

RISK AND RESILIENCE PORTAL

An Initiative of the Asia Pacific Disaster Resilience Network

Bridging the science policy gap for informed disaster and climate action



Asia Pacific Risk & Resilience Portal

Bridging the science policy gap for
informed action

☰ Data Explorer

700+
Datasets

100+
Policy documents

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Officer, Disaster Risk Reduction, ESCAP*



rrp.unescap.org

Impacts of climate-related disasters are record breaking

“Monster Floods” in Pakistan in 2022 attributed to climate change



How can countries lessen and mitigate these impacts?

Three key challenges

1. The contours of Asia-Pacific Riskscape are changing
2. Risk hotspots are intensifying, expanding and leading to complex, compound and cascading impacts
3. Managing climate risk for disaster resilience and sustainable development

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

Impacts of climate change on natural and other biological hazards

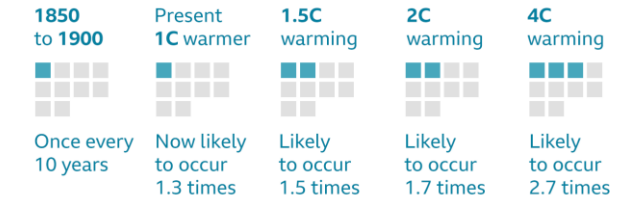
	CLIMATE CHANGE RISK	RELATED BIOLOGICAL AND HEALTH RISKS		
East and East North Asia	China	<ul style="list-style-type: none"> Increase drought Increase precipitation and flooding Increase sea level risk and flooding 	<ul style="list-style-type: none"> Undernutrition due to food insecurity Increase vector-borne disease risks Increase more than 50 million of population exposed to sea level rise 	
	Japan	<ul style="list-style-type: none"> Increase heatwaves Increase precipitation and flooding 	<ul style="list-style-type: none"> Increase excess death due to heatwaves by 0.2% Increase in infectious gastroenteritis cases by 8 % 	
	Mongolia	<ul style="list-style-type: none"> Increase precipitation and flooding 	<ul style="list-style-type: none"> Increase in tick-borne encephalitis 	
	Republic of Korea	<ul style="list-style-type: none"> Increase heatwaves Increase sea level risk and flooding 	<ul style="list-style-type: none"> Increase excess death due to heatwave by 0.3% Increase DALY for cardio and cerebrovascular disease by 131% 	
South-East Asia	Indonesia	<ul style="list-style-type: none"> Increase sea level risk and flooding 	<ul style="list-style-type: none"> Increase more than 50 million of population exposed to sea level rise 	
	Philippines	<ul style="list-style-type: none"> Increase heatwaves Increase sea level risk and flooding 	<ul style="list-style-type: none"> Increase excess death due to heatwaves by 1% Increase more than 50 million of population exposed to sea level rise 	
	Thailand	<ul style="list-style-type: none"> Increase heatwaves 	<ul style="list-style-type: none"> Increase excess death due to heatwaves by 1.9% 	
	Viet Nam	<ul style="list-style-type: none"> Increase heatwaves Increase precipitation and flooding 	<ul style="list-style-type: none"> Increase excess death due to heat by 1.4% Increase more than 50 million of population exposed to sea level rise 	
South and South-West Asia	Afghanistan	<ul style="list-style-type: none"> Increase precipitation and drought 	<ul style="list-style-type: none"> Increase cholera, typhoid, diarrhea and ascariasis Increase malaria and leishmaniasis 	
	Bangladesh	<ul style="list-style-type: none"> Increase precipitation and drought Increase sea level risk and flooding Increase cyclones 	<ul style="list-style-type: none"> Increase in diarrheal incidence rates by 5.6% Increase in dengue Increase in leishmaniasis 	
	Bhutan	<ul style="list-style-type: none"> Increase glacial lake outburst floods, landslides and flash floods 	<ul style="list-style-type: none"> Increase in malaria, dengue, Japanese encephalitis and chikungunya 	
	India	<ul style="list-style-type: none"> Increase drought Increase heatwaves Increase sea level risk and flooding 	<ul style="list-style-type: none"> Undernutrition due to food insecurity Increase in heatwaves related health risks (heatstroke etc.) 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	<ul style="list-style-type: none"> Decrease precipitation Increase drought 	<ul style="list-style-type: none"> Increase in dengue, chikungunya, scrub typhus ; Emerge of Zika virus Undernutrition due to food insecurity 	
	Nepal	<ul style="list-style-type: none"> Increase drought Increase precipitation 	<ul style="list-style-type: none"> Increase incidence of diarrheal Increase in malaria, chikungunya, and dengue, lymphatic filariasis and Japanese encephalitis, Emerge of Zika Virus 	
	Pakistan	<ul style="list-style-type: none"> Increase heatwaves Increase glacial lake outburst flood, severity of monsoons and cyclones and saline intrusion 	<ul style="list-style-type: none"> Increase in geographical range and incidence of vector-borne diseases Increase in water-borne diseases and malnutrition 	
	Sri Lanka	<ul style="list-style-type: none"> Increase drought and flooding 	<ul style="list-style-type: none"> Increase in malaria, dengue, and heat related diseases 	
	North and Central Asia	Russian Federation	<ul style="list-style-type: none"> Increase drought Increase precipitation and flooding 	<ul style="list-style-type: none"> Undernutrition due to food insecurity Increase in tick-borne encephalitis
	Pacific	Australia	<ul style="list-style-type: none"> Increase precipitation and flooding 	<ul style="list-style-type: none"> Increase dengue outbreaks by 16.6% and decrease by 42.3%
Marshall Islands		<ul style="list-style-type: none"> Increase sea level risk and flooding 	<ul style="list-style-type: none"> Freshwater resources affected by 0.4 meter rise in sea level 	
Fiji		<ul style="list-style-type: none"> Increase precipitation and flooding 	<ul style="list-style-type: none"> 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**

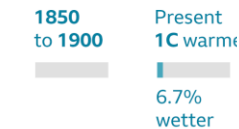
Increase in extreme rainfall

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



Increase in intensity



Source: IPCC, 2021: Summary for

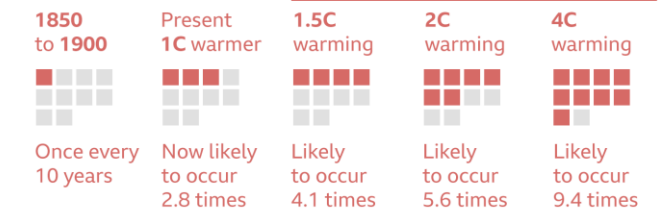
Future global warming levels

Future global warming levels

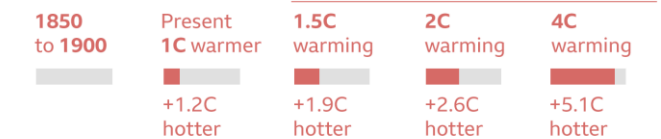
Extreme heat becomes more frequent

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



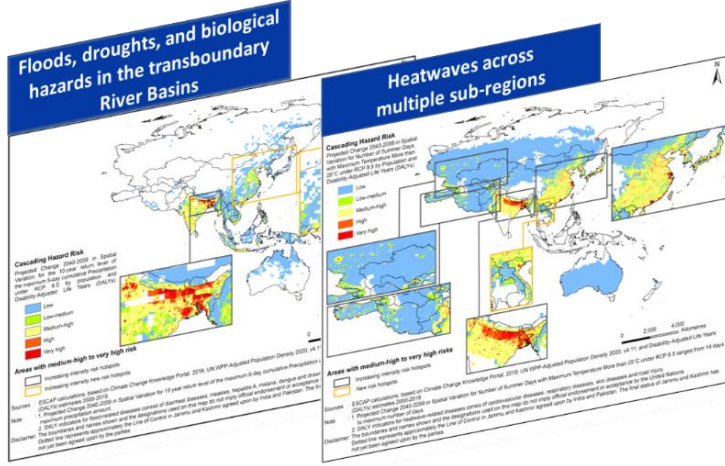
Increase in intensity



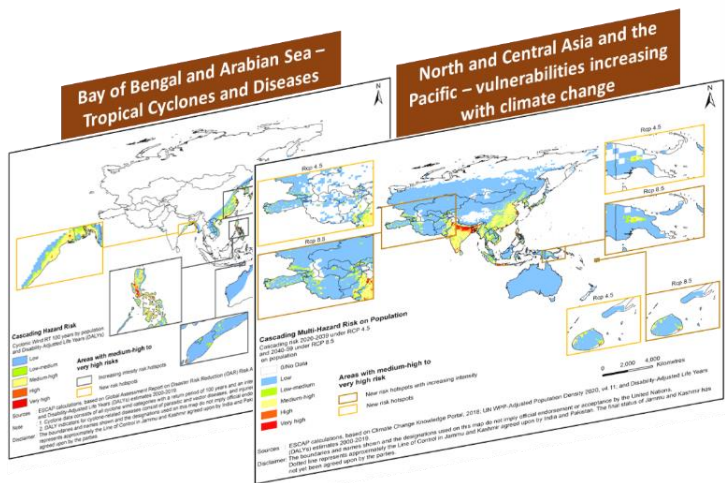
Source: IPCC, 2021: Summary for Policymakers

Asia Pacific Disaster Report 2021 identifies hotspots intensifying and emerging overlaps of natural and biological hazards is imperative for risk informed policymaking

Intensifying hotspots



Emerging hotspots



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Bridging the science policy gap for informed action

HOME HAZARD HOTSPOTS ECONOMIC IMPACT ADAPTATION COST & PRIORITIES DECISION SUPPORT SYSTEM ANALYSIS KNOWLEDGE PRODUCTS

Asia Pacific Risk & Resilience Portal

Bridging the science policy gap for informed action

[95 Data Requests](#)

700+ Dashboards
100+ Policy documents

An initiative of the Asia Pacific Disaster Resilience Network, the **Portal** is a one-stop solution to strengthen risk-information, decision making, catalyze subregional and regional cooperation and monitor progress on achieving multiple SDGs.

Decision Support System

Explore sub-national data in some target countries for evidence-based policy making

[Go to the system](#)

Harnessing new and emerging technologies to reduce risks and more effectively respond to adversity

Hazard Hotspots

The data on hazard exposure and assess the impacts and vulnerabilities for these hazards to develop crisis management and risk mitigation plans helping in hazard preparedness.

[KNOW MORE](#)

Economic Impact

A tool providing an overview of direct economic losses relative to global and gross domestic product as a result of hazards and natural disasters over the years across various regions in Asia-Pacific.

[KNOW MORE](#)

Adaptation Cost and Priorities

Access the graphs and information on cost and priorities of climate adaptation in different Asia-Pacific subregions in order to strengthen resilience, warning systems and preparedness mechanisms.

