

**20th Session of the  
Forum on Regional Climate Monitoring, Assessment and Prediction for Asia (FOCRAII-20)**

# **Challenges and Opportunities of Operationalizing Impact-based Forecasting**

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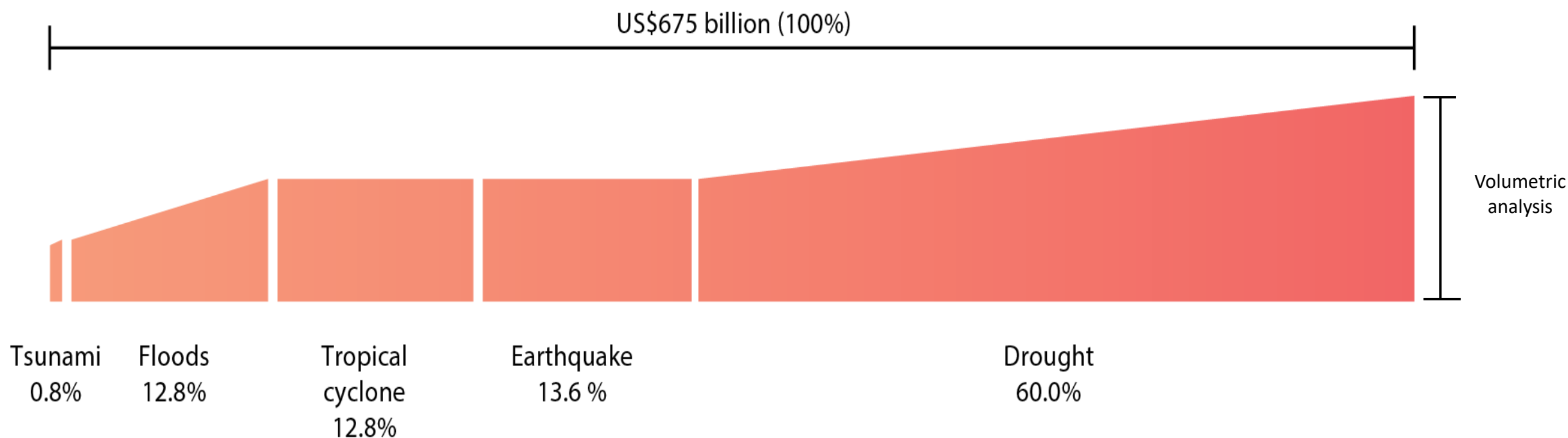
**Sanjay Srivastava (Mr), Ph.D**  
Chief, Disaster Risk Reduction Section  
UN Economic and Social Commission for Asia and the Pacific

**Beijing Climate Centre  
China Meteorological Administration  
10 May 2024, Qingdao, China**

# Asia-Pacific Disaster Riskscape:

AAL of USD 980 billion – around 3.1 per cent of region's GDP under 2°C warming

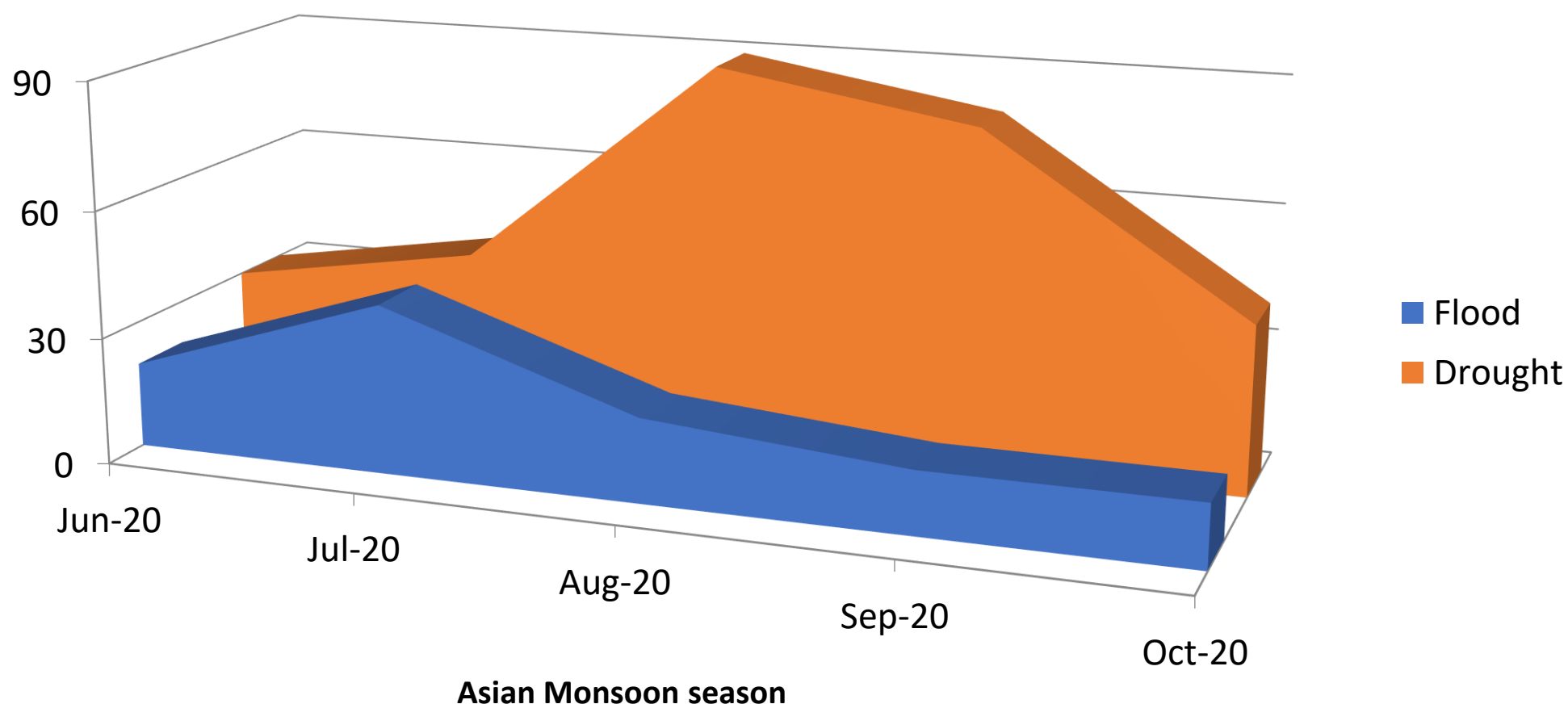
Climate risk accounts for 85 per cent of the regional 'riskscape'.



