Central Asia Regional Economic Cooperation Program Disaster Risk Engagement Meeting

Session 2: Technical Assistance Progress, Deliverables and Results

Islamabad, Pakistan
July 2023

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Disaster Risk in CAREC

High exposure to flood, earthquake and infectious disease risk

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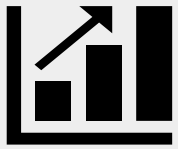
Robust economic growth is increasing value at risk



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Climate change is affecting the nature of disaster risk

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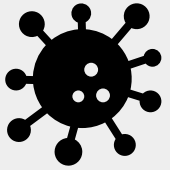
COVID-19 undermined fiscal budgets and ability to respond



Risk management and financing efforts must strengthen to protect livelihoods and economic development

Disaster Risk Profiles

Profiles for each CAREC member developed and made publicly available on the CAREC website

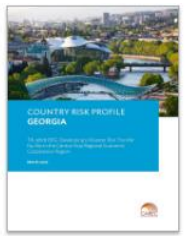
Cutting-edge catastrophe modelling used to estimate country-wide impacts of floods, earthquakes and infectious disease outbreaks

Country Risk Profile Pakistan

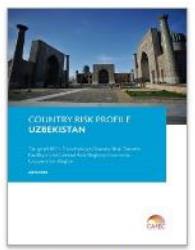
Country Risk Profile Azerbaijan

Country Risk Profile Kyrgyz Republic

Country Risk Profile Kazakhstan

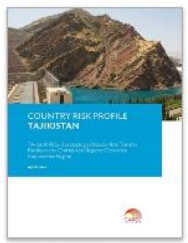


Country Risk Profile Georgia



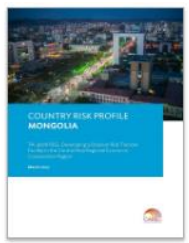
Country Risk Profile Uzbekistan

Country Risk Profile Turkmenistan



Country Risk Profile Tajikistan

Country Risk Profile People's Republic of China



Country Risk Profile Mongolia

Gathering Additional Risk Information from CAREC Countries

Outcomes of the first in-person disaster risk engagement workshop held in Istanbul (Nov 2022):

1. **Broad interest and endorsement** across CAREC countries
2. **Additional inputs** regarding disaster risk modelling and financing solutions at the national level**:**
   - National sources of hazard data and extreme event impacts
   - Relevant legislation for insurance product implementation
   - Information on key ministries that should be involved for the development and implementation of disaster risk management and disaster risk financing solutions
   - Existing ongoing DRF programmes and projects

Disaster Risk Modelling Approach

A **regionally consistent modelling approach** using country specific hazard, vulnerability and exposure information

Models developed by leading insurance industry modelling companies using latest science and data

A **consistent exposure dataset for earthquake and flood risk modeling** with information on number of buildings, location, replacement costs, number of occupants and vulnerability classes of the building stock

- This covered residential, commercial, and industrial assets – a nationally representative view of financial exposure

Disaster Risk Modelling – Key Definitions

- **Average Annual Loss (AAL) –** the modelled loss resulting from flooding / earthquake shaking that is expected on average for a given year. Calculated at the country-level, at the province level, and by asset type.

- **Return Period -** the estimated average time between events of a given size

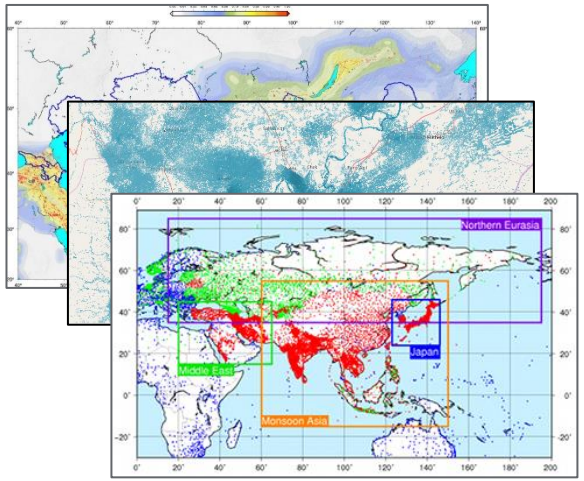
- **1-in-100 Year Loss** - a loss that has on average a 1 in 100 return period (1% probability) of being equalled or exceeded in any given year

- **Direct Damages –** losses that result from hazard event impacts to assets including residential, commercial and industrial buildings and their contents

- **Indirect Damages –** losses that result from hazard event disruption to business, social, governance / administrative, and economic activities, critical and public services, and people's livelihoods

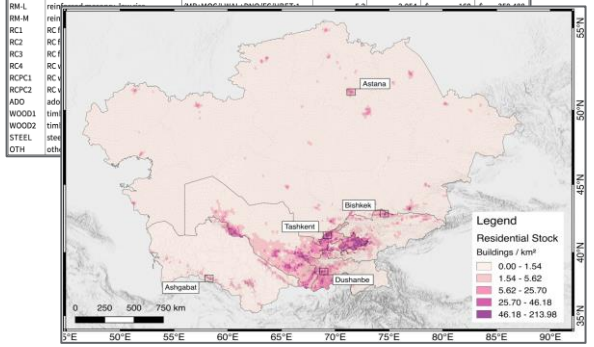
Disaster Risk Modelling Data and Methodology

Hazard

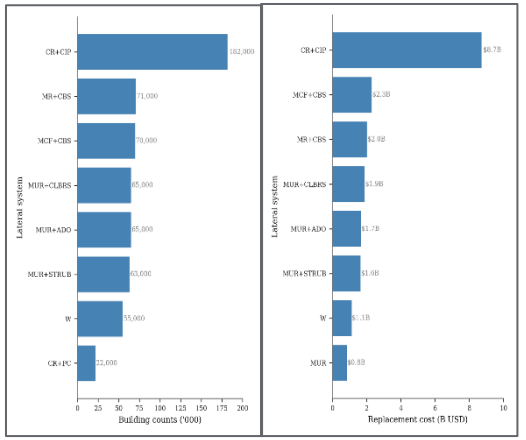


Exposure

Building Class	Description	Taxonomy (GEM v2.0)	Number of Occupants (Night)	Average Floor Area per Unit (m^2)	Average Cost per Unit Area (USD/m^2)	Average Cost per Unit (USD)
URM1	unreinforced masonry	/MUR+CLBRS+MOC/LWAL+DNO/FW	3.8	488	$ 175	$ 85,450
URM2	unreinforced masonry, concrete floors	MUR+MOCL/LWAL+DNO/FC	3.8	493	$ 200	$ 98,669
CM	confined masonry	/MCF+MOC/LWAL+DNO/FC/HBET	76	2,322	$ 288	$ 668,736
RM-L	reinf					
RM-M	reinf					
RC1	RC f					
RC2	RC f					
RC3	RC f					
RC4	RC v					
RCPC1	RC v					
RCPC2	RC v					
ADO	ado					
WOOD1	timb					
WOOD2	timb					
STEEL	stee					
OTH	othe					



