

SESSION 7

ROLE OF EVIDENCE AND RESEARCH IN SOCIAL PROTECTION

Building Block 4: Programmes and Delivery Systems for Adaptive Social Protection

Topic: Climate Risk Assessments and development of Climate Risk Profiles

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Why Climate Risk Analysis?

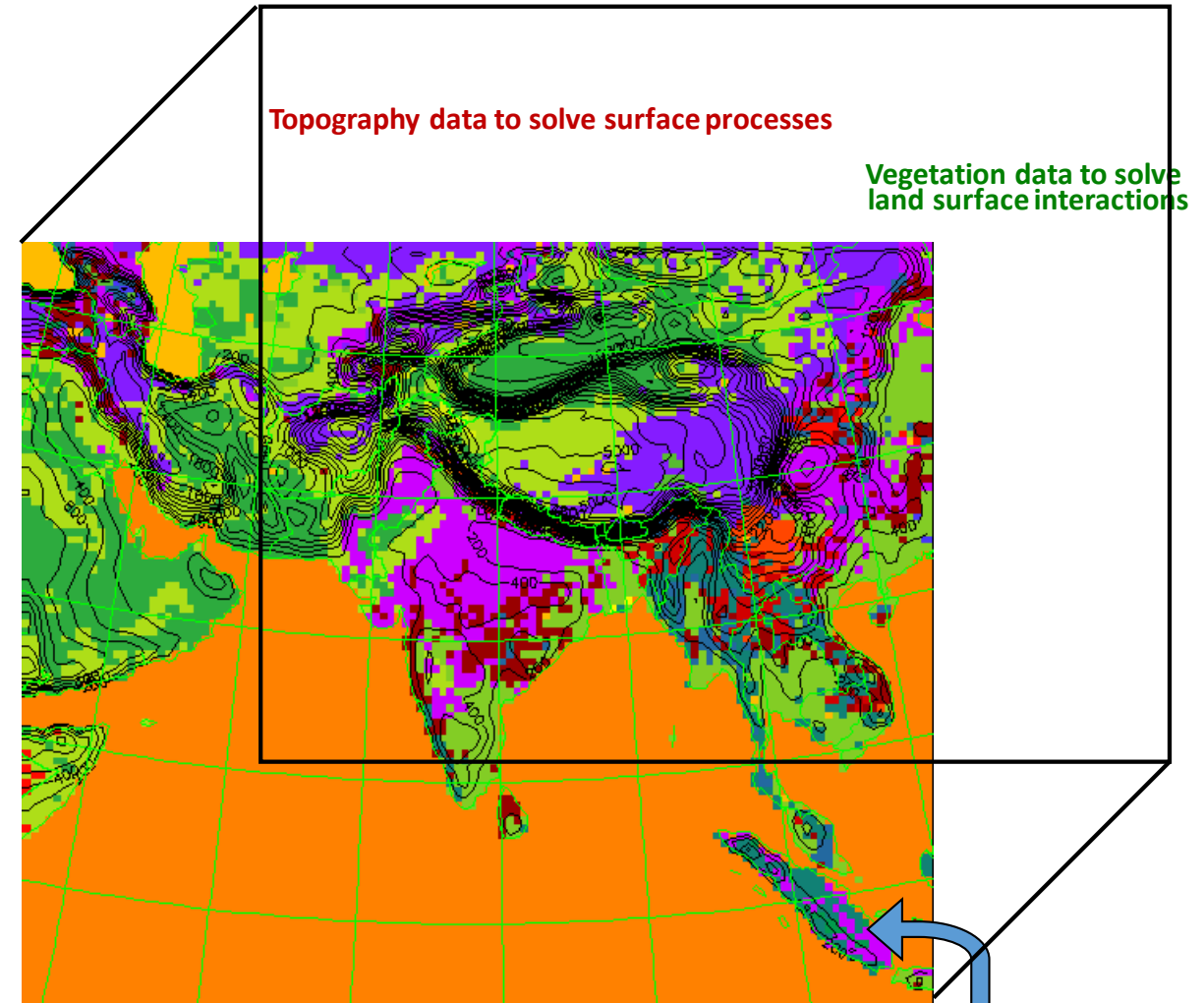
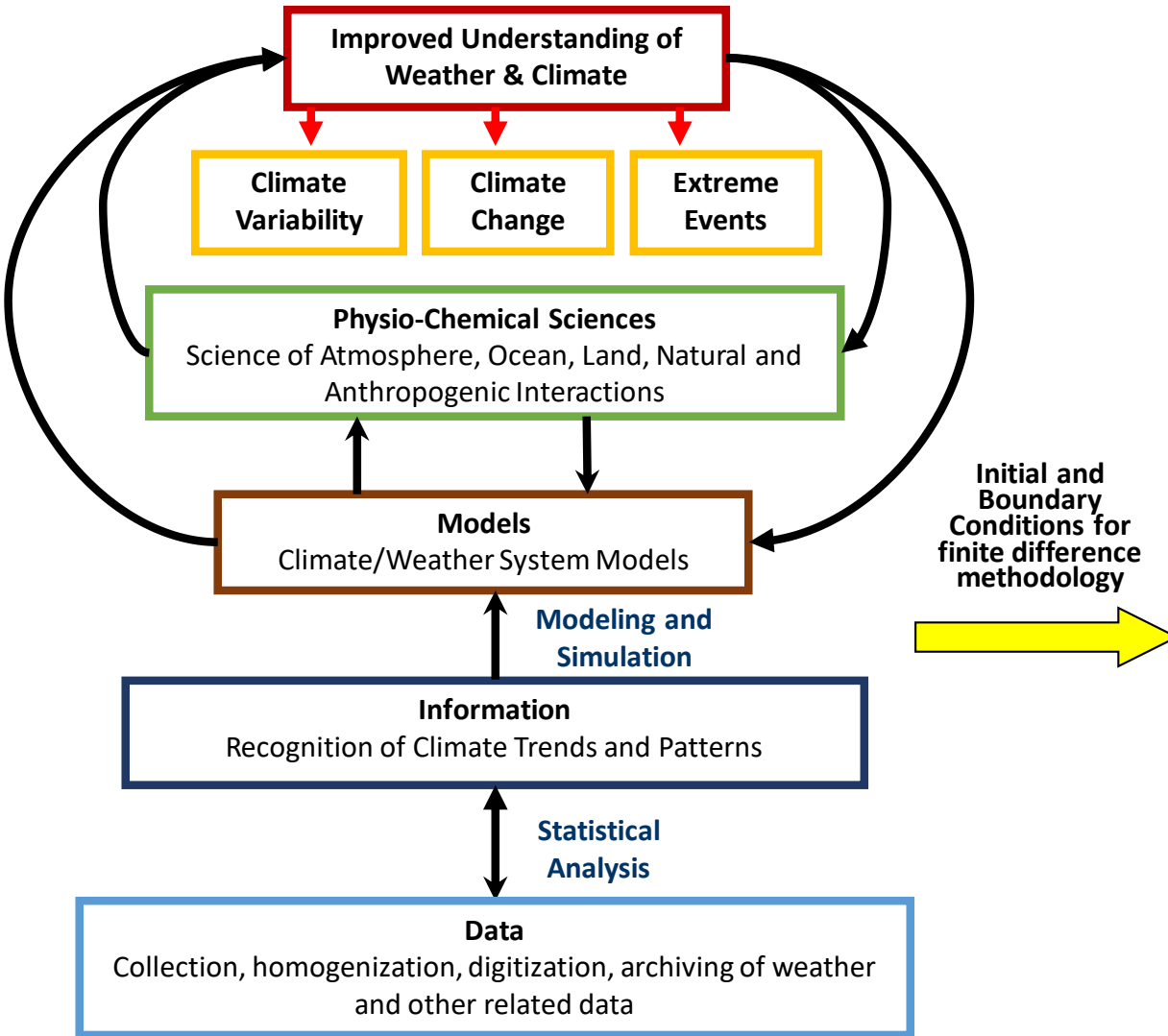


