

Disaster Risk Modeling Interface – User Guide

TA-9878: Developing a Disaster Risk Transfer Facility in the Central Asia Regional Economic Cooperation (CAREC) Region

2022



User Guide Contents



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1. About this Guide

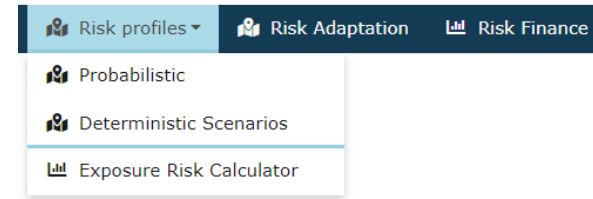
- This guide is intended to help users navigate the Disaster Risk Modeling Interface (DRMI) and access information for knowledge development, awareness raising, and policy-related decision-making
- The guide uses screenshots from the DRMI to help visualize and select appropriate data and build familiarity with the system. These screenshots are indicative of the content available but may differ from the user's specific experience depending on their permitted access to data
- The guide provides an overview of the different functions in the DRMI, it does not provide technical information on the risk modeling methodology. This is provided separately in the Risk Modelling Technical Note.
- This guide will continue to evolve based on user feedback.

2. Overview of the DRMI



- The DRMI provides users with access to information generated by TA-9878 Developing a Disaster Risk Transfer Facility in the Central Asia Regional Economic Cooperation Region
- Earthquake, flood and infectious disease risk profiling for all CAREC members has been conducted using state of the art modeling
- Risk metrics quantifying impacts to people, property and the economy from all three hazards are available on the interface, with an option to adjust exposure. Historic impacts are also available
- Climate adaptation scenarios inform on the costs and benefits of implementing different hazard mitigation mechanisms. These are modelled for current conditions, as well as future climate scenarios and for future economic growth scenarios
- A disaster risk financing dashboard allows testing of parameters of risk financing programmes, drawing on the risk modeling results to understand the extent and indicative costs of risk financing
- Users have the functionality to download data for further analysis

2. Overview of the DRMI: Structure



There are three core functions of the DRMI, containing data sets and tools for the user.

1. Risk Profiles

- Probabilistic – map-based view of economic losses, number of people affected and fatalities from catastrophe modeling of flood, earthquake and infectious disease
- Deterministic Scenarios – map-based view of historic earthquake and flood events, and infectious disease outbreaks
- Exposure Risk Calculator – a tool to enable adjustments to the exposure component of the probabilistic risk assessments

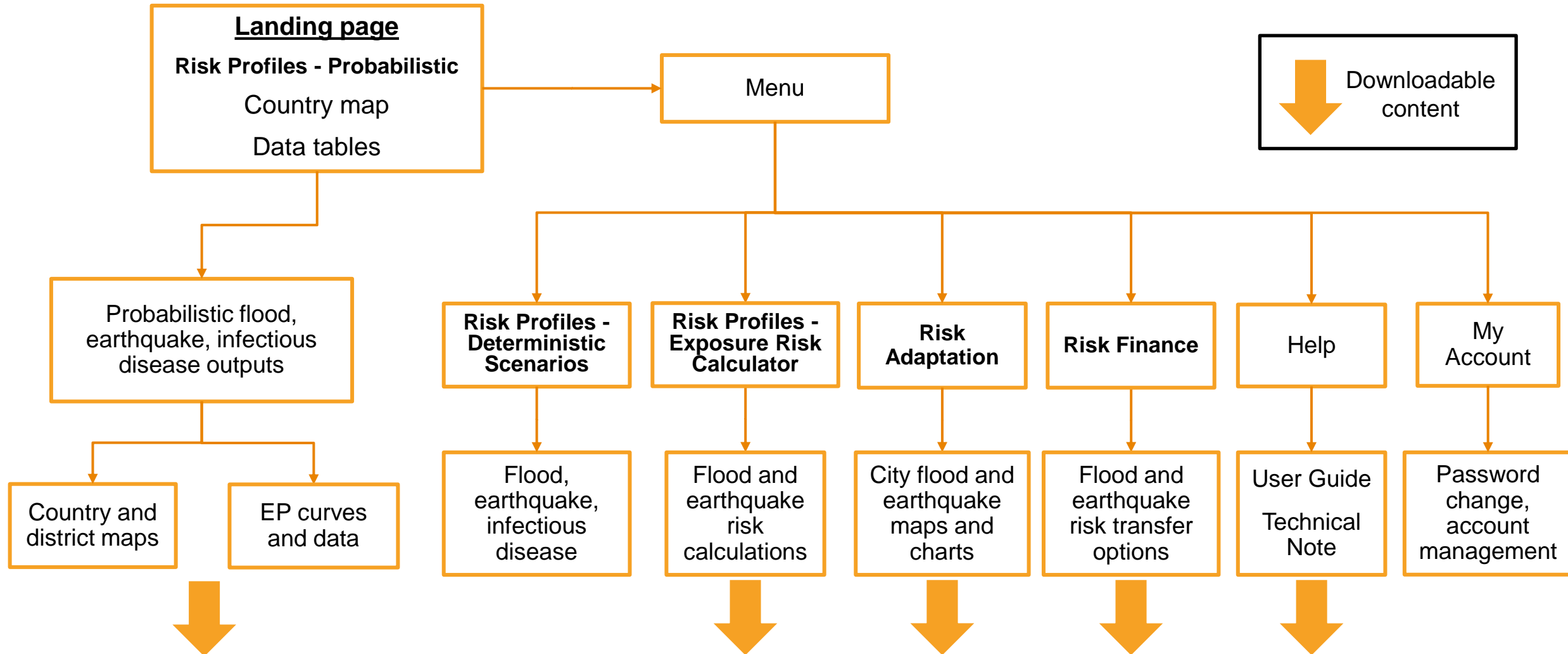
2. Risk Adaptation

- Map-based view of the cost-efficiency of mechanisms to mitigate the impact of floods and earthquakes, including under different climate and economic growth scenarios

3. Risk Finance

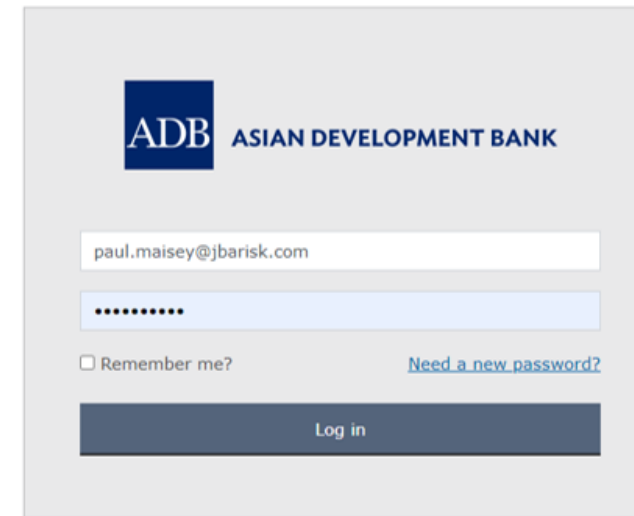
- Tool to enable testing of different key risk financing parameters

2. Overview of the DRMI: Site Map



3. User Access: Login

- The [DRMI](#) is accessed via web browser
- Login requires a username and password
- User registration is controlled centrally
- Each user has tailored access to information on the DRMI, depending on their location (i.e., not all users can see all data)
- Upon login, the map-based probabilistic section is automatically loaded



The screenshot shows the ADB login interface. At the top left is the ADB logo. To its right, the text 'ASIAN DEVELOPMENT BANK' is displayed. Below this, there is a text input field containing the email address 'paul.maisey@jbarisk.com'. Underneath the email field is a password field represented by a series of dots. To the left of the password field is a checkbox labeled 'Remember me?'. To the right of the password field is a blue link that says 'Need a new password?'. At the bottom of the form is a dark blue button with the text 'Log in' in white.



3. User Access: Navigation

- Consistent throughout the tool is a top navigation panel that allows you to move between the core functions of the tool



4. Risk Profiles - Probabilistic

- Probabilistic modelling combines hazard, vulnerability and exposure components to generate a description of the distribution of impacts of disaster risk: metrics are available for physical damage, people affected and fatalities on a geographical basis.
- The two main outputs from the probabilistic modelling are average annual losses (AALs) and exceedance probability (EP) curves.
 - Average annual loss is the mean value of an EP distribution. It indicates the expected impact per year, averaged over a long period
 - An EP curve describes the probability that various levels of impact will be exceeded. If 10,000 years are simulated, then there is a 0.01% (1/10,000) probability that the largest impact in the set will be exceeded. Similarly, there is a 1% (1/100) probability that an event that occurs on average every 100 years will be exceeded
- The modelling is based on models from GEM (earthquake), JBA (flood), and Metabiota (infectious disease). Additional information is provided in the Risk Modelling Technical Note.

