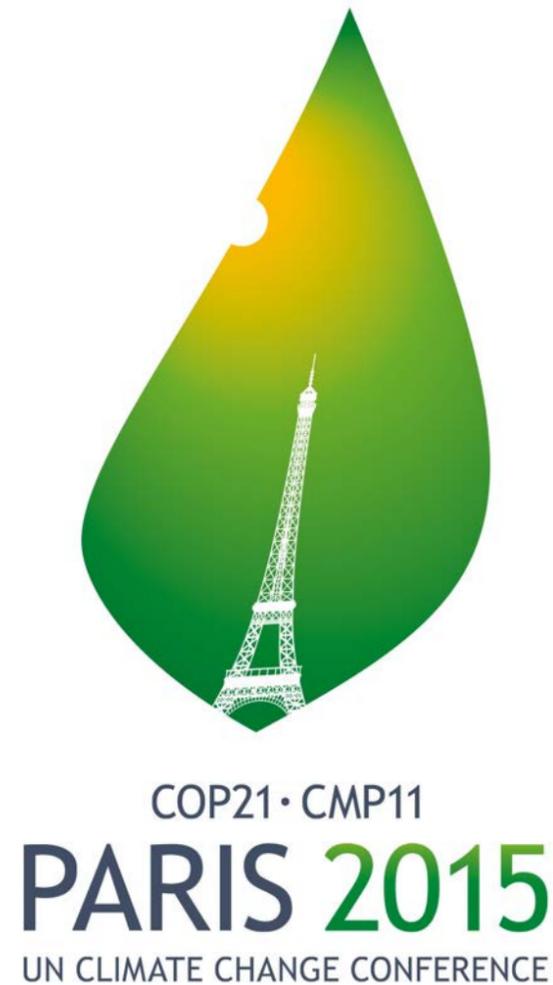


Growing Investor Awareness of Climate Risk



Goal: Global agreement for adaptation, resilience & reduced vulnerability

Plan: Set expectation to implement adaptation

Report: Describe adaptation efforts & needs

Review: Every 5 years, measure adequacy, effectiveness & progress

Adaptation has Emerged as the Top Corporate Risk in Terms of impact

	2011	2012	2013	2014	2015	2016
1st	Fiscal crises	Major systemic financial failure	Major systemic financial failure	Fiscal crises	Water crises	Failure of climate-change mitigation and adaptation
2nd	Climate change	Water supply crises	Water supply crises	Climate change	Rapid and massive spread of infectious diseases	Weapons of mass destruction
3rd	Geopolitical conflict	Food shortage crises	Chronic fiscal imbalances	Water crises	Weapons of mass destruction	Water crises
4th	Asset price collapse	Chronic fiscal imbalances	Diffusion of weapons of mass destruction	Unemployment and underemployment	Interstate conflict with regional consequences	Large-scale involuntary migration
5th	Extreme energy price volatility	Extreme volatility in energy and agriculture prices	Failure of climate-change mitigation and adaptation	Critical information infrastructure breakdown	Failure of climate-change mitigation and adaptation	Severe energy price shock