Vulnerability



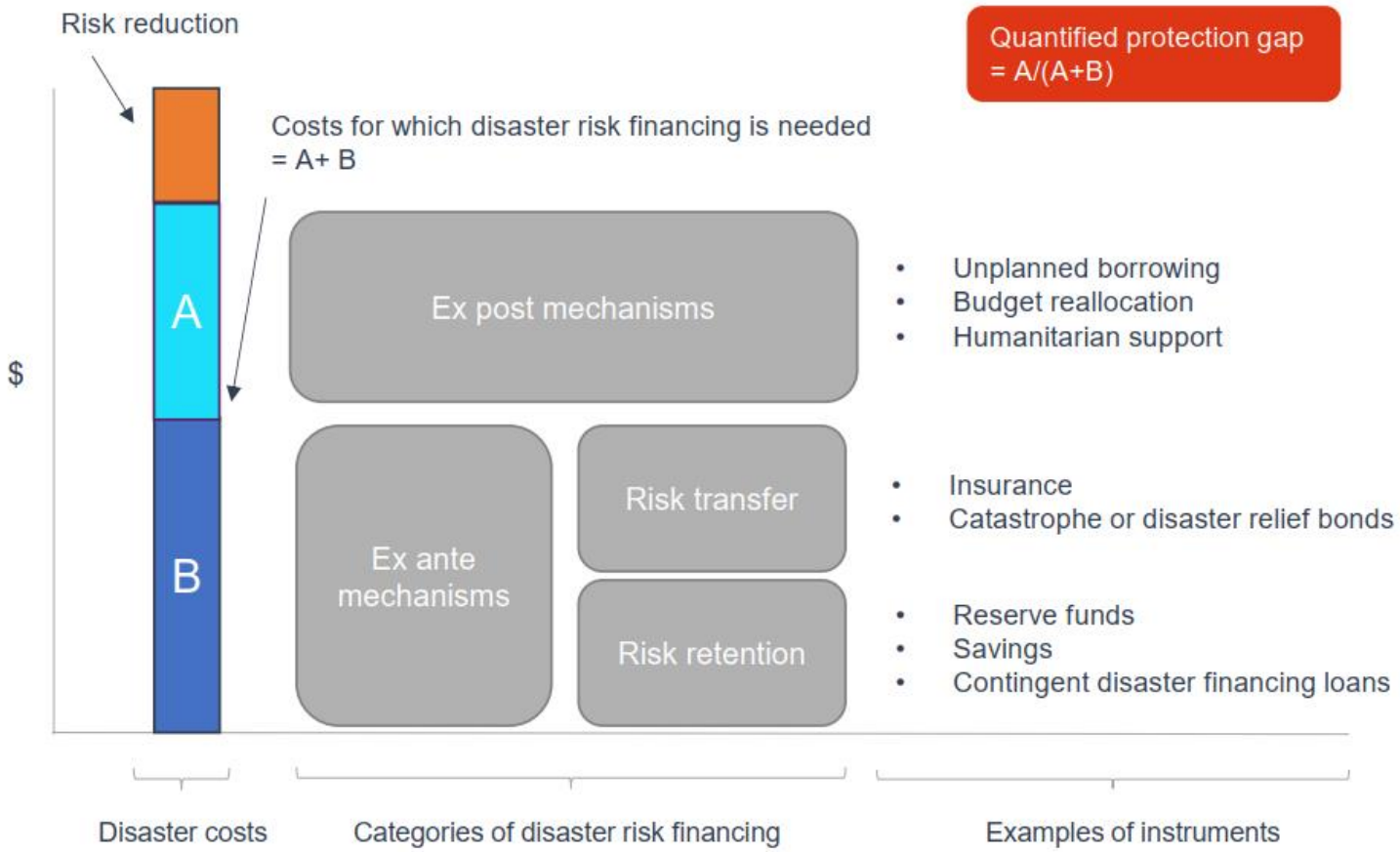
The risk modelling delivers an enhanced understanding of earthquake, flood, and infectious disease risk across the region, although limitations and uncertainties do exist.

Disaster Risk Profiles

Country	Flood		Earthquake	
	Average Annual Loss	1-in-100 Year Loss	Average Annual Loss	1-in-100 Year Loss
Azerbaijan	$58.3m	$550m	$71.4m	$964m
Georgia	$31.8m	$230m	$14.3m	$300m
Kazakhstan	$419m	$1.8b	$57.6m	$1.1b
Kyrgyz Republic	$73.3m	$680m	$72.4m	$1.16b
Mongolia	$24m	$400m	$0.6m	$7.7m
Pakistan	$1.5b	$14.6b	$613.7m	$4.6b
PRC Inner Mongolia	$247.7m	$1.5b	$121.6m	$2.2b
PRC Xinjiang Uyghur	$106.6m	$1.2b	$282.9m	$2.9b
Tajikistan	$60.8m	$550m	$63.5m	$885.6m
Turkmenistan	$139.8m	$940m	$11.3m	$228.4m
Uzbekistan	$395.6m	$2.8b	$214.3	$3.6b

Protection Gap

Current financing levels for disaster risk were compared to the modelled results from the profiles to understand the size of the protection gap



Country Protection Gap Classification and Response Product Options

Group Name	Countries	Flood Emergency Response Product Options	Earthquake Emergency Response Product Options
Critically Insufficient Financing (80% or more of annual average loss (AAL) from floods and earthquakes are not covered by ex-ante mechanisms)	Pakistan Tajikistan	1 in 5 year	1 in 5 year
Weak Financing (~0%-80% of AAL not covered by ex-ante mechanisms)*	Kyrgyz Republic Mongolia Uzbekistan	1 in 20 year	1 in 20 year
Modest Financing (AALs from flood and earthquakes are covered)	Azerbaijan Georgia Kazakhstan	1 in 50 year	1 in 50 year
Insufficient data	PRC, Inner Mongolia Autonomous Region PRC, Xinjiang Uyghur Autonomous Region Turkmenistan	N/A	N/A

Protection Gap – Infectious Disease

- The COVID-19 experience revealed the protection gap for infectious disease
- Pandemic financing arrangements were virtually non-existent for the initial response to COVID-19. Instead, programs were rapidly designed: expensive and inefficient.
- Aggressive, **early action is essential to containing disease spread** and influential in determining overall economic cost,

6-7% decrease from forecasted economic growth to actual[1]

>$2bn committed by ADB to CAREC member states[2]

>$16tn spent by governments globally post-outbreak[3]

1 ADB. 2020. Asian Development Outlook Supplement December 2020
2 ADB 2020. News Releases on COVID-19 Financial Assistance to ADB Members
3 IMF 2021. Fiscal Monitor: Database of Country Fiscal Measures in Response to the COVID-19 Pandemic

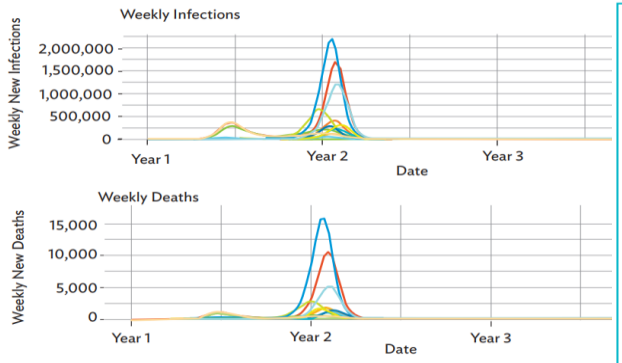
Infectious Disease Risk Financing

Spark Risk Cover	**Financing for rapid, aggressive action in the early stages of an outbreak**
Containment Financing	**Financing for action in the early stages of an outbreak in a neighbouring country to help contain spread in an unaffected country**
SME Business Interruption	**Financing to support a structural backbone of the economy**

Compound Risk Analysis

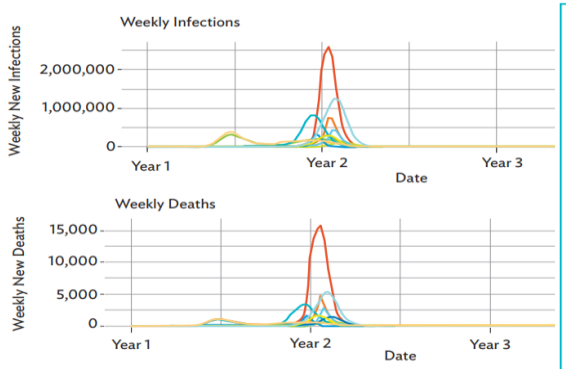
- Representative earthquake and flood events impacting assets, populations, and critical healthcare infrastructure were modelled and incorporated into simulations of pandemic events.
- The spatial extent of earthquake risk appears to be more influential than that of flooding, with a more significant impact on disease spread. However, the events being modelled are extreme and rare.

Figure 5: Simulated Influenza Pandemic in Central Asia Regional Economic Cooperation Locations Showing the Progression of Weekly Infections and Deaths Over Time for the Baseline Scenario



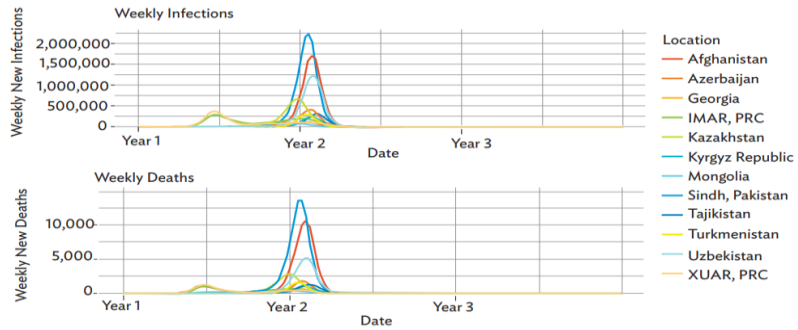
IMAR = Inner Mongolia Autonomous Region, PRC = People's Republic of China, XUAR =
Source: Consultant team modeling.

Figure 6: Simulated Influenza Pandemic in Central Asia Regional Economic Cooperation Locations Showing the Progression of Weekly Infections and Deaths Over Time for the Earthquake Scenario



IMAR = Inner Mongolia Autonomous Region, PRC = People's Republic of China, X
Note: Sindh, Pakistan is not plotted in the earthquake scenario.
Source: Consultant team modeling.