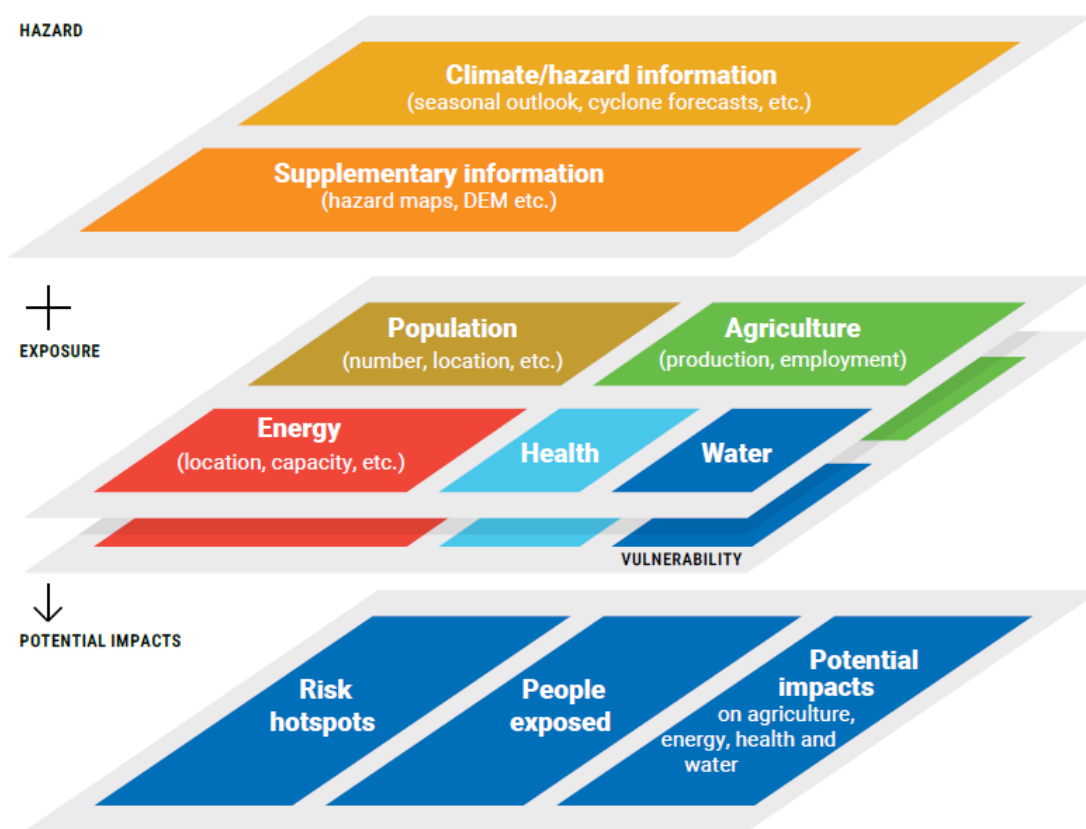
Source: ESCAP, Asia-Pacific Disaster Report 2019, Figure 1-1

**Floods and droughts are primarily driven by the Asian monsoon.**  
**Seasonal forecast captures the temporal risk profile.**