Actionable Information

- Quantification of Impact (Magnitude)
- Frequency
- Exact locations
- Hotspots on Maps



Mix of Complex Processes for Climate Modeling



Models Used For Climate Risk Profile of Pakistan



4 Global Climate Models (GCMs) IPSLCM5ALR, GFDLES2M, MIROC5, HadGEM2ES GCMs simulate the physical, chemical and biological dynamics of the climate system.



6 Global Hydrological Models (GHMs) CLM45, H08, LPJmL, MPIHM, PCRGLOBWB, WaterGAP2 GHMs simulate the hydrological cycle at the land surface of continental scale river basins.



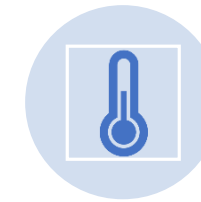
3 Global Gridded Crop Models (GGCMs) GEPIC, LPJmL, PEPIC GGCMs simulate crop growth at the grid scale for a selected number of crop functional types.



3 Global Vegetation Models (GVMs) LPJGUESS, LPJmL, ORCHIDEE GVMs simulate the dynamics of terrestrial vegetation and soil as well as the associated carbon pools and fluxes.



2 Global Species Distribution Models (GSDMs) BioScen1.5SDMGAM, BioScen1.5SDMGBM GSDMs simulate species distribution based on known locations of a species and information on environmental conditions.