Simulated Influenza Pandemic in Central Asia Regional Economic Cooperation Locations Showing the Progression of Weekly Infections and Deaths Over Time for the Flood Scenario

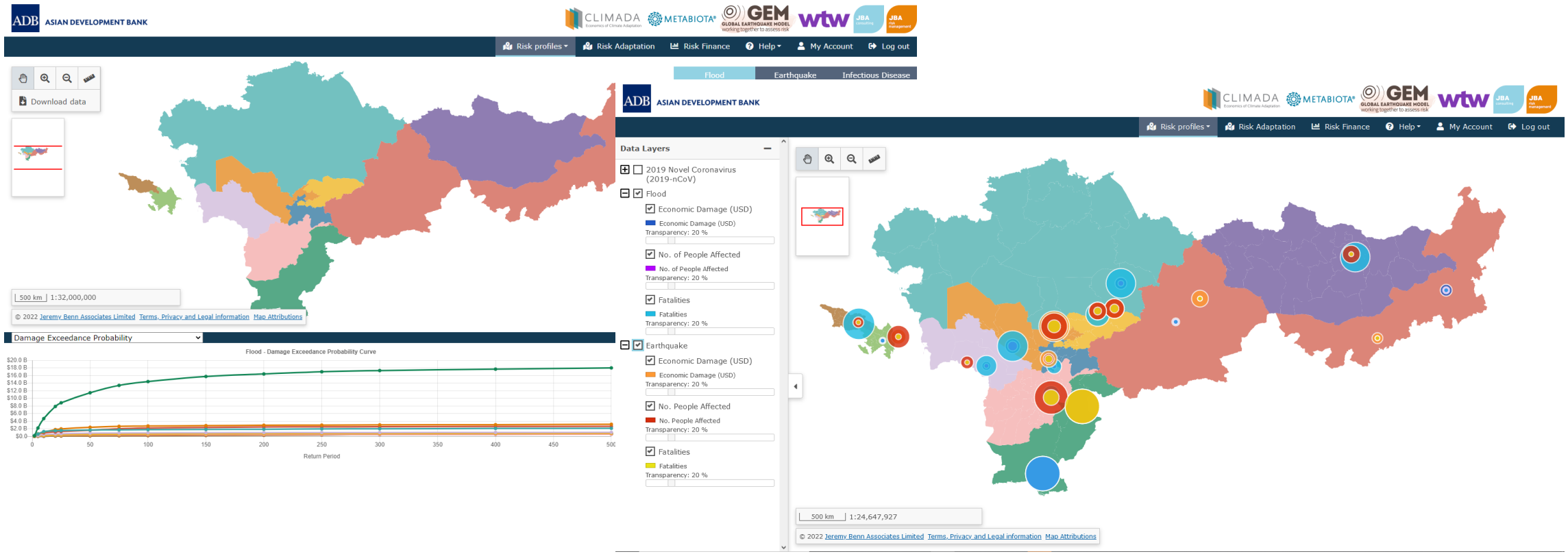


IMAR = Inner Mongolia Autonomous Region, PRC = People's Republic of China, XUAR = Xinjiang Uygur Autonomous Region.
Note: Islamabad, Pakistan is not plotted in the earthquake scenario.
Source: Consultant team modeling.

Source: Consultant team modelling

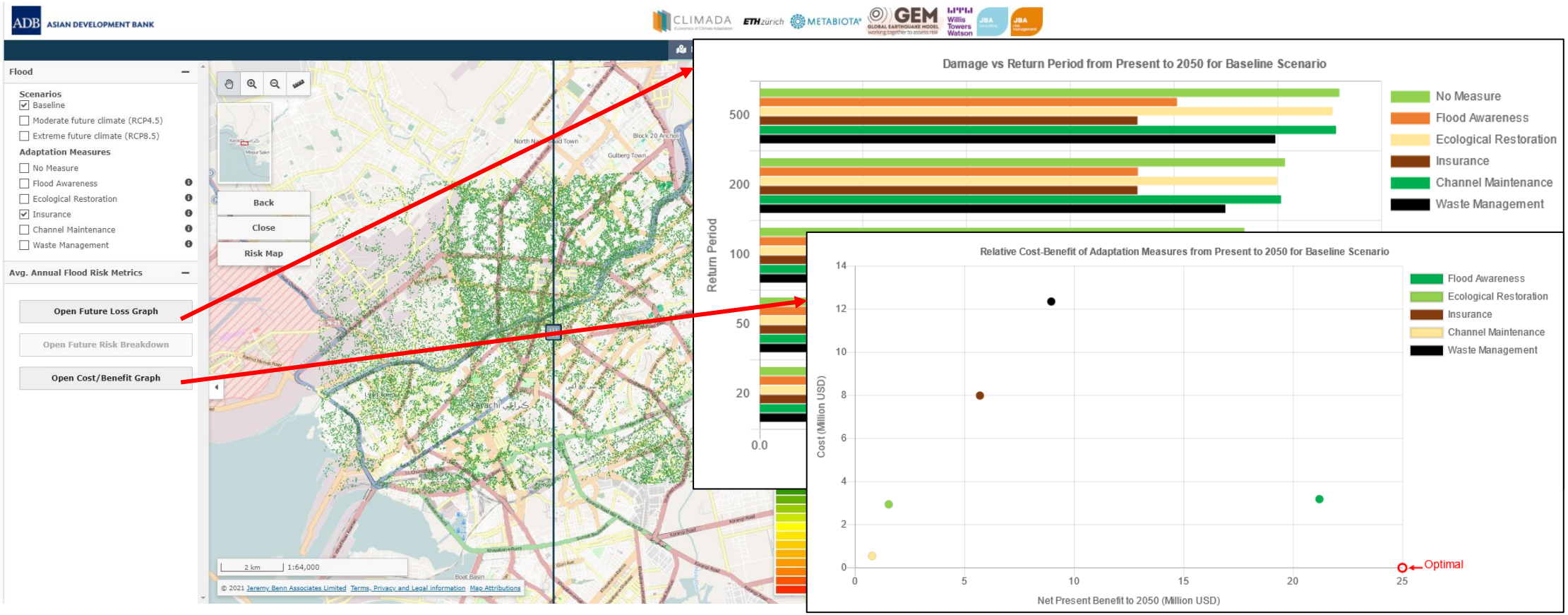
Disaster Risk Management Interface (DRMI) – Risk Profiles

Risk metrics quantifying the impacts to people, property and the economy using probabilistic and deterministic modelling approaches. Impacts from historic events are also available.



DRMI – Future Climate Risk and Adaptation Modelling

Climate adaptation scenarios on the costs and benefits of different hazard mitigation options. These include current conditions, future climate scenarios and future economic growth scenarios.



DRMI – Disaster Risk Financing Tool

A disaster risk financing tool to explore the parameters of risk financing

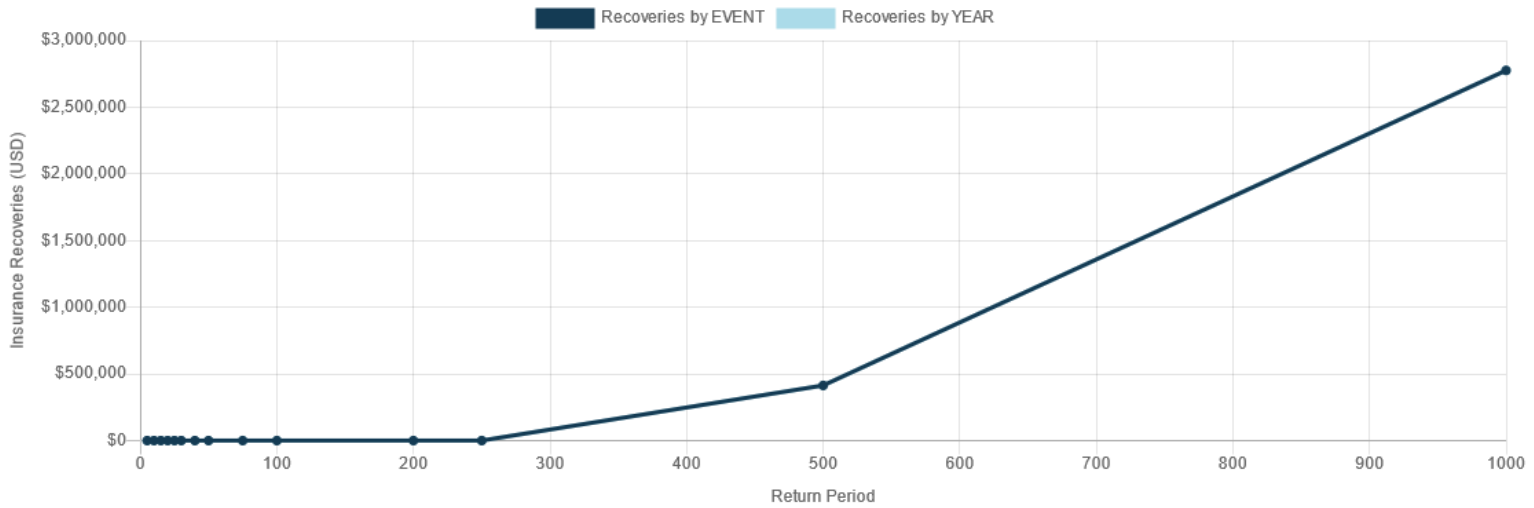
Country

Flood risk transfer options

Event sum insured (Fixed)	$10,000,000	USD
Minimum Recovery	$250,000	USD
Return period attachment	5	
Return period exhaustion	100	
Number of reinstatements	1	

