

Economic Analysis– Some Preliminary Insights to the Adaptation and Resilience

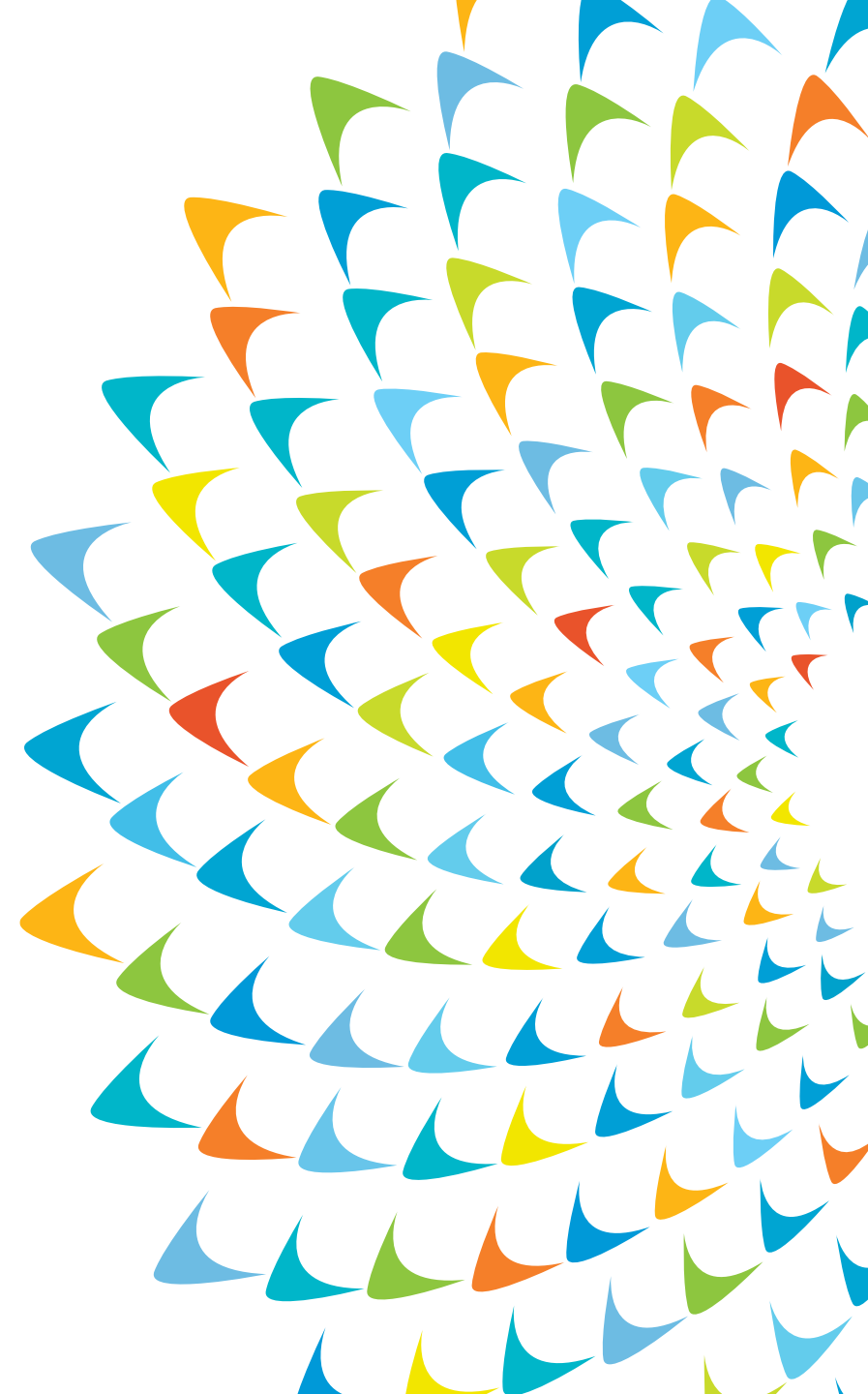
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Outline

1. Background on Economic Analysis

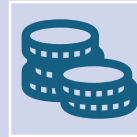
- Why do we do economic analysis?
- What is economic analysis?

2. Economic Analysis of Adaptation projects

- Benefits of adaptation
- Pilot projects (work in progress Type 2B):
 - Transport project in PNG
 - AFNR project in RMI



Why Economic Analysis?



