SESSION 2.1:

Role of climate and disaster risk assessment in investment decisions

Regional Workshop on Climate and Disaster Risk-Informed Investments

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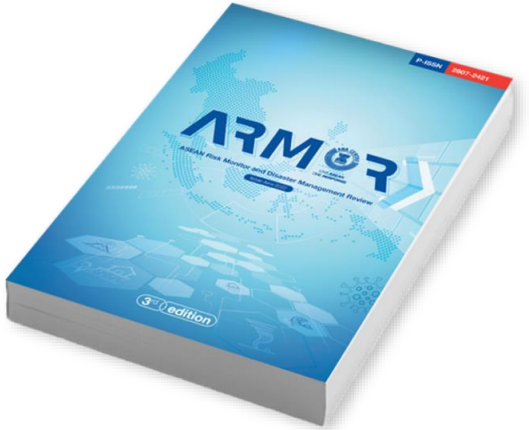
June 2023

Tropical Cyclone Wind	49%	of ASEAN population exposed	310 million people USD 3.2 trillion economic exposure
Earthquake	57%	of ASEAN population exposed	359 million people USD 2.9 trillion economic exposure
Tsunami	1%	of ASEAN population exposed	5 million people USD 87 billion economic exposure
Flood	23%	of ASEAN population exposed	146 million people USD 7.6 trillion economic exposure
Volcano	38%	of ASEAN population exposed	238 million people USD 2 trillion economic exposure
Landslide	3%	of ASEAN population exposed	17 million people USD 332 billion economic exposure
Wildfire	21%	of ASEAN population exposed	134 million people USD 1.8 trillion economic exposure

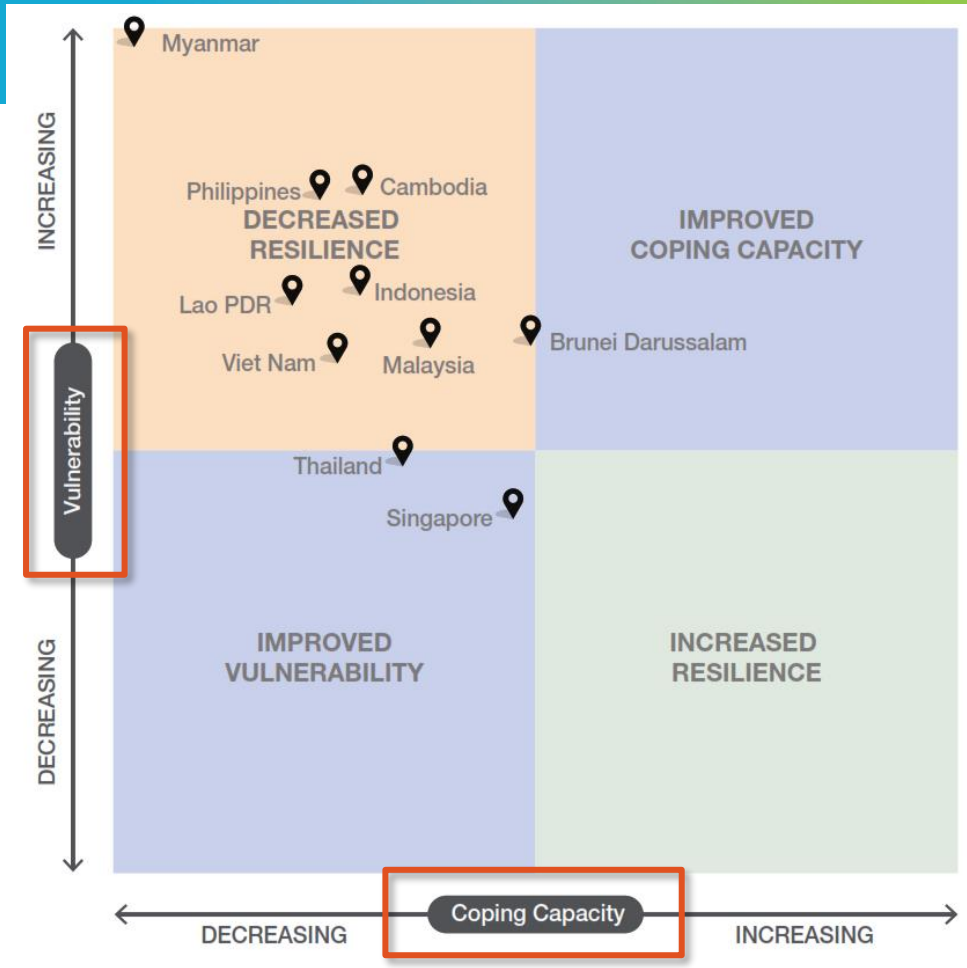
ASEAN Risk Monitor and Disaster Management Review (ARMOR)

(June 2022)



A summary of the ASEAN region's population and economic exposure to natural hazards shows that:

- earthquakes, tropical cyclones, and volcanoes pose the highest threat to its population.
- floods—the most frequent disaster in the region, pose the highest threat to the economy.



A comparison of ASEAN RISK assessments between 2019 and 2022 shows a general decrease in resilience in the ASEAN region.

Contents

- How to assess risks?
- Upstream- versus project risk assessment
- Dealing with uncertainty
- Dealing with system-level dependencies
- Dealing with the dynamic nature of risk

MentiMeter questions

Code: 5265 8243

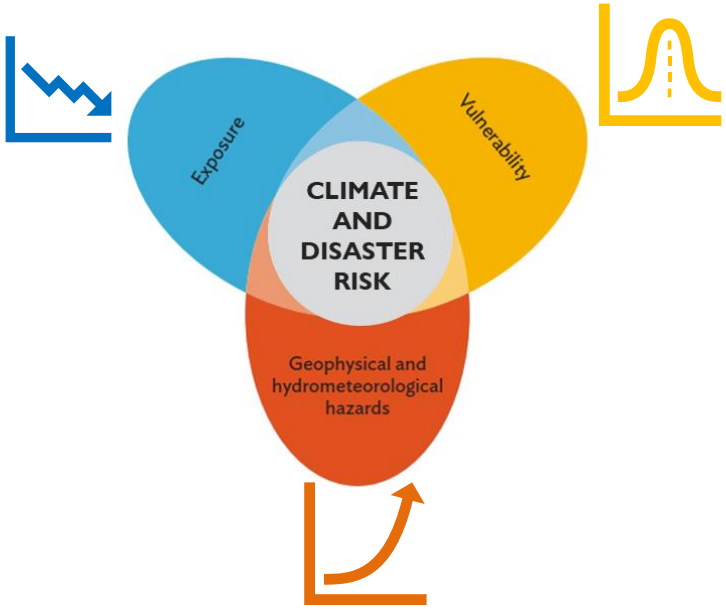
a. What is the purpose of performing a Climate and Disaster Risk Assessment? To inform:

a) investment and adaptation planning
b) scoping and siting of a project
c) design of an investment project
d) all (answer a, b and c)

