ESCAP
Economic and Social Commission for Asia and the Pacific

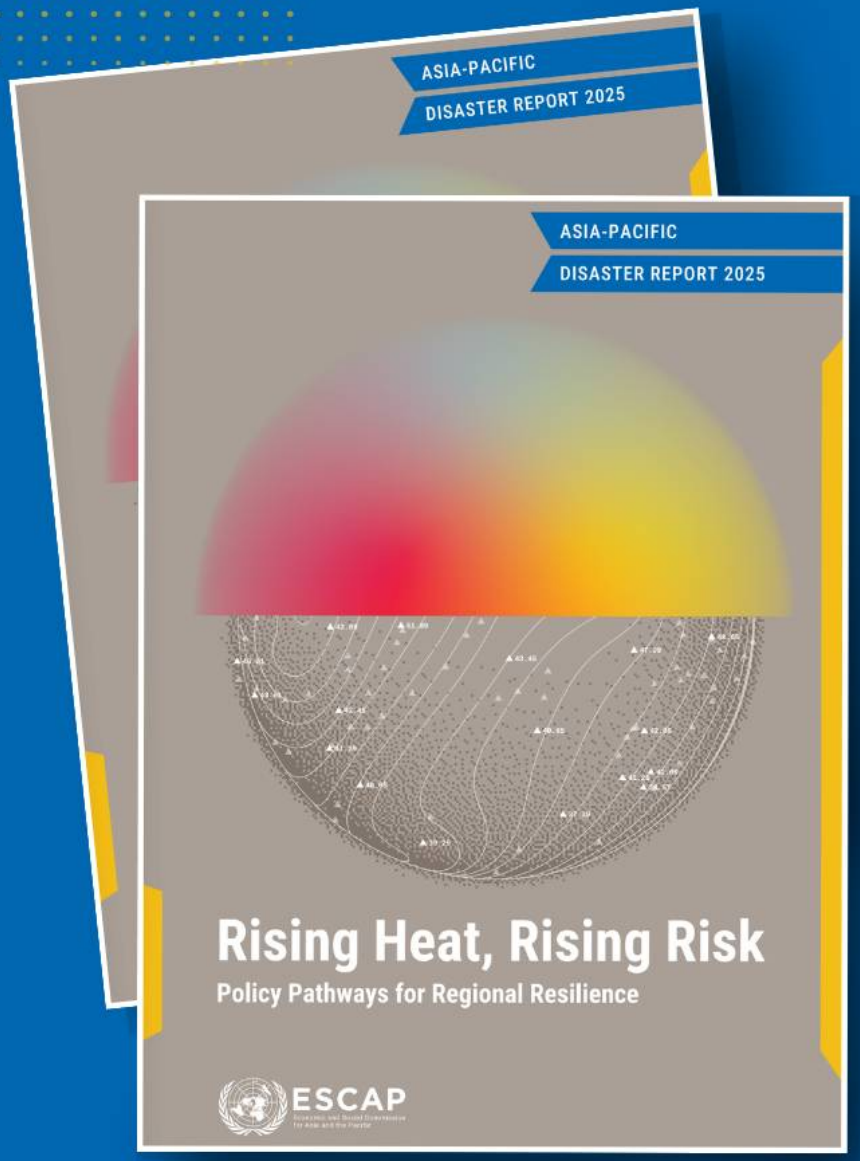
33rd South Asian Climate Outlook Forum (SASCOF-33)

Climate Services User Forum (CSUF)

Impact-Based Forecasting for the Seasonal Outlook JJAS 2026

Dr. Leila Salarpour Goodarzi
Disaster Risk Reduction, ESCAP

April 2026



ESCAP
Economic and Social Commission for Asia and the Pacific

ASIA-PACIFIC DISASTER REPORT 2025

Rising Heat, Rising Risk

Policy Pathways for Regional Resilience

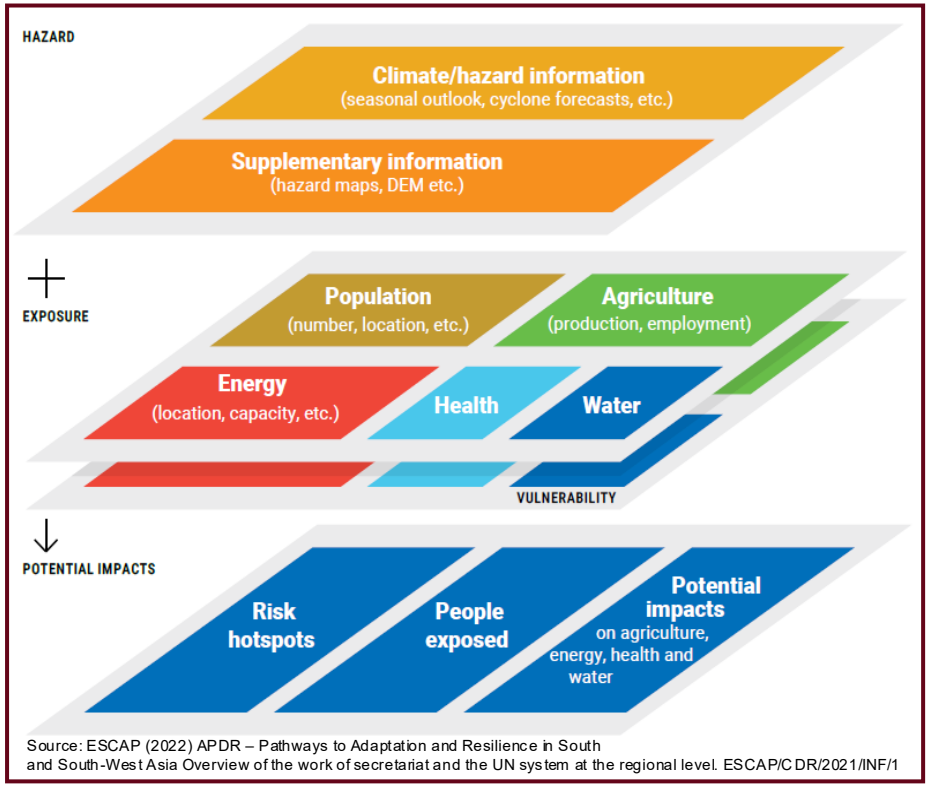
View/Open

ESCAP Impact-Based Forecasting (IBF): Turning climate data to actionable insights

Follows WMO global framework for climate services

- How it Works
  - ✓ **Hazards** → Leverages SASCOF Seasonal Outklook for precipitation and temperature data + Climate indicators
    - **Tmin**: below normal (–35%, –50 to –60%), above normal (+35%, +40–50%, +50–60%)
    - **Tmax**: classified into similar anomaly bands as Tmin
    - **Precipitation** : below normal or above normal rainfall
  - ✓ **Exposure** → Populations, agriculture (rice, wheat, maize), and infrastructure located in hazard-prone areas
  - ✓ Combining hazard × exposure × vulnerability produces hotspot maps and impact scenarios for early warning and action

- Why it matters
  - ✓ Provides policymakers with a clear view of cascading risks across climate, disaster, and health domains
  - ✓ Delivers evidence-based analytics to support regional cooperation and actionable risk assessments
  - ✓ Strengthens ministries' ability to plan and budget with risk-informed decision tools
  - ✓ Translates technical hazard classifications into practical, localized insights for resilience building

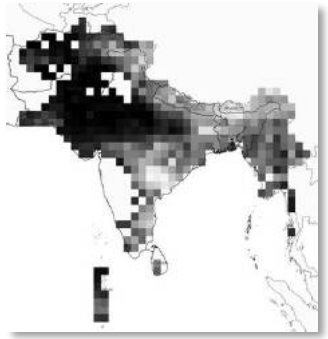


Source: ESCAP (2022) APDR – Pathways to Adaptation and Resilience in South and South-West Asia Overview of the work of secretariat and the UN system at the regional level. ESCAP/CDR/2021/INF/1

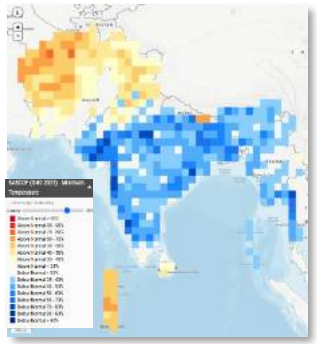
Agriculture IBF: Integrating Seasonal Crop Calendars

- In agriculture, crop type and crop growth stage strongly influence climate impact, as sensitivity to temperature and moisture stress varies across phenological stages (Porter & Semenov, 2005; FAO, 2018)
- To account for this, seasonal climate signals are interpreted using regional crop calendars
- Crop calendars are sourced from national agriculture databases and FAO crop calendars.
- Climate impact pathways and sensitivities are informed by literature review, documented in **ESCAP Risk and Resilience Portal**

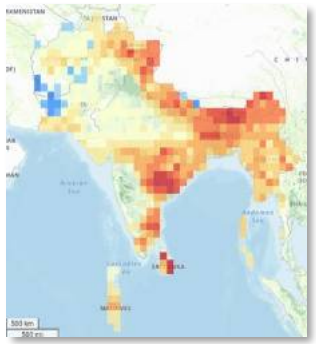
Step 1
Seasonal Outlook Temperature and Precipitation Anomalies



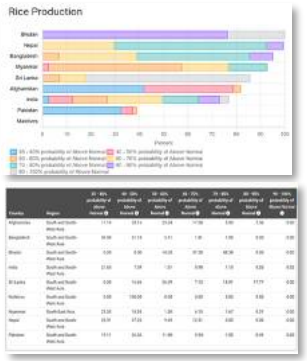
Step 2
Hazard Reclassification



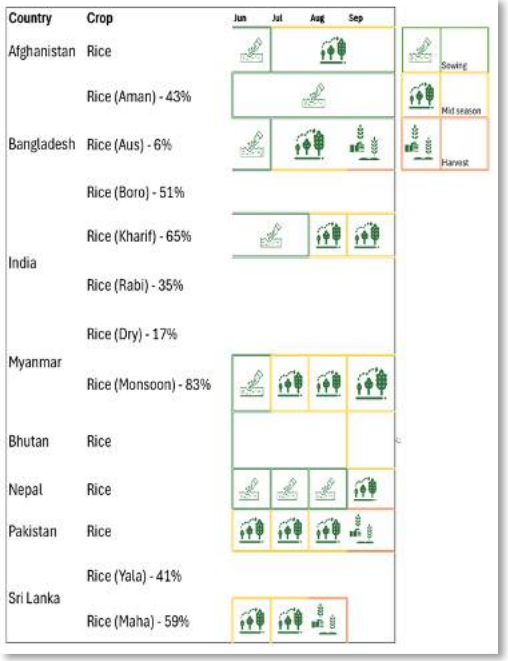
Step 3
Overlay with Exposure datasets



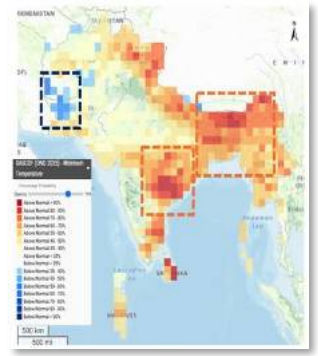
Step 4
Exposure Tables and Charts for Sectoral Analysis