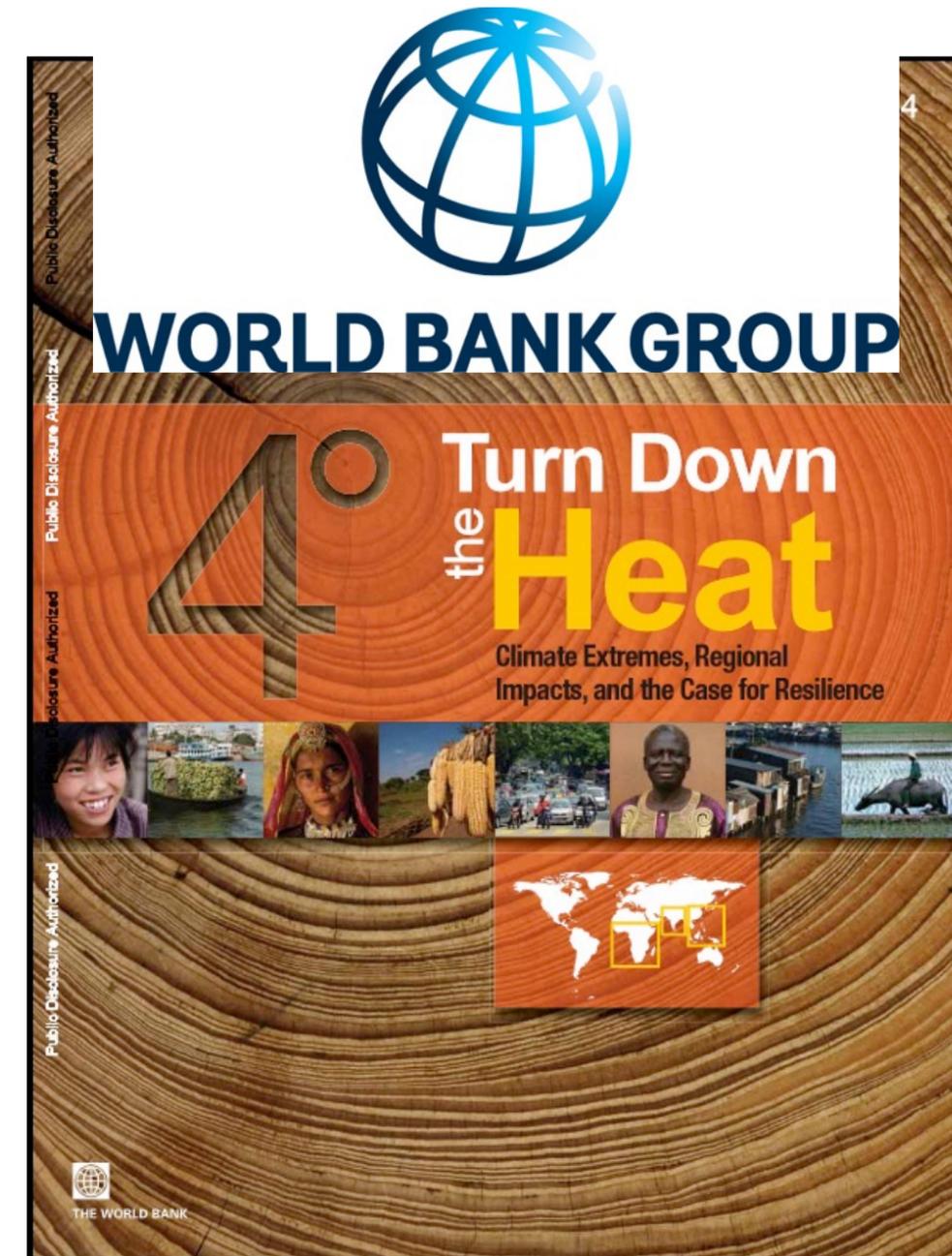
■ Economic
 ■ Environmental
 ■ Geopolitical
 ■ Societal
 ■ Technological

Over 90% of world's largest 100 companies see extreme weather & other climate impacts as business risks