Probability of risk

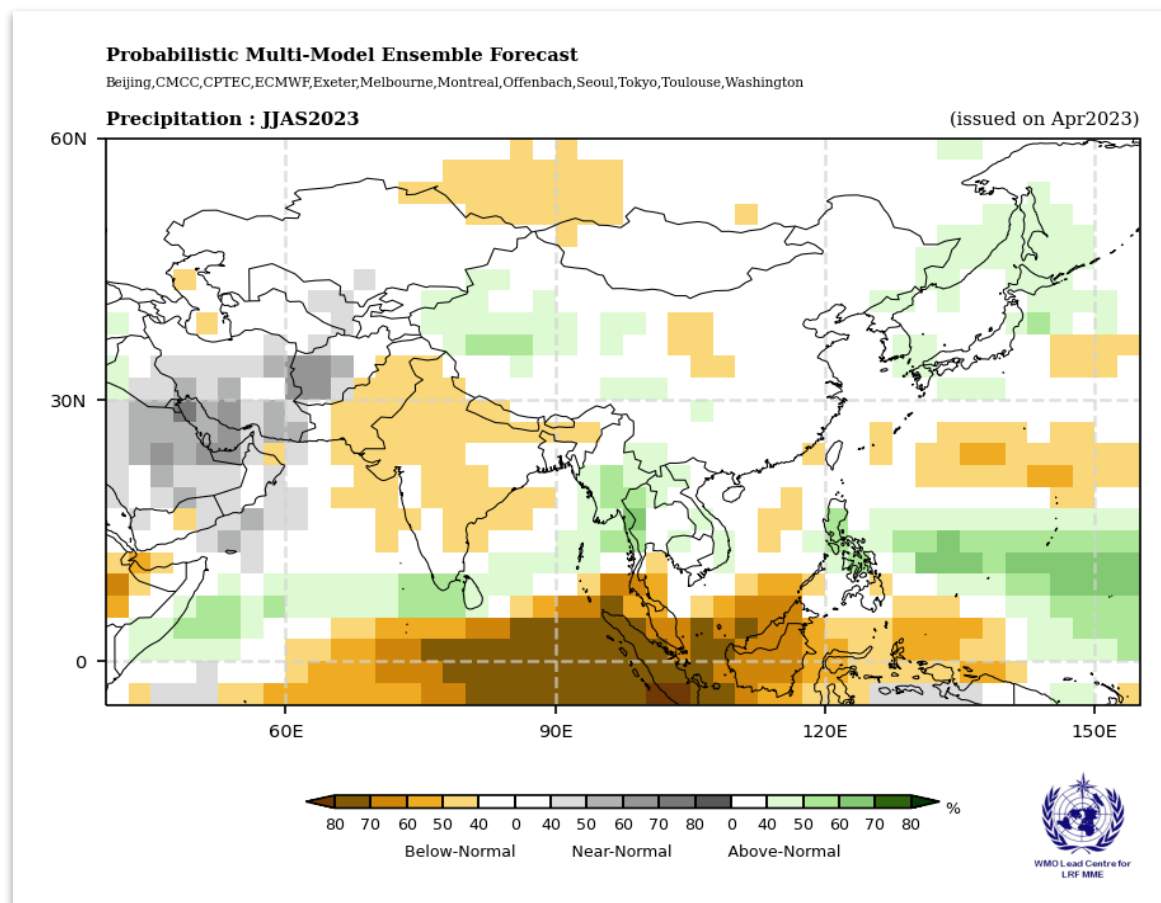


# ESCAP's IBF approach follows the WMO Global Framework for Climate Services.

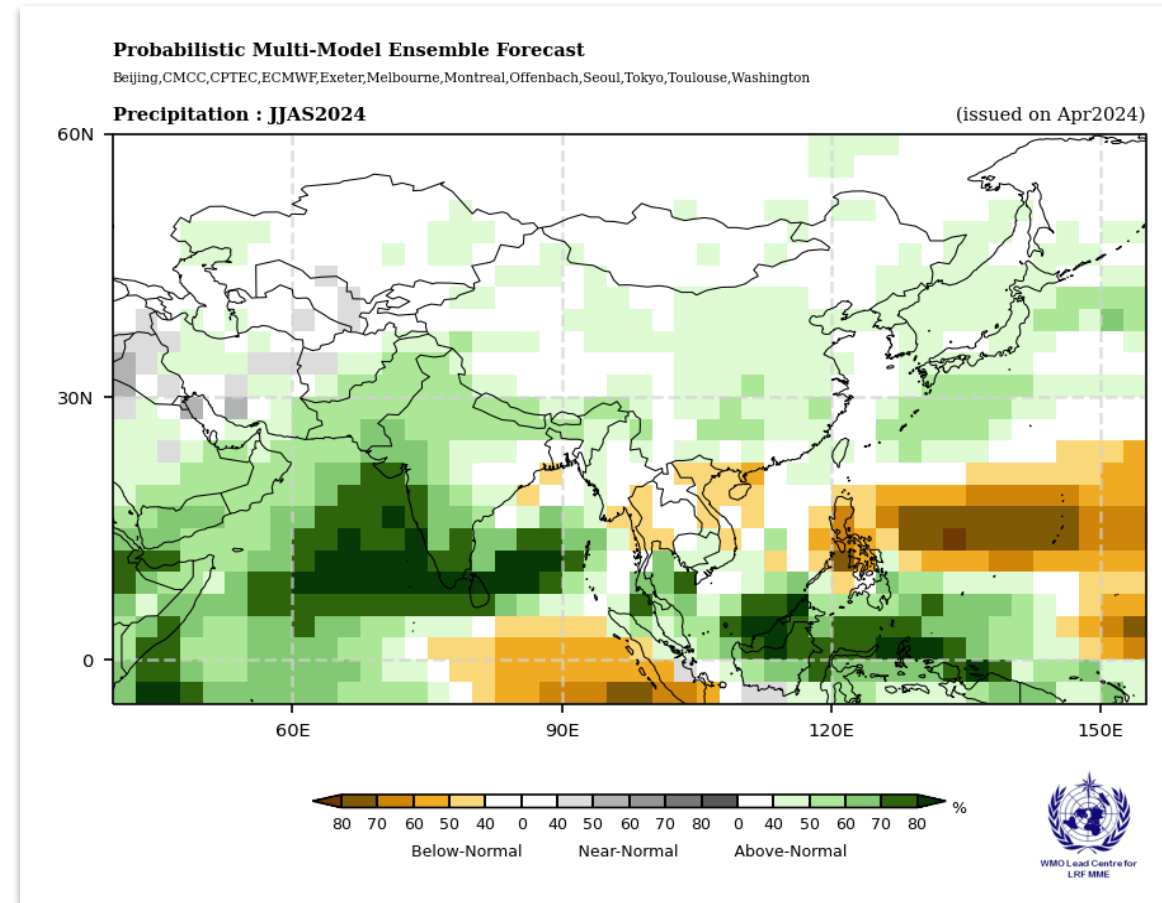


- **IBF based on seasonal forecast products** - Concept and cases were presented to SASCOF, EASCOF, ASEANCOF and FOCRAII.
- **IBF based on observed and forecast tracks of tropical cyclones (quadrant wind)** - Concept and a case were presented to and discussed at TC and PTC.

## WMO Seasonal outlook for precipitation (ensemble) JJAS 2023



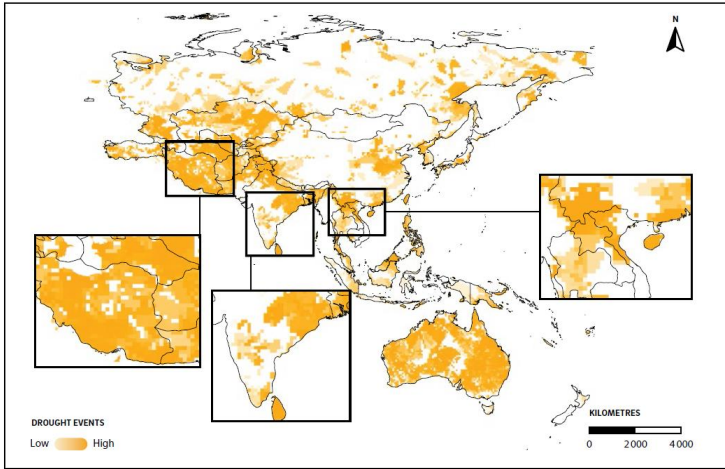
## WMO Seasonal outlook for precipitation (ensemble) JJAS 2024



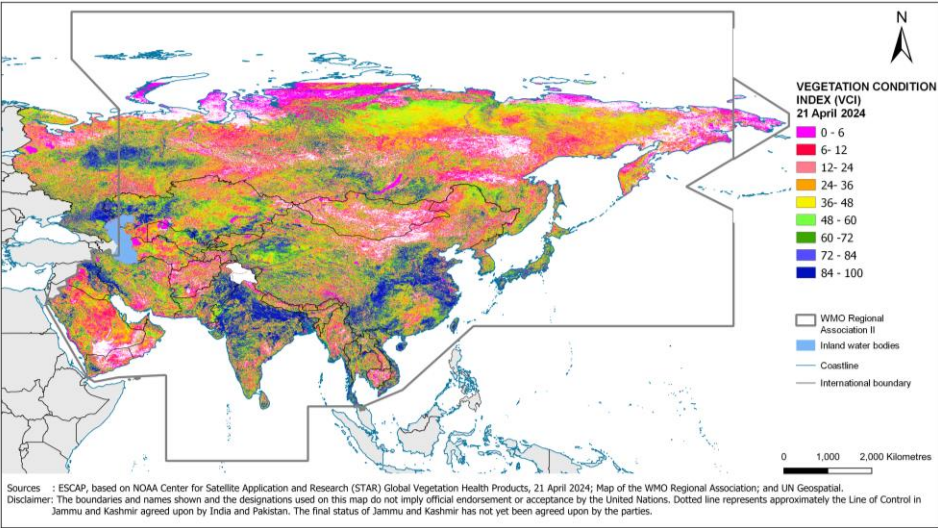
# Seasonal Outlook JJAS 2024

## Areas of attention for precipitation

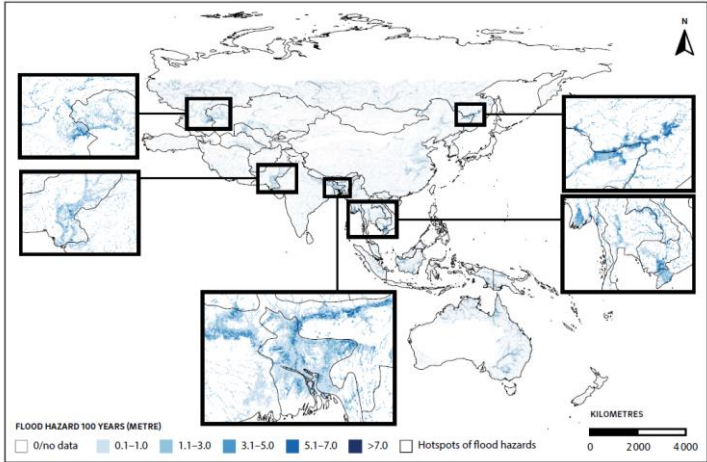
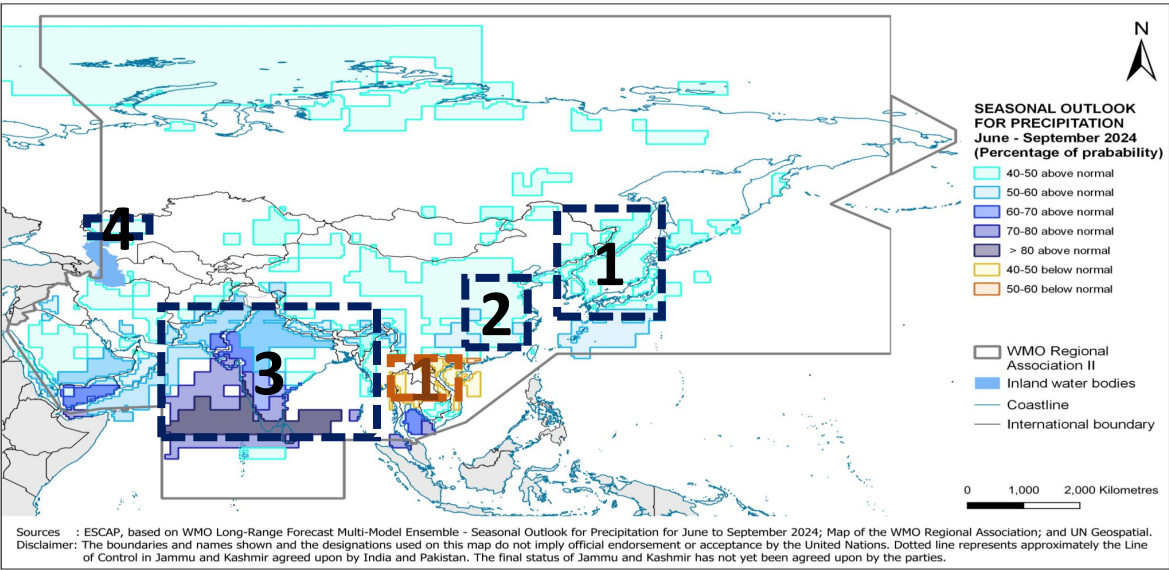
Vegetation health during the most recent week, historical flood and drought hazard maps were used to find out the areas of attention for **above-normal** and **below-normal** precipitation.