[KNOW MORE](#)



Challenges must be managed using a Science-Policy-Action Interface

Socio-economic Data



Hazard and climate data



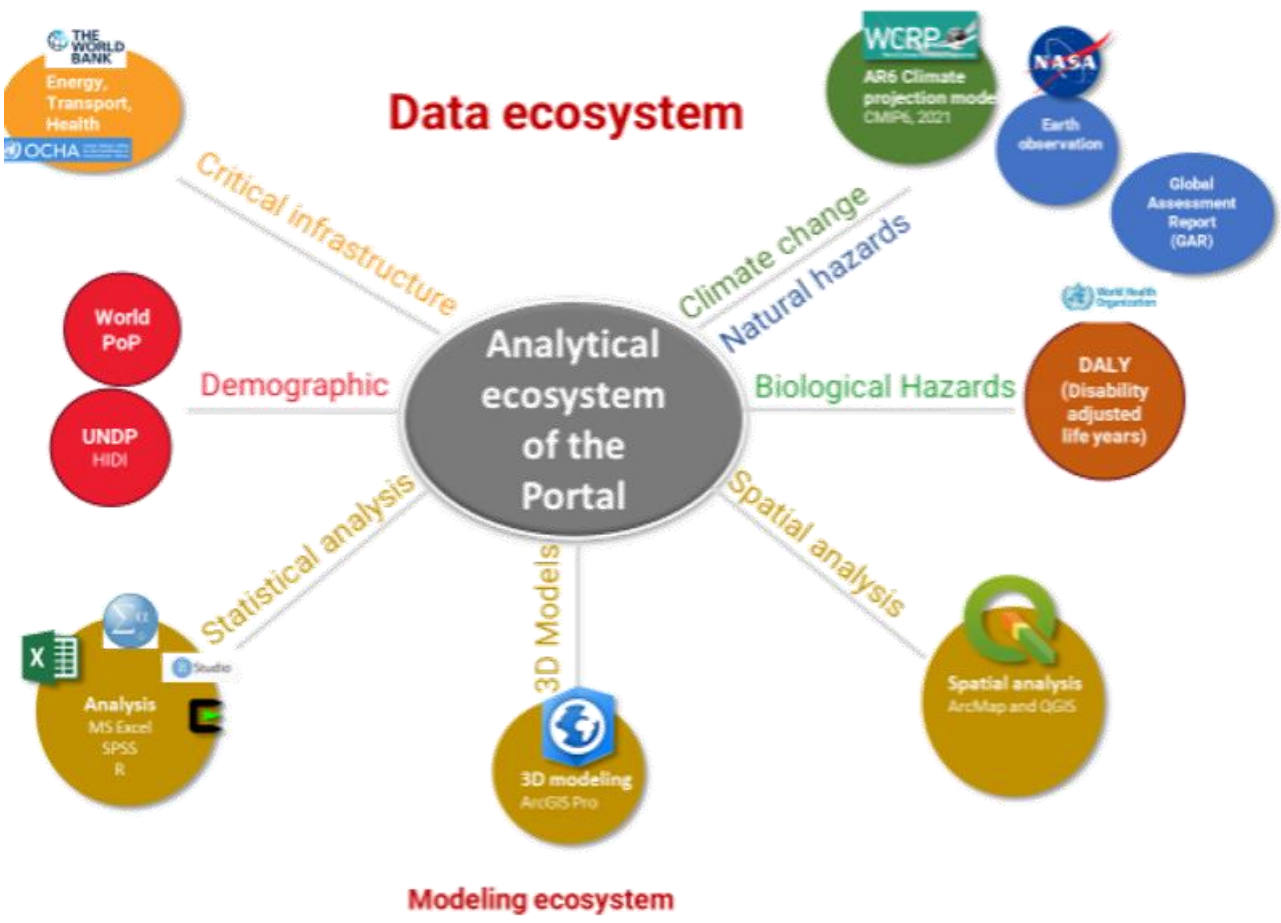
Sectoral data



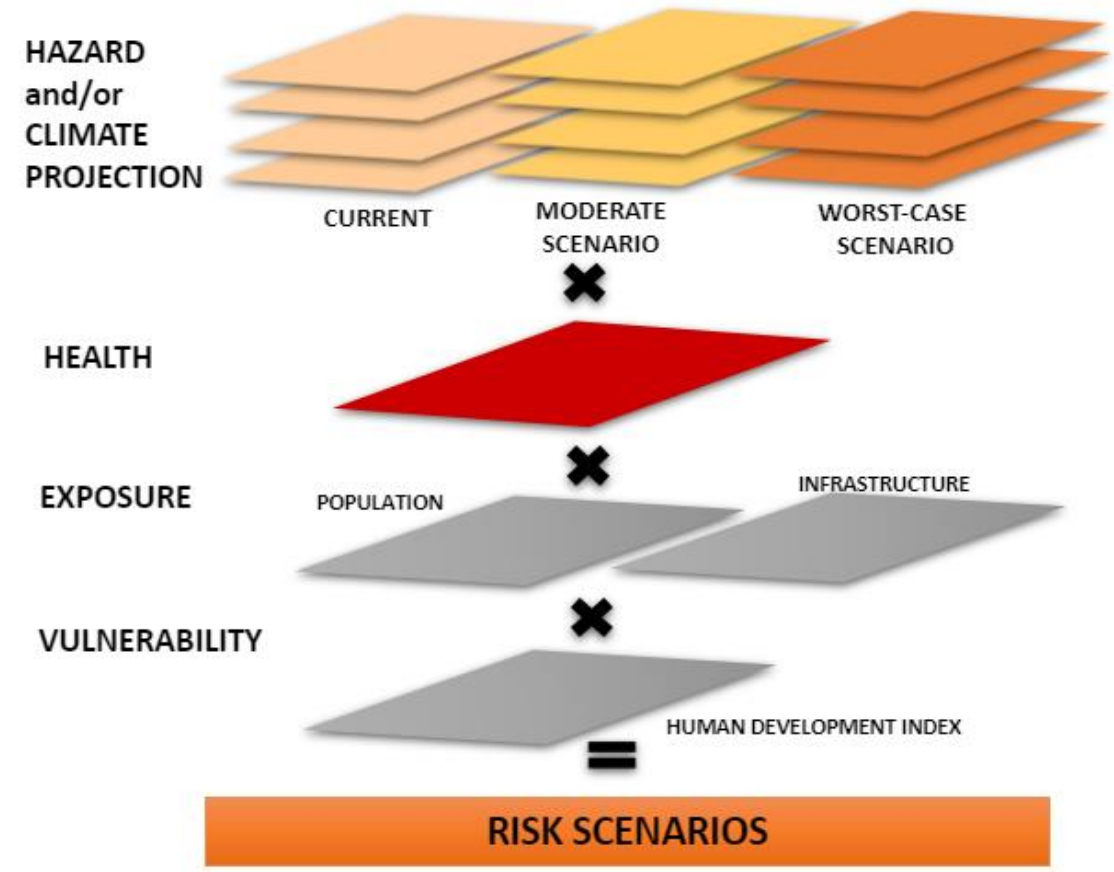
There is a lot of available data on demographics, vulnerability, hazards and climate models but data interoperability is an issue which feeds into the larger issue of data insufficiency

A Science-Policy-Action Interface to manage disaster and climate risk

ONE data ecosystem analyzing **multiple** datasets

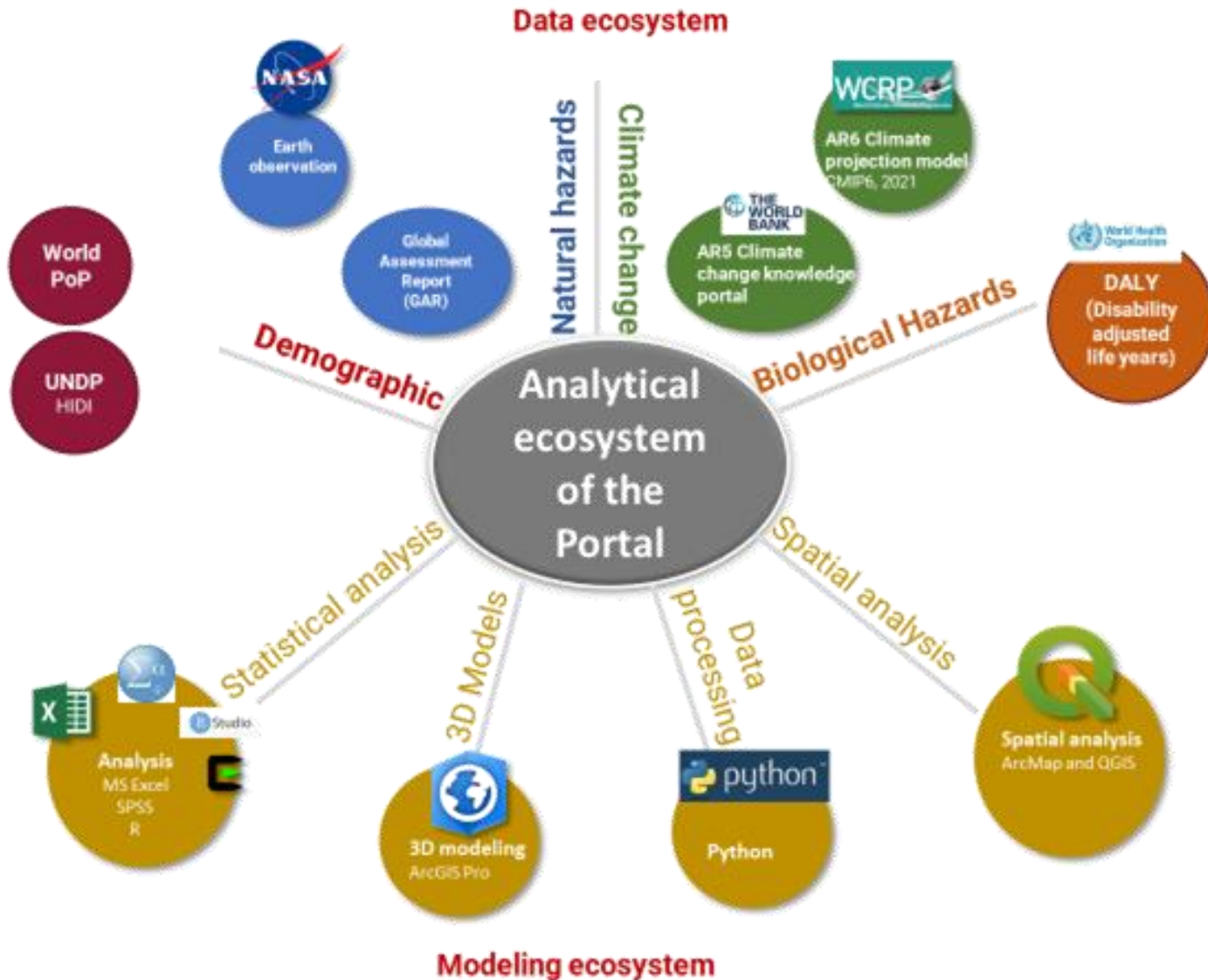


UNIQUE methodology to build climate and disaster **risk scenarios**



The Portal is built on a state-of-the-art data intensive and risk analytics

Analytical ecosystem for measuring vulnerability and exposure in the Portal



DATA TYPES

Vector data (.shp/shapefile)

- Point
- Line
- Polygon (area)

The vector model represents the location and shape of geographic features using points, lines and polygons (and for 3D data also surfaces and volumes), while their other properties are included as attributes (often presented as a table in QGIS) (qgis.org)

Raster data (.tiff/georeferenced tiff)

Delimited text layer data, from spreadsheet (.csv)

ESCAP Risk and Resilience Portal is a Solution to these challenges

HOME HAZARD HOTSPOTS ECONOMIC IMPACT ADAPTATION COST & PRIORITIES DECISION SUPPORT SYSTEM COUNTRY ANALYSIS KNOWLEDGE PRODUCTS

Asia Pacific Risk & Resilience Portal

Bridging the science-policy gap for informed action

Data Explorer

1

Where are the risk hotspots under various climate change scenarios?

