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17. konferencija o održivom razvoju

Understanding and Managing Climate Risks: From Science to Action

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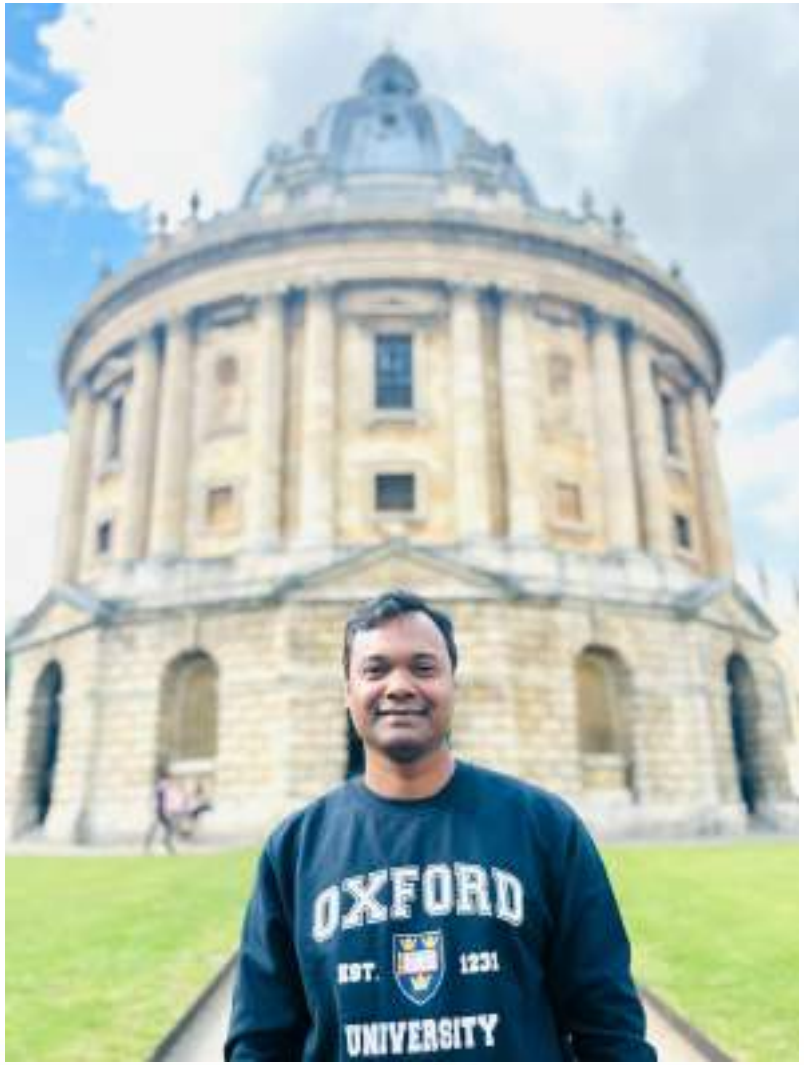
Zatvaramo krug, otvaramo prilike!

HRI
HRVATSKI INDEKS ODRŽIVOSTI

About me

- Environment and climate change scientist with more than 12 years of experience
- Co-Founder, Vienna Climate Connect
- Doctoral Candidate in Climate Change (Uni Graz)
- Visiting Research Scholar, University of Oxford
- Beahrs Environmental Leadership Fellow, UC Berkeley
- Mentor, MIT Solve (USA); Three Cairns Fellow, Yale University
- Ambassador, European Climate Pact (Austria)



Structure of workshop

- Welcome & framing: 5 min
- Input talk: 25 min
- World Café setup: 5 min
- Groupwork: 45 min
- Commitments & close: 10 min

Objectives

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- Build a shared understanding of climate risk (hazard-exposure-vulnerability-capacity-risk)
- Explore sectoral and financial risk angles and tools (incl. AI/ML)
- Surface actionable ideas to bridge science, policy, and practice

Key Terms: Recap

Climate hazard. The potential occurrence of a natural or human-induced physical event, trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources. In this report, the term hazard usually refers to climate-related physical events or trends or their physical impacts (IPCC, 2022a).

IPCC, AR6, Annex II

Key Terms: Recap

Climate exposure: The presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected (IPCC, 2022a).

IPCC, AR6, Annex II

Key Terms: Recap

Climate vulnerability:

- ***For population groups:*** climate vulnerability describes the extent to which a population group is vulnerable to harm from climate related events.

- ***For sectors:*** climate vulnerability for sectors refers to the vulnerability of economic sectors (like agriculture, water resources, or energy) to climate variability and extremes.

IPCC, AR6, Annex II

Key Terms: Recap

Adaptive capacity: the ability of a system, community, or organisation to adjust to climate variability and extremes, to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

IPCC, AR6, Annex II

Key Terms: Recap

Climate impact: climate impact refers to the effects of climate variability and change on natural and human systems. Impacts can be positive or negative and can result from both gradual changes (like temperature rise) and extreme events (like hurricanes).

IPCC, AR6, Annex II

Key Terms: Recap

Climate risk: the potential for consequences where something of value is at stake and where the outcome is uncertain, recognising the diversity of values. Risk results from the dynamic interaction of hazard, vulnerability, exposure of human and ecological systems (IPCC, 2022a).

Risk = Hazard × Exposure × Vulnerability

IPCC, AR6, Annex II

What does "Climate Risk" mean to you?

