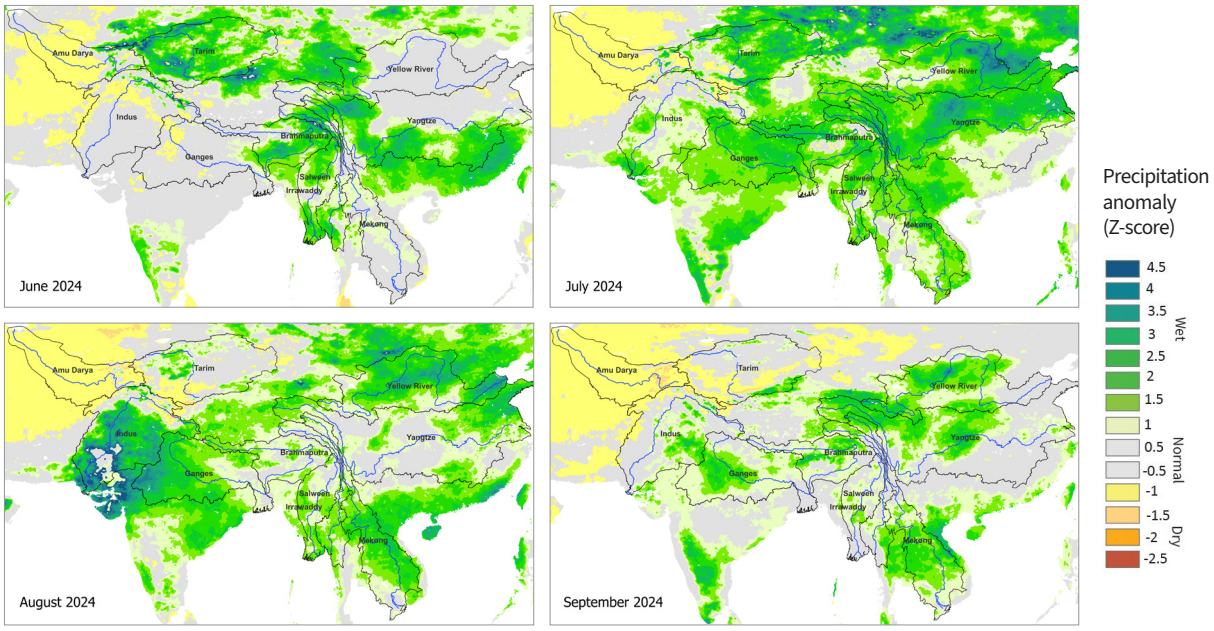
ICIMOD

Regional Drought Monitoring and Outlook System

Seasonal outlook June–September 2024

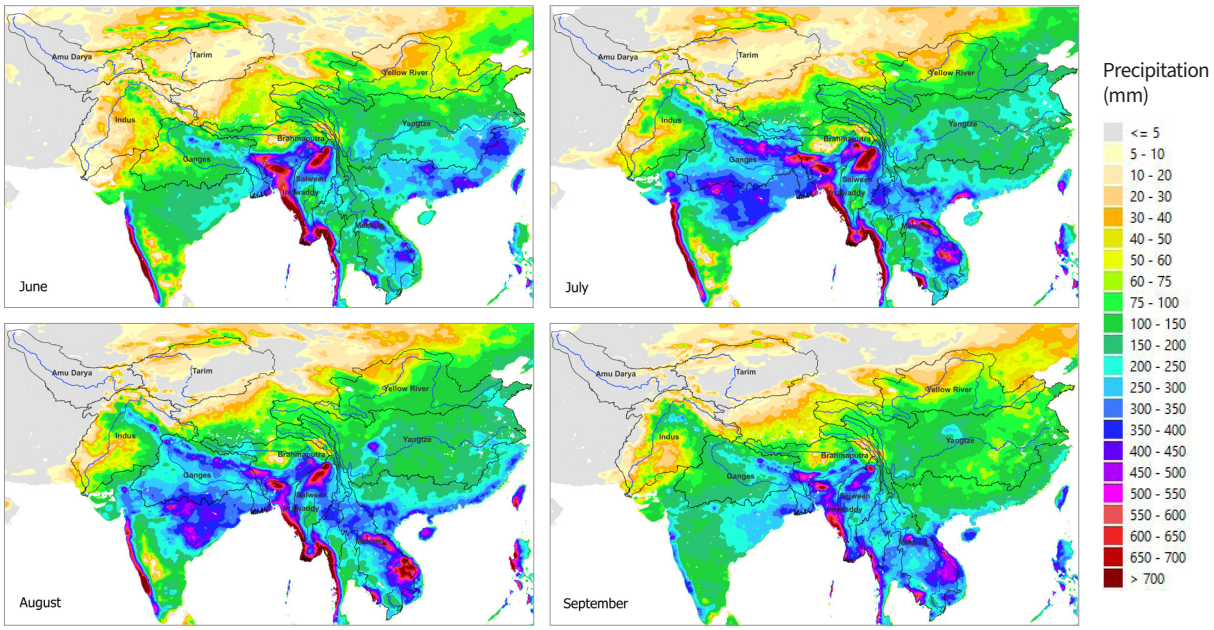
The following brief presents seasonal anomaly maps[1] from June to September 2024 in major river basins of the Hindu Kush Himalaya (HKH) region based on data generated by the Regional Drought Monitoring and Outlook System (RDMOS). Long-term average conditions (climate normal) are also provided for an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

Precipitation outlook for June–September 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 June to September based on observation from 2000–2020



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

Precipitation outlook for June–September 2024

The four-month precipitation outlook from June to September indicates that Amu Darya exhibits a slight deficit in rainfall throughout this period. Tarim shows moderately wet conditions, transitioning to mostly near-normal conditions in subsequent months. Likewise, the Indus and Ganges basins exhibit wetter-than-normal conditions throughout July to September. A surplus is expected in most parts of the Brahmaputra and Irrawaddy River basins throughout the monsoon season. Salween and Mekong basins, on the other hand, exhibit wetter-than-normal conditions with the southern parts remaining wet through September. The Yellow River and Yangtze show a fluctuation between a mixture of near-normal and mostly wet conditions throughout this period.