**Areas of attention for below-normal precipitation**  
1. Southeast parts



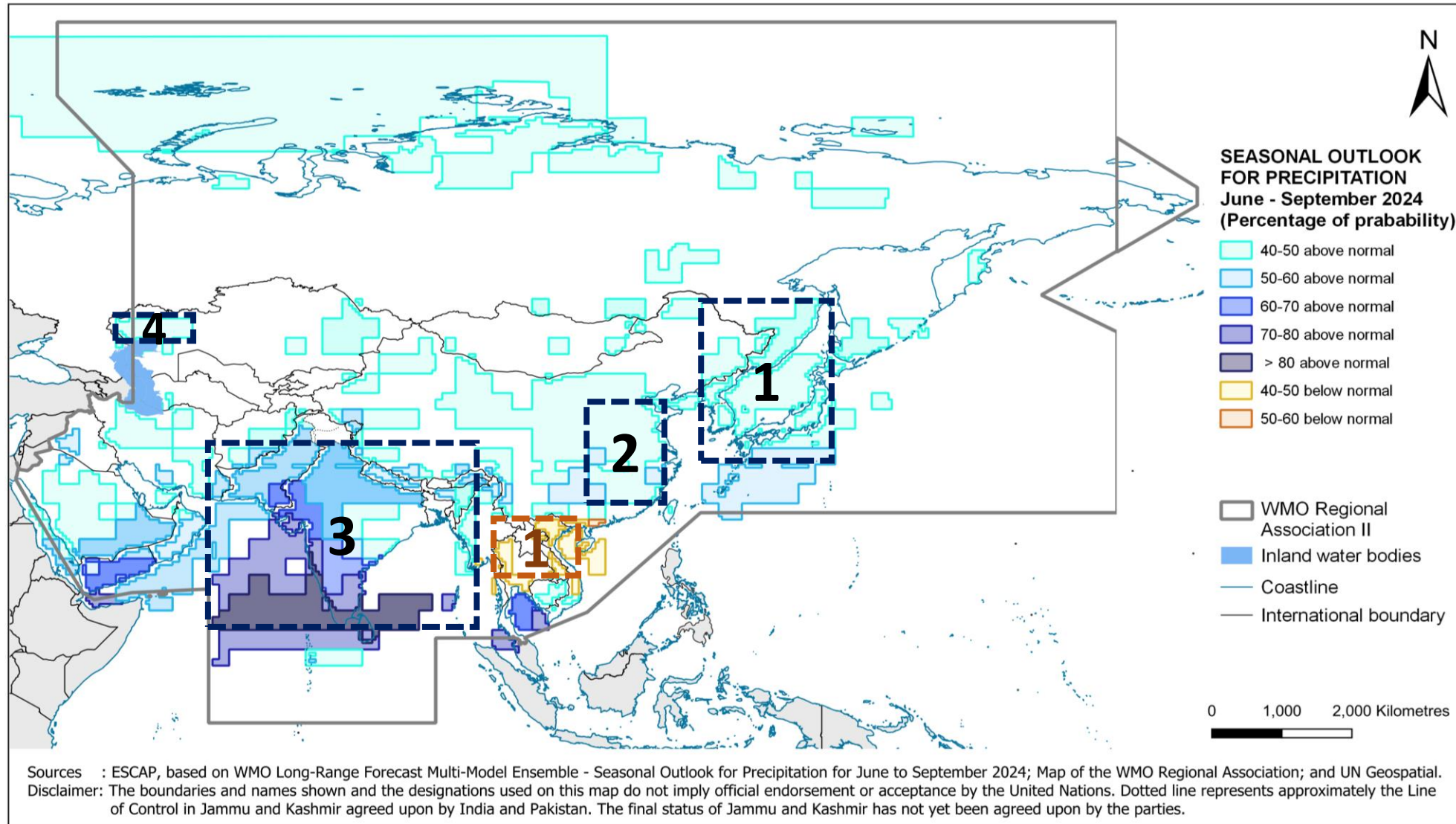
**Areas for attention for above-normal and below-normal precipitation, JJAS 2024**



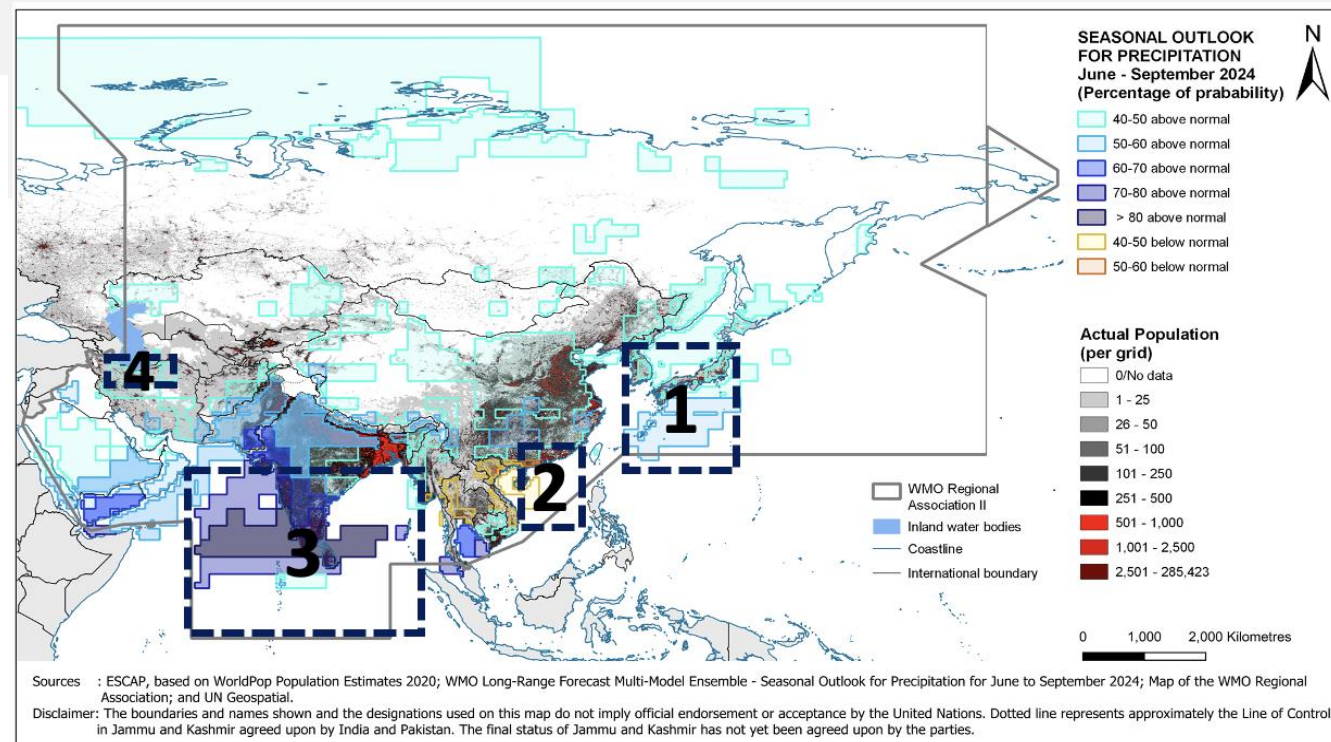
**Areas of attention for above-normal precipitation**  
1. Northeast parts  
2. Central east parts  
3. Southwest parts  
4. Central west parts