Economic analysis ensures that the country's resources are being used efficiently.



It is a safeguard that the investment benefits the citizens of the country and is not only driven by other motivations.



It can offer a set of tools to help get the right design:

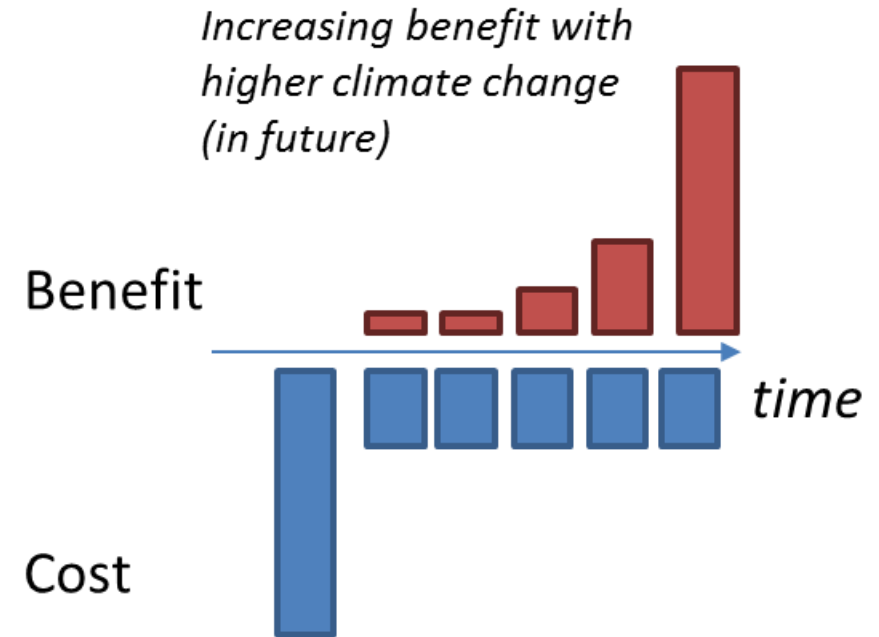
- Rationale
- Alternative
- Scale
- Assumptions



Economic expression of the project “theory of change”.

Economic analysis ensures that the country's resources are being used efficiently

- (i) a project is in line with the development context of a borrowing country and ADB's country partnership strategy (CPS);
- (ii) there is strong rationale for the public sector and ADB to finance the project; and
- (iii) the selected project represents the most efficient or least-cost option among all the feasible alternatives for achieving the intended project benefits and, when benefit can be valued, it will generate a positive economic net present value ENPV ($\text{Benefits}_{pV} - \text{Costs}_{pV} > 0$) at 9% discount rate or $\text{EIRR} > 9\%$ at $\text{ENPV} = 0$



$$\text{ENPV} = \text{Benefits}_{pV} - \text{Costs}_{pV}$$
$$\text{ENPV} > 0 \text{ at } \text{EIRR} = 9\%$$
$$\text{EIRR} > 9\% \text{ at } \text{ENPV} = 0$$

Adaptation projects

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graph TD; A[Adaptation projects] --> B[Type 1: Climate proofing  
(design is adjusted to  
incorporate climate  
adaptation measures)]; A --> C[Type 2: Projects supporting  
climate resilience outcomes]; C --> D[Type 2a: at least one of the  
project's outputs should  
explicitly seek to reduce  
vulnerability to climate  
change]; C --> E[Type 2b: all outputs should  
explicitly seek to reduce the  
impact of climate change];
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Type 1: Climate proofing
(design is adjusted to
incorporate climate
adaptation measures)

Type 2: Projects supporting
climate resilience outcomes

Type 2a: at least one of the
project's outputs should
explicitly seek to reduce
vulnerability to climate
change

Type 2b: all outputs should
explicitly seek to reduce the
impact of climate change

There is a strong case for many types of climate proofing:

- **'no-regrets'** net positive economic benefits regardless of the nature and extent of climate change, do not involve hard trade-offs (reducing leakage from water utility infrastructure).
- **'low-regret'** relatively low cost and provide relatively large benefits (the avoided expected costs from not climate proofing) under future climate change (additional water storage facilities)
- **'win-win'** not only reduces climate risks to the project, but also has other social, environmental, or economic benefits (land use and planning)

Most developing countries have many no-regret opportunities that represent both adaptation needs and development needs that exist even without climate change.