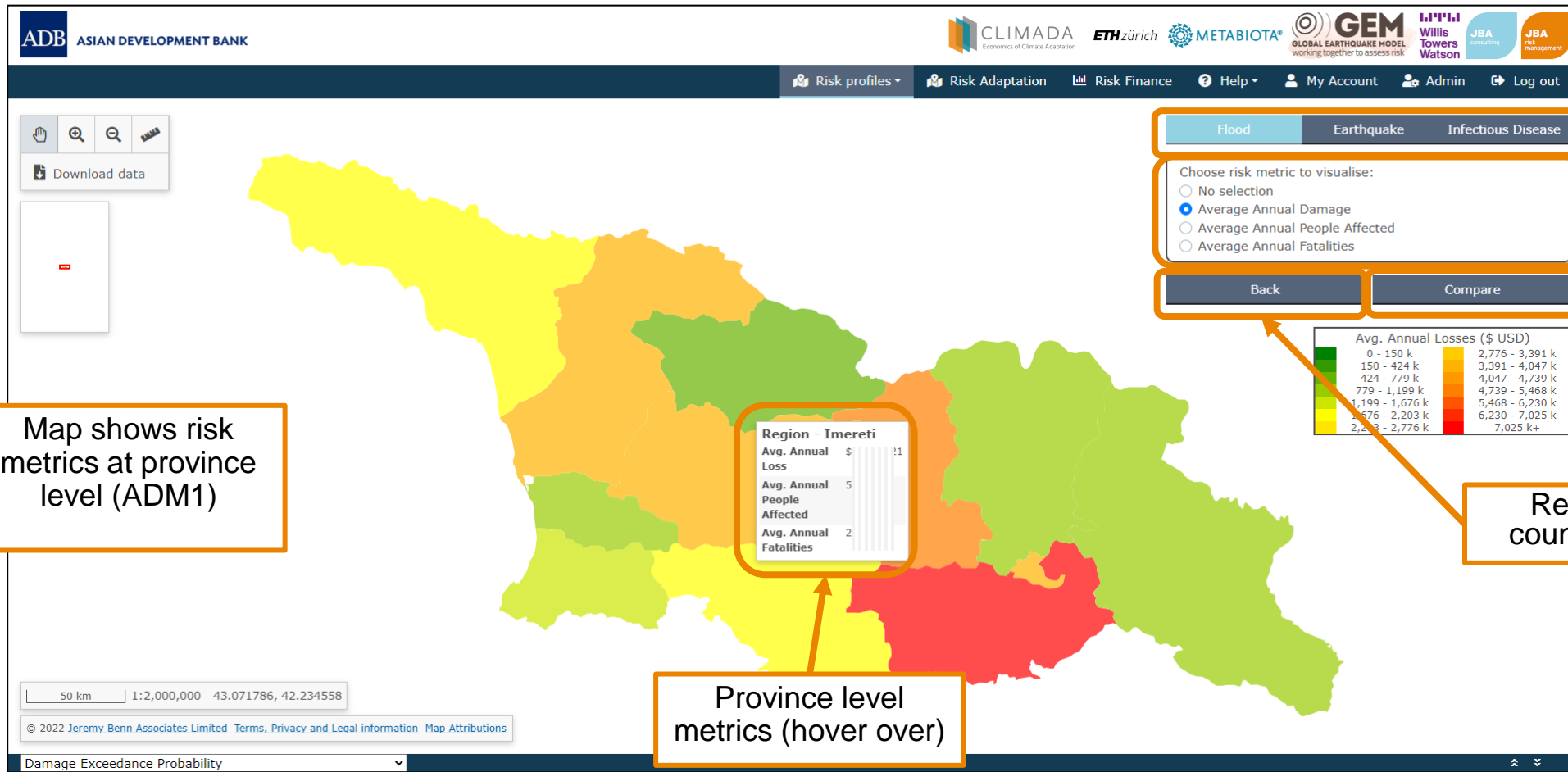
4. Risk Profiles - Probabilistic



Benefits of probabilistic modelling:

- Widely used by insurers and reinsurers to understand the risk from natural hazards when managing their portfolios and pricing insurance
- Probabilistic catastrophe models can provide a view of risk at a location or aggregate level where suitable exposure data is available
- The use of large sets of simulated events means that the models can estimate risk for extreme events of much greater intensity than anything that has been observed in recorded history
- Using the full probabilistic distribution of risk that the models generate, users can base their decisions on a modelled level of impact (e.g. \$50m of economic loss) or a specific frequency of event (e.g. 1 in 50 years)
- Probabilistic models represent the uncertainty in the hazard and exposure components used to generate risk outputs
- Probabilistic models are increasingly used to model risk beyond the traditional insurance market

4. Risk Profiles - Probabilistic Province Map



Map shows risk metrics at province level (ADM1)

Province level metrics (hover over)