What is Risk? A function of three dynamic factors

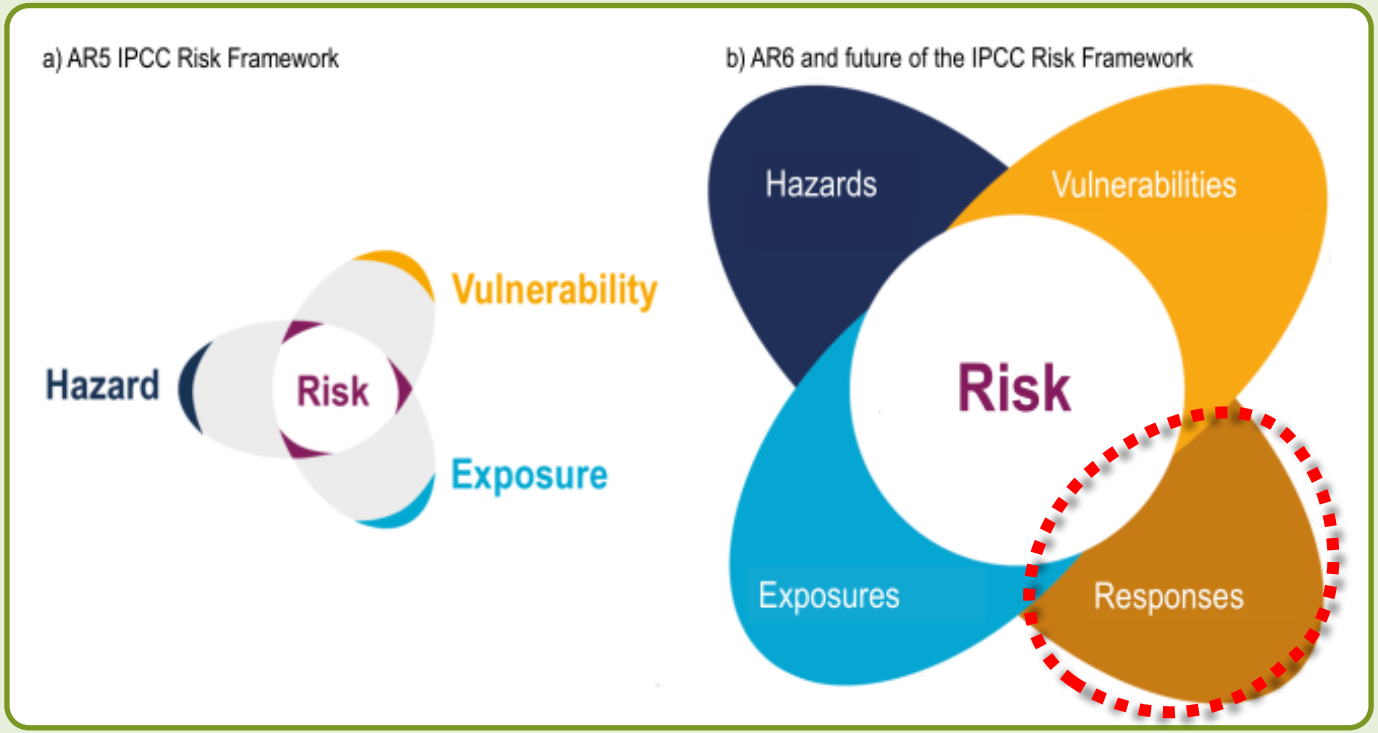
- Hazard:
  - physical phenomena that can cause impact on people and property.
- Exposure:
  - location of people, properties and activities in relation to hazards.
- Vulnerability:
  - Susceptibility to harm from a hazard (resilience).

- Risk:
  - potential losses triggered by natural hazards over exposed elements.

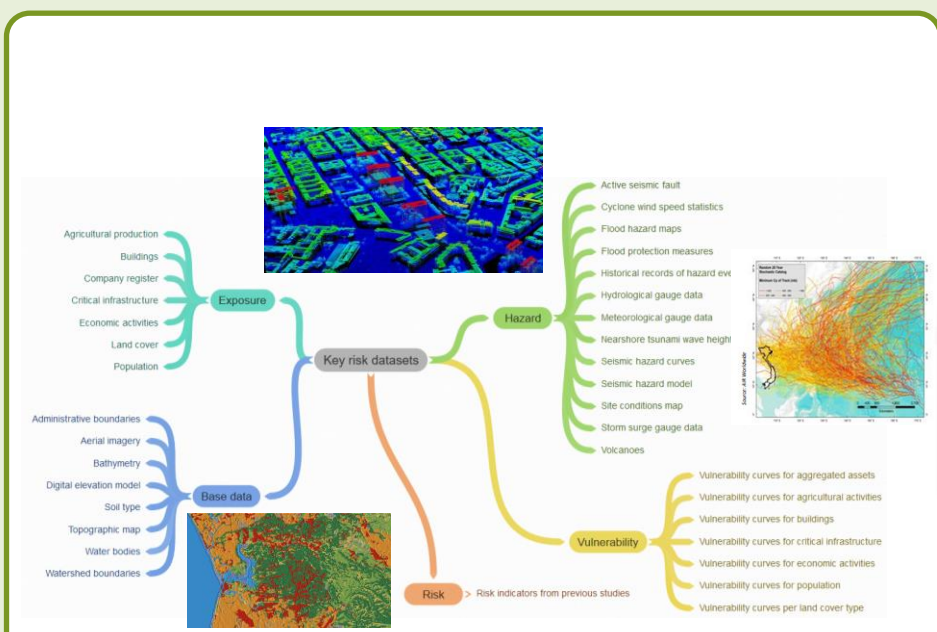


Risk is dynamic

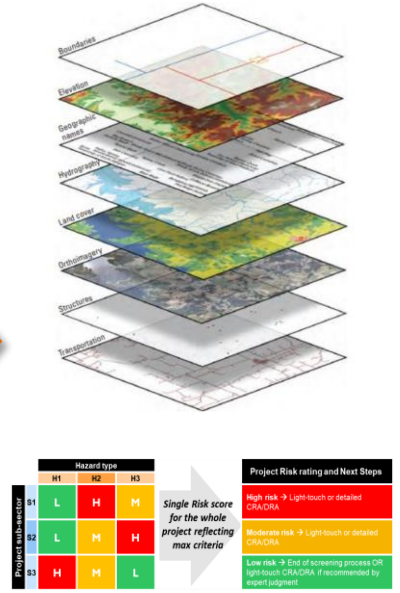
Latest IPCC report: responses also part of risk framework