More examples: [ClimateXChange](#)

Road project in PNG (type 2B): Mountainous Road Improvement and Resilience Project



“without project” (baseline scenario-no adaptation case)

Due to river flooding, slope failures, road and drainage damage

- Disruption to transport users (lower speed, rerouting traffic, increases congestion and GHG emissions).
- Repair work from frequent disasters (including GHG emissions)

“with project” (adaptation)

avoidance of:

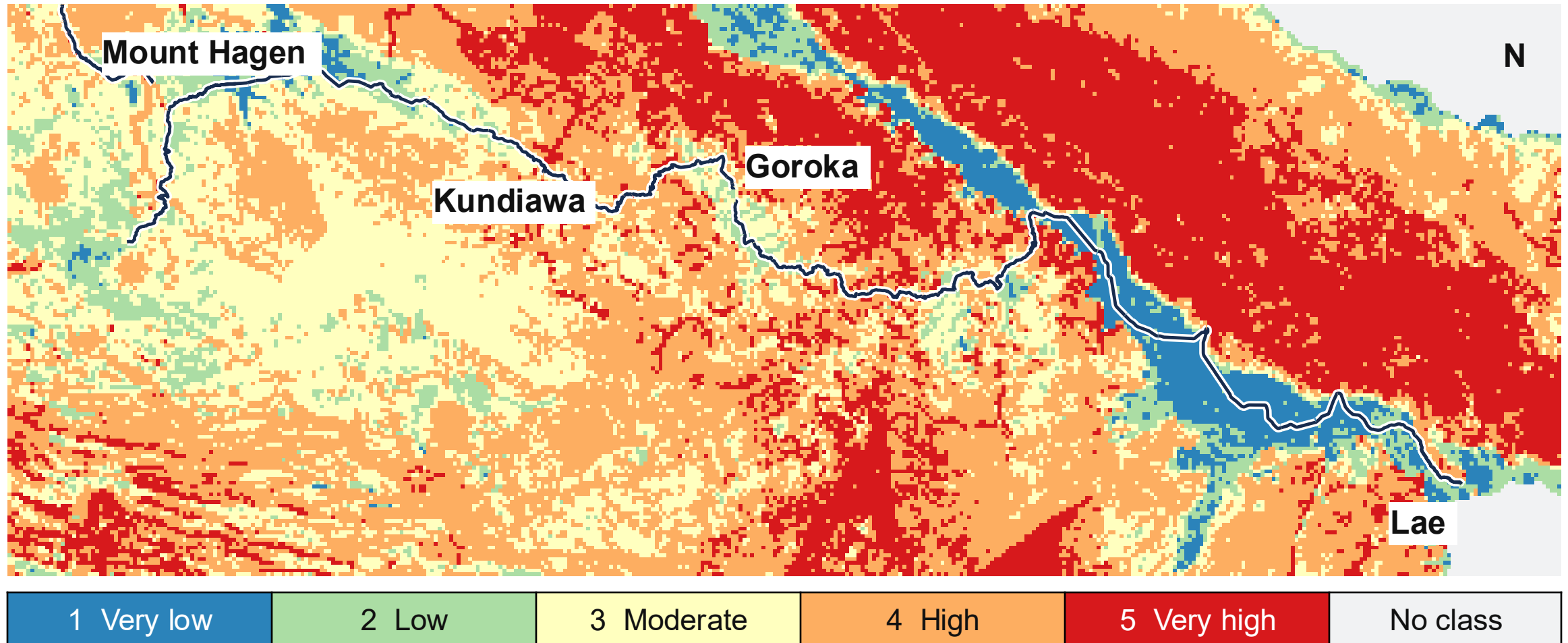
- higher cost with reactive restoration
- construction of temporary road formation in the event of failure
- increased maintenance cost with temporary road formation
- restriction on vehicle movement with road failure
- reduced speeds
- loss of connectivity

Data and tools for Economic Analysis of Adaptation: PNG road project

Data and tools	Source
Climate change scenario	Climate Risk Assessment (CRA)
Flood map	Development Data Partnership (DDP) - JBA
Land slide map <ul style="list-style-type: none">• Rainfall-induced landslides• Seismic-induced landslides	Risk Explorer Global landslide susceptibility map
List of satellite data for transport	EREA transport checklist
Road damage function	Global flood depth-damage functions: Methodology and the database with guidelines
Excel-based tool	World Bank Risk Stress Test Tool

2. Landslides: susceptibility along the highway

NASA susceptibility classes help prioritize slope investigations.