100+

2

What are the current and future economic losses from 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?

Home

Hazard Hotspots

Examine the data on hazard exposure and

KNOW MORE

Economic Impact

A tool providing an overview of direct

KNOW MORE

Adaptation Cost and Priorities

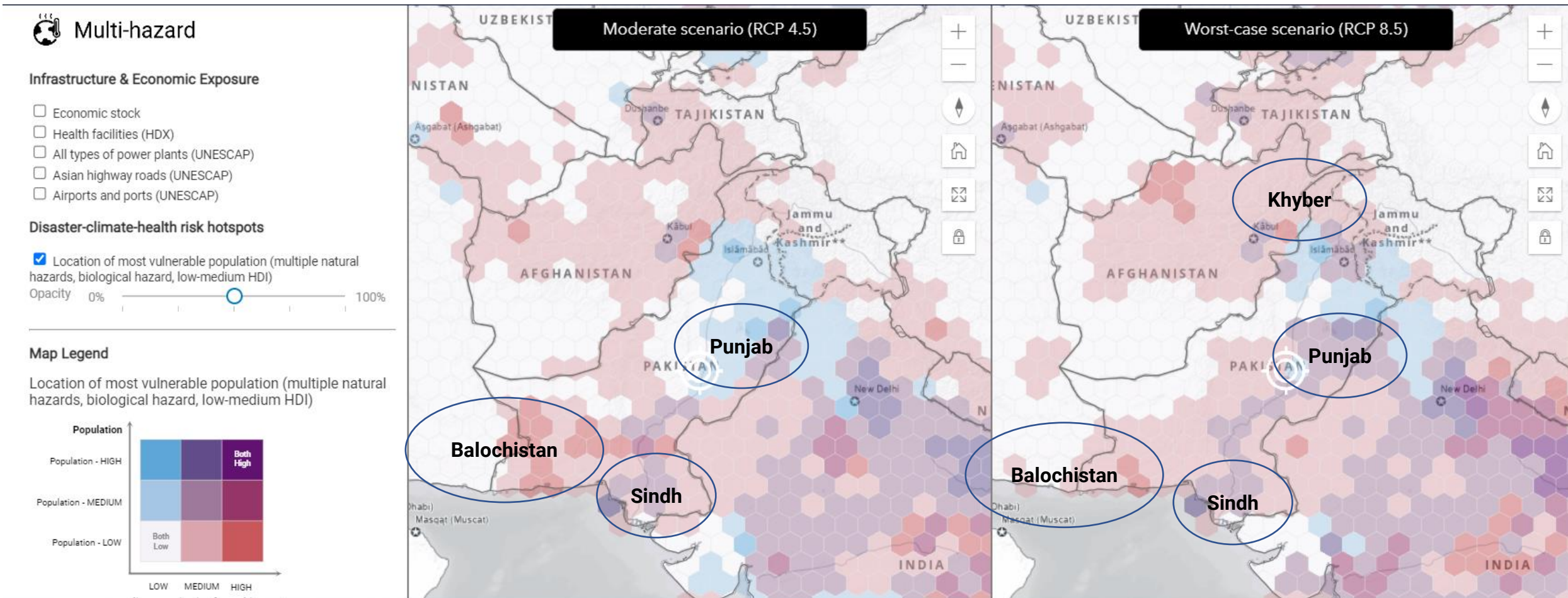
Access the graphs and information on cost
nate adaptation in
subregions in order to
warning systems and
mechanisms.

KNOW MORE



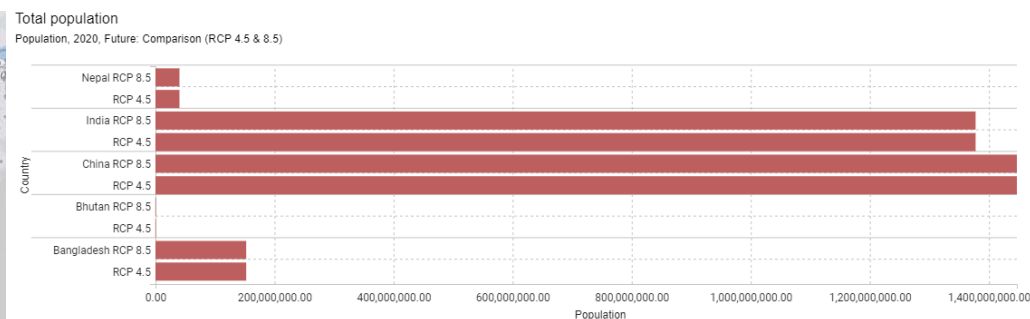
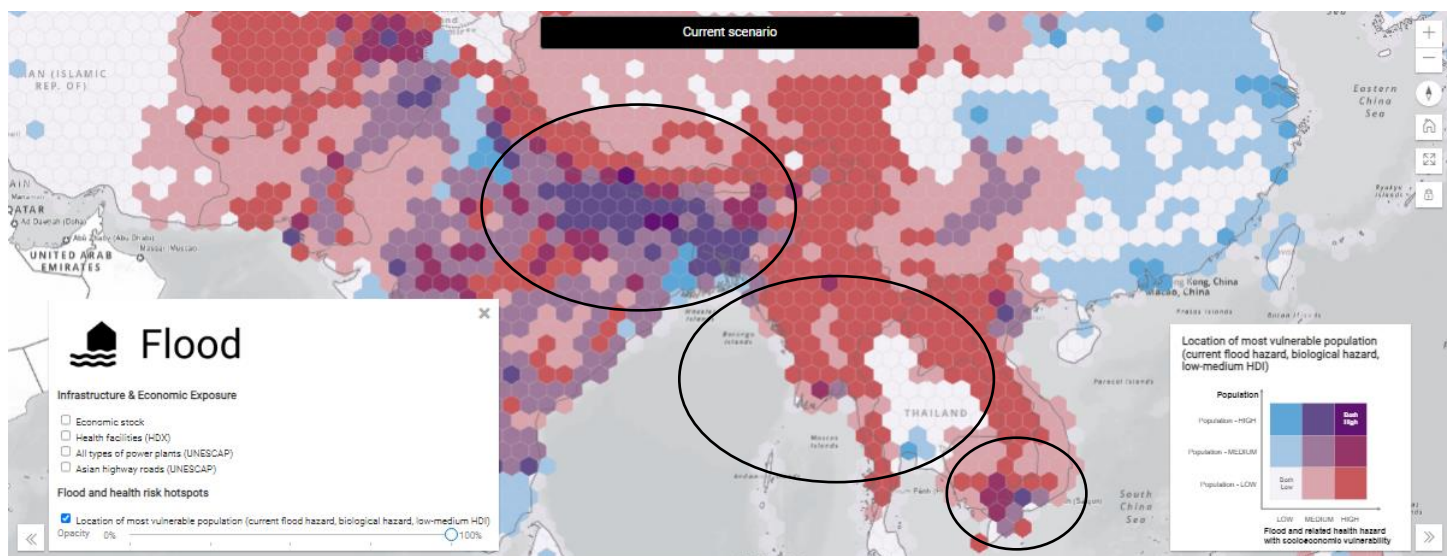
Easy to use, location-based data and analytics for early and anticipatory actions

Locating population at risk



Location of 2022 Pakistan "monster floods" identified in the integrated climate vulnerability models

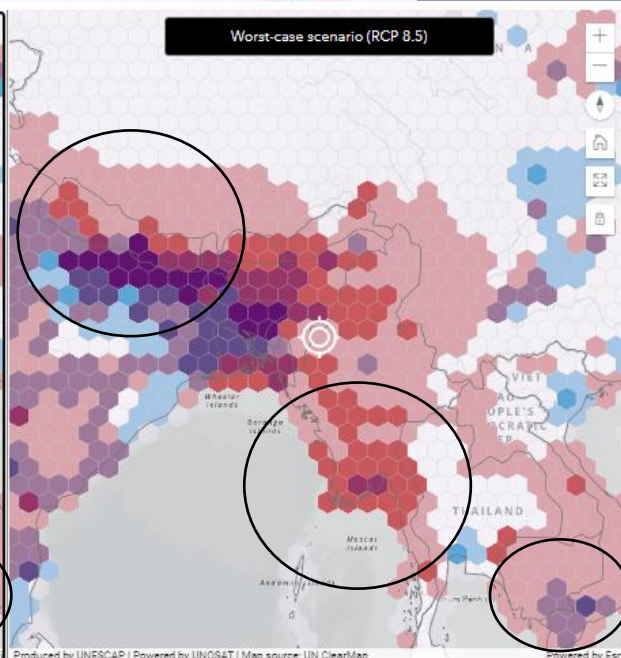
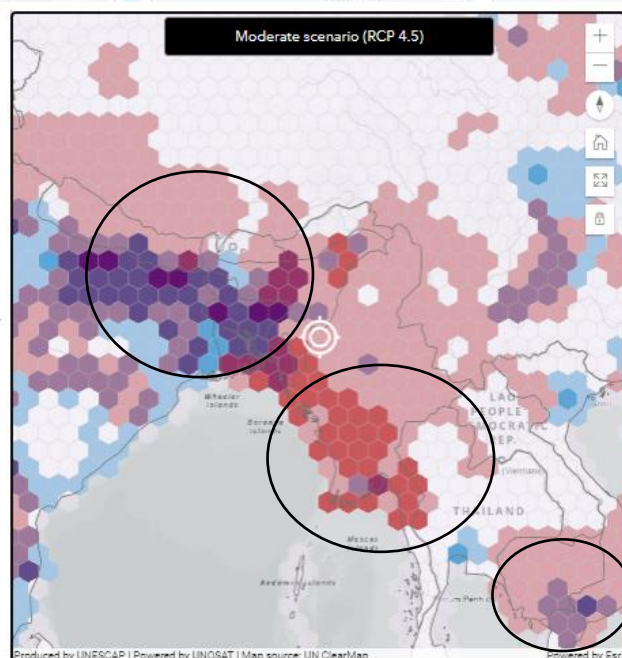
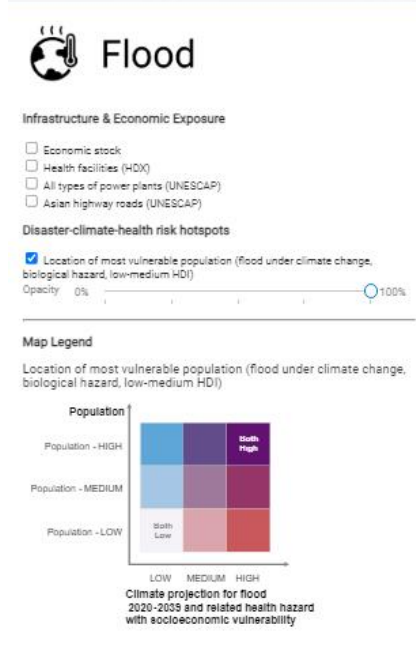
Where and how much of the population exposed under climate change scenarios?