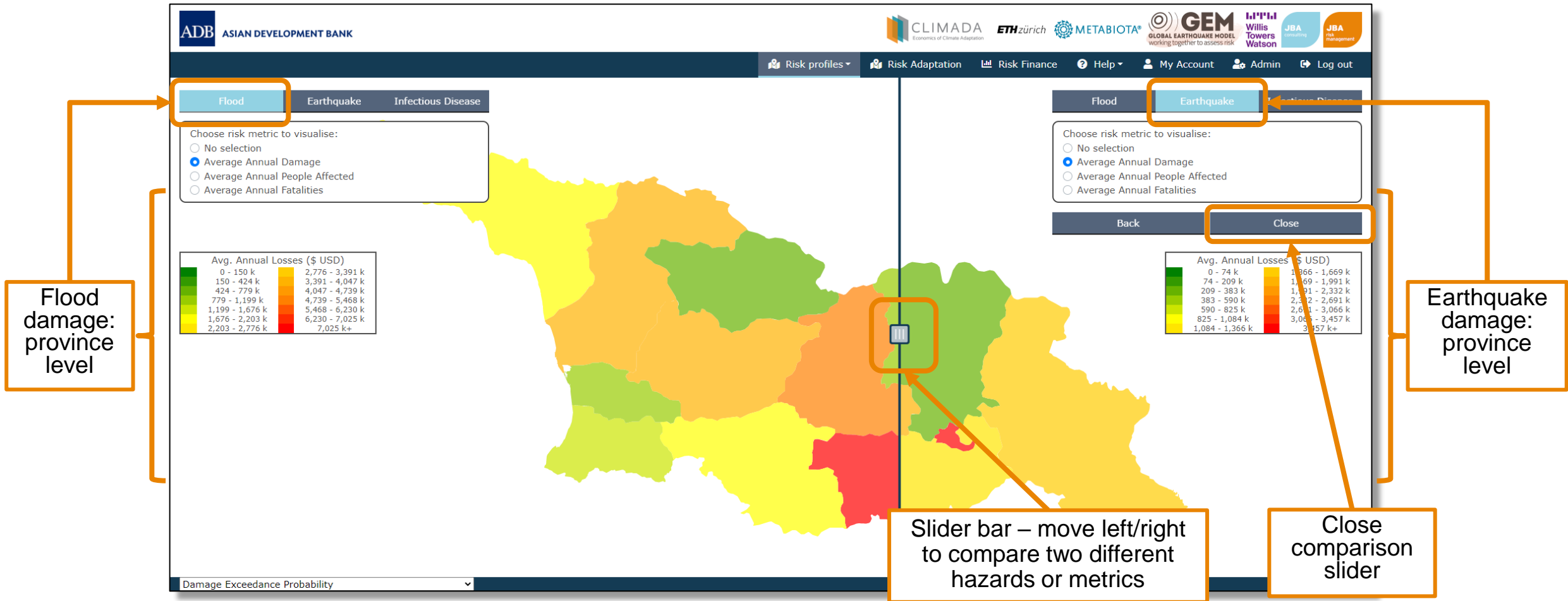
Hazard selection

Risk metric selection

Comparison slider

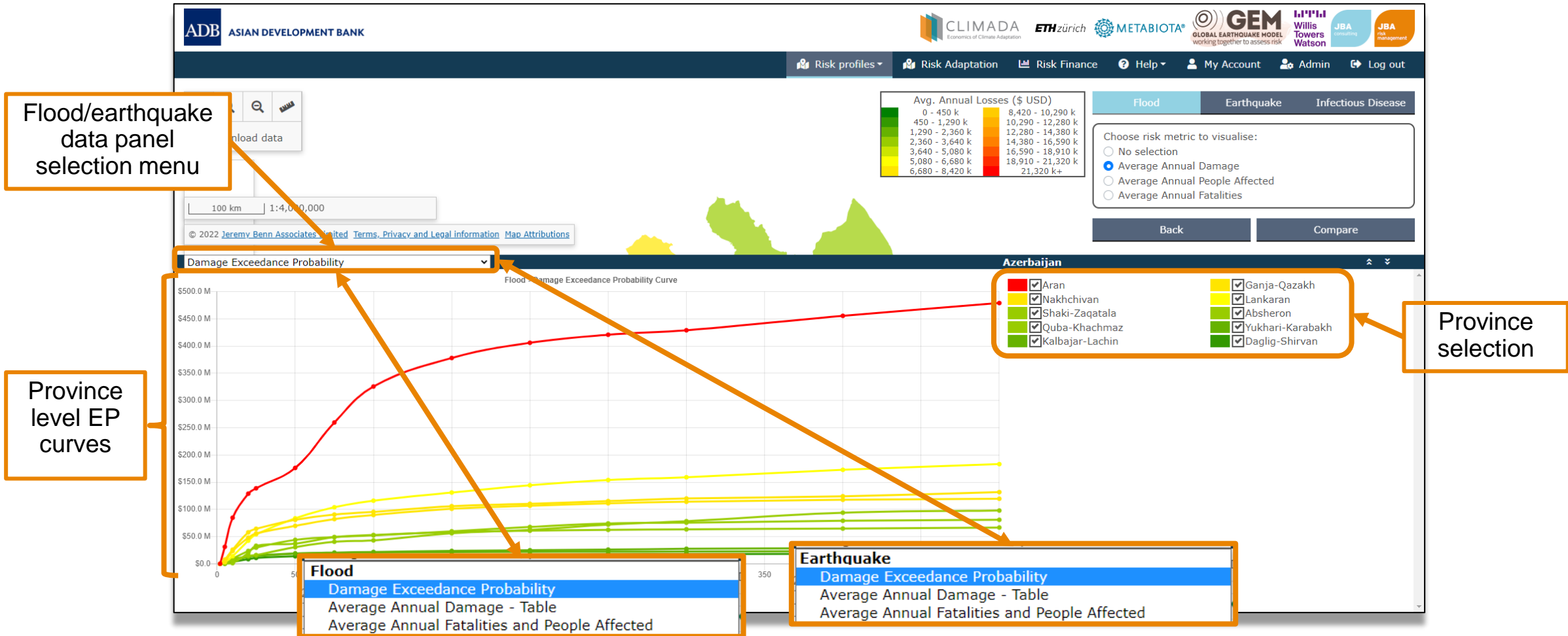
Return to country map

4. Risk Profiles - Probabilistic Comparison Slider



4. Risk Profiles - Probabilistic

Data Panel – Exceedance Probability curves

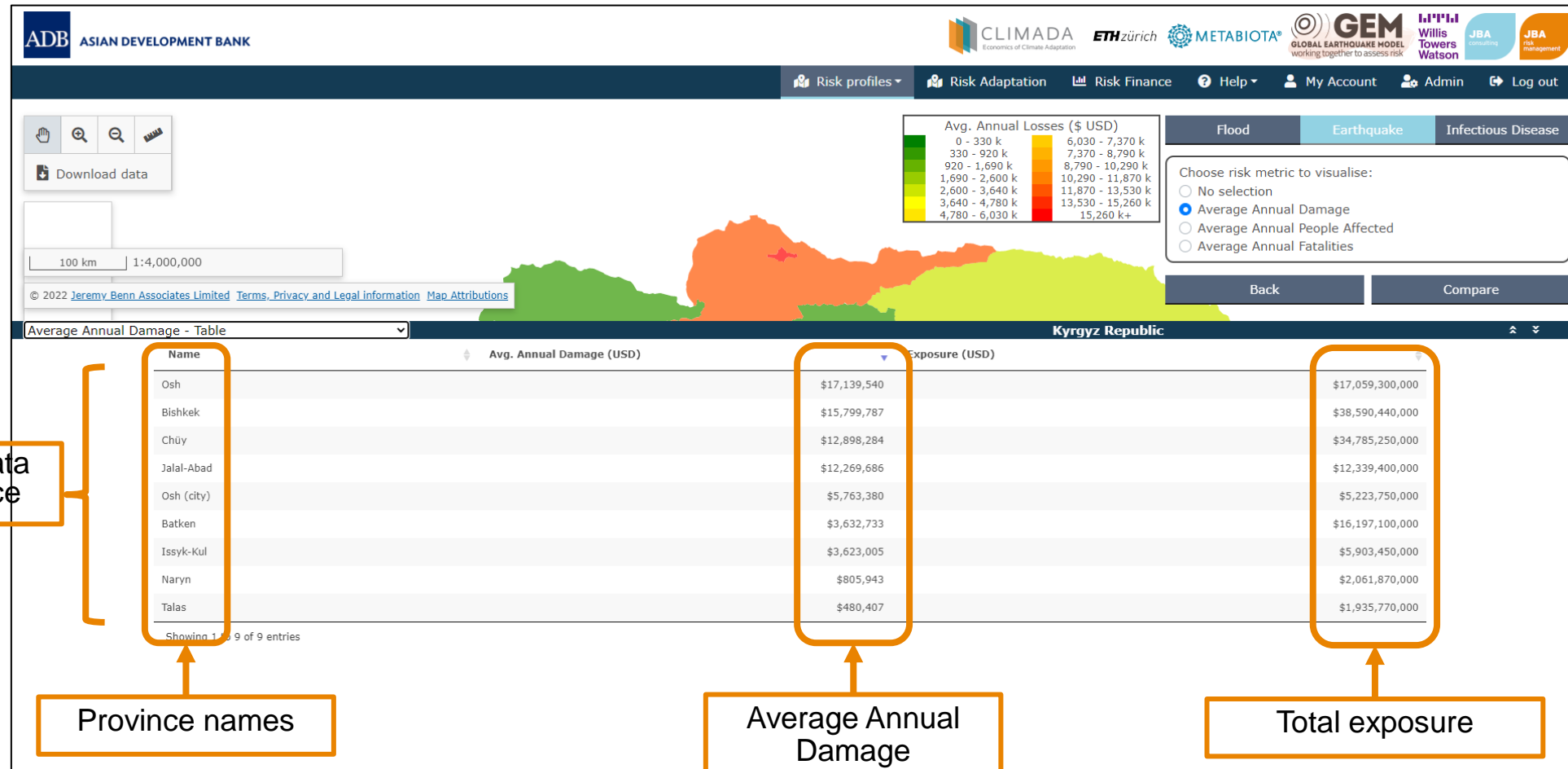


DISCLAIMER: Image shown is indicative of the display. When accessing the interface, users will be presented a display of their own country of interest.

4. Risk Profiles - Probabilistic



Data Panel – Average Annual Loss tables



4. Risk Profiles - Probabilistic



Infectious Disease

- Given the nature of infectious disease risk, information is presented on a national, rather than province, level.

The screenshot shows the ADB Risk Profiles interface for Infectious Disease in Pakistan. The interface includes a map, a dropdown menu for 'Infectious Disease', a line graph showing the number of people infected, and a detailed data selection menu. Annotations highlight the 'Infectious disease data panel selection menu' and 'Infectious disease data selection'.

