

2025 Drought in Nepal's Madhesh Province

A rapid situational analysis



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The project focuses on capacity building and developing innovative solutions to increase climate resilience, working with 28 municipalities across the Koshi and Madhesh provinces.

2025 Drought in Nepal's Madhesh Province: A rapid situational analysis

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Overview

Situated in the southeastern part of Nepal, in the Terai region, the Madhesh Province is suffering a 'slow burn' drought situation even at the current (2025) mid-monsoon season in Nepal. Experts call it a 'prolonged' drought from both meteorological and hydrological perspectives, resulting in an agricultural (and /or agroeconomic) drought in tandem. Acknowledging the severity of the situation publicly, the Government of Nepal has officially declared Madhesh a "disaster crisis zone" in an emergency cabinet meeting held on 23 July 2025.

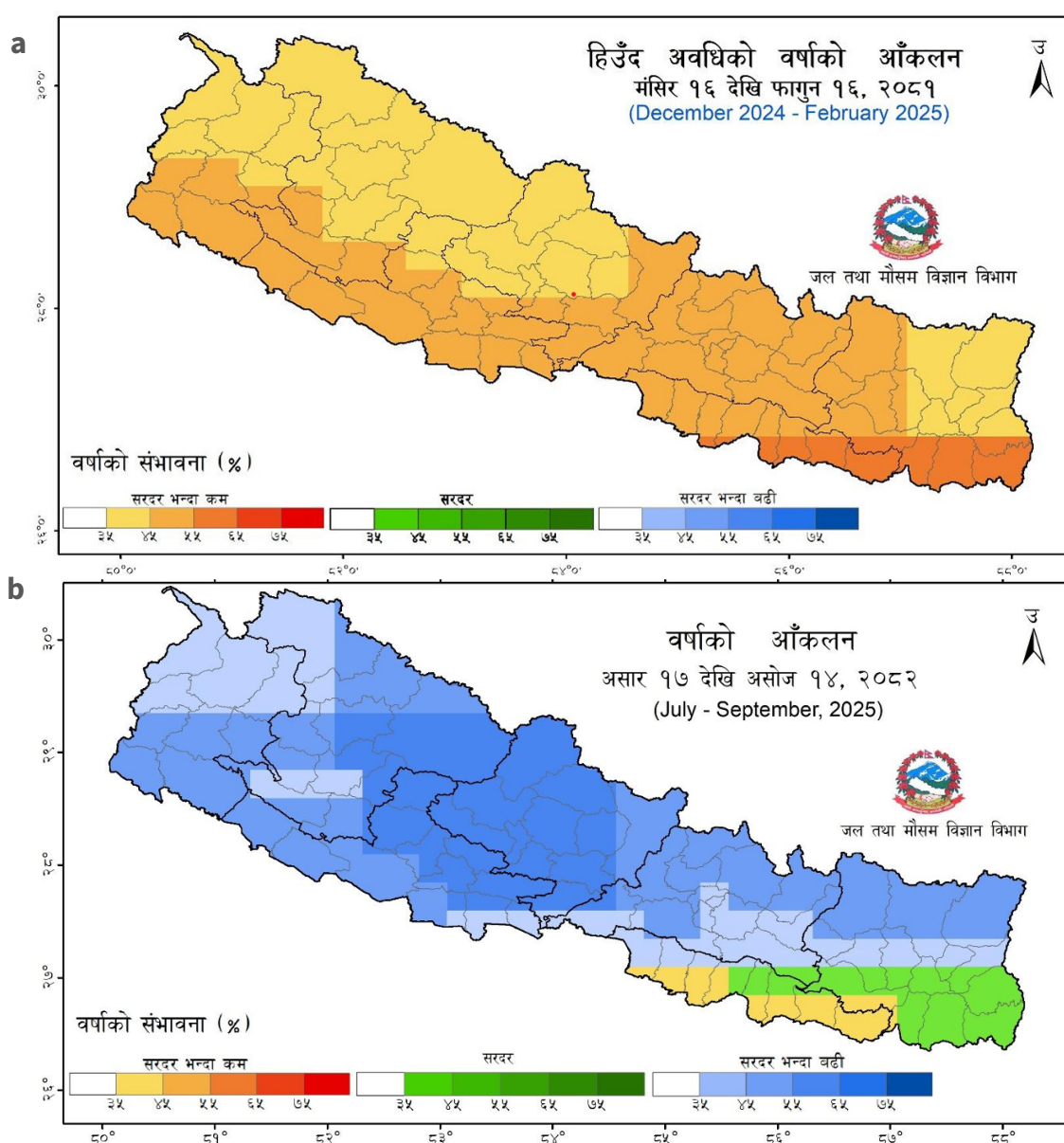
Prolonging precipitation deficits from 2024–2025 winter

