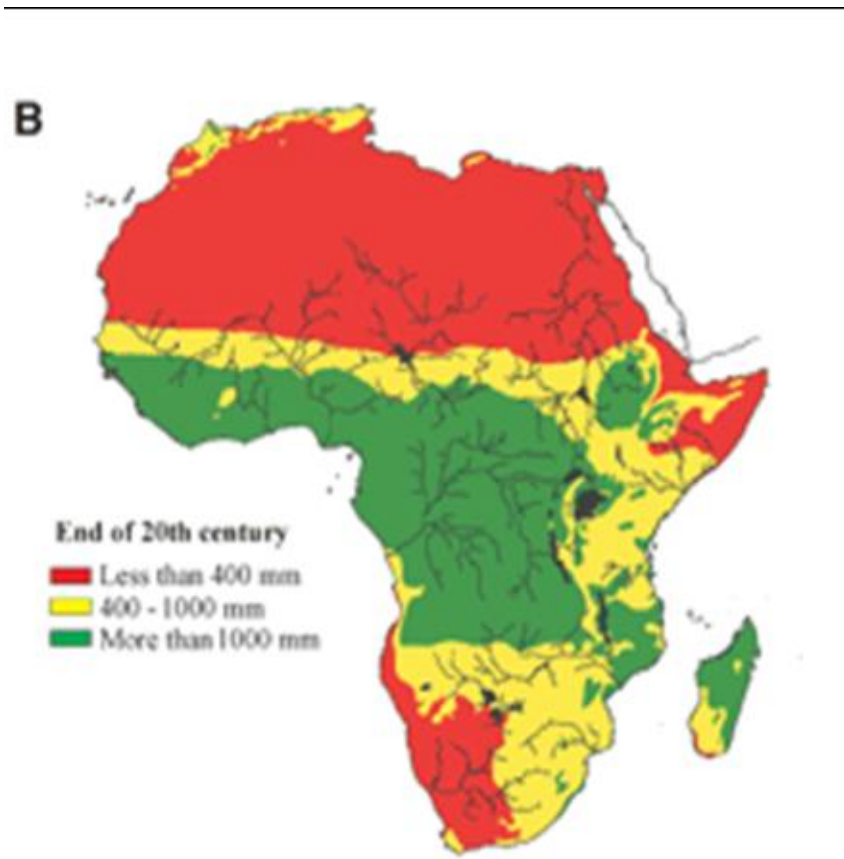
In the meantime, the demand for food will double within the next 25-50 years, primarily in developing countries

# Percent Change in Runoff by 2050

a



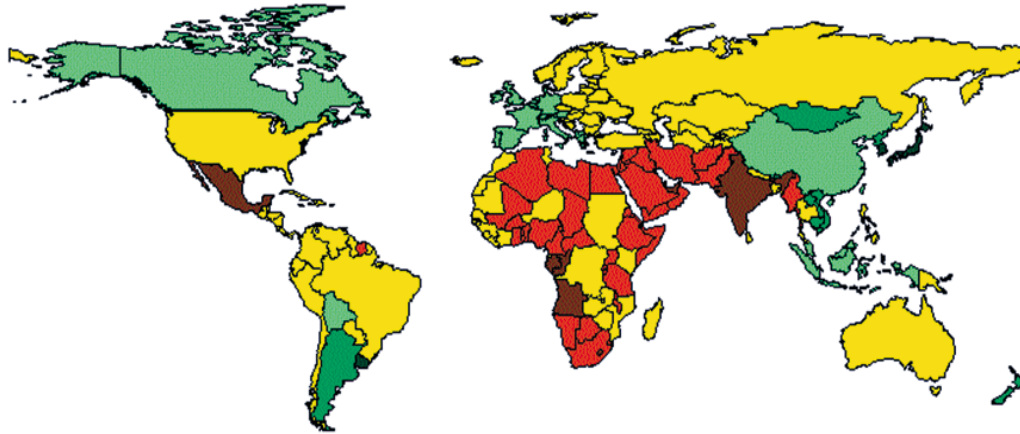
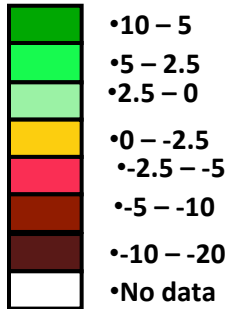
# Changes in Available Water