Step 5
Integration of regional crop calendar



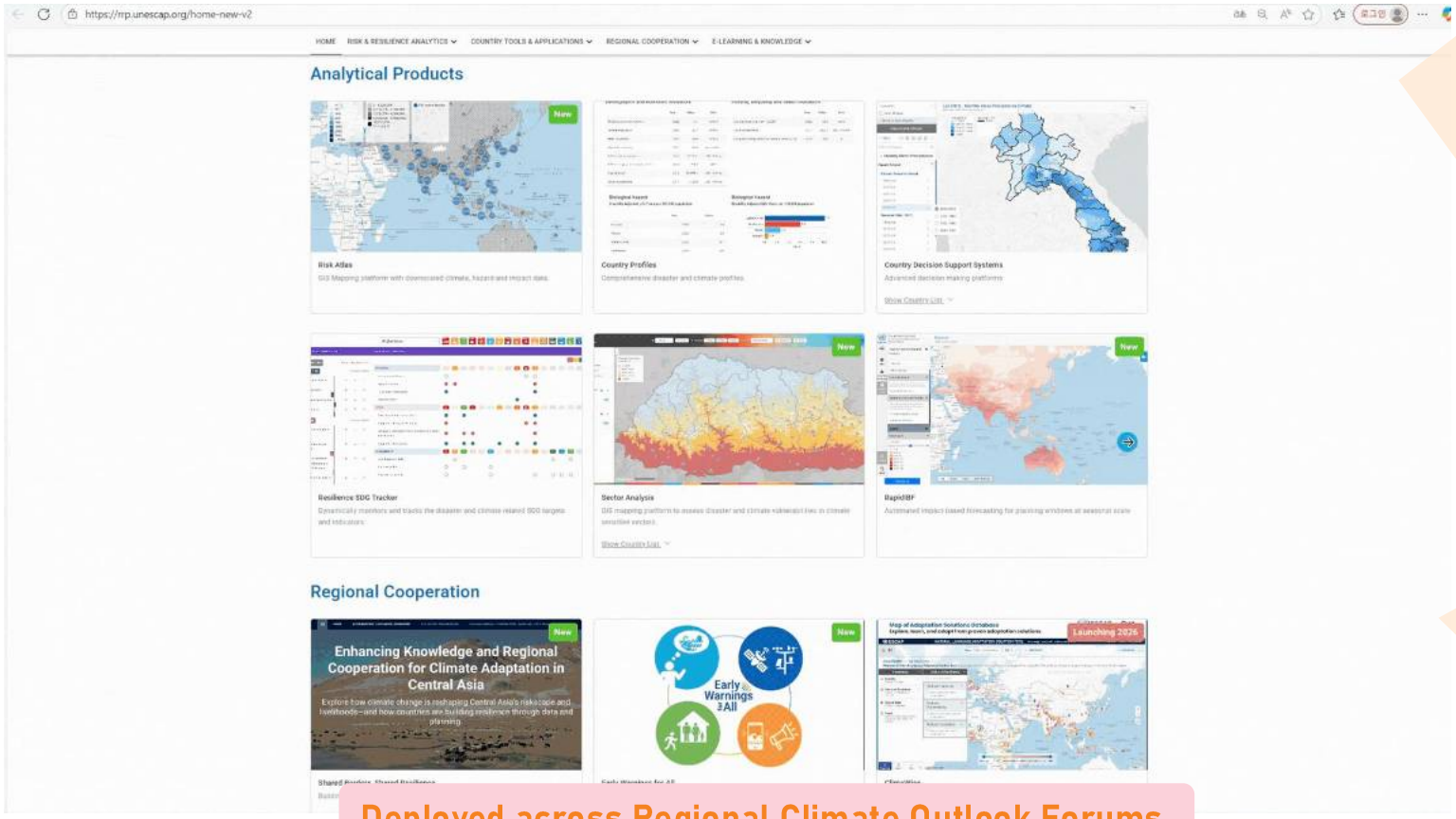
Step 6
Identification of Risk Hotspots



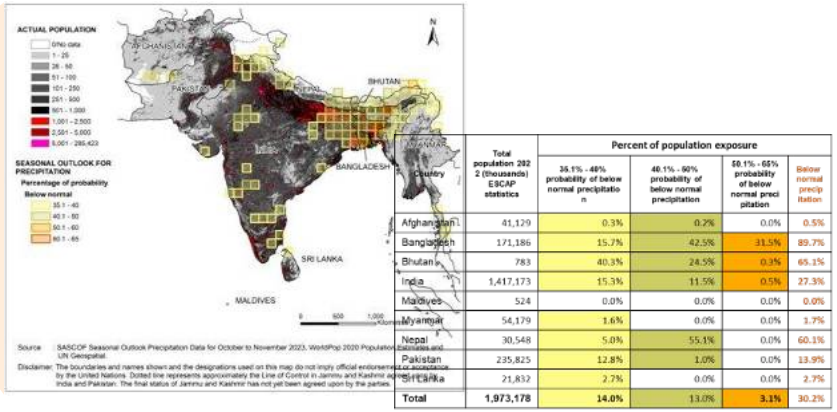
ESCAP Source: Porter, J.R. & Semenov, M.A. (2005). Crop responses to climatic variation. *Philosophical Transactions of the Royal Society B.*
FAO (2018). *Climate change and food security: Risks and responses.*

Rapid IBF: Automated seasonal impact forecasting

Next-gen operational IBF : upload forecast → automated impact analysis in minutes



Deployed across Regional Climate Outlook Forums



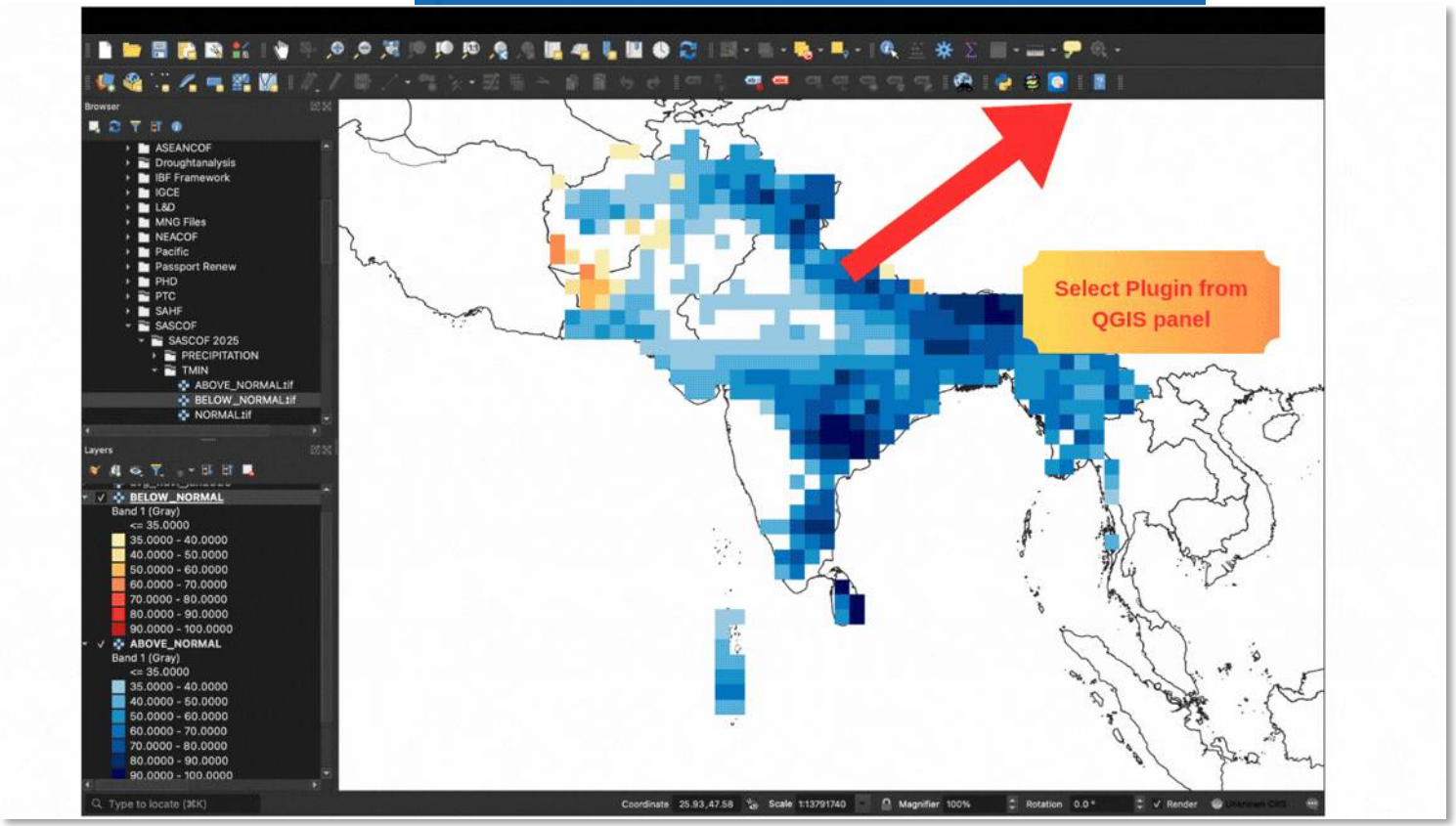
Country	Total population 2022 (thousands) ESCAP statistics	Percent of population exposure			
		35.1% - 40% probability of below normal precipitation	40.1% - 50% probability of below normal precipitation	50.1% - 65% probability of below normal precipitation	Below normal precipitation
Afghanistan	41,129	0.3%	0.2%	0.0%	0.5%
Bangladesh	171,186	15.7%	42.5%	31.5%	89.7%
Bhutan	783	40.3%	24.5%	0.3%	65.1%
India	1,417,173	15.3%	11.5%	0.5%	27.3%
Maldives	524	0.0%	0.0%	0.0%	0.0%
Myanmar	54,179	1.6%	0.0%	0.0%	1.7%
Nepal	30,548	5.0%	55.1%	0.0%	60.1%
Pakistan	235,825	12.8%	1.0%	0.0%	13.9%
Sri Lanka	21,832	2.7%	0.0%	0.0%	2.7%
Total	**1,973,178**	**14.0%**	**13.0%**	**3.1%**	**30.2%**

Offline download for customizing

Upload a seasonal forecast to instantly rank country exposure across population, infrastructure, transport, agriculture and economic assets, with ready-to-brief maps and tables.

RapidIBF-Next

A lightweight, interoperable QGIS plugin for offline use that enables risk-informed operational decision-making.

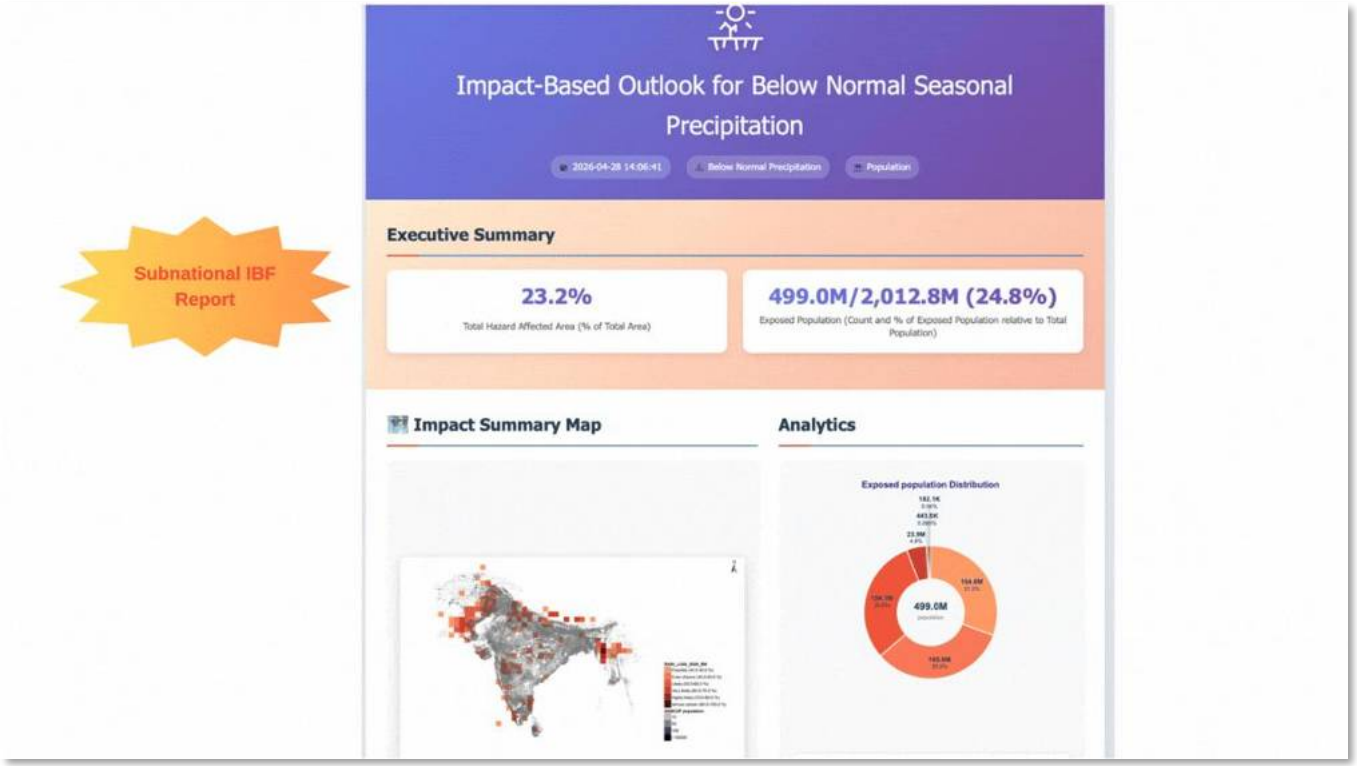


SASCOF Seasonal Outlook Sub-Regional Report
(Total Population)