Bleak meteorological conditions began with the [dry conditions in 2024–2025 winter in the province](#) (Fig 1(a)), which has prolonged further with erratic onset and weak progress of the monsoon during the month of July. The Department of Hydrology and Meteorology (DHM) issued a [seasonal forecast](#) on 1 July 2025, projecting below-normal rainfall in the province (Fig 1(b)), and through cumulative rainfall

deficits from 30%-50% between July and September 2025, especially across the districts of Mahottari, Siraha and Dhanusha that are among the major contributors to Madhesh's rice economy.

Furthermore, according to the forecasts of the University of California's Climate Hazard Center (CHC), for the month of August, chances of rainfall in early August remain bleak, with the dry spells continuing even during the next three weeks of the month (Fig 2).

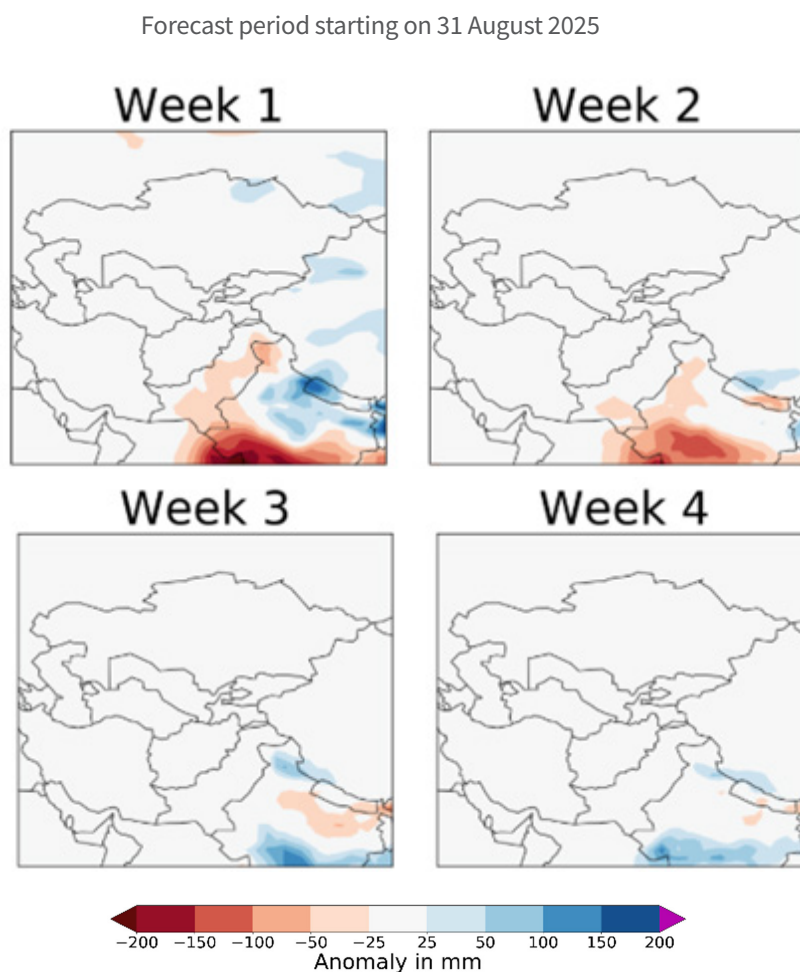
Figure 1: Rainfall in Madhesh from December 2024- September 2025



Panel (a) shows winter rainfall (%) between December 2024 and February 2025; Panel (b) shows predicted monsoon rainfall (%) for July – September 2025

Source: Department of Hydrology and Meteorology, Government of Nepal.