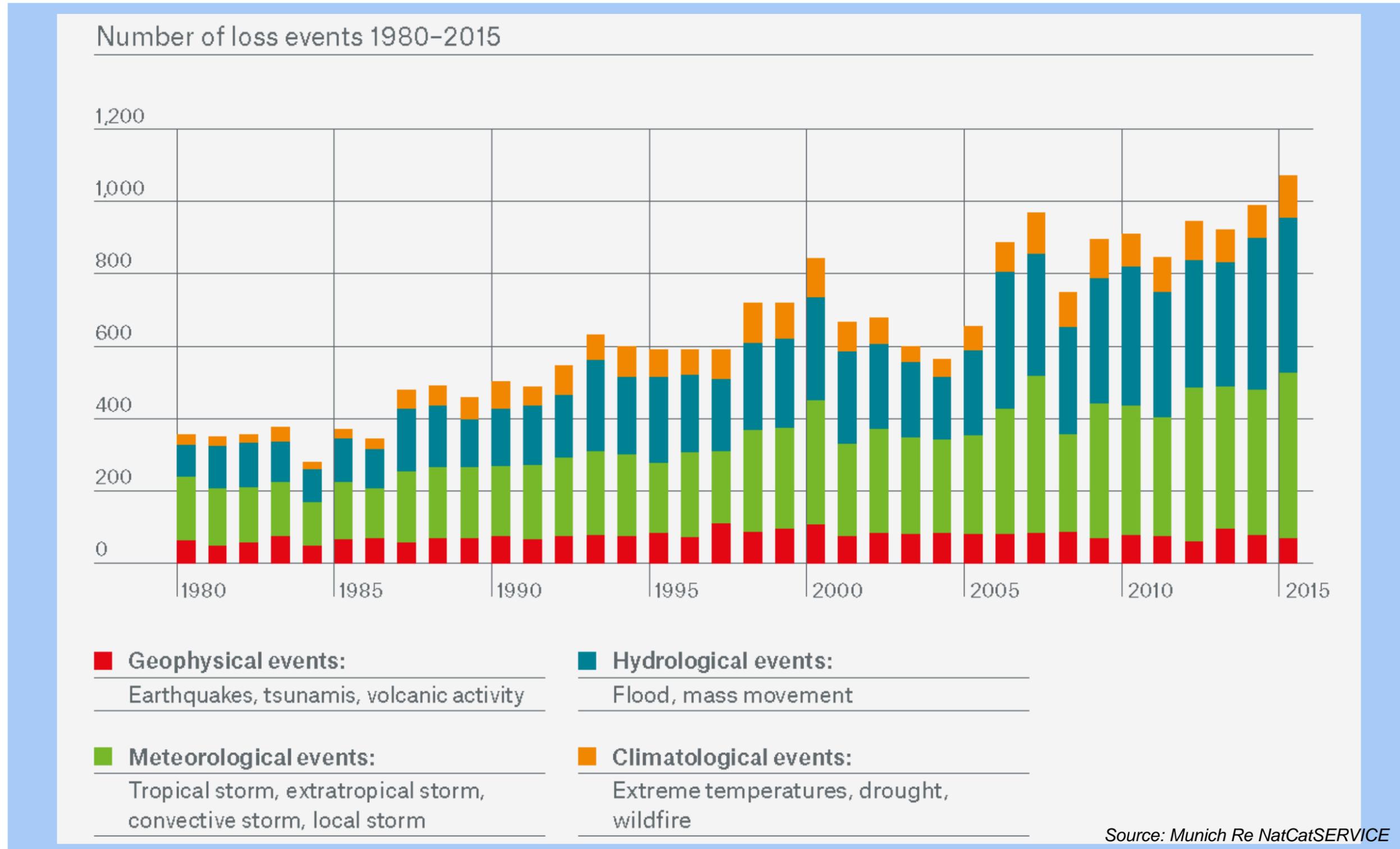


Climate Change Slows Middle Class Emergence

- Climate change threatens to erode progress made on poverty reduction
- Global incomes could decline 23 percent by 2100 relative to a world without climate change



