

# ECONOMICS OF ADAPTATION TO CLIMATE CHANGE – EACC

Study Launch  
September 2009



# Study Motivation

- Countries will need to adapt to a 2°C warmer world, *managing the unavoidable*
- Mitigation is needed to *avoid the unmanageable* consequences of higher temperatures
- *The Bali Action Plan promises new and additional resources* to help developing countries adapt
- Existing studies provide a wide range of cost estimates, *ranging from US\$4 – 109 billion per year*
- The EACC was initiated to fill *knowledge gap*



# STUDY OBJECTIVES

**Critical Assumptions**

**Key Results**

**Study Messages**

# Economics of Adaptation to Climate Change Study – EACC

**Participants:** Bangladesh, Plurinational State of Bolivia, Ethiopia, Ghana, Mozambique, Samoa, and Vietnam + World Bank

**Funding:** The Netherlands, United Kingdom, Switzerland, World Bank

## Objectives

Estimate costs of adaptation  
for developing countries



## Approach

EACC Global Track

**Presented today**

Support country processes for  
climate-resilient development



EACC Country Track

**Spring 2010**

# EACC Global Track

## Sectors

Agriculture

Forestry

Fisheries

Infrastructure

Water Resources

Coastal Zones

Health

Ecosystem Services

## Cross- Sectors

Extreme Weather Events

Social Protection

## Projections

Climate  
Water Run-off  
Baseline GDP/Population

Global  
data sets

## Economic, Social and Environmental Impacts

## Identification of Adaptation Measures

Decision Rule

## Cost of Adaptation



## Study Objectives

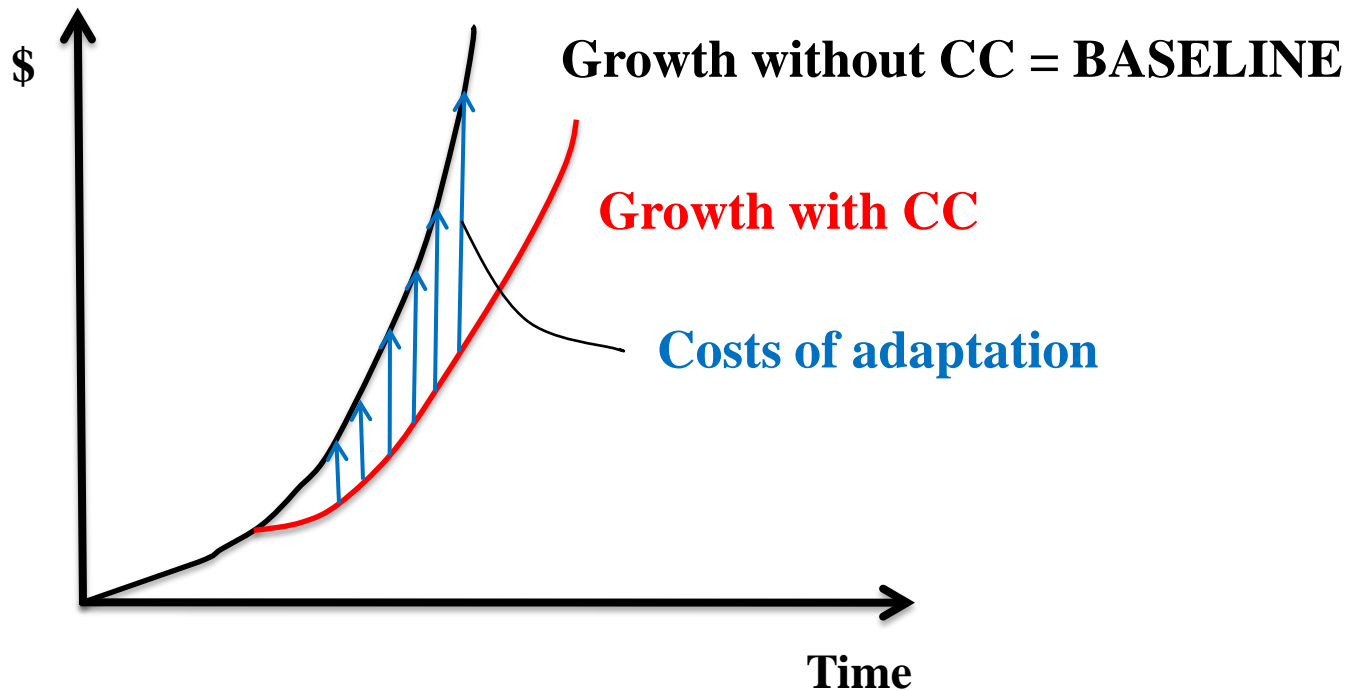
# CRITICAL ASSUMPTIONS

## Key Results

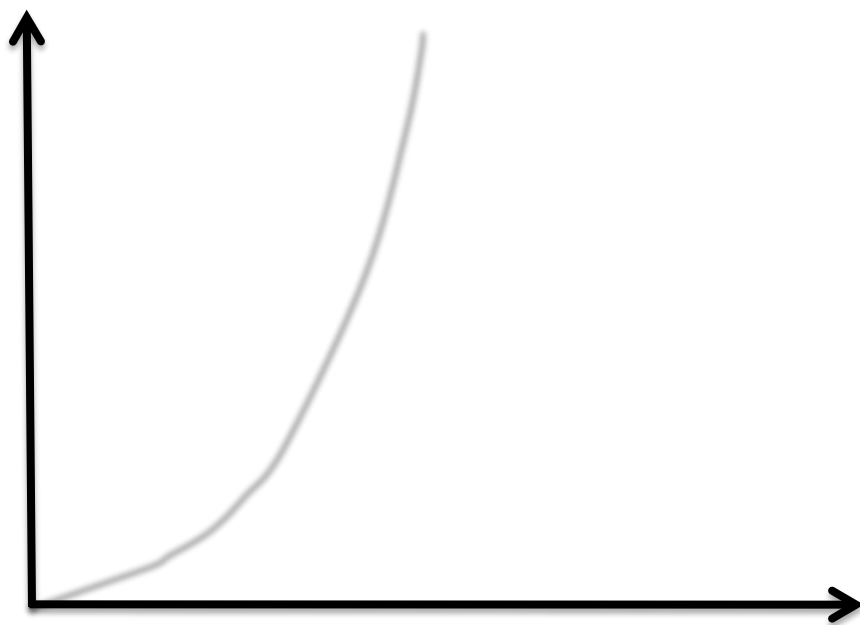
## Study Messages

# Assumption: How much to adapt (I)

Restore Welfare



# Assumption: How much to adapt? (II)

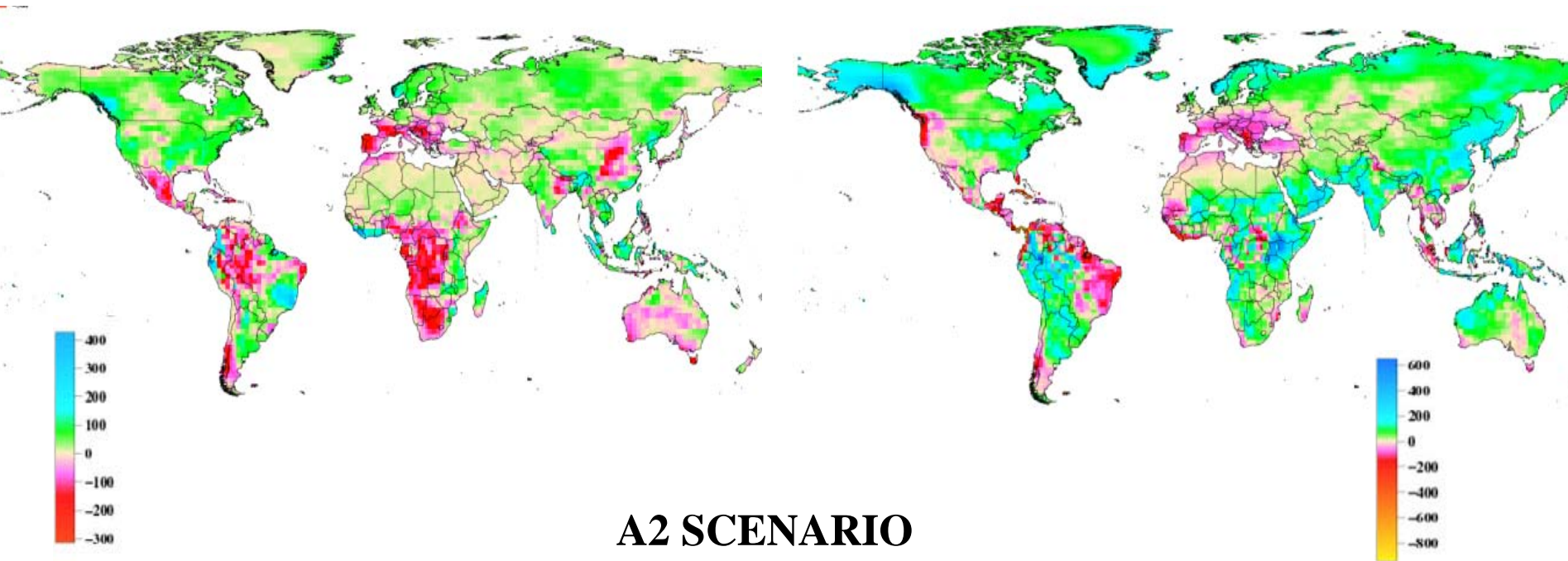


# Assumption: Adapt to what?

Change in average annual precipitation, 2000 – 2050

CSIRO (DRY)

NCAR (WET)



Two extreme GCMs used to estimate range of costs

# Assumption: Benefits offset costs?

**Should potential benefits from climate change offset costs of adaptation in a sector or a country?**

- **Say, Thailand incurs a cost in infrastructure but benefits in water supply...**
- **Say, Thailand benefits in water supply but Cambodia incurs a cost...**

