

MAIDEN SEMINAR ON CLIMATE RISK

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CLIMATE CHANGE & CLIMATE RISKS

Climate change refers to long-term shifts in temperatures and weather patterns. These shifts may be natural, but since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels (like coal, oil, and gas), which produces heat-trapping gases.

Climate risk is the potential for climate change to negatively impact human or ecological systems. These risks can be physical or chronic, and can affect lives, livelihoods, health, and more.



**UNITING
THE WORLD
TO TACKLE
CLIMATE
CHANGE.**

UNITED NATIONS FRAMEWORK

- United Nations Framework Convention on Climate Change (UNFCCC)
 - About 198 Parties
 - Agreement / Treaty to limit dangerous climate change
- Conference of the Parties
 - Meets every year



COP28

UAE

COP28



COP29

Baku
Azerbaijan

UN CLIMATE CHANGE CONFERENCE

MAIN EFFECTS OF CLIMATE CHANGE

- ▣ Raising Surface Temperatures
- ▣ Warming of the Oceans and Acidification
- ▣ Reduction in Land and Sea Size
- ▣ Rising Sea Levels
- ▣ Changes to Precipitation Patterns and Seasons

Presentation of the 8 representative key risks assessed in this report (and their underlying main key risks)

(a) Low-lying coastal systems

Nat. coastal protection & habitats



Loss of lives, livelihoods & well-being



Disruption of transport systems



(b) Terrestrial and marine ecosystems

Change structure/functioning



Loss ecosystem goods/services



Nat. coastal protection & habitats



Loss of biodiversity



(c) Critical infrastructure, networks and services

Damage & disruption



Impacts of failure on lives, livelihoods, economies



(d) Living standards

Aggregate economic impacts



Loss of livelihoods



Increased poverty



(e) Human health

Heat-related mortality



Vector-borne diseases



Waterborne diseases



(f) Food security

Decline provis. ecosystem services



Increased hunger



(g) Water security

Water scarcity



Water-related disasters



Indig. & trad. cultures & ways of life



(h) Peace & human mobility

Armed conflicts



Involuntary (im)mobility



A graphical representation of layered risk management



Figure 17.4 in New, M., D. Reckien, D. Viner, C. Adler, S.-M. Cheong, C. Conde, A. Constable, E. Coughlan de Perez, A. Lammel, R. Mechler, B. Orlove, and W. Solecki, 2022: *Decision-Making Options for Managing Risk*. In: *Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 2539–2654, doi:10.1017/9781009325844.026.

RISK MODELLING ISSUES

- ❑ Unique Features – requiring granular and forward looking measurement methodologies
- ❑ Measurement gaps in data and risk classification methods, methodologies of long term assessment are not always standard in nature
- ❑ Translating Climate Risk into robustly quantifiable Financial Risk is gathering pace
- ❑ Centered on transitioning near term transition risk drivers into counterparty and portfolio exposures
- ❑ Predominantly focused on assessing Credit Risk

SCENARIO APPROACH IS PREFERRED

- ▣ Past performance is not enough to predict future outcomes
- ▣ Emerging Risk and the Practice is Developing
- ▣ High Level of Uncertainty
- ▣ Time Horizons Matter
- ▣ Highly interconnected Risk Drivers
- ▣ Appropriate and Reliable Data

CLIMATE DATA VARIABLES / DRIVERS

■ Heat and Cold

mean air temperature; extreme heat; cold spell; and frost.

■ Wet and Dry

mean precipitation; river flood; heavy precipitation and pluvial flood; landslide; aridity; hydrological drought; agricultural and ecological drought; and fire weather.

■ Wind

mean wind speed; severe wind storm; tropical cyclones; and sand and dust storm.

CLIMATE DATA VARIABLES / DRIVERS

▣ Snow and Ice

snow, glacier and ice sheet; permafrost; land and sea ice; heavy snowfall and ice storm; hail; and snow avalanche.

▣ Coastal

relative sea level; coastal flood; coastal erosion; marine heatwave; and ocean acidity.

▣ Other

air pollution weather, atmospheric carbon dioxide at surface, and radiation at surface.

CLIMATE DATA SOURCES – IPCC & OPEN

- WGI Interactive Atlas
- UK Centre for Environment Data Analysis (CEDA)
- NASA / IPCC Sea Level Projection Tools
- NASA Earth Observatory
- European Space Agency Climate Change Initiative (CCI)
- UNEP Environmental Data Explorer
- US Government Open Data Initiative
- FAO Geo Network
- NASA's Socio Economic Data and Applications Center (SEDAC)
- Organization for Economic Co-operation and Development (OECD)

PARAMETRIC MICROINSURANCE – FIJI

- ☐ Rainfall is highly variable and Winds in all seasons with varying duration and intensity
- ☐ Extreme Wind Cover (> 91 Km / Hour) & Cyclonic Storm Cover (>150mm in 3 Consecutive Days)
- ☐ \$100 Premium for \$1000 Payout
- ☐ Measurement by Joint Typhoon Warning Centers and Automatics and Manual Weather Stations

Max Wind Speed Range [km/hr]; TC Category*	Distance to the Eye of the Cyclone (km)			
	0-25	25-50	50-75	75-100
Cat 1-[91-125)	\$75	NIL	NIL	NIL
Cat 2 - [126-166)	\$200	\$100	NIL	NIL
Cat 3 - [167-225)	\$400	\$250	\$100	NIL
Cat 4 - [226-280)	\$550	\$450	\$300	\$150
Cat 5 ->280	\$750	\$650	\$500	\$300

Payout Structure Rainfall	
Rainfall Range [mm]	Add on Factor
[150-225)	7.5%
[225-300)	12.5%
[300-375)	20%
>=375	30%

Final Payout =
(Windspeed damage
payout + Rainfall add
on factor)

ISSUES FOR INSURERS

- ▣ Changes in Climate Related Risks
- ▣ Some types of Risks may become Less Affordable
- ▣ Diminishing Markets
- ▣ Greater Accumulation of Risks
- ▣ Increased correlation of events
- ▣ Latent Claims
- ▣ Model Risk
- ▣ Adverse Selection
- ▣ Changing Mortality / Morbidity Risks
- ▣ Changes in Population
- ▣ Greater Capital Requirements

Nine Indian states among top 50 regions facing climate change risk

The report titled "Gross Domestic Climate Risk" assessed the physical climate risk in over 2,600 states and provinces around the world in 2050.



CHENNAI: Nine states in India, including Bihar, Uttar Pradesh, Tamil Nadu and Maharashtra, are among the top 50 regions in the world facing a high risk of damage to the built environment due to climate change hazards, according to the new report released on Monday.



INDIA EXPERIENCE

- Some States have started exploring Parametric Insurance for Coastal Districts
- Model may include some advance payouts to cover and minimize any losses in advance
- Simplified Model may be used combined with the reach of Microfinance Institutions
- Index and Payout mechanisms need to be properly set and priced
- Microinsurance; Weather Based Index Insurance; Government backed Insurance Schemes and International Risk Pooling

CITATIONS

1. *Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group I Contribution to the IPCC Sixth Assessment Report*
2. *Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the IPCC Sixth Assessment Report*
3. *Climate Change for Actuaries: an Introduction by Climate Change Working Party of Institute and Faculty of Actuaries, London*
4. *Climate Science - A Summary for Actuaries by International Actuarial Association*

Thank you!

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