Scan to learn more

RapidIBF-Next

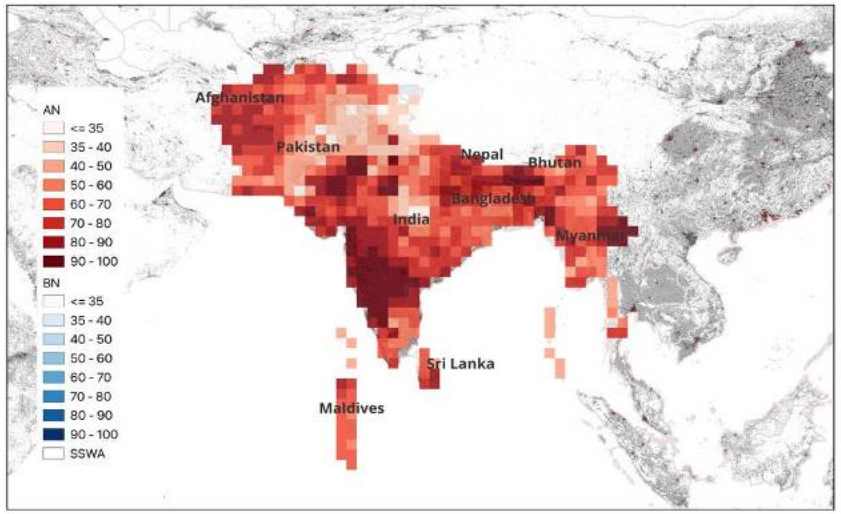
A lightweight, interoperable QGIS plugin for offline use that enables risk-informed operational decision-making.

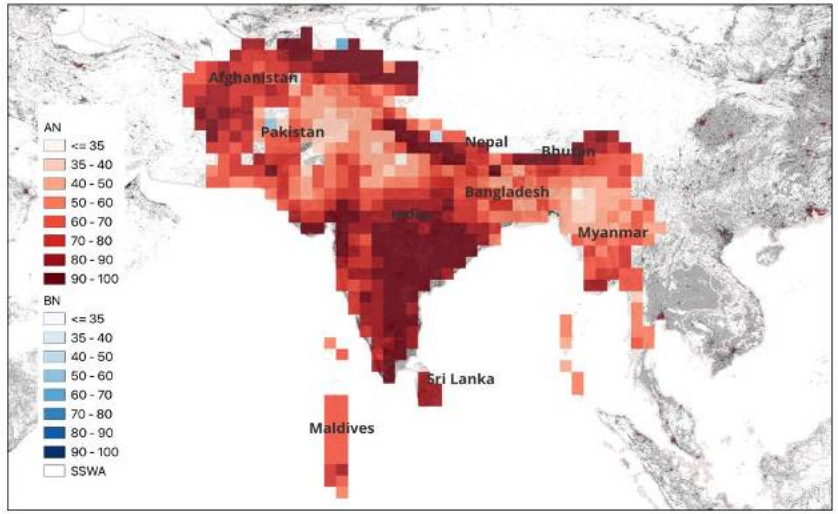


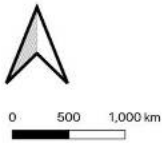
Scan to learn more

SASCOF Seasonal Outlook Sub-National Reports
(Total Population)

SEASONAL FORECAST DATA (JJAS 2026)-FINAL

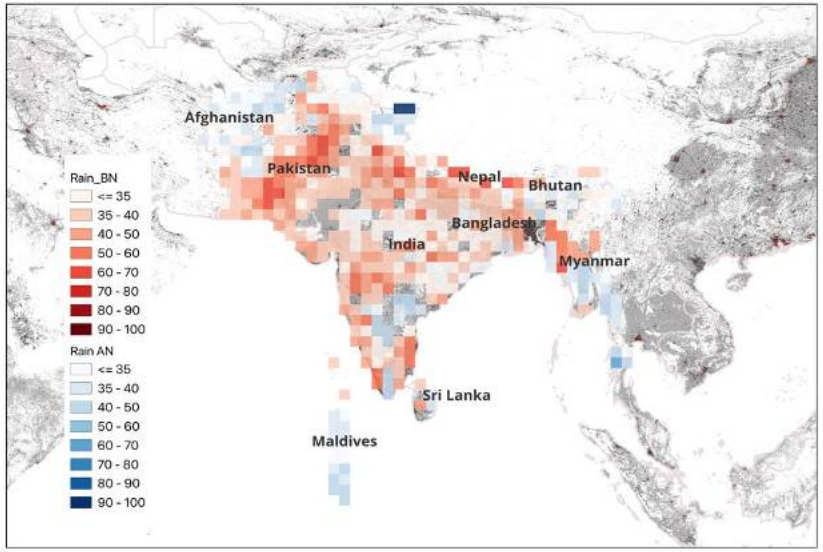




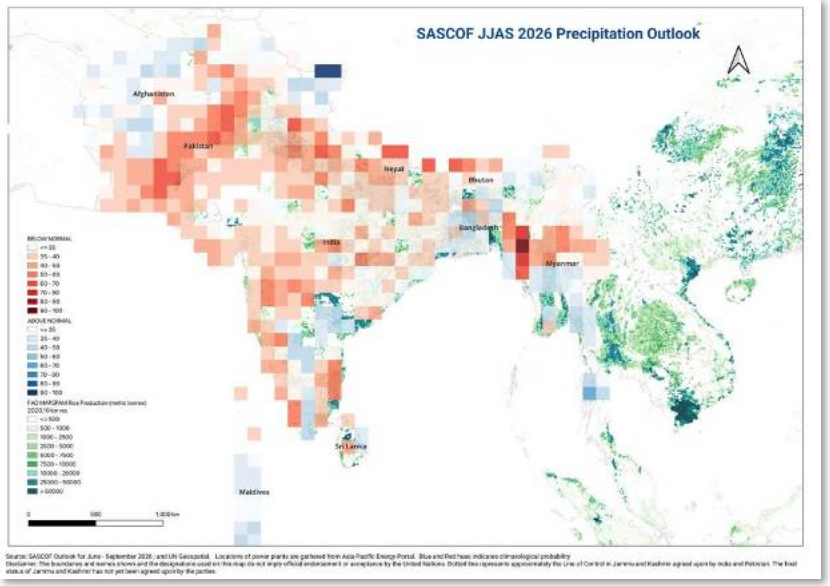


Source: SASCOF Outlook for June - September 2026 ; and UN Geospatial. Blue and Red hues indicates climatological probability

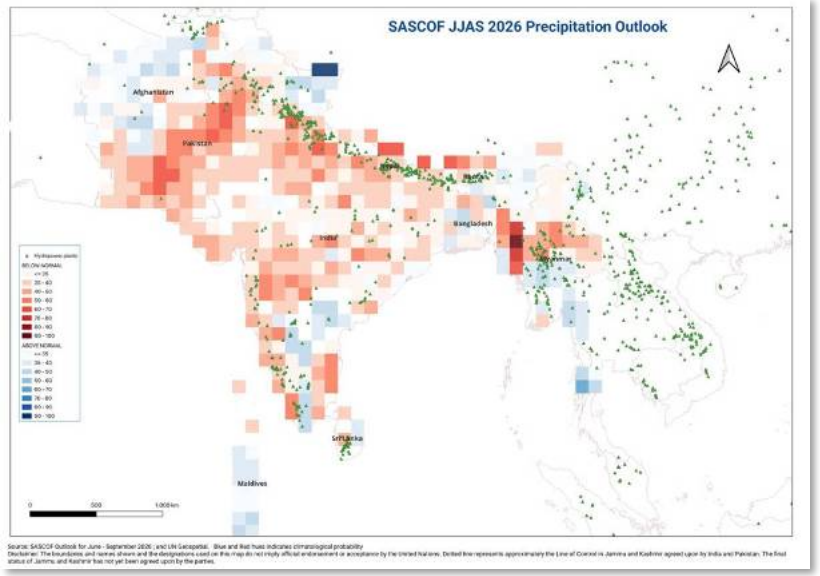
Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.



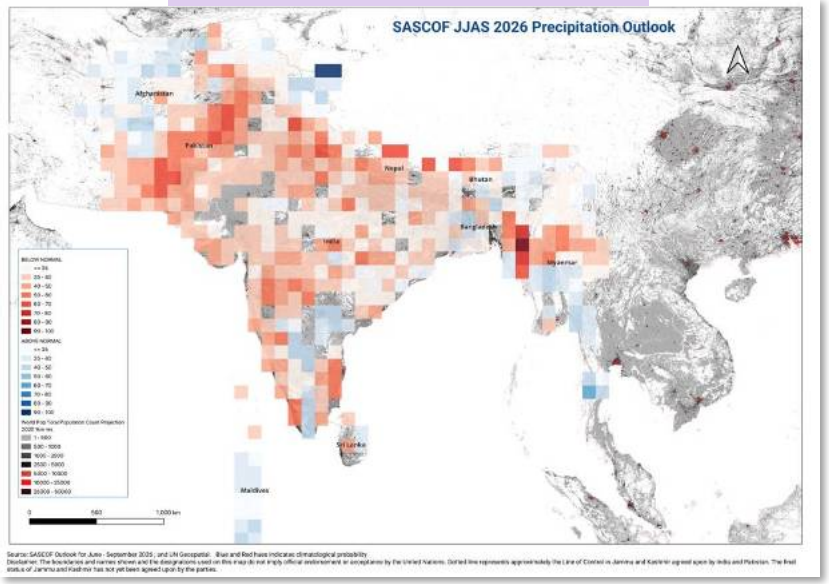
Potential Impacts of Precipitation Anomaly