Trend in Natural Disasters: 1980 - 2015



Costs to Adapt Rising to over \$280B/year by 2050; Threat Multiplier

23 July 2015

NATIONAL SECURITY IMPLICATIONS OF CLIMATE-RELATED RISKS AND A CHANGING CLIMATE

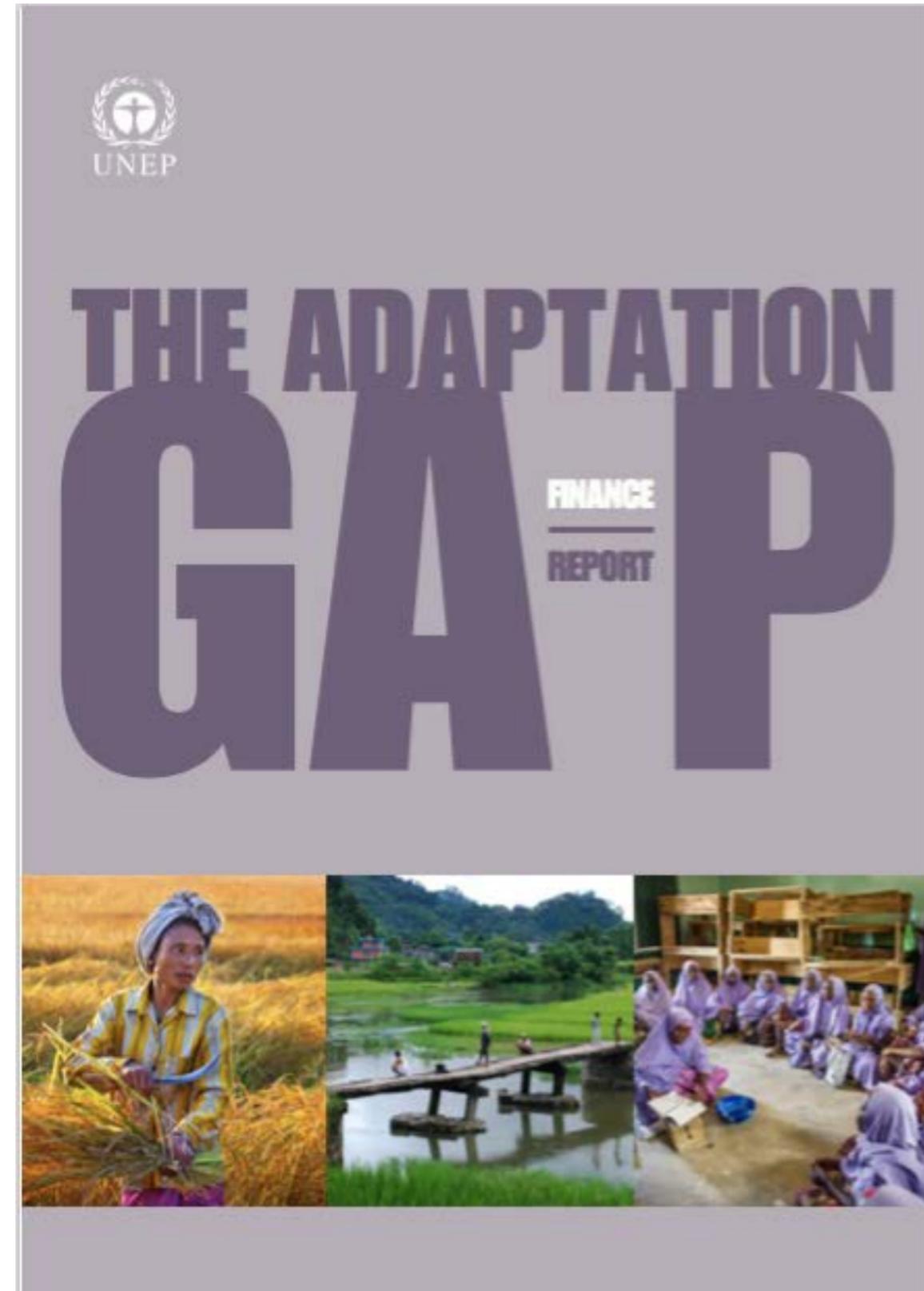
This report responds to the Congressional request to the Department of Defense to identify the most serious and likely climate-related security risks for each Combatant Command, the ways in which the Combatant Commands are integrating mitigation of these risks into their planning processes, and a description of the resources required for an effective response.

Submitted in response to a request contained in Senate Report 113-211, accompanying H.R. 4870, the Department of Defense Appropriations Bill, 2015.

The estimated cost of this report or study for the Department of Defense is approximately \$22,000 for the 2015 Fiscal Year. This includes \$0 in expenses and \$22,000 in DoD labor.

