

The background of the slide is a composite image. The top portion shows a city skyline with several skyscrapers under a grey, overcast sky. The bottom portion shows a wide river or floodplain with a long bridge spanning across it. The water is a murky, brownish-green color, and many trees are partially submerged. A semi-transparent dark green horizontal band runs across the middle of the image, containing the title and subtitle. A vertical band of white dots runs down the center of the slide, partially overlapping the dark green band.

Swiss Re



Economics of Climate Adaptation

A framework for decision-making

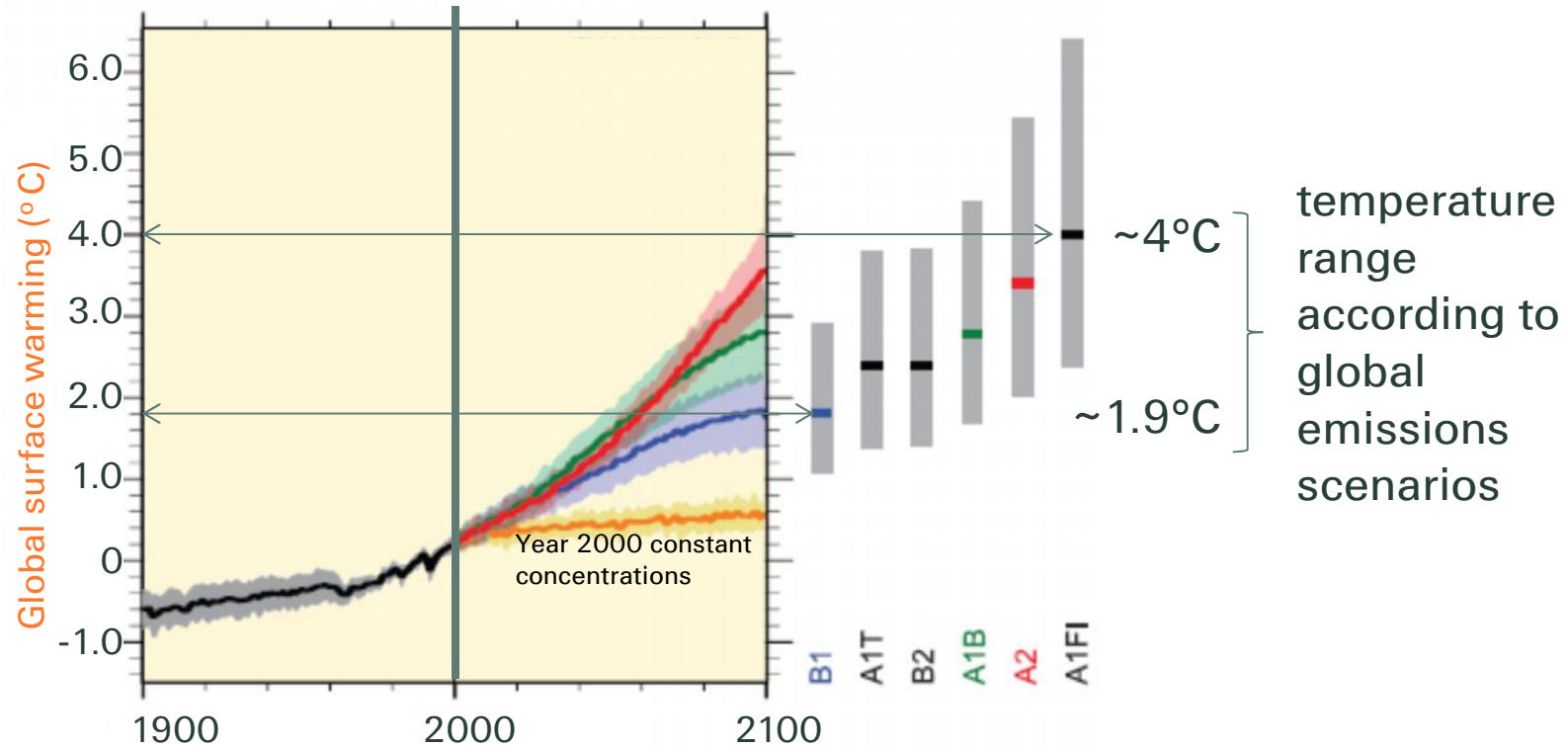
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The need for climate adaptation