# Other Key Assumptions

**Time Frame --- 2010 to 2050**

**Discount Rate --- 0% and constant 2005 prices**

**Development Baseline --- A2 SRES**

**Only Public Sector (Planned) Adaptation Included**

**Only “Hard” Physical Actions Included**

**Sectoral (as opposed to General Equilibrium) Approach**

**No Catastrophic Climate Change Scenario**

# What is not covered...

- **Complete assessment of ecosystem services and climate uncertainties**
- **Distributional implications of impacts and adaptation**
- **Assessment of institutional capacity and financial mechanisms**



**Study Objectives**

**Critical Assumptions**

**KEY RESULTS**

**Study Messages**

# Annual Costs of Adaptation: by Sectors, 2010-2050, US\$ Billion

SECTOR	Climate Scenario	
	DRY	WET
Agriculture, Forestry, Fisheries	7.3	7.6
Water Supply	18.8	13.7
Human Health	1.6	2.0
Coastal Zones	29.6	30.1
Infrastructure	13.7	29.5
Extreme events	6.5	6.7
<b>Total</b>	<b>77.6</b>	<b>89.7</b>

2005 Constant Prices, 0% Discounting

Source: World Bank Analysis

# Annual Costs of Adaptation: by Regions, 2010-2050, US\$ Billion

Climate Scenario	East Asia	Europe C. Asia	Latin America	M. East N. Africa	South Asia	Africa Sub-Sah.	Total
DRY	19.6	5.7	16.9	3	15.6	16.9	77.6
WET	25	9.5	21.5	3	12.7	18.1	89.7