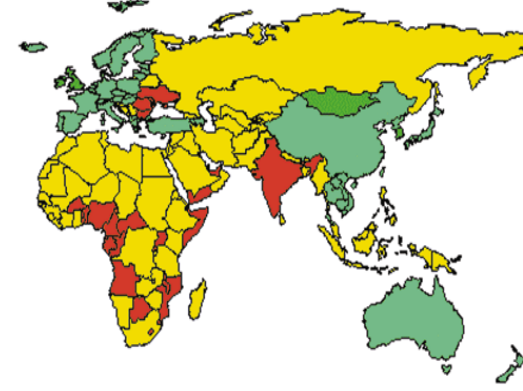
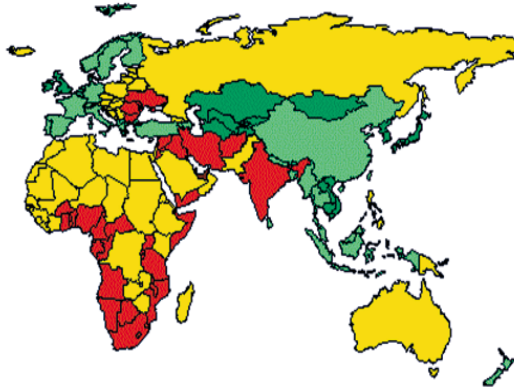
# Changes in Crop Yield

(from today to 2080)

•Potential change in cereal yields (%)