1 Temperature Related Mortality Model (TRMM) TRMTsukuba TRMMs simulate excess mortality attributable to nonoptimal temperature based on statistical relationships between temperature and mortality

Indicators Used for CRP Pakistan



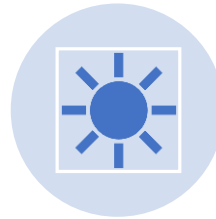
Temperature (4 Global Climate Models (GCMs))	Very hot days (4 GCMs):	Sea level rise (4 GCMs)	Precipitation (4 GCMs)	Heavy precipitation events (4 GCMs)
Extremely dry months (4 GCMs)	Soil moisture (4 GCMs, 6 Global Hydrological Models (GHMs))	Potential evapotranspiration (4 GCMs, 5 GHMs)	Water availability (4 GCMs, 6 GHMs)	Runoff (4 GCMs, 6 GHMs):
Exposure to droughts (4 GCMs, 6 GHMs): Based on a drought index using soil moisture projections.	Crop yields (4 GCMs, 3 Global Gridded Crop Models (GGCMs))	Exposure to river floods (4 GCMs, 6 GHMs):	Species richness (4 GCMs, 2 Global Species Distribution Models (GSDMs) Tree cover (4 GCMs, 3 Global Vegetation Models (GVMs))	Exposure to heatwaves (4 GCMs)
		Heat-related mortality (4 GCMs, 1 Temperature Related Mortality Model (TRMM))		



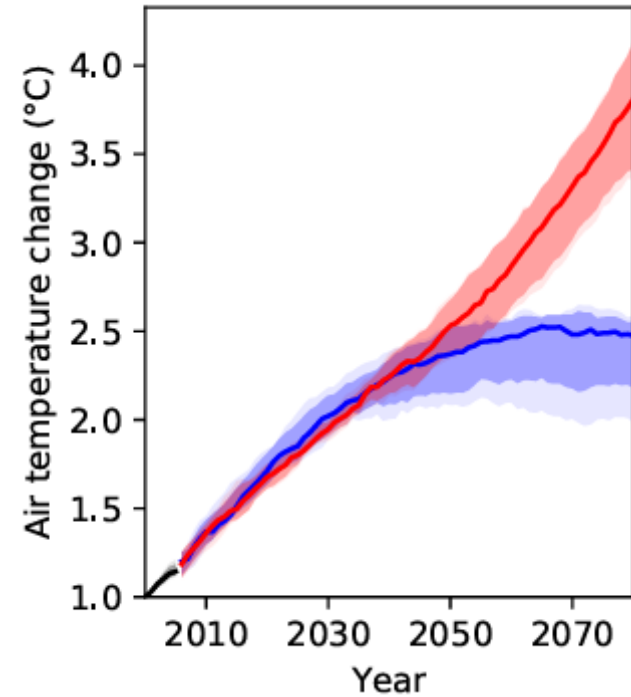
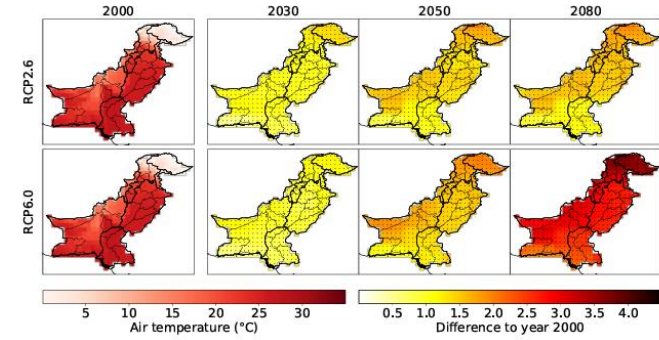
Temperature Rise



AVERAGE TEMPERATURES ARE
PROJECTED TO INCREASE BY
2.0-4.1°C BY 2080,
DEPENDING ON THE EMISSIONS
SCENARIO.



