Managing systemic risks from natural and biological hazards

Bridging the science policy gap for informed action

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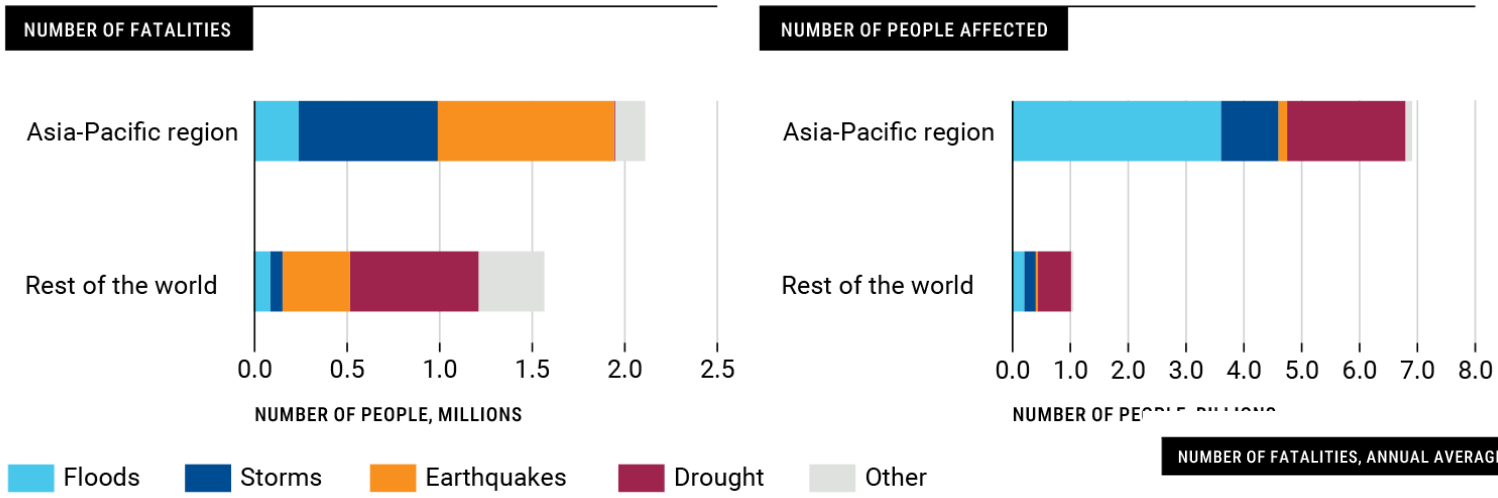
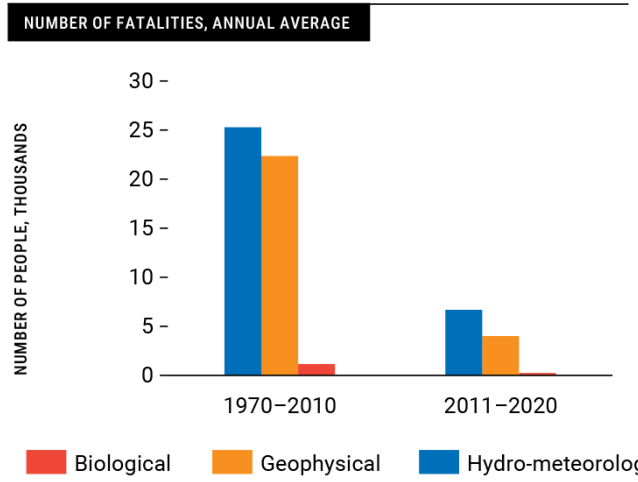
The Asia Pacific region has made good progress in reducing impacts from natural hazards

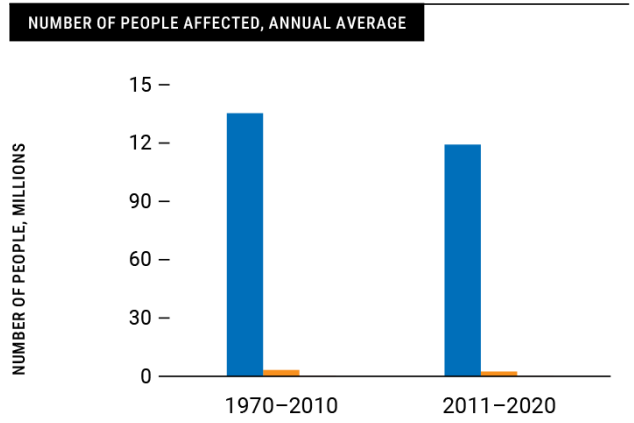
Number of fatalities and people affected in in the Asia-Pacific region and the rest of the world, 1970-2020



Source: Data from EM-DAT – The International Disaster Database. Available at https://www.emdat.be/ (accessed on 4 May

Substantial **progress** in the region to manage natural disasters and **reduce loss of lives**