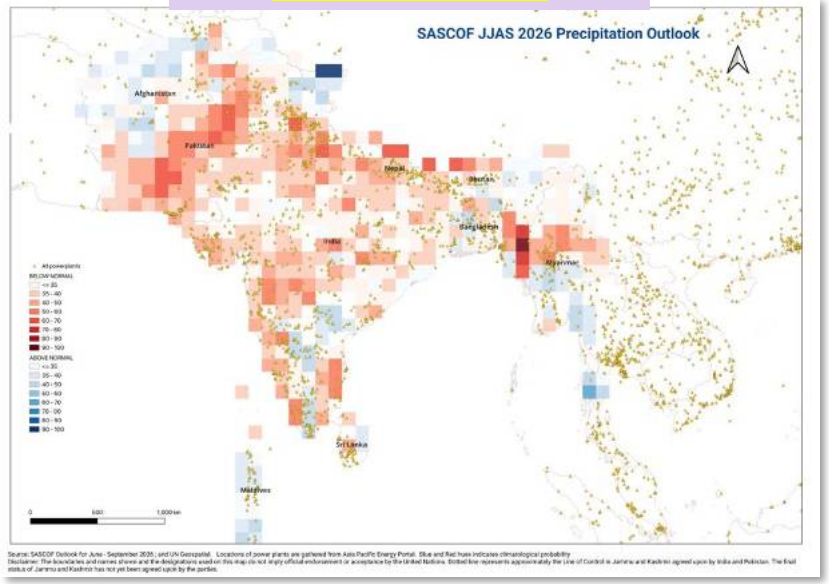
Rice Production



Hydro Powerplants



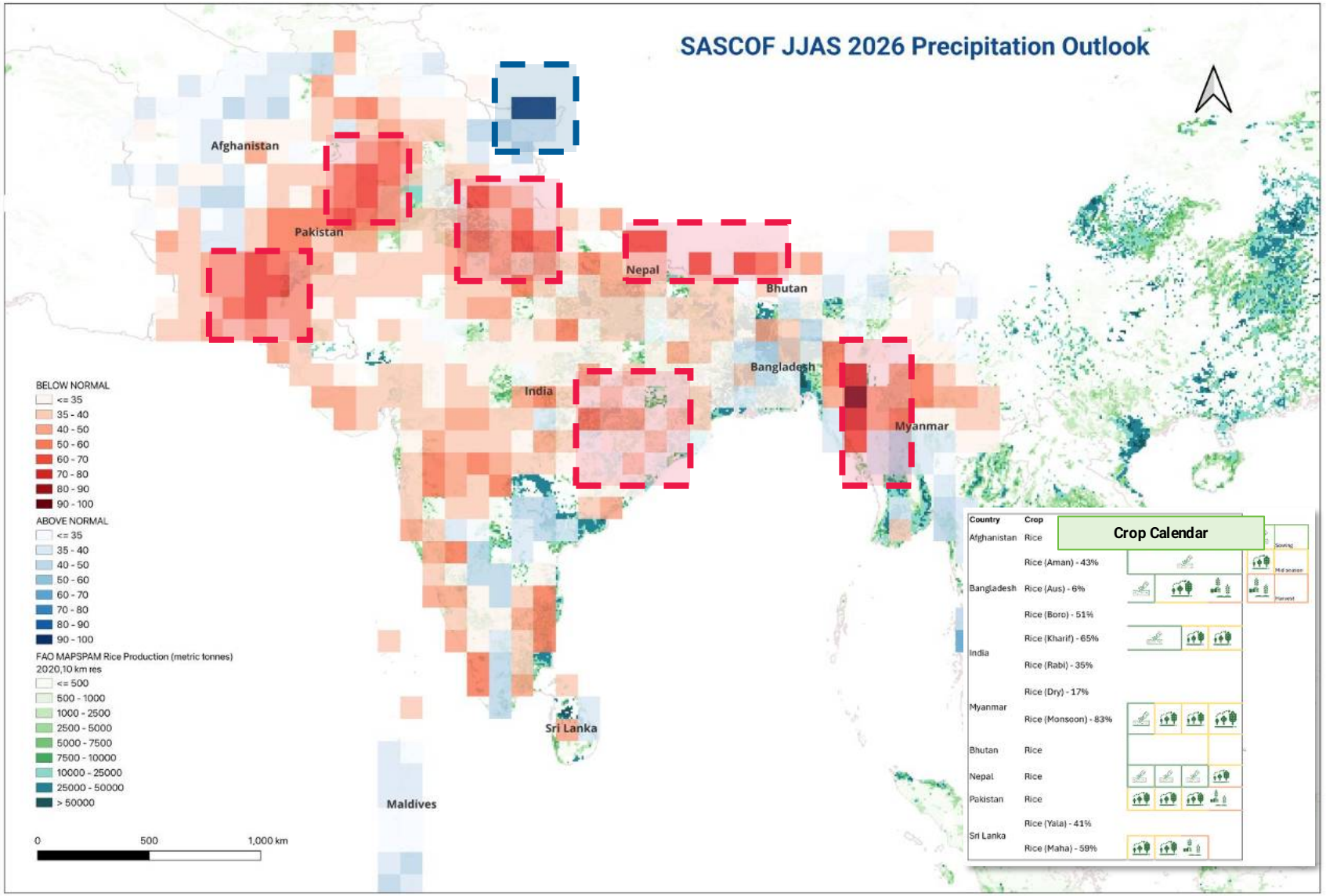
Total Population

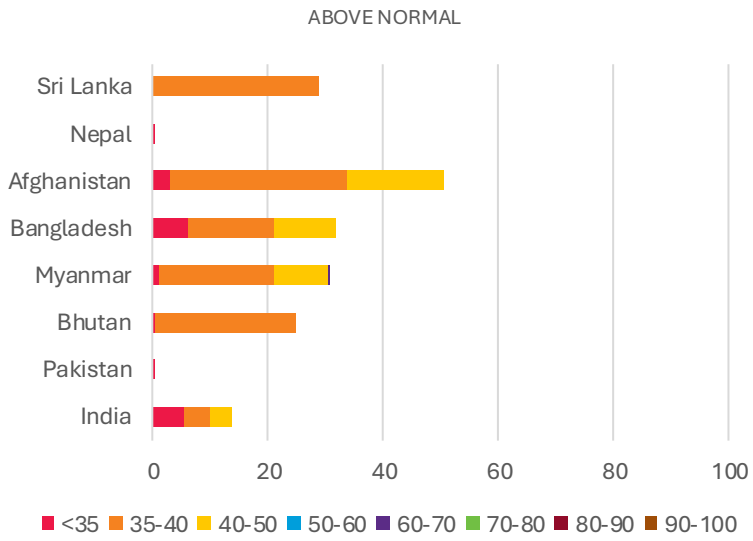


Total Powerplants

Potential Impacts of Precipitation ABOVE NORMAL: On Rice Production

Charts show value of area exposed under each category/ total rice production area of country



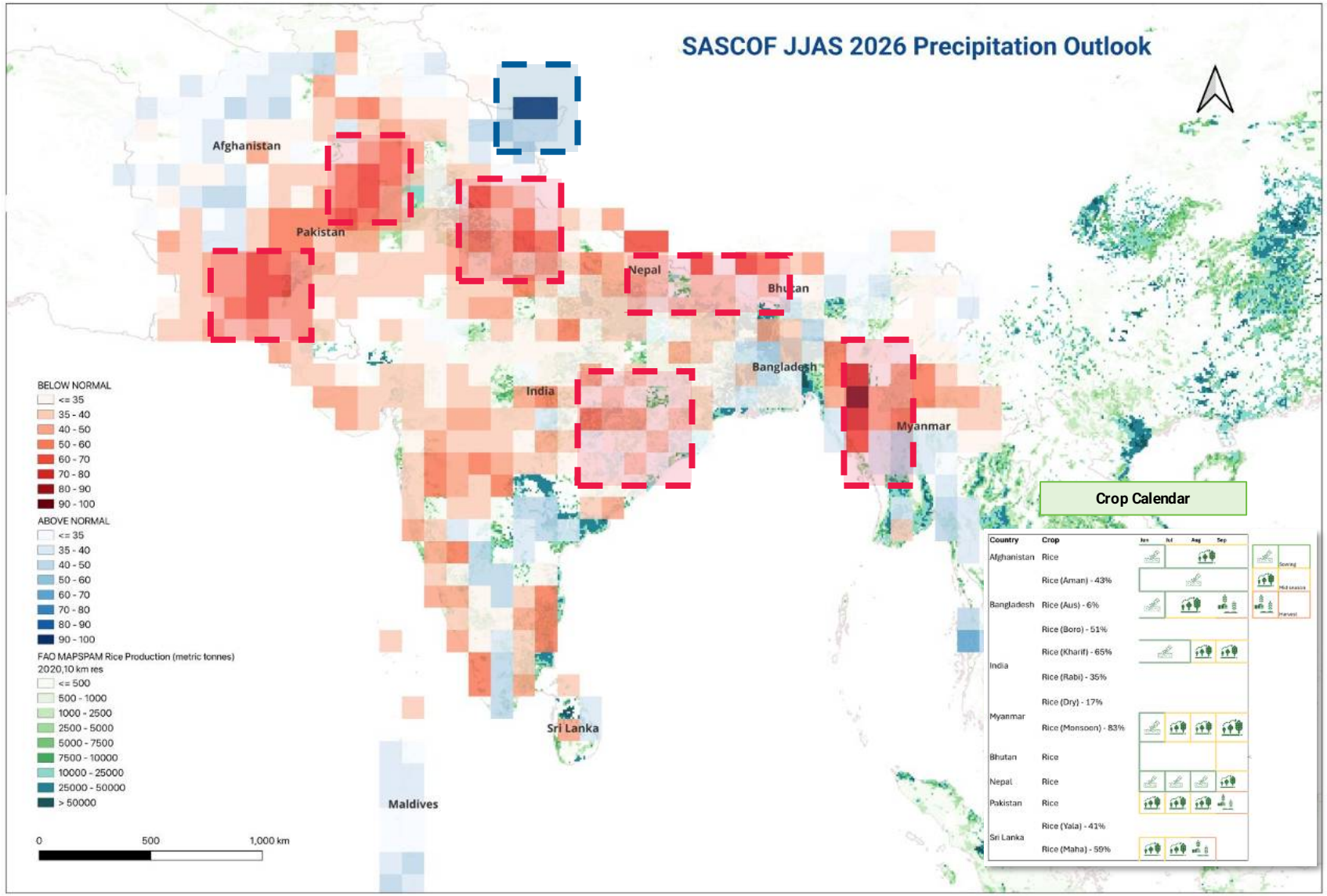


- Above-normal rainfall generally provides a positive boost to rice sowing by ensuring adequate water availability for submerged paddy fields and facilitating early, uninterrupted planting, particularly in rainfed rice ecosystems that depend entirely on monsoon rains
- Overall, the chances of above-normal rainfall are less likely in the region.
- Nearly 10% of the total rice production in Afghanistan and Bangladesh is likely to be affected by 40-50% probability of above normal rainfall. This is during the major sowing window for Aman Rice in Afghanistan. Rice (Kharif) in Bangladesh is mostly in the sowing / maturing stage during this time.