Generated on 2015May27 RefID: 8-6475571

1



2

Celebrating Corporate Adaptation Best Practice



Adaptation

Community Resilience
INNOVATION OPPORTUNITIES

THE BUSINESS CASE FOR RESPONSIBLE CORPORATE ADAPTATION:
Strengthening Private Sector and Community Resilience

A Caring for Climate Report

CLIMATE ACTION
Learning
Risk Management

Caring for Climate



A Climate of Change

ClimateWise
Principles
Independent
Review 2015



Climate
Resilience
Consulting

Influential Insurance Industry Engagement



Beyond response and recovery: an introduction to the Zurich flood resilience program

This issue brief provides an overview of the global challenges caused by flooding and how we are tackling them through the work of the Zurich flood resilience alliance.



Why we focus on floods

Floods affect more people globally than any other type of natural hazard. They cause some of the largest economic, social and humanitarian losses, involving on average some 250 million people each year.¹

While floods are natural, there is nothing 'natural' about their disastrous consequences. Often the poorest and least-prepared communities suffer most. Evidence shows that repeated disasters like floods undermine societies' and economies' potential to develop and it may trap them in a poverty cycle. We tend to think of these events as happening in other places, to other people but floods also cause devastation in developed countries. The reasons for this are surprisingly similar in both developing and developed countries.

To address the need for a proactive approach to flood risks, Zurich Insurance Group (Zurich) launched a dedicated flood resilience program in 2013. It includes two humanitarian organizations – the International Federation of Red Cross and Red Crescent Societies (IFRC), and Practical

Action – and two leading research institutions: the Wharton School of the University of Pennsylvania (Wharton), and the International Institute of Applied Systems Analysis (IIASA) in Austria.

The program is based on a new approach to cross-sector collaboration. It brings together flood risk research, community-based programs and risk expertise. It looks for, and shares ways that community flood resilience can be measured and improved. The program directly helps about 125,000 people through projects in flood-prone communities in Bangladesh, Indonesia, Mexico, Nepal, Peru and the U.S.

Growing risks

Risks of floods are increasing. By some estimates, river flooding alone could annually affect 54 million people worldwide by 2030, more than double the number currently affected. There are several reasons why floods are having a greater impact:

Growing populations, more people living in cities: The world's urban population increased fivefold from 700 million in 1950 to 3.9 billion in 2014.²

Swiss Re
III

Economics of Climate Adaptation (ECA) – Shaping climate-resilient development A framework for decision-making

Making rural communities more resilient to the impact of climate change requires a comprehensive portfolio of adaptation measures. 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 base to answer these questions in a systematic way. It enables them to understand the impact of climate change on their economies – and identify actions to minimize 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, McKinsey & Company, Swiss Re, the Rockefeller Foundation, ClimateWorks Foundation, the European Commission, and Standard Chartered Bank. See [reference](#) below.

Growing Climate Risk Disclosure

CLIMATE RISK

SASB TECHNICAL BULLETIN 2016-01



WORKING DRAFT: FOR COMMENT
THE SUSTAINABILITY ACCOUNTING STANDARDS BOARD



Phase I Report of the Task Force on Climate-Related Financial Disclosures

Presented to the Financial Stability Board
March 31, 2016

Potential Credit Rating Climate Impacts



SuRe®
The Standard for Sustainable
and Resilient Infrastructure
v 0.2

9 December 2015



RatingsDirect®

Climate Change Will Likely Test The Resilience Of Corporates' Creditworthiness To Natural Catastrophes

Primary Credit Analysts:

Miroslav Petkov, London (44) 20-7176-7043; miroslav.petkov@standardandpoors.com

Michael Wilkins, London (44) 20-7176-3528; mike.wilkins@standardandpoors.com

Research Contributor:

Xenia Xie, London; xenia.xie@standardandpoors.com

Table Of Contents

Catastrophes Seldom Trigger Rating Actions – Yet

Energy And Consumer Products Sectors Most At Risk

Katrina And Tohoku Took Their Toll

Climate Change And Global Trade Links Raise The Stakes

So Far So Good, But The Future Could Be Very Different

Notes

Related Criteria And Research

Determining Hedgeable and Unhedgeable Climate Risk

Morgan Stanley
JANUARY 21, 2019

MORGAN STANLEY RESEARCH GLOBAL
JESSICA ALFORD
Morgan Stanley & Co. International plc
VICTORIA CHAPMAN
Morgan Stanley & Co. International plc
RICHARD FELTON
Morgan Stanley & Co. International plc
PAUL JONACKA
Morgan Stanley & Co. LLC

5+R | [Investment](#)

Embedding Sustainability into Valuation

A Global Framework for Analysing Environmental, Social and Governance Risks and Opportunities



Morgan Stanley does not advise on its business with companies covered in Morgan Stanley Research. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of Morgan Stanley Research. Investors should consider Morgan Stanley Research as only a single factor in making their investment decisions.
For analyst certification and other important disclosures, refer to the Disclosure Section, located at the end of this report.
*Analysts employed by Morgan Stanley are not regulated with FINRA, may not be associated persons of the member and may not be subject to FINRA's rules on communications with a subject company, public appearances and trading securities held by a research analyst account.

UNIVERSITY OF CAMBRIDGE
INSTITUTE FOR SUSTAINABILITY LEADERSHIP

#RewireEconomy

Unhedgeable risk

How climate change sentiment impacts investment

UNIVERSITY OF CAMBRIDGE
UNIVERSITY OF CAMBRIDGE
Centre for Risk Studies
Judge Business School