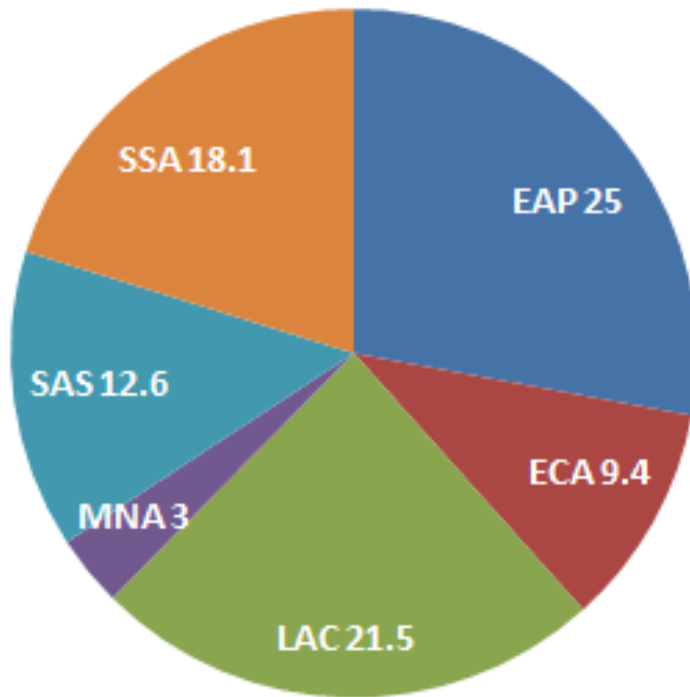
2005 Constant Prices, 0% Discounting

Source: World Bank Analysis

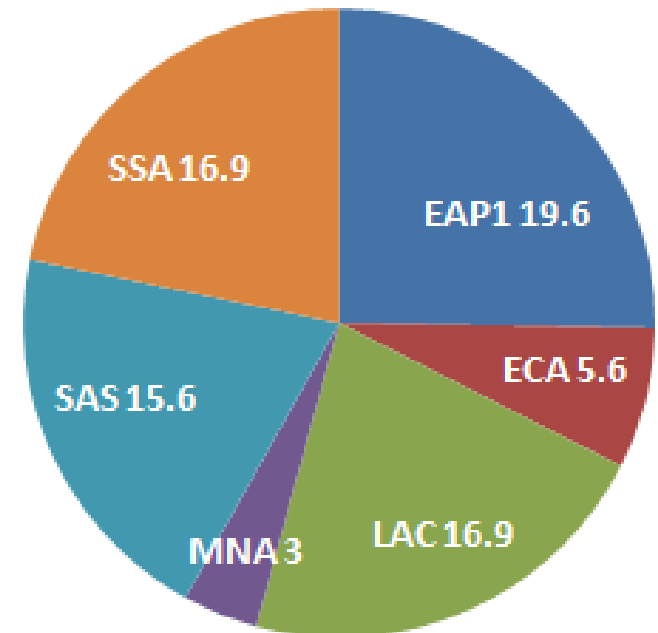
# Annual Costs of Adaptation: by Region, 2010 – 2050, US\$ Billion