Leading scientists expect a continuing rise of the global mean temperature

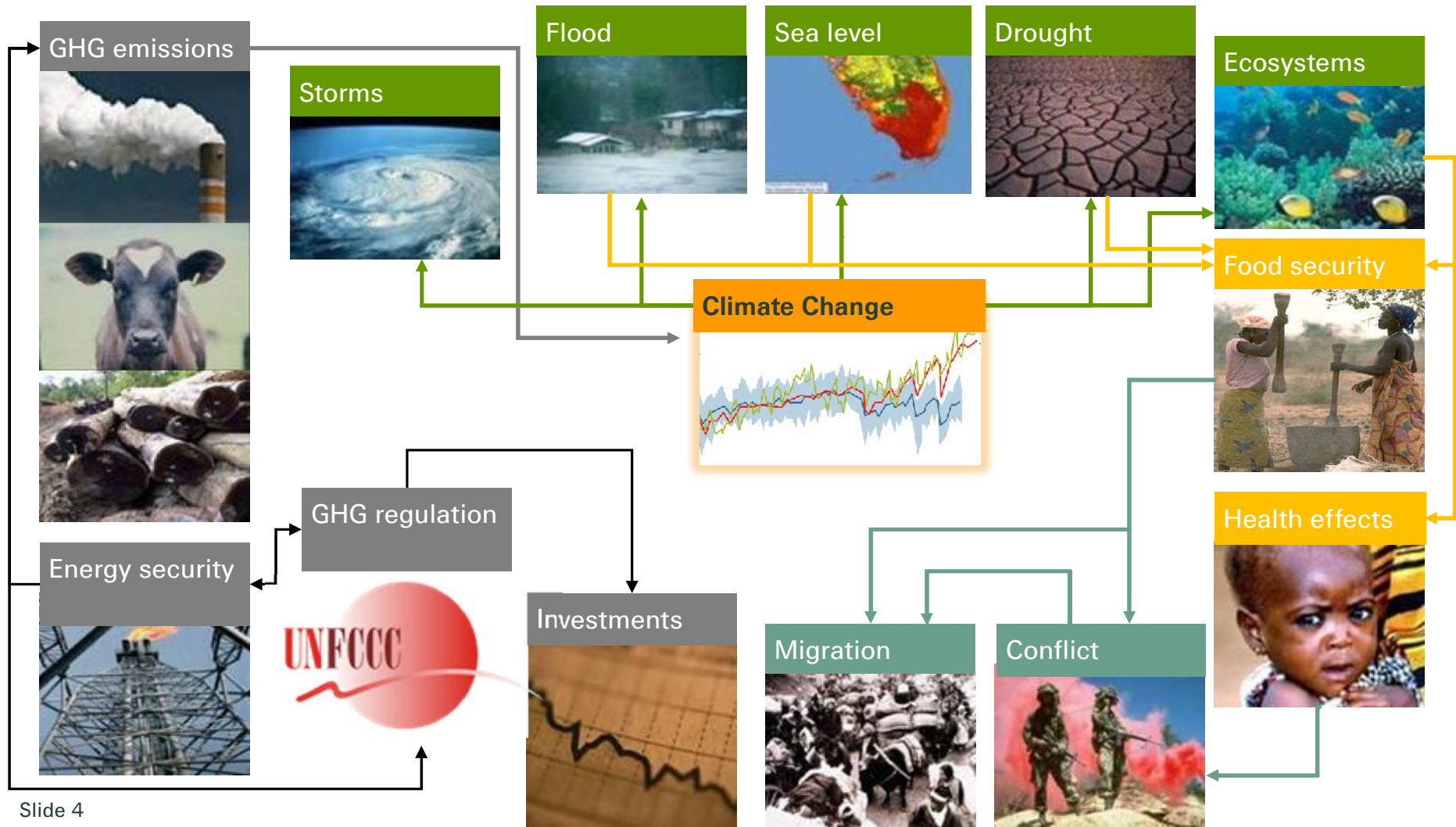
IPCC AR4* multi-model averages and assessed ranges for surface warming**



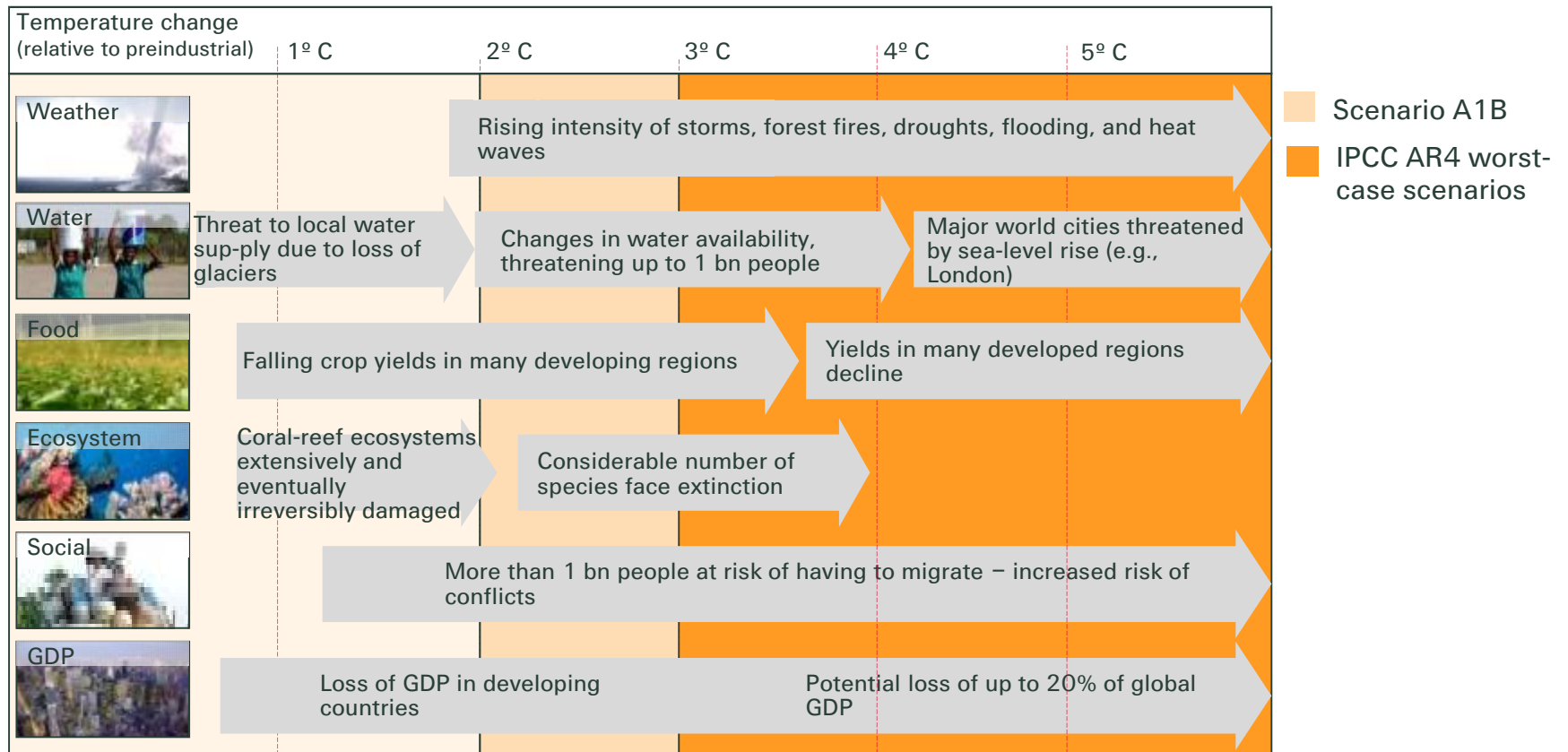
Source: IPCC

- A 2°C outcome would be desirable, but very unlikely to be achieved
- Even if we stop all emissions today, climate is still going to alter
- We need to adapt to a changing environment