# Seasonal Outlook for Precipitation JJAS 2024



# Population likely to be exposed to above-normal precipitation



Areas need attention, in association with above-normal rainfall

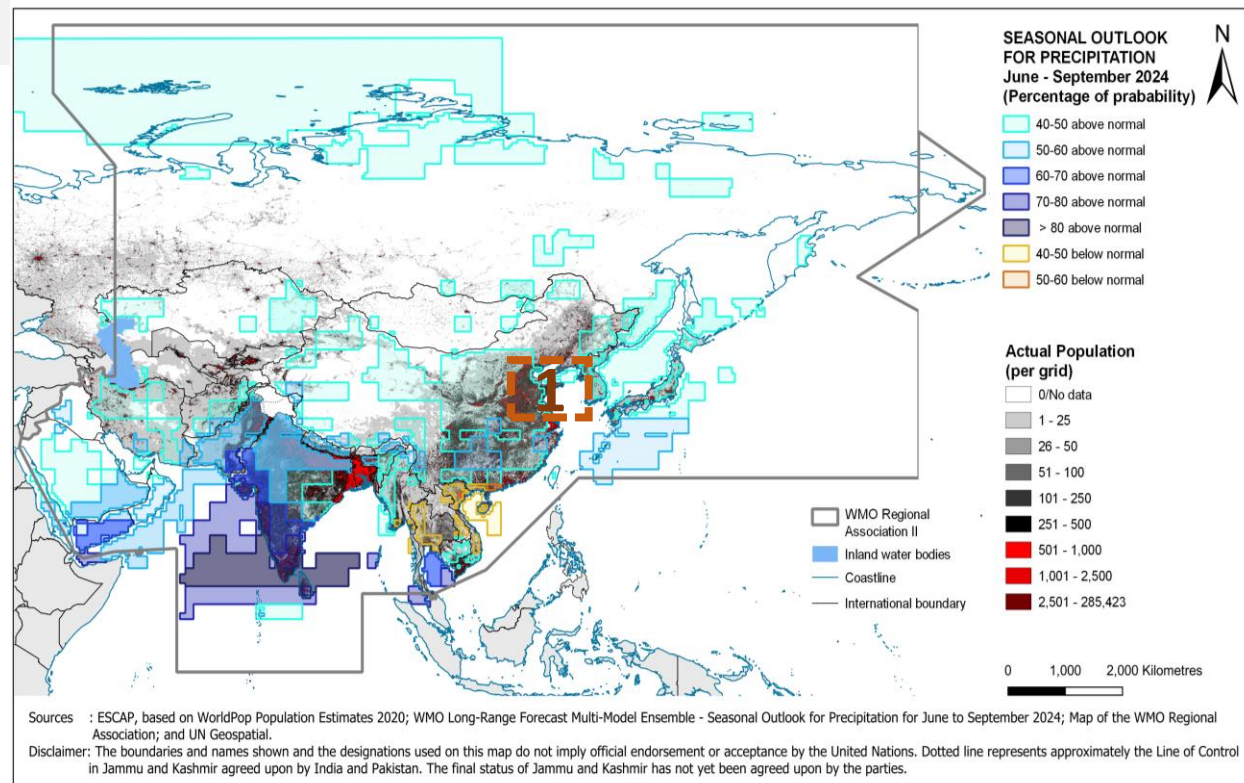
- The seasonal forecast data is overlaid with population data, and it can help identify location and number of population exposed to less or more precipitation to normal years.
- This can help identify the number of population/population density in the areas of concerns.
- The **above-normal precipitation** is expected in **1. Northeast** (Russian Federation, Japan, Republic of Korea, DPR Korea), **2. Central east** (China), **3. Southwest** (India, Pakistan, Nepal, Myanmar), and **4. Central west** (Kazakhstan) parts of the WMO Regional Association II.

Country	Total population 2022 (thousands) ESCAP statistics	Percent of population exposure		
		40.1% - 50% probability of above normal precipitation	50.1% - 80% probability of above normal precipitation	Above normal precipitation
Afghanistan	41,129	40.0%	4.4%	<b>44.3%</b>
Bangladesh	171,186	0.0%	0.4%	0.4%
Cambodia	16,768	42.5%	0.1%	<b>42.5%</b>
China	1,425,887	54.9%	5.7%	<b>60.5%</b>
Hong Kong, China	7,489	0.0%	0.0%	0.0%
Macau, China	695	0.0%	0.0%	0.0%
DPR Korea	26,069	38.6%	0.0%	<b>38.6%</b>
India	1,417,173	7.7%	<b>68.2%</b>	<b>75.9%</b>
Iran, Islamic Rep. of	88,551	45.4%	2.5%	<b>47.9%</b>
Japan	123,952	23.0%	0.0%	<b>23.0%</b>
Kazakhstan	19,398	5.6%	0.0%	5.6%
Kyrgyzstan	6,631	0.7%	0.0%	0.7%
Lao PDR	7,530	1.5%	0.0%	1.5%
Maldives	524	0.0%	0.0%	0.0%
Mongolia	3,398	2.1%	0.0%	2.1%
Myanmar	54,179	17.3%	0.1%	<b>17.4%</b>
Nepal	30,548	0.0%	<b>38.2%</b>	<b>38.2%</b>
Pakistan	235,825	1.0%	<b>71.0%</b>	<b>72.1%</b>
Rep. of Korea	51,816	16.8%	0.0%	<b>16.8%</b>
Russian Federation	144,713	2.3%	0.0%	2.3%
Sri Lanka	21,832	0.0%	<b>95.9%</b>	<b>95.9%</b>
Tajikistan	9,953	0.2%	0.0%	0.2%
Thailand	71,697	0.3%	0.0%	0.4%
Turkmenistan	6,431	0.7%	0.0%	0.7%
Uzbekistan	34,628	0.0%	0.0%	0.0%
Viet Nam	98,187	4.9%	0.1%	5.0%
<b>TOTAL</b>	<b>4,116,187</b>	<b>25.4%</b>	<b>29.86%</b>	<b>55.2%</b>

- 25.4%** of population in the region are likely to experience **40-50%** probability of **above normal precipitation**. This equals approximately **1 Billion** of people
- 95.9%** of Sri Lanka, **71%** of Pakistan, and **68.2%** of India population are likely to experience **50.1-80%** probability of more rainfall.
- Countries with the greatest proportion of exposed population to **above normal precipitation** are: **Sri Lanka (95.9%), Pakistan (72.1%), India (75.9%), China (60.5%), Iran (47.9%), Afghanistan (44.3%), and Cambodia (42.5%).**



