Flood Risk Analytics

And its role in the IFRM process

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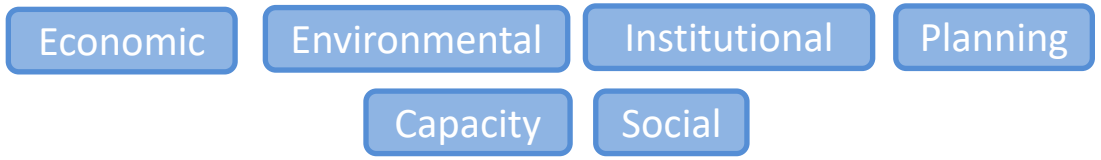
TA 9634-REG: Strengthening Integrated Flood Risk Management

What is the IFRM process?

- The process that we go through to determine what is right mix of IFRM solution for a given area, considering:
  - The Risk (Hazard, exposure and vulnerability)
  - The Context:
    - Objectives (what do we want to protect?)
    - Constraints (what are our limits?)
    - Stakeholders (who is affected?)
    - Pressures:

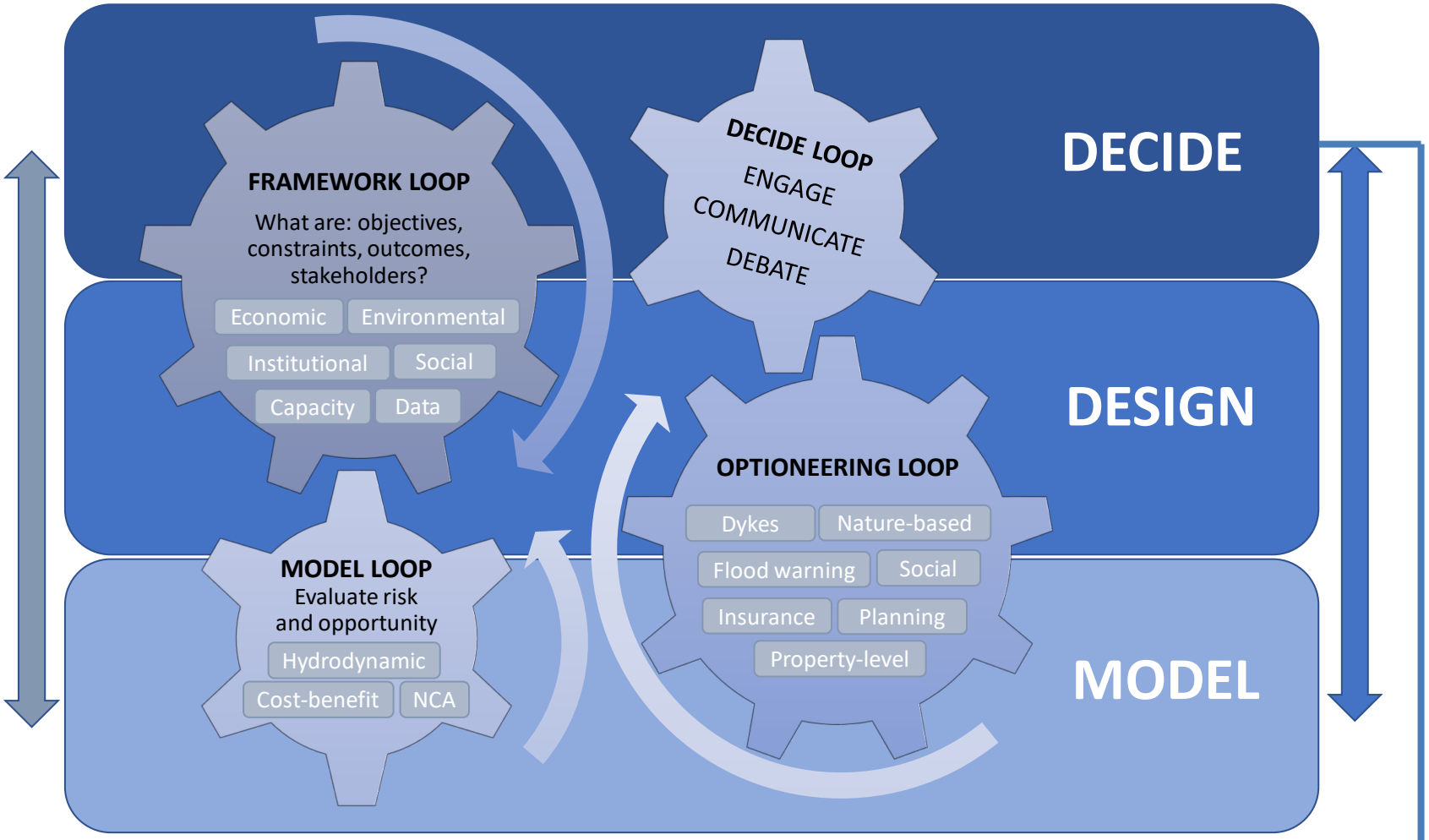


- These are complex considerations, so they need considered in a structured way

What is the IFRM process?

- Not a linear process
- Requires:
  - An understanding of the context that decision need to be made within (Framework Loop)
  - Engagement to support decision making at each stage of the process (Decide Loop)
  - Optioneering to consider the cost/benefit of different mixes of solutions (Optioneering Loop)
  - Modelling and analytics to inform the optioneering (Modelling Loop)
  - And all these things influence each other in an iterative way, so it is a loop

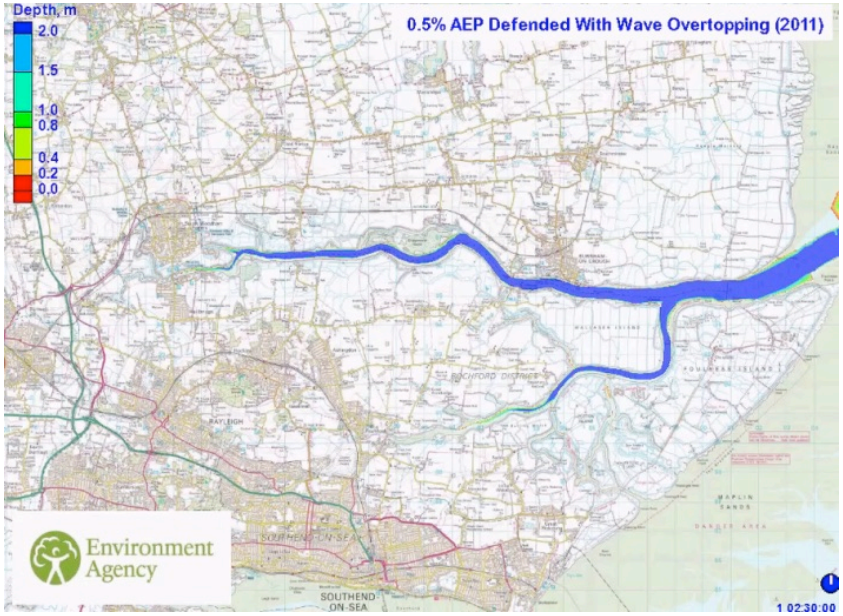
What is the IFRM process?