Climate risks are highly inter-connected



As global warming accelerates scientists expect increasingly drastic impacts



Source: Stern Review; IPCC

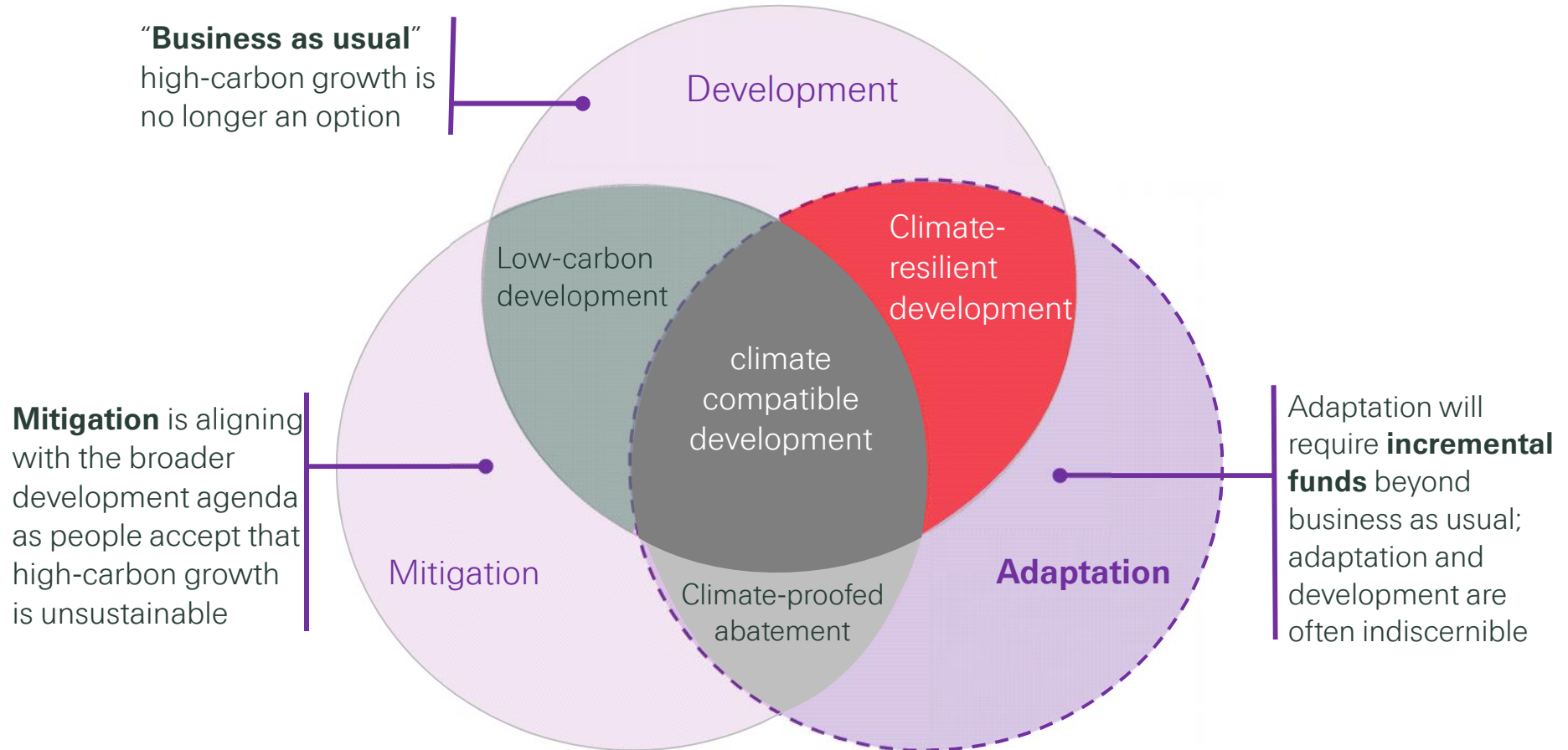
The main levers for combating climate change

- **Mitigation:** Reduction of greenhouse gas emissions, or increase greenhouse gas sinks
 - Energy efficiency, renewables, clean tech/low-carbon growth

- **Adaptation:** Increase the ability to adjust to a changing environment
 - Risk prevention
 - Physical infrastructure
 - Process/technology optimization
 - Risk transfer and financing
 - Incentivize prevention

→ In general the more mitigation there is, the less will be the impacts to which we will have to adjust, and the less the risks for which we will have to try and prepare.