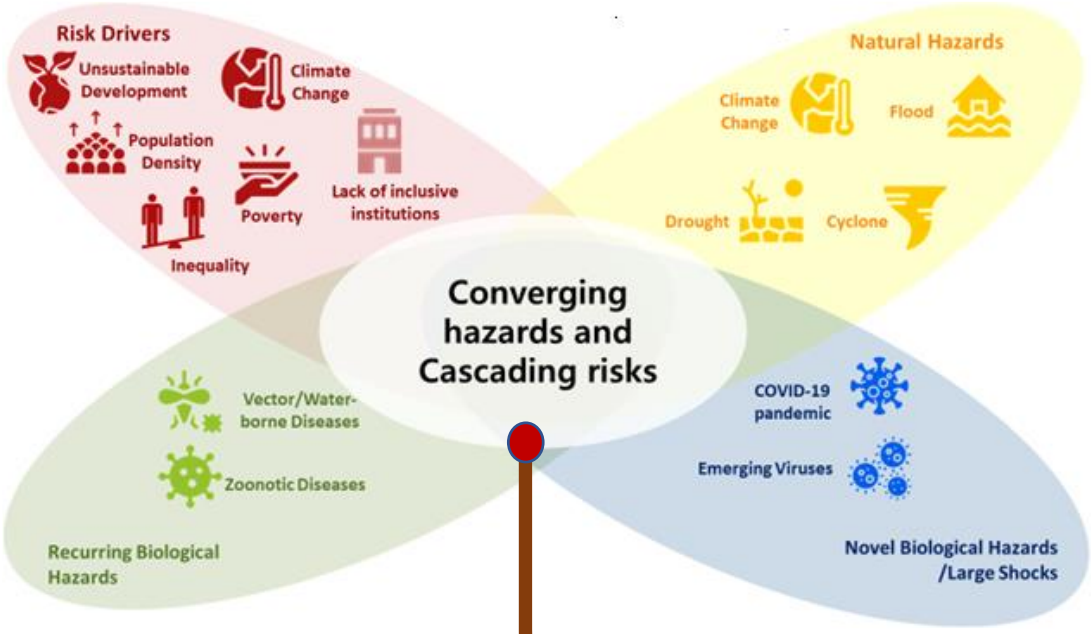


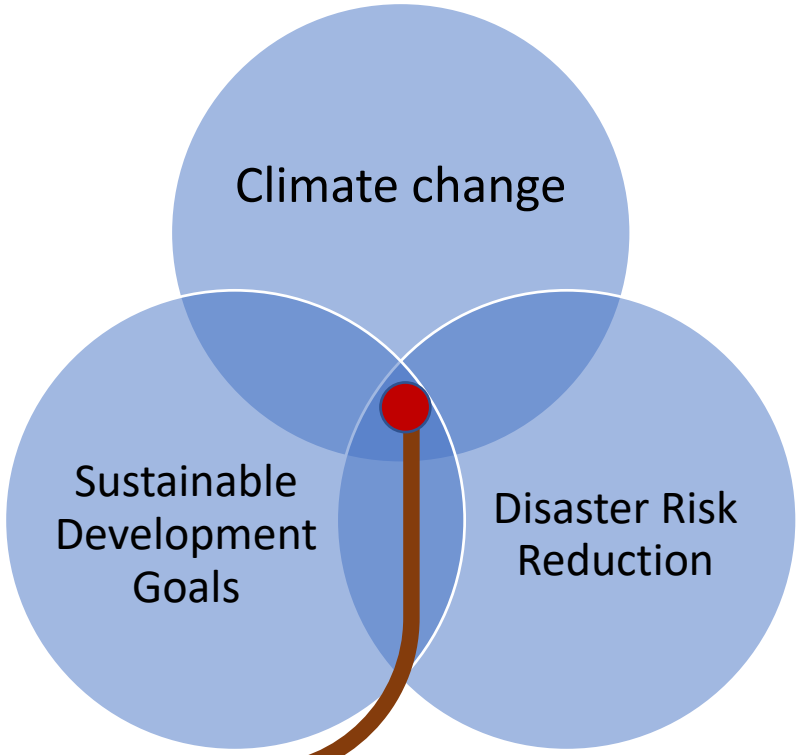


Source: Data from EM-DAT – The International Disaster Database. Available at https://www.emdat.be/ (accessed on 4 May 2021).

Source: Data from EM-DAT – The International Disaster Database

The Asia Pacific disaster riskscape is being reshaped by hazards under a new disaster-climate-health nexus where hazards converge increasing exposure and vulnerability of populations impacting multiple SDGs





Reducing vulnerability and enhancing resilience

Bridging the science policy gap for informed action

Six characteristics of systemic risk

FIRST	Systemic risks are characterized by **high complexity**.
SECOND	Systemic risks are **transboundary** and **global** in nature.
THIRD	Systemic risks are characterized by stochastic relationships between **trigger and effects**.
FOURTH	Systemic developments are **non-linear** and include **tipping points**.
FIFTH	Systemic risks are often **underestimated in public policy arenas** and public perception due to **uncertainties** of point of occurrence and extent of damage.
SIXTH	Established methods of science cannot identify the probability of occurrence. Instead, science utilizes **models of scenario-building** to sketch out the stochastic nature of systemic risks..

COVID-19 RESPONSE

Understanding systemic risks key to COVID-19 response and recovery

Source: Adapted from Ortwin Renn and others, "Systemic risks from different perspectives", *Risk Analysis*, vol. 0, No. 0, (2020). Available at https://onlinelibrary.wiley.com/doi/epdf/10.1111/risa.13657

These challenging times call for a **reformulation and paradigm shift** from a single hazard, single sector perspective to a **multihazard, multi-sectoral and systemic risk** perspective.