Infectious disease data panel selection menu

Infectious disease data selection

Combined

Infectious Disease - Infection - Damage Exceedance Probability

- Combined
- Crimean-Congo hemorrhagic fever virus
- Nipah
- Respiratory

Infectious Disease - Fatality - Damage Exceedance Probability

- Combined
- Crimean-Congo hemorrhagic fever virus
- Nipah
- Respiratory

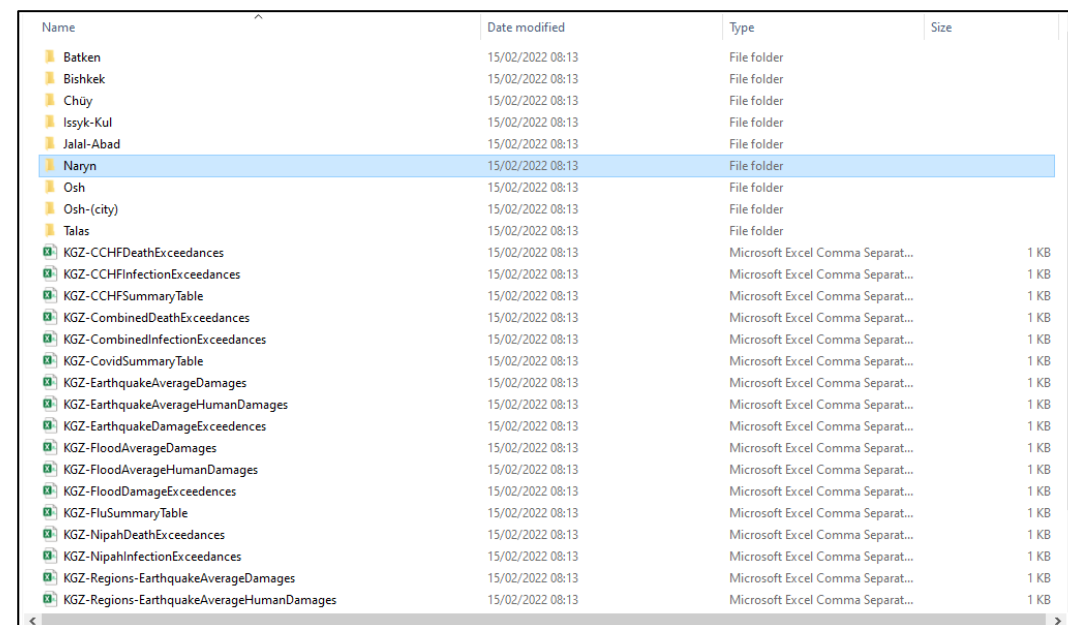
Infectious Disease - Summary

- Crimean-Congo hemorrhagic fever virus
- 2019 Novel Coronavirus (2019-nCoV) (up to Sept 2021)
- Pandemic Influenza
- SARS Coronavirus

4. Risk Profiles - Probabilistic

Data download

- From the button on the top left of the screen data can be downloaded in csv format
- Download zip file contains
 - Country level flood, earthquake and infectious disease data
 - Average annual metrics and exceedance probabilities
 - Metrics for damage, people affected and fatalities
 - Flood and earthquake outputs at province level (ADM1)



Name	Date modified	Type	Size
Batken	15/02/2022 08:13	File folder	
Bishkek	15/02/2022 08:13	File folder	
Chüy	15/02/2022 08:13	File folder	
Issyk-Kul	15/02/2022 08:13	File folder	
Jalal-Abad	15/02/2022 08:13	File folder	
Naryn	15/02/2022 08:13	File folder	
Osh	15/02/2022 08:13	File folder	
Osh-(city)	15/02/2022 08:13	File folder	
Talas	15/02/2022 08:13	File folder	
KGZ-CCHFDeathExceedances	15/02/2022 08:13	Microsoft Excel Comma Separat...	1 KB
KGZ-CCHFInfectionExceedances	15/02/2022 08:13	Microsoft Excel Comma Separat...	1 KB
KGZ-CCHFSummaryTable	15/02/2022 08:13	Microsoft Excel Comma Separat...	1 KB
KGZ-CombinedDeathExceedances	15/02/2022 08:13	Microsoft Excel Comma Separat...	1 KB
KGZ-CombinedInfectionExceedances	15/02/2022 08:13	Microsoft Excel Comma Separat...	1 KB
KGZ-CovidSummaryTable	15/02/2022 08:13	Microsoft Excel Comma Separat...	1 KB
KGZ-EarthquakeAverageDamages	15/02/2022 08:13	Microsoft Excel Comma Separat...	1 KB
KGZ-EarthquakeAverageHumanDamages	15/02/2022 08:13	Microsoft Excel Comma Separat...	1 KB
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KGZ-FloodAverageHumanDamages	15/02/2022 08:13	Microsoft Excel Comma Separat...	1 KB
KGZ-FloodDamageExceedances	15/02/2022 08:13	Microsoft Excel Comma Separat...	1 KB
KGZ-FluSummaryTable	15/02/2022 08:13	Microsoft Excel Comma Separat...	1 KB
KGZ-NipahDeathExceedances	15/02/2022 08:13	Microsoft Excel Comma Separat...	1 KB
KGZ-NipahInfectionExceedances	15/02/2022 08:13	Microsoft Excel Comma Separat...	1 KB
KGZ-Regions-EarthquakeAverageDamages	15/02/2022 08:13	Microsoft Excel Comma Separat...	1 KB
KGZ-Regions-EarthquakeAverageHumanDamages	15/02/2022 08:13	Microsoft Excel Comma Separat...	1 KB

5. Risk Profiles - Deterministic Scenarios

- As a supplement to the probabilistic model outputs, and to help better understand the level of risk from extreme events, the deterministic section displays impact values (damage, fatalities and people affected) based on analysis of a specific simulated event for each country
- Displayed events represent the probability of occurrence of 0.5%, or a return period of 1-in-200-years
- The intention is to illustrate potential impacts for an event of this magnitude, to inform planning for a plausible, extreme event. It is important to note there is a range of uncertainty around these values that cannot be represented by an individual event analysis
- More information is available in the Risk Modelling Technical Note

5. Risk Profiles - Deterministic Scenarios

Data Layers

- Earthquake
 - Economic loss (USD)
 - Economic loss (USD)
 - Transparency: 20 %
 - No. People Affected
 - No. People Affected
 - Transparency: 20 %
 - Fatalities
 - Fatalities
 - Transparency: 20 %
- Flood
 - Economic loss (USD)
 - Economic loss (USD)
 - Transparency: 20 %
 - No. of People Affected
 - No. of People Affected
 - Transparency: 20 %
 - Fatalities
 - Fatalities
 - Transparency: 20 %
- 2019 Novel Coronavirus (2019-nCoV)
 - No. of People Infected
 - No. of People Infected (up to Sept 2021)
 - Transparency: 20 %

Tajikistan

Peril	Flood
Economic Loss (USD)	72,000
GDP (USD)	M
Economic Loss/GDP Ratio	
Population	96
No. People Affected)
No. People Affected/Population Ratio)8

Hazard/metric selection using check boxes

Colour of circle refers to menu selection in left-hand panel

Values for the selected data layer (hover over)

5. Risk Profiles - Deterministic Scenarios

The screenshot displays the ADB risk assessment interface. On the left, a 'Data Layers' panel lists various risk categories such as Earthquake, Flood, and 2019 Novel Coronavirus. The central map shows Tajikistan with a red circle and a purple circle highlighting specific regions. On the right, a 'Deterministic Scenario' data box is open, providing detailed information for Tajikistan under a Flood peril.

Deterministic Scenario	
Country	Tajikistan
Peril	Flood
Economic Loss (USD)	2,000
GDP (USD)	M
Economic Loss/GDP Ratio	
Population	96
Fatalities	
Fatalities/Population Ratio	.4
No. People Affected	
No. People Affected / Population Ratio	.18

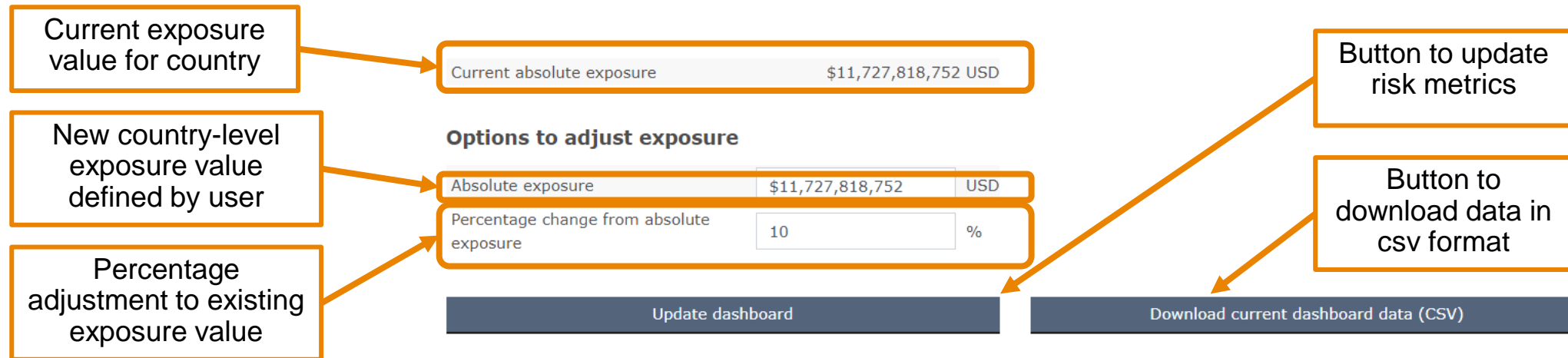
Below the table, there is a 'Scenario selection' section with explanatory text: 'The deterministic scenarios provide information on the impacts (damage, fatalities and people affected) that can be expected, on average, from a flood or earthquake event with an occurrence probability of 0.5% (return period of 1 in 200 years). Individual simulated events have been selected to provide a'.