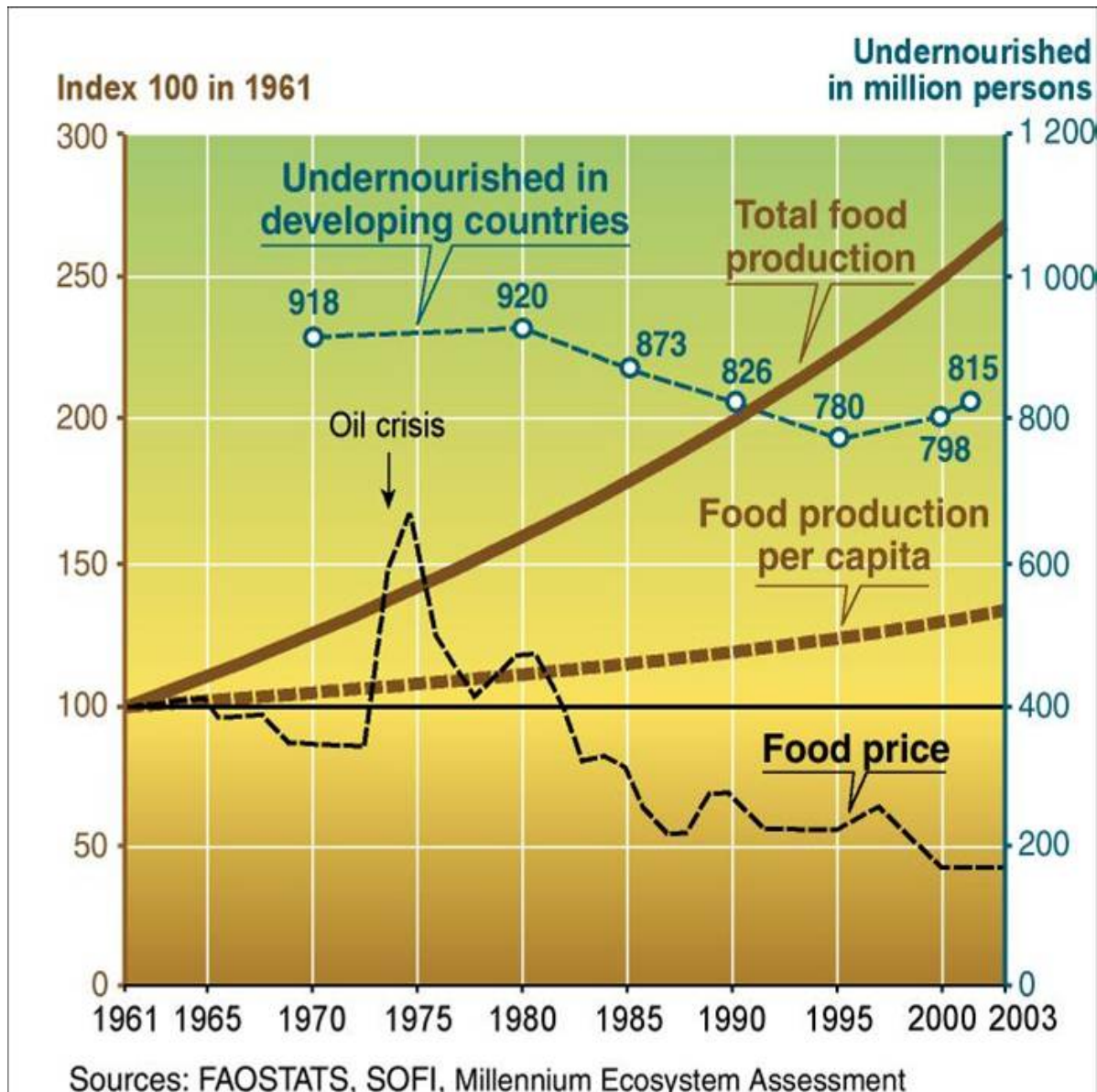
•Unmitigated emissions



•Stabilisation of CO<sub>2</sub> at 750 ppm

•Stabilisation of CO<sub>2</sub> at 550 ppm

# Food Production





# Food Security

## Drivers of the recent increase in food prices

- Poor harvests due to variable weather - possibly related to human-induced climate change
- Increased use of biofuels
- Increased demand
- High energy prices
- Speculation on the commodity markets
- Export bans from some large exporting countries