Climate change is exacerbating the impacts of converging natural and biological hazards

Impacts of climate change on natural and other biological hazards

		CLIMATE CHANGE RISK	RELATED BIOLOGICAL AND HEALTH RISKS
East and East North Asia	China	Increase drought	Undernutrition due to food insecurity
		Increase precipitation and flooding	Increase vector-borne disease risks
		Increase sea level risk and flooding	Increase more than 50 million of population exposed to sea level rise
	Japan	Increase heatwaves	Increase excess death due to heatwaves by 0.2%
		Increase precipitation and flooding	Increase in infectious gastroenteritis cases by 8 %
	Mongolia	Increase precipitation and flooding	Increase in tick-borne encephalitis
	Republic of Korea	Increase heatwaves	Increase excess death due to heatwave by 0.3%
		Increase sea level risk and flooding	Increase DALY for cardio and cerebrovascular disease by 131%
South-East Asia	Indonesia	Increase sea level risk and flooding	Increase more than 50 million of population exposed to sea level rise
	Philippines	Increase heatwaves	Increase excess death due to heatwaves by 1%
		Increase sea level risk and flooding	Increase more than 50 million of population exposed to sea level rise
	Thailand	Increase heatwaves	Increase excess death due to heatwaves by 1.9%
	Viet Nam	Increase heatwaves	Increase excess death due to heat by 1.4%
		Increase precipitation and flooding	Increase more than 50 million of population exposed to sea level rise
South and South-West Asia	Afghanistan	Increase precipitation and drought	Increased cholera, typhoid, diarrhea and ascariasis
			Increase malaria and leishmaniasis
	Bangladesh	Increase precipitation and drought	Increase in diarrheal incidence rates by 5.6%
		Increase sea level risk and flooding	Increase in dengue
		Increase cyclones	Increase in leishmaniasis
	Bhutan	Increase glacial lake outburst floods, landslides and flash floods	Increase in malaria, dengue, Japanese encephalitis and chikungunya
	India	Increase drought	Undernutrition due to food insecurity
		Increase heatwaves	Increase in heatwaves related health risks (heatstroke etc.)
		Increase sea level risk and flooding	Increase of more than 50 million population exposed to sea level rise
			Increase of exposure to arsenic contamination of ground water in the eastern region
			Increase in malaria, dengue, Japanese encephalitis, leishmaniasis and diarrhea
			Increase in diarrhea expected by 13.1% by 2041
	Maldives	Decrease precipitation	Increase in dengue, chikungunya, scrub typhus ; Emerge of Zika virus
		Increase drought	Undernutrition due to food insecurity
	Nepal	Increase drought	Increased incidence of diarrheal
		Increase precipitation	Increase in malaria, chikungunya, and dengue, lymphatic filariasis and Japanese encephalitis; Emerge of Zika Virus
	Pakistan	Increase heatwaves	Increase in geographical range and incidence of vector-borne diseases
		Increase glacial lake outburst flood, severity of monsoons and cyclones and saline intrusion	Increase in water-borne diseases and malnutrition
	Sri Lanka	Increase drought and flooding	Increase in malaria, dengue, and heat related diseases
North and Central Asia	Russian Federation	Increase drought	Undernutrition due to food insecurity
		Increase precipitation and flooding	Increase in tick-borne encephalitis
Pacific	Australia	Increase precipitation and flooding	Increase dengue outbreaks by 16.6% and decrease by 42.3%
	Marshall Islands	Increase sea level risk and flooding	Freshwater resources affected by 0.4 meter rise in sea level
	Fiji	Increase precipitation and flooding	Increase in diarrhea by 3%

Climate change increases **frequency and intensity** of hazards and **exacerbates interactions** between biological and other hazards, which in turn **increases the underlying risk drivers of poverty and inequality**

Increase in extreme rainfall

Projected increase in frequency and intensity of heavy rainfall in one day which only occurred once in every 10 years on average in a climate without human influence

Frequency every 10 years

1850 to 1900	Present 1C warmer	Future global warming levels: 1.5C warming	2C warming	4C warming
Once every 10 years	Now likely to occur 1.3 times	Likely to occur 1.5 times	Likely to occur 1.7 times	Likely to occur 2.7 times

Increase in intensity

1850 to 1900	P… 1…
	6… w…

Source: IPCC, 2021: Su…

Extreme heat becomes more frequent

Projected increase in frequency and intensity of high temperatures which only occurred once in every 10 years on average in a climate without human influence

Frequency every 10 years

1850 to 1900	Present 1C warmer	Future global warming levels: 1.5C warming	2C warming	4C warming
Once every 10 years	Now likely to occur 2.8 times	Likely to occur 4.1 times	Likely to occur 5.6 times	Likely to occur 9.4 times

Increase in intensity

1850 to 1900	Present 1C warmer	Future global warming levels: 1.5C warming	2C warming	4C warming
	+1.2C hotter	+1.9C hotter	+2.6C hotter	+5.1C hotter

Source: IPCC, 2021: Summary for Policymakers

BBC

Bridging the science policy gap for informed action

4 Key Questions For Resilience to the disaster-climate-health nexus

1. Where are the risk hotspots of the disaster-climate-health nexus?
2. What are the current and future economic losses from natural and biological hazards?
3. How much will it cost countries, the subregions, and the region to adapt to the new riskscape?
4. What are the adaptation priorities for the region, sub-region and for every country in the region?