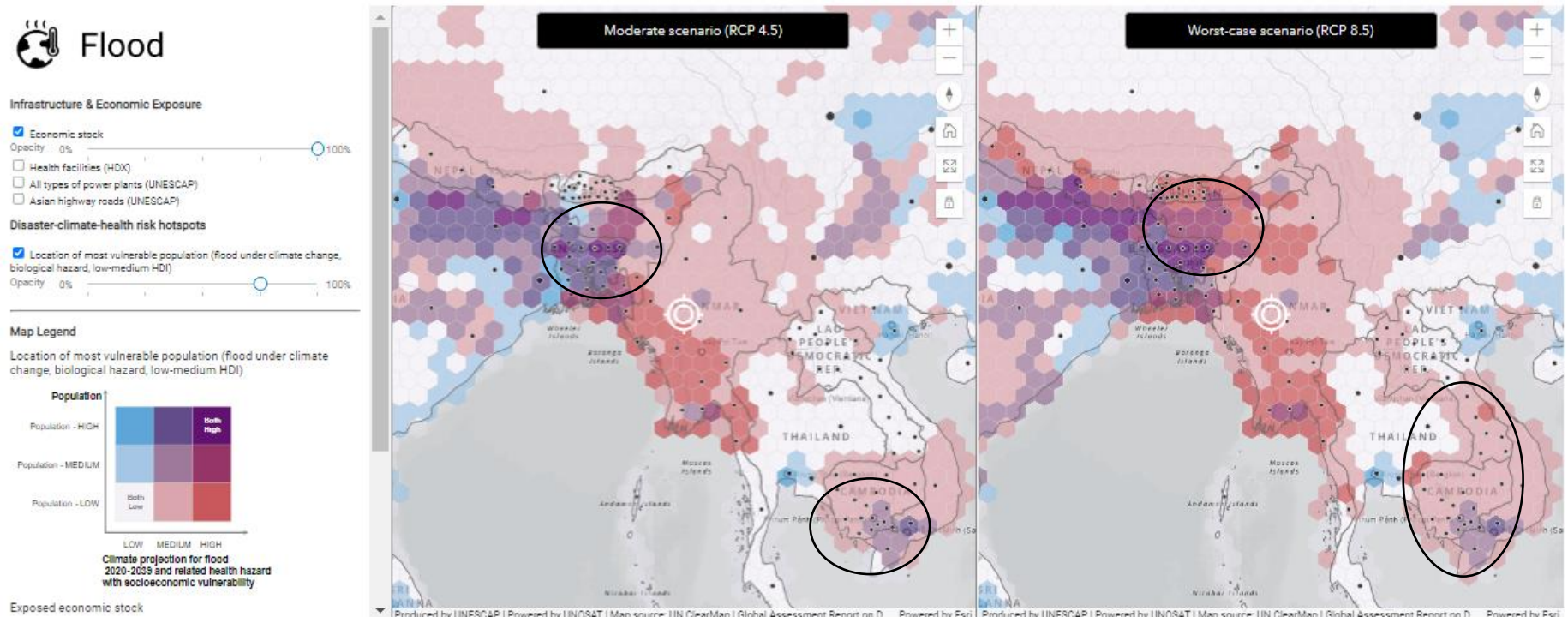
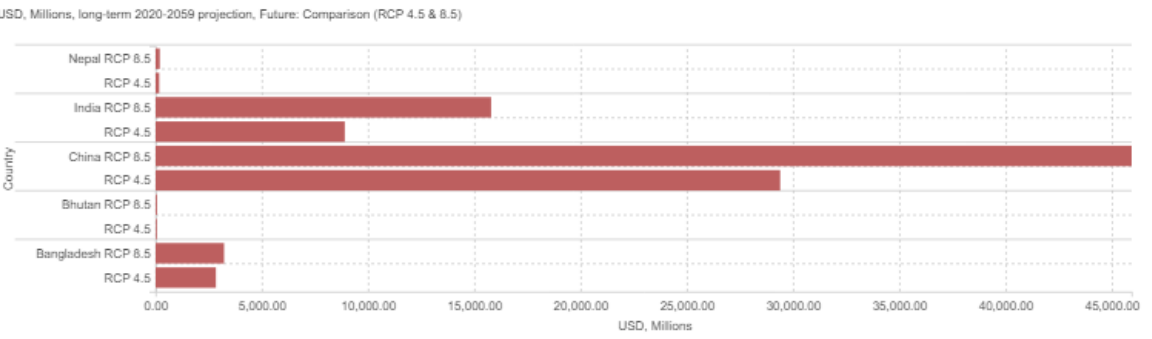
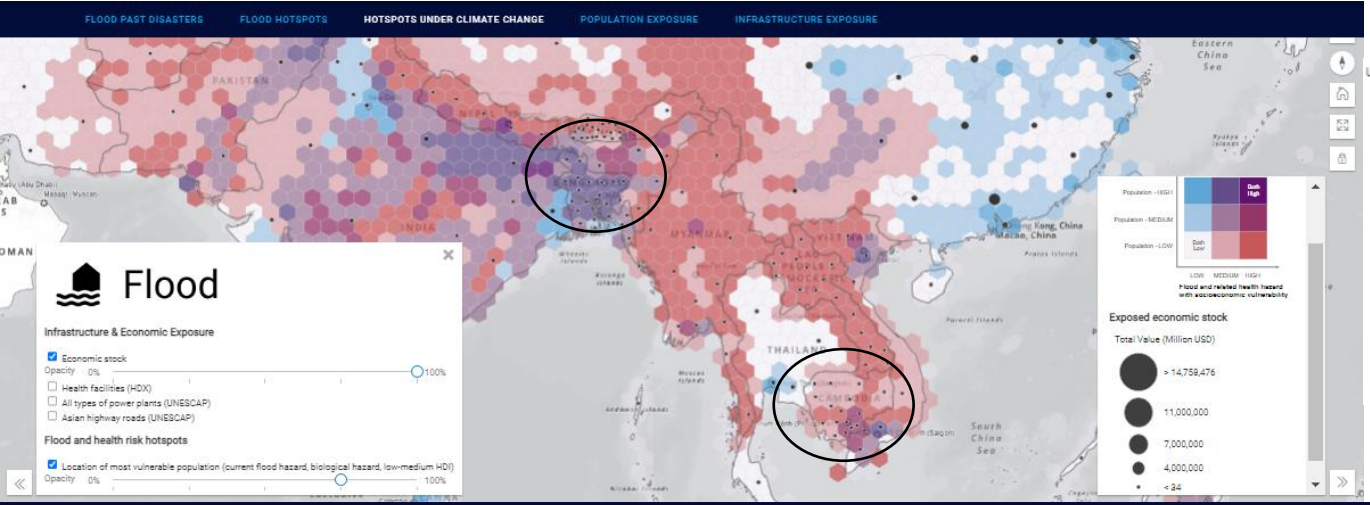
Shows through location-based GIS analysis where the most vulnerable populations will be in the deltas under climate change

As noted previously- there are areas of **emerging and intensifying risks** under climate change which will require in-depth climate knowledge to make evidence-based investments

Currently, the Portal's climate scenarios are based on the RCP climate models but we are in the process of upgrading this to the latest IPCC AR6 models (SSP scenarios)



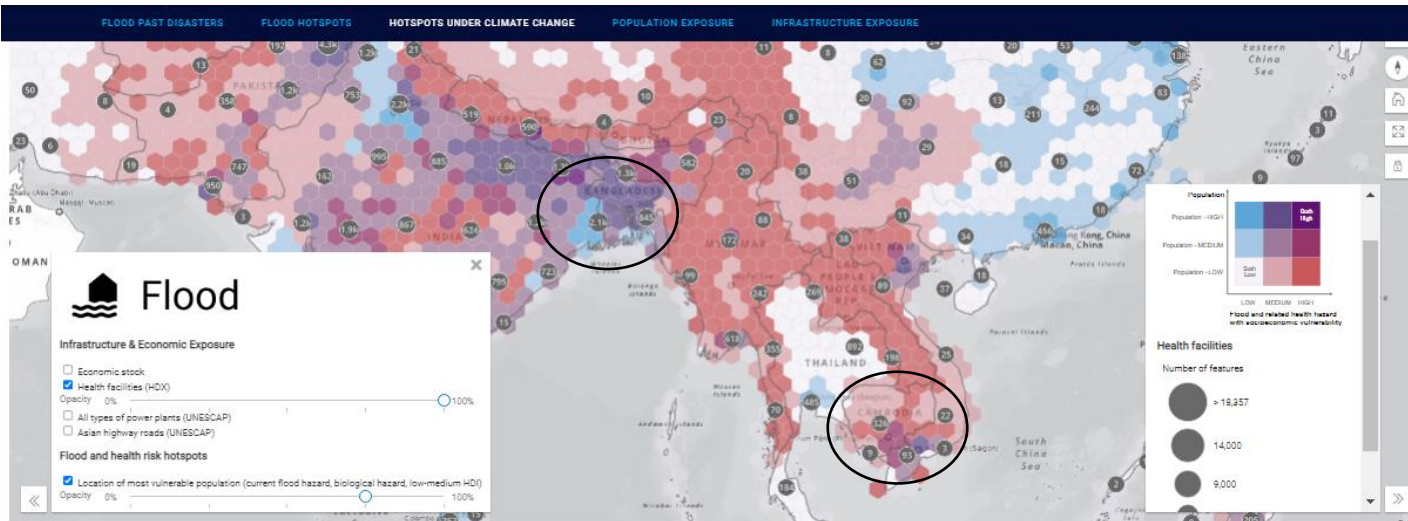
Where and how much of the economic stock exposed under climate change scenarios?