Results in decisions that are based on good engagement, good data and analytics and lead to good, sustainable investment decisions

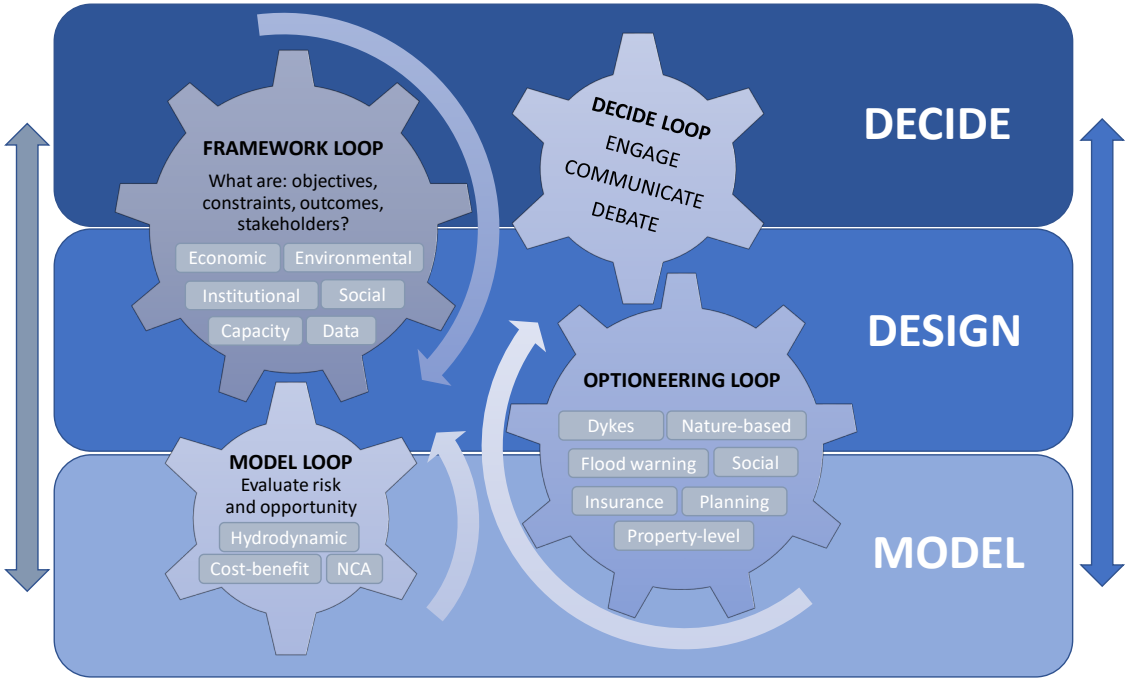
What is Flood Risk Analytics

- The models and analytical approaches that are used to inform the IFRM Process so that sounds invests can be made:
  - Hydrodynamic models
  - Statistical models
  - Cost-benefit
  - Natural Capital Accounting