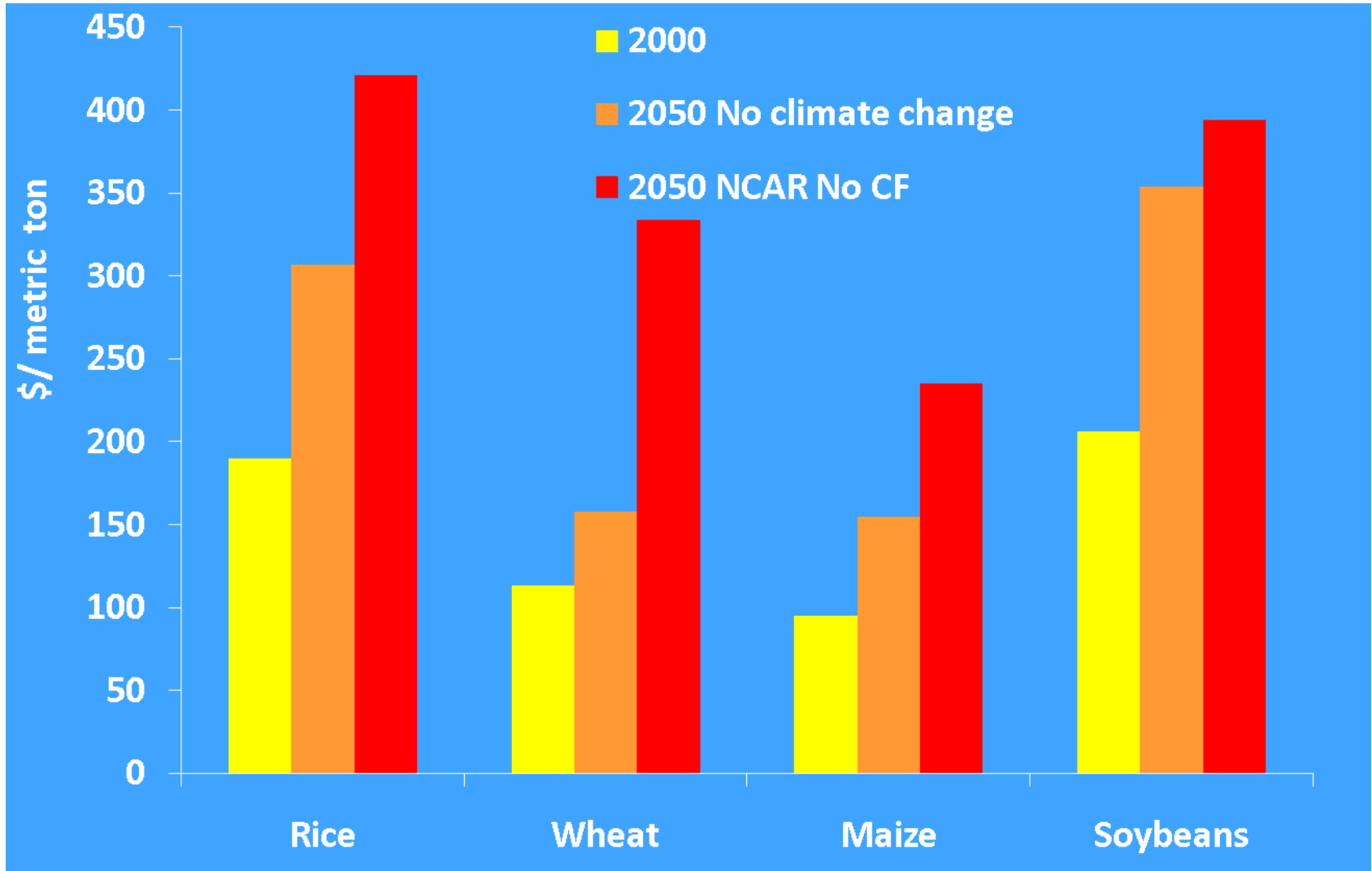
## The future challenge

The demand for food will double within the next 25-50 years, primarily in developing countries, and the type and nutritional quality of food demanded will change

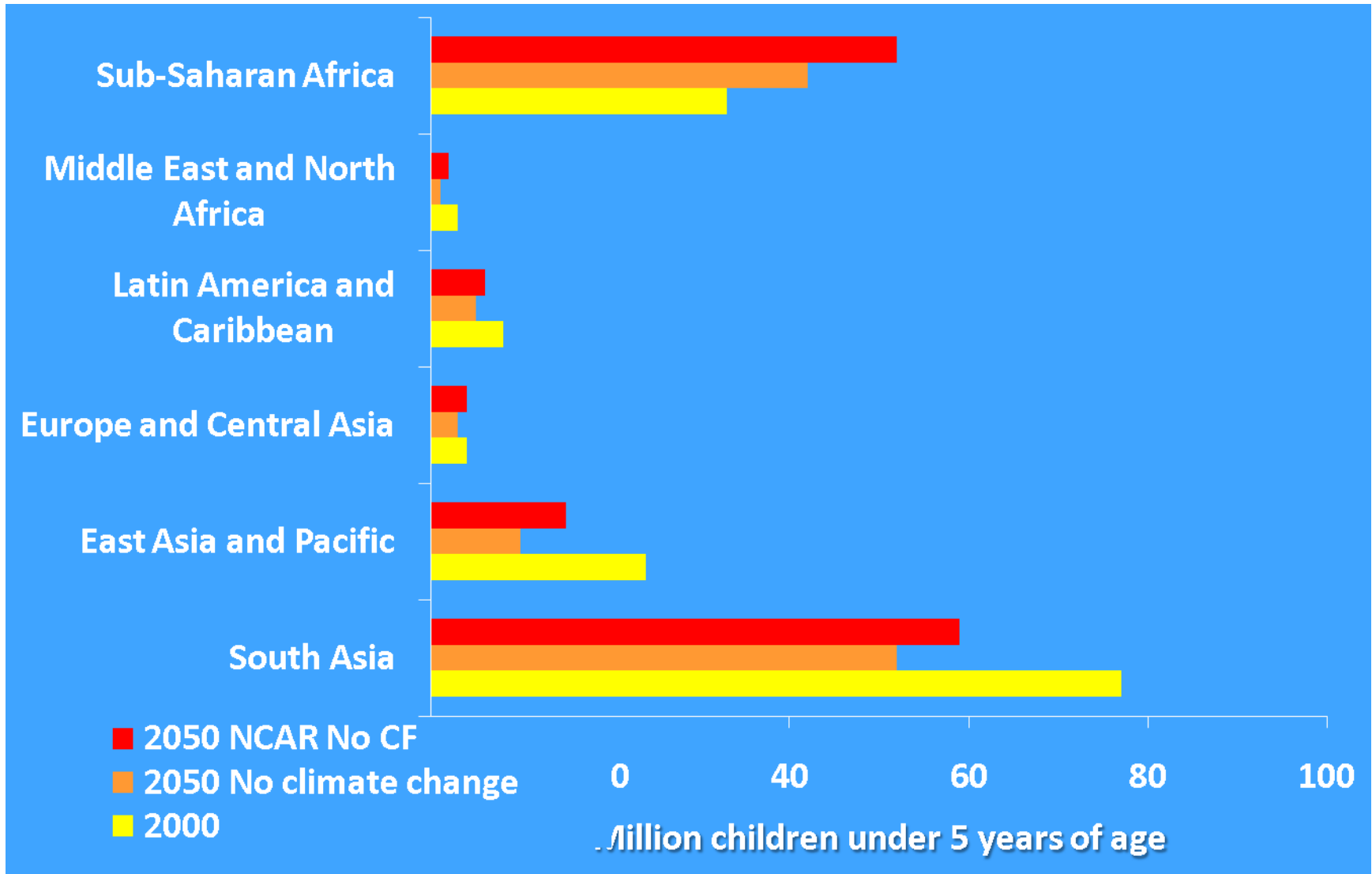
We need sustained growth in the agricultural sector to feed the world, enhance rural livelihoods and stimulate economic growth, while meeting food safety standards