Shows through location-based GIS analysis **where much of the economic stock will be exposed** in the deltas under climate change

Estimates the amount of **economic loss** under various climate change scenarios for the countries in the deltas

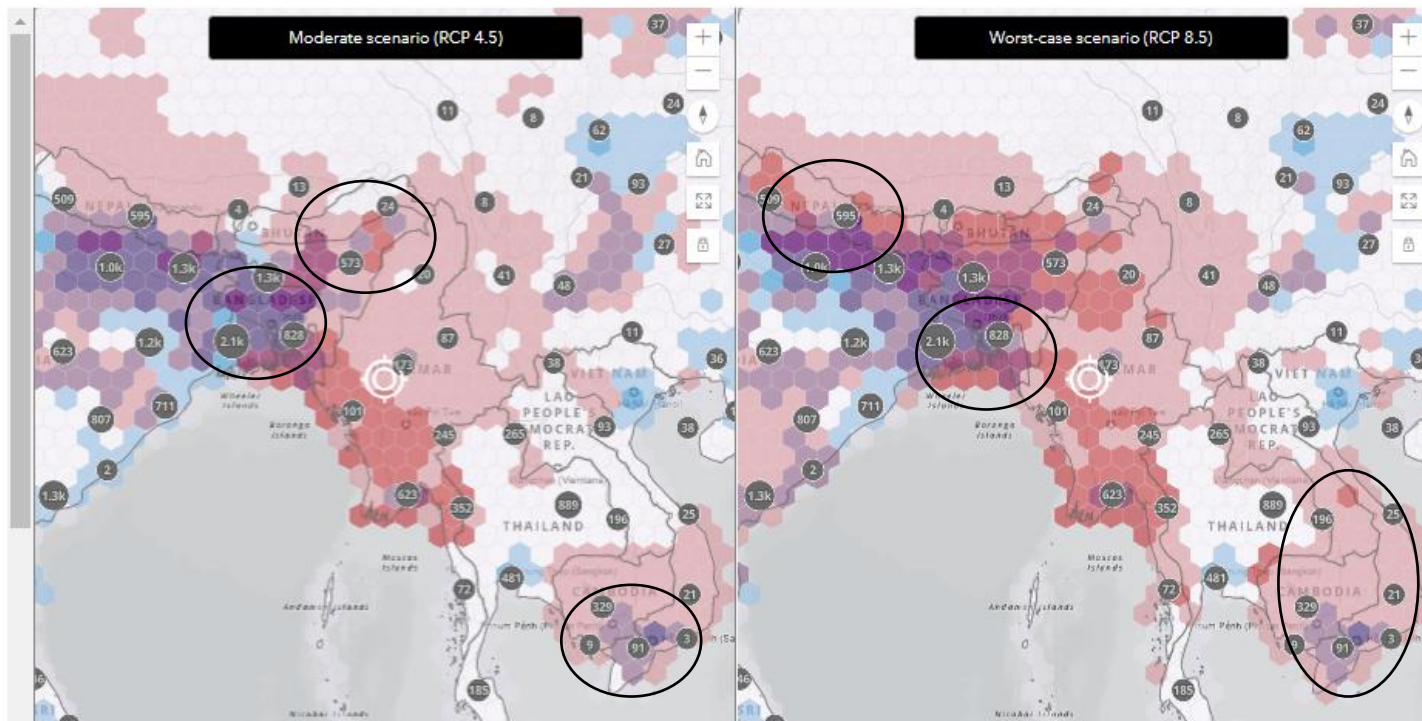
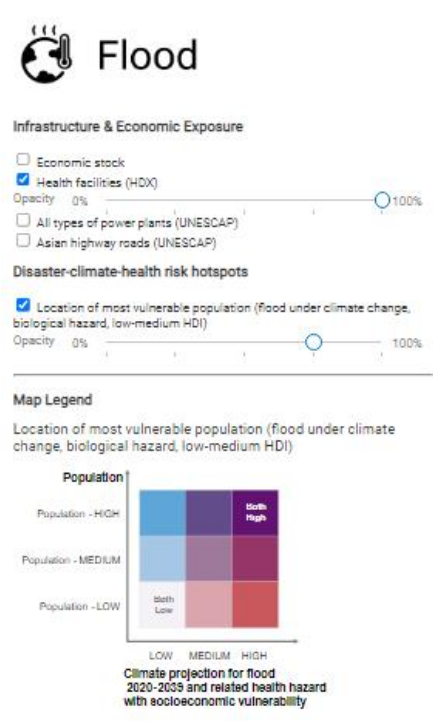
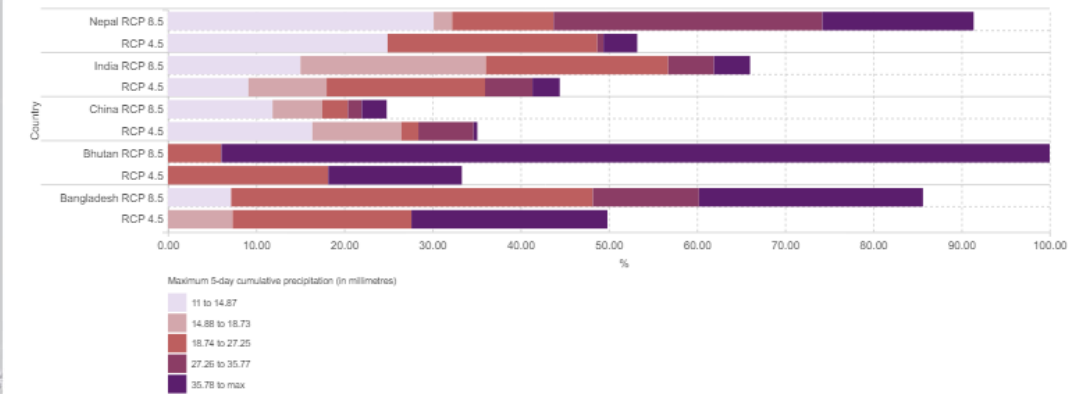
Which sectors are most impacted and exposed under climate change scenarios?



Infrastructure exposure to flood under current scenario, moderate (RCP 4.5) and worst case (RCP 8.5) climate change scenario

Health facilities exposed to flood

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



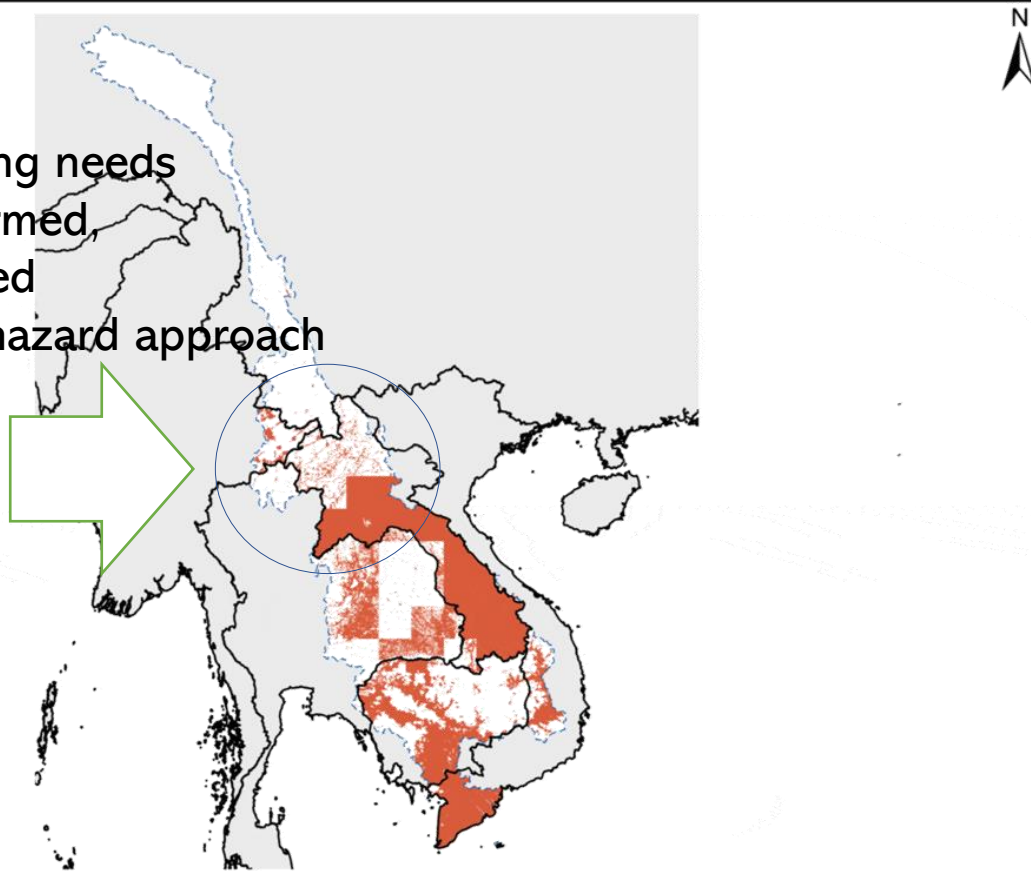
Shows through location-based GIS analysis **where much of the critical infrastructure (like health facilities) will be exposed** under climate change

Estimates the number of **vulnerable critical infrastructure** under various climate change scenarios for the countries

Analytics for transboundary risk to support **“Early Warning for All”**

Emerging hotspots of population vulnerability in Mekong Basin (Baseline, 1.5°C, 2°C)

Early warning needs to risk informed impact based with multi-hazard approach



Hotspots of Cascading Hazard Risk
Baseline (1995-2014)

- International boundary
- - - Mekong basin

Sources : ESCAP calculations based on IPCC WGI Interactive Atlas - Coupled Model Intercomparison Project Phase 6 (CMIP6) 2021; WorldPop 2020 Population Estimates; Disability-Adjusted Life Years (DALYs) estimates 2000-2019; and UN Geospatial.

- Notes :
1. Cascading Hazard Risk is obtained from weighted overlay of the Projected Spatial Variation for Maximum 5-day precipitation amount with baseline scenario 1995-2014, by Population and Disability-Adjusted Life Years (DALYs).
 2. The selected range for the Annual Maximum 5-day precipitation is from 55 mm to the maximum 227 mm, under baseline scenario 1995-2014.
 3. DALY indicators for flood-related diseases consist of diarrheal diseases, measles, hepatitis A, malaria, dengue and drowning.

Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

To close the largest gaps, the EWS initiatives for adapting to climate change have to understand the changing geography of water related hazards and use dynamic risk assessments

Establish early warning systems and enhance communication strategies **now** will build resilience and could potentially mitigate the impacts of future 'monster floods'

Comprehensive historical damage and loss risk profiles for 55 countries in Asia Pacific

Maldives

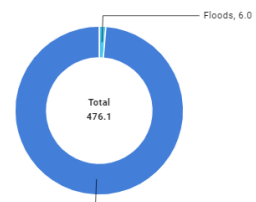
Disaster Data

Past disasters (EM-DAT) (1970 - 2021)

	Number of events (Events)	Number of deaths (People)	Number of affected (People)	Number of damaged (USD, Millions)
Floods	3		3,749	6.0
Tropical cyclone	1		1,320	
Tsunami	1	102	27,214	470.1

How much are historical damages?
How much are historical losses?
Which hazard have the highest loss and damage?
...and more

Number of damaged
All hazards, in USD, Millions

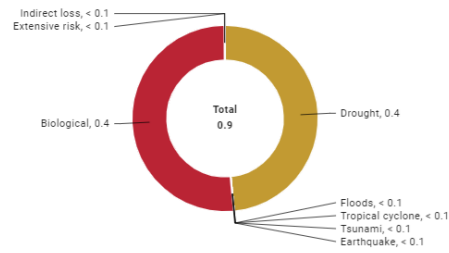


Disaster Risk

Average Annual Loss (AAL), Current

	USD, Millions	% GDP
Drought	22.2	0.4
Floods	0.0	0.0
Tropical cyclone	0.0	0.0
Tsunami	0.1	0.0
Earthquake	0.0	0.0
Biological	23.5	0.4
Extensive risk	0.0	0.0
Indirect loss	0.0	0.0
All hazard	45.8	0.9

Average Annual Loss (AAL), Current
All hazards, in % GDP

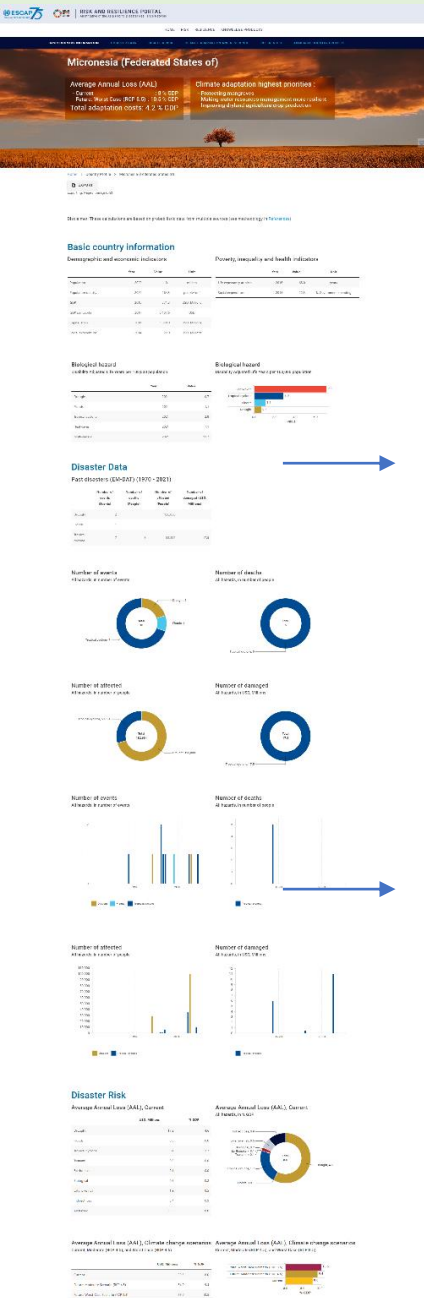


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HOME RISK RESILIENCE KNOWLEDGE PRODUCTS

- Afghanistan
- American Samoa
- Armenia
- Australia
- Azerbaijan
- Bangladesh
- Bhutan
- Brunei Darussalam
- Cambodia
- China
- Cook Islands
- D.P.R. Korea
- Fiji
- French Polynesia
- Georgia
- Guam
- India
- Indonesia
- Iran (Islamic Rep. of)
- Japan
- Kazakhstan
- Kiribati
- Kyrgyzstan
- Lao P.D.R.
- Malaysia
- Maldives
- Marshall Islands
- Micronesia (F.S)
- Mongolia
- Myanmar
- Nauru
- Nepal
- New Caledonia
- New Zealand
- Niue
- Northern Mariana Islands
- Pakistan
- Palau
- Papua New Guinea
- Philippines
- Republic of Korea
- Russian Federation
- Samoa
- Singapore
- Solomon Islands
- Sri Lanka
- Tajikistan
- Thailand
- Timor-Leste
- Tonga
- Turkiye
- Turkmenistan
- Tuvalu
- Uzbekistan
- Viet Nam
- Vanuatu

Estimates of future annual average loss and adaptation priorities for resilience

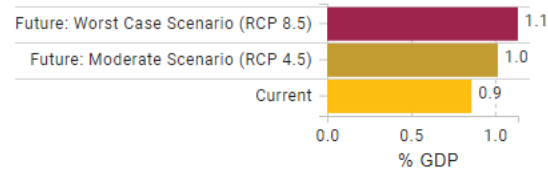


Maldives

Average Annual Loss (AAL), Climate change scenarios Current, Moderate (RCP 4.5), and Worst Case (RCP 8.5)

	USD, Millions	% GDP
Current	45.8	0.9
Future: Moderate Scenario (RCP 4.5)	54.2	1.0
Future: Worst Case Scenario (RCP 8.5)	60.5	1.1

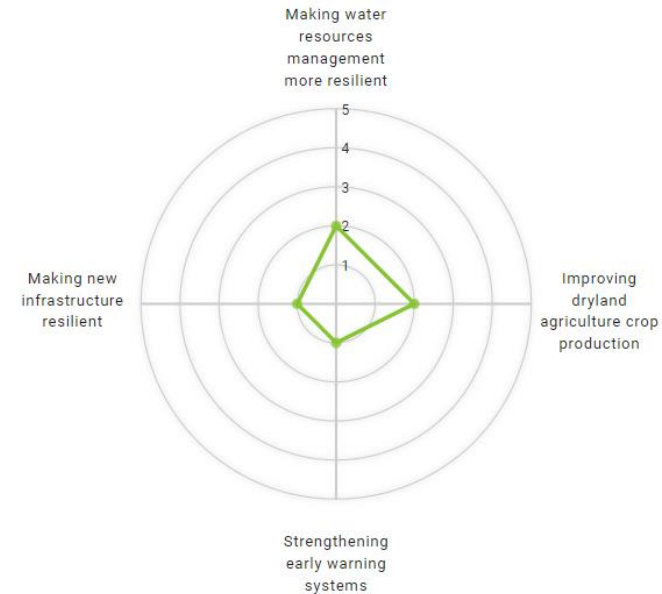
Average Annual Loss (AAL), Climate change scenarios Current, Moderate (RCP 4.5), and Worst Case (RCP 8.5)



Climate Adaptation

	Priority score / 5	USD, Millions	% GDP
Making water resources management more resilient	2	0.0	0.0
Improving dryland agriculture crop production	2	0.0	0.0
Strengthening early warning systems	1	0.0	0.0
Making new infrastructure resilient	1	0.0	0.0

Climate Adaptation Priorities



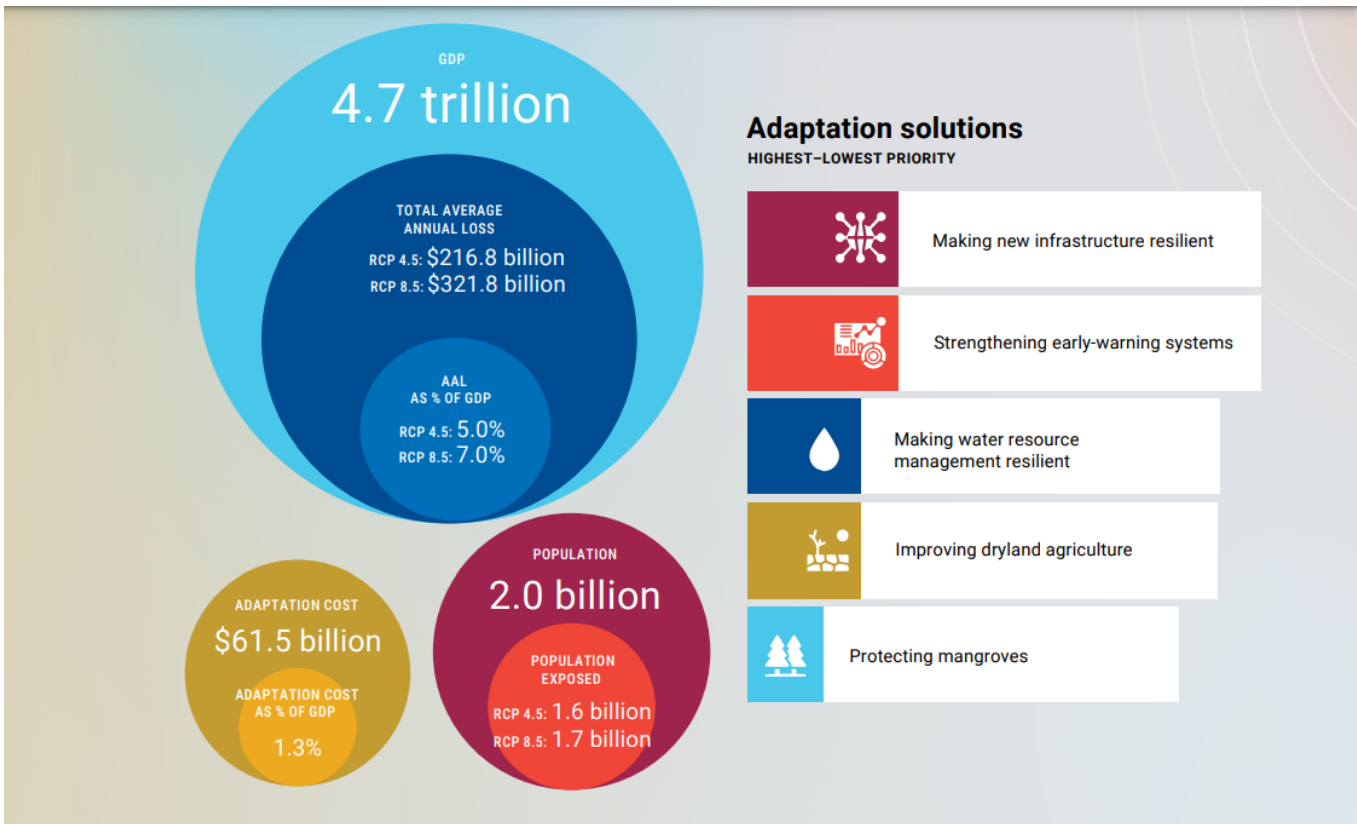
How much will be climate related losses?

Which hazard will have the highest losses under climate change?