Source: NASA (2020)

Marshall Islands: an atoll nation on the front line of climate change

Case study for the CCA economic analysis guidance

Why the RMI is the hardest test case for adaptation economics

29 + 5

atolls + islands, central Pacific

~36,000

people (2025); shrinking population

53%

of GDP is overseas aid

~1.5 m

lagoon-side berm vs ~2.7 m ocean side

0.5–1.0 m

SLR threshold — flood extents jump

0.56–0.9 m

SLR at Majuro by 2100 (IPCC AR6)

Hazards: swell, typhoons, king-tide flooding, drought, heat. 34.8% of under-fives stunted.

The project

\$14.5m grant · 2027–2032 · ADB AFNR

Type 2B — 100% adaptation

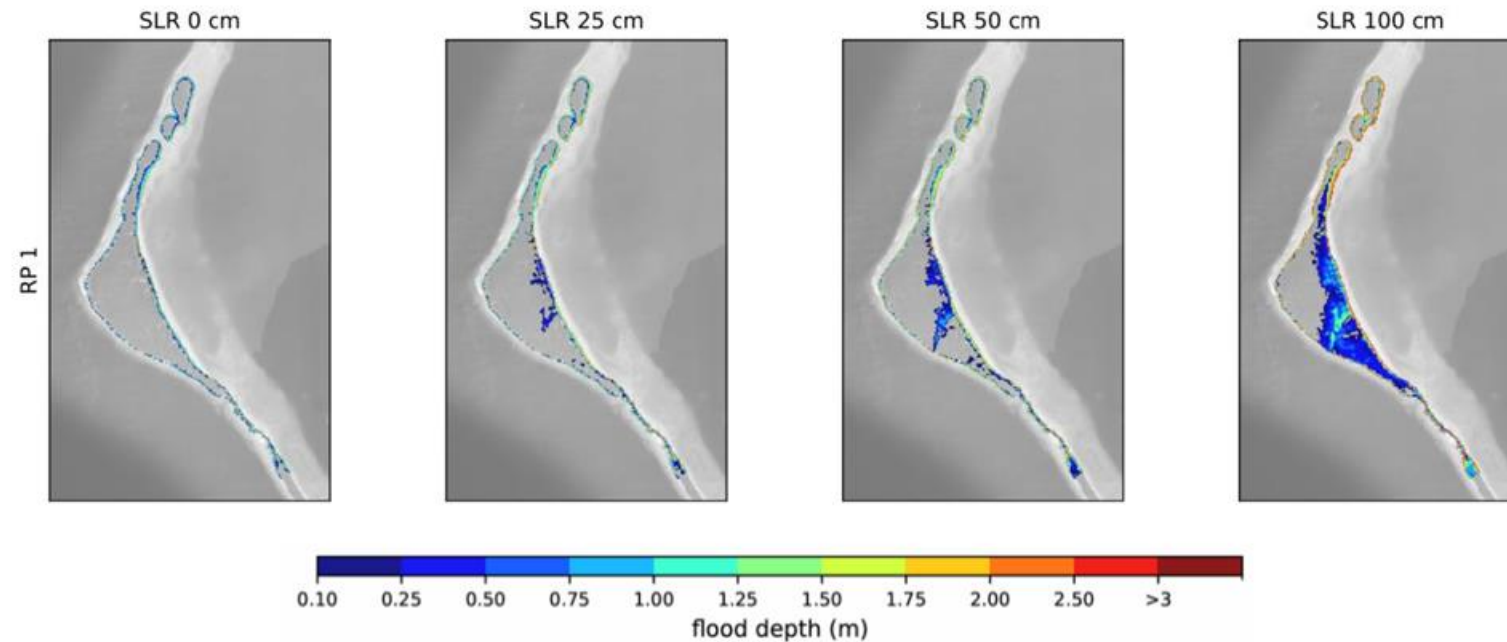
Three atolls: Arno, Jaluit, Mili

Output 1 — planning tools

- Output 2 — coastal protection
- Output 3 — food security
- Outcome: community + ecosystem resilience

Flood hazard mapping with climate scenarios built in from the start

Deltares flood risk mapping — the CRA that feeds the CBA



Arno: 1-in-1-year lagoon flooding at 0, 25, 50, 100 cm SLR.