NORTHERN PAKISTAN WILL
EXPERIENCE THE MOST
SIGNIFICANT WARMING

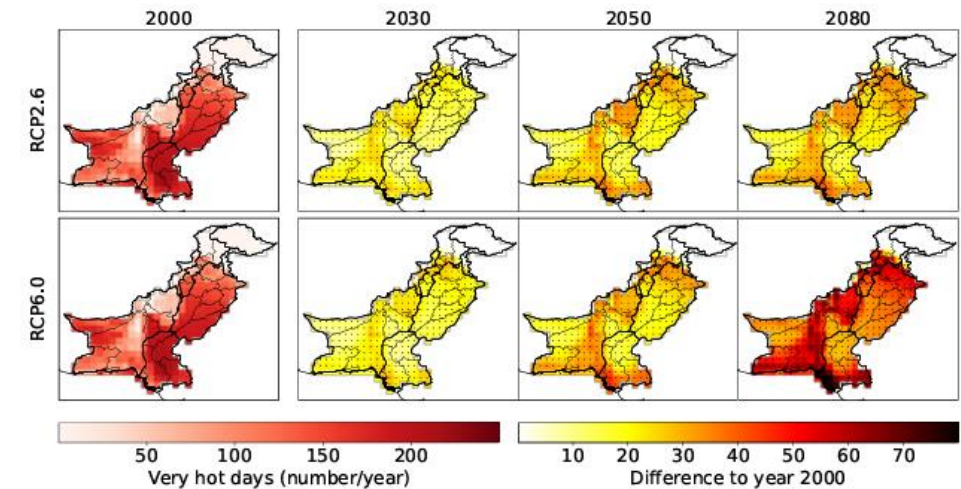




Very Hot Days

The number of very hot days (above 35°C) will rise dramatically, posing threats to human health, animal productivity, and crop production.

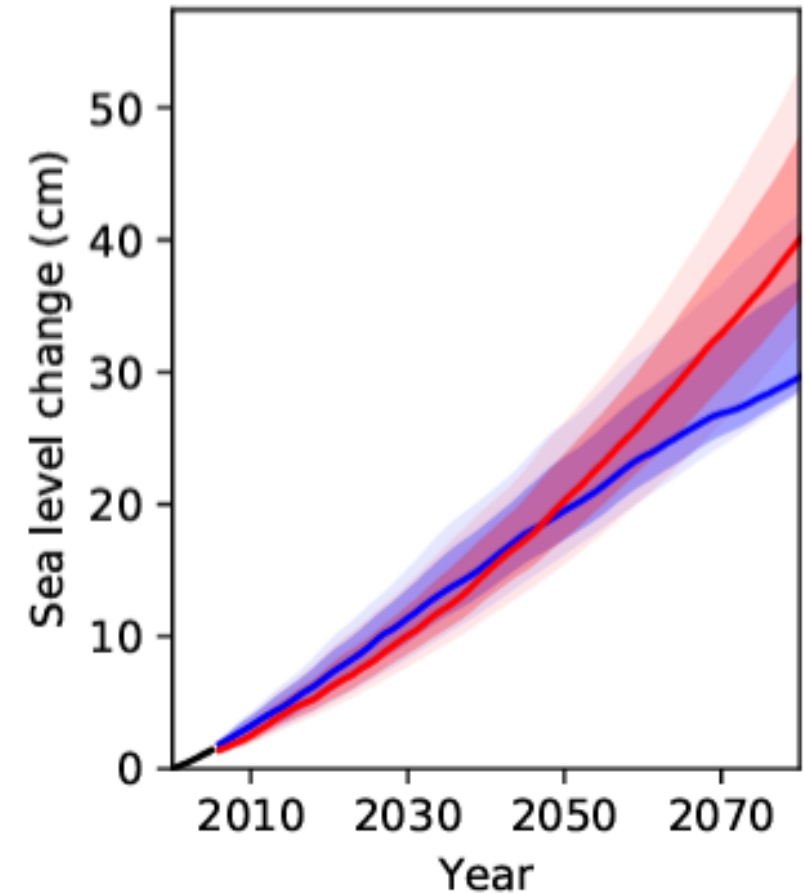
Some regions could experience up to 256 very hot days per year by 2080



Sea Levels Rise

Sea level is projected to rise by 30-40 cm by 2080, threatening coastal communities and causing saline intrusion.

Many coastal communities are already experiencing salinization, leading to agricultural land loss and migration

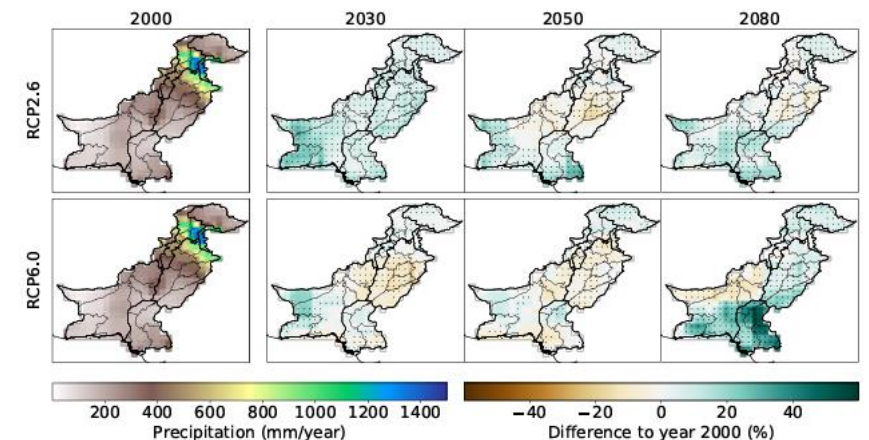
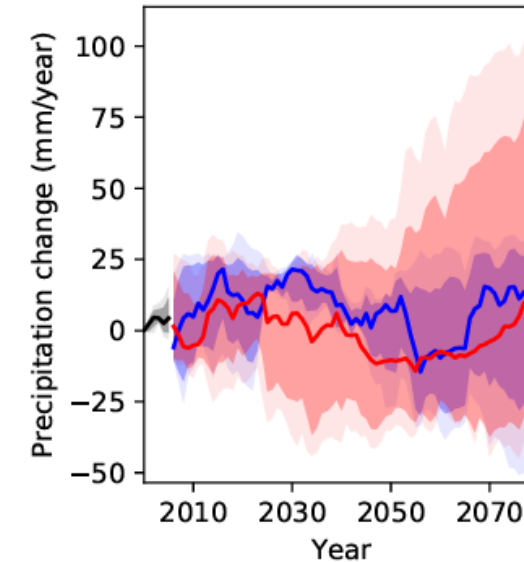