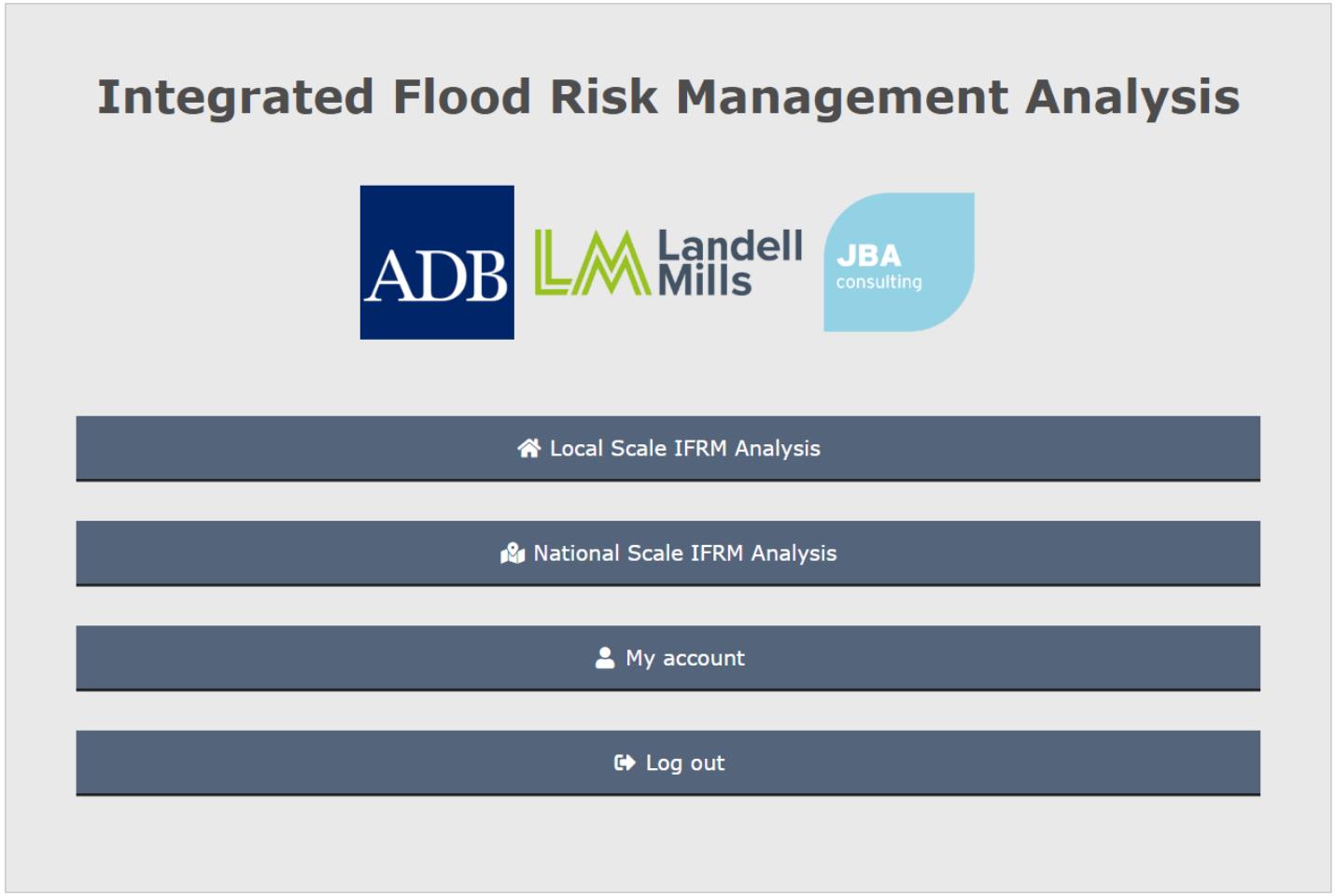


NIRA - National Integrated Risk Analysis

- An innovative data mining tool
- A mechanism to support good decision making with respect to IFRM investments
- Relevant to all of the cogs!

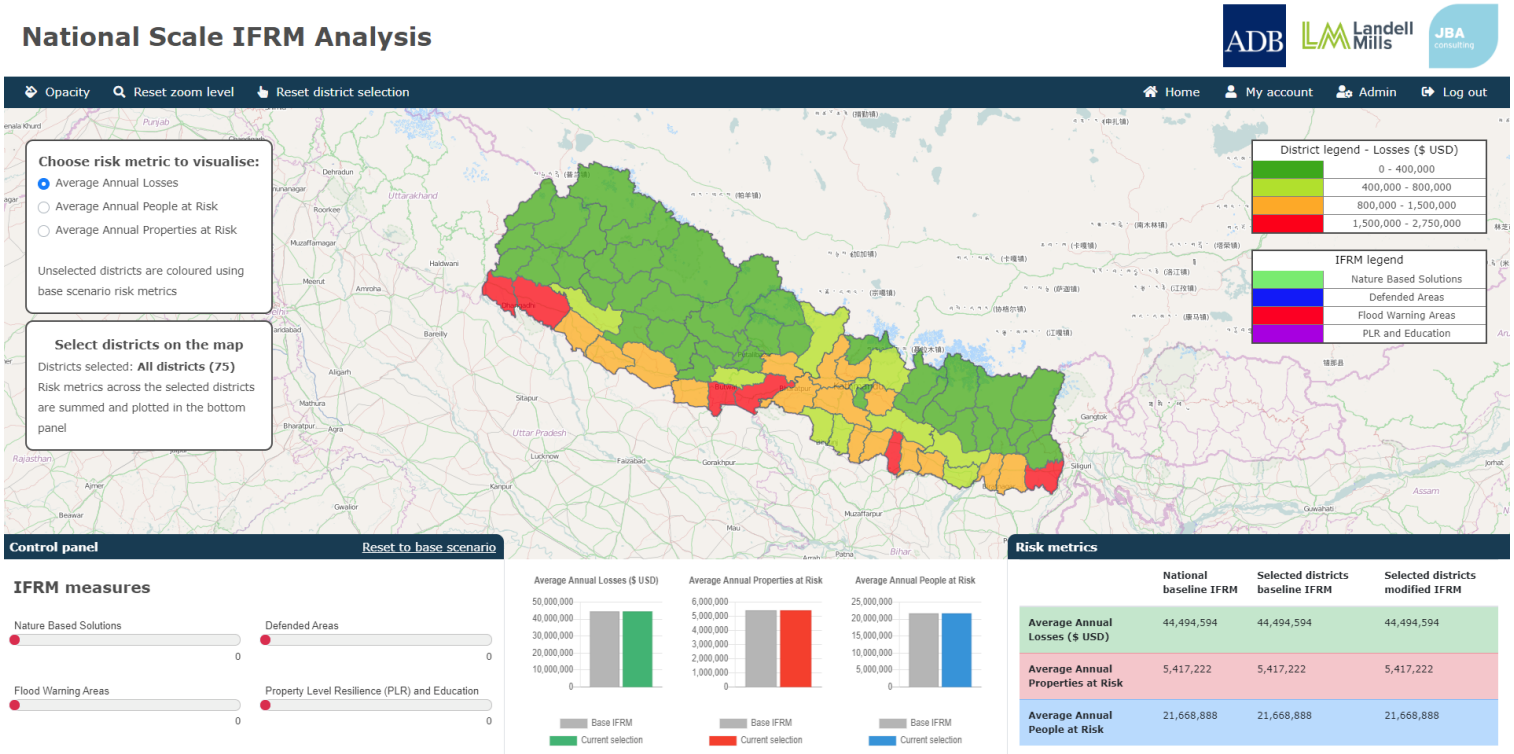


NIRA - National Integrated Risk Analysis



In what way does is support IFRM?

- Model: evaluate the scale and distribution of flood risk
- Design: support optioneering (what mix?)
- Decide: prioritise investment, facilitate engagement, communication and debate

