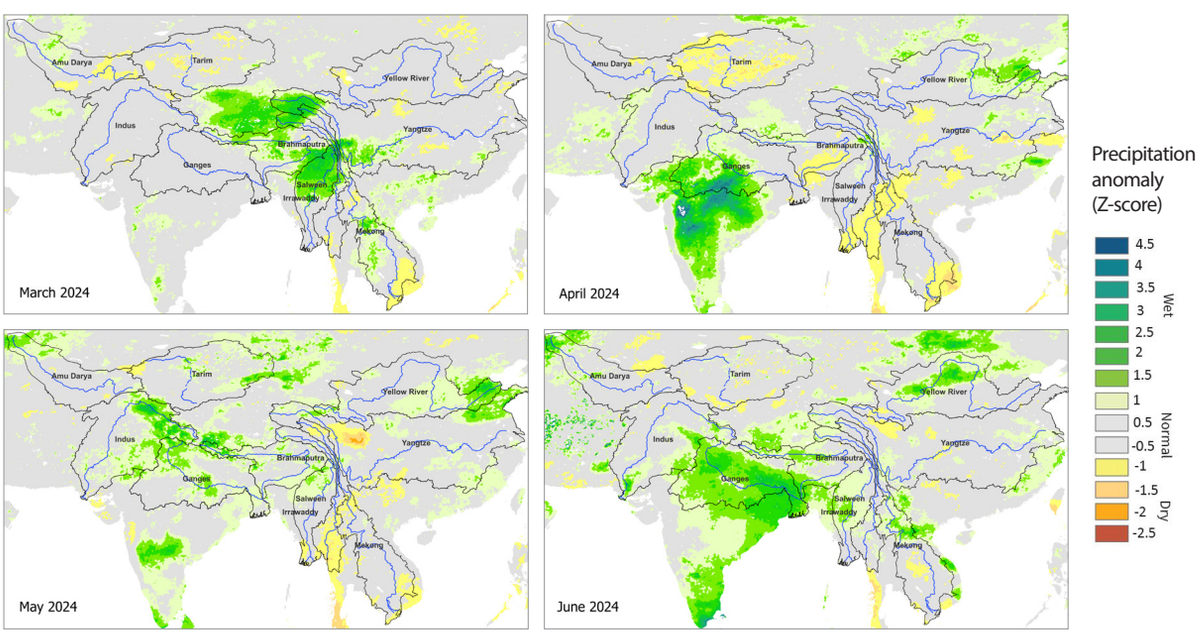
ICIMOD

Regional Drought Monitoring and Outlook System

Seasonal outlook March–June 2024

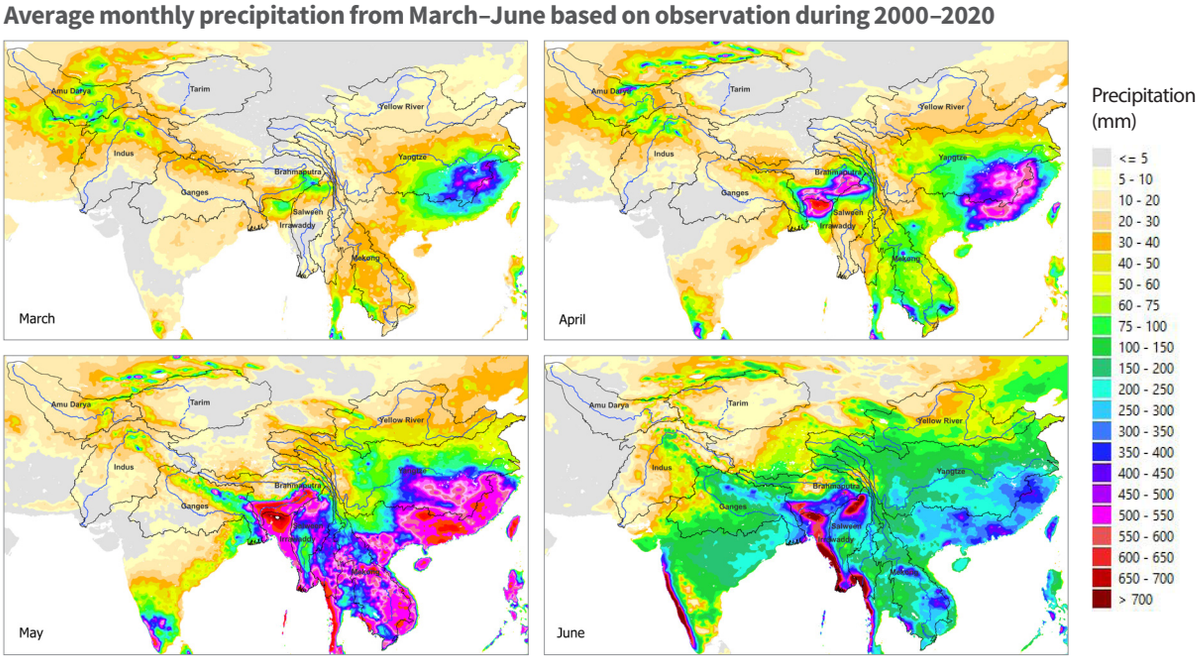
The following brief presents seasonal anomaly maps[1] from March to June 2024 in major river basins of the Hindu Kush Himalaya (HKH) region based on data generated by the Regional Drought Monitoring and Outlook System (RDMOS). Long-term average conditions (climate normal) are also provided for an overall understanding of precipitation, temperature, soil moisture and evapotranspiration patterns in the region. Read more about the RDMOS) here.