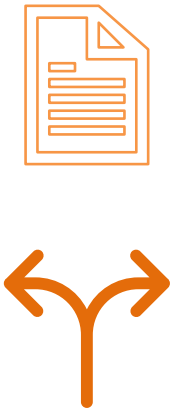
How to assess risks



Risk datasets

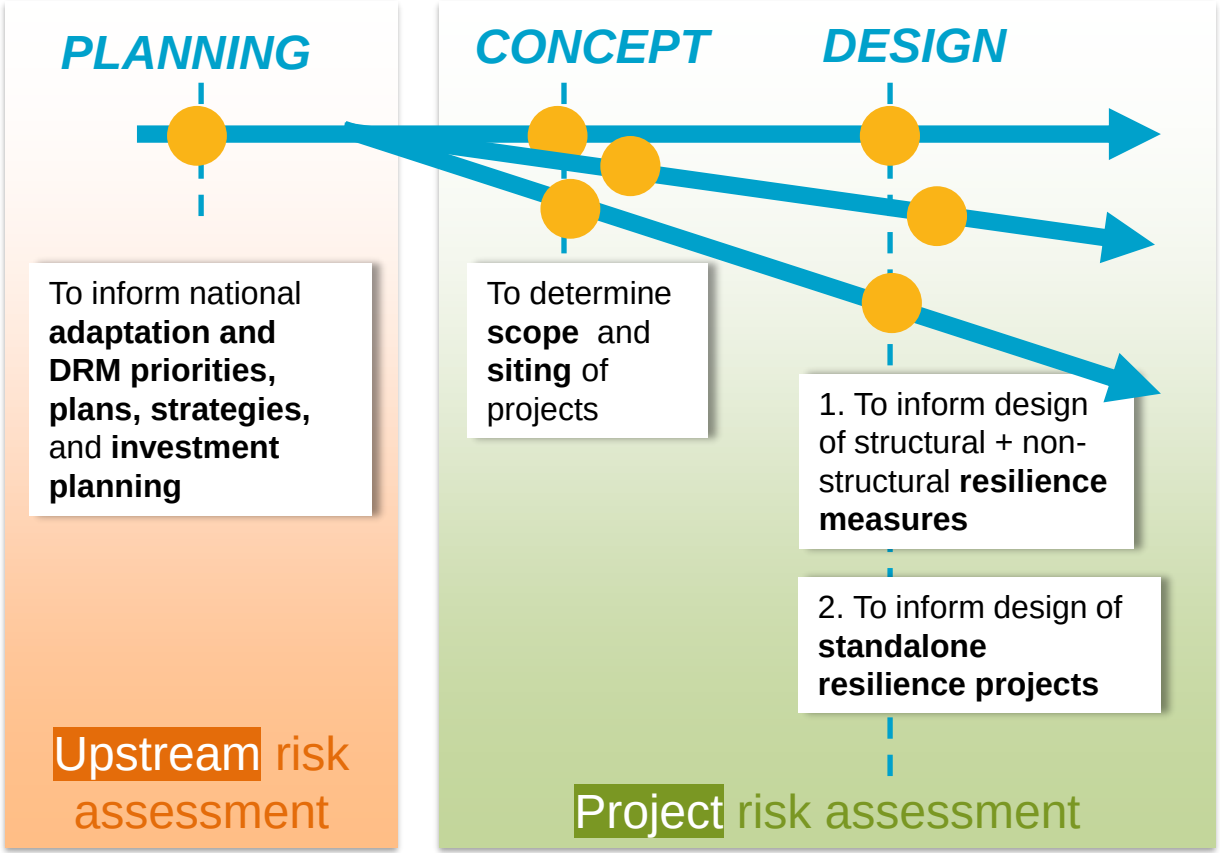


Risk calculation



Report / decisions

What type of risk assessment?



Different flavours depending on stage in project cycle

Upstream vs. project-level risk assessment

- Differences
  - 1 Scope and scale
  - 2 Timeframe
  - 3 Decision making
  - 4 Granularity (level of detail)

- Examples:
  - Bangladesh;
  - Uzbekistan – presented earlier
  - Kazakhstan; Waste Water Treatment

Upstream vs. project-level risk assessment

> 1. Scope and Scale:
  - **Upstream:** broader risks and opportunities associated with climate change and disasters across an entire **sector or multiple sectors**, and across a larger region, or **national-level**.
  - **Project:** project vulnerabilities, exposure to climate hazards, and potential **impacts on project objectives**, design, construction, and operation.

> 2. Timeframe:
  - **Upstream:** potential impacts over **decades**. It involves projecting future climate risks, and adapting investment strategies to capitalize on climate-related **opportunities over the long term**.
  - **Project:** specific timeframe of a **project's lifecycle**. It assesses **short to medium-term risks** and incorporates climate projections and disaster risk considerations into project planning, design, and implementation stages.

Upstream vs. project-level risk assessment

- 3. Decision-Making:
  - **Upstream:** **guides high-level** decision-making processes, such as setting climate-related investment **priorities**, allocating resources
  - **Project:** decisions on project design, **site selection, engineering considerations, risk management measures**, and adaptation strategies.

- 4. Granularity:
  - **Upstream:** higher level of abstraction, focusing on broad risk categories, **geographical regions, and sectors**. It may involve utilizing climate risk indices, conducting sectoral vulnerability assessments, and evaluating **systemic risks**.
  - **Project:** **site-specific** vulnerability assessments, considering localized climate projections, evaluating exposure to specific hazards, and developing project-specific risk management plans.