Join at

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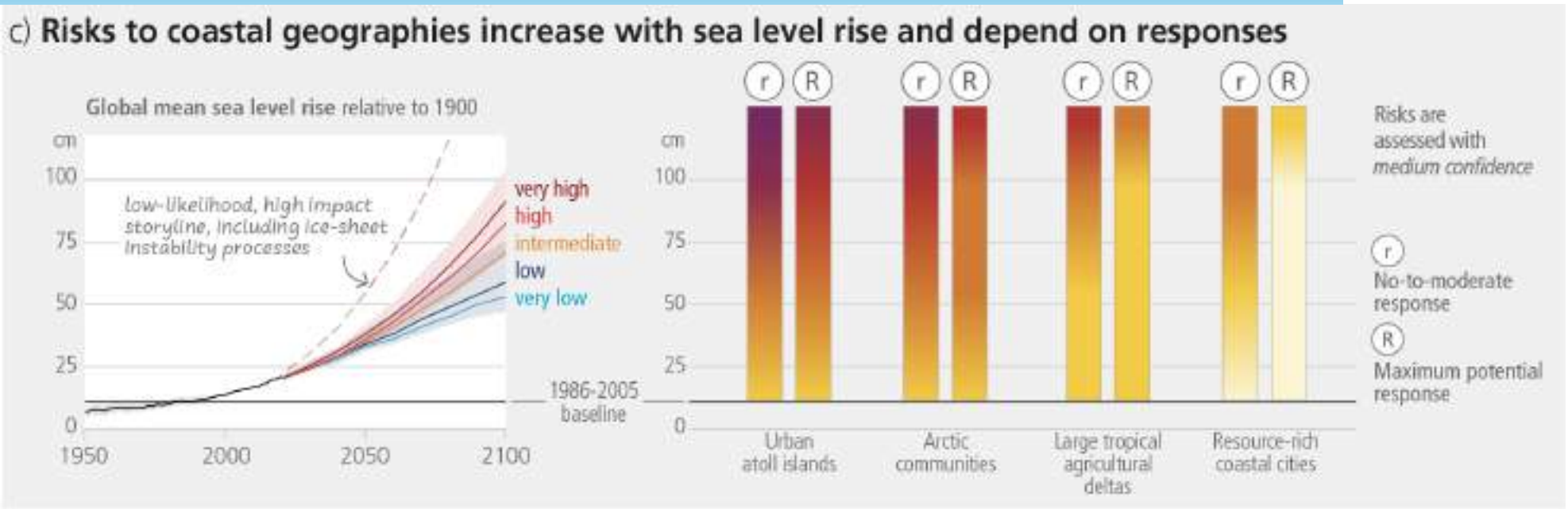