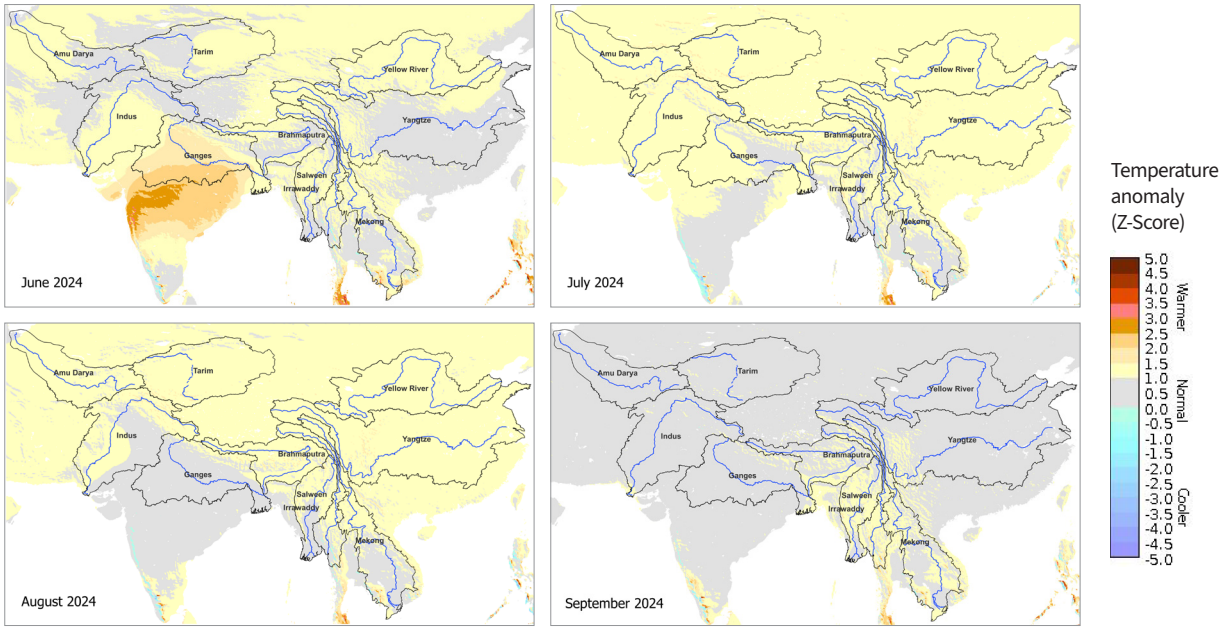
Monthly breakdown

June: Shows a deficit in rainfall for Amu Darya, while Tarim indicates wetter-than-normal conditions. Near-normal conditions are expected for the Indus, Ganges, Yellow River, upper parts of Yangtze and Mekong basins, except for a surplus in the Brahmaputra and Irrawaddy basins. These wetter-than-normal conditions also extend to the lower parts of the Salween and Yangtze basins.

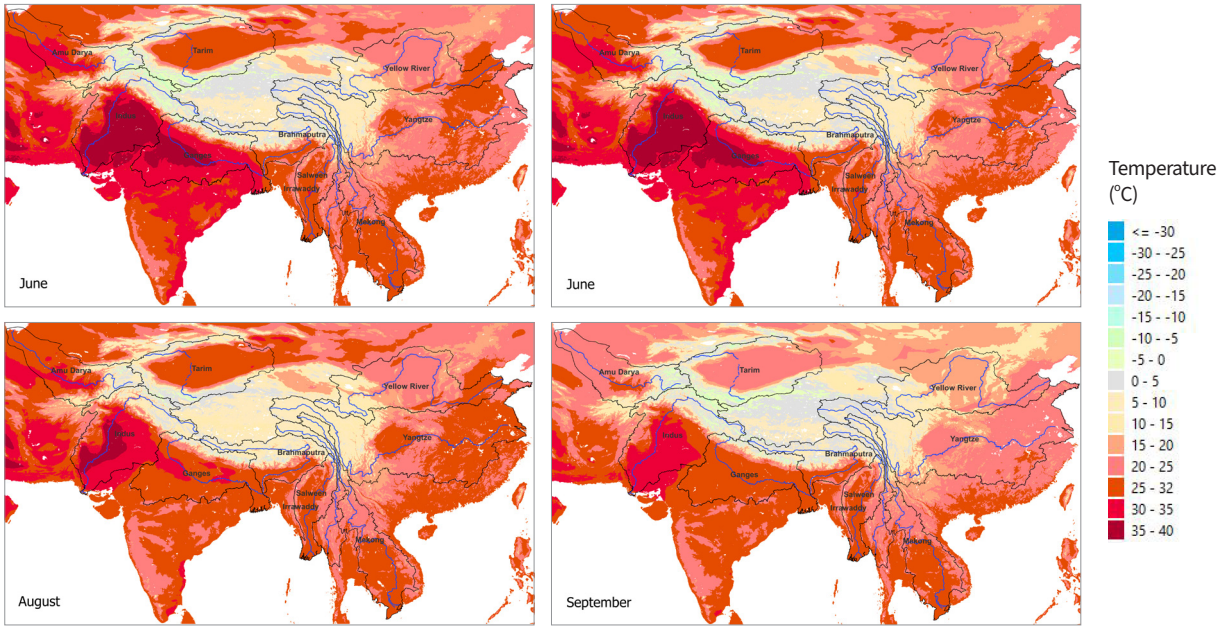
July: Indicates a low-to-moderate surplus in South and Southeast Asia with only Amu Darya showing a prolonged deficit.