# Population likely to be exposed to below-normal precipitation



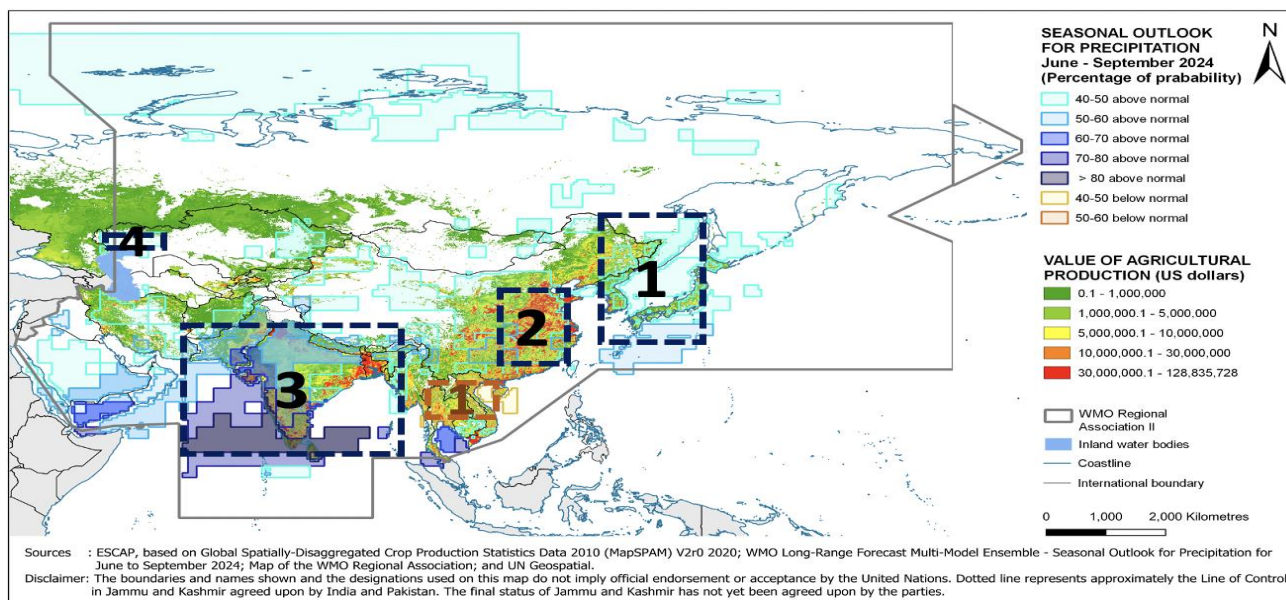
Country	Total population 2022 (thousands) ESCAP statistics	Percent of population exposure		
		40.1% - 50% probability of below normal precipitation	50.1% - 80% probability of below normal precipitation	Below normal precipitation
Afghanistan	41,129	0.0%	0.0%	0.0%
Bangladesh	171,186	0.0%	0.0%	0.0%
Cambodia	16,768	0.0%	0.0%	0.0%
China	1,425,887	0.4%	0.5%	0.9%
Hong Kong, China	7,489	0.0%	0.0%	0.0%
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Japan	123,952	0.0%	0.0%	0.0%
Kazakhstan	19,398	0.0%	0.0%	0.0%
Kyrgyzstan	6,631	0.0%	0.0%	0.0%
Lao PDR	7,530	17.7%	0.0%	17.7%
Maldives	524	0.0%	0.0%	0.0%
Mongolia	3,398	0.0%	0.0%	0.0%
Myanmar	54,179	10.1%	0.0%	10.1%
Nepal	30,548	0.0%	0.0%	0.0%
Pakistan	235,825	0.0%	0.0%	0.0%
Rep. of Korea	51,816	0.0%	0.0%	0.0%
Russian Federation	144,713	0.0%	0.0%	0.0%
Sri Lanka	21,832	0.0%	0.0%	0.0%
Tajikistan	9,953	0.0%	0.0%	0.0%
Thailand	71,697	33.0%	0.0%	33.0%
Turkmenistan	6,431	0.0%	0.0%	0.0%
Uzbekistan	34,628	0.0%	0.0%	0.0%
Viet Nam	98,187	27.3%	0.0%	27.3%
<b>TOTAL</b>	<b>4,116,187</b>	<b>1.5%</b>	<b>0.17%</b>	<b>1.7%</b>

 Areas need attention, in association with below-normal rainfall

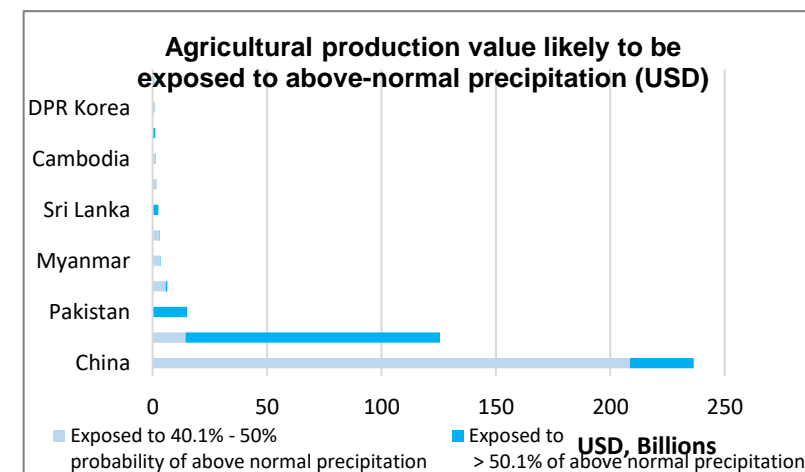
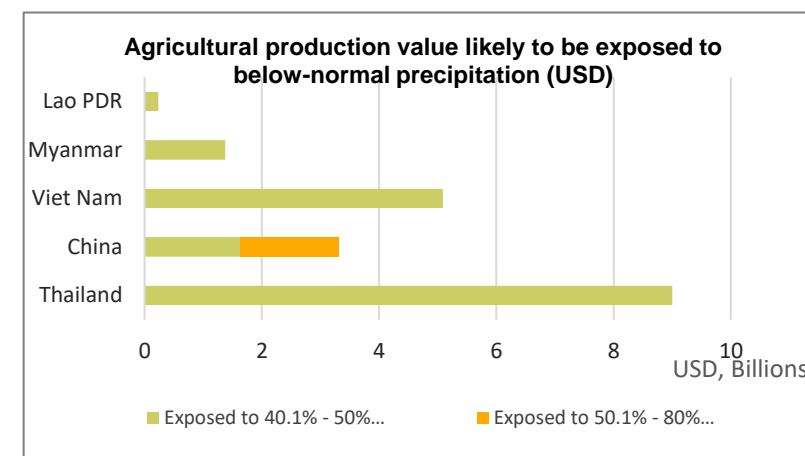
- The **below-normal precipitation** is expected in the **Southeast** (Viet Nam, Lao PDR, and Thailand) parts of the WMO Regional Association II.

- 1.5%** of population in the region are likely to experience **40-50%** probability of **below-normal precipitation**. This equals approximately **63,360** of people.
- Countries with the greatest proportion of exposed population to below normal precipitation are: **Thailand (33%), Viet Nam (27.3%), Lao PDR (17.7%), and Myanmar (10.1%).**

# Potential exposure of agricultural production value



- **2.6%** of agricultural value in the region are likely to be exposed to **40%-80% probability of below-normal precipitation**. This equals **\$19 billion**.
- **\$8.9 billion** of **Thailand's** agricultural value are likely to be exposed, followed by **Viet Nam** at **\$5 billion**, **China** at **\$3.3 billion**, **Myanmar** at **\$1.4 billion**, **Lao PDR** at **\$0.2 billion**.
- **55.4%** of agricultural value in the region are likely to be exposed to **more than 40% of above-normal precipitation**. This equals **\$401 billion**.  
Countries with the greatest risk are **China** at **\$236.5 billion**, followed by **India** at **\$125.5 billion**, and **Pakistan** at **\$15.1 billion**.