The need for climate-resilient development



Swiss Re's climate change strategy

Coping with climate change requires both mitigation and adaptation measures

Assess and manage the risk



- Advance knowledge
- Address in risk management, underwriting/pricing

Seize business opportunities



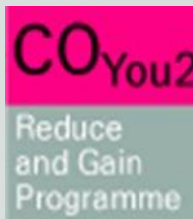
- Solutions for mitigating and adapting to climate change
- Catastrophe insurance
- Weather risk solutions

Influence the business environment



- Dialogue with regulators, investors, clients, and employees
- Support climate policy development

Lead by example



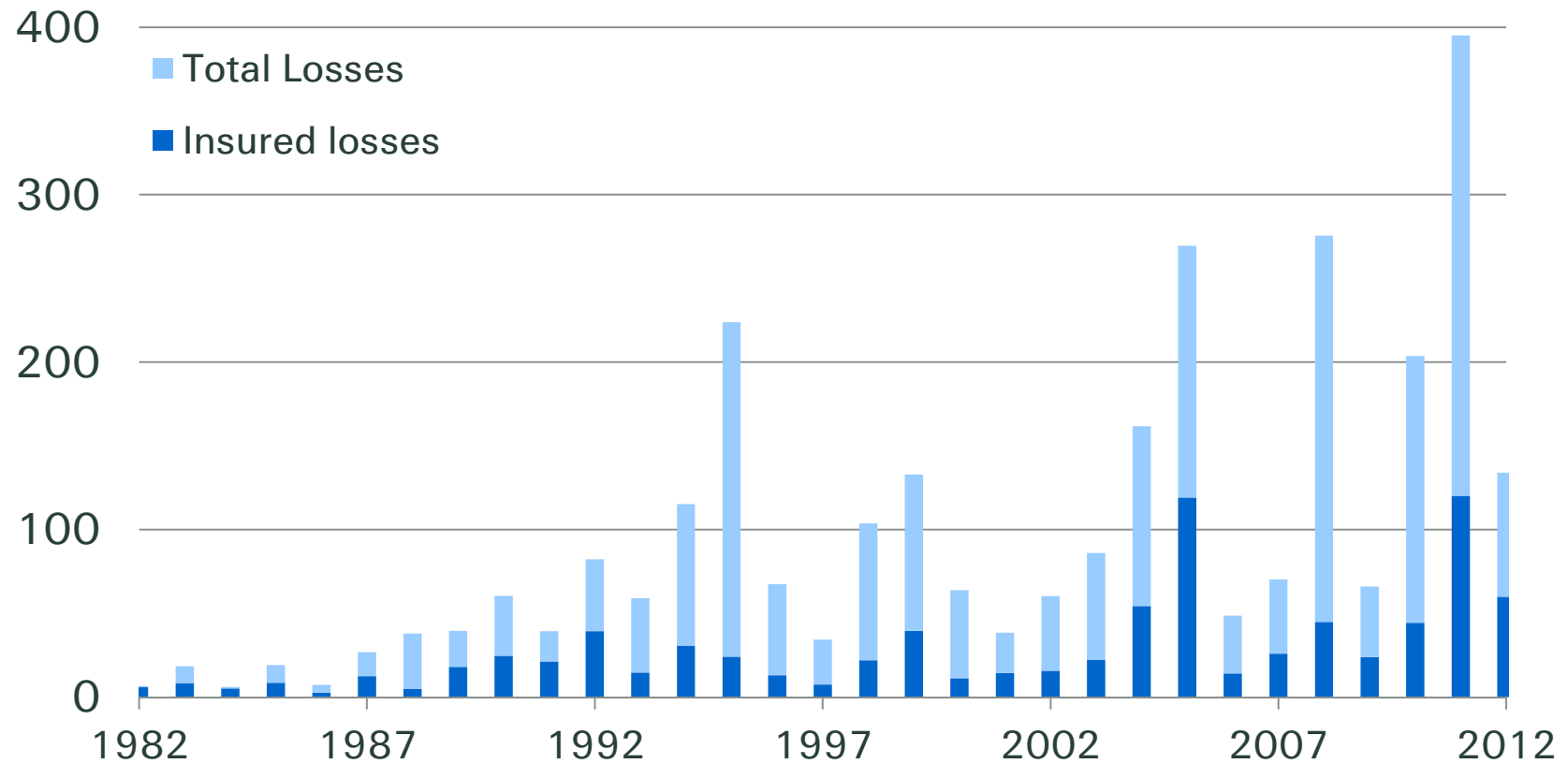
- Greenhouse neutral since October 2003
- Reduced emissions per employee by 50.6% by 2010 (2013 target met)
- COYou2 Programme since 2006



Natural catastrophe losses are on the rise

Natural catastrophe losses 1982-2012, in USD billion (2012 prices)

* 2012 Loss numbers are a preliminary estimate



Note: Insured losses: property and business interruption, excluding liability and life insurance losses

Source: Swiss Re sigma

The key driver so far

Ocean Drive, FL, 1926



Ocean Drive, FL, 2000



Climate adaptation is an urgent priority

- **Decision makers** of national and local economies ask
 - What is the potential **climate-related loss** to the economies and societies over the coming decades
 - How much of that loss can we avert, with what **measures**?
 - What investments will be required to fund those measures and will the **benefits** of that investment outweigh the **costs**?