Precipitation Changes

Precipitation trends are uncertain, with some models projecting increases and others decreases.

Dry and wet periods are likely to become more extreme, impacting water resources and agriculture

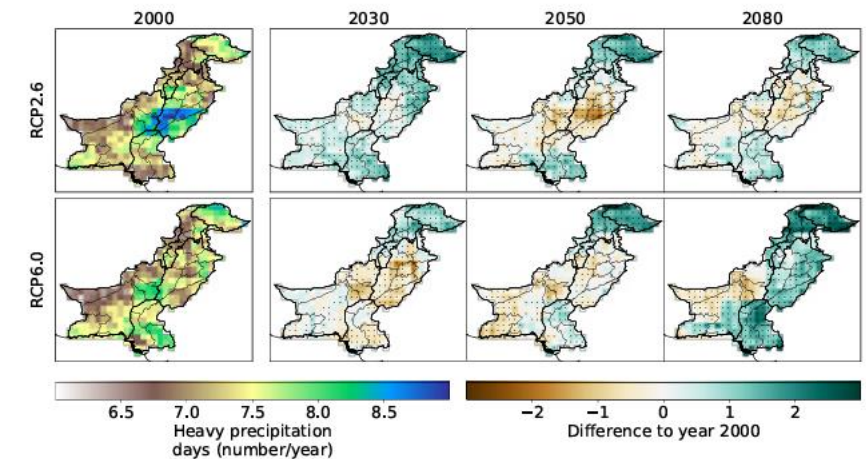
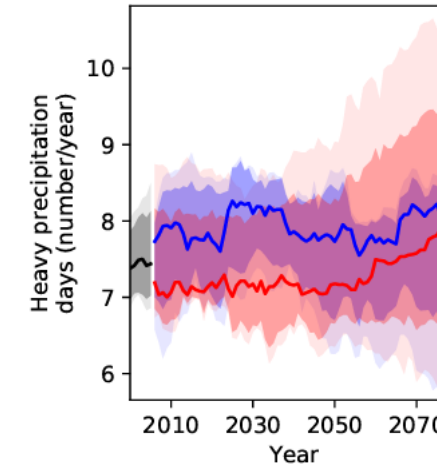




Heavy Precipitation Events

Heavy precipitation events are expected to increase in intensity and frequency, leading to potential flooding.

Some regions may see an increase of up to 3.5 days per year with heavy precipitation

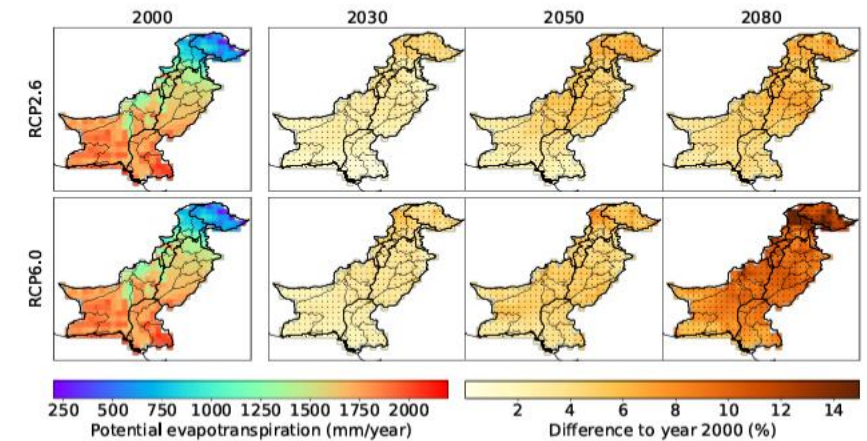
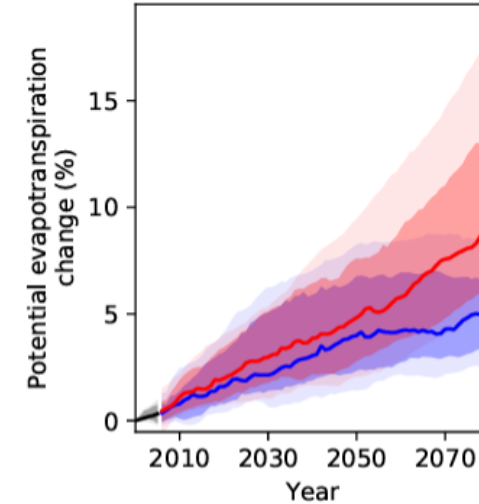