**Bridging the  
science policy gap  
for informed action**

## RISK AND RESILIENCE PORTAL

An Initiative of the Asia Pacific Disaster Resilience Network



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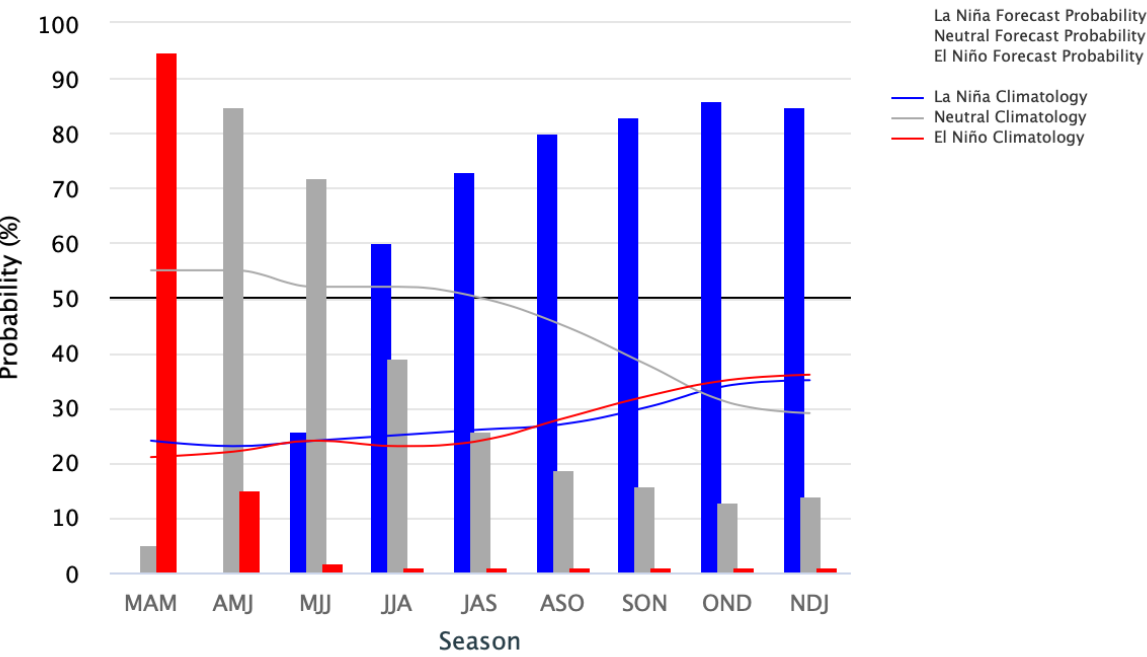
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# Early-April 2024 Probabilistic ENSO forecasts

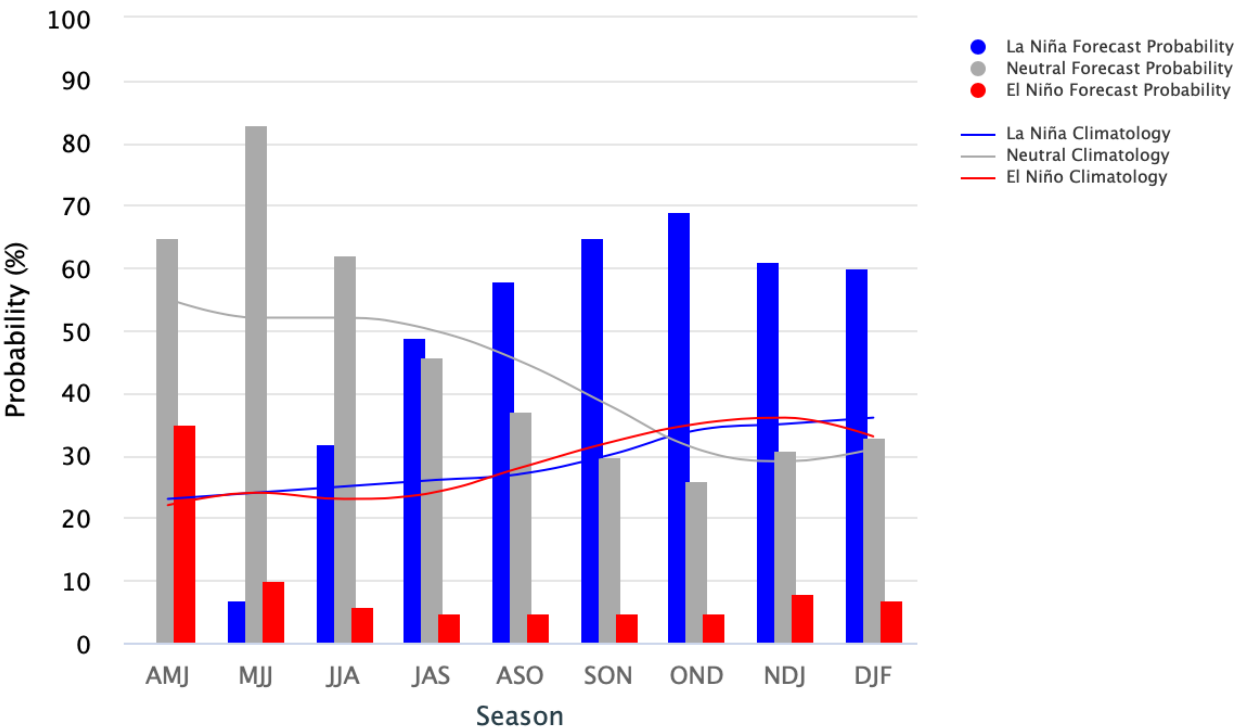
Early-April 2024 CPC Official Probabilistic ENSO Forecasts

ENSO state based on NINO3.4 SST Anomaly  
Neutral ENSO: -0.5 °C to 0.5 °C



Mid-April 2024 IRI Model-Based Probabilistic ENSO Forecasts

ENSO state based on NINO3.4 SST Anomaly Neutral ENSO: -0.5 °C to 0.5 °C



As of mid-April, El Nino conditions still persist. Most models in IRI ENSO predicts a transition of El Nino event to ENSO-neutral in Apr-Jun, 2024 to persist during boreal summer seasons of May-Aug, 2024. La Nina expected to be likely in Aug-Oct through Dec-Feb 2025.