1 Where are the risk hotspots of the disaster-climate-health nexus in SAARC?

GIS mapping shows where the most vulnerable population and health infrastructure are located under multi hazard risks from natural and biological hazards under climate change in the SAARC region

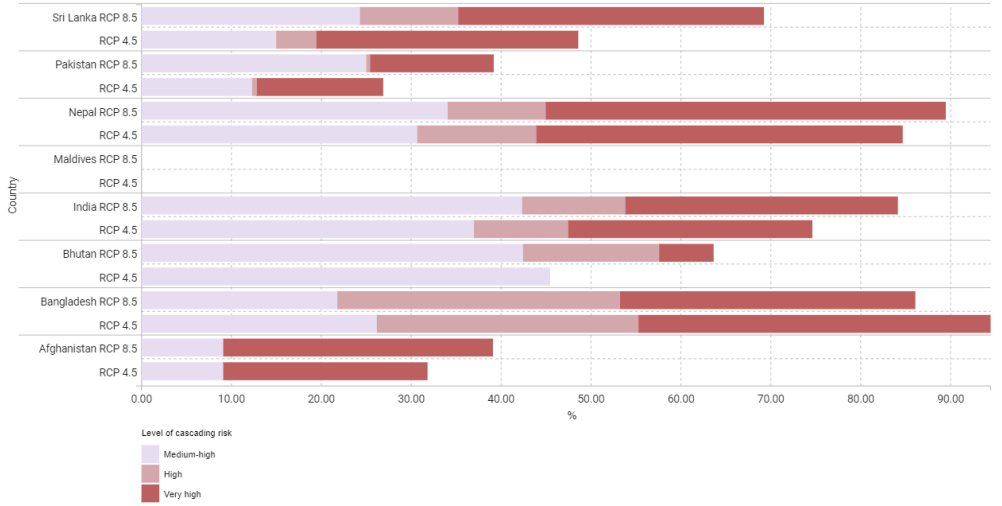
The Data Explorer shows the percentage of population and infrastructure that will be exposed

For SAARC countries, total number of Health facilities exposed to cascading risk under Multi-Hazard worst case climate change scenario (RCP 8.5) is 38,370 which is 67% of total health facilities in the region

Infrastructure exposure to climate-related natural and biological hazard under moderate (4.5) and worst case (8.5) climate change scenario

Health facilities exposed to cascading risk (multi-hazard and biological hazard)

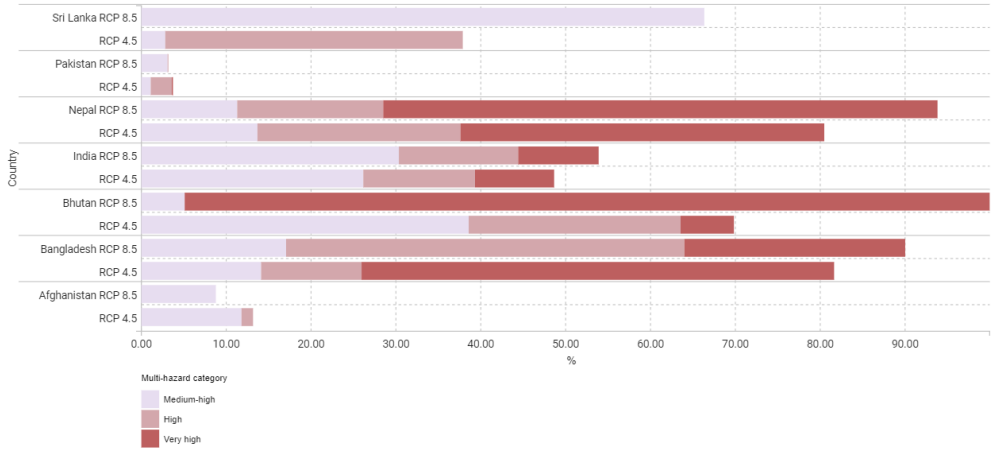
%, 2020-2039, Future: Comparison (RCP 4.5 & 8.5)