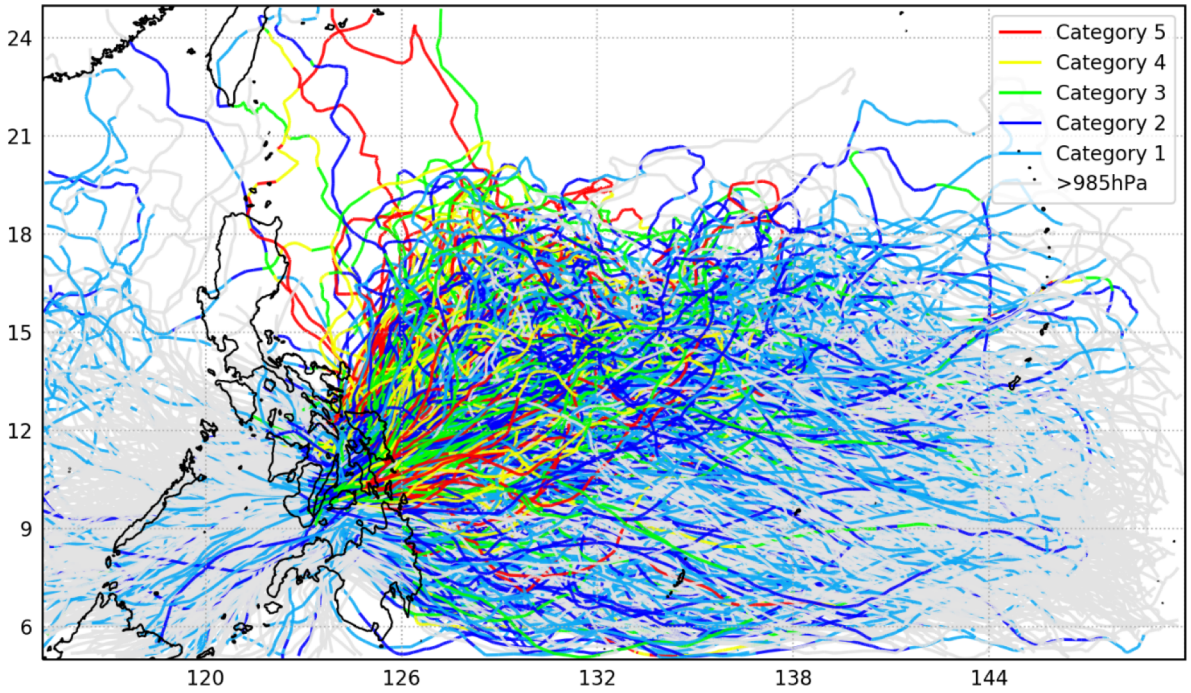


In what way does is support IFRM?

- Using the tool, we have:
  A. Evaluated the scale and spatial distribution of flood risk (and losses), at a national scale, considering current flood defences
  B. Explored
     - Where different IFRM measures might have an impact
     - An indication of the potential scale of that impact
     - An indication of what mix of IFRM solutions might be appropriate

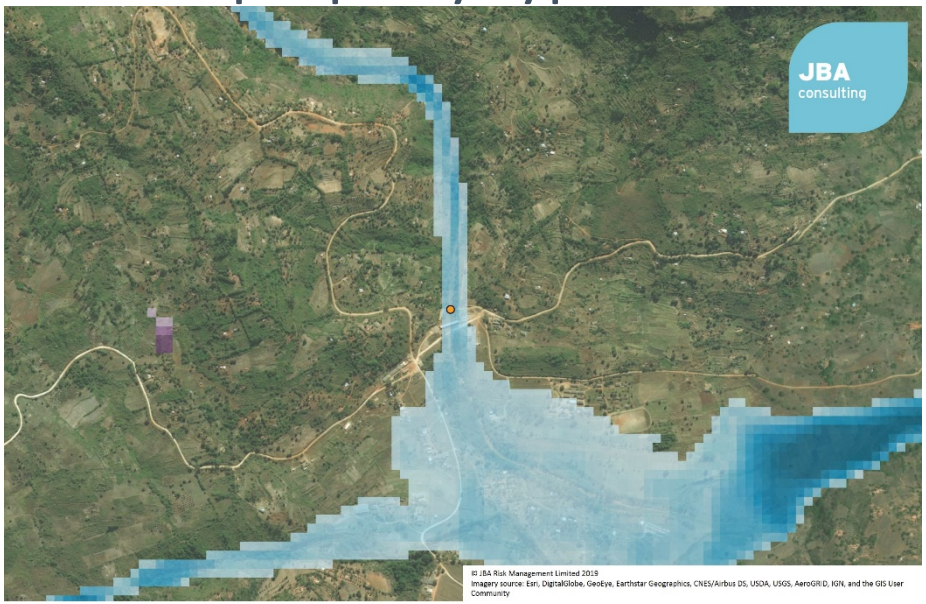
Evaluating risk of present day situation

- Evaluate risk using probabilistic modelling
- Estimates expected annual average losses by simulating the impact of many thousands of storms and then integrating those losses in an annualised manner



Evaluating risk of present day situation

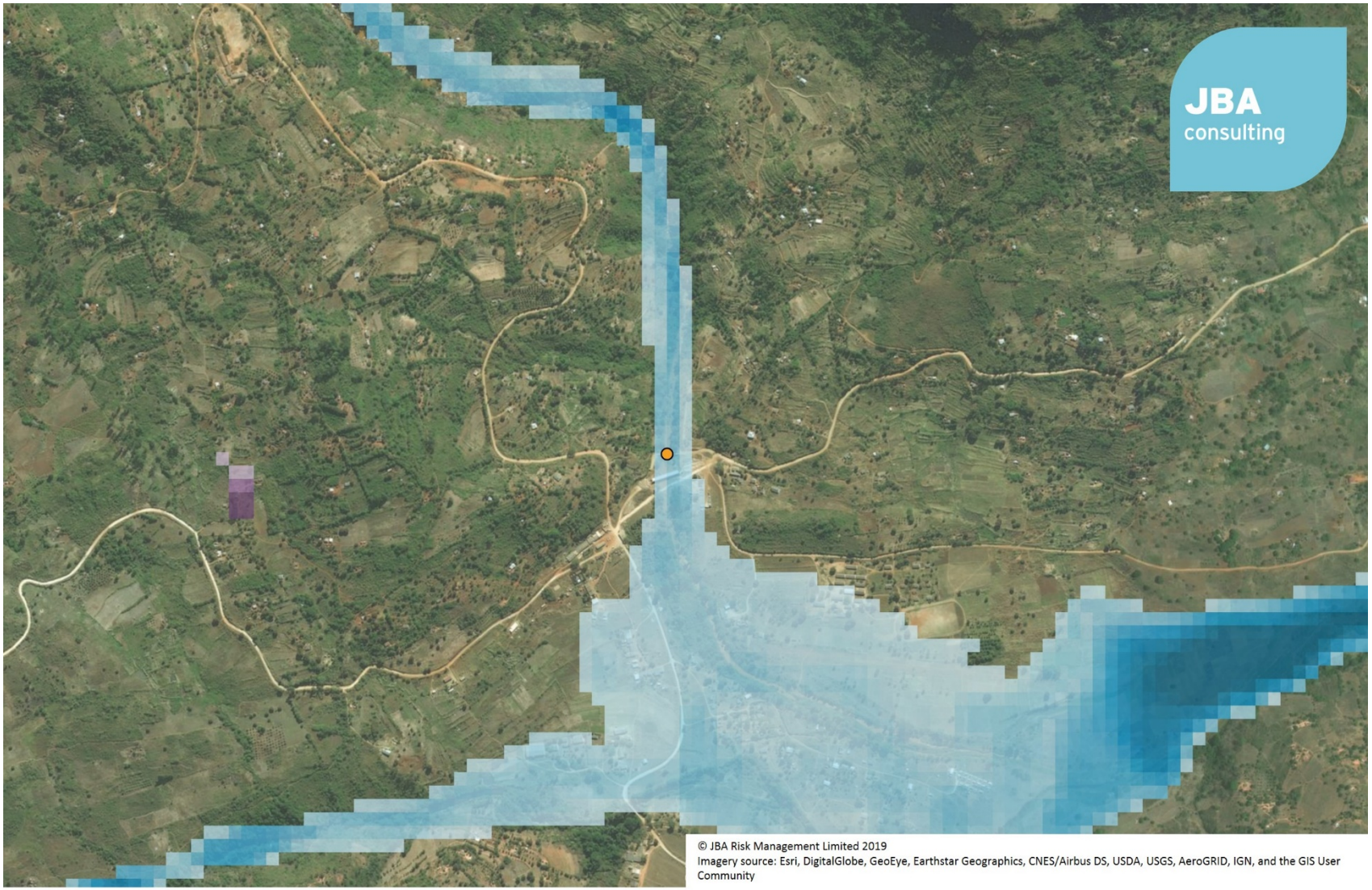
- Data inputs
  - National flood maps (30m river and surface water)
  - Global flood event sets
  - World population 100m grid
  - Generic depth-damage curves for SE Asia
  - Census data on property types