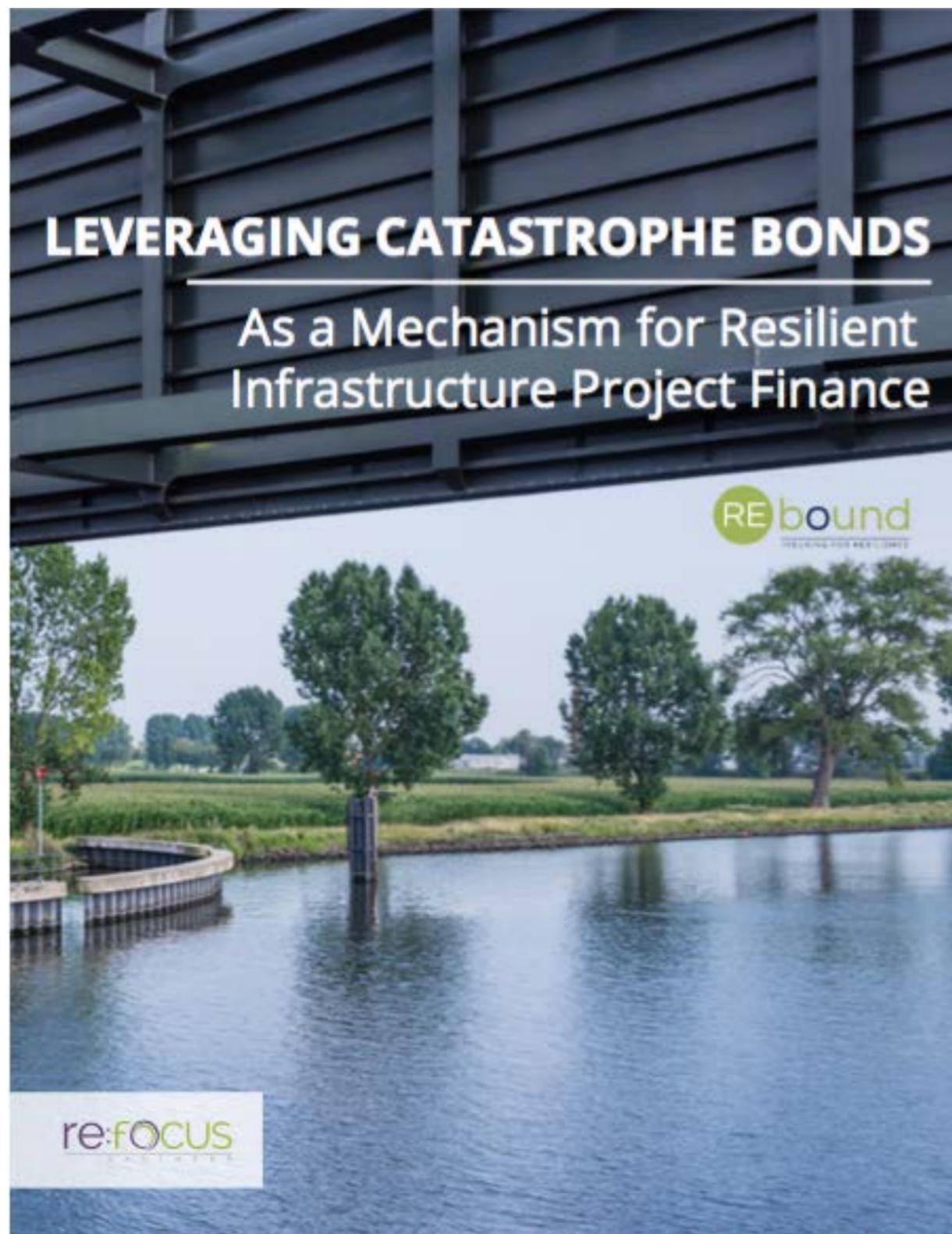
Climate Resilience Consulting

Increasing Investor Awareness of Climate Risk



Climate
Resilience
Consulting

Innovative Adaptation Finance Mechanisms Entering Market



Oasis Platform for Catastrophe and Climate Change Risk Assessment and Adaptation



Insurance, in the context of broader disaster risk management strategies, can increase community resilience and reduce recovery times when disaster strikes. Total economic losses to property and infrastructure from natural disasters averaged around USD 180 billion annually in the last decade, 70% of which are uninsured. Asian low and middle-income countries, in particular, have disproportionately low insurance coverage despite high susceptibility to natural disasters.

Understanding risk is critical for the management of extreme events and natural disasters. Yet high quality catastrophe risk models to assess and price the severity and probability of loss from climate-related risk are not readily available or adequately developed in Asian low and middle-income countries. Key barriers include the cost of model development and maintenance, lack of standardized hazard, exposure, and vulnerability data, and the difficulty in accessing locally available data and specialized knowledge. Underdeveloped insurance markets also inhibit demand for these products.

By providing access to transparent and standardized analytics, the Oasis Platform aims to improve understanding and management of climate-related risks, thereby facilitating investments in insurance and/or risk reduction.

The Oasis Platform for Catastrophe and Climate Change Risk Assessment and Adaptation (the

"Platform") is a set of tools that together aim to offer a more transparent, robust and comprehensive approach for analyzing and pricing risk from extreme events.

The Platform could strengthen climate resilience by helping to narrow the gap between insured and uninsured losses, and extending the use of catastrophe risk modeling beyond the insurance industry for risk-informed decision-making.

The Platform could directly save re/insurers 25-50% in modeling costs, catalyze USD 1-9 million in new risk model development, and indirectly generate ~USD 1.4 to 6 billion investment in property insurance coverage.

The Platform would reduce modeling costs and catalyze investment in model development by lowering transaction costs and enhancing competition. Were the Platform to become the modeling infrastructure underpinning the development of catastrophe risk insurance markets in the Philippines, Indonesia, and Bangladesh – the countries in Asia which The Lab Secretariat identified as the most suitable candidates for pilot projects and that have garnered the most interest from relevant stakeholders – the Platform could indirectly facilitate an additional USD 1.4 to 6 billion of property insurance coverage.

To demonstrate the use of the Platform in the identified Asian countries, proponents and

Joyce Coffee

jcoffee@climateresilienceconsulting.com

1 (312) 894-9028