Precipitation outlook for March–June 2024



Extremely dry (< -3), Very dry (-2 to -3), Dry (-1 to -2), Near-normal (1 to -1), Wet (1 to 2), Very wet (2 to 3), Extremely wet (> 3)

Average monthly precipitation from March–June based on observation during 2000–2020



[1] Anomaly maps based on Z-score: The Z-score (anomaly) is a measure that reflects the departure of conditions in a particular month from normal conditions observed during 2000 to 2020.

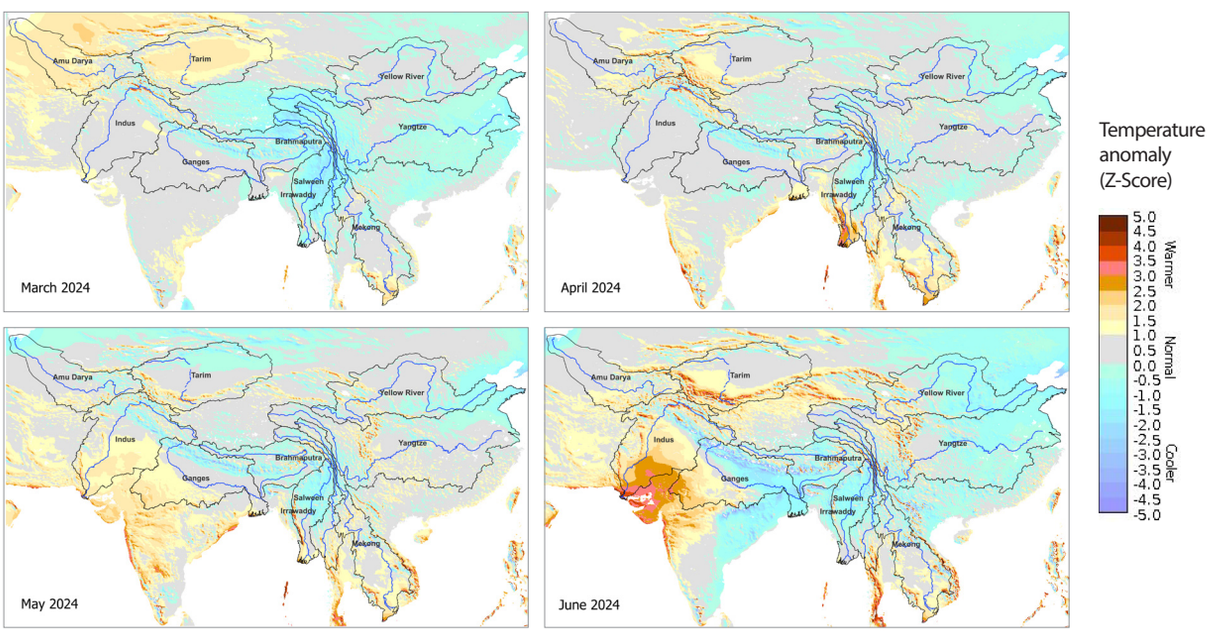
Precipitation outlook for March–June 2024

The four-month precipitation outlook from March to June indicates that Amu Darya, Tarim, Yellow River, Yangtze, and Mekong basins exhibit normal conditions with a slight deficit in rainfall in parts of Tarim for the month of April. The upper part of Indus Basin shows slightly wet conditions from May to June. Likewise, the Ganges Basin exhibits wetter-than-normal conditions throughout April to June. On the other hand, a minor surplus is expected in most parts of the Brahmaputra and Irrawaddy basins, with a slight deficit in April. The Salween Basin shows normal conditions with a slight deficit in the subsequent months until May.