Evaluating risk of present day situation

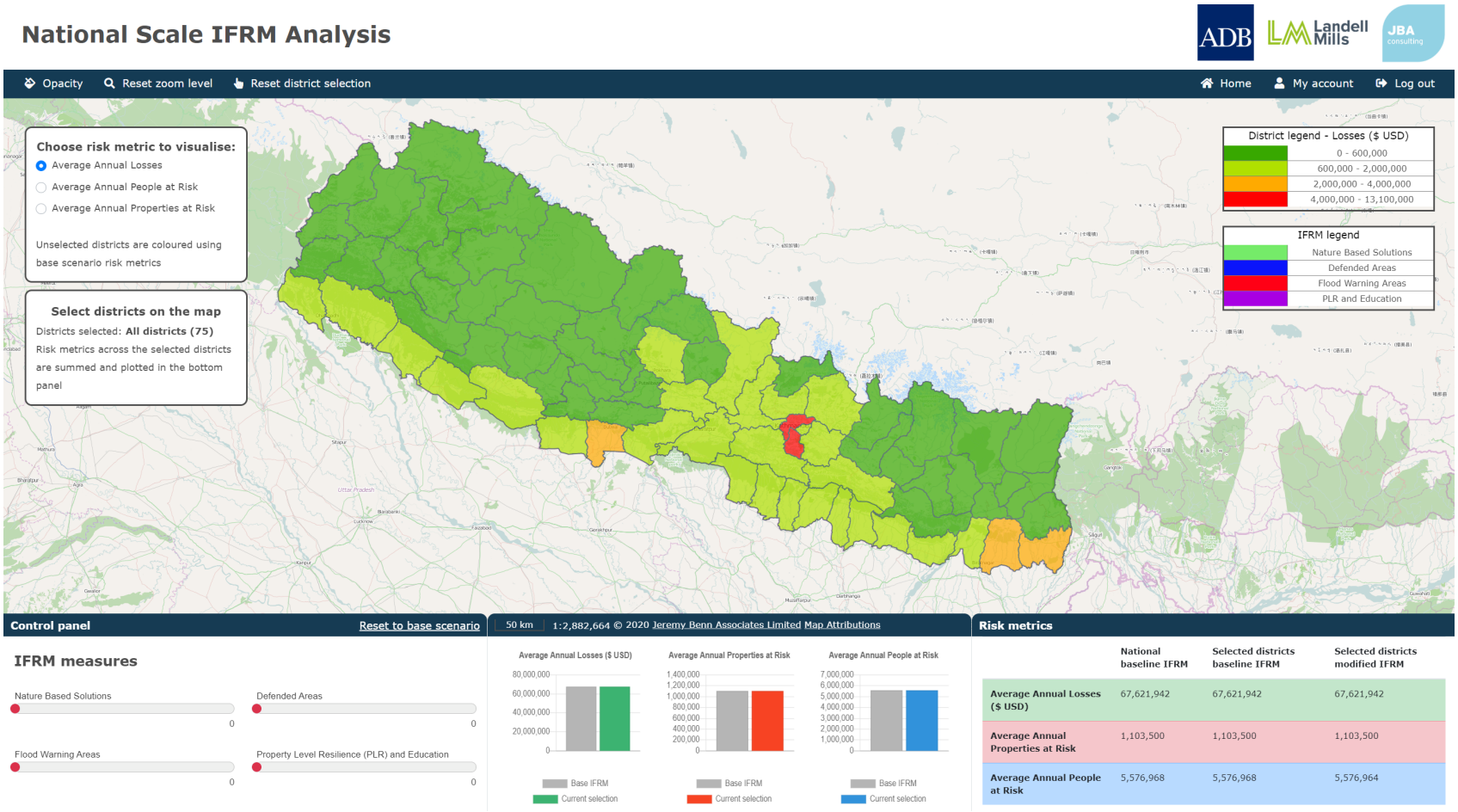
- Steps
  - Simulate event 1
  - Assign the event a return period (and associated map)
  - Interrogate map to identify properties flooded
  - For each property, determine depth of flooding
  - Calculate damage for each property based on depth-damage curve and building type
  - Simulate next event (10,000 in total)
  - Annualise:
    - Average annual losses
    - Average annual people
    - Average annual properties