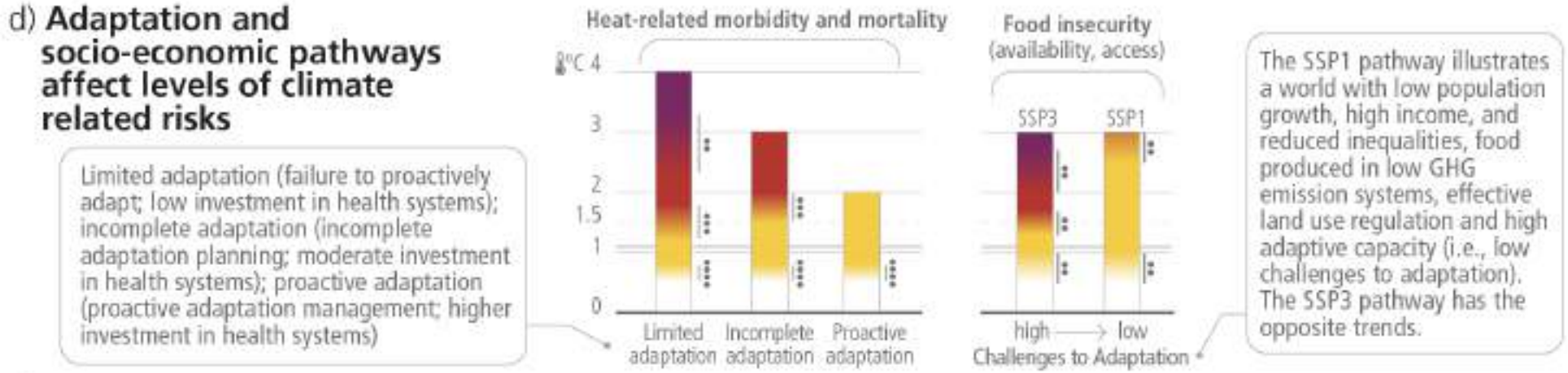
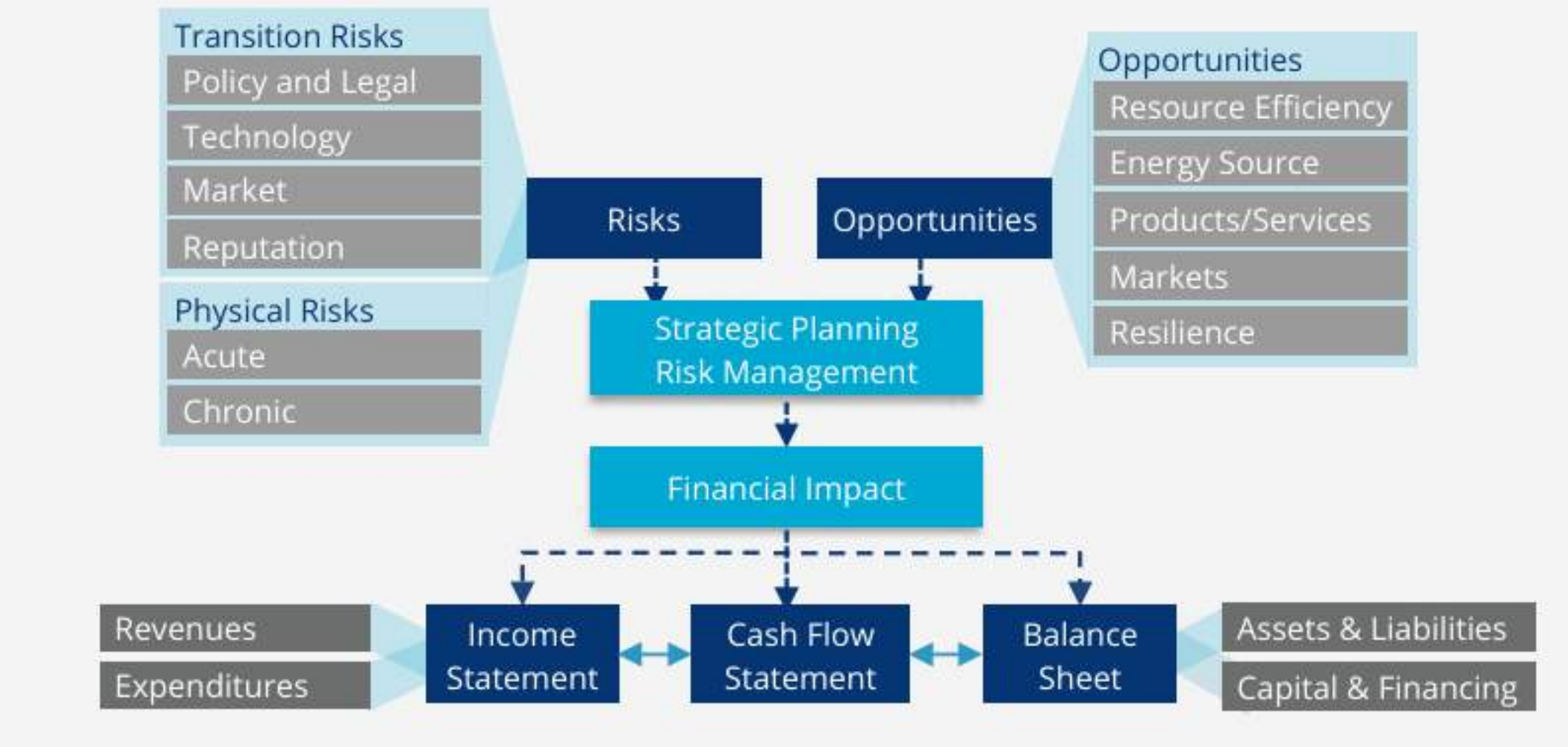
Climate Risk: Scales and Sectors