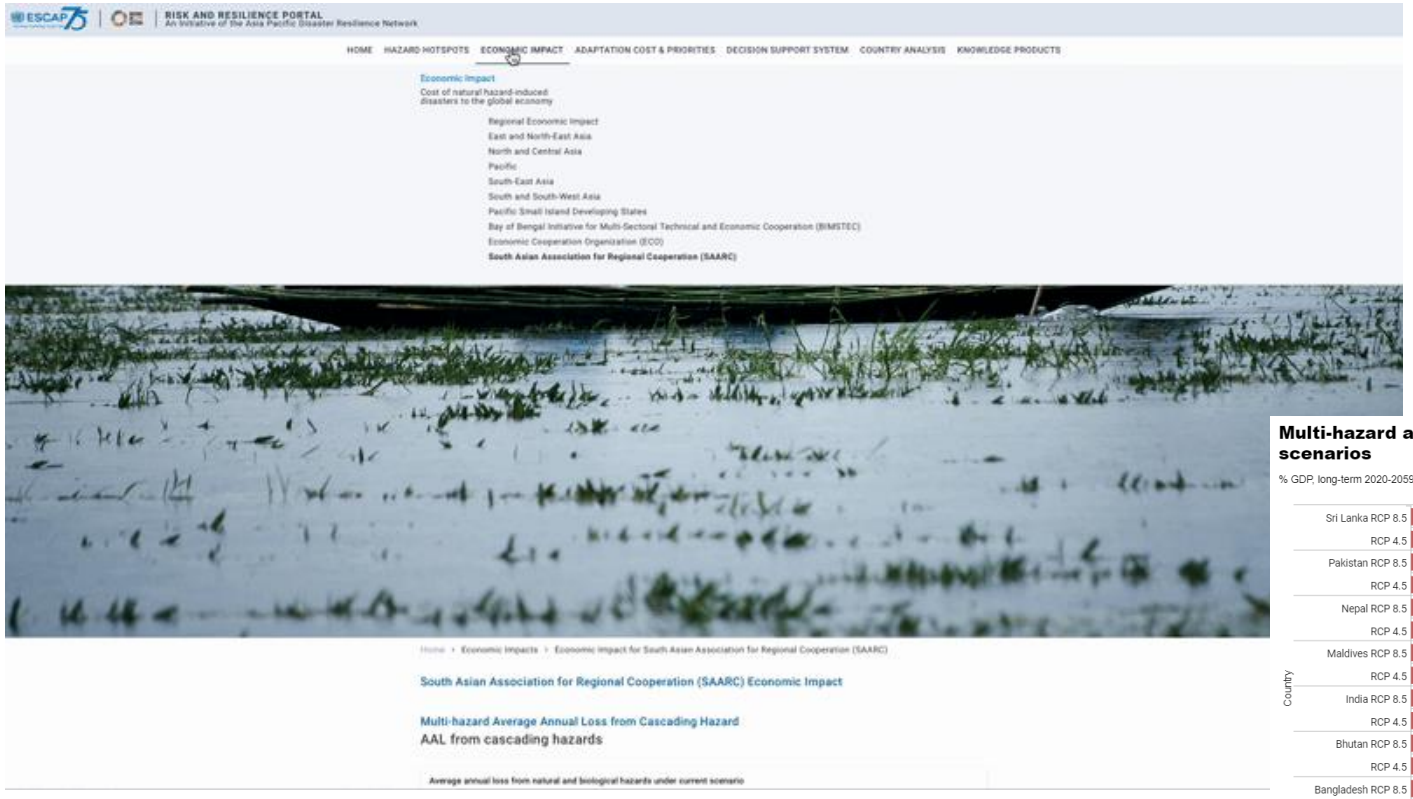
Population exposure to climate-related natural and biological hazard under moderate (4.5) and worst case (8.5) climate change scenario

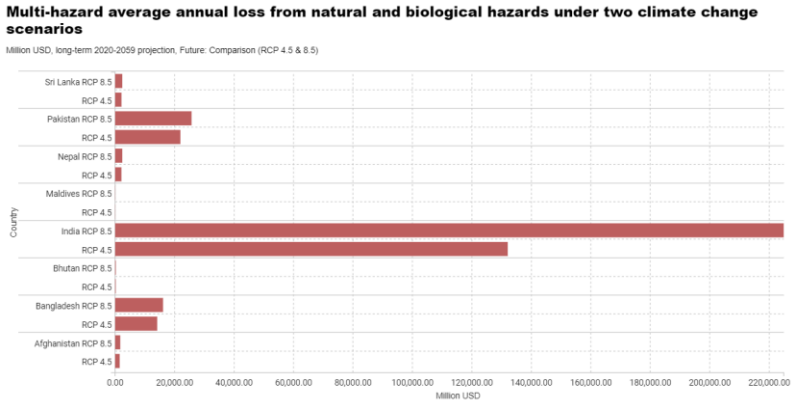
Population exposed to multi-hazard

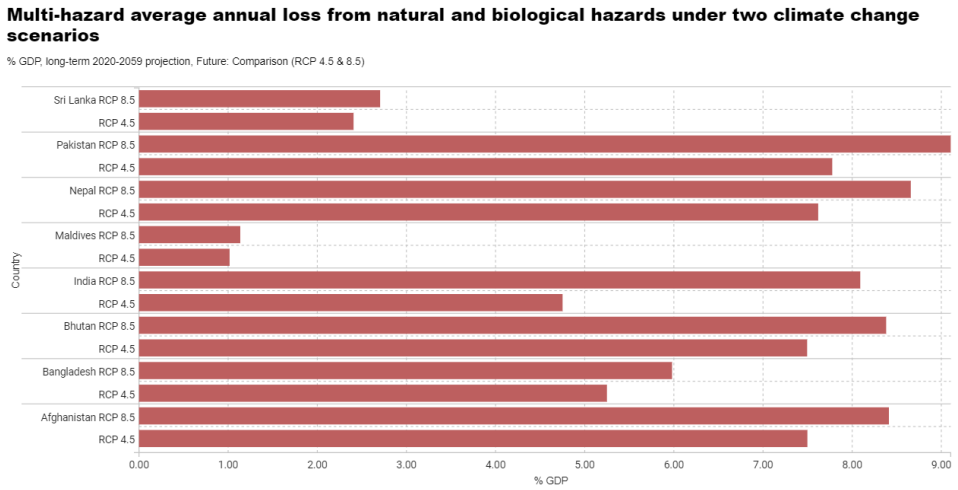
%, 2020-2039, Future: Comparison (RCP 4.5 & 8.5)