Upstream Risk Assessment: Bangladesh

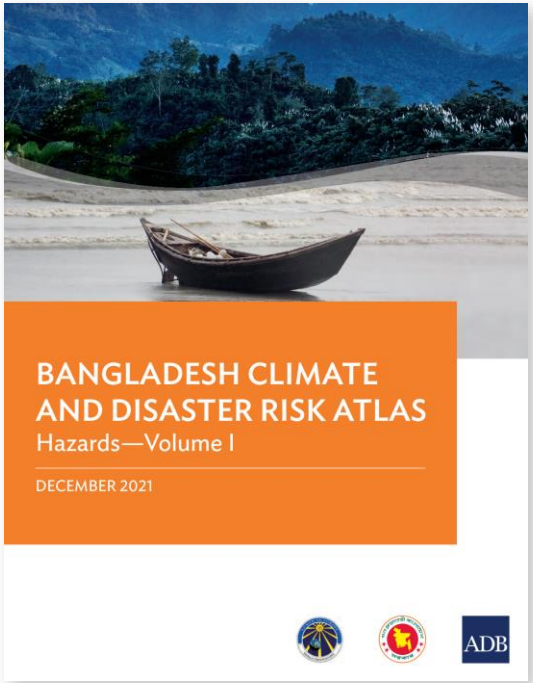
- Bangladesh Climate and Disaster Risk Atlas:
- Hazards—Volume I
- Exposures, Vulnerabilities, and Risks—Volume II

Conceptual Relationship of Components of Disaster Risk

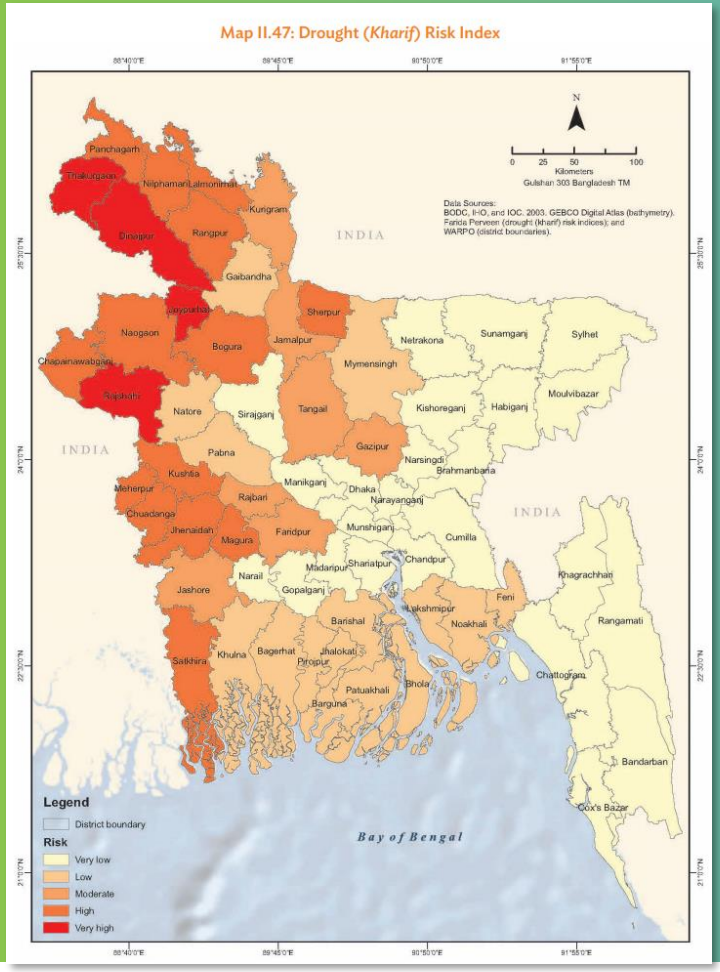
This study explored the relationship, risk (R) $\backsimeq \int$ [Hazard (H), Exposure (E), and Vulnerability (V)]. Various formulae were tested and the resulting maps arising from different calculations were compared against the true conditions on the ground. The risk indexing formula that best reflects true ground conditions is

$$R = H \times (0.7E + 0.3V)$$

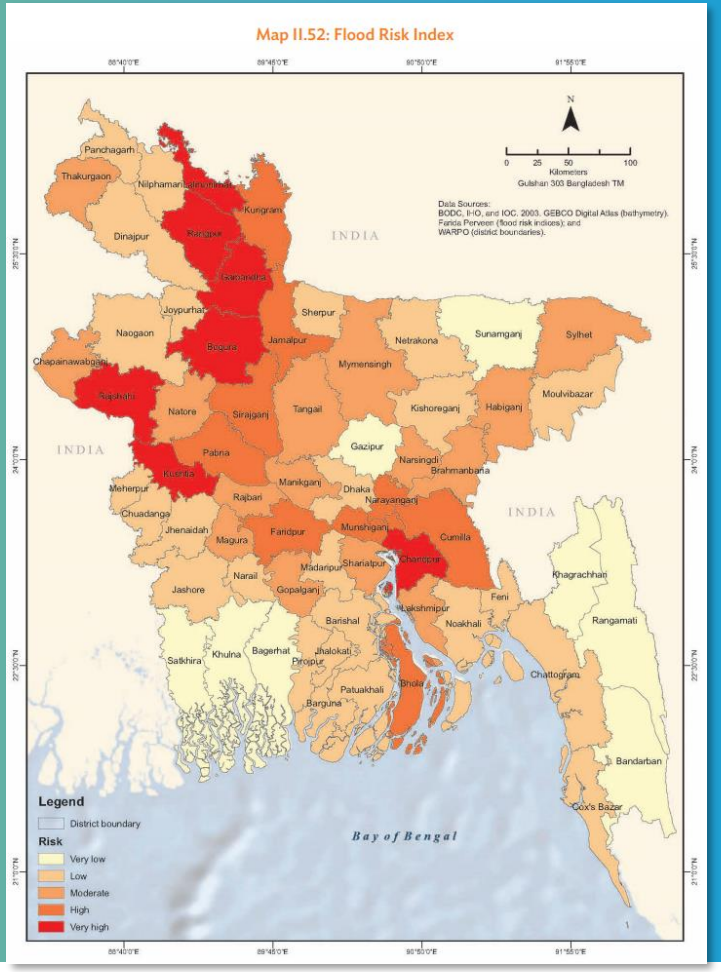
where R = risk, H = hazard, E = exposure, and V = vulnerability.