Earthquake risk transfer options

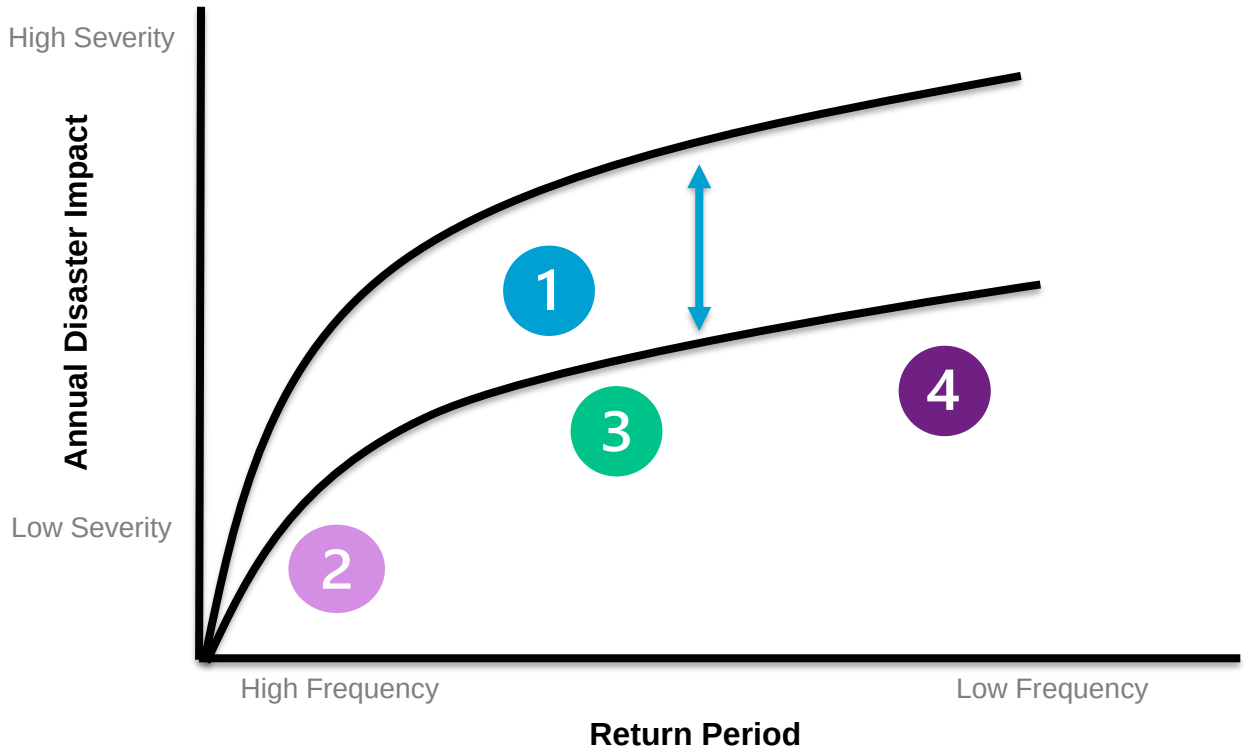
Event sum insured (Fixed)	$2,500,000	USD
Minimum Recovery	$100,000	USD



Disaster Risk Management & Financing Considerations

Risk Quantification and Layering

Modelling disaster risk profiles for informed DRM decisions



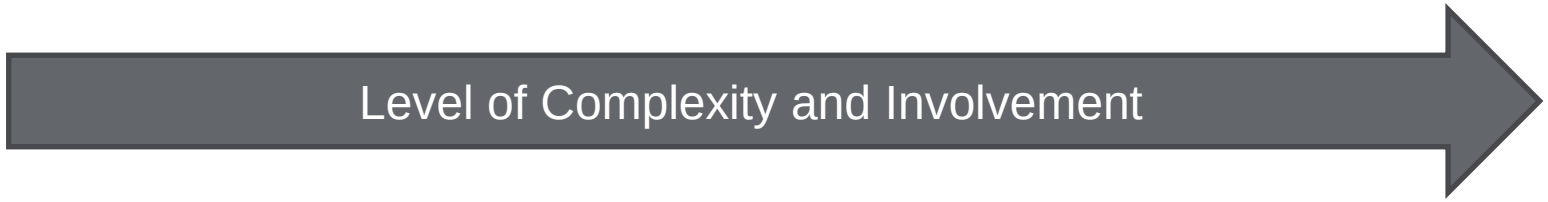
Risk layering: no single financial instrument can address all risks

1. **Disaster Risk Reduction (DRR)**
   - Loans, grants, micro-credit, bonds, subsidies, tax breaks, crediting, impact bonds
2. **Disaster Risk Protection**
   - Reserves and contingency budgets
   - Post Disaster reallocation budgets, emergency assistance loans and borrowing
   - Contingent disaster finance
3. **Disaster Risk Transfer**
   - Regional / Sovereign
   - Indemnity / Parametric based
   - Local insurance markets
   - International reinsurance markets
   - Insurance Linked Securities / Cat bond markets
4. **International Assistance**
   - Exceptional Events / Acts of God

Functions of a CAREC Disaster Risk Facility

A CAREC facility can serve several functions:

Collaboration	Arranges risk transfer	Retains risk
Sharing of best practice, of data, and of regional management to disaster risk management	Facilitates risk coverage for participating countries, including insurance and ILS	A licensed and regulated insurance company to which countries transfer risks in exchange for premiums



Benefits of Regional Disaster Risk Financing Schemes

Countries around the world have collaborated on regional risk financing, including in the Caribbean and Central America, in South America, in Africa, in the Pacific, and in Southeast Asia

Regional risk financing brings **benefits** including:

1. Complementary to national risk financing programs
2. Reduce the cost through diversification and economies of scale
3. Share best practice
4. Incentivise standardized data collection
5. Attract private sector involvement
6. Promote improved ownership of risk management

These principles can be applied to benefit CAREC countries

Disaster Relief Bonds

Bridging the Protection Gap in the Shorter- to Medium-Term

Addressing a Real Need

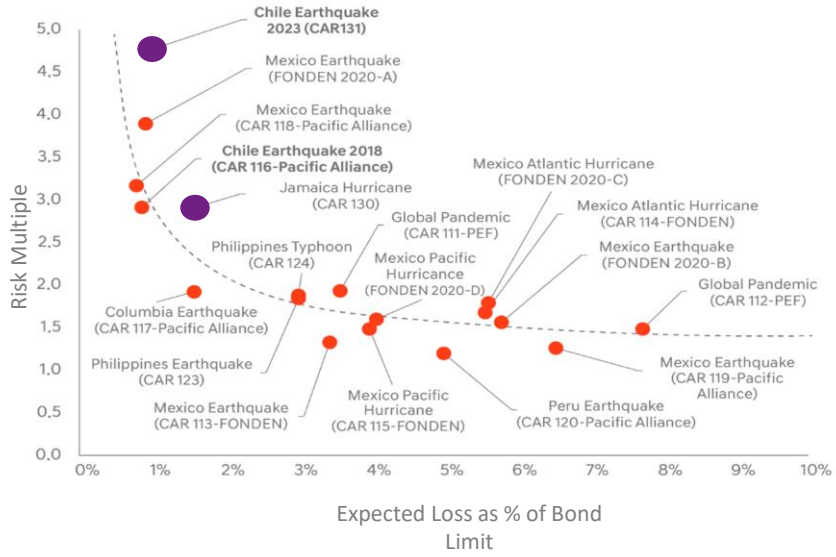
- **Funding gaps** exist for both severe events and insufficient funding for average annually occurring events **for most CAREC countries**.