August: Shows further intensification of rainfall in most parts of the Indus Basin and the western side of Ganges Basin, whereas parts of Tarim, Yangtze, and Brahmaputra return to mostly near-normal conditions. The other basins are expected to remain wet during this month.

Air temperature outlook for June–September 2024



Average monthly temperature from June–September based on observation from 2000–2020



September: Most parts of all basins are expected to remain slightly wet, with only Amu Darya and southern Tarim likely to have a low deficit.

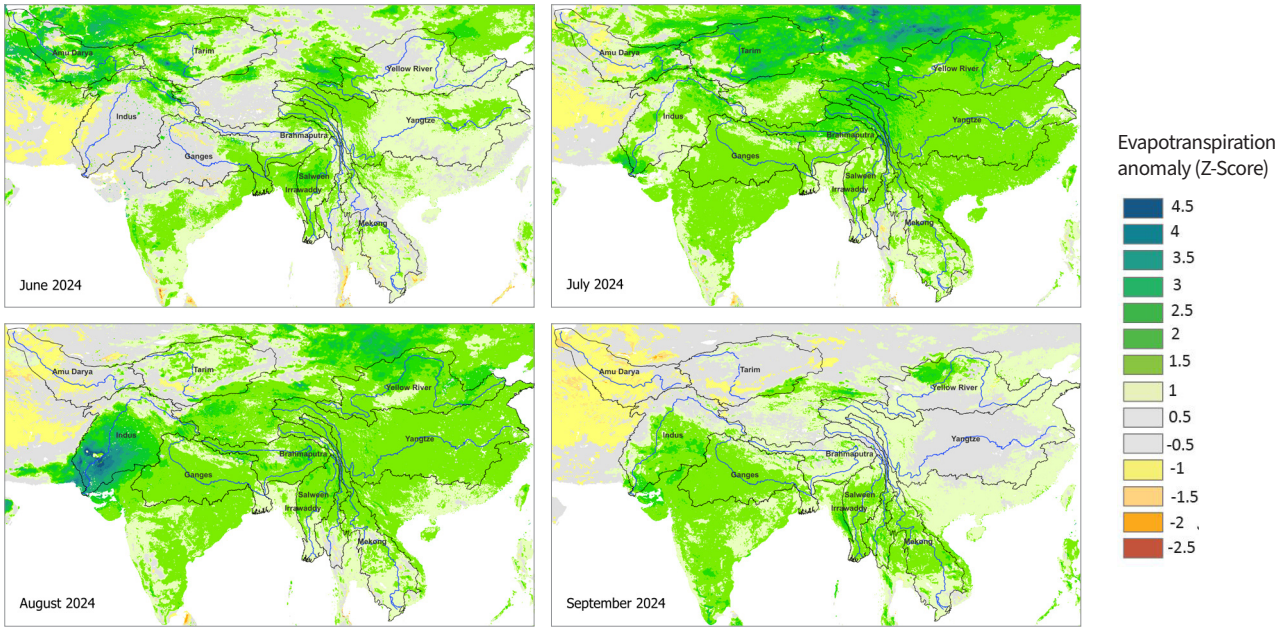
Temperature outlook for June–September 2024

As shown in the air temperature anomaly maps, Amu Darya, Indus, and Tarim basins show a mixed distribution of near-normal to slightly warmer temperatures. These basins are expected to remain warmer than normal until September. The Ganges Basin indicates a moderately warmer-than-normal temperature in June, transitioning to normal conditions from August through September. The Brahmaputra, Yellow River Basin, and upper Mekong region are expected to remain warm until September. The Salween and Irrawaddy basins indicate slightly warmer temperatures and are expected to remain warmer than normal through September. The Yangtze Basin, on the other hand, shows fluctuations between normal to warmer-than-normal temperatures throughout this period.