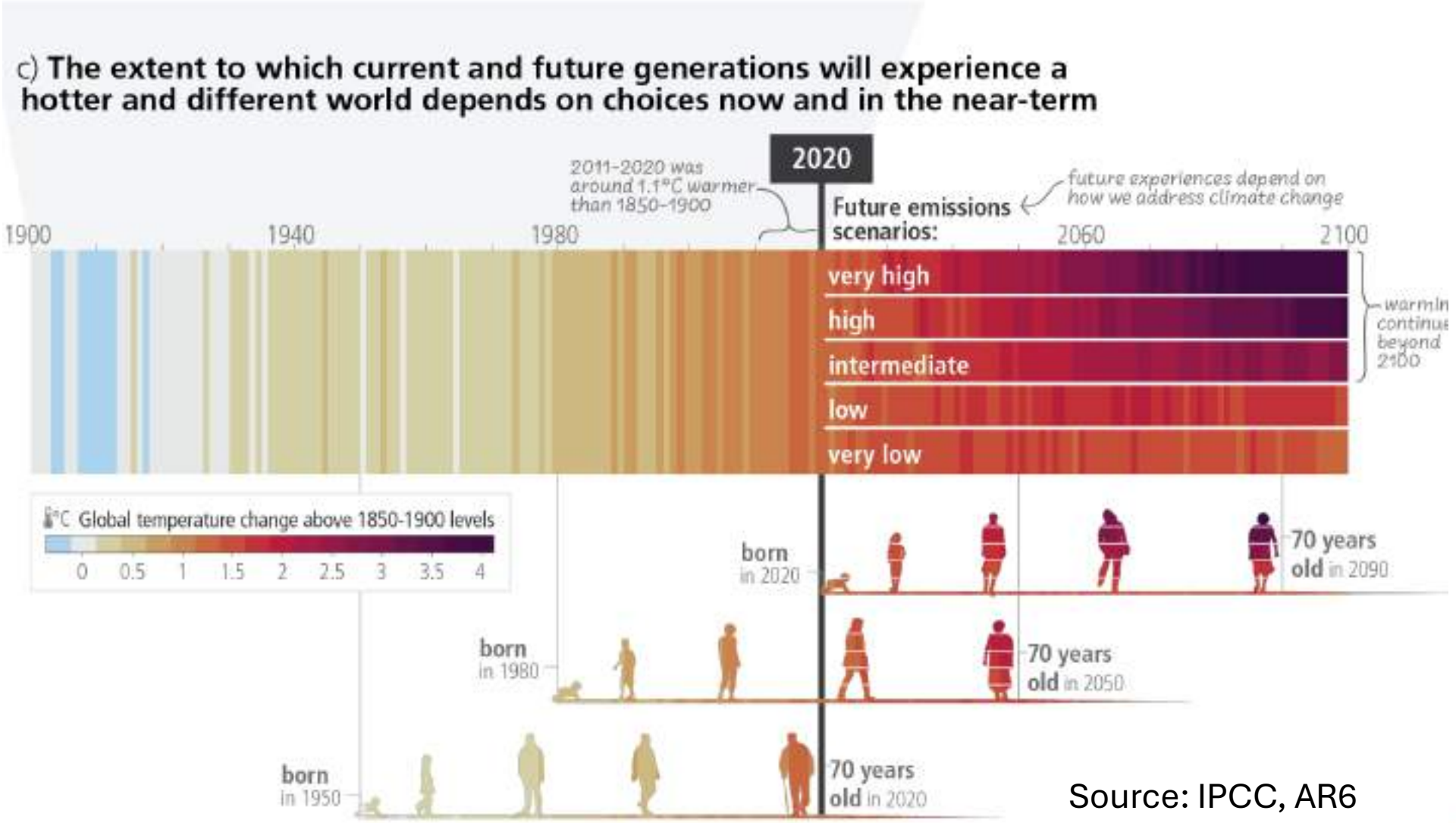
Source: IPCC, AR6

Climate Risk: Opportunities-Financial Impacts



Source: E06 - Climate related risks and opportunities.pdf

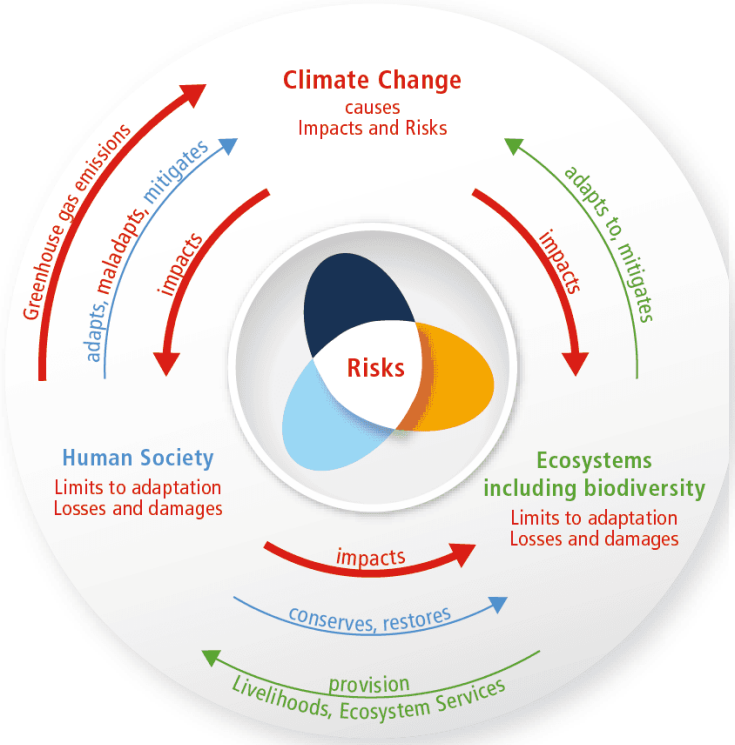
Future Climate Risk



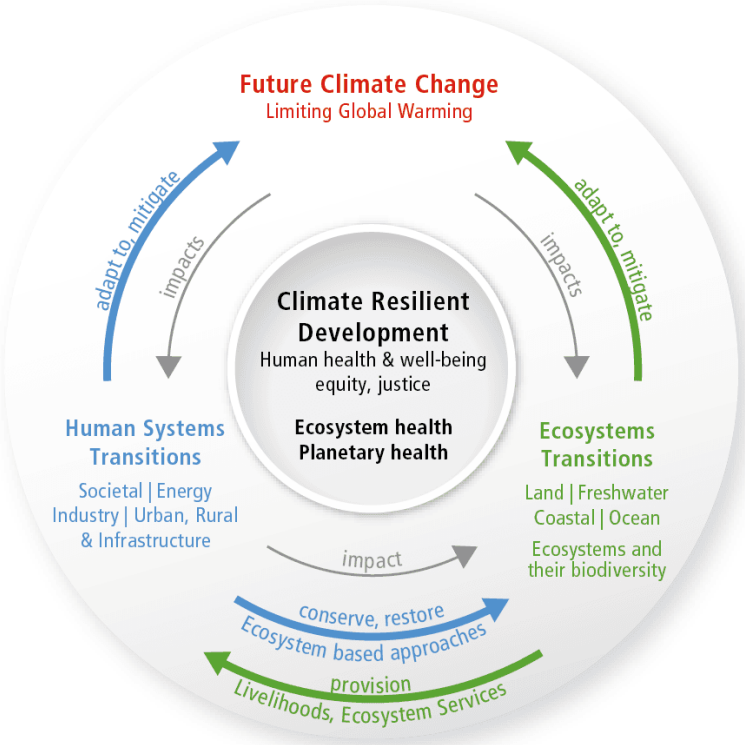