Source: SASCOF Outlook for June - September 2026 ; and UN Geospatial. Locations of power plants are gathered from Asia Pacific Energy Portal. Blue and Red hues indicates climatological probability

Potential Impacts of Precipitation BELOW NORMAL: On Rice Production

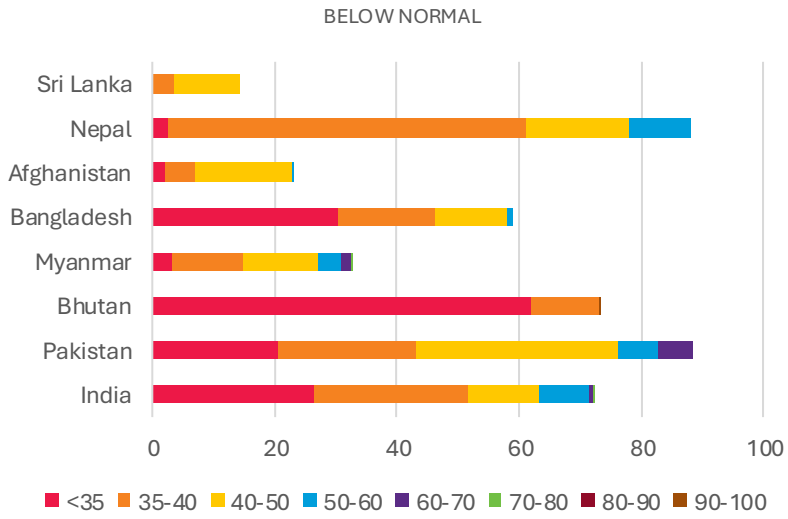
Charts show value of area exposed under each category/ total rice production area of the country



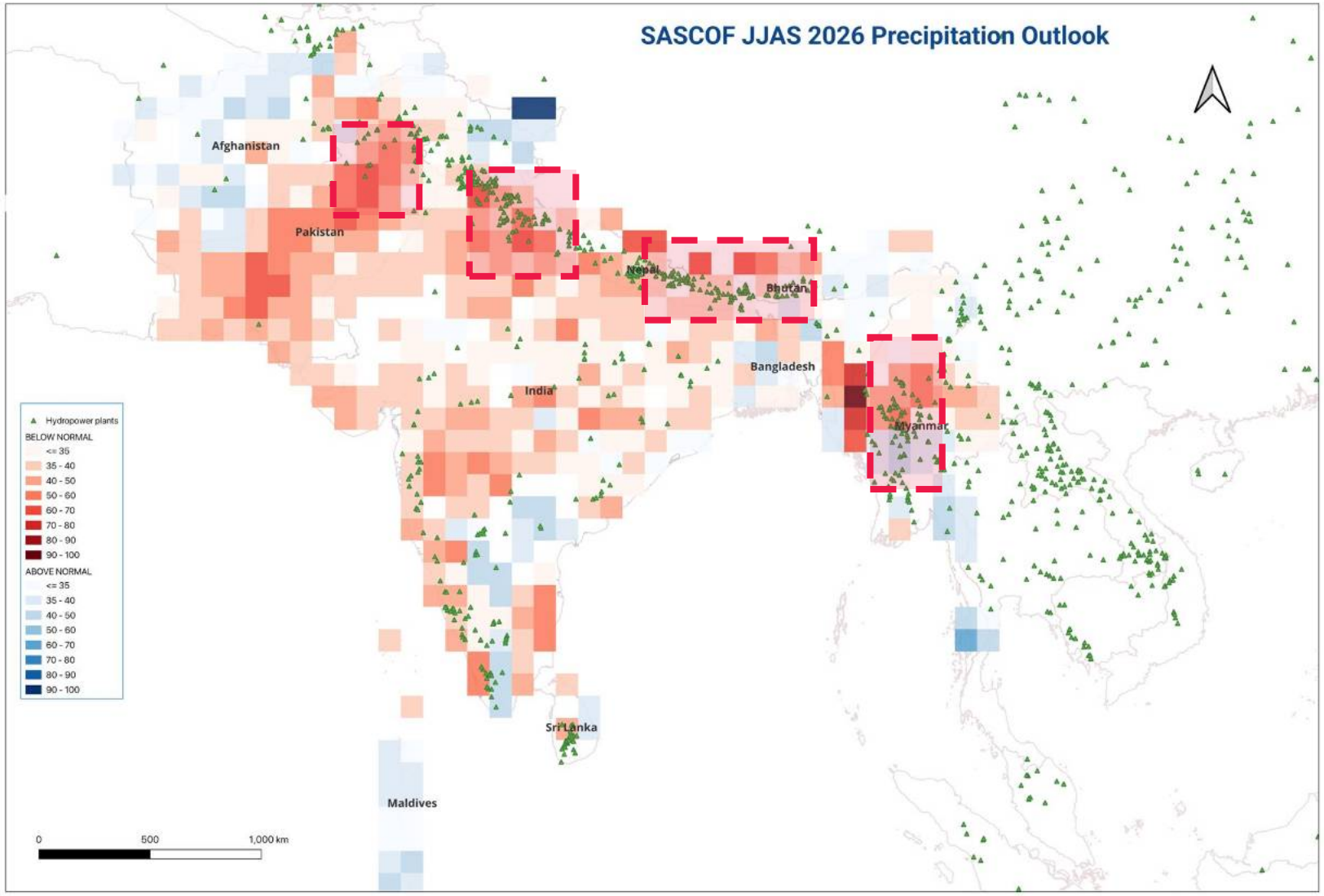
Source: SASCOF Outlook for June - September 2026 ; and UN Geospatial. Locations of power plants are gathered from Asia Pacific Energy Portal. Blue and Red hues indicates climatological probability

Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

- Below normal Rainfall is likely to have detrimental impact on sowing windows , especially in regions that engage in rainfed agriculture.
- Nepal: More than 25% of the total rice production of Nepal is likely to be affected by 40-60% probability of below normal rainfall. This is during the major sowing window for Rice.
- Pakistan: Nearly 25% of total rice production in Pakistan is likely to be affected by even chance (40-60%) of below normal rainfall. With an additional 10% of rice production being exposed to moderate(70-80%) and high (80-90%) likelihood of below normal rainfall.
- Bangladesh: Nearly 10% of total rice production in Bangladesh is likely to be impacted by moderate likelihood (40-60%) of below normal rainfall.

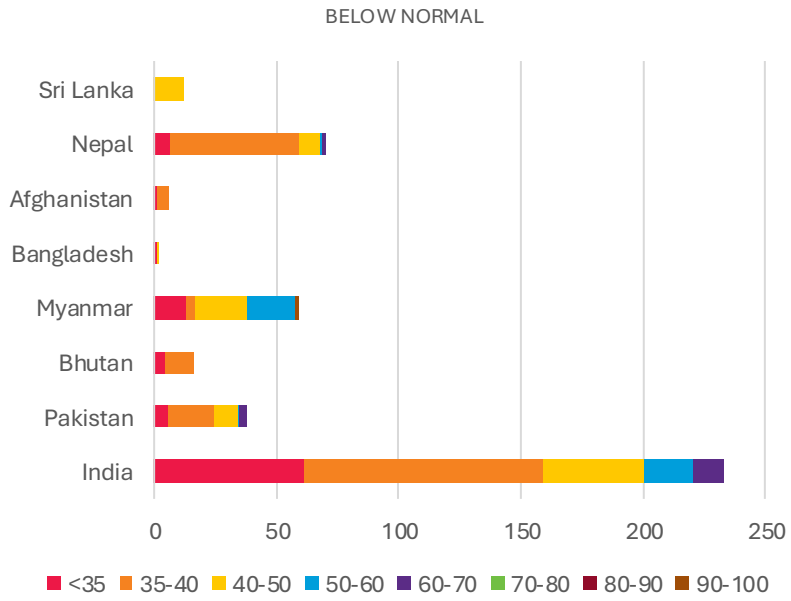


Potential Impacts of Precipitation Anomaly: On Hydropower



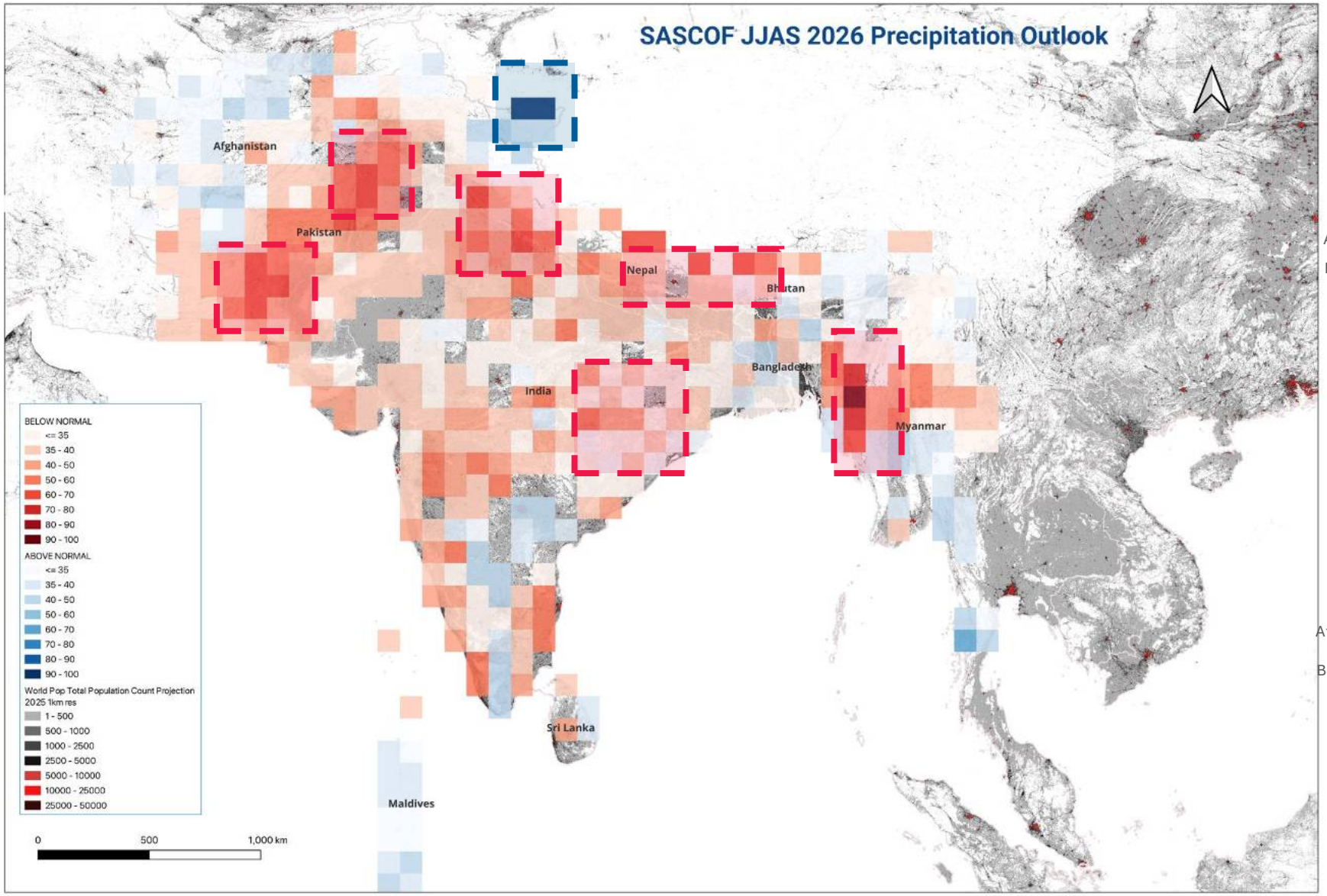
Source: SASCOF Outlook for June - September 2026 ; and UN Geospatial. Blue and Red hues indicates climatological probability
Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

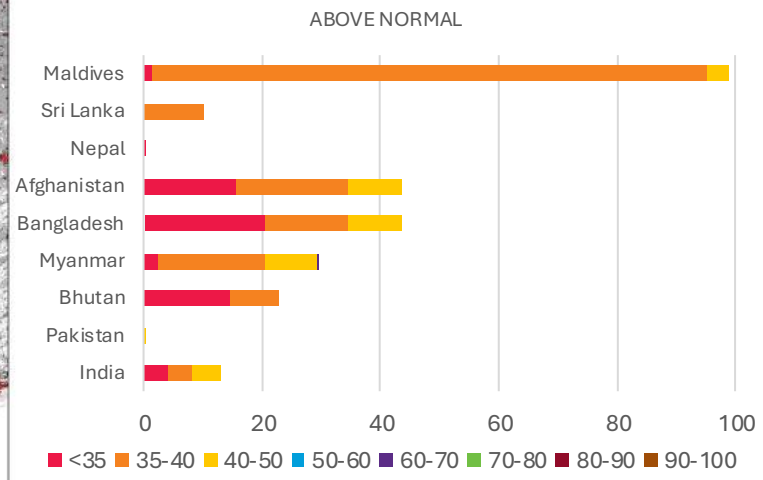
- Below-normal rainfall during the June-to-September monsoon season (often critical for filling reservoirs) significantly impacts hydropower plants.
- It reduces water availability for power generation, leading to lower output, potential power shortages, and forced reliance on alternative energy sources.
- India is most affected with nearly 75 powerplants exposed to moderate (40-60%) and high (70-80%) likelihood of below normal rainfall; followed by Myanmar, Pakistan, and Bangladesh.