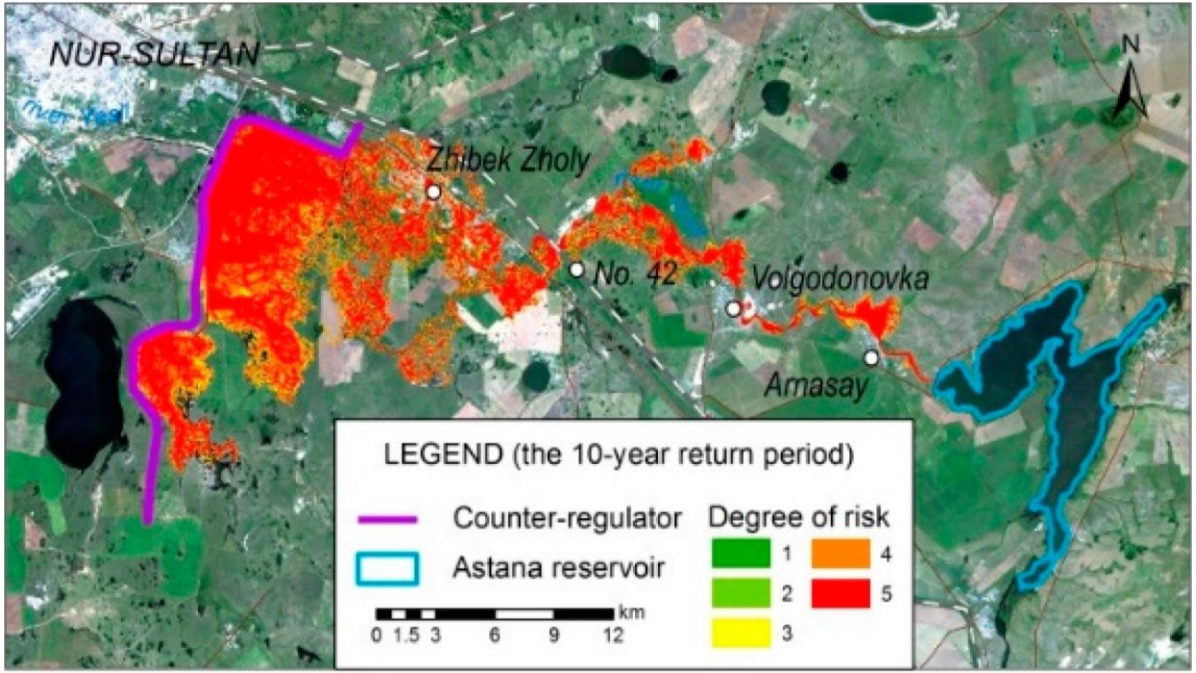
Map II.47: Drought (*Kharif*) Risk Index



Map II.52: Flood Risk Index



Project Risk Assessment (example Kazakhstan)



Source: ADB. 2021. Climate Risk Assessment: Nur-Sultan: Kazakhstan Urban Infrastructure Modernization Program and Finance Facility

- Hazard map produced from the 10-year return period flow hydrograph.
- Location: Nur Sultan
- Method: Hydraulic modeling of Climate impacts for Yesil (Ishim) River in Kazakhstan

Detailed hazard modeling was deemed necessary

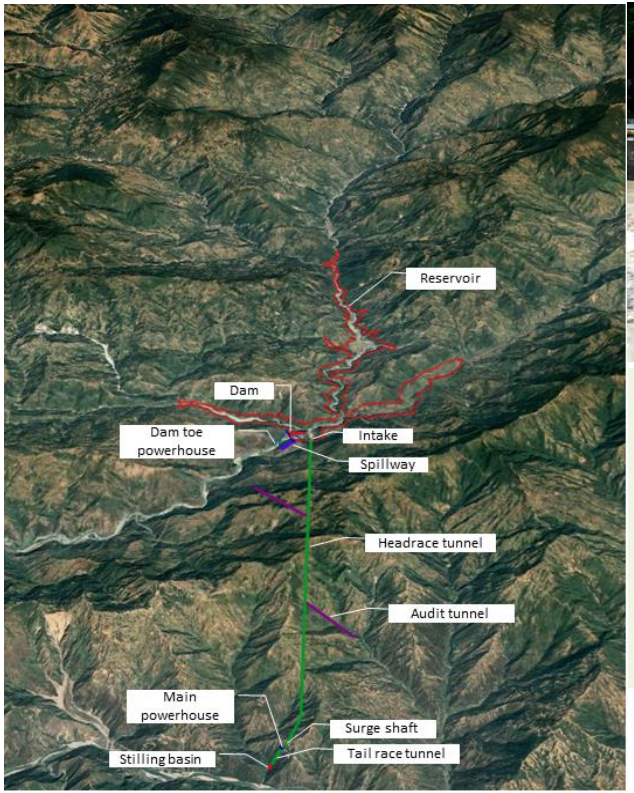
Project risk assessments: level of detail

> If the project

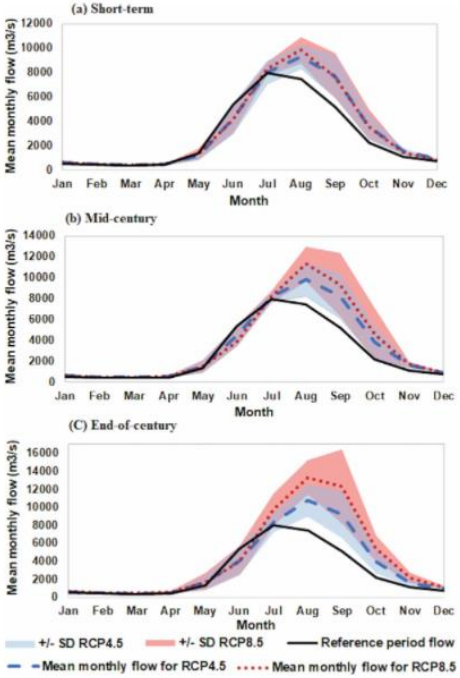
1. .. has activities in a sector which are typically **sensitive** to climate (e.g. water supply sector)
2. … is a relatively **large** project in terms of **budget**
3. … has a high **design life**
4. … has a high risk for **lock-in** (meaning alteration is difficult or costs are high). *For example: degree of lock-in for a major new road or bridge which will enable urban development in a previously inaccessible area is high.*
5. … a high level of **precaution** is warranted. *For example: the failure of flood defences may lead to severe and widespread damage and socio-economic impacts*