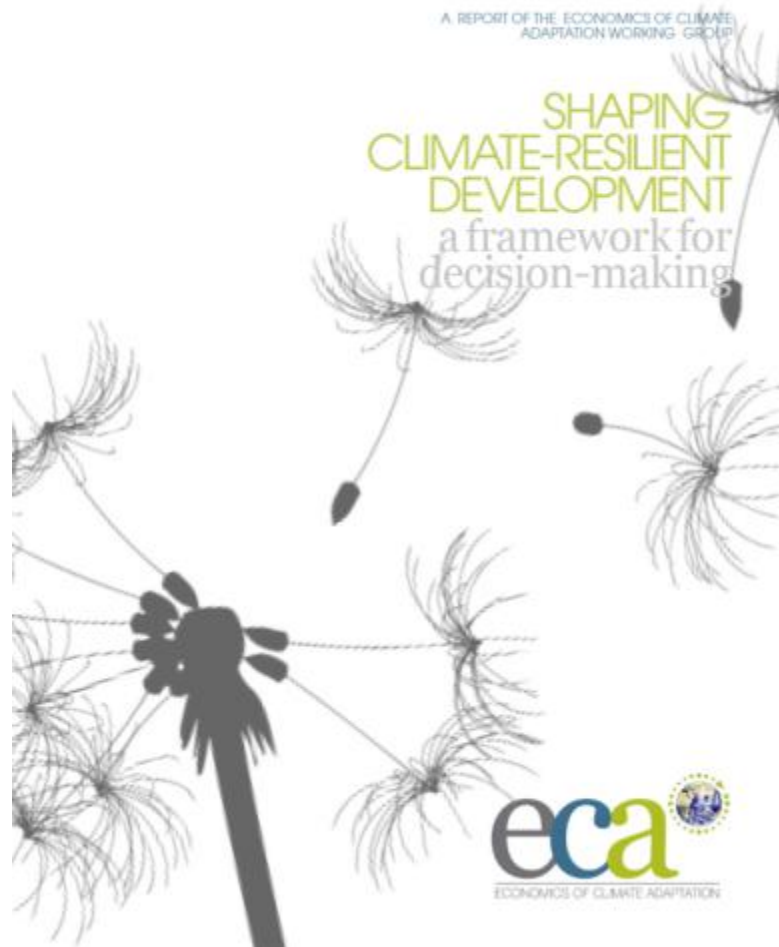
Economics of Climate Adaptation

Key Messages

- Adaptation measures are available to make societies more resilient to the impacts of climate change and should be an urgent priority for the custodians of national and local economies, such as finance ministers and mayors.
- Decision makers need the facts to identify the most cost effective investments.
- The Economics of Climate Adaptation (ECA) methodology provides decision-makers with a fact base to answer these questions in a systematic way.
- It allows decision-makers to integrate adaptation with economic development and sustainable growth.
- The insurance industry is an important partner in future adaptation plans because of its experience in risk management and modeling, and in developing new insurance products.

No need to take notes... → www.swissre.com/climatechange

- The full report, 8 case studies, 164 pages
http://media.swissre.com/documents/rethinking_shaping_climate_resilient_development_en.pdf



- Factsheet on urban resilience, 3 pages
http://media.swissre.com/documents/Economics_of_Climate_Adaption_UK_Factsheet.pdf



Adaptation measures are available to make cities more resilient to the impacts of climate change. But decision-makers need the facts to identify the most cost-effective investments.



background

Climate adaptation is an urgent priority for the custodians of national and local economies, such as finance ministers and mayors. Such decision-makers ask: What is the potential climate-related loss to our economies and societies over the coming decades? How much of that loss can we avert, with what measures? What investment will be required to fund those measures – and will the benefits of that investment outweigh the costs?

The ECA methodology¹ provides decision-makers with a fact-based answer to these questions in a systematic way. It enables them to understand the impact of climate change on their economies – and identify actions to mitigate that impact at the lowest cost to society. It therefore allows decision-makers to integrate adaptation with economic development and sustainable growth. In essence, we provide a methodology to pro-actively manage total climate risk, which means:

- Assess today's climate risk
- Chart out the economic development paths that put greater population and assets at risk
- Consider the additional risks presented by climate change

¹ The methodology is based on the findings of a study by the Economics of Climate Adaptation Working Group, a partnership between the Global Environment Facility, Milliman's Company, Swiss Re, the Rockefeller Foundation, ClimateWorks Foundation, the European Commission, and Standard Chartered Bank, see reference below.

Climate-resilient development needs to **assess** and **address** total climate risk