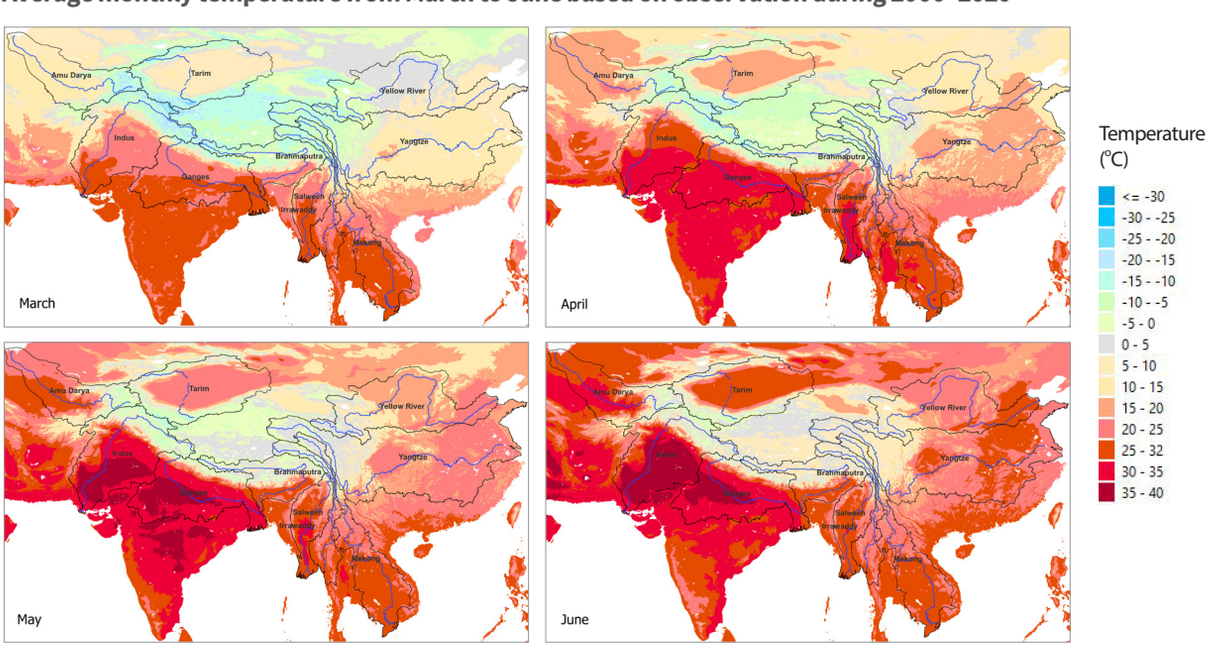
Monthly breakdown

March generally demonstrates near-normal conditions for Amu Darya, Tarim, Indus and Ganges basins, except for a surplus expanding from the Brahmaputra to the upper part of Irrawaddy Basin. Slightly wet conditions are expected in the central part of the Mekong Basin. April indicates a low to moderate surplus in the lower Ganges with a slight deficit in parts of Tarim, Brahmaputra and Salween basins; other basins are expected to have near-normal conditions. In May, some parts of Indus, Ganges, and Irrawaddy basins are expected to have a slight surplus, though conditions are similar to those for the other basins as in April. June shows largely near-normal conditions where the Ganges Basin transitions towards wetter conditions with moderate excess, and a low surplus is expected in parts of the Brahmaputra, Irrawaddy, and Mekong basins. The rest of the basins are anticipated to encounter near-normal conditions.