Source: IPCC, AR6

Climate Risk Assessment

(a) Main interactions and trends



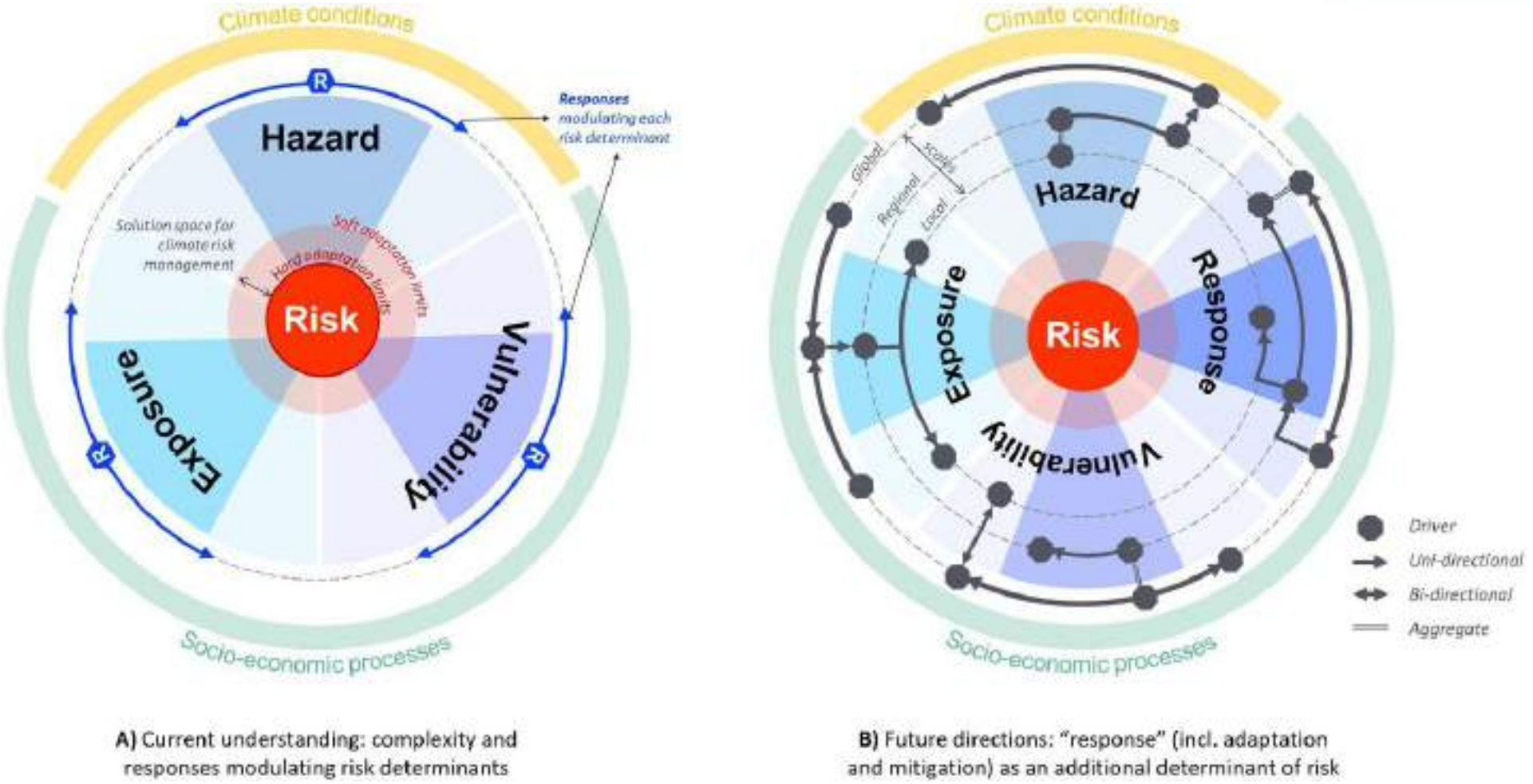
(b) Options to reduce climate risks and establish resilience



The risk propeller shows that risk emerges from the overlap of:

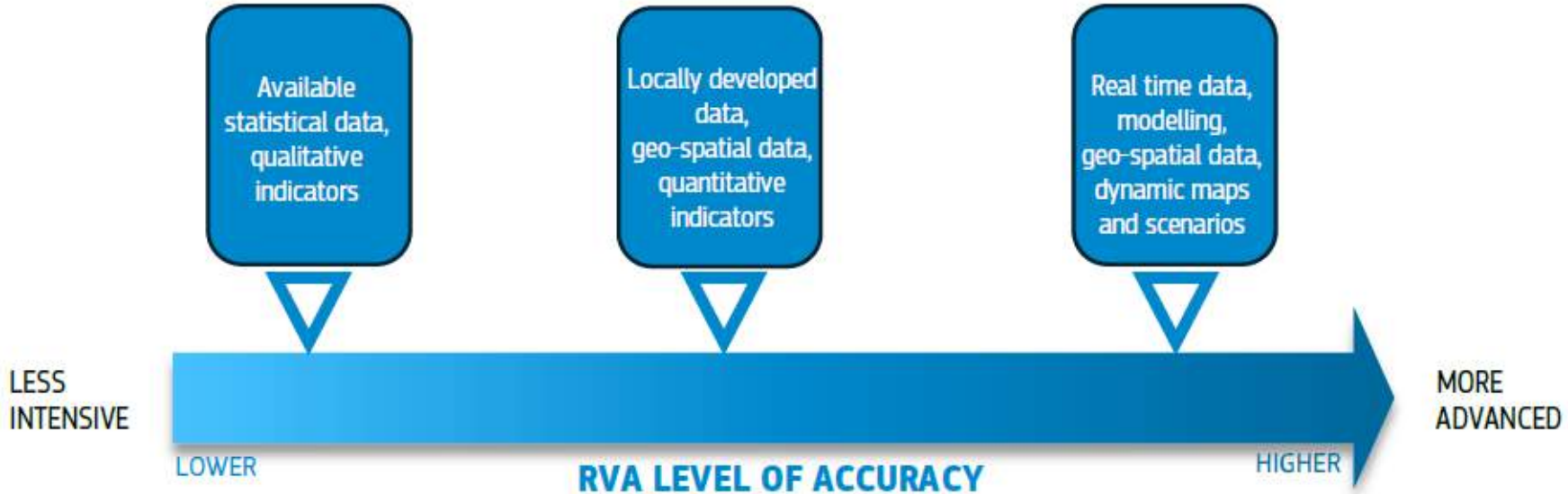
Source: IPCC, AR6

Climate Risk Assessment



Modified representation of the IPCC AR6 'Risk Propeller (Roa et al, 2025; ERL)

Climate Risk Assessment



	Available statistical data, qualitative indicators	Locally developed data, geo-spatial data, quantitative indicators	Real time data, modelling, geo-spatial data, dynamic maps and scenarios
PROs	• flexibility in data sources, • limited technical expertise and resources.	• better prioritisation capacity, • quantitative and qualitative information.	• high prioritisation capacity • detailed data, accuracy and timely information
CONs	• low-integration with existing models, • low prioritisation	• skills and capacity needs, • challenges in data collection and integration	• high technical requirements • data intensity and complexity

Source: JRC elaboration

Source: JRC, European Commission

Climate Risk Assessment

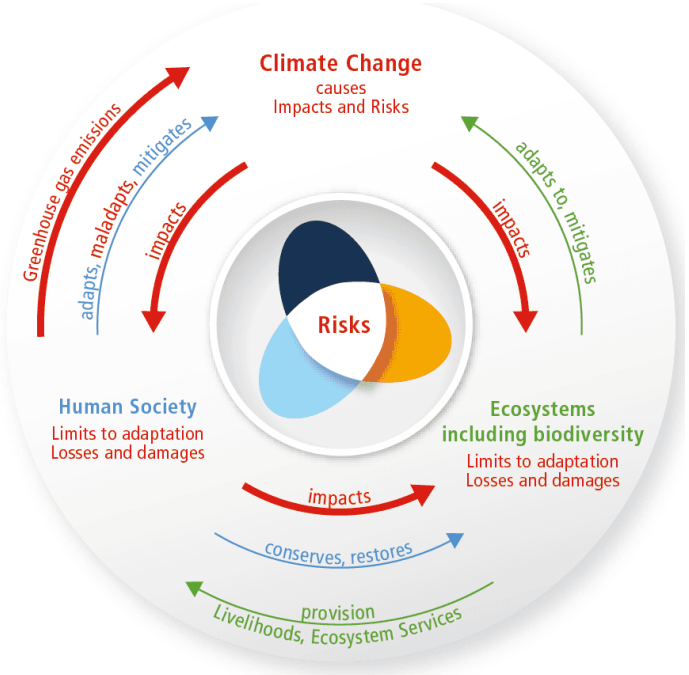
qualitative risk matrix

		Exposure x Vulnerability			
		Low	Medium	High	Not known
Hazard	Low	Insignificant	Minor	Moderate	
	Medium	Minor	Moderate	Significant	
	High	Moderate	Significant	Severe	
	Not known				

Risk matrix combining likelihood and magnitude of impacts

		Impact[52]			
		Low	Medium	High	Not known
Likelihood	Low	Insignificant	Minor	Moderate	
	Medium	Minor	Moderate	Significant	
	High	Moderate	Significant	Severe	
	Not known				