Detailed risk assessments are required

Project Risk Assessment (example Nepal)



- Multi-Hazard (erosion, landslides, glacial lake outbursts, flooding)
- Hydrological modeling



Source: ADB / FutureWater. 2022. Climate Risk Assessment: Dudhkoshi HEP, Nepal

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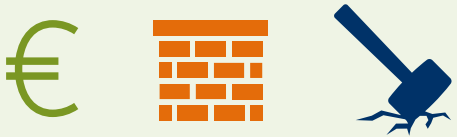
b. When making decisions based on risk assessment, which of the following statements best reflects the role of uncertainties?

a) Uncertainties in climate change are too high: no effective decision-making is possible
b) Uncertainties should be minimized by relying solely on scientific predictions and models.
c) Uncertainties should be acknowledged and incorporated into decision-making processes.
d) Uncertainties are irrelevant and do not impact the decision-making process.

Considering Uncertainty: why it is important?

- Projects: **contingency measures, selecting low-cost or non-regret measures**
- Investment planning: **flexible and adaptive policies**
  - better equipped to accommodate changing conditions, emerging scientific knowledge, and evolving societal needs.

- Overall this assures that: decisions are **robust,** meaning effective under all (or most) plausible climate change scenarios.
- Minimizes the costs on the long-term



Considering Uncertainty: why it is important?

Not all CCA/ DRM solutions are high-cost, they may simply require **different approaches and improved planning.**

‘No-regrets/ low-regrets actions’ prioritize activities which address **existing climate/ disaster risks** while also providing future benefits.

Low-cost solutions

Low-regrets solutions

e.g., more effective infrastructure siting, broadening beneficiary catchments, contingency planning, incorporating flexibility for future upgrade, local work-force capacity building.

Considering Uncertainty: why it is important?

- Enhanced public understanding: Communicating the uncertainties associated with climate change is essential for building public trust and fostering informed decision-making.

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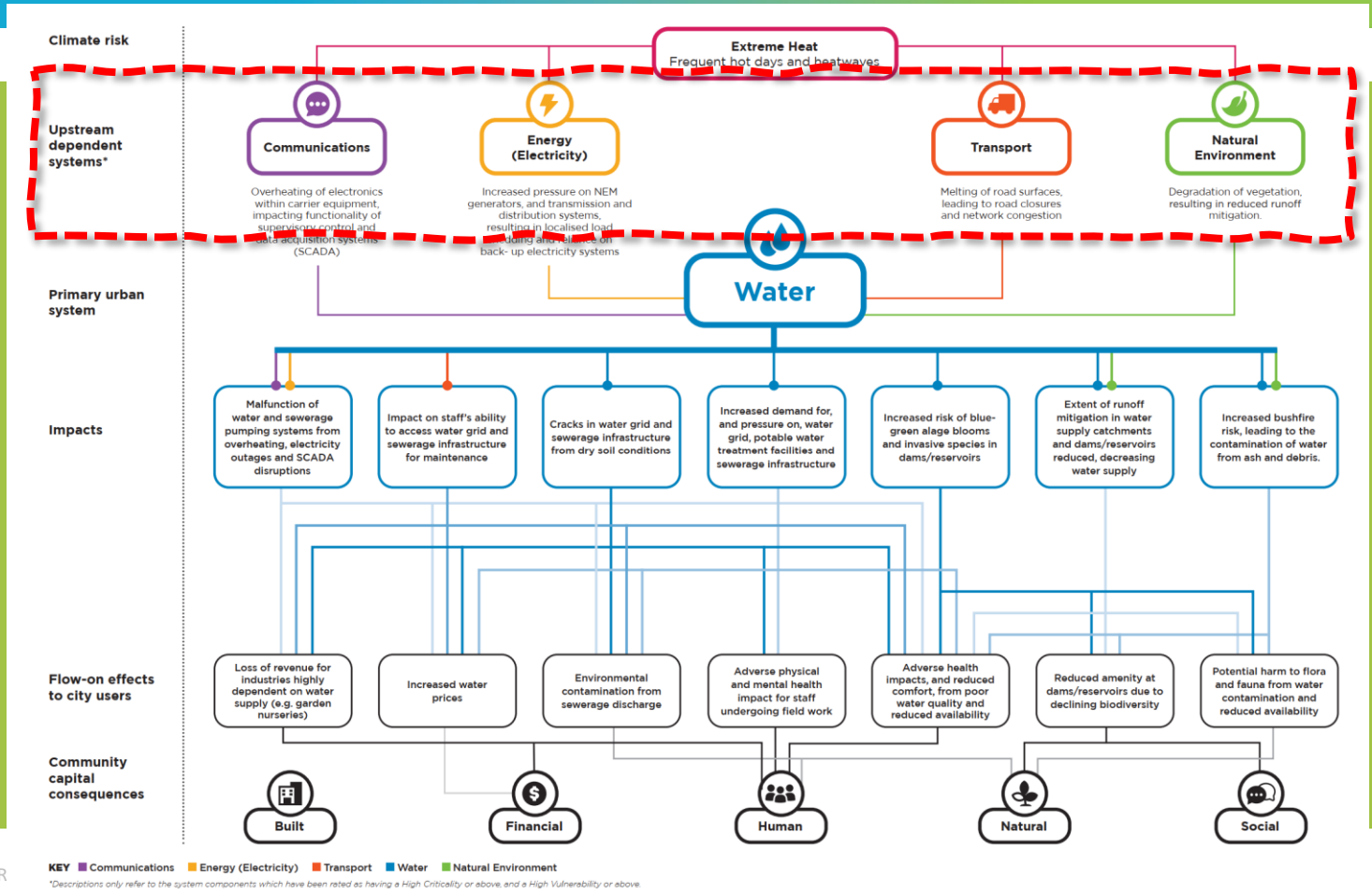
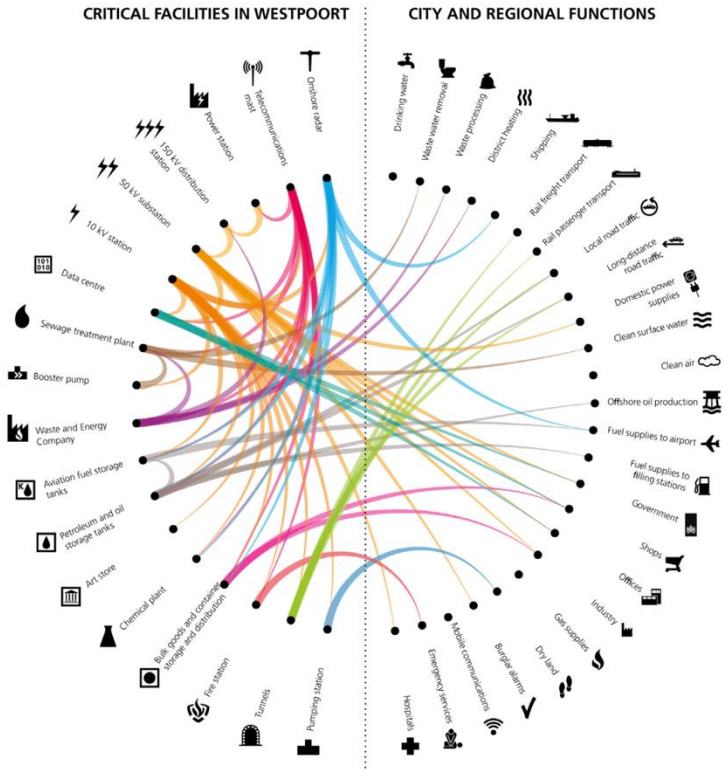
Need for systems-level approach – interdependencies