Clicking on country circle brings up right hand data box

Data box containing more country risk information

6. Risk Profiles - Exposure Risk Calculator

- Based on flood and earthquake probabilistic model outputs
- Allows an alternative value of country level exposure to be applied to the risk metrics (Average Annual Loss, Aggregate and Exceedance Probabilities) for flood and earthquake individually or combined
- Current and updated values are displayed side by side and downloadable in csv format



6. Risk Profiles - Exposure Risk Calculator



Calculator Outputs



Current country Average Annual Loss

Current Occurrence Exceedance Probability (OEP) – the modelled value of loss that would be incurred from the single largest event at the given return period

Current Aggregate Exceedance Probability (AEP) – the modelled value of loss that would be incurred from the whole year at the given return period

Country Average Annual Loss calculated using an updated exposure value

OEP calculated using an updated exposure value

AEP calculated using an updated exposure value

Graph of Current and Adjusted AEPs and OEPs

6. Risk Profiles - Exposure Risk Calculator



Example use of the Exposure Risk Calculator for calculating future risk

Say that the chosen country has an absolute exposure value of \$400bn, the user can generate an estimate of future Average Annual Loss and Aggregate Exceedance Probability based on a future exposure projection that might account for economic and population growth. This can be done in two ways:

1. If the absolute future exposure value is known, this can be entered, e.g. \$440bn
2. If the user has a percentage increase in exposure, this can be entered in the second box, e.g. +10%

Multiple estimates can be made to assess the range of potential outcomes.

The screenshot shows the 'Exposure Risk Calculator' interface. It features a navigation bar with logos for ADB, CLIMADA, ETH zürich, METABIOTA, GEM, Willis Towers Watson, and JBA. The main content area is titled 'Exposure Risk Calculator' and includes a dropdown menu for 'Country', a text input for 'Current absolute exposure' (set to \$400,000,000 USD), and two input fields under 'Options to adjust exposure': 'Absolute exposure' (set to \$400,000,000 USD) and 'Percentage change from absolute exposure' (set to 0%). Below these are buttons for 'Update dashboard' and 'Download current dashboard data (CSV)'. At the bottom, there are expandable sections for 'Flood' and 'Earthquake', each with a plus sign.

7. Risk Adaptation



- The adaptation scenarios are designed to inform on the potential costs and benefits of implementing different adaptation measures
- The same flood and earthquake modeling in the probabilistic section was input into the CLIMADA modeling framework to generate estimates of cost and benefit for the current (baseline) climate, two future climate scenarios (one moderate and one severe) and one economic growth scenario.
- Only the larger cities were modelled, to account for the large proportion of people, livelihoods and assets at risk. A high level of uncertainty would otherwise have been associated with country-level modeling. The largest city in each CAREC member state was selected. Different cities were selected within the same member state where appropriate to the flood and/or earthquake risk profile.
- These scenarios can inform decision-making on upfront investment in risk reduction measures by estimating future risk averted and comparing them to the cost of the measure itself.
- A folder containing all the data needed to rerun the scenarios in CLIMADA can be downloaded from the Adaptation entry screen. More information is available in the Risk Modelling Technical Note.

7. Risk Adaptation City Risk Map



The screenshot shows the City Risk Map interface with the following callout boxes:

- Return to Adaptation home page**: Points to the 'Back' button in the left sidebar.
- Split screen with slider for comparing scenarios**: Points to the 'Compare Measures' button in the left sidebar.
- Return to probabilistic map**: Points to the 'Risk Map' button in the left sidebar.
- Expand/retract side panel**: Points to the expand/collapse icon in the left sidebar.
- Individual risk locations for hazard footprint**: Points to a specific location on the map.
- Map legend**: Points to the 'Avg. Annual Damage' legend on the right side of the map.

The interface includes a top navigation bar with logos for ADB, CLIMADA, METABIOTA, GEM, wtw, and JBA. The main map area displays a city with a color-coded risk footprint. The left sidebar contains a 'Flood' section with scenario selection (Baseline, RCP4.5, RCP8.5) and various adaptation measures. The right sidebar shows a legend for 'Avg. Annual Damage' with a color scale from green (\$0 to 200) to red (> \$2400).

DISCLAIMER: Image shown is indicative of the display. When accessing the interface, users will be presented a display of their own country of interest.

7. Risk Adaptation

City Risk Map – menu options



The image displays two screenshots of the City Risk Map interface, one for Flood risk and one for Earthquake risk. Both screenshots show a sidebar menu with various options, and a main map area with a red box highlighting a specific location. The screenshots are annotated with callout boxes explaining the menu options.

Flood Risk Screenshot:

- Climate scenario selection:** Points to the 'Scenarios' section, which includes 'Baseline' (checked), 'Moderate future climate (RCP4.5)', and 'Extreme future climate (RCP8.5)'.
- Flood adaptation measures selection:** Points to the 'Adaptation Measures' section, which includes 'No Measure' (checked), 'Flood Awareness', 'Ecological Restoration', 'Channel Maintenance', and 'Waste Management'.
- Cost/benefit visualisations:** Points to the 'Average Annual Risk Metrics' section, which includes 'Open Future Damage Graph', 'Open Future Risk Breakdown', and 'Open Cost/Benefit Graph'.

Earthquake Risk Screenshot:

- Population/economic scenario selection:** Points to the 'Scenarios' section, which includes 'Baseline' (checked) and 'Future growth'.
- Information on adaptation measures:** Points to the 'Adaptation Measures' section, which includes 'No Measure' (checked), 'Building Codes', and 'Retro-fitting'.
- Earthquake adaptation measures selection:** Points to the 'Average Annual Risk Metrics' section, which includes 'Open Future Damage Graph', 'Open Future Risk Breakdown', and 'Open Cost/Benefit Graph'.

7. Risk Adaptation Adaptation Plots



Earthquake -

Scenarios

Baseline

Future growth

Adaptation Measures

No Measure

Building Codes i

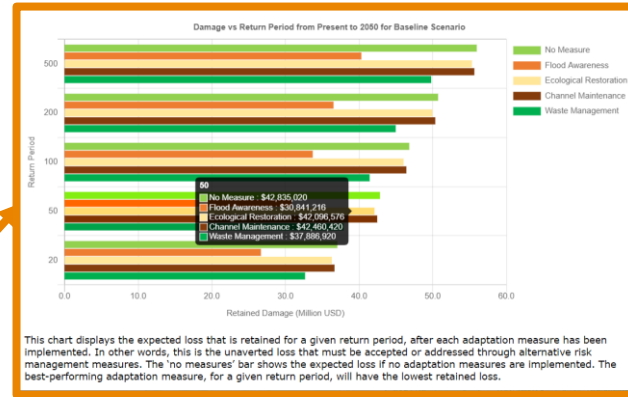
Retro-fitting i

Average Annual Risk Metrics -

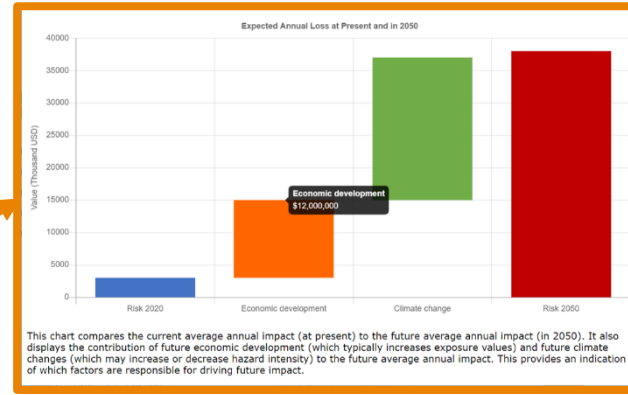
Open Future Damage Graph

Open Future Risk Breakdown

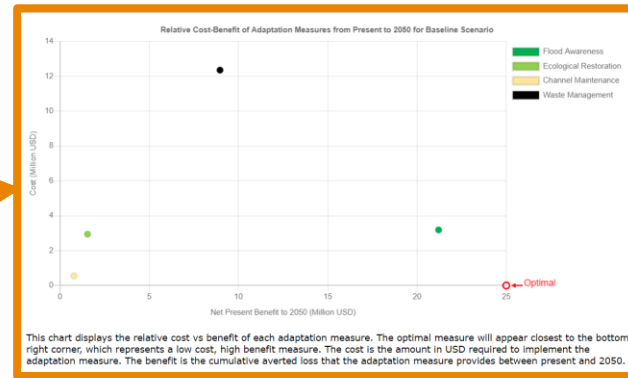
Open Cost/Benefit Graph



Retained Loss - shows retained loss (\$) for all adaptation measures for different return period events