Rising food production and hunger numbers means we must also focus on access

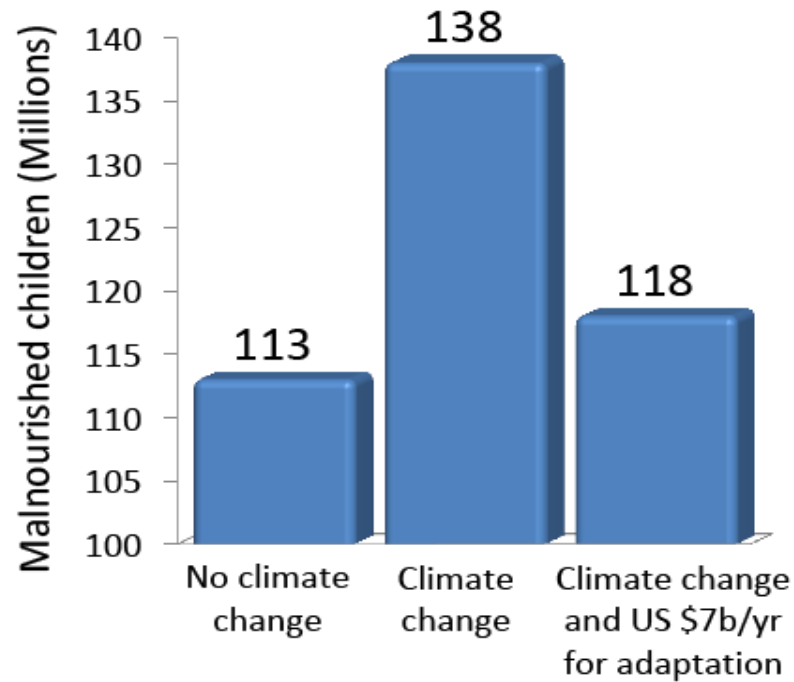
# Climate Change Impact



# Climate Change Impact



## Number of malnourished children in 2050 with and without climate change



Source: Projections by the International Food Policy Research Institute

# Agriculture and Climate Change: Adaptation and Mitigation

**ADAPTATION.** Need to reduce the vulnerability and increase resilience to increased incidence of extreme events, greater climate variability, hotter and drier summers

- Breed new varieties (temperature, drought, pest, salinity tolerant traits)
- Water harvesting
- Agricultural practices, e.g., change crops and planting times

**MITIGATION.** Need to reduce greenhouse gas emissions from the agricultural sector, especially methane and nitrous oxide

- Non exceedance of crop N requirements
- Appropriate timing/conditions for manure application
- Increase livestock nutrient use efficiency
- Anaerobic digestion technology for manures/slurries
- Nitrification inhibitors
- Feed supplements

# Feeding the World: Agricultural Production

- Embed economic, environmental and social sustainability into agricultural policies, practices and technologies
- Address today's hunger problems with appropriate use of current technologies, emphasizing agro-ecological practices (e.g., no/low till, IPM and INRM), coupled with decreased post-harvest losses
- Advanced biotechnologies may be needed to address future demands for increased productivity and emerging issues such as climate change and new plant and animal pests – but the risks and benefits must be fully understood
- Provide payments to the farmer for maintaining and enhancing ecosystem services
- Innovation along the whole food chain, involving all relevant stakeholders, is critical
- The farmer must be in the middle – especially the small-scale farmer – participatory processes are critical