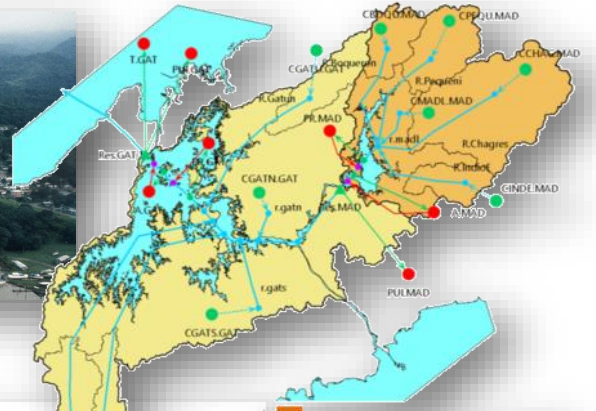
Need for systems-level approach – interdependencies

- Physical interdependence
  - For example: electrified rail lines require a secure supply of electricity.
- Information interdependence
  - For example: information about electricity usage is needed to determine generation needs
- Geographic interdependence
  - For example: project reliant on ecosystem services, water provision from glaciers, utility connections, etc
- Organisational interdependence
  - Institutional and legal connections among third-party organizations or stakeholders



Why a system-level approach? - Example

- Panama Canal: investments are dependent on ecosystem services and land-use upstream in the catchment
  - Scenario analysis
  - Robustness analysis
  - Adaptation pathways



		Robustez Climática Cobertura Promedio 95%				Robustez Climática Cobertura Promedio 85%			
Escenario	Descripción	2025	2030	2040	2070	2025	2030	2040	2070
Sc01. TTT	Tendencial-Base	58%	19%	6%	2%	58%	19%	6%	2%
Sc02. A00	Ambicioso-Base	93%	74%	41%	6%	47%	27%	14%	6%
Sc03. AGG	Ambicioso-Gestión	99%	97%	93%	60%	74%	56%	47%	38%
Sc07. AX1	Ambicioso-Combinado	99%	100%	100%	100%	74%	100%	100%	99%
Sc10. C00	Consensuado-Base	74%	47%	14%	2%	33%	14%	9%	2%
Sc11. CGG	Consensuado-Gestión	92%	59%	36%	6%	46%	18%	11%	6%
Sc14. CX3	Consensuado-Combinado1	92%	99%	94%	47%	46%	79%	55%	18%
Sc15. CX4	Consensuado-Combinado2	92%	99%	97%	58%	46%	81%	58%	28%

Source: IADB 2022, Prospectiva: Tendencias y Escenarios de la Disponibilidad de Recursos Hídricos en la Cuenca Hidrográfica del Canal de Panamá
https://www.futurewater.eu/projects/robust-decision-making-for-land-use-planning-in-the-panama-canal-river-basin/

Contents

- What is risk assessment
- Strategic vs project risk assessment
- Dealing with uncertainty
- Challenges and limitations
- Dynamic nature of risk

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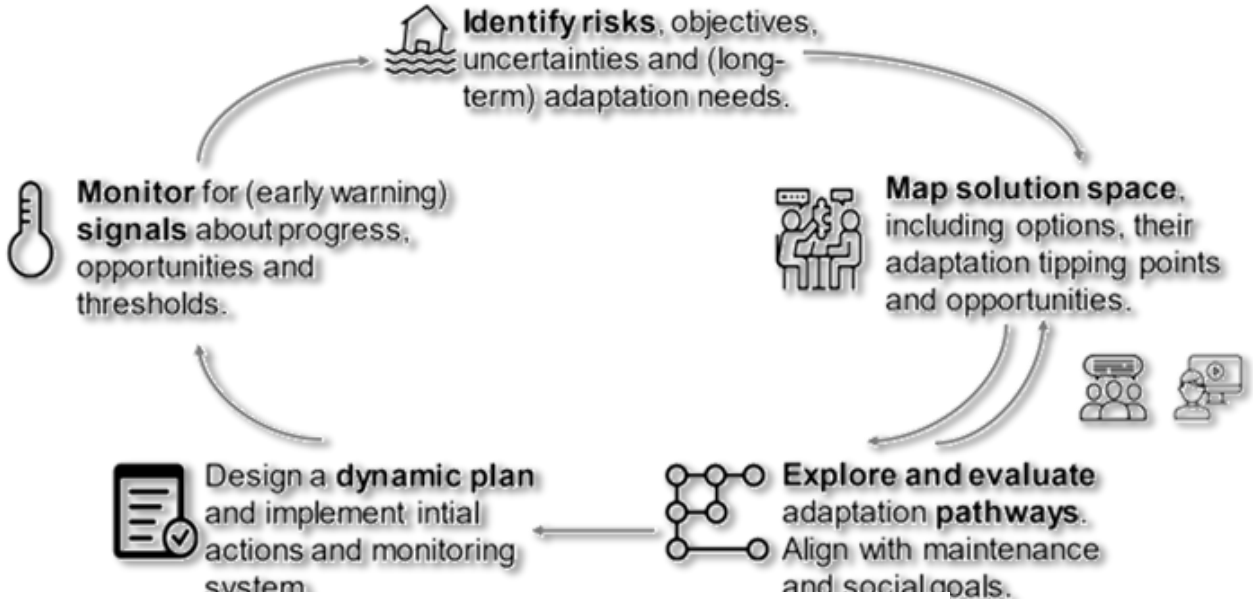
Dynamic nature of risk