Temperature outlook for May–August 2023



Average monthly temperature from March to June based on observation during 2000–2020



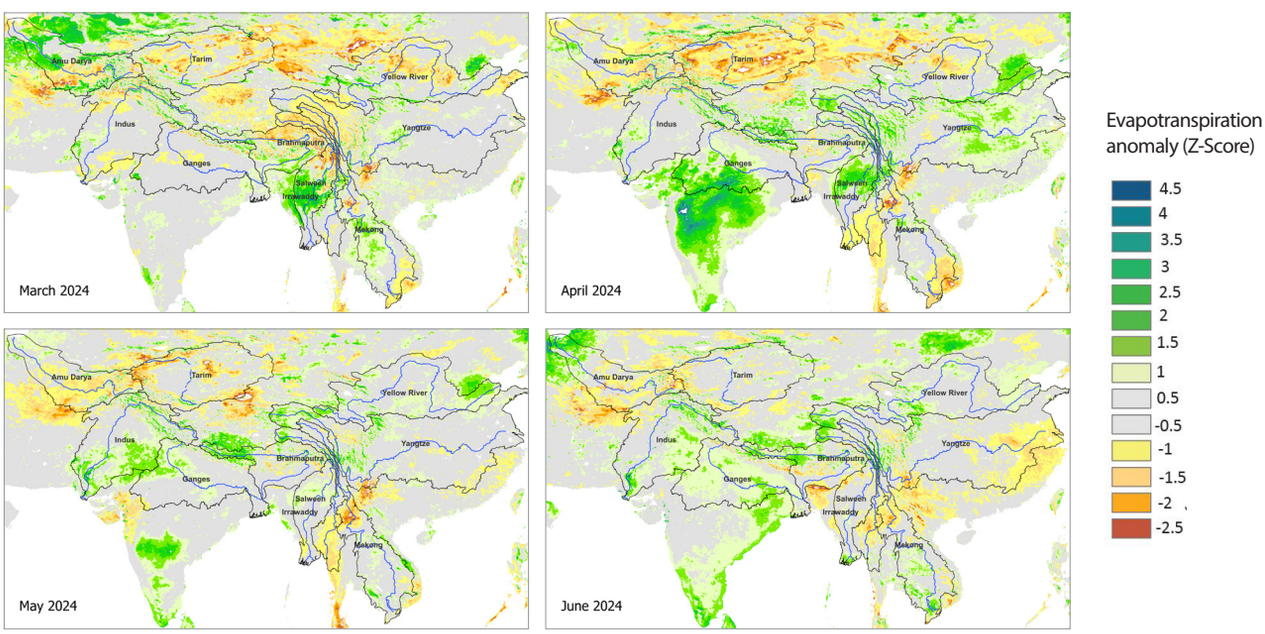
Temperature outlook for March–June 2024

As shown in the temperature anomaly maps, the northern basins comprising Amu Darya and Tarim basins indicate fluctuations between normal and moderately warmer temperatures. Most of the eastern parts of the major river basins of the HKH are expected to remain under cooler-than-normal temperatures until June. The upper parts of the Indus and Ganges basins show mostly normal to cooler temperatures throughout this period, whereas their lower regions transition to slightly warmer conditions from May through June. Only the lower region shows slightly warmer-than-normal conditions from April, while the Salween and Mekong basins indicate cooler and normal conditions, respectively.

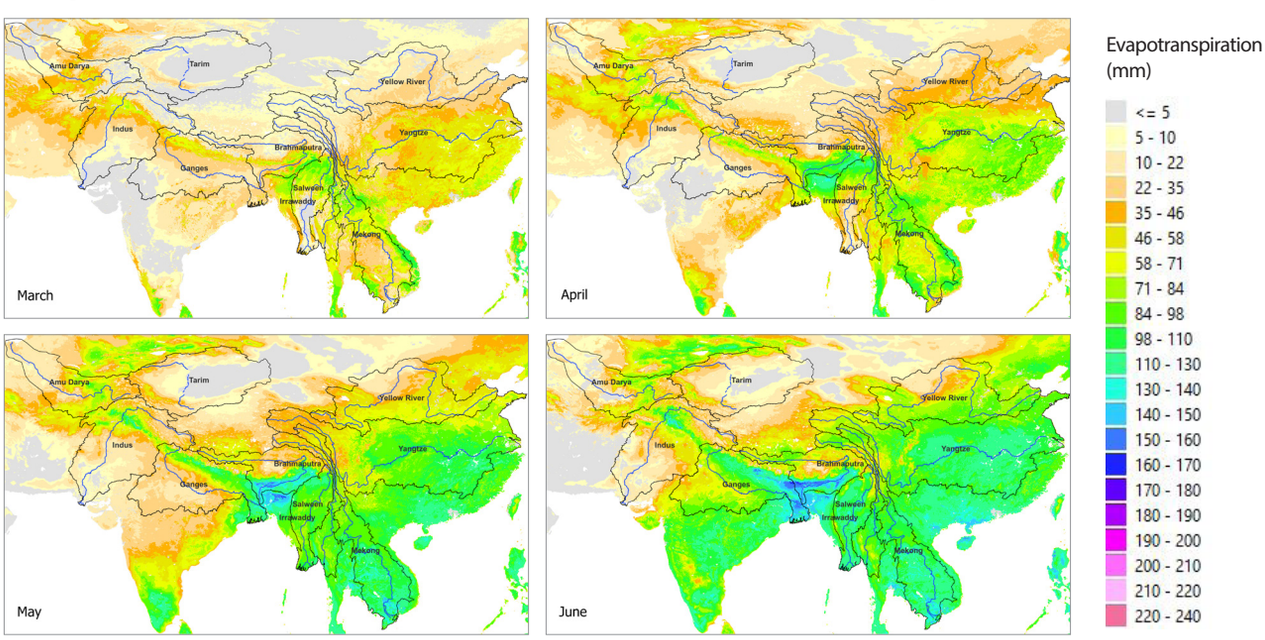
Evapotranspiration outlook for March–June 2024