2 What are the current and future economic losses in SAARC in the disaster-climate-health nexus?

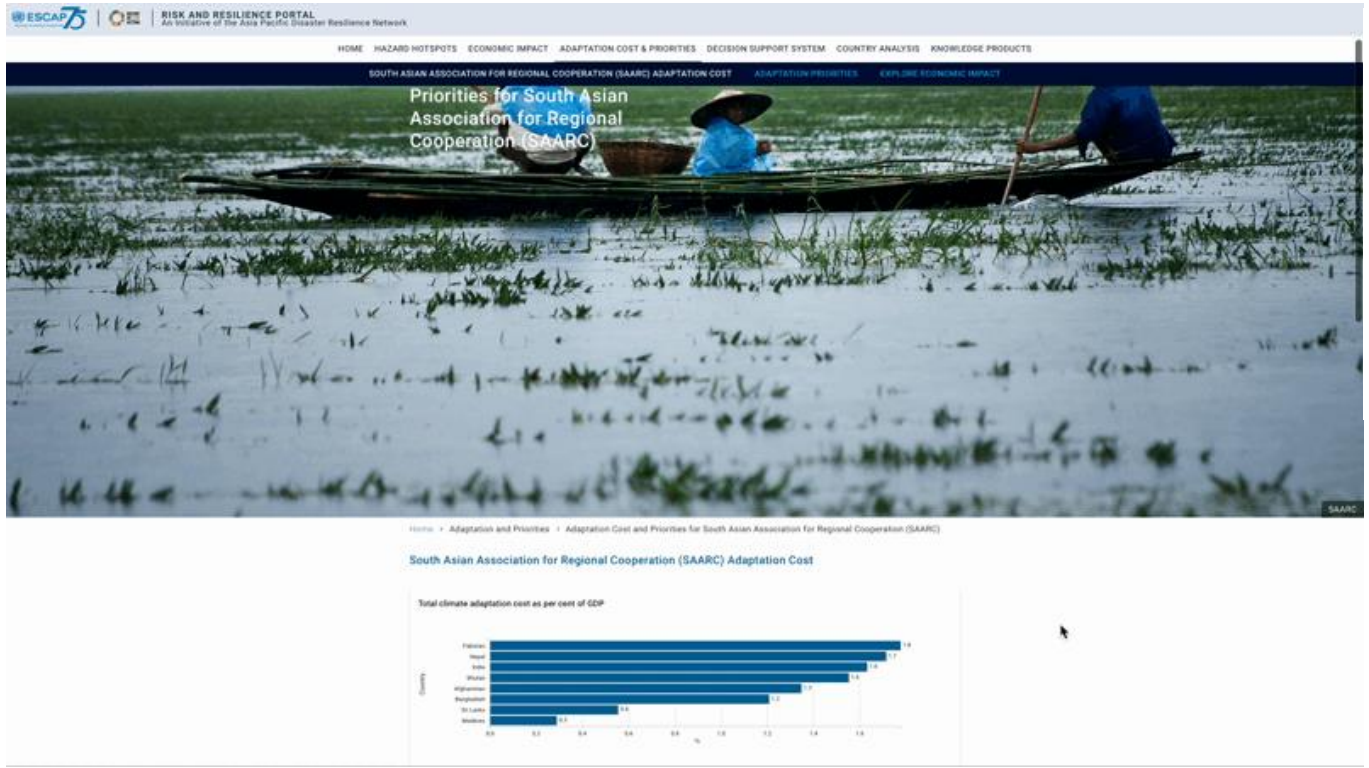


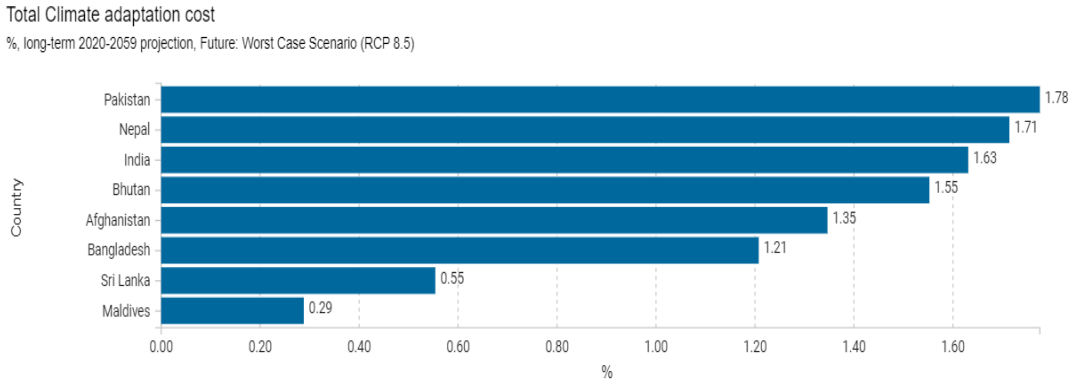


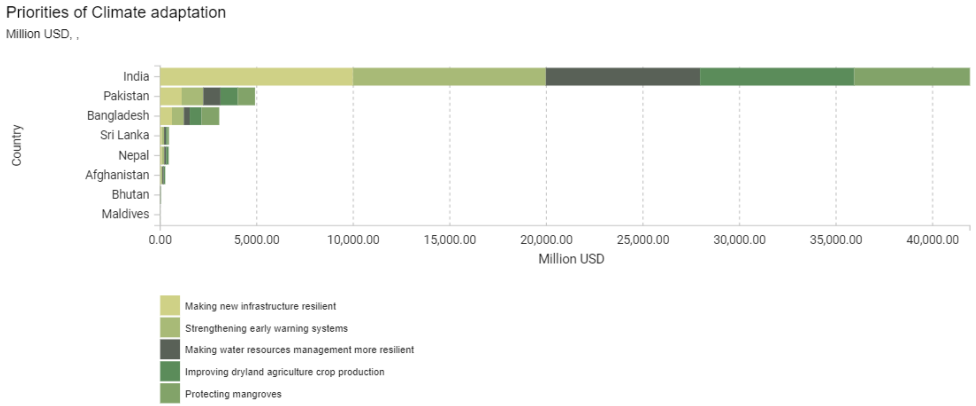


Estimation of losses under current and climate change scenarios shows the current and projected amount of economic loss and **which hazard** produces the highest losses for SAARC countries

3 How much will it cost to adapt to the new riskscape and what are the priorities for adaptation among SAARC countries?







For SAARC countries , the total adaptation cost is estimated at $ 56 billion with $52.2 billion for adaptation to climate related hazards and $3 billion for biological hazards

Highest total adaptation cost is recorded for India and Pakistan