Source: JRC, European Commission

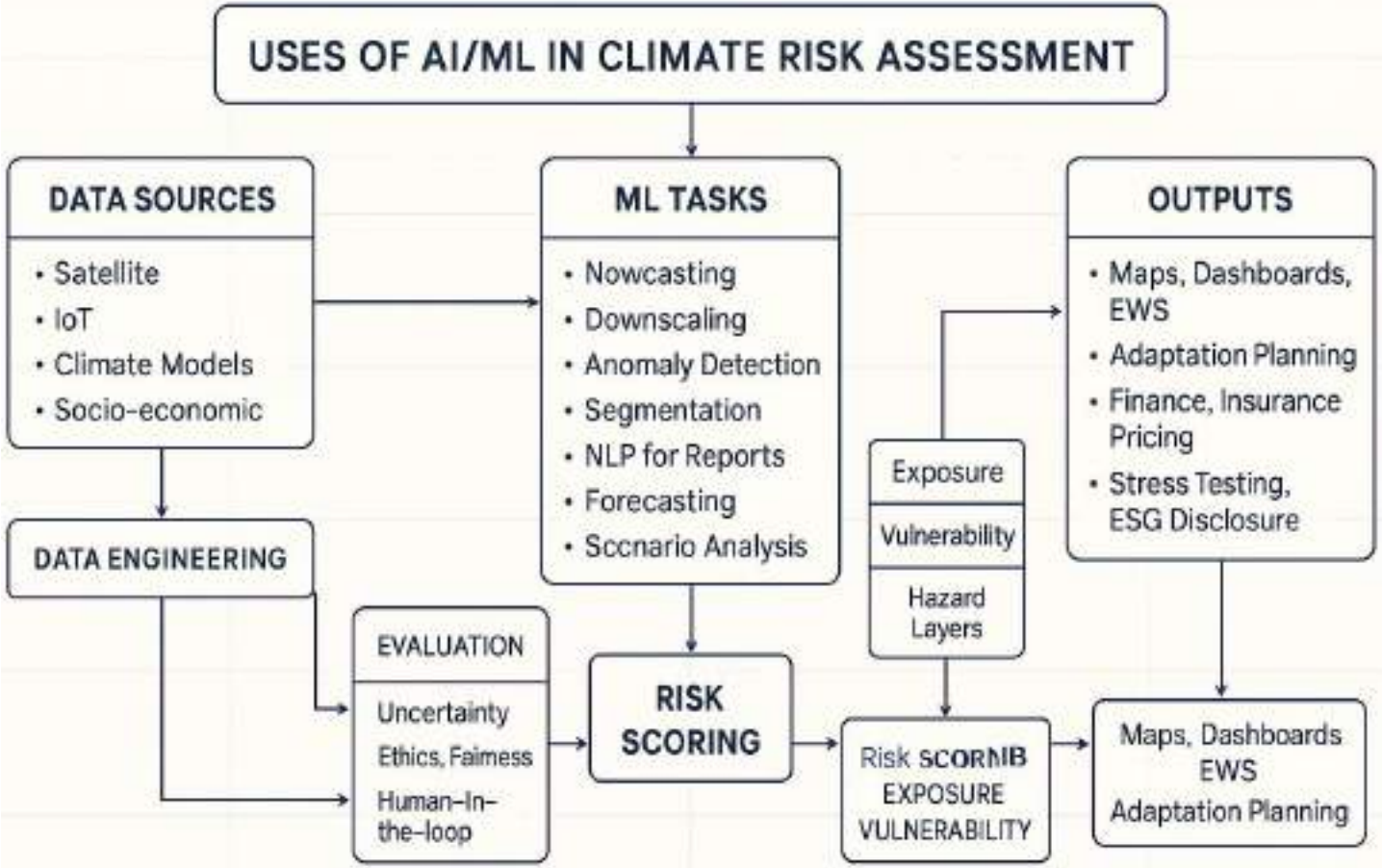


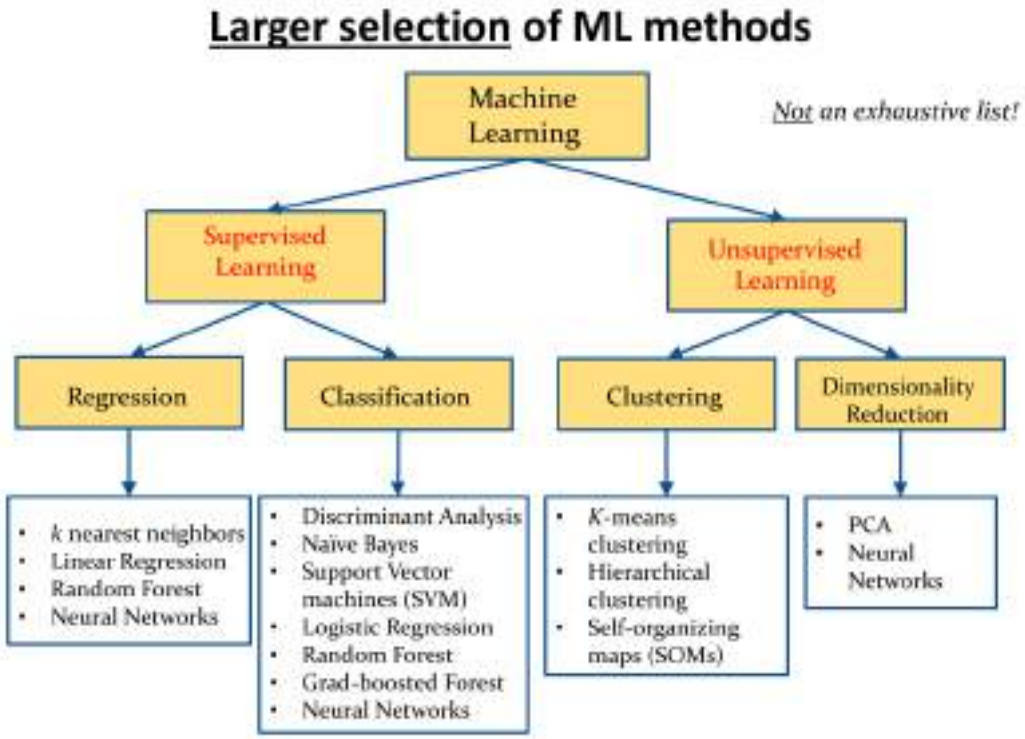
The risk propeller shows that risk emerges from the overlap of:

Climate hazard(s) Vulnerability Exposure

...of human systems, ecosystems and their biodiversity

Climate Risk Assessment: AI/ML





Climate Risk Mgt: Socio-ecological Transformations

Scale up low-carbon electricity with renewables and other clean sources

Double down on innovation and commercialization to decarbonize industry

Design cities for zero- and low-carbon transport, shift to electric vehicles, and scale clean fuels

Green buildings with climate-smart materials, technology and energy codes

Protect and restore forests and other landscapes, improve agricultural practices, shift to sustainable diets, and reduce food loss and waste

Source: Authors.