Potential Evapotranspiration

**Potential
evapotranspiration
is projected to
increase,**

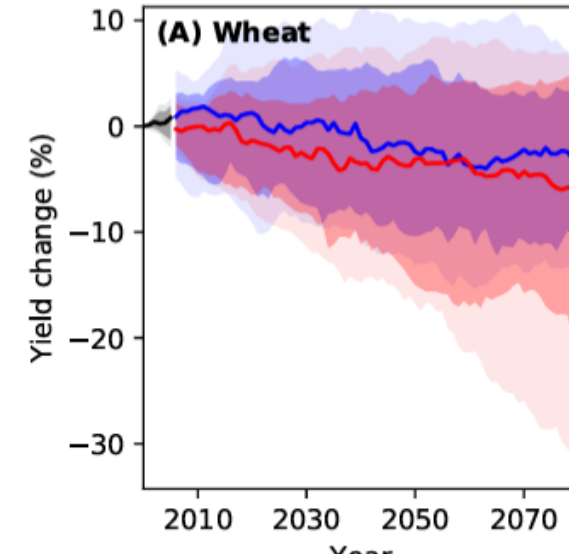
by 3.0 % in 2030,
4.8 % in 2050 and
9.1 % in 2080,
affecting water
supply and surface
water
availability.

**Higher
evapotranspiration
rates can
exacerbate drought
conditions**

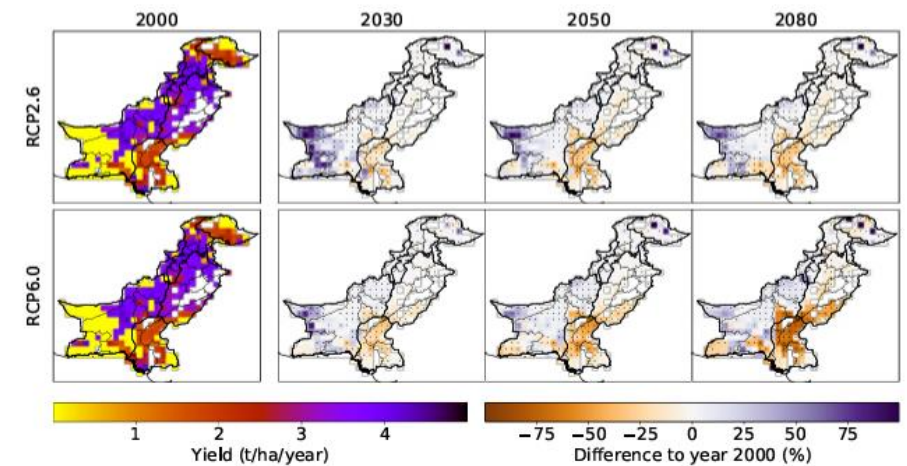




Wheat yields are projected to decrease, particularly in regions with already high temperatures.



Some regions, like Sindh and southern Punjab, may become too hot to grow wheat by the end of the century



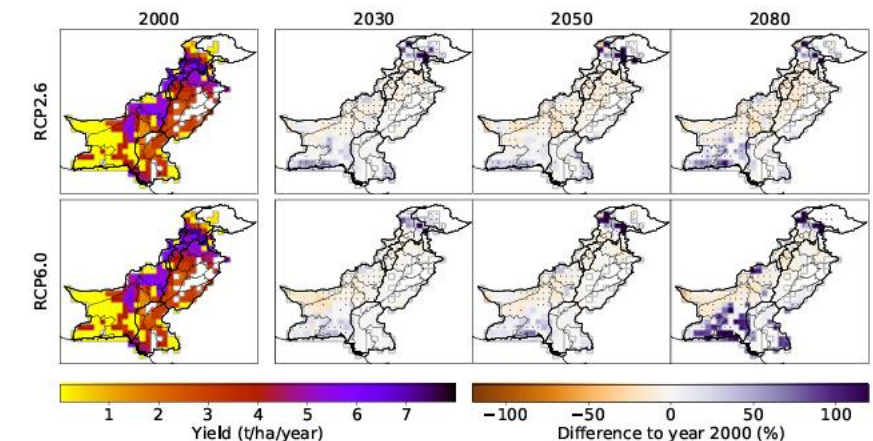
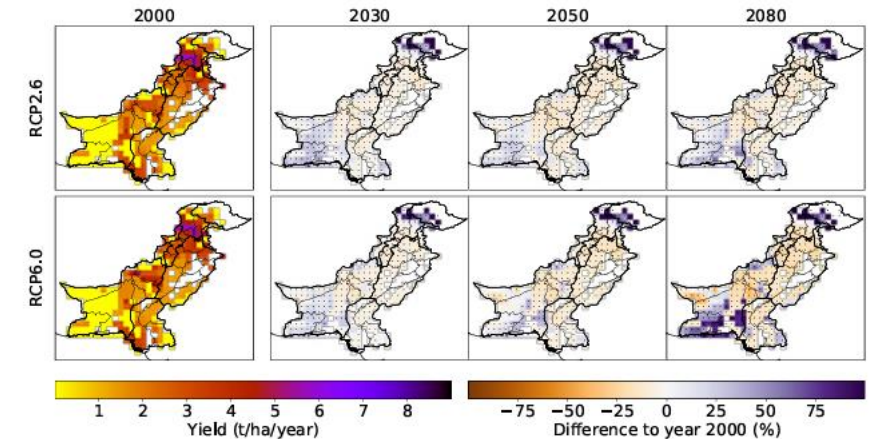
Impact on Wheat