Accelerating SDGs through disaster and climate adaptation measures

Improving dryland agriculture crop production	Making new infrastructure resilient	Making water resources management more resilient	Nature based solutions: green infrastructure	Multi-hazard risk assessment and early warning systems
				

Catalyzing progress on Agenda 2030 for Sustainable Development

Monitor Disaster-related SDGs and the Targets of the Sendai Framework

1 NO POVERTY

3 GOOD HEALTH AND WELL-BEING

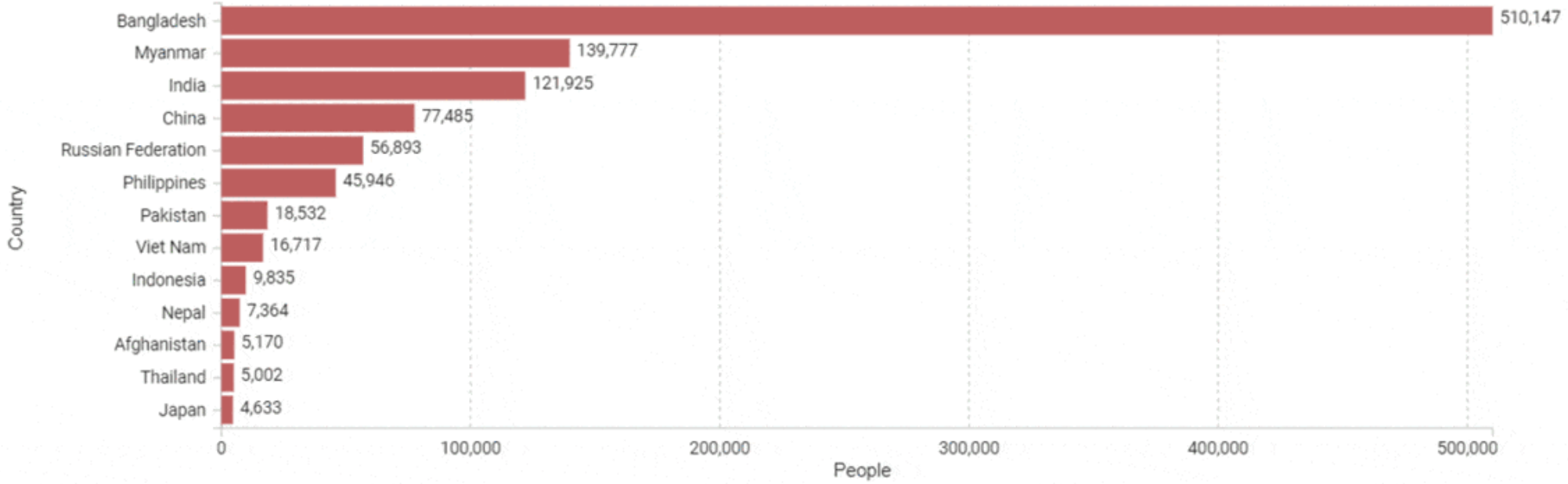
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

11 SUSTAINABLE CITIES AND COMMUNITIES

13 CLIMATE ACTION

Global Target A: Disaster Mortality

Number of deaths



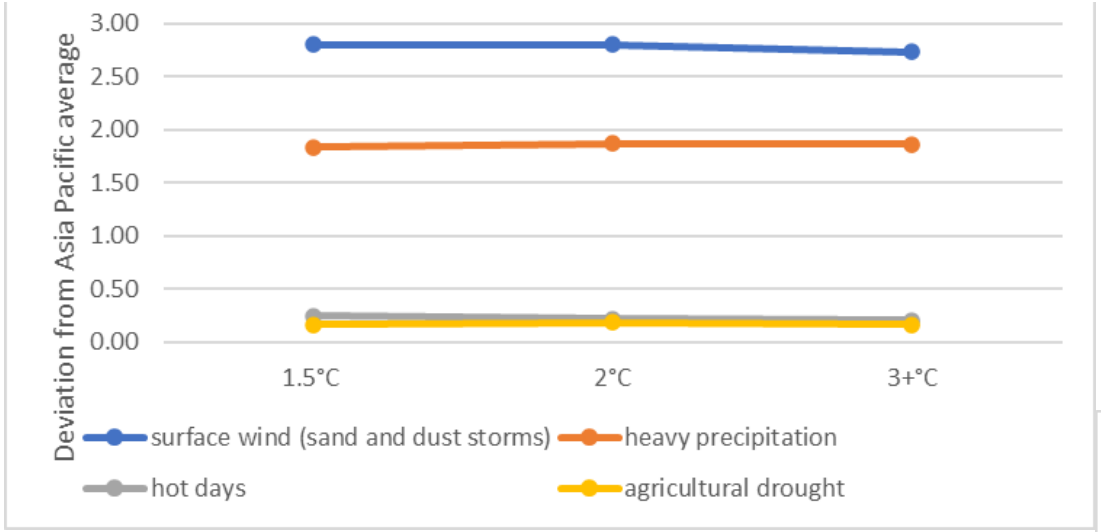
Pakistan Subnational Level Risk and Resilience