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Climate Risk Management: 10 Solutions

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1. **RETIRE** coal plants

2. **INVEST** in clean energy & efficiency

3. **RETROFIT** and **DECARBONIZE** buildings

4. **DECARBONIZE** cement, steel & plastics

5. **SHIFT** to electric vehicles

6. **INCREASE** public transport, biking and walking

7. **DECARBONIZE** aviation and shipping

8. **HALT** deforestation & **RESTORE** degraded lands

9. **REDUCE** food loss and waste and **IMPROVE** agricultural practices

10. **EAT** more plants & less meat

Source: IPCC AR6.

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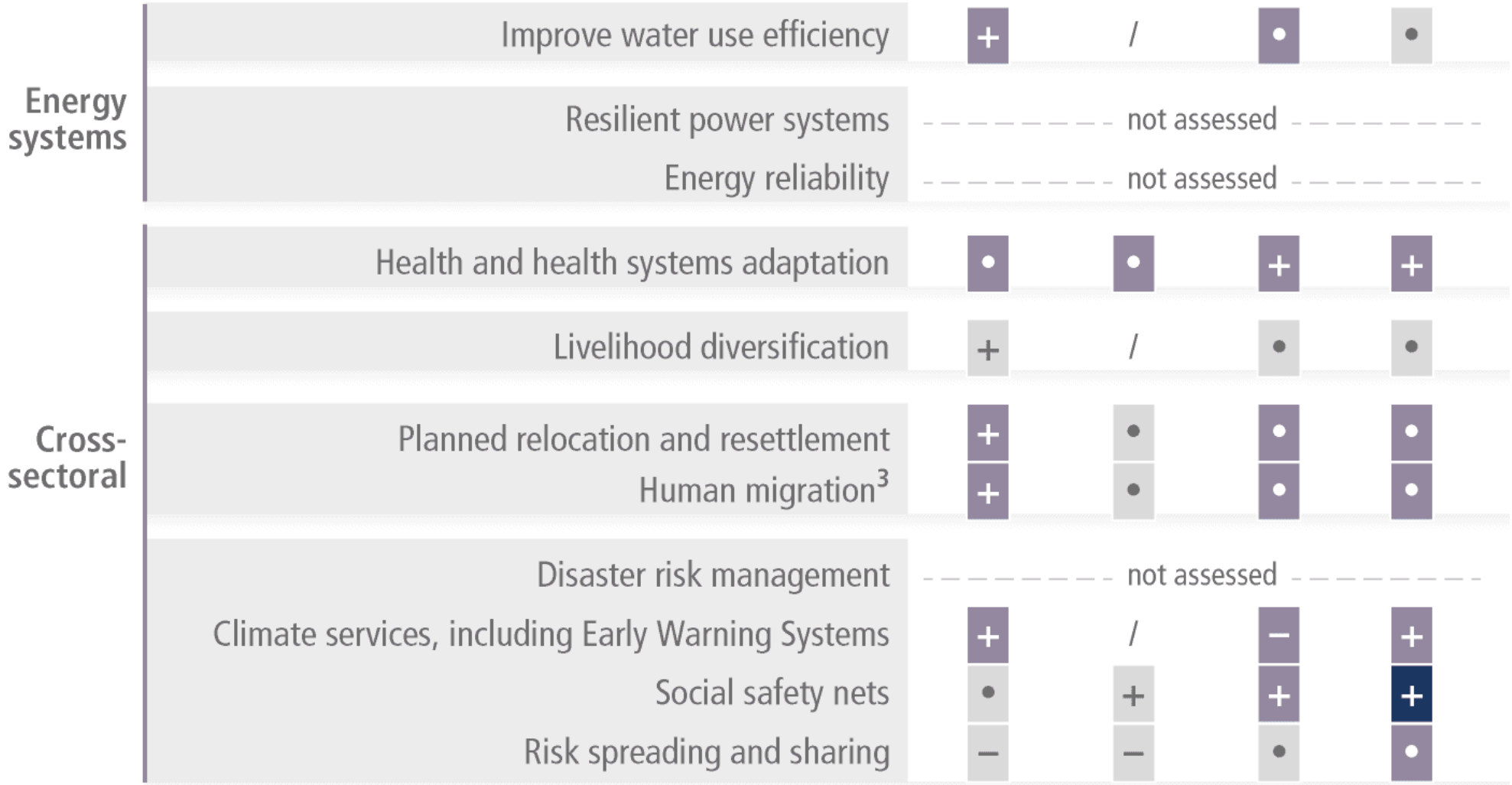
Resilience and Adaptation to Climate Risks

C3S and WMO, 2025

Responses to Climate Risk: Co-benefits



Source: IPCC, AR6

Thank you!

Contact

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World Café

Table 1: Climate Risk Framework in Practice

Aim: Shared understanding of H–E–V–C–Risk.

Quiding Questions:

- Where do hazard, exposure, vulnerability, capacity show up in your context? What evidence or indicator would show we've reduced risk?

Table 2: Sector Hot-Spots

Aim: Sectoral vulnerabilities (industry, agriculture, water, energy).

Guiding Questions:

- What's a sector-specific risk that's underestimated, and how would we evidence it?

Table 3: Tools & Data (incl. AI/ML)

Aim: Practical tools to improve decisions.

Quiding Questions:

- What tool/dataset/AI-ML would most improve your next risk decision?

Table 4: From Science to Action

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Aim: Bridge research, policy, and practice.

Quiding Questions:

- What policy or organizational decision could we influence in 6-12 months, and what evidence do they need?