Impact on Rice and Maize

Rice and maize yields will see regional variations, with some areas experiencing increases and others decreases.

Northern Balochistan is projected to have decreased rainfall and soil moisture, which will affect

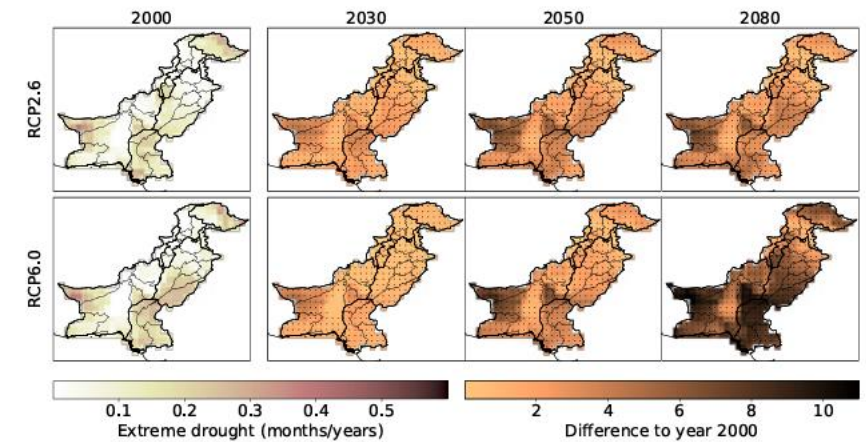




Exposure to Droughts

The crop land area
exposed to drought
is projected to
increase,
impacting
agricultural
production.

Some models
project a six-fold
increase in
drought exposure
by 2080

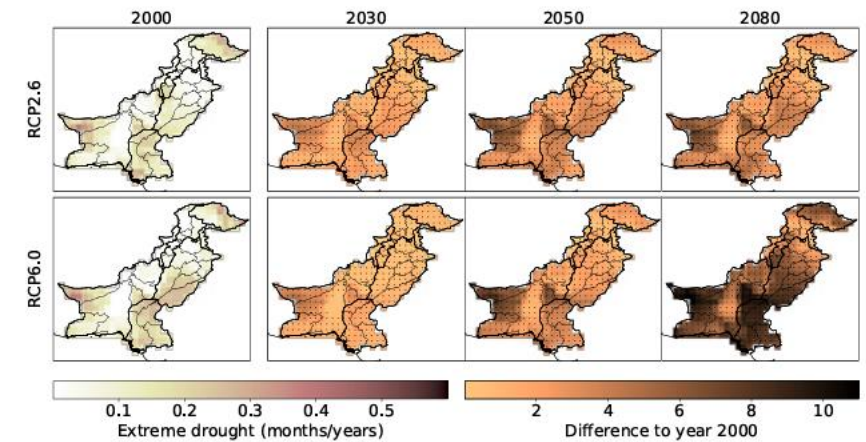




River Floods

Projections show little change in national road exposure to river floods.