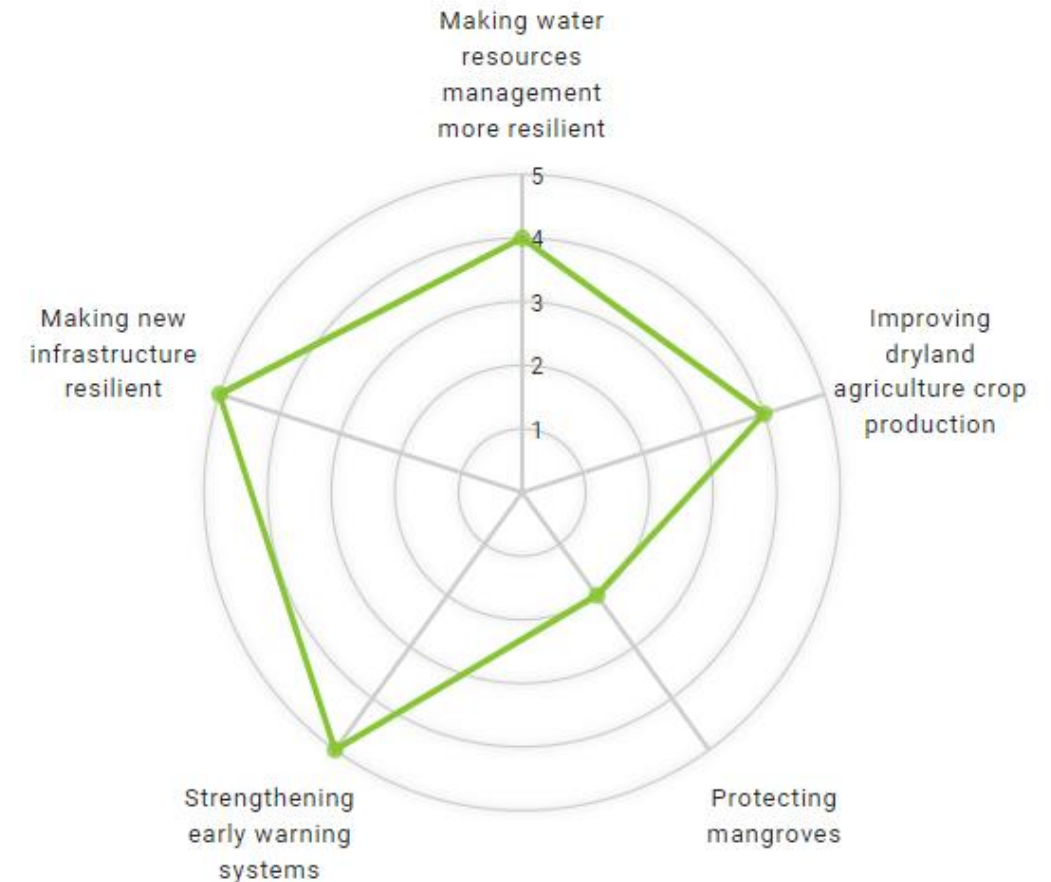
...and more

The Portal uses risk analytics to provide **policy actions at regional, subregional and national levels**

South and South-West Asia priorities for adaptation under climate change



Pakistan climate adaptation priorities for implementing the Sustainable Development Goals



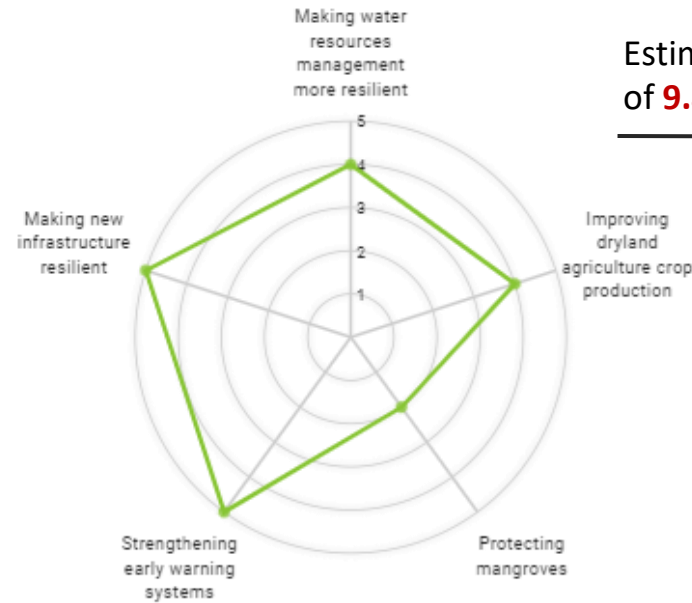
Helping countries inform their VNR, NAP, DRR and Climate Strategies

Building resilience for floods in Pakistan

Climate Adaptation

	Priority score / 5	US Dollars, Millions	% GDP
Making water resources management more resilient	4	996.7	0.4
Improving dryland agriculture crop production	4	996.7	0.4
Protecting mangroves	2	498.4	0.2
Strengthening early warning systems	5	1,245.9	0.4
Making new infrastructure resilient	5	1,245.9	0.4

Climate Adaptation Priorities

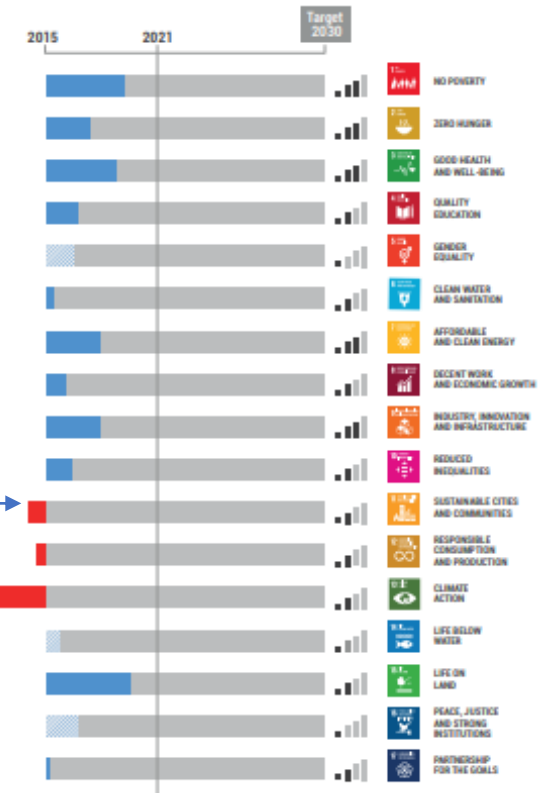


Using the risk profile, we estimate **adaptation priorities** and **adaptation costs** for Pakistan

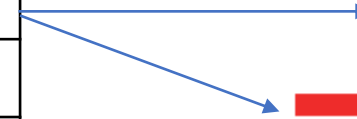
Estimated adaptation cost is **1.8% of GDP** compared to estimated losses of **9.8% of GDP** under climate scenarios

South and South-West Asia

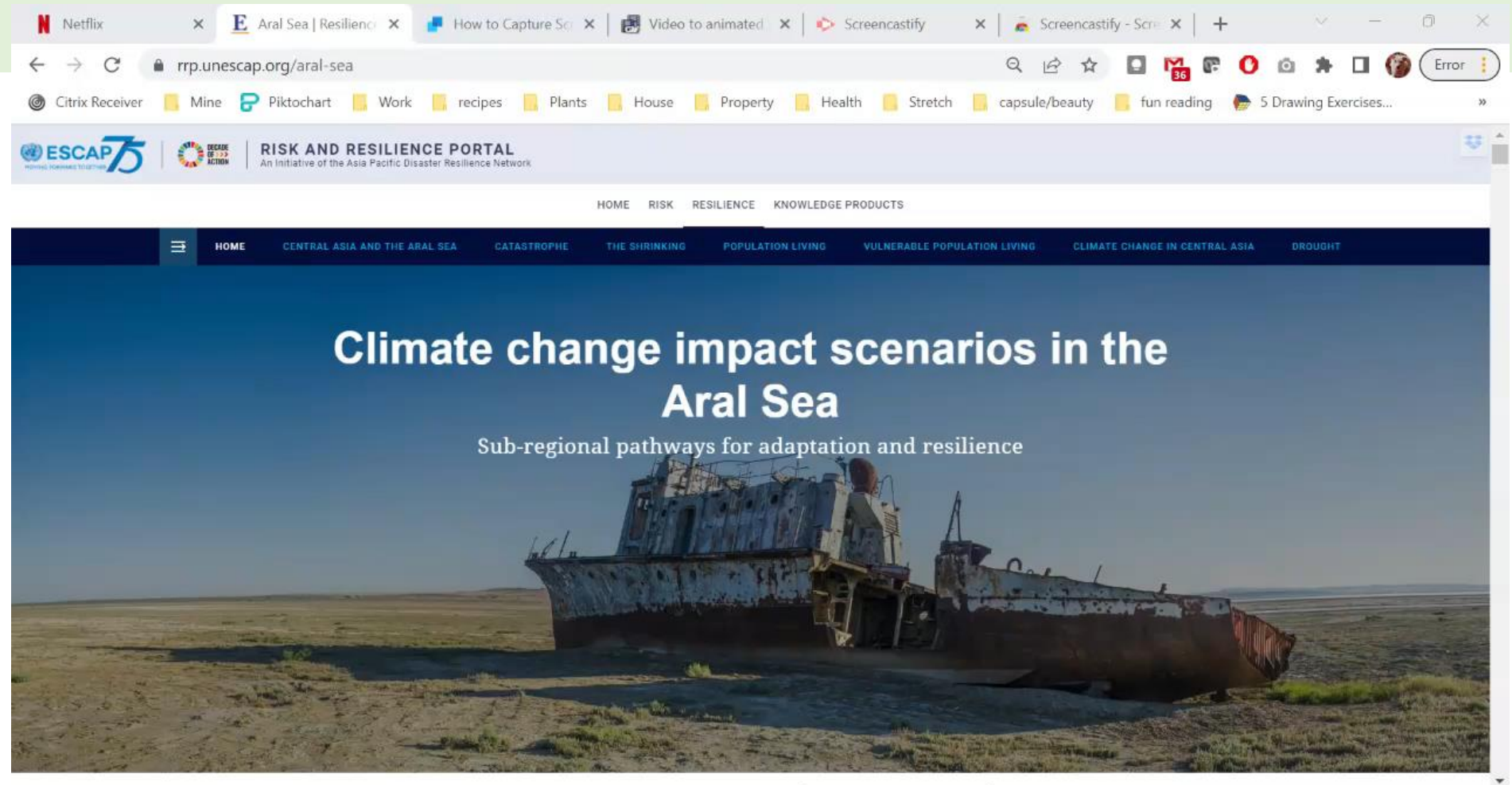
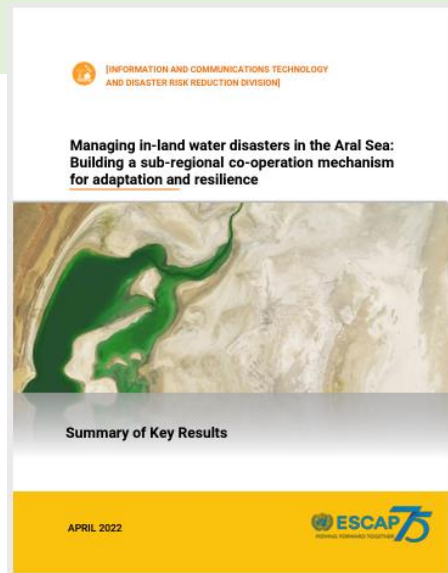
Snapshot of SDG progress in South and South-West Asia, 2021