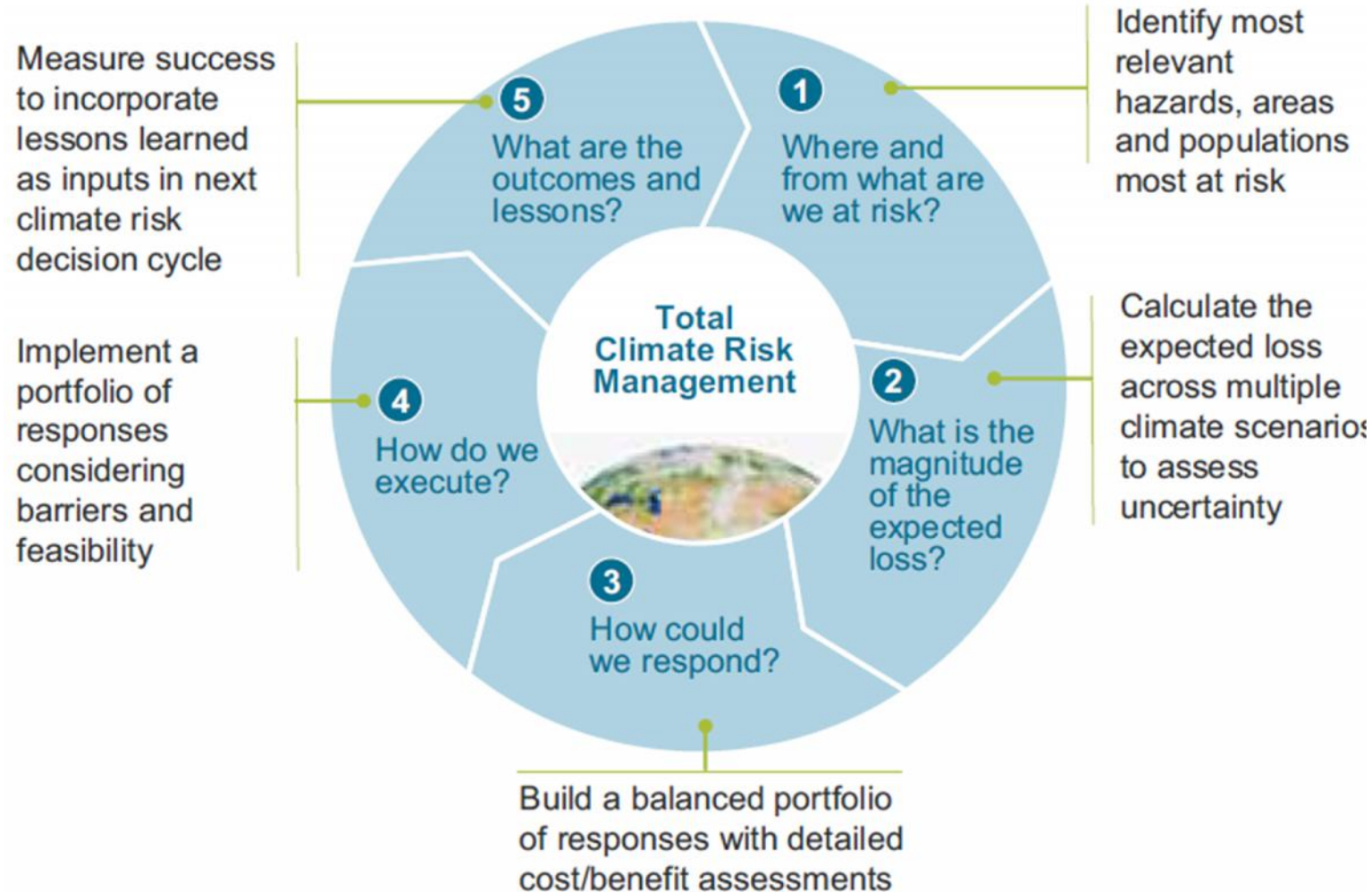
Objectives

- Provide decision makers with the **facts and methods** necessary to design and execute a climate adaptation strategy
- Supply insurers, financial institutions, and potential funders with the **information** required to unlock risk prevention funding and deepen global risk transfer markets

Methodology

- 1) Follow a rigorous risk management approach to **assess local total climate risk**, the sum of
 - today's climate risk,
 - the economic development paths that might put greater population and value at risk
 - the additional risks presented by climate change
- 2) Propose and prioritize a basket of adaptation measures to **address** total climate risk on an economic basis

A framework for assessing total climate risk



The working group studied 17 regions with diverse climate hazards

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www.swissre.com/climatechange

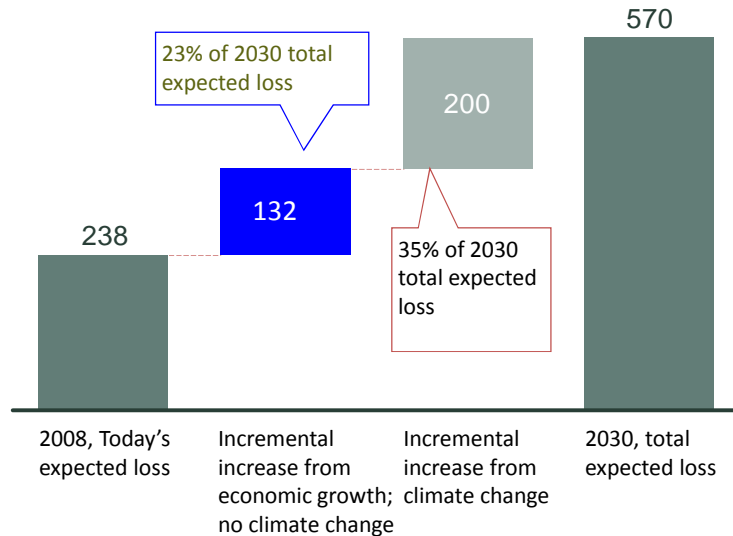
Economics of Climate Adaptation (eca) Working Group, a partnership between the Global Environment Facility, McKinsey & Company, Swiss Re, the Rockefeller Foundation, ClimateWorks Foundation, the European Commission, and Standard Chartered Bank.



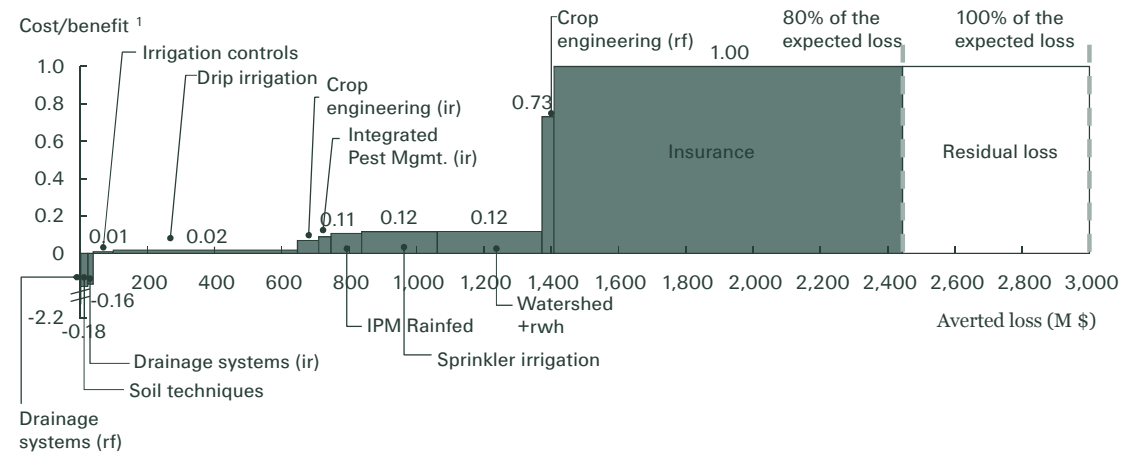
Maharashtra India

Drought Risk to Agriculture

Expected loss from exposure to climate
High climate change scenario, 2008 USD millions