Wet Scenario – 89.7

2005 constant prices, 0% discounting



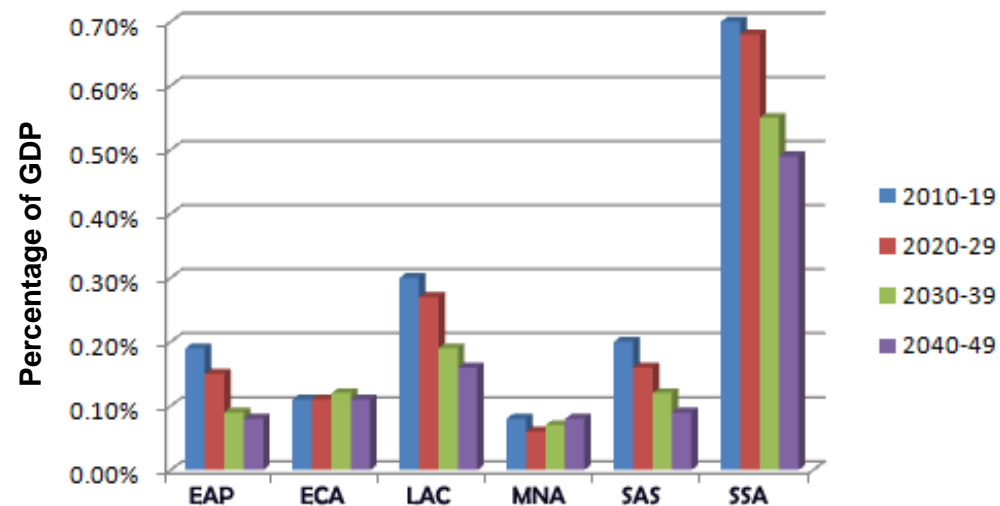
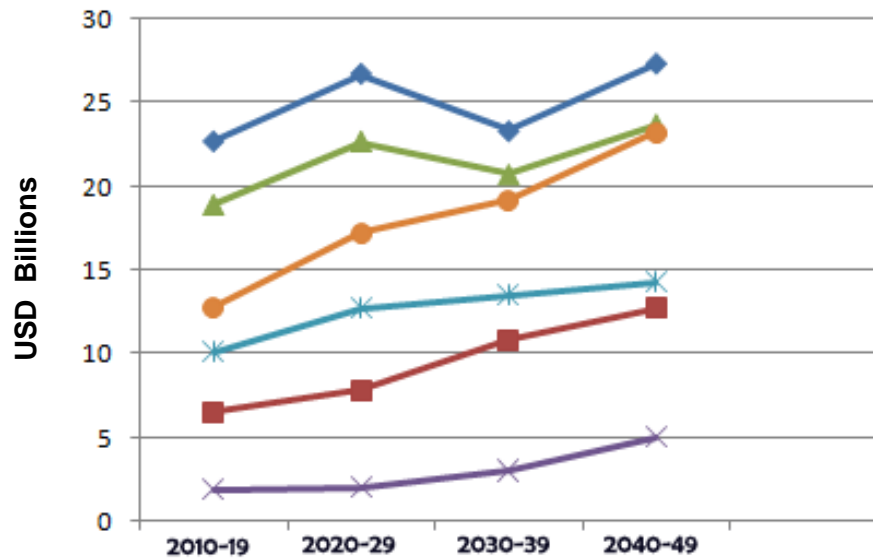
Dry Scenario – 77.6



Source: World Bank Analysis

# Annual Costs of Adaptation: by Region, Decades, 2010-2050, US\$ Billion

WET Scenario, 2005 constant prices, 0% discounting

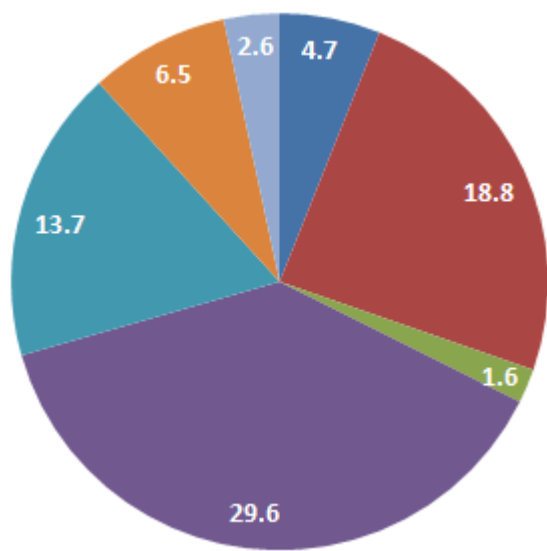


- East Asia and Pacific, EAP
- Europe and Central Asia, ECA
- Latin America and Caribbean, LAC
- Middle East and North Africa, MNA
- South Asia, SSA
- Sub-Saharan Africa, SSA