Top 3 Adaptation Priority	NDC Priority sectors
Strengthening early warning systems	Agriculture, water, land, human health
Making new infrastructure resilient	Agriculture, human health, water
Making water resource management more resilient	Agriculture, Natural ecosystems



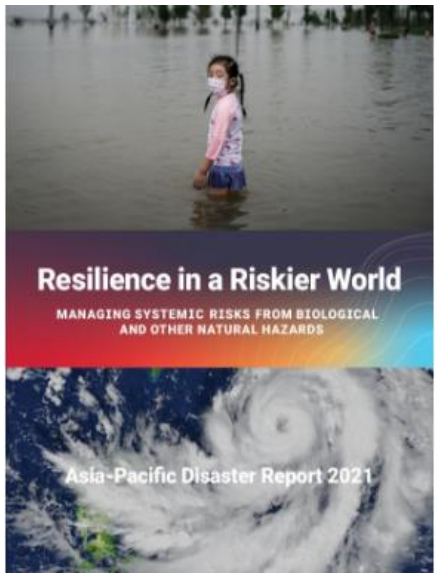
Developing innovative communication products using newest tools in data science and visualization- Example, Aral Sea



Links risks from warming to resilience, adaptation and SDGs for a transboundary hazard that requires subregional cooperation
We are using 3D modeling to visualize the risks

The Portal enables scientific Analytical Research and Publications

- ✓ Support to risk informed development policies
- ✓ financing for climate change adaptation and building disaster resilience



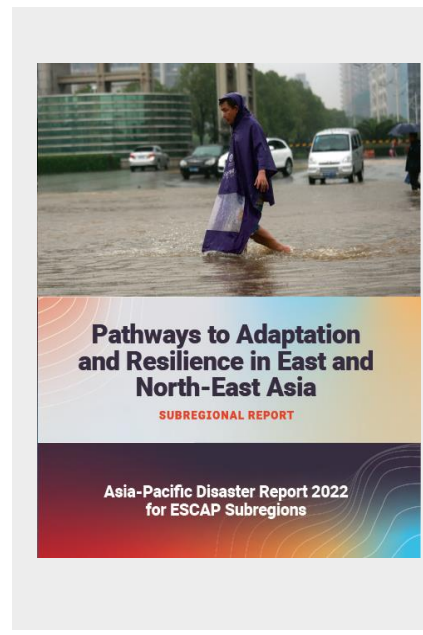
Asia-Pacific Disaster Report 2021



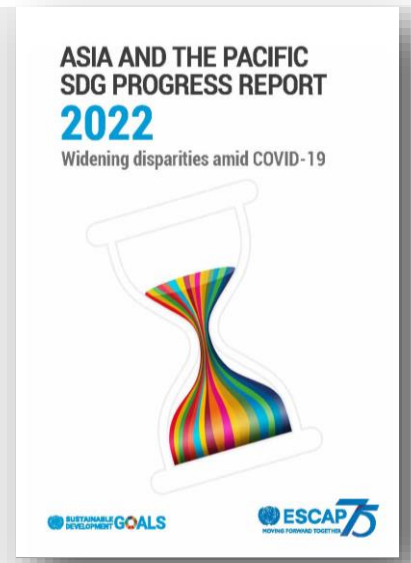
APDR Summary for Policymakers



APDR Subregional Reports and other flagships



Partner reports:
WMO State of Climate (2021) – Asia and Southwest Pacific Reports to launched @ COP27



Successful Applications

Country Level

Bhutan

Common Country Assessment Framework

Lao People's Democratic Republic

National DRR Strategy

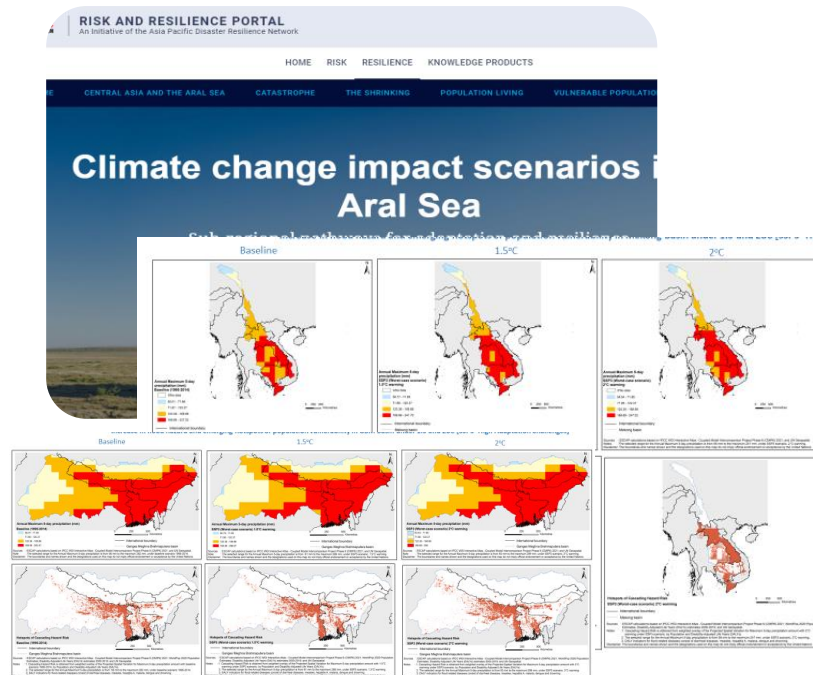
Papua New Guinea

Transport and agriculture sector

Pakistan

National Adaptation Plan

Sub-regional cooperation

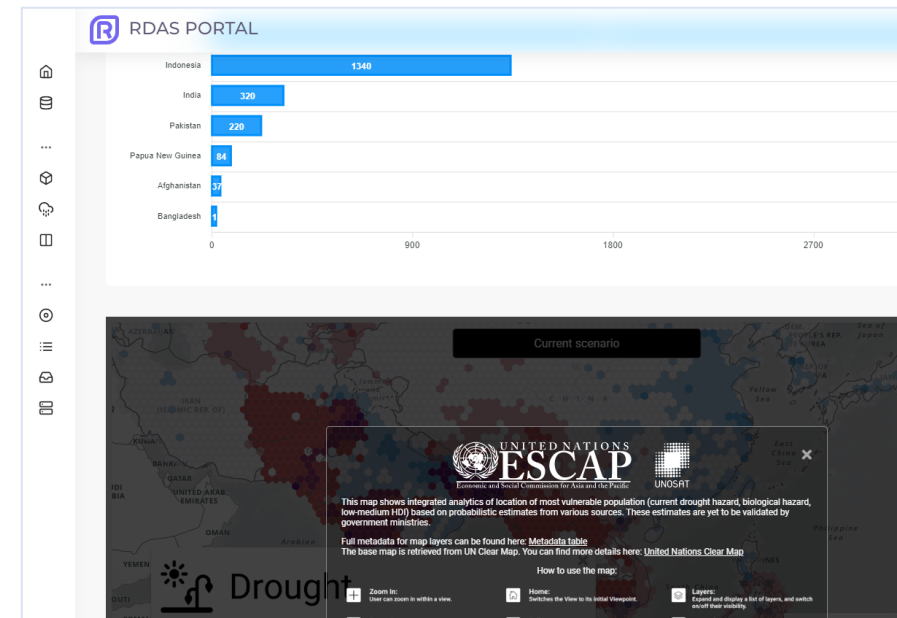


Aral Sea

Mekong River Basin

Ganga-Bhramhaputra-Meghna River Basin

Partnerships



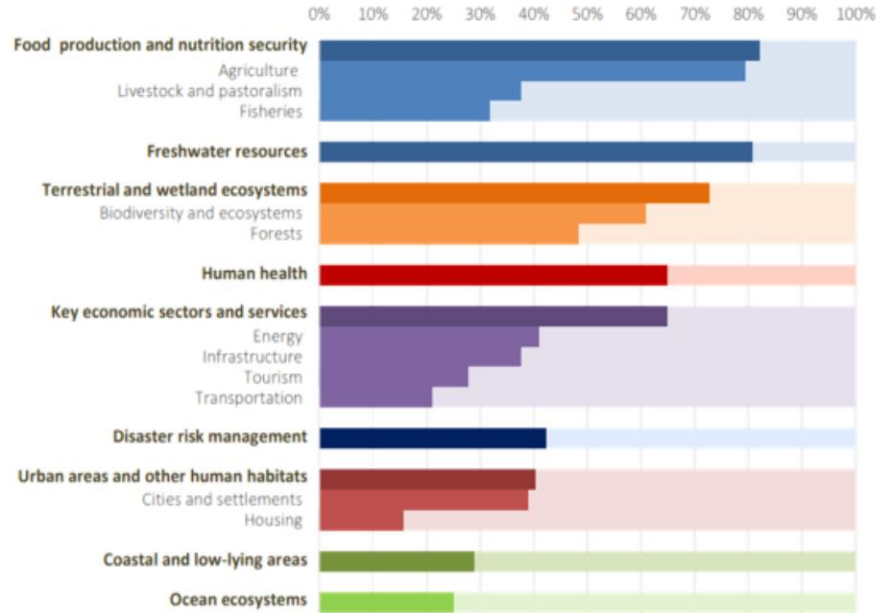
Synergized into World Bank/RIMES Data Portal- Regional Resilience Data and Analytics Service (RDAS)

What's next

Deepen sectoral science-policy interface for resilient food and energy systems

Adaptation Priorities of 191 Parties to Paris Agreement, COP26 2021

Share of adaptation components of nationally determined contributions referring to specific adaptation priority themes linked to the SDGs



Disaster and climate SDG Action tracker



Deepen understanding of L&D estimation

The new "loss and damage" fund Understanding Loss and Damage Assessment



Needs assessment models

Estimate the expenditure needed to rebuild and recover after disasters (e.g. DaLA model; PDNA model)

Economic and social costs

Risk assessment models

Cost-benefit analysis of climate risk reduction strategies (e.g. Hazus-MH, CATSIM)

Economic costs

Catastrophe risk models

Predict L&D based on the analysis of past disasters and insurable goods (mostly used by insurance companies)

Economic costs

Economic models

Econometric studies using damage functions or input-output models

Economic costs

Attribution models

Identify human influence on climate events, extrapolated to measure the magnitude of social, economic, and environmental impacts

Economic, social and environmental costs

ESCAP through its analytical research (Asia-Pacific Disaster Report 2023), capacity development (Risk and Resilience Portal) and in partnership with key stakeholders will deepen the understanding of L&D estimation

A photograph of three children in a rural setting. The child in the foreground is a young girl with a bright red knitted hat and a red sweater, smiling broadly. Behind her are two other children, a girl and a younger child, also smiling. The background shows a stone wall and some debris.

Thank you!

Acknowledgement:

12th Tranche of the Development Account “Operationalizing DRR and Resilience Building in Asia and Pacific”

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