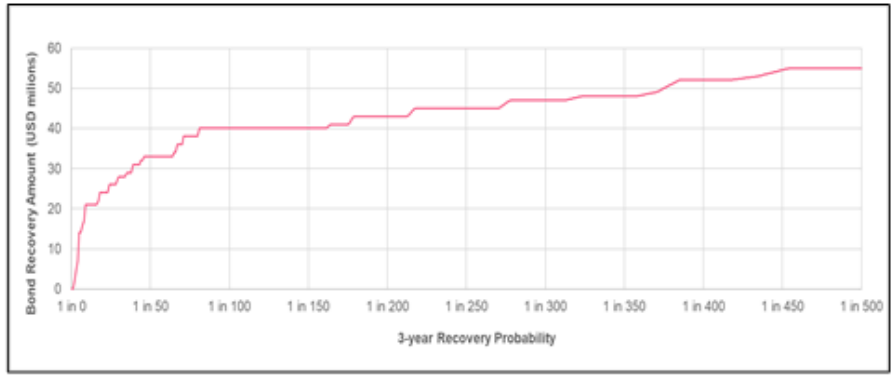
The Proposal

- An **ADB-issued pilot Disaster Relief Bond (DRB)** for all CAREC countries (with identical financial coverage for each country) demonstrating its benefit and mechanism.

Catalyst for Broader DRR and DRF Engagement

- The DRB requires **countries' commitment to** engage in and implement **DRR/DRF measures** which can be supported through other modalities (e.g., PBLs, CDFs, etc.)
- A complementary country specific bond (or insurance placement) tailored to the specific needs of member countries can follow.





Annex

Disaster Risk Profiles – Azerbaijan

GDP: 48,047,000,000 (2019)

Population: 10,023,320 (2019)

1 IN 100 YEAR FLOOD ECONOMIC LOSS
$550,000,000

1 IN 100 YEAR EARTHQUAKE LOSS
$964,000,000

AVERAGE ANNUAL LOSS FLOOD
$58,300,000

AVERAGE ANNUAL LOSS EARTHQUAKE
$71,400,000

AVERAGE ANNUAL PEOPLE AFFECTED FLOOD
39,599

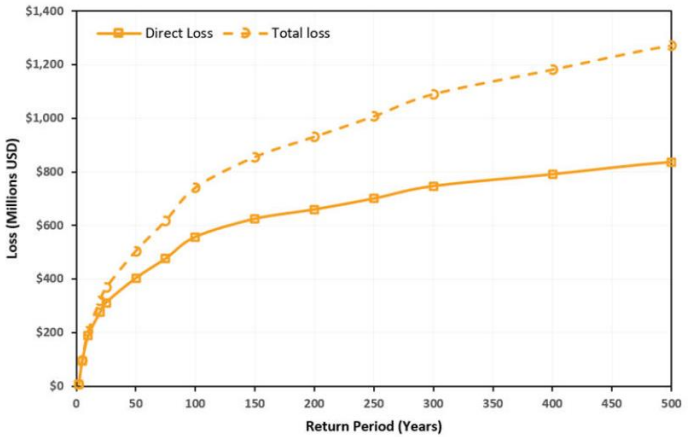
AVERAGE ANNUAL PEOPLE AFFECTED EARTHQUAKE
237,280

AVERAGE ANNUAL PEOPLE AFFECTED INFECTIOUS DISEASE
102,251

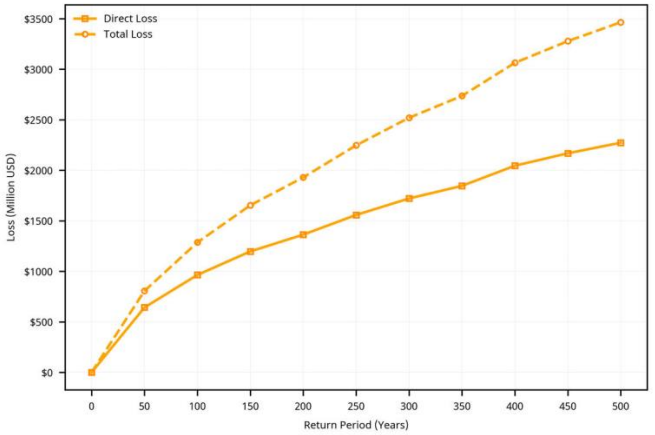
EVENT FREQUENCY WHERE FLOOD LOSS EXCEEDS EXISTING COVER
1 IN 25

EVENT FREQUENCY WHERE EARTHQUAKE LOSS EXCEEDS EXISTING COVER
1 IN 20

Exceedance probability curves – floods



Exceedance probability curves – earthquake



Disaster Risk Profiles – Georgia

GDP: $17,743,000,000 (2019)

Population: 3,700,000 (2019)