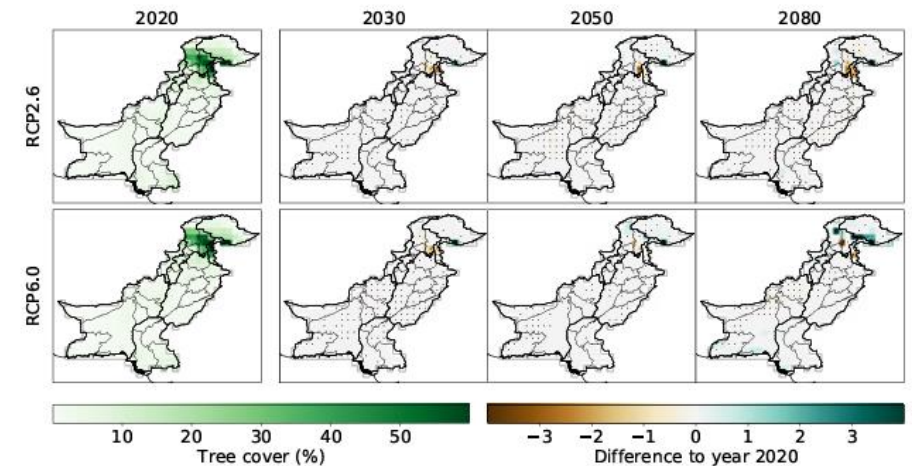
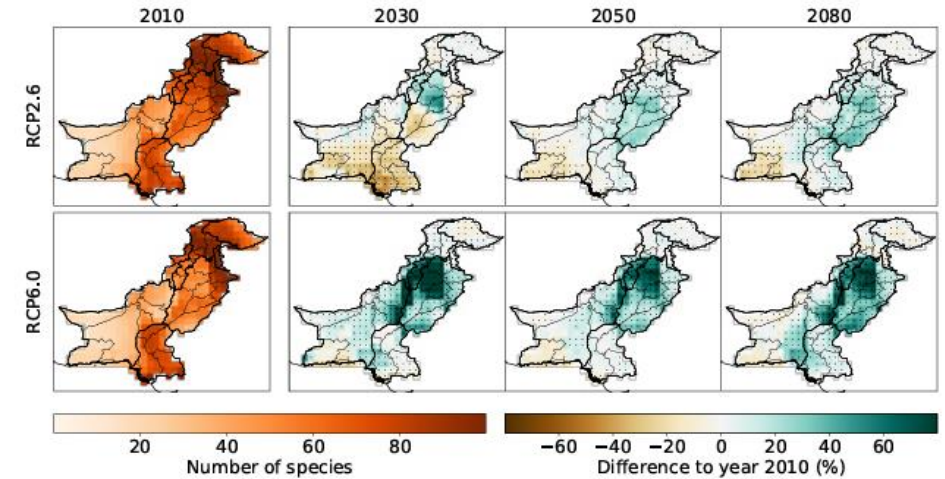
Model uncertainty is large, and infrastructure is still at risk



Species Richness and Forest Cover

Species richness is expected to increase in most parts of Pakistan, but some regions will see decreases.

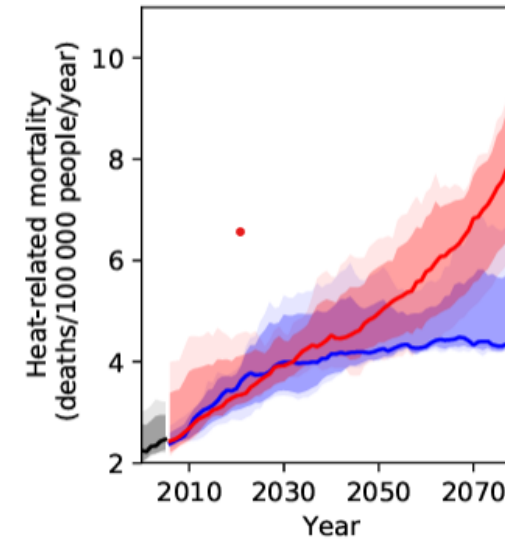
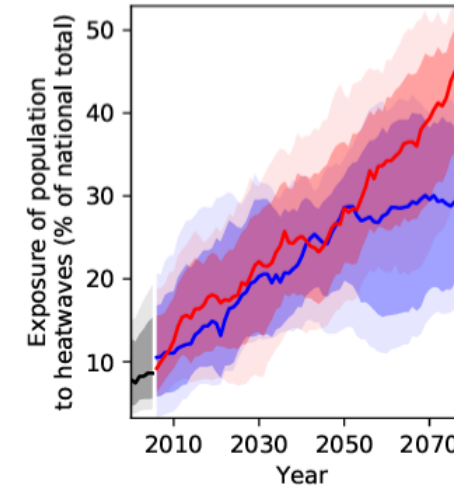
Deforestation and habitat loss remain major threats to biodiversity



Heatwaves

The population exposed to heatwaves is projected to rise dramatically, increasing heat-related mortality.

Heat-related mortality could increase by a factor of 3.5 by 2080



Infrastructure

- Extreme weather events will damage infrastructure, including roads and bridges
- Investing in climate-resilient infrastructure is crucial



Conclusion



The science is clear—climate risks are increasing, and their impacts are unavoidable. But with informed action, resilience planning, and sustainable solutions, we can safeguard our people, economy, and environment.

The time to act is now.