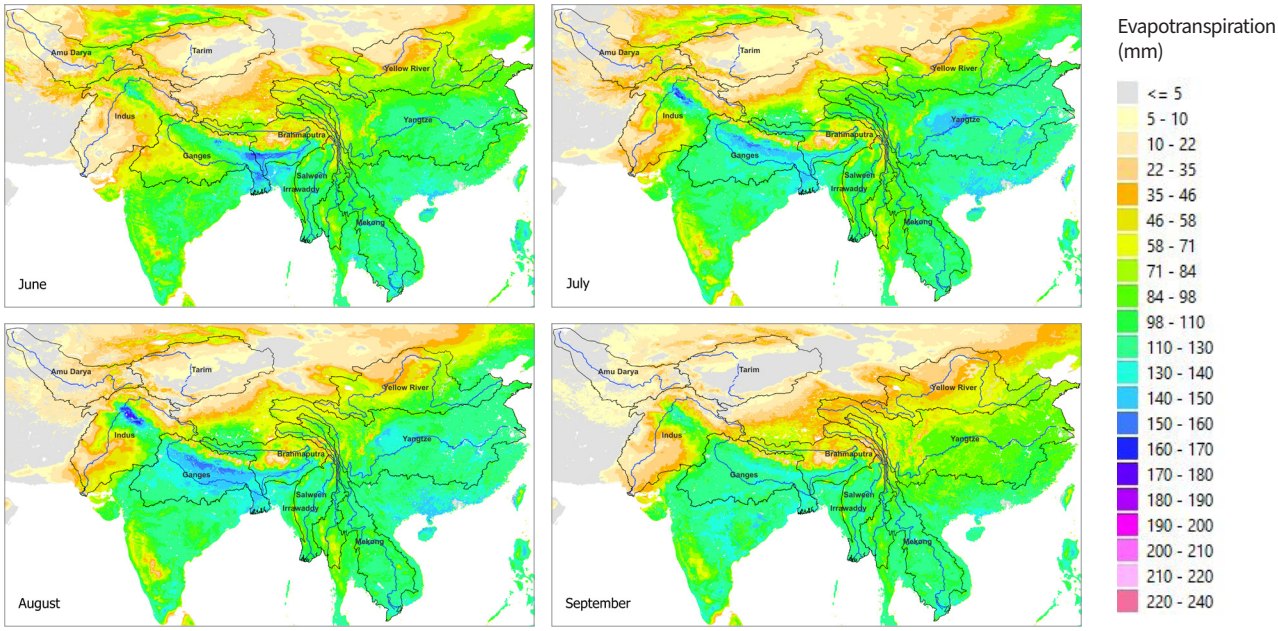
Evapotranspiration outlook for June–September 2024

June indicates moderate evapotranspiration in Amu Darya, gradually decreasing from July through September, hence depicting the lowest degree of evapotranspiration across the HKH in subsequent months. The Tarim, Brahmaputra, Yellow River, and Yangtze basins show a gradual increase

Evapotranspiration outlook for June–September 2024



Average monthly evaporation from June–September based on observation from 2000–2020