Threshold, not a slope

Flood extents jump between 0.5–1.0 m SLR.

Lagoon: the new main risk

Under SLR, lagoon flooding rivals or exceeds ocean.

Events → chronic exposure

At 1–2 m SLR, RP1/10/50 look alike — chronic, not event.

How the maps were built

6 flood drivers

(ocean/typhoon/lagoon/rain/inundation)

Climate: SLR 0/0.25/0.5/1/2 m × SSP1-2.6/2-4.5/5-8.5

RPs: 1, 10, 50 yr — ~2,000 maps across 3 atolls

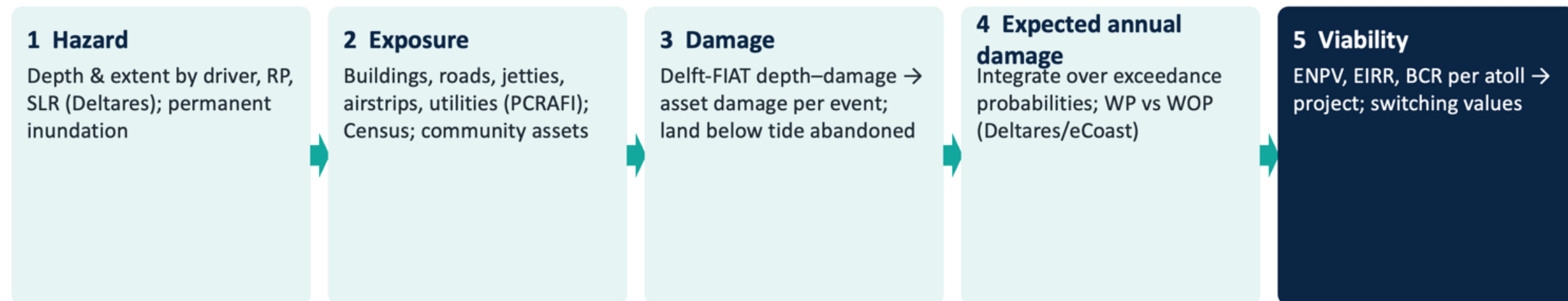
Chain: TCWiSE → Delft3D → XBeach → SFINCS → Delft-FIAT

Data: DeltaDTM + UAV/GNSS + Majuro tide + ERA5 + PCRAFI

Verified: community flood maps (2026 consultations)

From hazard maps to economic analysis: the RMI approach

CBA per atoll, following ADB Guidelines (2017), IFRM Guide (2022), draft CCA guidance



Beyond avoided flood damage

- Land loss valued via ecosystem services
- Output 3 — household/plot models per atoll
- Co-benefits counted, double-counting policed
- CEA ranks alternative designs at the same site

Key parameters (draft, to be locked at appraisal)

Unit of analysis	One CBA model per atoll (Arno, Mili, Jaluit); aggregated to project, disaggregated by output
Discount rate	6% real (tests at 3% and 9%; switching values reported)
Horizon	2027–2046 base with residual values; 30-year sensitivity reflecting coastal asset life
Prices	2026 US\$; border-price numeraire; SCF 0.93, SWRF 0.83 (provisional, RMI 2018)
Climate cases	Present day + Deltares SLR increments by SSP; no-climate-change and upper-SSP sensitivities
Other sensitivities	Cost +10–30%, delays, benefits –10–30%, NBS survival and maintenance failure, combined worst case

What the RMI case says about doing adaptation economics well

Lessons for prioritising and sequencing adaptation investments

Rule 3

Design the risk assessment for the economics

Scope the CRA to produce CBA inputs — retrofitting is costlier.

Rules 2–3

One set of climate scenarios, end to end

SLR × SSP scenarios used identically for design and appraisal.

Prioritisation

Chronic risk changes the prioritisation logic

Chronic risk → benefits are avoided land loss; WOP includes abandonment.

Rule 4

Long-lived benefits vs short horizons

30–50-yr asset life needs longer horizon; 6% rate needs justification. Report switching values.

Rule 1

Count co-benefits, police double-counting

Count co-benefits; value protection only through modelled avoided damage — never twice.

Trade-offs

Data and affordability decide what is credible

LiDAR + local surveys are worth the cost. Outer-atoll O&M is the affordability risk.

For the room: Same climate scenario for design and appraisal? And how do you frame WOP when risk becomes chronic?