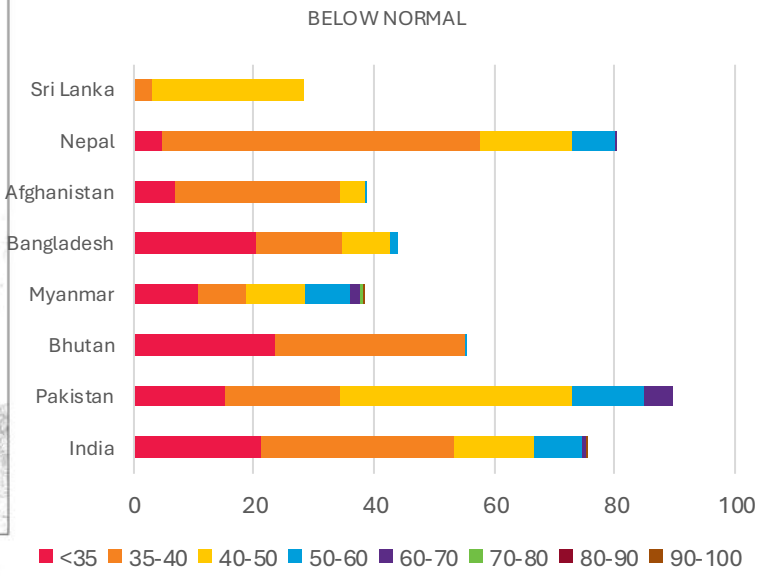


Potential Impacts of Precipitation Anomaly: On Population

- Maldives: Almost 100% of total population is exposed to low (35-50%) likelihood of above normal rainfall
- Pakistan: Nearly 60% of population is exposed to moderate – high (40-70%) likelihood of below normal rainfall.



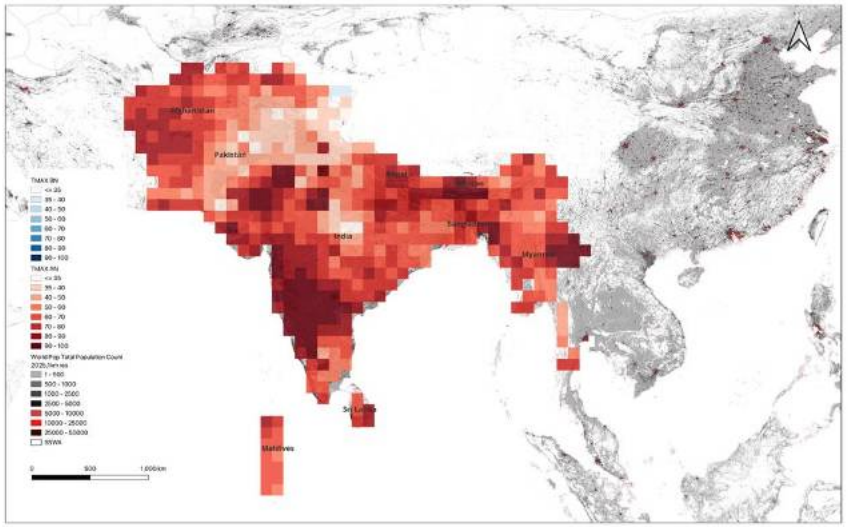




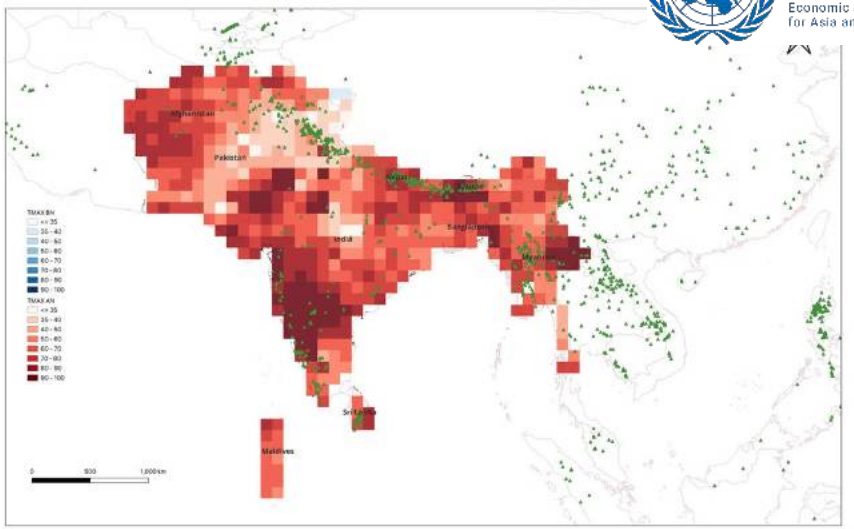
Source: SASCOF Outlook for June - September 2026 ; and UN Geospatial. Blue and Red hues indicates climatological probability

Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

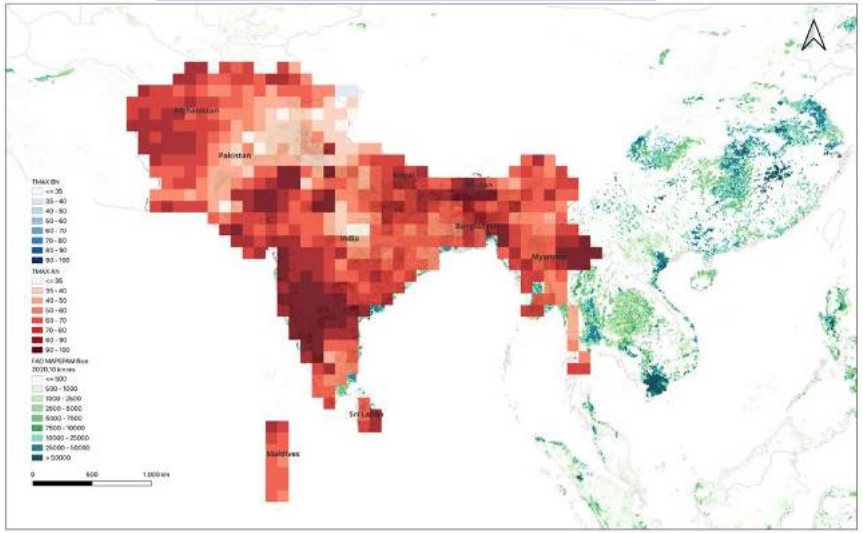
Potential Impacts of T-MAX Anomaly



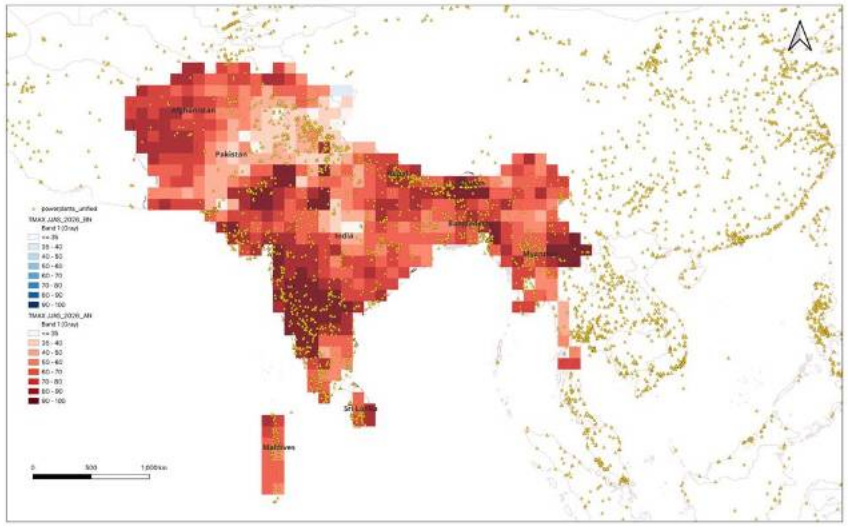
Rice Production – (combined effect of BN Rainfall and AN Temperature)



Hydro Powerplants



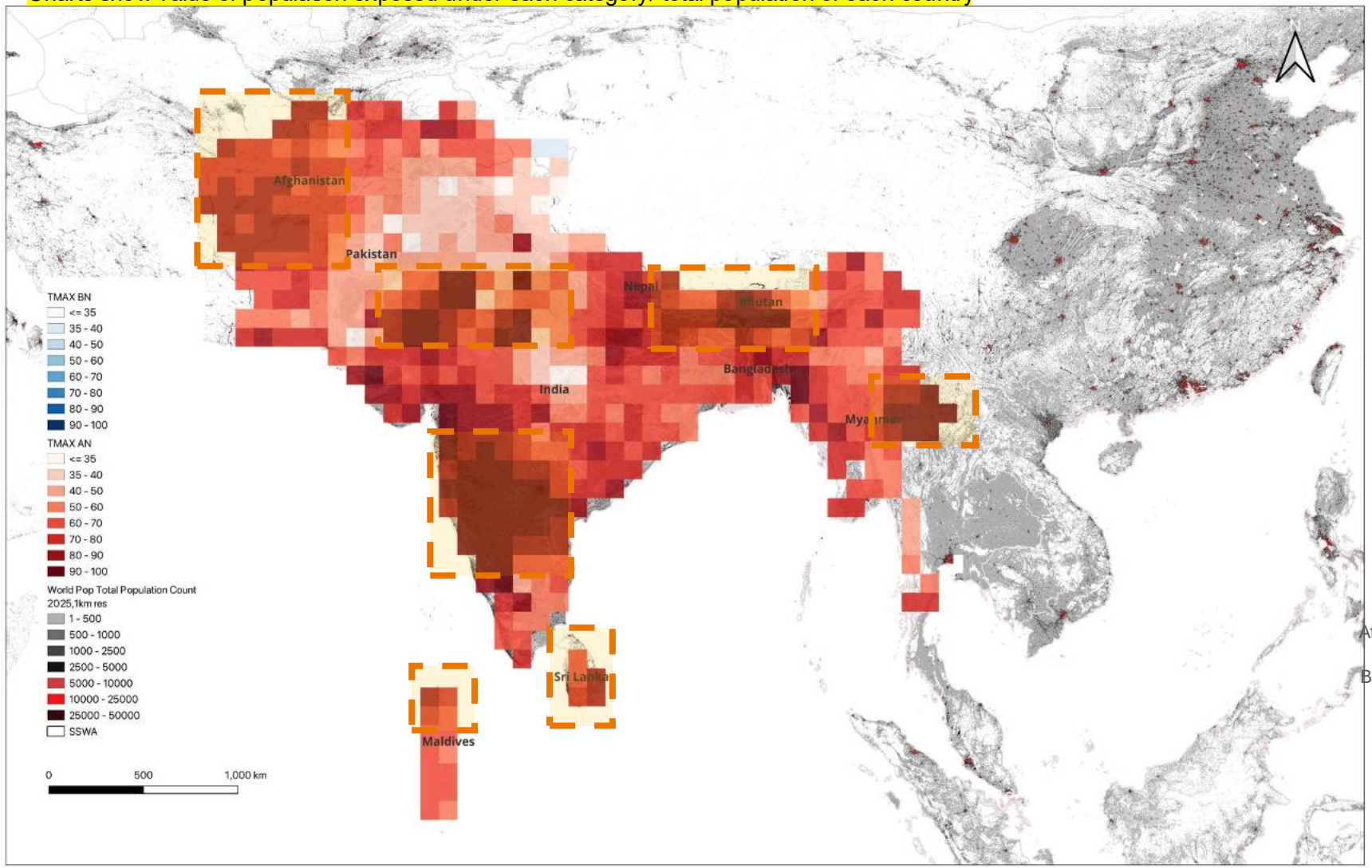
Total Population



Total Powerplants

Potential Impacts of Rising Heat On Population

Charts show value of population exposed under each category/ total population of each country