# Feeding the World (cont.)

- Reform international trade, e.g., eliminate OECD production subsidies, eliminate tariff escalation on processed products, recognize the special needs of the least developed countries through non-reciprocal market access
  - Recognize the critical role of women and empower them (e.g., education, property rights, access to financing)
  - Build and reform AKST skill base (basic sciences, social, political and legal knowledge) and innovation capacities of rural communities and consumers
  - Increase public and private sector investment in research and development, extension services, and weather and market information

# Role of GM

- Potential to improve productivity, drought, temperature and pest tolerance and enhanced nitrogen use efficiency
- However, insertion of genes is continuing to cause concern for some consumers and governments even though GM plants undergo extensive testing
  - Health risks – little evidence, robust EU safety processes in place
  - Environmental risks – need to understand gene transfer and manage
  - Role of companies – some lack consumer trust
  - Potential negative impact on poor farmers in developing countries
    - reliance on large multi-nationals

# More From Agriculture...

We need not only produce *more food*, but to do it in a way that is:

- More *sustainable* (given that agriculture accounts for 70% of human water use and 32% of greenhouse gas emissions);
- More *resilient* (given the impacts that climate change and other scarcity trends will have on agriculture); and
- More *equitable* (given that three quarters of the world's poor people are located in rural areas).

# What Farmers, and the Poor Generally, Need

- *Assets – like land, water, machinery and so on;*
- *Markets – which means not only rural roads, technologies that can put them in touch with price data and so on;*
- *Credit – to avoid predatory lending, and allow smallholder farmers to access new technologies;*
- *Knowledge – where the challenge is not only to push back the frontiers of agricultural science, but to build up the extension services that can get it out to the field; and finally*
- *Risk management to cope with an increasingly turbulent world – from weather indexed crop insurance to disaster risk reduction and from humanitarian assistance to social protection.*
- *All this will need massively scaled up financial resources – including in research and development – and a reversal of the trend in the last two decades, which saw the proportion of aid spent on agriculture fall from nearly 20 percent to less than 5 percent.*

# And Less From Agriculture...

The evidence suggests that wages, self-employment outside agriculture, and other earnings from commercial activities, manufacturing and other services are significant sources of income for rural households.

Rural nonfarm income tends to be positively correlated with national development and case studies indicate positive growth over time of nonfarm income as a share of total household income in rural areas.

As a proportion of total employment in rural areas, nonfarm *employment* averages approximately 25% in Latin America and 44% in Asia, usually representing a lower share than nonfarm *income* relative to total income.

# Policy Implications

How to facilitate the transition from a rural economy based on small farms to one diversified in income sources, competitive in internat'l markets, dynamic.

This might mean migration, public policies to facilitate the Non-ag. rural economy, education, R&D, public infrastructure, etc.

But there is an analytical problem: we know more about how to promote agricultural growth than we do about how to promote non-agricultural rural activities. This is because we know so little about what drives the rural economy and territorial development

# What Are We Missing? Social Protection!

- Building resilience to scarcity: helping people cope, facilitating livelihood change out of agriculture, community level adaptation
- Forms of assistance: cash transfers, employment guarantee schemes, food assistance, micro-finance, insurance
- Only 20 percent of people covered

# More Predictable Incomes, Often Achieved Through Safety Nets Should be the Goal

1. Price volatility is not a new problem
2. Diversification is best protection – but can be tricky
3. Basic tools to help producers and countries get more predictable incomes are better-understood than ever before

# One Other Key Issue

## Governing natural resources

- Who benefits from access to resources?
- Water, land, forests

## ...leading to reforming the multilateral system

- Rights and responsibilities – equity
- Trade
- Finance for development

# WFP's Comparative Advantages

- Large body of experience in support to Governments.
- Operating where most negative impacts.
- Deep field presence = unique platform for implementing CC related activities.
- VAM, EW, DRR = critical analytical tools for national and regional CC planning processes.
- Leading innovation in areas related to climate info and risk management, e.g. risk insurance programmes.

# WFP's Approach

- **CC as a risks and needs multiplier**
- **Focus on CC impact on hunger and malnutrition**
- **Food access issues** (complementing FAO's focus on food availability).



# WFP's Entry Points

1. Disaster risk reduction and emergency preparedness
2. Responding to climate-related hunger crisis and disasters
3. Community-based adaptation
4. Mitigation
5. Social protection and safety nets
6. Advocacy and public policy

# Emergency Response Capacity

We will need to upgrade emergency response capacity to deal with the effects of climate and scarcity.