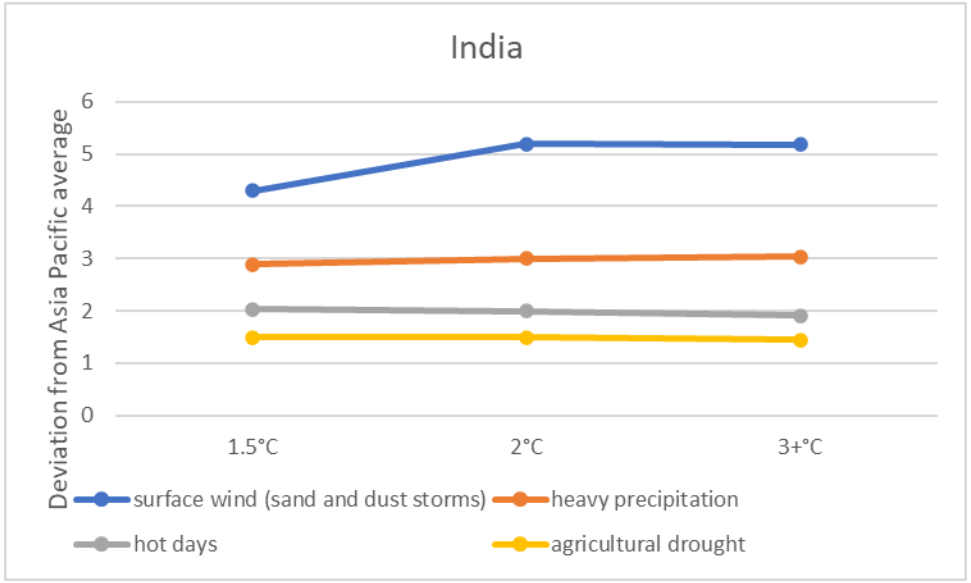
Targeted policy action at **local level**

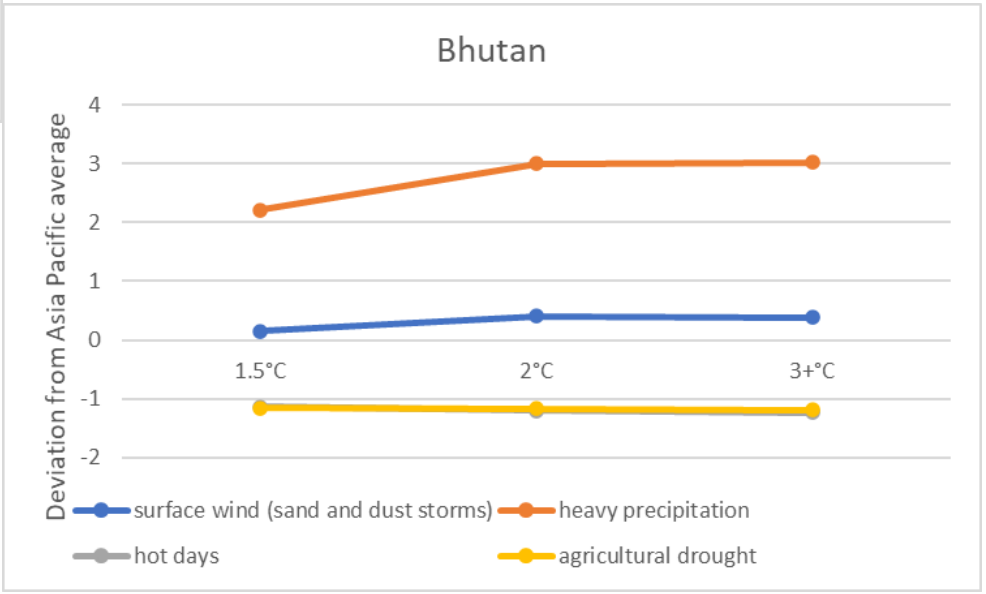
Continued support with translating new CMIP6 models

How does the ECO region and countries fare under 1.5°C, 2°C, and 3+°C global warming?

Relative impacts of weather extremes in the SAARC region at 1.5°C, 2°C and 3°C Global Warming Levels







Differential impacts of weather extremes for countries

What's next in the Portal?

1. Refine risk and resilience analyses for vulnerable population and infrastructure under new CIMP6 and the Shared-Socioeconomic Pathway Models

2. Estimate how climate and disaster resilience solutions can support multiple SDGs

3. Build additional sub-regional risk and resilience profiles upon country request

Thank you

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