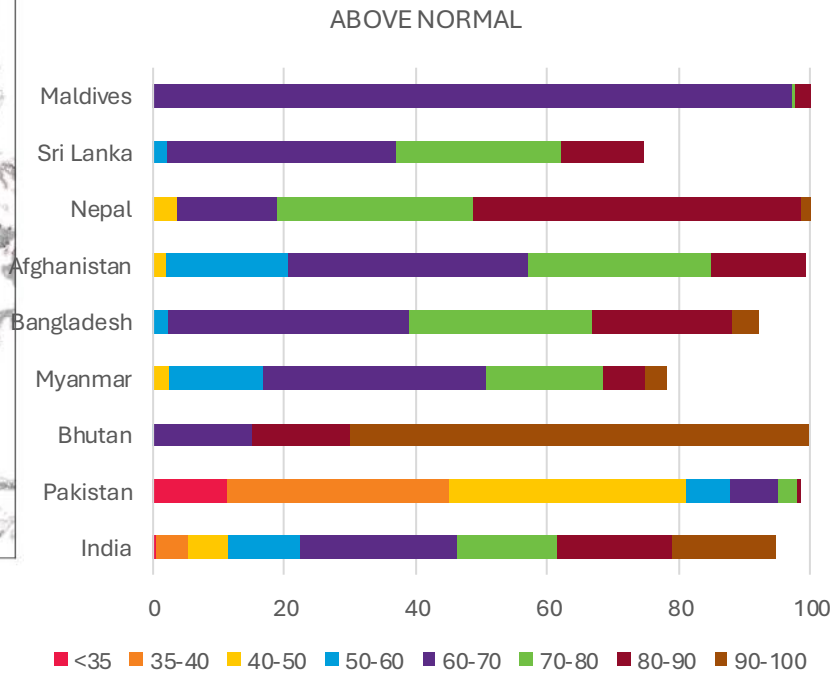


Source: SASCOF Outlook for June - September 2026 ; and UN Geospatial. Blue and Red hues indicates climatological probability

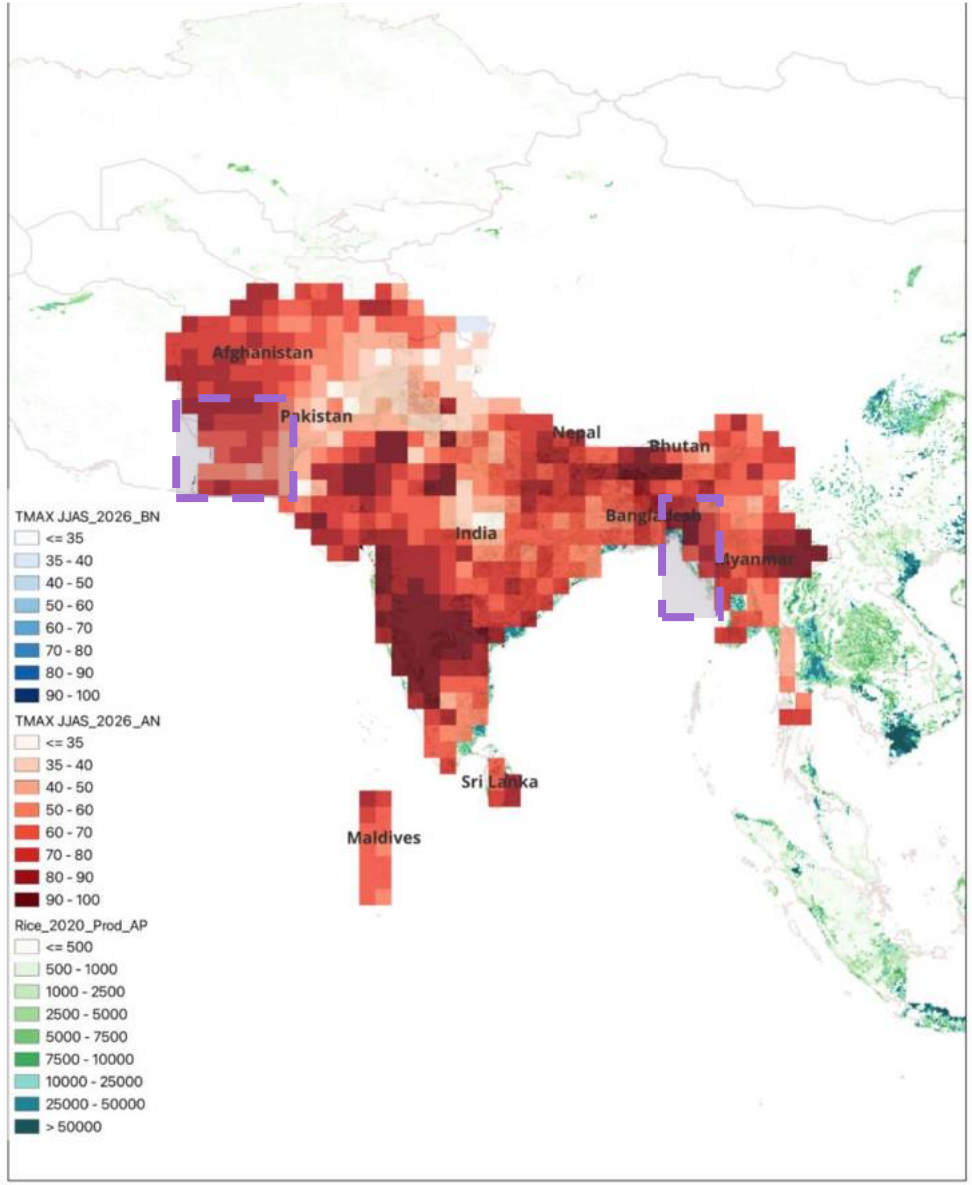
Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

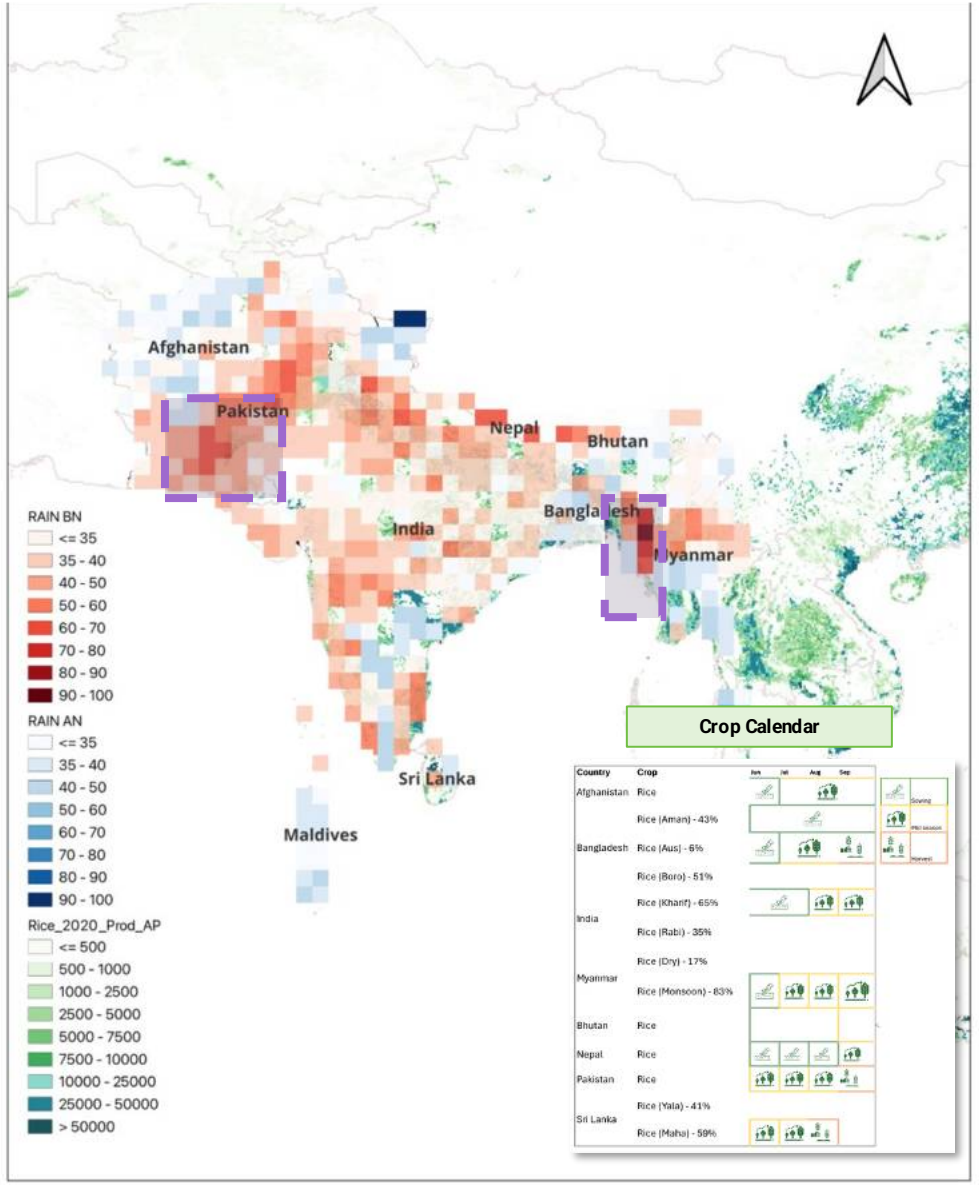
Cities to be affected by

- Above Normal Temperature: Karachi, Lahore , Islamabad, New Delhi , Mumbai, Kolkata, Bengaluru, Dhaka, Male
- Bhutan and Nepal has the highest risk:
  - 100% of Bhutan's population is under moderate to high likelihood (60-100%) of Above Normal Temperature; 75% of Bhutan's population is **under very high** (80-100%) likelihood of Above Normal Temperature
  - Nearly 50% of Nepal's population is at risk of 80-100% likelihood of Above Normal Temperature.
- Entire population od Maldives is at moderate to high likelihood (60-100% likelihood) of Above Normal Temperature



Compound Climate Signal: Dual Stress on crops due to Low Rainfall and Warm Nights



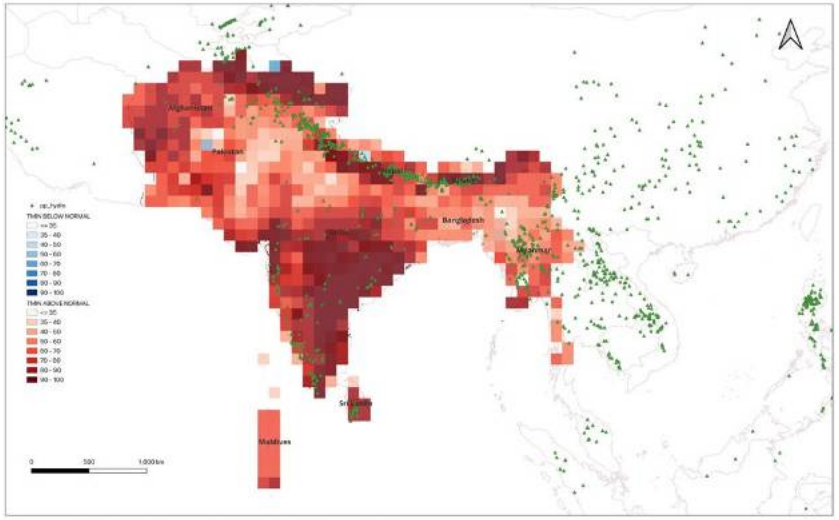


Below-normal rainfall reduces soil moisture, while above-normal daytime temperatures (Tmax) increase evapotranspiration, compounding stress on rice during sowing and grain-filling stages.

- Pakistan: Sind and Punjab regions are likely to affected by the compound climate stress caused by below normal rainfall and above normal temperature. Rainfed regions are more likely to face the impact on rice production, Irrigated regions are likely to face increased energy demand.
- Bangladesh: Aus rice (pre-monsoon rice) cultivating regions (from April to August) and aman rice crop that follows the monsoon rains, is mainly rainfed (July to December) and likely to be severely affected by this pattern.