At present, the informal rule of thumb is that emergency relief agencies can reach up to 100 million people at any one time.

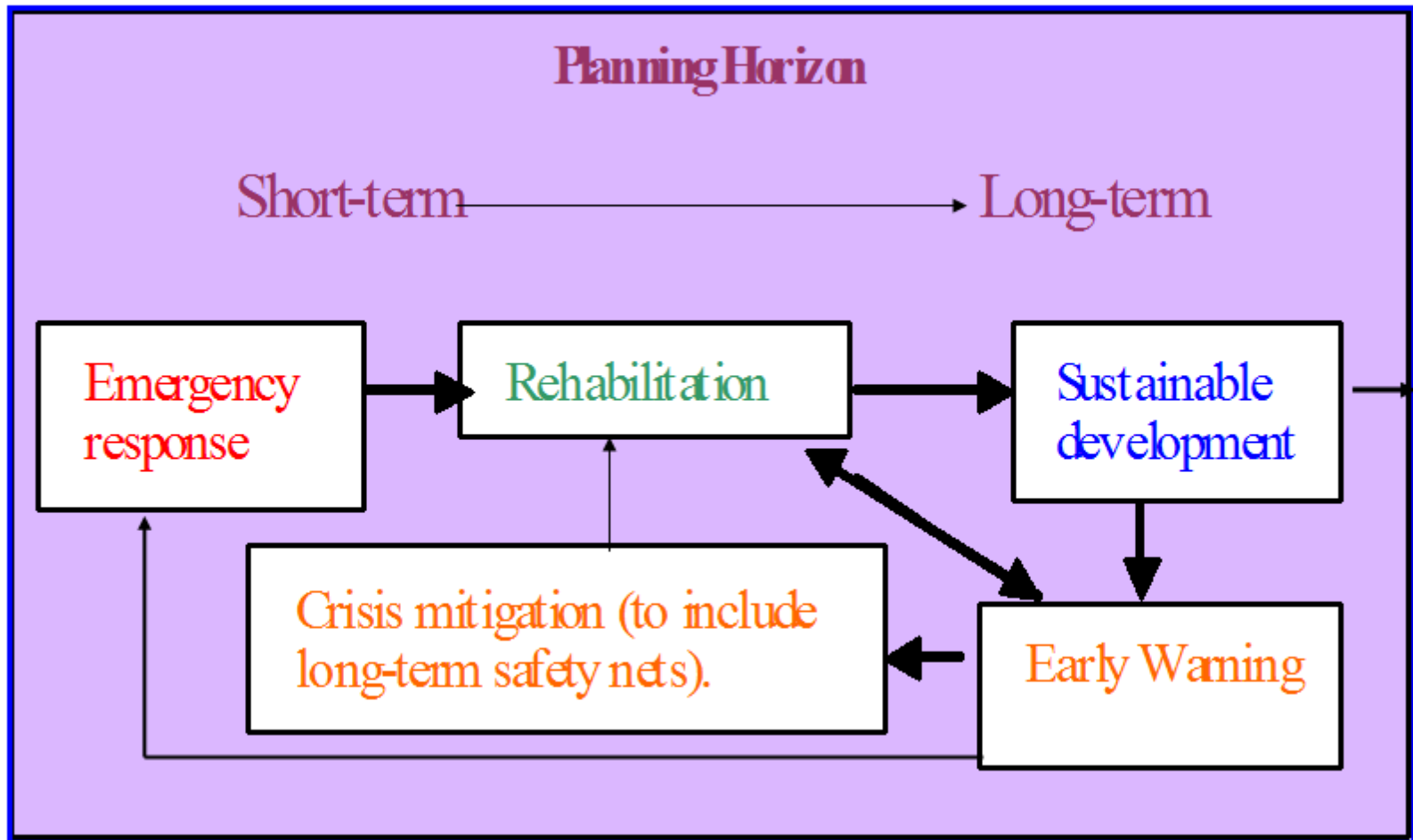
Given projected future trends, it's reasonable to suppose that we might need to double this capacity within a decade or so.

# Focus on Adaptation

Long-standing WFP activities such as targeted food supported employment programmes can be deployed to strengthen resilience of the most vulnerable to CC:

- building flood defences and small-scale irrigation systems, fixing dunes, planting trees, etc.

# Moving From Emergency Response to Development



**Thank You**