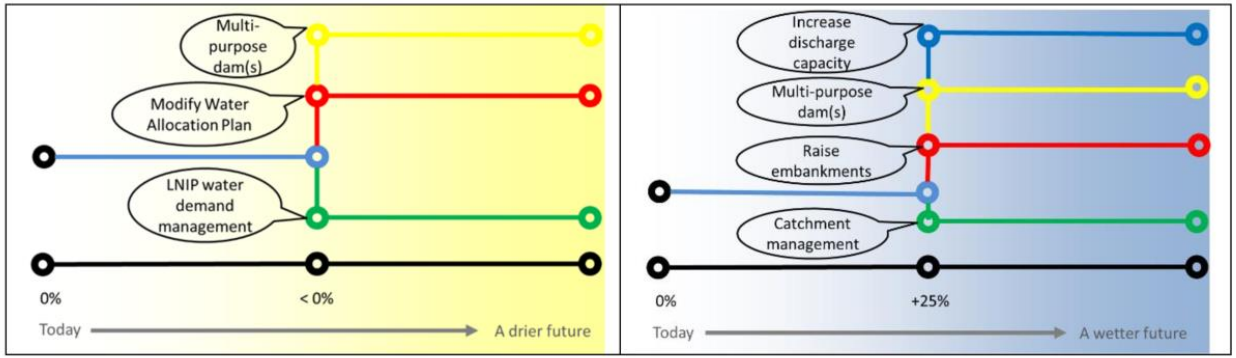
- Risks: not static; change over time, e.g.:
  - Sea level rise may rise quickly or not
  - Precipitation may decrease or increase
- Thus:
  - Monitor
  - Adapt dynamically

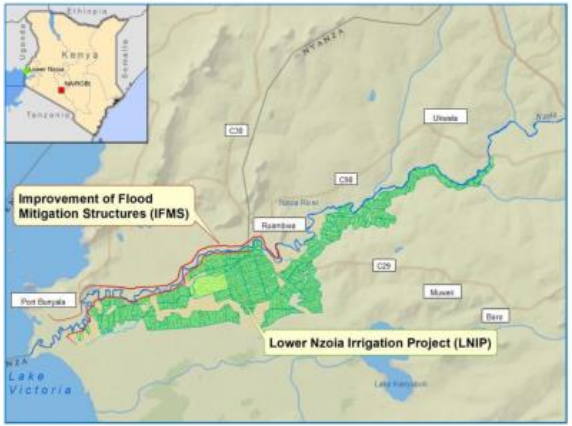


Haasnoot et al. 2013/2019, IPCC SROCC 2019. Several guidances exist: CRIDA, World Bank, national guidances (e.g. New Zealand)
https://doi.org/10.1007/978-3-030-05252-2_4

Dynamic Adaption Pathways

- Adapt depending on dry or wet future
- Monitoring rainfall trends and adapt accordingly

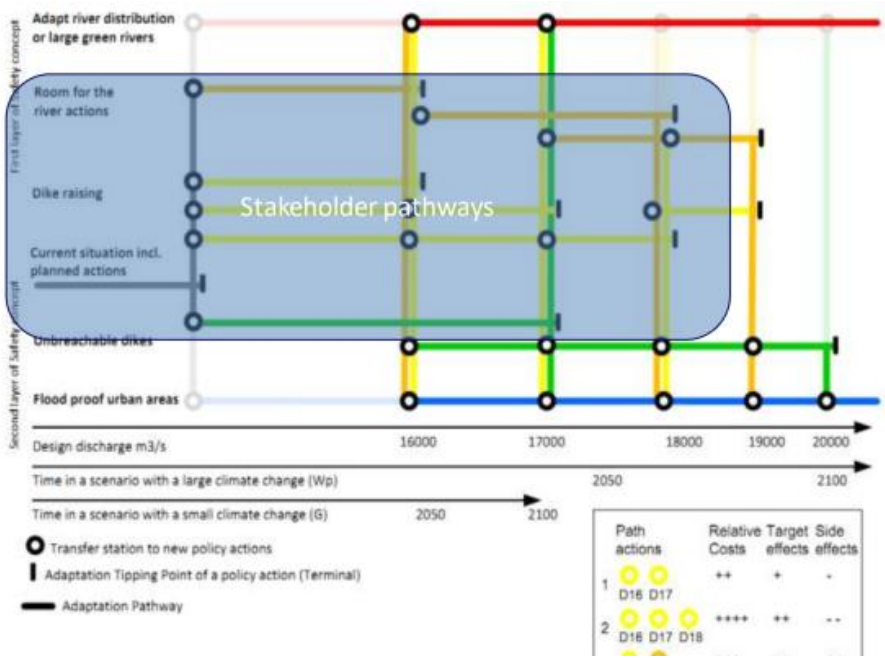




Source: FutureWater/Deltares/World Bank. 2019. Lower Nzoia Project, Kenya, Climate Change Risk Analysis

Dynamic Adaption Pathways

- Adapt based on threshold or tipping points
- Stakeholder-based pathways



Example: Rhine river Flood risk Haasnoot 2013. Anticipating Change

MentiMeter question

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c. Do you believe there is sufficient capacity in your country for climate and disaster risk assessment?

a) Yes, there is sufficient capacity
b) There is quite some capacity, but it could be further enhanced
c) There is moderate capacity, but it needs to be enhanced significantly
d) There is poor capacity: considerable capacity building is highly needed.

Thank you