1 IN 100 YEAR FLOOD ECONOMIC LOSS
$230,000,000

1 IN 100 YEAR EARTHQUAKE LOSS
$300,000,000

AVERAGE ANNUAL LOSS FLOOD
$31,800,000

AVERAGE ANNUAL LOSS EARTHQUAKE
$14,300,000

AVERAGE ANNUAL PEOPLE AFFECTED FLOOD
22,483

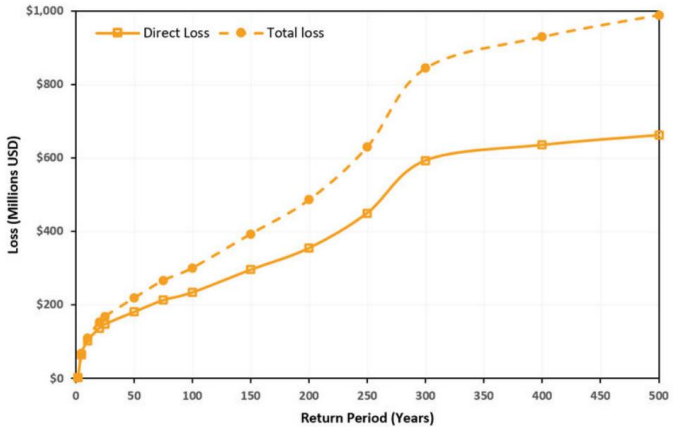
AVERAGE ANNUAL PEOPLE AFFECTED EARTHQUAKE
34,608

AVERAGE ANNUAL PEOPLE AFFECTED INFECTIOUS DISEASE
52,203

EVENT FREQUENCY WHERE FLOOD LOSS EXCEEDS EXISTING COVER
1 IN 5

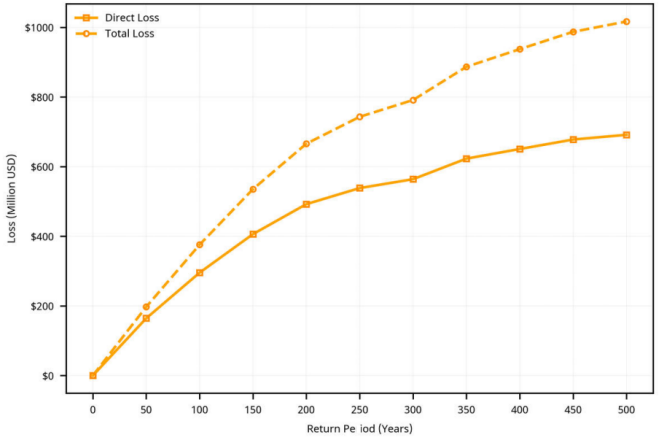
EVENT FREQUENCY WHERE EARTHQUAKE LOSS EXCEEDS EXISTING COVER
1 IN 20

Exceedance probability curves – floods



Source: JBA Risk Management

Exceedance probability curves – earthquake



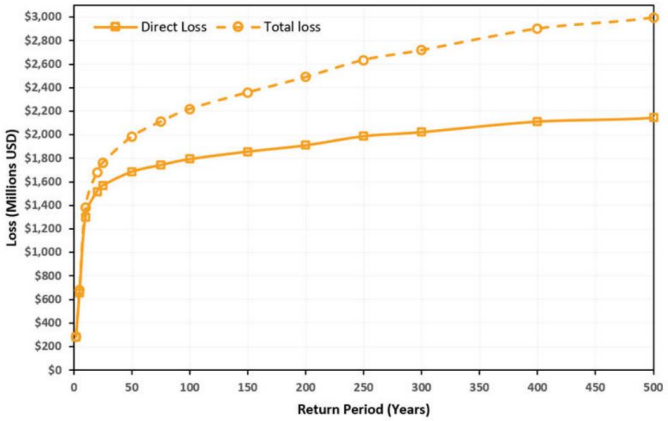
Source: Global Earthquake Model

Disaster Risk Profiles – Kazakhstan

GDP: 180,160,000,000 (2019) **Population: 18,750,000 (2020)**

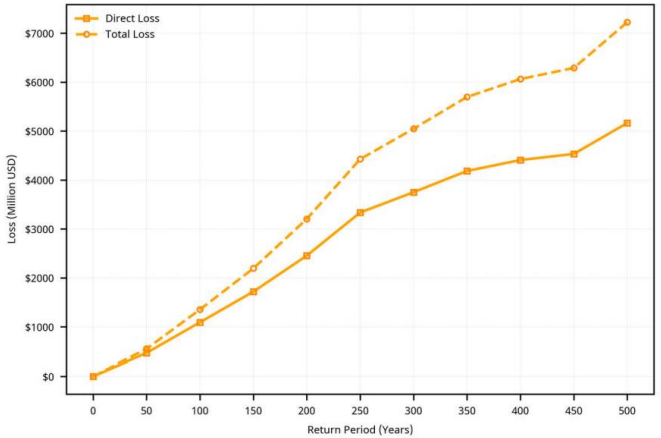
1 IN 100 YEAR FLOOD ECONOMIC LOSS **$1,800,000,000**	1 IN 100 YEAR EARTHQUAKE LOSS **$1,100,000,000**	AVERAGE ANNUAL LOSS FLOOD **$419,000,000**	AVERAGE ANNUAL LOSS EARTHQUAKE **$57,600,000**
AVERAGE ANNUAL PEOPLE AFFECTED FLOOD **156,000**	AVERAGE ANNUAL PEOPLE AFFECTED EARTHQUAKE **44,028**	AVERAGE ANNUAL PEOPLE AFFECTED INFECTIOUS DISEASE **159,688**	
EVENT FREQUENCY WHERE FLOOD LOSS EXCEEDS EXISTING COVER **1 IN 10**	EVENT FREQUENCY WHERE EARTHQUAKE LOSS EXCEEDS EXISTING COVER **1 IN 75**		

Exceedance probability curves – floods



Source: JBA Risk Management

Exceedance probability curves – earthquake



Source: Global Earthquake Model

Disaster Risk Profiles – Kyrgyz Republic

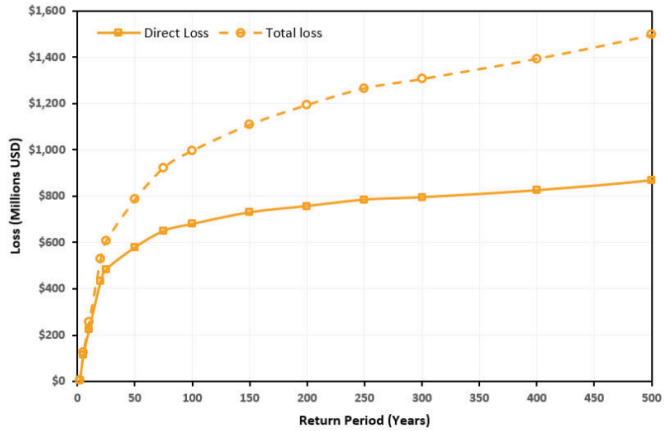
GDP: 8,869,700,000 (2020) **Population: 6,524,000 (2020)**

1 IN 100 YEAR FLOOD ECONOMIC LOSS	1 IN 100 YEAR EARTHQUAKE LOSS	AVERAGE ANNUAL LOSS FLOOD	AVERAGE ANNUAL LOSS EARTHQUAKE
$680,000,000	**$1,160,000,000**	**$73,300,000**	**$72,400,000**

AVERAGE ANNUAL PEOPLE AFFECTED FLOOD	AVERAGE ANNUAL PEOPLE AFFECTED EARTHQUAKE	AVERAGE ANNUAL PEOPLE AFFECTED INFECTIOUS DISEASE
27,000	**38,089**	**67,080**

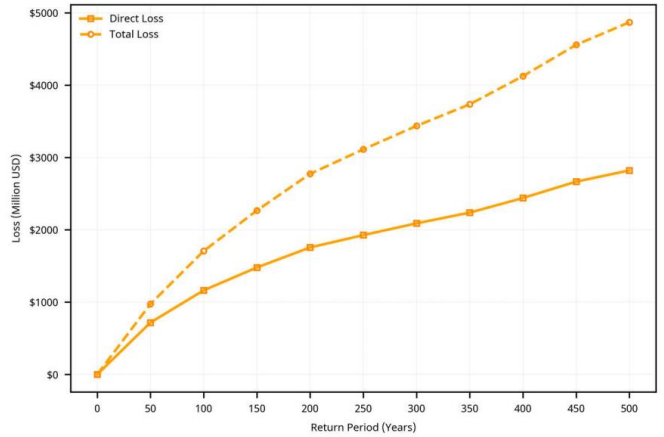
EVENT FREQUENCY WHERE FLOOD LOSS EXCEEDS EXISTING COVER	EVENT FREQUENCY WHERE EARTHQUAKE LOSS EXCEEDS EXISTING COVER
1 IN 5	**1 IN 10**

Exceedance probability curves – floods



Source: JBA Risk Management

Exceedance probability curves – earthquake



Source: Global Earthquake Model

Disaster Risk Profiles – Mongolia

GDP: 13,852,000,000 (2019)

Population: 3,225,000 (2019)

1 IN 100 YEAR FLOOD ECONOMIC LOSS
$400,000,000

1 IN 100 YEAR EARTHQUAKE LOSS
$7,700,000

AVERAGE ANNUAL LOSS FLOOD
$24,000,000

AVERAGE ANNUAL LOSS EARTHQUAKE
$600,000

AVERAGE ANNUAL PEOPLE AFFECTED FLOOD
17,589

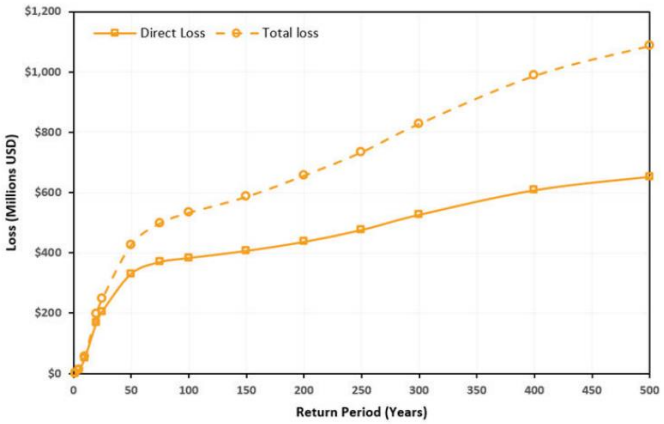
AVERAGE ANNUAL PEOPLE AFFECTED EARTHQUAKE
4,210

AVERAGE ANNUAL PEOPLE AFFECTED INFECTIOUS DISEASE
28,867

EVENT FREQUENCY WHERE FLOOD LOSS EXCEEDS EXISTING COVER
1 IN 10

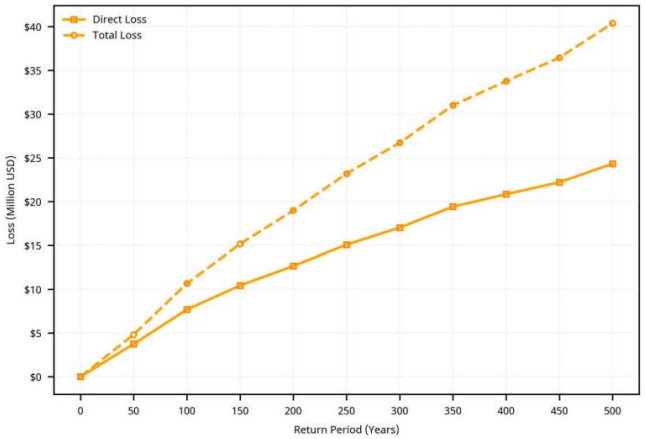
EVENT FREQUENCY WHERE EARTHQUAKE LOSS EXCEEDS EXISTING COVER
>1 IN 200

Exceedance probability curves – floods



Source: JBA Risk Management

Exceedance probability curves – earthquake



Source: Global Earthquake Model

Disaster Risk Profiles – Pakistan

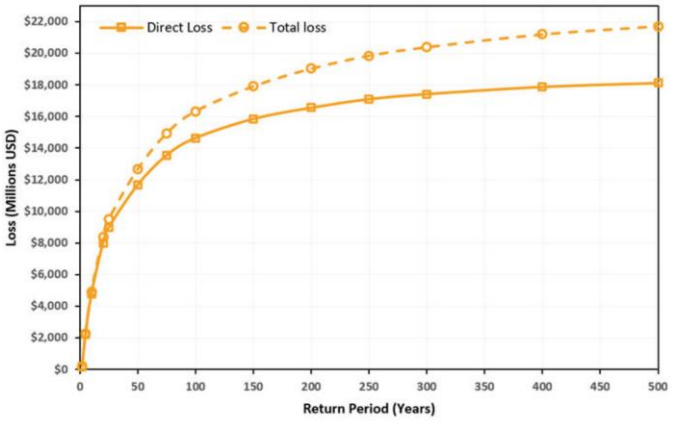
GDP: $278,221,910,000 (2019) **Population: 216,565,320 (2019)**