The initial portfolio of responses cost-effectively averts much (~80%) of the expected losses



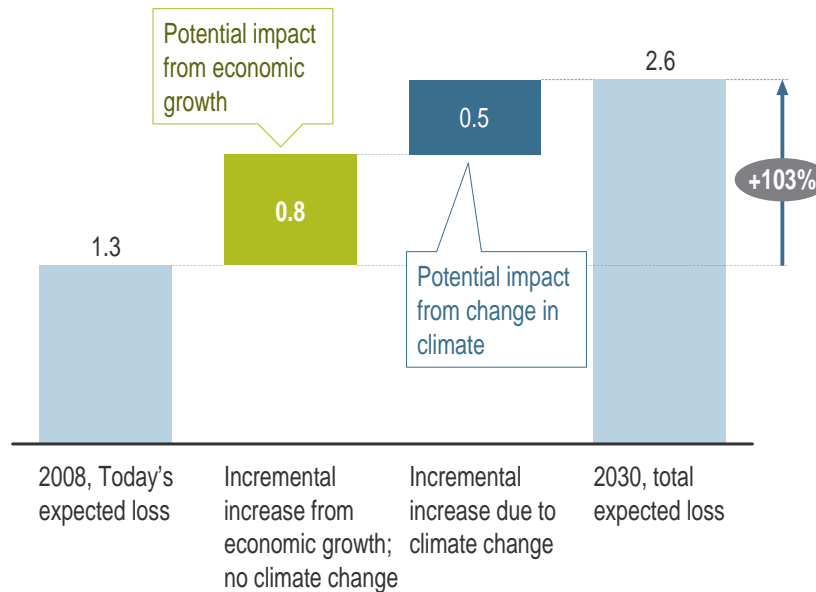
- Expected loss is driven by current risk, agricultural growth, and climate change
- Agriculture income growth would contribute to an additional 23% of 2030 high change loss
- Climate change (*occurring in combination with income growth*) will account for 35% of 2030 high change loss

- 80% of the expected loss can be addressed by measures. The remaining 20% is “residual” loss, which will require additional penetration of insurance, or relief and rehabilitation
- ~50% of measures have lifetime economic benefits greater than costs
- Micro irrigation measures, watershed management and insurance are key measures (addressing 70% of the expected loss)
- 3 of these measures have negative costs, which means that they save costs along with averting loss

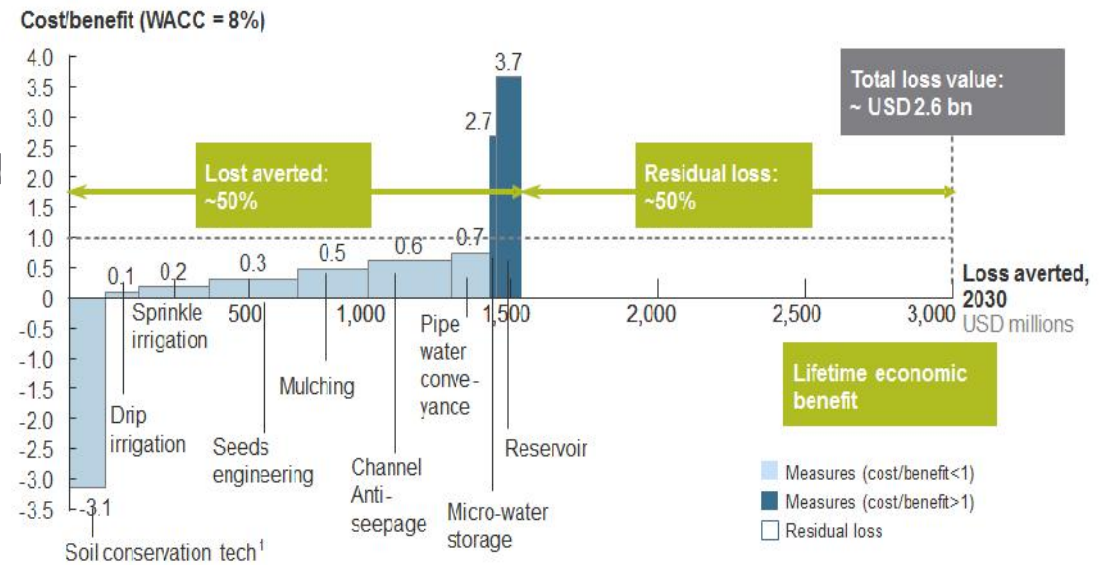


North and Northeast China Drought Risk to Agriculture

Annual expected loss from exposure to climate
Moderate climate change scenario, USD billions



The initial portfolio of responses cost-effectively averts about 50 percent of the expected losses