March indicates near-normal conditions across the HKH with moderate evapotranspiration, mainly in parts of Amu Darya, Irrawaddy, and central parts of the Mekong basins. Tarim and Salween basins indicate the lowest degree of evapotranspiration rates across the HKH in the subsequent months. However, evapotranspiration has gradually increased within the Indus and Ganges basins throughout this period. The Yangtze Basin shows a gradual transition from near-normal in March to a slight increase in evapotranspiration in April and back to normal conditions in the succeeding months. The rest of the basins consist of a mixed distribution between mostly normal and low evapotranspiration.

Evapotranspiration outlook for March–June 2024



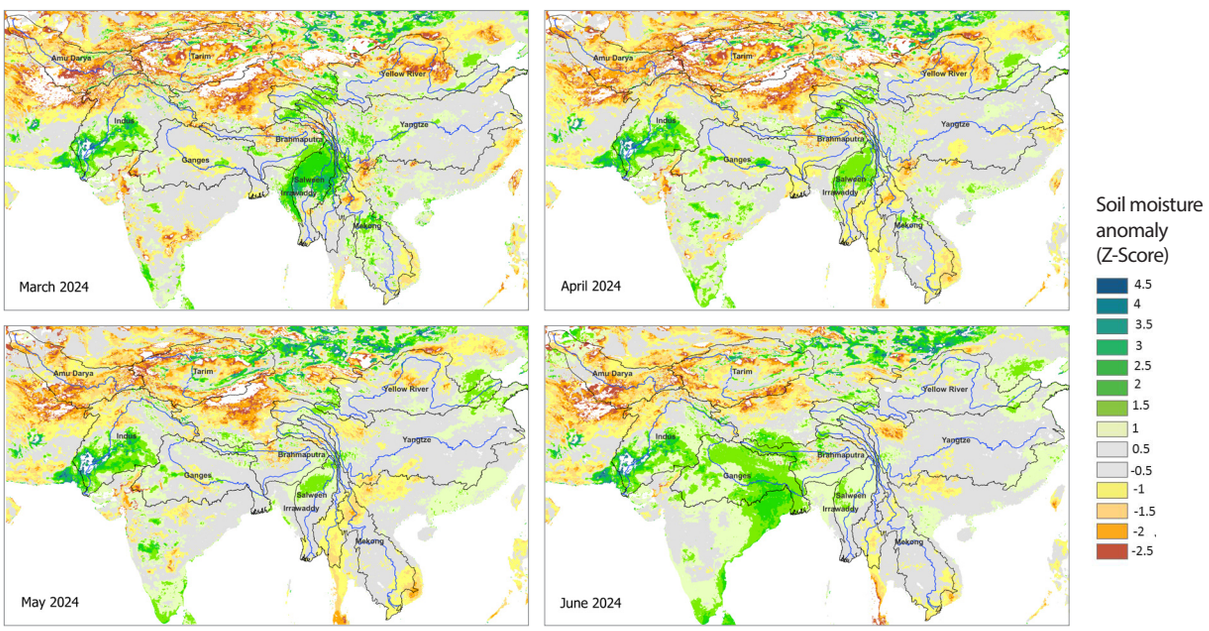
Average monthly evapotranspiration from March–June based on observation during 2000–2020



