

A REPORT OF THE ECONOMICS OF CLIMATE
ADAPTATION WORKING GROUP

SHAPING CLIMATE-RESILIENT DEVELOPMENT

a framework for
decision-making

EXECUTIVE SUMMARY

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Many national and local economies are already vulnerable to climate events, in the form of floods, droughts, heat waves, and tropical storms. Global warming, which could see the Earth's surface temperature rise by 2.5-5.9 degrees Celsius by the end of the century compared to pre-industrial levels¹, could greatly heighten this vulnerability, triggering more frequent and severe weather disasters, shifts in rainfall patterns and climate zones, and a rise in sea levels.

Climate adaptation is thus 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 aim of this report is to provide decision-makers with a systematic way of answering these questions. Focusing specifically on the economic aspects of adaptation, it outlines a fact-based risk management approach that national and local leaders can use to understand the impact of climate on their economies – and identify actions to minimize that impact at the lowest cost to society.

The report is based on the initial findings of a study by the Economics of Climate Adaptation 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.



1. DESIGNING A SYSTEMATIC APPROACH TO CLIMATE ADAPTATION

Over the past 50 years, severe weather disasters have caused some 800,000 deaths and over a trillion dollars in economic loss – and in the present decade the damage wrought by such disasters has reached record levels. Economies in many parts of the world are already susceptible to significant disruption from today's climate – and continued economic growth could put even more value at risk. Climate change could cause significant incremental loss, even within the next 20 years. However, knowledge about future climate – particularly the local impacts of global climate change trends – is incomplete. Decision-makers will have no option but to make policy and investment choices under uncertainty.

As a practical contribution to the knowledge base on climate risk and adaptation, the Working Group has developed a quantitative decision-making framework built around two sets of tools.

- First, the framework provides tools to quantify a location's "total climate risk". Included in this quantification is an assessment of the expected annual loss to the location's economy from existing climate patterns; a projection of the extent to which future economic growth will put greater value at risk; and finally, an assessment of the incremental loss that could occur over a twenty-year period under a range of climate change scenarios based on the latest scientific knowledge.

- Second, the framework uses **cost-benefit discipline** to evaluate a selection of feasible and applicable measures to adapt to the expected risk – spanning infrastructural, technological, behavioral and financial solutions. The output of this cost-benefit exercise provides one key input – along with policy, capacity, and other considerations – for a country, region or city assembling a comprehensive adaptation strategy. Because any such strategy will need to be closely integrated with the location’s broader economic development choices, many of the measures evaluated will be economic development steps.

The Working Group developed a detailed methodology to underpin this framework, and applied it in eight on-the-ground test cases in China, Guyana, India, Mali, Samoa, Tanzania, the UK, and the US, conducted in partnership with local governments and stakeholders. The cases focused on selected climate-sensitive regions and cities in each of these countries, and tested the methodology against a sample of climate hazards, economic impacts, and development stages.

The assessments undertaken in these test cases were built on broad metrics of climate-related economic loss, such as GDP, asset value, and agricultural production, and in most cases did not attempt to calculate the additional social and environmental costs of climate impacts. In selected cases, however, the methodology was extended to incorporate human costs – including the impacts of climate risk on health, homes and livelihoods – as well as to the losses facing particular economic sectors such as power generation. The cases did not calculate losses beyond 2030, nor make national policy recommendations.



2. TOWARDS SOLUTIONS: FINDINGS FROM THE TEST CASES

There were four overarching findings from the test cases.

The first is that, despite much uncertainty about the possible effects of global warming on local weather patterns, society knows enough to build **plausible scenarios on which to base decision-making**. This is true even in developing countries, where historical longitudinal climate data may be limited. Using such scenarios helps decision-makers identify adaptation measures that would be useful against a range of climate change outcomes.

The second finding is a sobering one: **significant economic value is at risk**. If current development trends continue to 2030, the locations studied will lose between 1 and 12 percent of GDP as a result of existing climate patterns, with low income populations such as small-scale farmers in India and Mali losing an even greater proportion of their income. Within the next 20 years, climate change could worsen this picture significantly: in the locations studied, a scenario of high climate change would increase today’s climate-related losses by up to 200 percent as soon as 2030.