Evaluating risk of present day situation



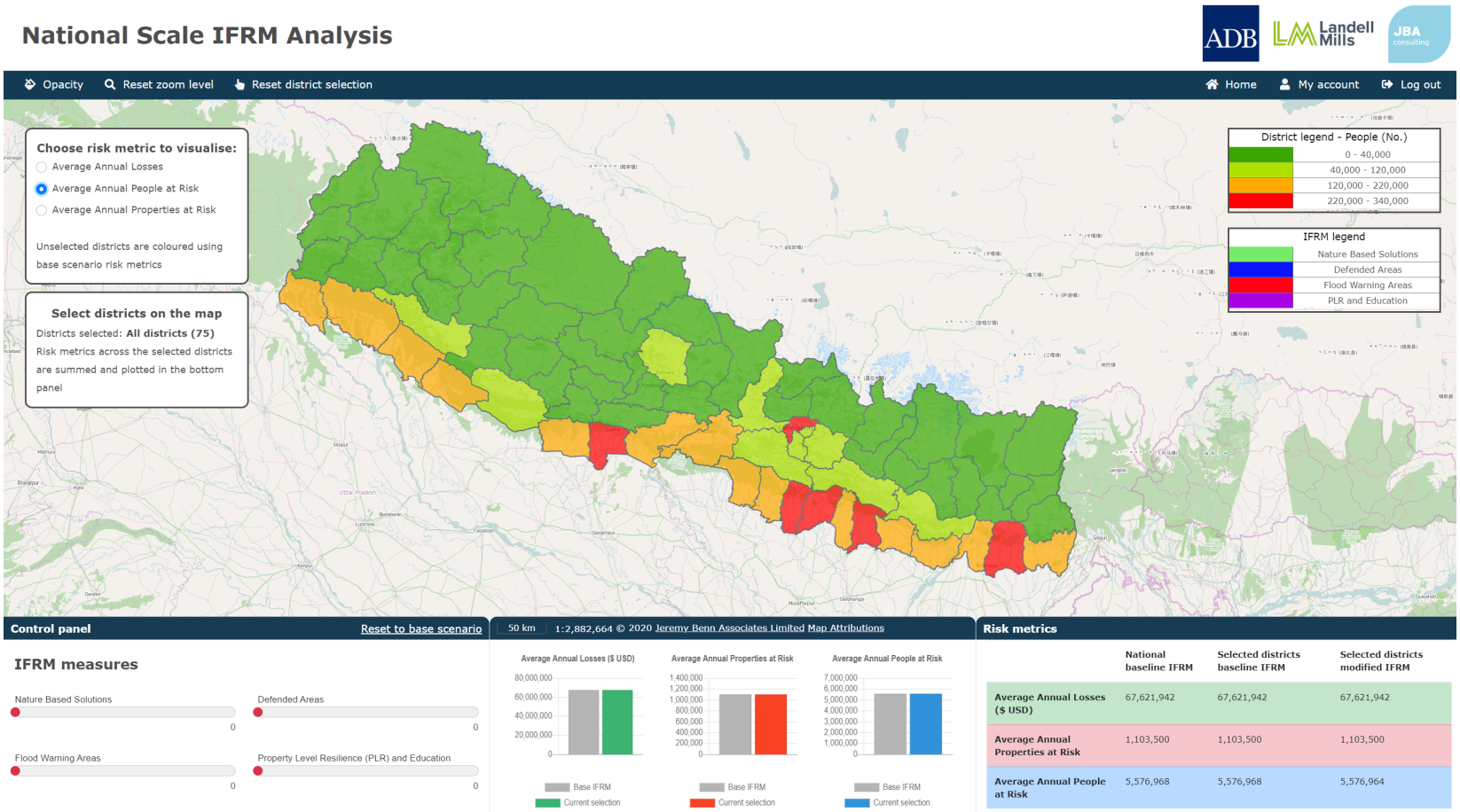
Evaluating risk of present day situation

- Average Annual Losses (Nepal)



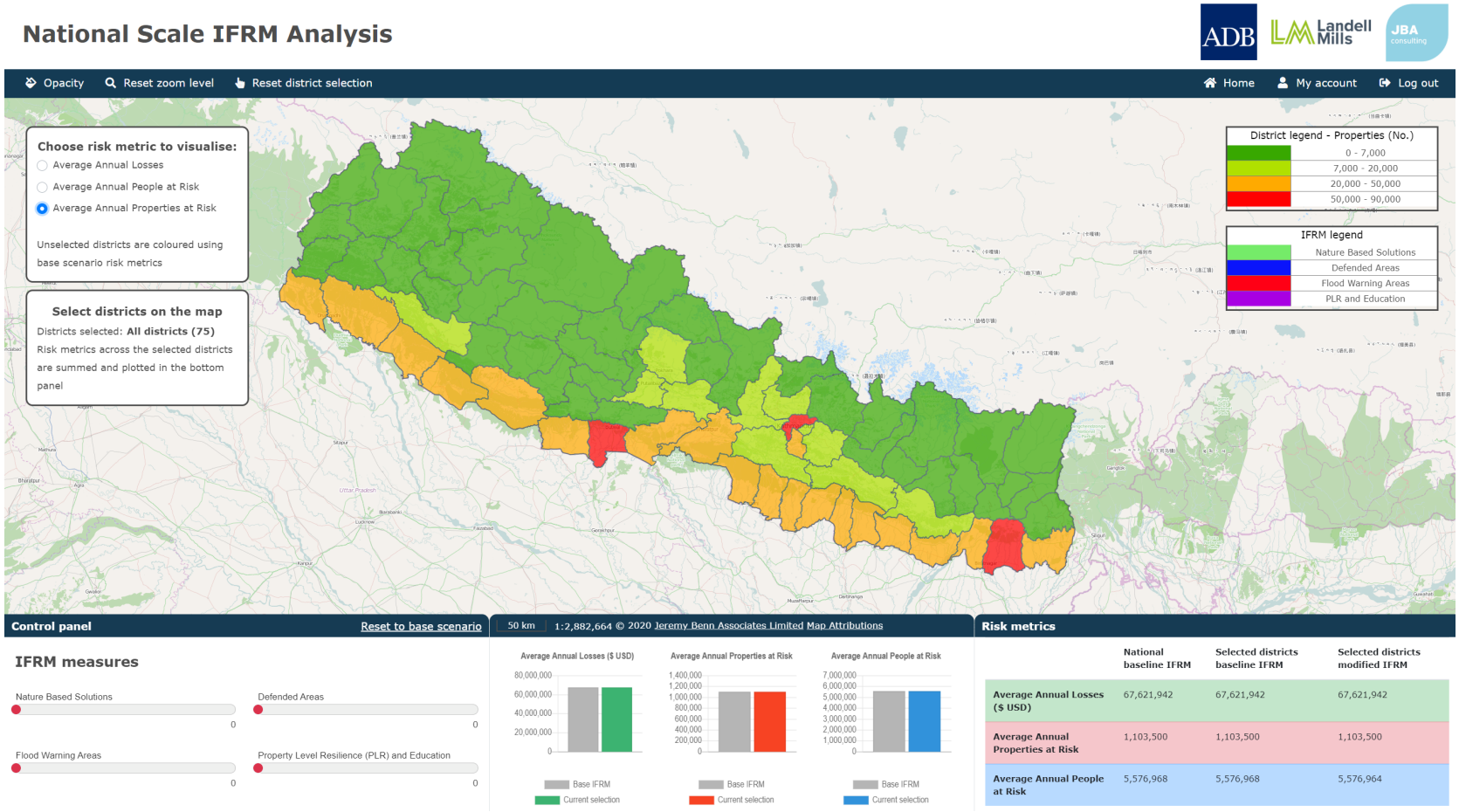
Evaluating risk of present day situation