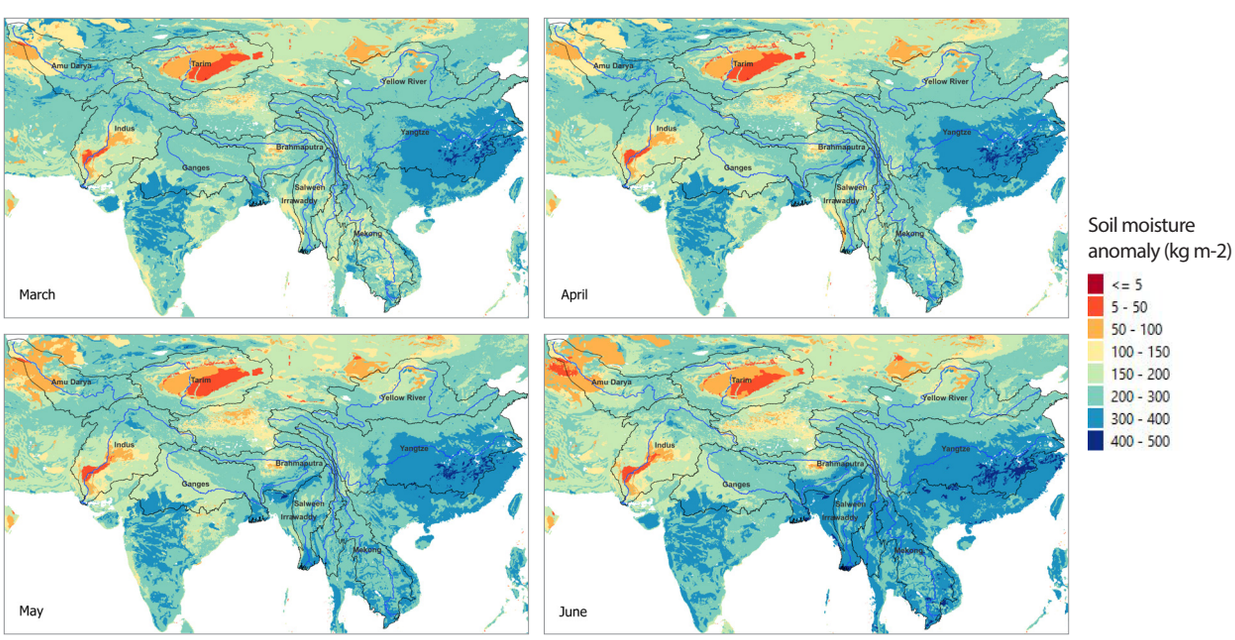
Soil moisture outlook for March–June 2024

The soil moisture indicates that the Amu Darya, Tarim and Yellow River basins show widespread dry conditions, with the latter basin gradually returning to normal conditions in June. Major areas in the Indus Basin will remain moderately wet throughout this period, whereas Irrawaddy shows moderate wetness with a gradual decrease in the following months. June shows an abrupt increase in soil moisture throughout the Ganges Basin from normal conditions. The Brahmaputra and Yangtze basins both represent a similar pattern throughout this period with fluctuation between normal and slightly wet conditions. The Salween and Mekong basins are expected to remain normal and dry, respectively, during this period.

Soil moisture outlook for March–June 2024



Average monthly soil moisture from March– June based on observation during 2000–2020



Background

The RDMOS is an operational service which produces reliable drought indicators for the HKH region. The system incorporates climatic models with suitable Earth observation data and land surface models to produce drought indices – precipitation, temperature, soil moisture, and evapotranspiration – and vegetation conditions at 10-day intervals for near real-time monitoring of droughts. The RDMOS also provides seasonal outlooks at four-month intervals to support drought management and preparedness processes.

This system applies the Noah-MultiParameterization (NoahMP) Land Surface Model (LSM) in the NASA Land Information System (LIS), driven by downscaled meteorological fields from the Global Data Assimilation System (GDAS) and Climate Hazards InfraRed 20 Precipitation products (CHIRP and CHIRPS) to optimise initial conditions. The NASA Goddard Earth Observing System Model - sub-seasonal to seasonal (GEOS-S2S) forecasts, downscaled using the National Center for Atmospheric Research (NCAR) General Analog Regression Downscaling (GARD) tool and quantile mapping, are then applied to drive 5-km resolution hydrological forecasts to a 9-month forecast time horizon.