# Impact forecasting of the Asian Monsoon is key to #3 transformative actions.

## 1. Policy action

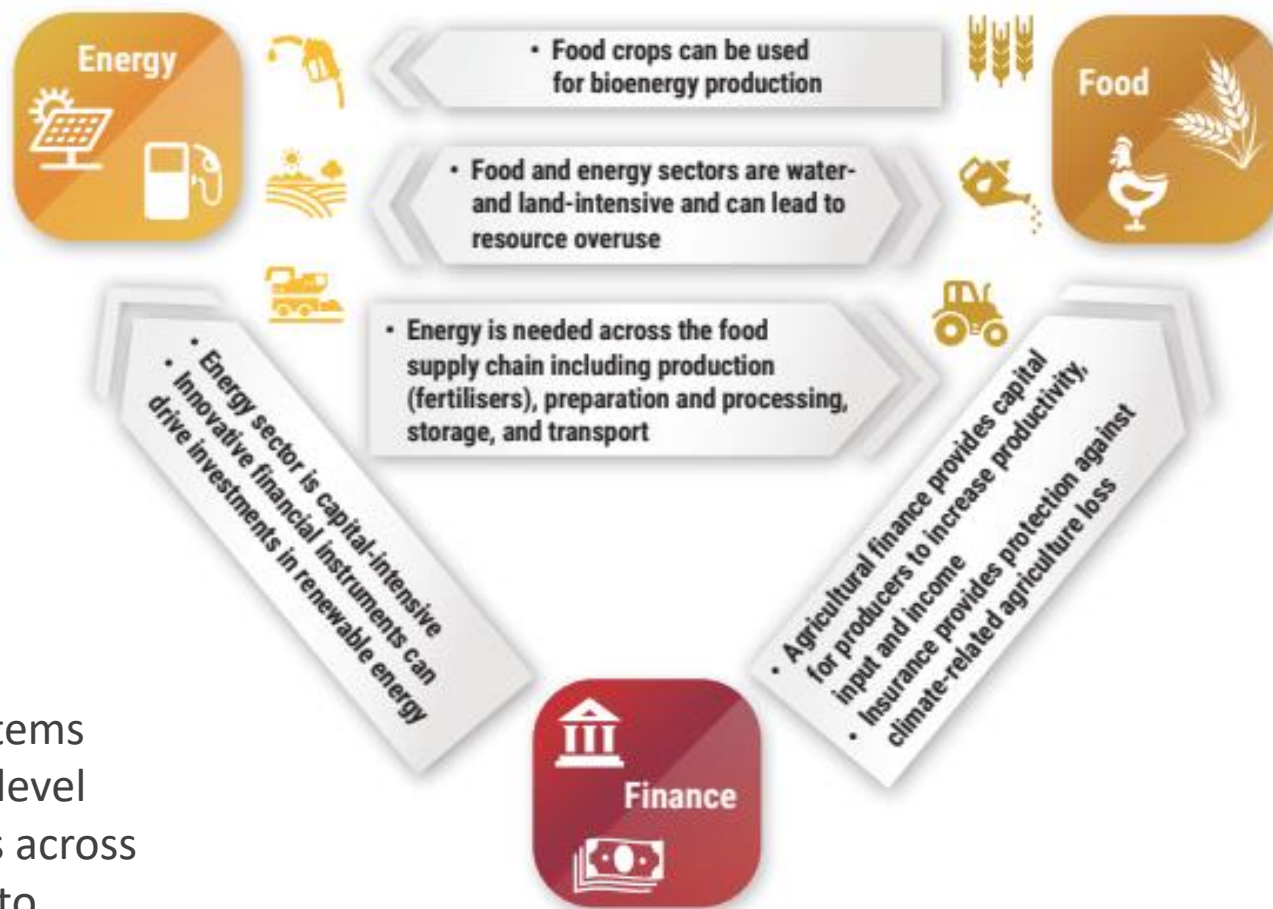
Managing complex, compounding and cascading risks through comprehensive climate risk management approach

## 2. Paradigm shift from Sector to System approach

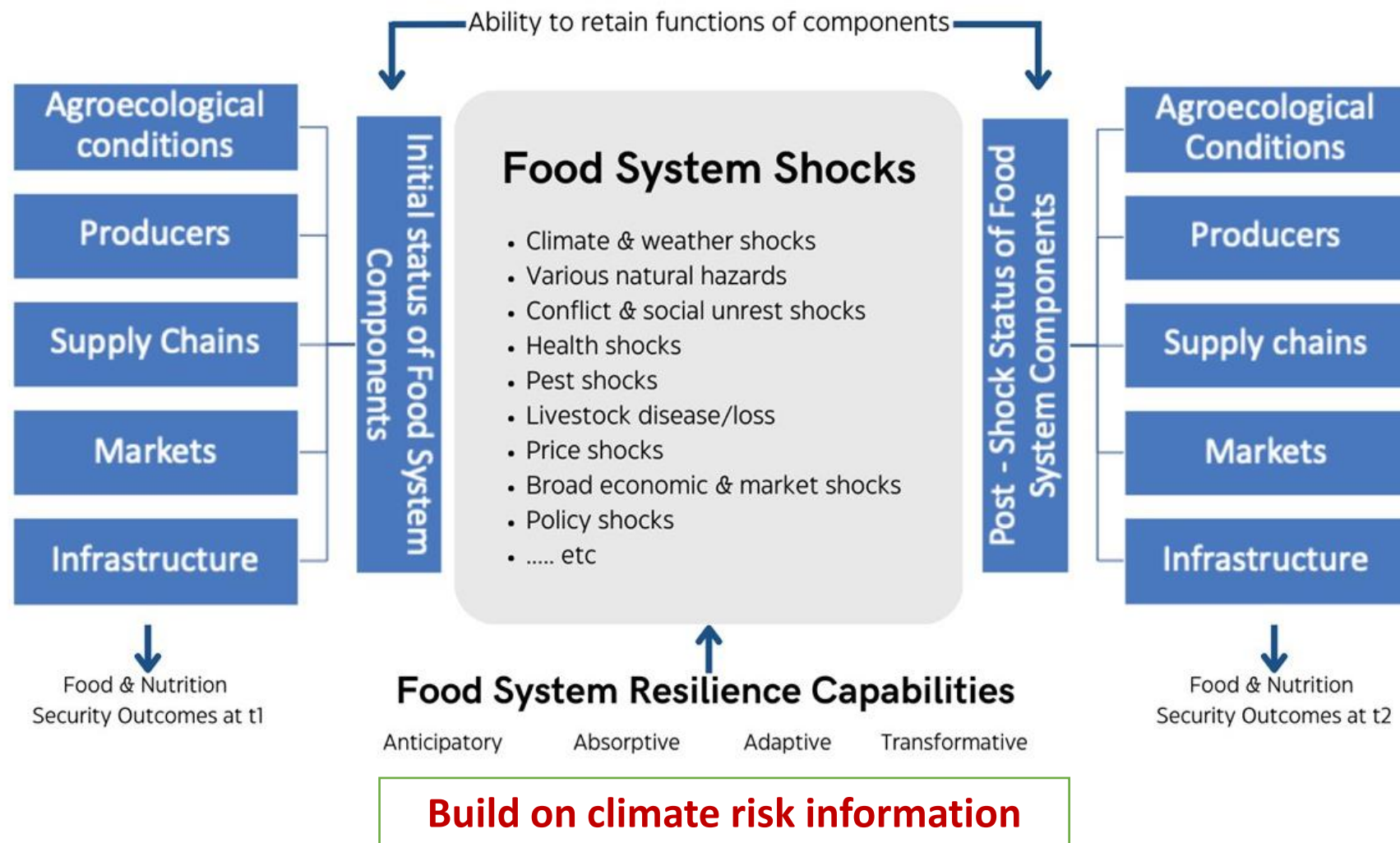
Food and energy systems are inter-related and linked with finance as reflected in today's global crisis

## 3. Making food systems more resilient.

The sectors and systems that support and connect food systems and food security are highly integrated. If risks at producer-level are not effectively managed, this can have cascading effects across all components of the food value chain, potentially leading to overall food system failures.



# Food system resilience in the era of climate emergency



[FAO 2021]

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