- Average Annual People at Risk (Nepal)



Evaluating risk of present day situation

- Average Annual Properties at Risk (Nepal)

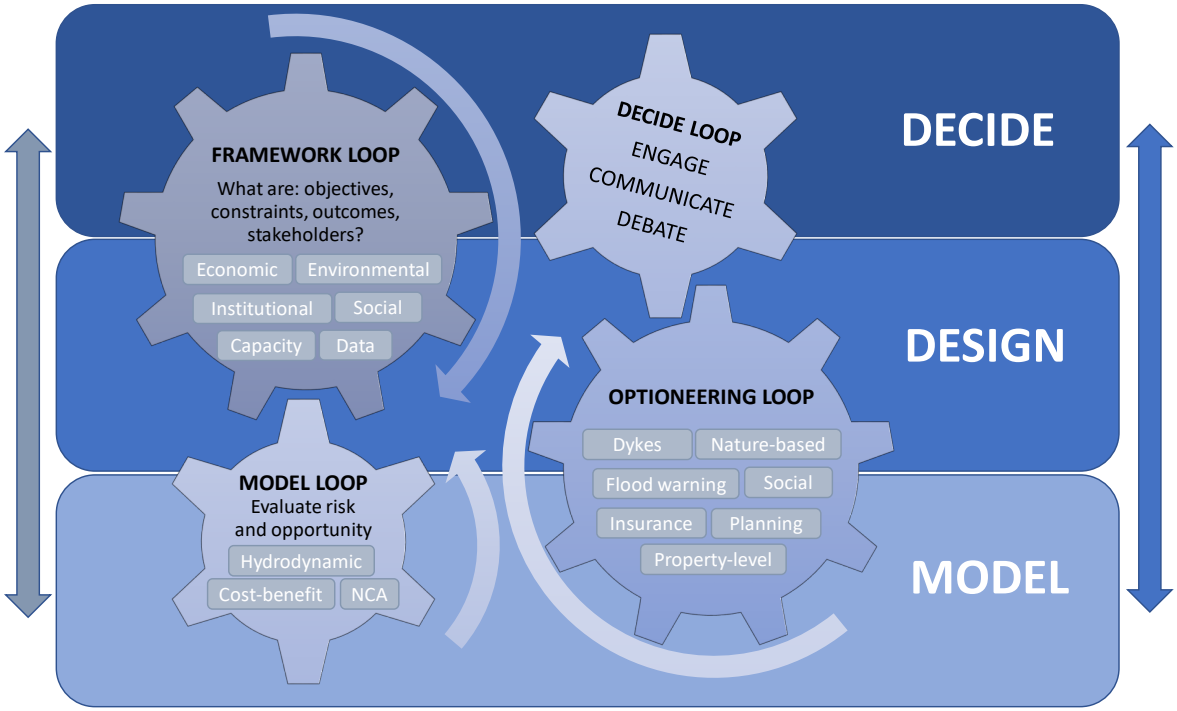


Exploring IFRM opportunities

- NIRA can also be used to identify:
  - Where different IFRM measures might have an impact
  - An indication of the potential scale of that impact
  - An indication of what mix of IFRM solutions might be appropriate
- Parametrisation, rather an detailed modelling
- IFRM types:
  - Property level protection
  - Flood warning
  - Dykes/embankments
  - Nature based solutions

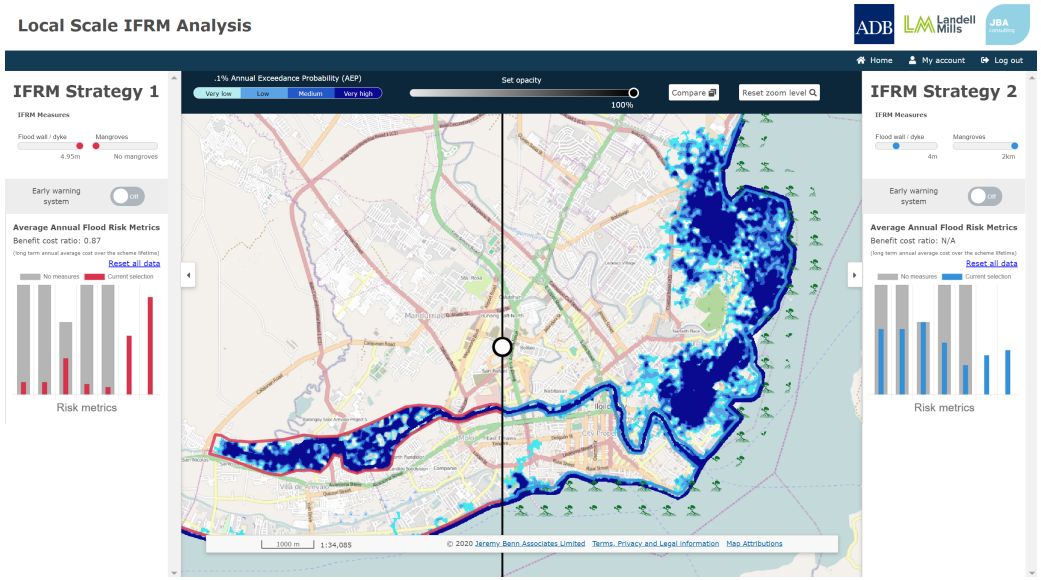
The IFRM process

- Evaluate scale and distribution of risk
- Prioritise further studies and investment focus
- Consider high-level opportunities for IFRM
- Engage, communicate and debate