1 IN 100 YEAR FLOOD ECONOMIC LOSS	1 IN 100 YEAR EARTHQUAKE LOSS	AVERAGE ANNUAL LOSS FLOOD	AVERAGE ANNUAL LOSS EARTHQUAKE
$14,600,000,000	**$4,600,000,000**	**$1,500,000,000**	**$613,700,000**

AVERAGE ANNUAL PEOPLE AFFECTED FLOOD	AVERAGE ANNUAL PEOPLE AFFECTED EARTHQUAKE	AVERAGE ANNUAL PEOPLE AFFECTED INFECTIOUS DISEASE
2,300,000	**1,667,897**	**2,557,455**

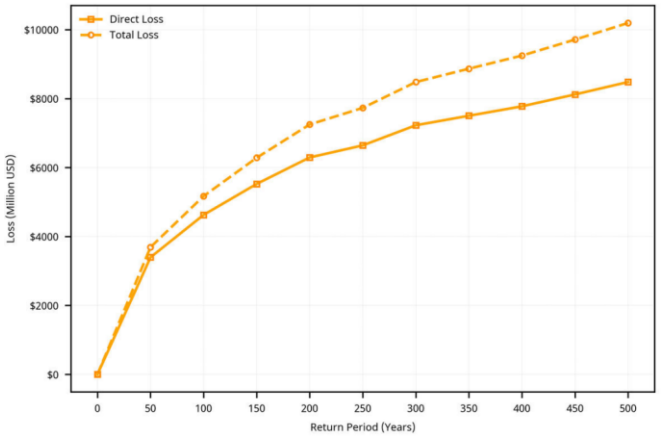
EVENT FREQUENCY WHERE FLOOD LOSS EXCEEDS EXISTING COVER	EVENT FREQUENCY WHERE EARTHQUAKE LOSS EXCEEDS EXISTING COVER
ALL	**ALL**

Exceedance probability curves – floods



Source: JBA Risk Management

Exceedance probability curves – earthquake



Source: Global Earthquake Model

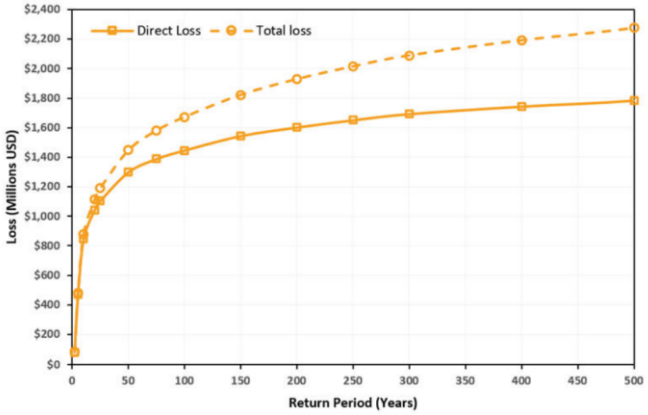
Disaster Risk Profiles – PRC Inner Mongolia

GDP: $279,000,000,000 (2020) | **Population: 24,700,000 (2010)**

1 IN 100 YEAR FLOOD ECONOMIC LOSS	1 IN 100 YEAR EARTHQUAKE LOSS	AVERAGE ANNUAL LOSS FLOOD	AVERAGE ANNUAL LOSS EARTHQUAKE
$1,500,000,000	**$2,200,000,000**	**$247,700,000**	**$121,600,000**

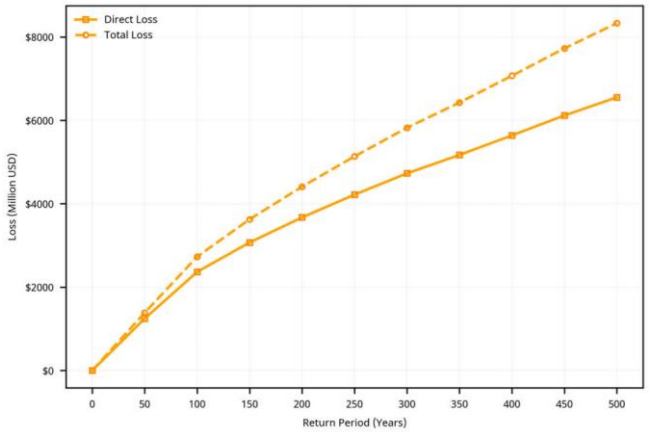
AVERAGE ANNUAL PEOPLE AFFECTED FLOOD	AVERAGE ANNUAL PEOPLE AFFECTED EARTHQUAKE	AVERAGE ANNUAL PEOPLE AFFECTED INFECTIOUS DISEASE
162,809	**41,290**	**275,707**

Exceedance probability curves – floods



Source: JBA Risk Management

Exceedance probability curves – earthquake



Source: Global Earthquake Model

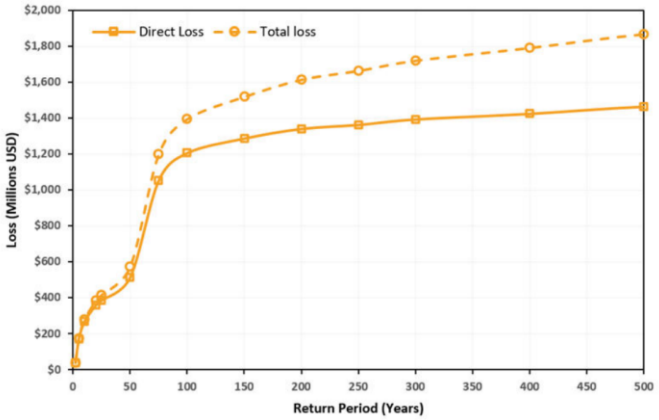
Disaster Risk Profiles – PRC Xinjiang Uyghur

GDP: $211,000,000,000 (2019) **Population: 21,800,000 (2010)**

1 IN 100 YEAR FLOOD ECONOMIC LOSS	1 IN 100 YEAR EARTHQUAKE LOSS	AVERAGE ANNUAL LOSS FLOOD	AVERAGE ANNUAL LOSS EARTHQUAKE
$1,200,000,000	**$2,900,000,000**	**$106,600,000**	**$282,900,000**

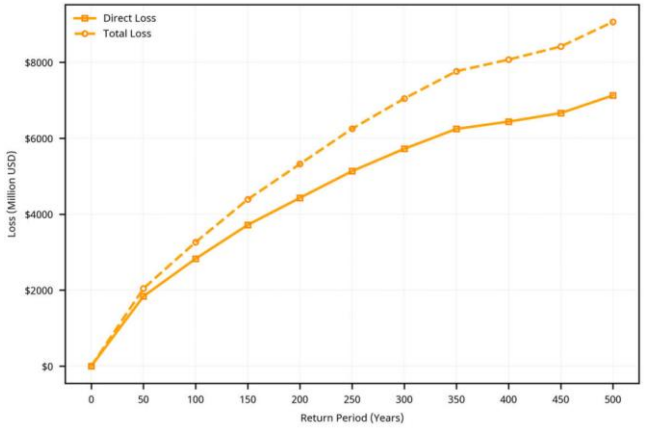
AVERAGE ANNUAL PEOPLE AFFECTED FLOOD	AVERAGE ANNUAL PEOPLE AFFECTED EARTHQUAKE	AVERAGE ANNUAL PEOPLE AFFECTED INFECTIOUS DISEASE
104,315	**87,044**	**268,488**

Exceedance probability curves – floods



Source: JBA Risk Management

Exceedance probability curves – earthquake



Source: Global Earthquake Model

Disaster Risk Profiles – Tajikistan

GDP: 8,400,000,000 (2019)