Source: SASCOF Outlook for June - September 2026 ; and UN Geospatial. Blue and Red hues indicates climatological probability

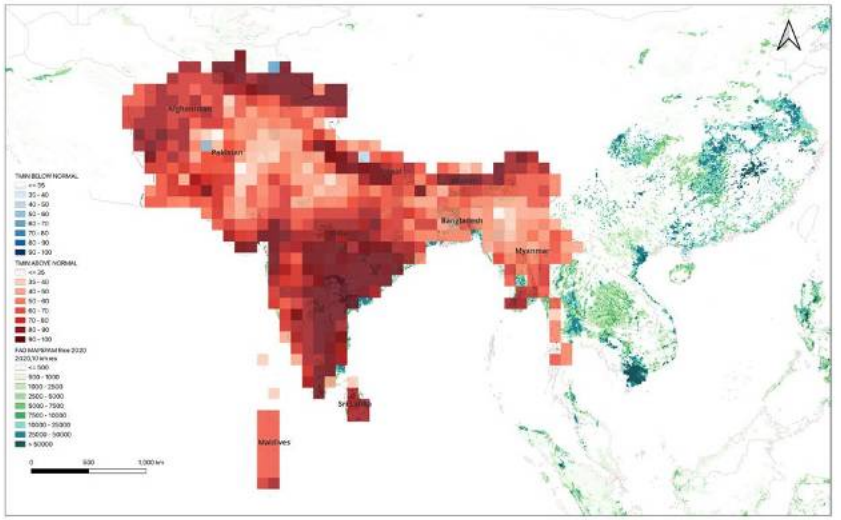
Potential Impacts of T-MIN Anomaly



Source: SASCOF Outlook for June - September 2026 ; and UN Geospatial. Blue and Red hues indicates climatological probability

Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

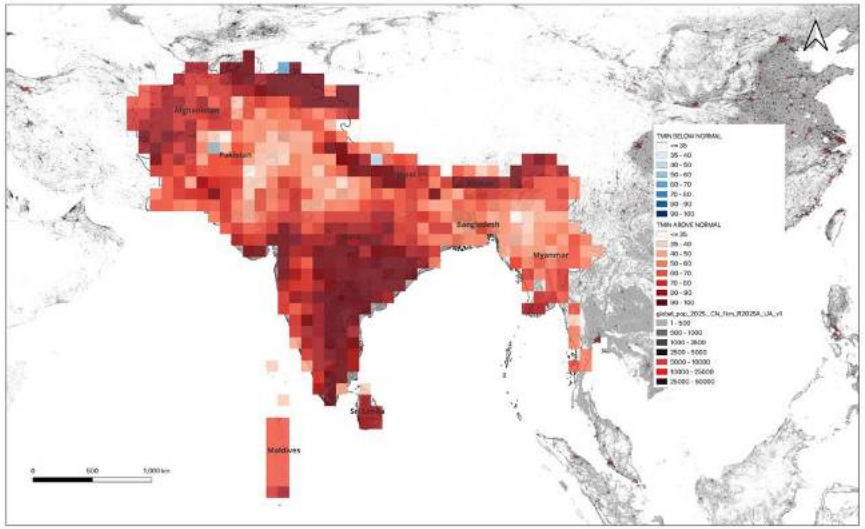
Rice Production



Source: SASCOF Outlook for June - September 2026 ; and UN Geospatial. Blue and Red hues indicates climatological probability

Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

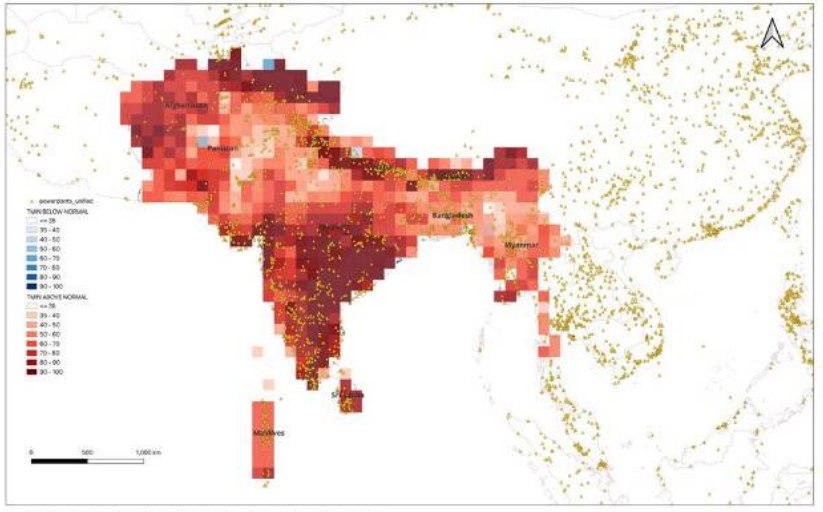
Hydro Powerplants



Source: SASCOF Outlook for June - September 2026 ; and UN Geospatial. Blue and Red hues indicates climatological probability

Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

Total Population



Source: SASCOF Outlook for June - September 2026 ; and UN Geospatial. Blue and Red hues indicates climatological probability

Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

Total Powerplants

Future work and key next steps

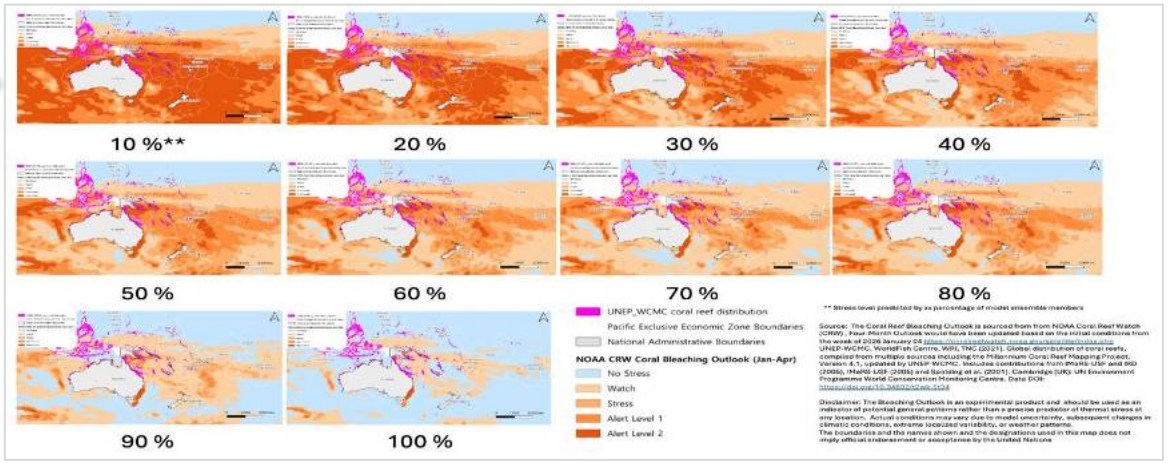
- **More detailed data = sharper insights** → supports targeted early warning, adaptation planning, and resilience investments
- With collaboration, develop IBF on Marine ecosystems – impact of sea surface temperature on Corals, Fish catch and Mangrove

- With **more granular exposure data** (Maldives example) **-> more refined IBF**
  - Potential case studies for South Asia sub-region

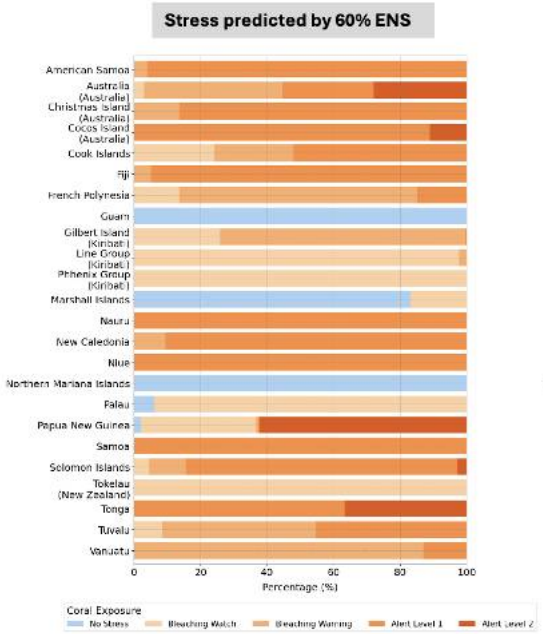
IBF on Coral Bleaching: Case study from Pacific

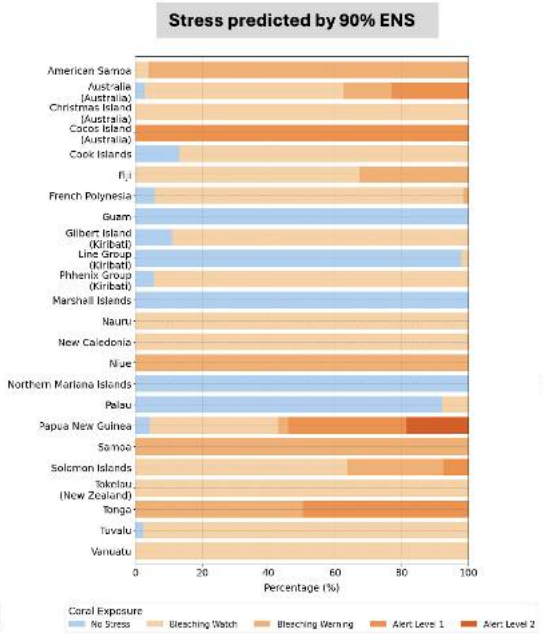
Coral Bleaching	**National Oceanic and Atmospheric Administration(NOAA) Coral Reef Watch (Liu et al., 2018)** • Sea Surface Temperature − Maximum Monthly Mean above a threshold (≥ 1°C) is accumulated over 12 weeks to compute Degree Heating Weeks (DHW) • DHW is used to classify coral bleaching risk (No Stress, Watch, Stress, Warning Alert Level 1 , Warning Alert Level 2).
Coral Reef Distribution	**UNEP-World Conservation Monitoring Centre (WCMC) Coral Reef Distribution (UNEP-WCMC et al., 2021)** • Compiled from multiple sources using high-resolution satellite imagery by UNEP-WCMC and the WorldFish Centre, in collaboration with World Resources Institute(WRI) and The Nature Conservancy (TNC). • The dataset includes both warm and cold corals.
Marine Exclusive Economic Zone Boundary	**Boundaries of Exclusive Economic Zones (Flanders Marine Institute, 2024)** • The EEZ polygons used in this analysis are typically derived from global maritime boundary datasets obtained from Pacific Ocean Portal.

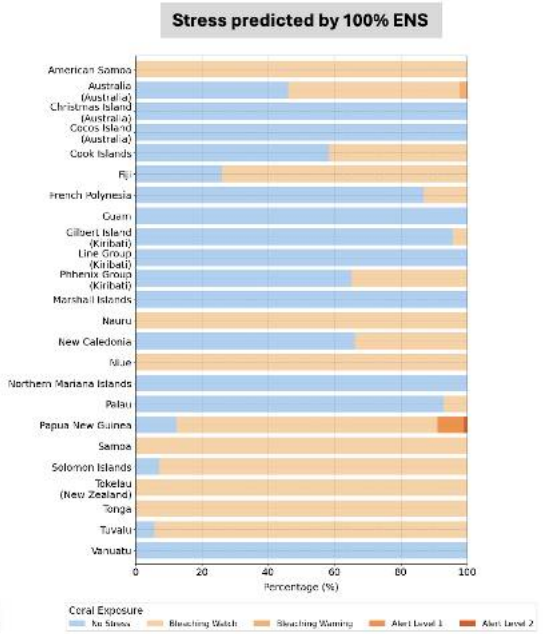
NOAA CRW Coral bleaching Outlook Jan-Apr 2026



Using the Coral Bleaching Outlook (from NOAA) and Coral Reef Distribution data (from UNEP WCMC), bleaching stress was estimated for each country/territory in pacific region.







ESCAP
Economic and Social Commission for Asia and the Pacific

Thank you

Follow us:

unescap

unitednationsescap

united-nations-escap

unescap.org