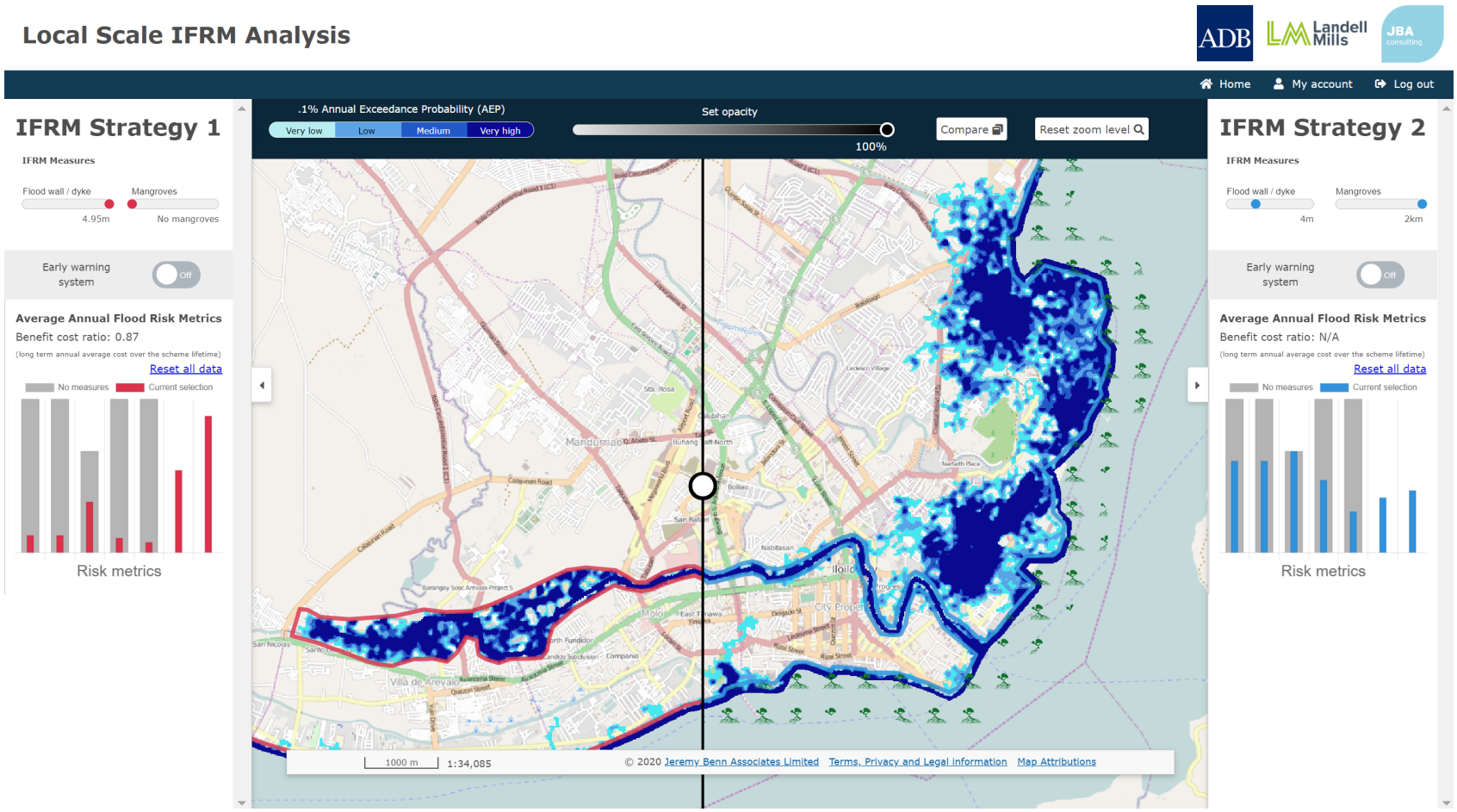


Exercise

- Objective
  - to explore the process of IFRM optioneering
  - To consider the challenges associated with finding an “optimal decision”
  - Many eggs, many baskets, also many stakeholders!



Exercise


Local Scale IFRM Analysis
ADB
Landell Mills
JBA consulting
Home
My account
Log out
IFRM Strategy 1
IFRM Measures
Flood wall / dyke
Mangroves
4.95m
No mangroves
Early warning system
Off
Average Annual Flood Risk Metrics
Benefit cost ratio: 0.87
(long term annual average cost over the scheme lifetime)
Reset all data
No measures
Current selection
Risk metrics
.1% Annual Exceedance Probability (AEP)
Very low
Low
Medium
Very high
Set opacity
100%
Compare
Reset zoom level
IFRM Strategy 2
IFRM Measures
Flood wall / dyke
Mangroves
4m
2km
Early warning system
Off
Average Annual Flood Risk Metrics
Benefit cost ratio: N/A
(long term annual average cost over the scheme lifetime)
Reset all data
No measures
Current selection
Risk metrics
1000 m
1:34,085
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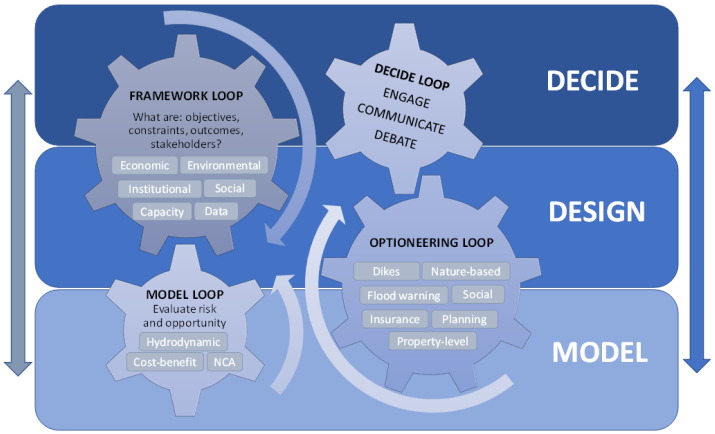
Exercise



- Welcome to Paradise City
  - 2 million people
  - Low-lying coastal plain within active typhoon belt
  - Significant industries of fishing, agriculture and tourism
  - The Port is trade and a commercial hub for the region
  - One large hospital complex where medical services are concentrated
  - The City government has included budget for coastal protection to mitigate flood risk from storm surge.

Exercise

The Stakeholders

Fisherman:

City Government:

Hospital Manager:

Exercise

- Your mission
  - Put your self in the shoes of each stakeholder
  - Find a solution for each that has a BCR great than 1
  - Consider why this solution is best for them
  - Consider where the conflicts

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