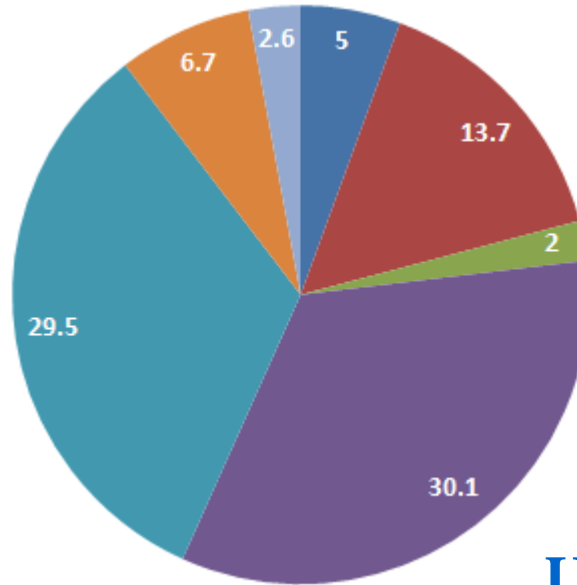
Source: World Bank Analysis

# Comparison with UNFCCC (2007)

## World Bank – EACC

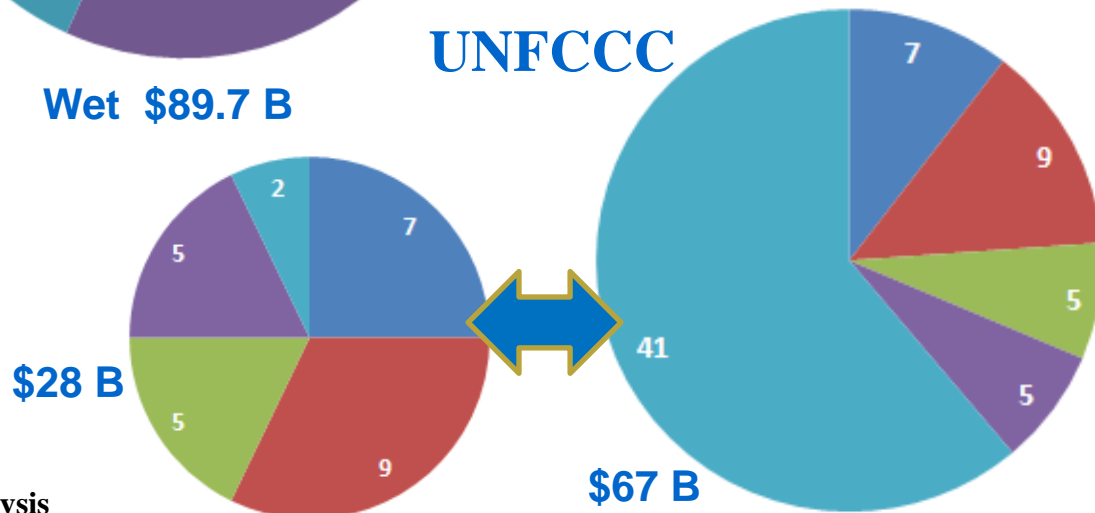


**Dry \$77.6 B**



**Wet \$89.7 B**

## UNFCCC



- Agriculture
- Water Resources
- Health
- Coastal Protection
- Infrastructure
- Extreme Weather Events
- Fisheries

Source: World Bank Analysis

# Implications of Study Assumptions

Assumption	Implication for Cost Estimate
2010 to 2050	↑ with longer horizon
0% Discount Rate	Net present value ↓ with positive rate
A2 Development Baseline	Higher growth implies ↑ absolute costs, but ↓ as % of GDP
Public Sector (Planned) Adaptation	↑ if private included
Only “Hard” Physical Actions Included	Unknown effect if “soft” (policy) actions included
Sectoral Approach	Unknown if analyzed under general equilibrium
Catastrophic Impacts	Considerably ↑



**Study Objectives**

**Critical Assumptions**

**Key Results**

**STUDY MESSAGES**

# Study Messages

- **Adaptation to 2°C warmer world will be costly (\$75-100 billion /yr), even if low compared to GDPs;**
- **Adaptation addresses effect, not causes of climate change; Mitigation critical, especially to reduce catastrophic risks;**
- **Economic growth is the most powerful form of adaptation; but not development as usual;**
- **Development strategies must maximize flexibility to incorporate climate knowledge as it is gained.**



**THANK YOU !**

**[www.worldbank.org/environment/eacc](http://www.worldbank.org/environment/eacc)**



THE WORLD BANK GROUP

# How much to Adapt?

## Adaptation Level

## Definition

Restoring  
Welfare

(First graph)

*Minimum cost of adaptation actions to restore welfare*

- **Infrastructure:** restore level of services
- **Agriculture:** restore nutritional levels

Optimal  
Adaptation

(Second graph)

*Minimum cost of adaptation actions where cost-benefit ratio  $\leq 1$ , plus the residual damage*