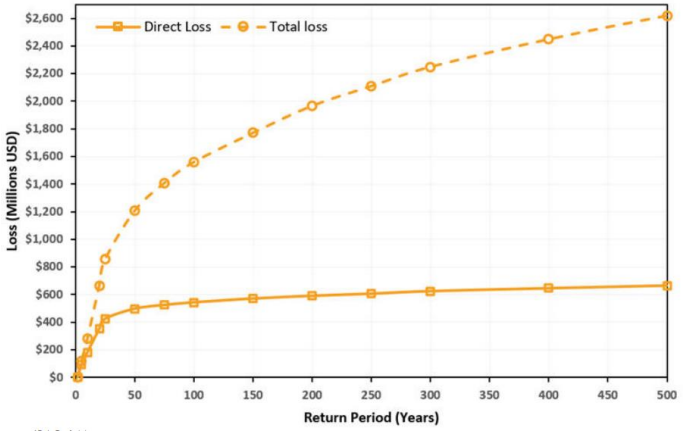
Population: 9,314,000 (2019)

1 IN 100 YEAR FLOOD ECONOMIC LOSS	1 IN 100 YEAR EARTHQUAKE LOSS	AVERAGE ANNUAL LOSS FLOOD	AVERAGE ANNUAL LOSS EARTHQUAKE
$550,000,000	**$885,600,000**	**$60,800,000**	**$63,500,000**

AVERAGE ANNUAL PEOPLE AFFECTED FLOOD	AVERAGE ANNUAL PEOPLE AFFECTED EARTHQUAKE	AVERAGE ANNUAL PEOPLE AFFECTED INFECTIOUS DISEASE
220,000	**160,314**	**350,516**

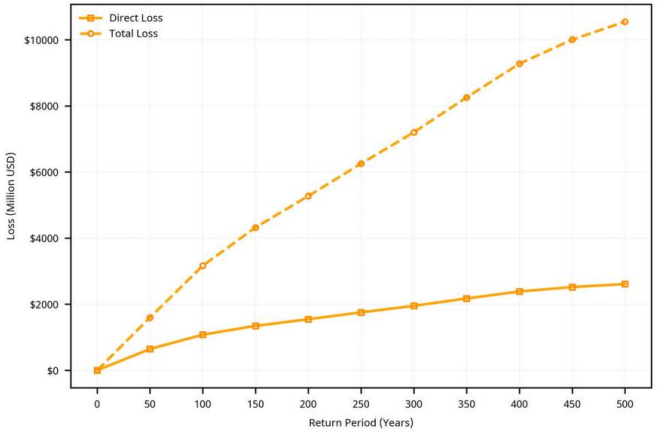
EVENT FREQUENCY WHERE FLOOD LOSS EXCEEDS EXISTING COVER	EVENT FREQUENCY WHERE EARTHQUAKE LOSS EXCEEDS EXISTING COVER
1 IN 5	**1 IN 5**

Exceedance probability curves – floods



Source: JBA Risk Management

Exceedance probability curves – earthquake



Source: Global Earthquake Model

Disaster Risk Profiles – Turkmenistan

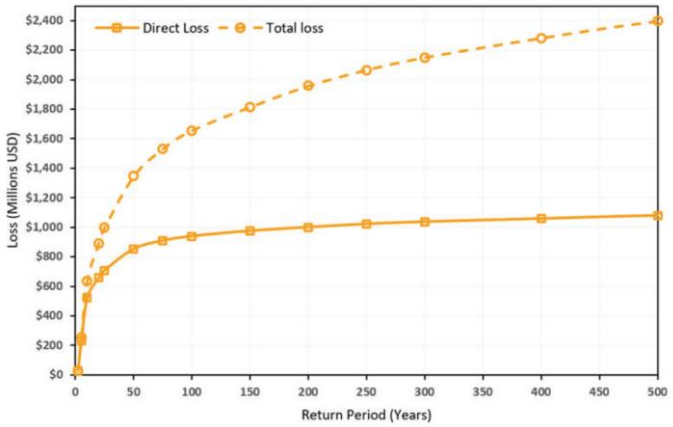
GDP: $40,761,000,000 (2019) **Population: 5,942,000 (2019)**

1 IN 100 YEAR FLOOD ECONOMIC LOSS **$940,000,000**	1 IN 100 YEAR EARTHQUAKE LOSS **$228,400,000**	AVERAGE ANNUAL LOSS FLOOD **$139,800,000**	AVERAGE ANNUAL LOSS EARTHQUAKE **$11,300,000**

AVERAGE ANNUAL PEOPLE AFFECTED FLOOD **69,000**	AVERAGE ANNUAL PEOPLE AFFECTED EARTHQUAKE **9,454**	AVERAGE ANNUAL PEOPLE AFFECTED INFECTIOUS DISEASE **43,927**

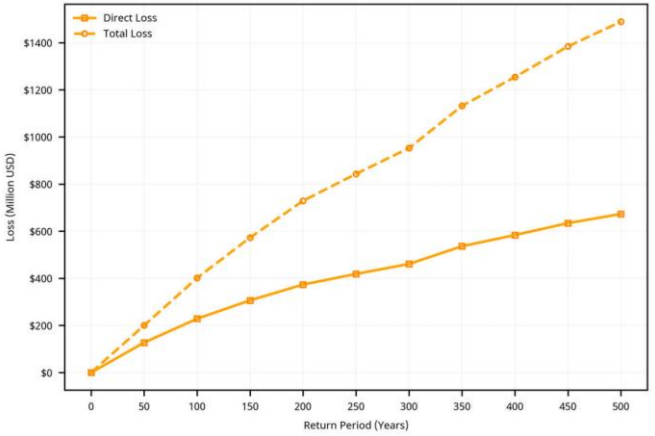
EVENT FREQUENCY WHERE FLOOD LOSS EXCEEDS EXISTING COVER **N/A**	EVENT FREQUENCY WHERE EARTHQUAKE LOSS EXCEEDS EXISTING COVER **N/A**

Exceedance probability curves – floods



Source: JBA Risk Management

Exceedance probability curves – earthquake



Source: Global Earthquake Model

Disaster Risk Profiles – Uzbekistan

GDP: 57,921,000,000 (2019)

Population: 33,580,000 (2019)

1 IN 100 YEAR FLOOD ECONOMIC LOSS
$2,800,000,000

1 IN 100 YEAR EARTHQUAKE LOSS
$3,600,000,000

AVERAGE ANNUAL LOSS FLOOD
$395,600,000

AVERAGE ANNUAL LOSS EARTHQUAKE
$214,300,000

AVERAGE ANNUAL PEOPLE AFFECTED FLOOD
220,000

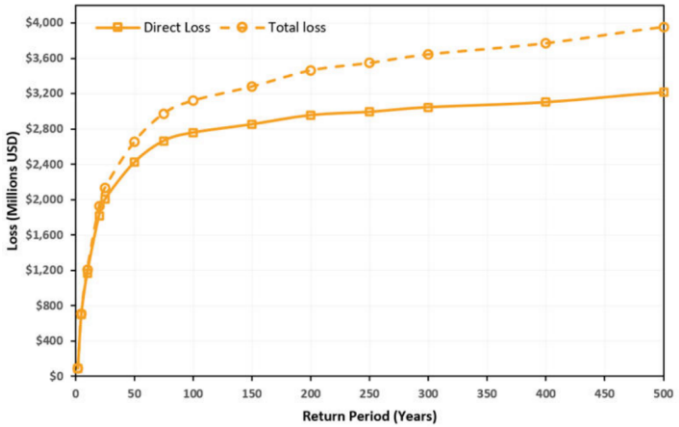
AVERAGE ANNUAL PEOPLE AFFECTED EARTHQUAKE
160,314

AVERAGE ANNUAL PEOPLE AFFECTED INFECTIOUS DISEASE
350,516

EVENT FREQUENCY WHERE FLOOD LOSS EXCEEDS EXISTING COVER
1 IN 2

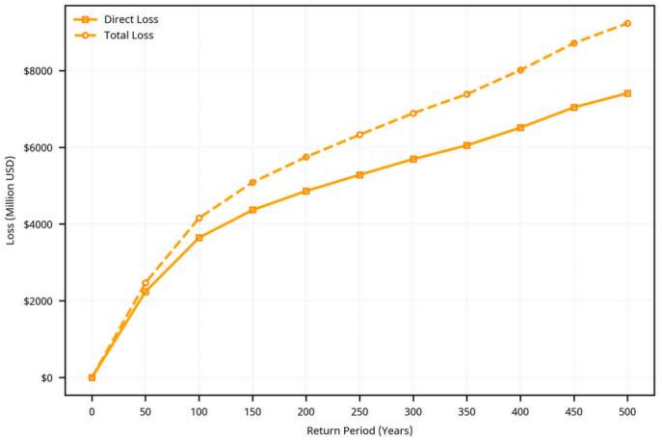
EVENT FREQUENCY WHERE EARTHQUAKE LOSS EXCEEDS EXISTING COVER
1 IN 10

Exceedance probability curves – floods



Source: JBA Risk Management

Exceedance probability curves – earthquake



Source: Global Earthquake Model

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