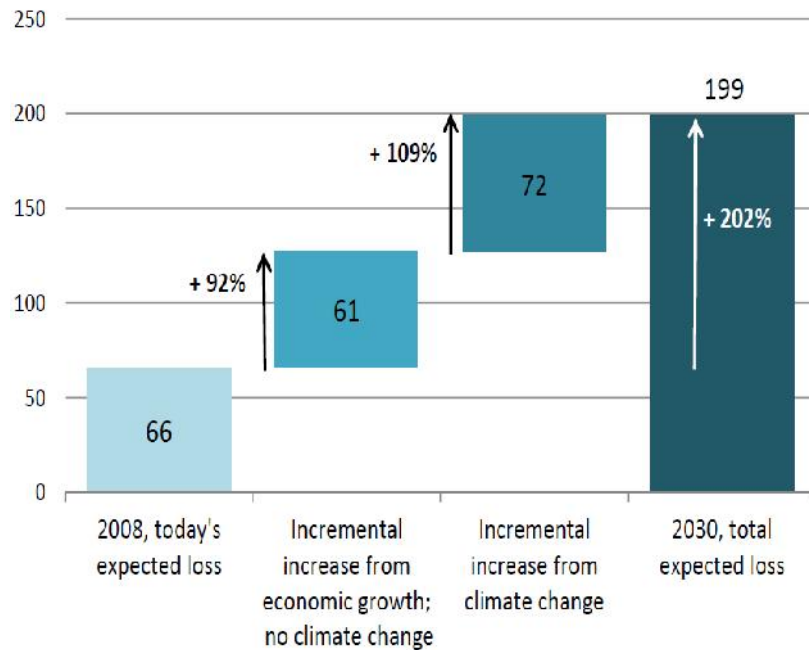
- Drought is the largest threat to food security in China with \$8bn losses in recent years
- Climate change could lead to 50 percent increase in drought loss in Northeast China by 2030, while having limited impact in North China
- Under the moderate climate change scenario, the total loss rises to more than \$2.5bn in 2030

- Measures costing \$15bn for the period 2010-2030 have the potential to avert 50 percent of drought loss by 2030
- A combination of irrigation measures, planting measures, and seed-engineering measures can be used to cost-effectively reduce climate-related losses
- Engineering measures appear not to be cost-effective
- 40 percent of the capital investments would come from individual farmers

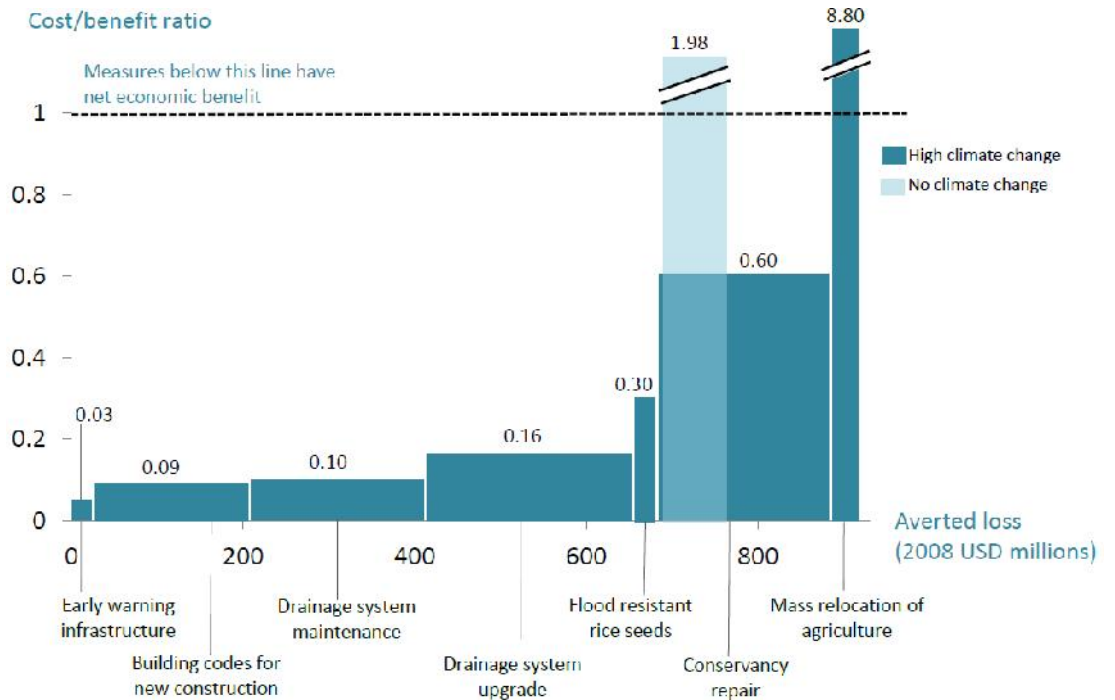


Georgetown, Guyana Managing Flash Flood Risk

Annual expected loss from exposure to climate
Extreme climate change scenario, USD millions



The initial portfolio of responses cost-effectively averts more than 60 percent of the expected losses



- Rain related flooding is the primary climate hazard
- Even if flood risks decrease, Guyana faces significant loss due to the current low level of climate resilience
- The probably range of expected climate-related losses in 2030 ranges from 12 to 19 percent of GDP

- A balanced portfolio of prevention, intervention and insurance measures can be used to proactively manage total climate risk
- Most of the losses can be cost-effectively averted
- The conservancy repair measure is cost-effective in the high climate change scenario, while in the low climate change scenario the cost-benefit ratio is 1.98

Conclusions

- ECA methodology provides decision-maker
 - with a **fact base**
 - enables to **understand the impact** of climate change on their economies
 - enables to **identify actions** to minimize the impact at the lowest cost to society
 - allows to **integrate adaptation** with economic development and sustainable growth
- Natural catastrophe modeling is the essence
- Climate is a strategic issue

Will adaptation or mitigation be the prevailing strategy?

Adaptation

“Direct concrete effect, but only treating the symptoms, not the disease”

- + Immediate effect of investments (in 1-2 years)
- + Obvious self-interest
- + No dependence on other stakeholders for benefits to be realized
- Much more expensive in the long term than mitigation
- Cannot protect in the long term against all global warming effects



either or?
 how to
 combine?

Mitigation

“Addresses the underlying issue in the long term, but impact not visible in the short term”

- Long term effect of investments (>20-30 years) – benefit comparable to global insurance
- Very indirect link to self-interest
- Large dependence on many other stakeholders for the benefit to be realized
- + Cheap compared to adaptation in the long term
- + Addresses the root cause and solves the problem

Swiss Re



Thank you

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