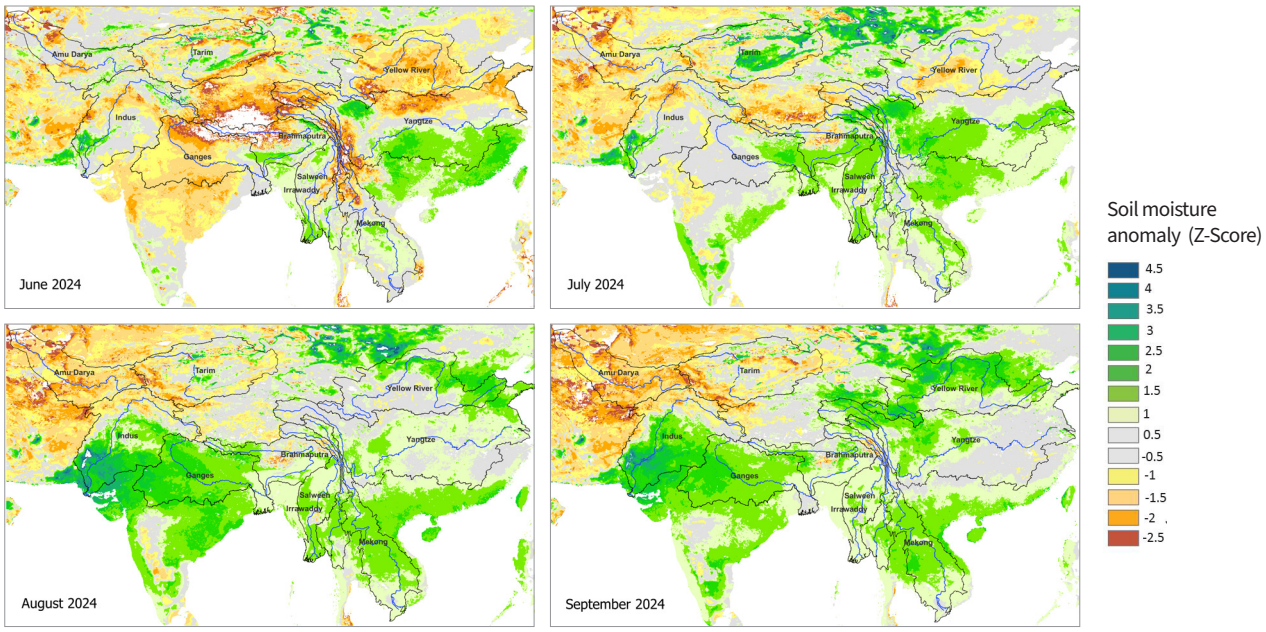


in evapotranspiration until September, where near-normal conditions are expected. The Indus and Ganges basins indicate near-normal conditions in June, gradually transitioning to higher evapotranspiration in subsequent months. The Irrawaddy Basin shows a consistent evapotranspiration rate throughout the period. The rest of the basins in Southeast Asia exhibit a mixed distribution between near-normal and mostly low-to-moderate evapotranspiration.

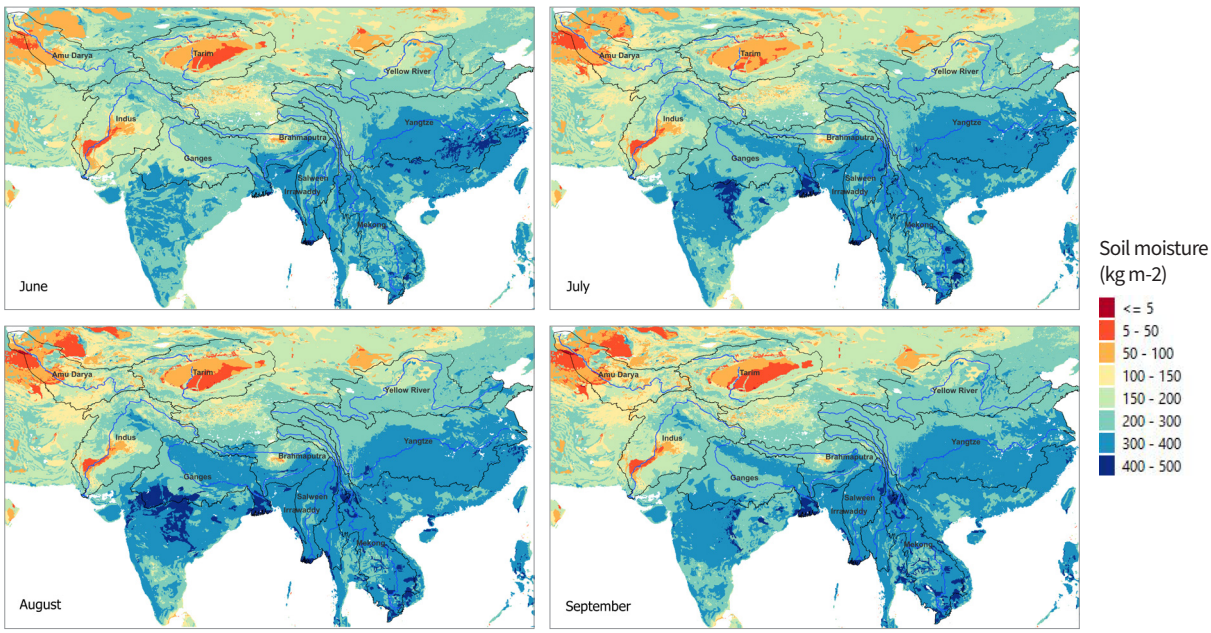
Soil moisture outlook for June–September 2024