Thirdly, however, the cases found that a **portfolio of cost-effective measures** can be put together to address a large part of the identified risk. In principle, between 40 and 68 percent of the loss expected to 2030 in the case locations – under severe climate change scenarios – could be averted through adaptation measures whose economic benefits outweigh their costs – with even higher levels of prevention possible in highly targeted geographies. These measures include infrastructure improvements, such as strengthening buildings against storms or constructing reservoirs and wells to combat drought; technological measures, such as improved fertilizer use; systemic or behavioral initiatives, such as →

awareness campaigns; and disaster relief and emergency response programs. Risk transfer or insurance measures also play a key role in addressing low-frequency, high-severity weather events such as once-in-100 year floods. However, in most cases there remains a proportion of climate-related risk that cannot be averted through known adaptation measures – underlining the fact that adaptation, no matter how well designed, cannot be a substitute for action to reduce carbon emissions and slow the rate of global warming.

Finally, the cases reinforced the view that adaptation measures are in many cases also effective steps to **strengthen economic development** – especially in developing countries. In Mali, for example, the implementation of climate-resilient agricultural development could potentially bring in billions of dollars a year in additional revenue. Measures with demonstrated net economic benefit are also more likely to attract investment – and trigger valuable new innovations and partnerships. Indeed, well-targeted, early investment to improve climate resilience – whether in infrastructure development, technology advances, capacity improvement, shifts in systems and behaviors, or risk transfer measures – is likely to be cheaper and more effective for the world community than complex disaster relief efforts after the event.

The specific outputs of each of the test cases, underpinning these findings, are summarized in Appendix 1 of the report.



3. TAKING CLIMATE-RESILIENT DEVELOPMENT FORWARD

The framework presented in this report can help societies better understand the climate risk to their economies – and provide vital input into impactful, cost-effective adaptation strategies that boost overall economic development.

The initial application of the framework to the eight local test cases generated several important lessons on how decision-makers can best assess and address the climate risk facing their economies and societies – not least of which is the insight that a common risk framework does indeed apply across hugely diverse locations, climate risks, and economic impacts. The implication for decision-makers is that it is possible to undertake a focused, solutions-oriented climate risk assessment in a short space of time. →

A second key lesson is that, even in locations where climate and economic data is sparse – as is often the case in least developed countries – it is possible to develop a robust climate loss model and quantify the economic costs and benefits of a wide range of adaptation measures. A systematic framework, combined with in-depth engagement with local experts, officials and populations, can provide a strong basis for decision-making.

Further, the test cases emphasized differences in the climate risk profiles of individual regions and cities – and even the individual districts and suburbs within them. An effective climate risk assessment should be built on multiple local assessments – not an extrapolation of a few local assessments to the national level. Equally, adaptation measures should be evaluated and selected based on local applicability.

The test cases did not analyze the steps that would be required to implement the identified adaptation measures in the locations studied. However, the following steps would be key to implementing a comprehensive climate-resilient development strategy at the national or local level:

- Create an inclusive national or local effort. This would ideally be an official process led by a senior government decision-maker, with significant engagement from the private sector, NGOs and academics
- Define current and target penetration of the priority measures identified
- Address existing obstacles to development implementation, such as policy frameworks, institutional capability, and organization
- Encourage sufficient funding from the international community – for example, technical skills, institutional capacity-building, policy and planning, and knowledge dissemination
- Recognize and mobilize different roles for each stakeholder, including governments, NGOs, the private and informal sectors, communities, and individuals.

While this report is by no means the complete answer to the complex problem of economic development in the face of increased climate risk, it is intended as a practical contribution to shaping climate-resilient development paths at the country and local level. The framework described here should assist decision-makers in allocating public and private sector funding to the most effective, resilience-building adaptation measures that encourage sustainable development. ○