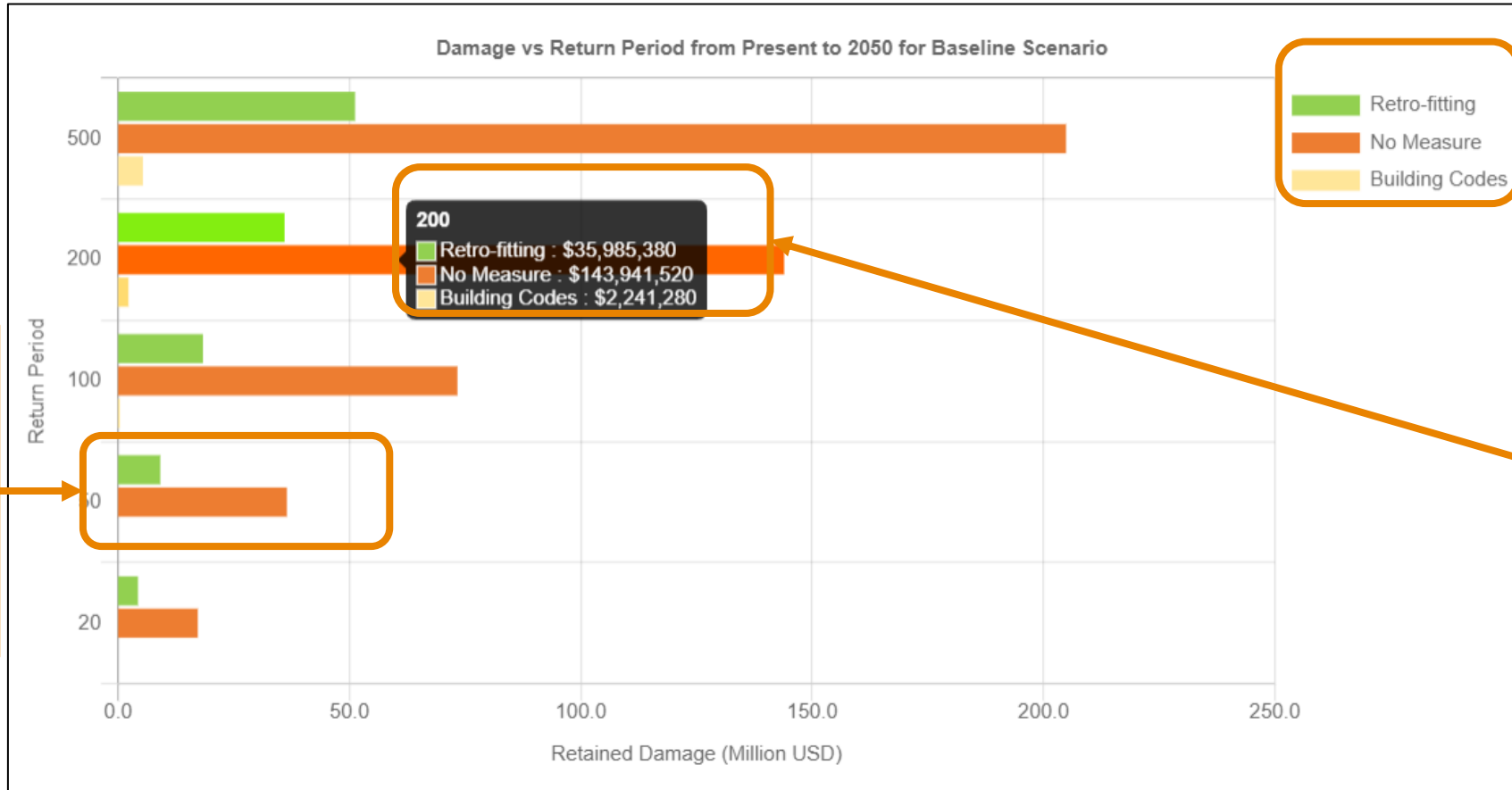
Future Risk Breakdown – shows how the climate and economic growth components relate current loss to future (2050) loss



Cost/Benefit Graph – shows how cost and benefit are related for each adaptation measures – bottom right is optimum of cost/benefit

7. Risk Adaptation

Future Loss Graph



Values of retained loss for each measure for a given return period

Key to measures

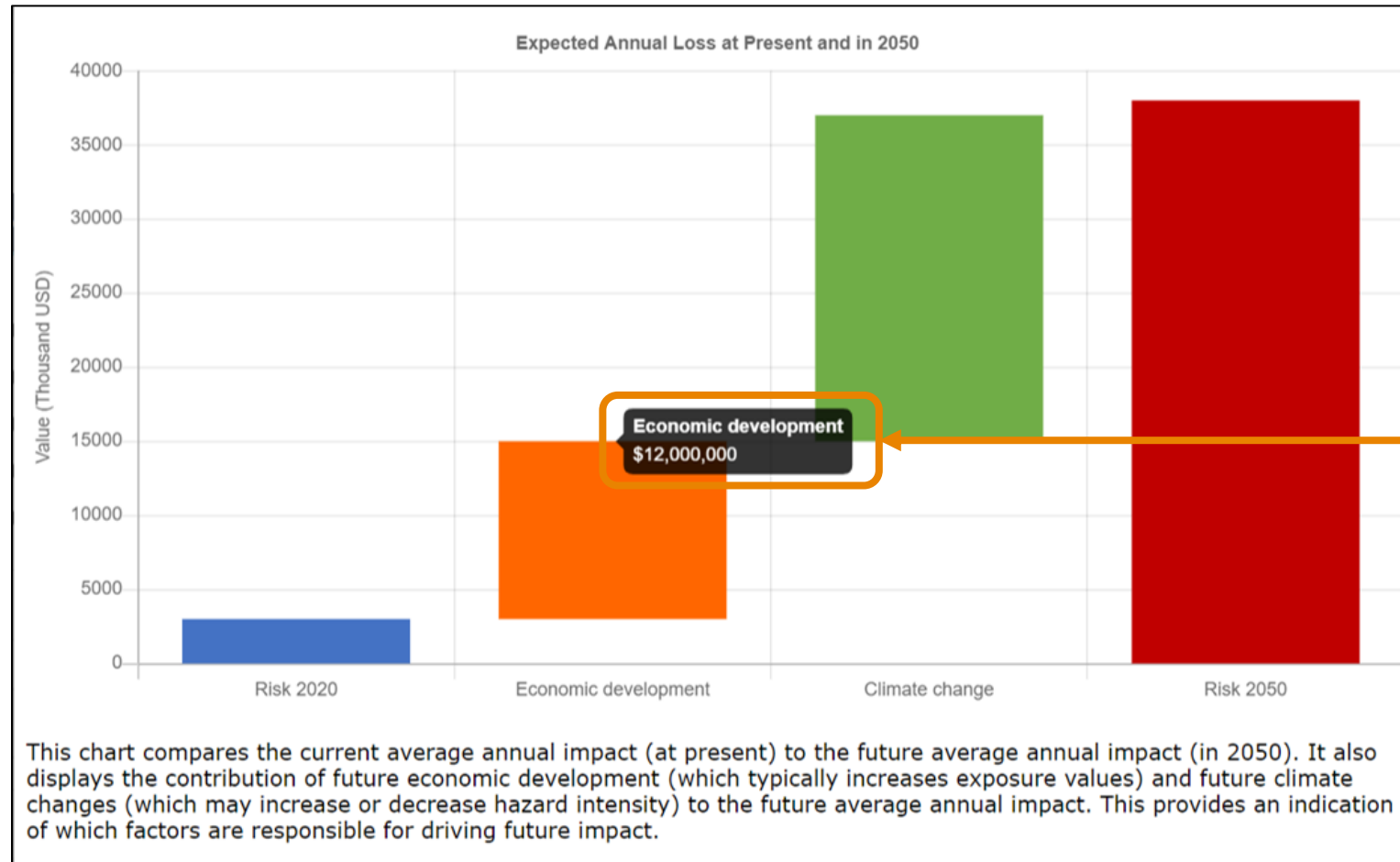
Hover over bars for values

This chart displays the expected loss that is retained for a given return period, after each adaptation measure has been implemented. In other words, this is the unaverted loss that must be accepted or addressed through alternative risk management measures. The 'no measures' bar shows the expected loss if no adaptation measures are implemented. The best-performing adaptation measure, for a given return period, will have the lowest retained loss.