The month of June is expected to have the lowest concentration of soil moisture in the HKH, with Amu Darya remaining dry throughout this period. The Tarim, Brahmaputra, and Yangtze basins indicate a mixed distribution of simultaneously normal, slightly wet, and dry conditions in different parts of the basin, with the Yangtze experiencing a slight increase in soil moisture in the following months. The Indus and Ganges basins show dry conditions in June, transitioning to near-normal conditions followed by a moderate increase in soil moisture from August through September. Likewise, the Yellow River exhibits dry conditions in June, transitioning to near-normal and moderately wet conditions in subsequent months. The Irrawaddy, Salween, and Mekong basins are expected to have near-normal conditions with areas in the northern part of these basins experiencing dry spells. These regions are expected to have a gradual increase in soil moisture starting from July through September.

Soil moisture outlook for June–September 2024



Average monthly soil moisture from June–September based on observation from 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 via http://tethys.icimod.org/apps/regionaldrought/

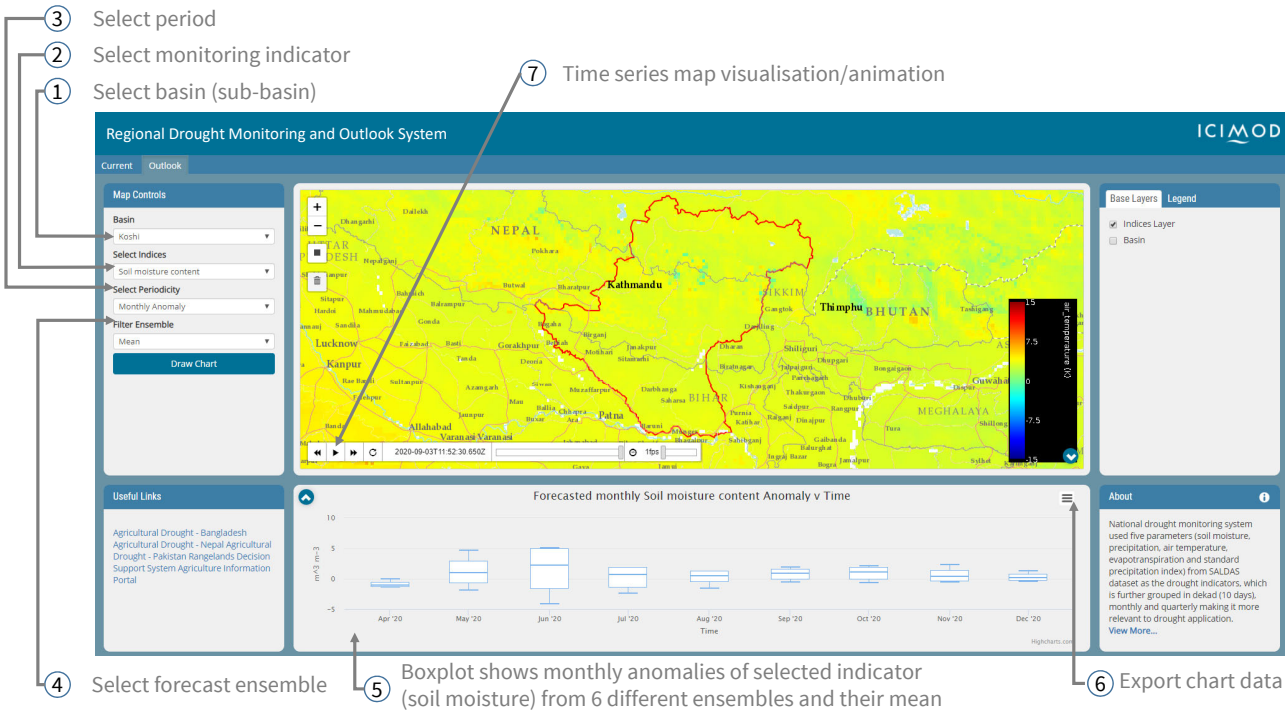
The system has been further customised to generate drought outlook at the provincial level for Afghanistan, Bangladesh, Nepal, and Pakistan and can be directly accessed via the following links:

National Agricultural Drought Watch – **Afghanistan**

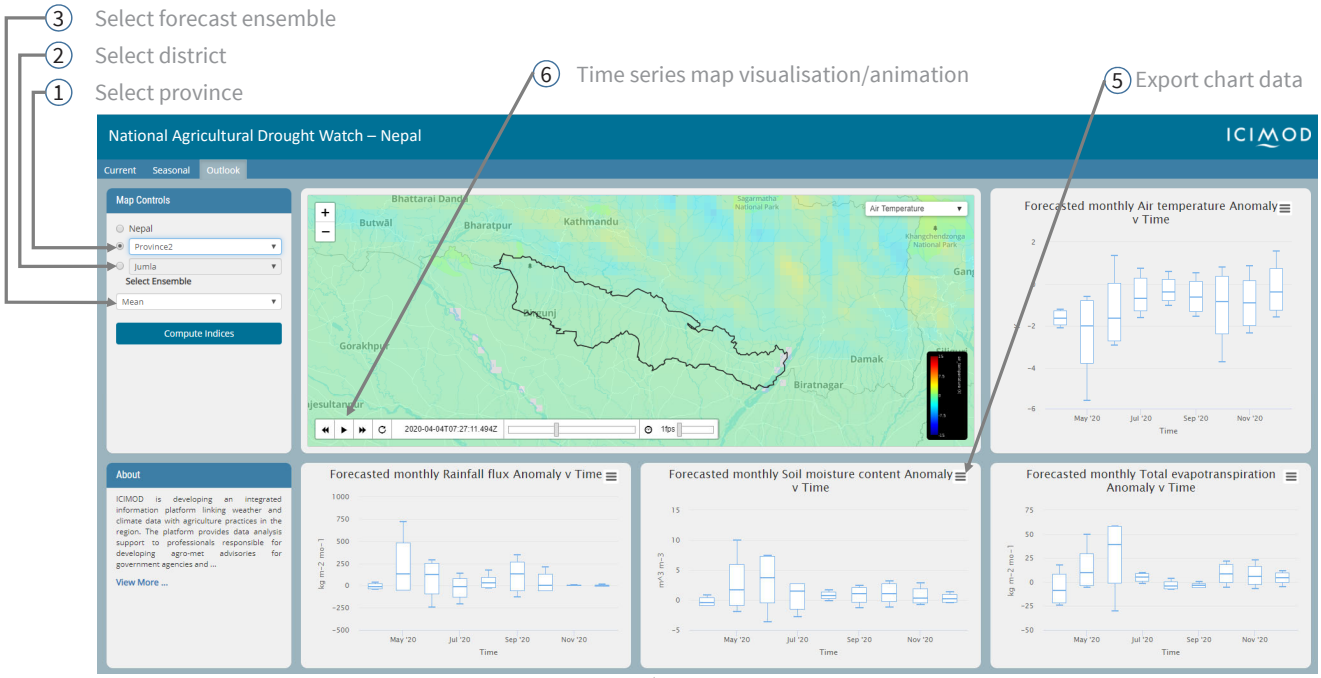
National Agricultural Drought Watch – **Bangladesh**

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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A joint initiative of NASA, USAID, and leading geospatial organisation 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 disaster, 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 the five regional hubs of the SERVIR network – in its Regional Member Countries. For more, visit servir.icimod.org

For further information

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