A web-based graphical user interface provides a user-friendly means to analyse drought indices across river basins, national administrative boundaries, or a pre-defined area of interest and to aggregate results along cropping seasons. This capability has been in operation since April 2019 and has provided reliable outlooks of the region's emerging seasonal water availability scenarios.

User guide for visualisation of drought outlook at the sub-basin level

Users can interact with the RDMOS to view and download different snapshots; the map control element in the web-based interface allows users to select different sub-basins, indices, periodicity, and filter forecast ensemble via dropdown menus. The map/visualisation and corresponding graph are updated as per the selected variables. The system can be accessed from http://tethys.icimod.org/apps/regionaldrought/

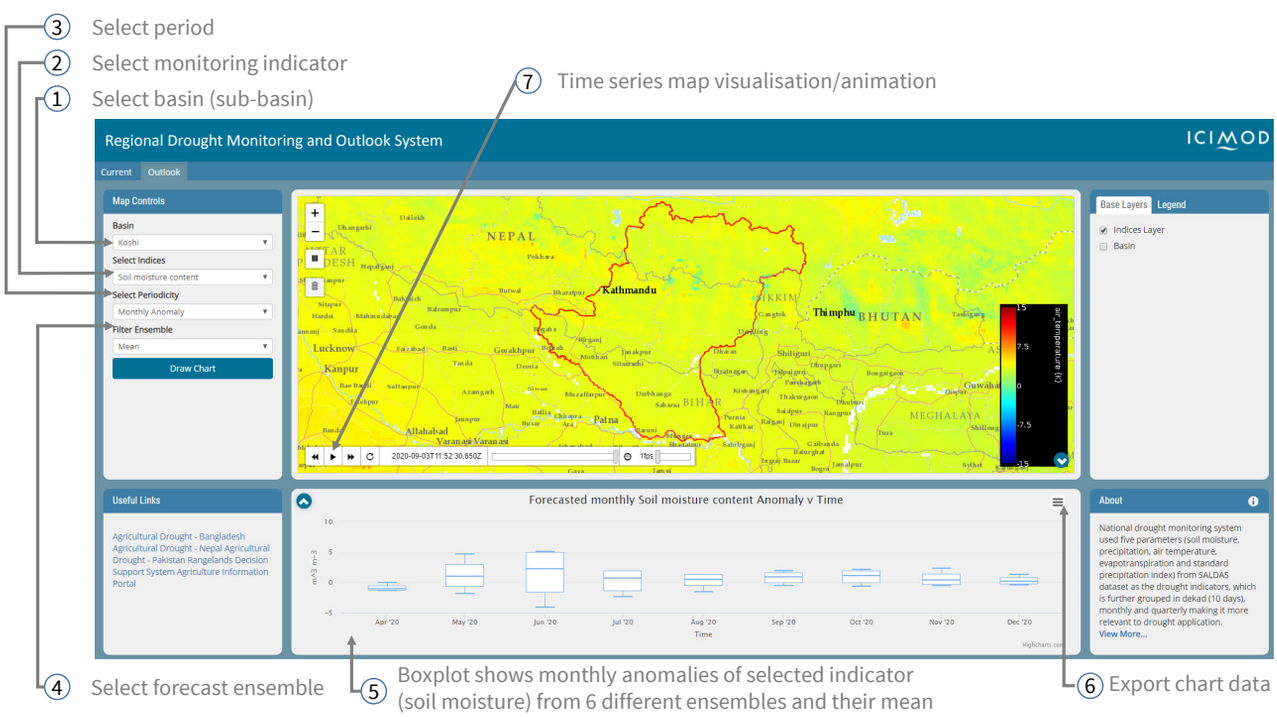
The system has been further customised to generate drought outlooks at the provincial level for Afghanistan, Bangladesh, Nepal, and Pakistan and can be directly accessed from the following URLs:

National Agricultural Drought Watch – **Afghanistan**

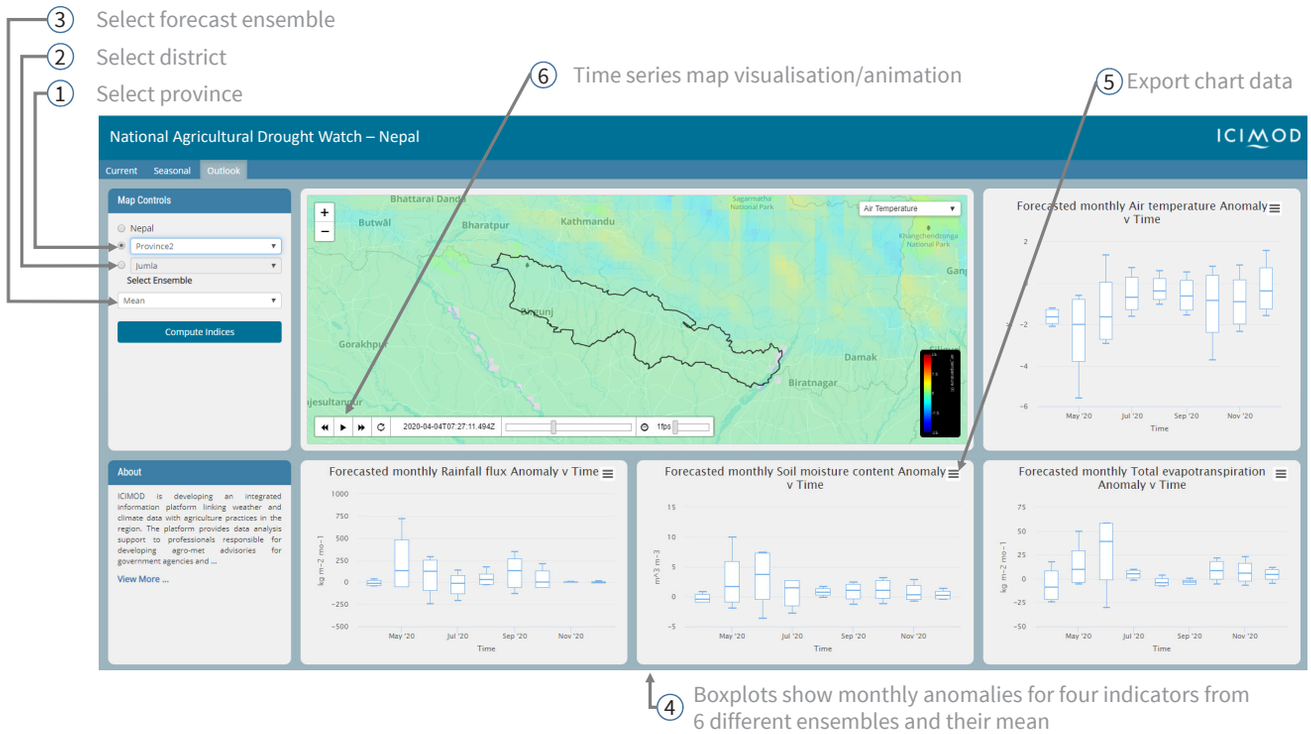
National Agricultural Drought Watch – **Bangladesh**

National Agricultural Drought Watch – **Nepal**

National Agricultural Drought Watch – **Pakistan**



VISUALISATION OF DROUGHT OUTLOOK AT THE SUB-BASIN LEVEL FOR THE KOSHI SUB BASIN
http://tethys.icimod.org/apps/regionaldrought/



VISUALISATION OF DROUGHT OUTLOOK AT THE DISTRICT LEVEL FOR PROVINCE 2 IN NEPAL
http://tethys.icimod.org/apps/droughtnp/

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Acknowledgements

Development of the Regional Drought Monitoring and Outlook System was supported by the United States Agency for International Development (USAID) and the National Aeronautics and Space Administration (NASA) under the SERVIR programme.

About SERVIR

A joint initiative of NASA, USAID, and leading geospatial organisations in Asia, Africa, and Latin America, SERVIR partners with countries in these regions to address critical challenges in climate change, food security, water and related disasters, land use, and air quality. Using satellite data and geospatial technology, SERVIR co-develops innovative solutions through a network of regional hubs to improve resilience and sustainable resource management at local, national, and regional scales.

ICIMOD implements the SERVIR Hindu Kush Himalaya (SERVIR-HKH) Initiative – one of five regional hubs of the SERVIR network – in its Regional Member Countries. For more, visit servir.icimod.org

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ICIMOD and its Regional Member Countries gratefully acknowledge the generous support of Austria, Norway, Sweden and Switzerland for core and programme funding, and Australia, Canada's International Development Research Centre, the European Union, Finland, Germany, the United Kingdom, the United States of America, and the World Bank for project funding.

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