7. Risk Adaptation

Future Risk Breakdown

Values of annual loss for baseline scenario and contributions to future risk estimate

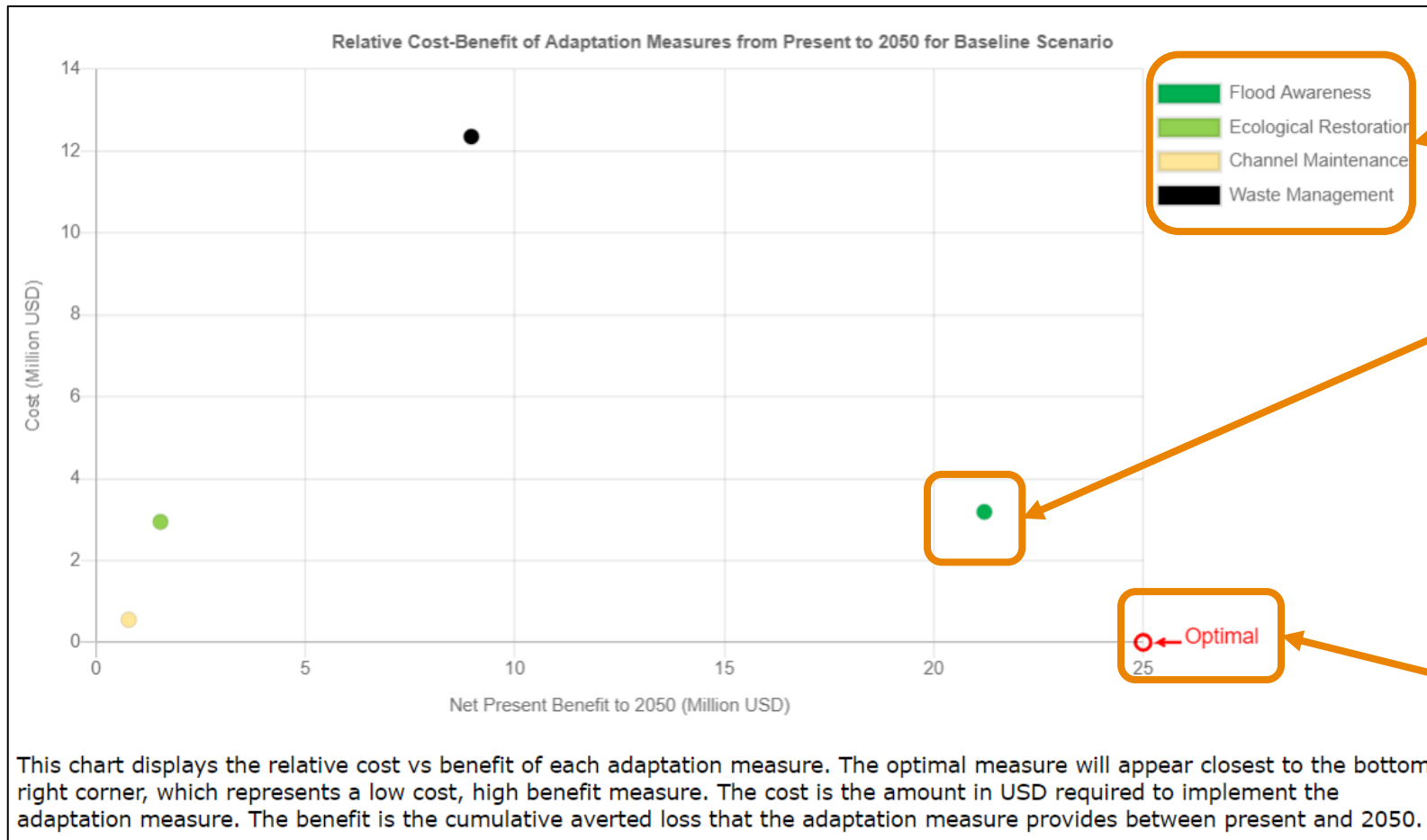


Hover over bars for values

7. Risk Adaptation

Cost / Benefit Graph

Costs and benefits for each adaptation measure for the given scenario. Bottom right hand corner is optimal combination of low cost and high benefit



Key to measures

Points represent cost-benefit of each adaptation measure

Optimal cost/benefit to the bottom right of the plot

7. Risk Adaptation Comparison Slider

The screenshot displays the 'Risk Adaptation Comparison Slider' interface. At the top, there are logos for ADB, CLIMADA, METABIOTA, GEM, wtw, JBA, and JBA. The main navigation bar includes 'Risk profiles', 'Risk Adaptation', 'Risk Finance', 'Help', 'My Account', and 'Log out'. The central map shows a city area with a vertical slider bar in the middle. On either side of the slider are panels for 'Scenarios' and 'Adaptation Measures'. The left panel has 'Baseline' checked, while the right panel has 'Flood Awareness' checked. Below the map, there are buttons for 'Back', 'Close', and 'Risk Map'. A legend for 'Avg. Annual Damage' is visible on the right side of the map, ranging from \$0 to \$2400. The interface is annotated with several callouts explaining the controls.

Left-hand panel for selection showing on left-hand side of map

Right-hand panel for selection showing on right-hand side of map

Close split screen

Slider bar – move left/right to compare the effects of different scenarios or adaptation measures

Close adaptation selection panel

8. Risk Finance



- Allows different parametric insurance options at a country level for flood and earthquake individually or combined
- Dashboard type allows to fix the sum insured, or fix the premium
- Based on the selection of fundamental parameters that determine the structure of the risk transfer
- Selections include:
 - Event sum insured
 - Minimum recovery (minimum pay-out)
 - Return period attachment (start of cover)
 - Return period exhaustion (end of cover)
 - Number of reinstatements (number of pay-outs)
- This builds familiarity with the key parameters for parametric insurance and allows testing to understand how premium prices may respond to different levels of cover, building on the probabilistic section

Disaster Risk Financing Tool

Based on outputs from the probabilistic flood and earthquake models, this tool allows you to model different risk transfer options at the country level for both hazards individually or combined, based on the selection of parameters that determine the structure of the risk transfer. To use the tool, either adjust the parameters or simply click "Update dashboard" to view the modelled damage and the insurance coverage (recoveries) that your chosen selections provide. More information on using this screen is available in the [User Guide](#) (a [Russian version version](#) is also available).

Dashboard type

Fixed sum insured

Country

Select a country...

Flood risk transfer options			Earthquake risk transfer options		
Event sum insured (Fixed)	\$0	USD	Event sum insured (Fixed)	\$0	USD
Minimum Recovery (as a percentage of sum insured)	0	%	Minimum Recovery (as a percentage of sum insured)	0	%
Minimum Recovery (absolute)	\$0	USD	Minimum Recovery (absolute)	\$0	USD
Return period attachment	1	RP	Return period attachment	1	RP
Return period exhaustion	2	RP	Return period exhaustion	2	RP

Update dashboard

Download current dashboard data (CSV)

8. Risk Finance



ADB ASIAN DEVELOPMENT BANK | CLIMADA Economics of Climate Adaptation | METABIOTA | GEM GLOBAL EARTHQUAKE MODEL working together to assess risk | wtw | JBA consulting | JBA risk management

Risk profiles | Risk Adaptation | Risk Finance | Help | My Account | Log out

Home > Disaster Risk Financing Tool

Disaster Risk Financing Tool

Based on outputs from the probabilistic flood and earthquake models, this tool allows you to model different risk transfer options at the country level for both hazards individually or combined, based on the selection of parameters that determine the structure of the risk transfer. To use the tool, either adjust the parameters or simply click "Update dashboard" to view the modelled damage and the insurance coverage (recoveries) that your chosen selections provide. More information on using this screen is available in the [User Guide](#) (a [Russian version version](#) is also available).

Dashboard type
Fixed sum insured

Country
Select a country...

Flood risk transfer options			Earthquake risk transfer options		
Event sum insured (Fixed)	\$0	USD	Event sum insured (Fixed)	\$0	USD
Minimum Recovery (as a percentage of sum insured)	0	%	Minimum Recovery (as a percentage of sum insured)	0	%
Minimum Recovery (absolute)	\$0	USD	Minimum Recovery (absolute)	\$0	USD
Return period attachment	1	RP	Return period attachment	1	RP
Return period exhaustion	2	RP	Return period exhaustion	2	RP

Update dashboard

Download current dashboard data (CSV)

Select dashboard type

Flood risk transfer parameters

Update results

Earthquake risk transfer parameters

Download results in csv format

8. Risk Finance



Example 1 - Use of the 'Fixed sum insured' dashboard for estimating parametric insurance

Let's say that the average annual loss of the country of interest is \$75m for a specific hazard, the estimated losses for a 1 in 10-year event are \$200m and \$750m for a 1 in 200-year event (these numbers can be found in the Probabilistic Modeling):

- If you wish to cover losses up to the 1 in 200-year level, then **Event Sum Insured** should be set to \$750m
- If it is expected that half of losses from frequent events (e.g. 1 in 10-years) are to be covered by insurance, then the **Minimum Recovery** could be set to this level (e.g. \$100m)
- Given we have set the Minimum Recovery at the 1 in 10-year level, the **Return Period Attachment** should be set to 10 years
- If we want to cover some of the losses above the Event Sum Insured, then the Return Period Exhaustion could be set higher, e.g. 500 years
- If we only expect the scheme to pay once per policy, then **Number of Reinstatements** is 1

8. Risk Finance



Example 1 - Use of the 'Fixed sum insured' dashboard for estimating parametric insurance

The results of our example are:

- Average Annual Premium of \$50m (against an average annual loss of \$75m)
- The cover would pay out between \$150m and \$750m on a linear scale between a 1 in 10-year event and a 1 in 500-year event, then payments are capped at that level
- In this example, results show that the event losses almost exactly match the cover up to 1 in 200 years

If the Average annual premium is deemed too high, then a cover starting at the 1 in 25-year level (\$400m) would have an annual premium of \$25m.

Alternative risk financing options could then be considered for the remaining gap.

8. Risk Finance

Dashboard Outputs



Combined

Average Annual Premium (USD) \$5,260,100
 Average Annual Loss (USD) \$205,853,100

Average Annual Premium and Average Annual Loss for the selected parameters

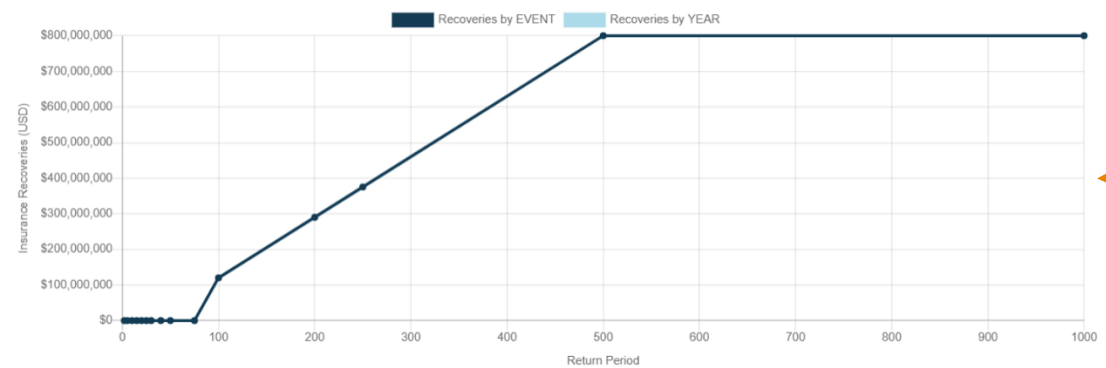
Occurrence Exceedance Probability (OEP) – the modelled value of loss that would be incurred from the single largest event at the given return period

Aggregate Exceedance Probability (AEP) – the modelled value of loss that would be incurred from the whole year at the given return period

Return Period	Economic loss (OEP)	Economic loss (AEP)	Recoveries by EVENT	Recoveries by YEAR
2	\$60,362,338	\$60,880,200	\$0	\$0
5	\$261,507,070	\$261,796,342	\$0	\$0
10	\$511,792,652	\$515,108,198	\$0	\$0
15	\$789,077,136	\$793,800,143	\$0	\$0
20	\$1,017,383,513	\$1,028,243,540	\$0	\$0
25	\$1,215,231,856	\$1,241,234,730	\$0	\$0
30	\$1,386,126,970	\$1,397,209,253	\$0	\$0
40	\$1,685,994,746	\$1,688,325,101	\$0	\$0
50	\$1,896,451,827	\$1,896,509,535	\$0	\$0
75	\$2,407,733,191	\$2,417,765,776	\$0	\$0
100	\$3,812,235,695	\$2,840,051,882	\$120,000,000	\$120,000,000
200	\$3,968,899,572	\$4,002,861,896	\$290,000,000	\$290,000,000
250	\$4,334,779,837	\$4,507,758,642	\$375,000,000	\$375,000,000
500	\$6,087,639,497	\$6,191,711,186	\$800,000,000	\$800,000,000
1000	\$10,524,900,988	\$10,524,924,626	\$800,000,000	\$800,000,000

Recoveries by **event** – the cover provided by the parametric scheme for an event of given return period

Recoveries by **year** – the cover provided by the parametric scheme for an event of given return period



Graph of event and year recoveries against return period

8. Risk Finance



Example 2 - Use of the 'Fixed premium' dashboard for estimating parametric insurance

Let's say that the average annual loss of the country of interest is \$75m for a specific hazard, the estimated losses for a 1 in 10-year event are \$200m and \$750m for a 1 in 200-year event (these numbers can be found in the Probabilistic Modeling):

- If you wish to fix your premium at a known level, then **Average annual premium** should be set to \$5m
- If it is expected that half of losses from frequent events (e.g. 1 in 10-years) are to be covered by insurance, then the **Minimum Recovery** could be set to this level (e.g. 50%)
- Given we have set the Minimum Recovery at the 1 in 10-year level, the **Return Period Attachment** should be set to 10 years
- If we want to cover some of the losses above the Event Sum Insured, then the Return Period Exhaustion could be set higher, e.g. 500 years
- If we only expect the scheme to pay once per policy, then **Number of Reinstatements** is 1

8. Risk Finance



Example 2 - Use of the 'Fixed premium' dashboard for estimating parametric insurance

The results of our example are:

- Event Sum Insured of \$121m (against an average annual loss of \$75m)
- The cover would pay out between \$60m and \$120m on a linear scale between a 1 in 10-year event and a 1 in 500-year event, then payments are capped at that level
- In this example, results show that the event losses almost exactly match the cover up to 1 in 200 years

If the Event sum insured is deemed too high, then a lower Annual average premium of \$2m would provide a \$50m maximum of Event sum Insured

Alternative risk financing options could then be considered for the remaining gap.

9. DRMI Administration



The screenshot shows the DRMI web application interface. At the top left is the ADB logo. The top right features logos for CLIMADA, ETH zürich, METABIOTA, GEM, Willis Towers, and JBA. A navigation bar contains 'Help', 'My Account', 'Admin', and 'Log out'. Below this are tabs for 'Flood', 'Earthquake', and 'Infectious Disease', with a 'View Districts' button. The main content area displays a map of a region. Three callout boxes provide details:

- Access to this User Guide and the Technical Note document**: Points to the 'Help' menu item.
- Account**: Points to the 'My Account' menu item. It lists:
 - Change password
 - Edit details
 - Delete account
- Admin**: Points to the 'Admin' menu item. It lists:
 - Edit, add, delete user functionality for admin users only

At the bottom left, there is a scale bar (500 km, 1:16,000,000) and a copyright notice: © 2022 Jeremy Benn Associates Limited. At the bottom right, there is a dropdown menu for 'Damage Exceedance Probability'.