Figure 2: Rainfall forecast for the weeks of August 2025



Source: CHC (<https://chc.ucsb.edu/monitoring/subx>)

Disrupted recharge, depleting groundwater levels

Hydrologically, Madhesh has been facing the challenge of depleting groundwater levels for several years, with the situation further exacerbated by the ongoing precipitation deficits. Among the various factors responsible for the gradual depletion of groundwater levels in the province, is the degradation of the Chure Hills ecology - a critical source of groundwater recharge for Madhesh - under climatic and anthropogenic stresses. With the traditional recharge systems such as shallow wells, ponds, and canals, now reeling under additional stress of prolonged dry spells ever since the winter months, the simmering risk of impending drought, has now culminated into a reality.

Nepal's most populous province (with a population density of circa 634 persons per square kilometre vis-à-vis the national average of circa 205 persons

per square kilometre as of 2021), Madhesh has a very high reliance on groundwater, especially for household and agricultural (irrigation) use. The drought, thus, has cascading effects on daily lives and livelihoods.

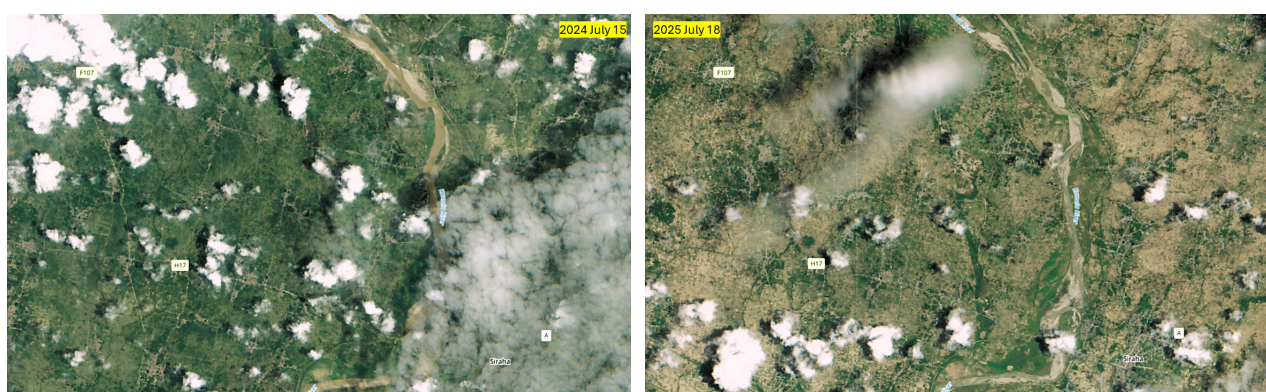
Groundwater levels are critically low, with over 30% of community boreholes reportedly dried up. Rivers and canals have shrunk drastically, contributing to an acute drinking water crisis. In the Parsa and Bara districts of the province, for instance, many hand pumps have stopped functioning, forcing communities to depend on bottled or tanker-supplied water. Water shortages also place a disproportionate burden on women and girls, who, in this region, are usually the primary water fetchers for their households.

Planting delays to crop failure: Agricultural drought tightens grip on Madhesh

The effect of the drought on agricultural production is severe. ICIMOD's (International Centre for Integrated Mountain Development) analysis using satellite-based remote sensing tools, such as Sentinel-2 images (Fig 3) show significant decline in vegetative (greenness) cover in July vis-à-vis around the same time in 2024, indicating widespread planting delays and crop failure.

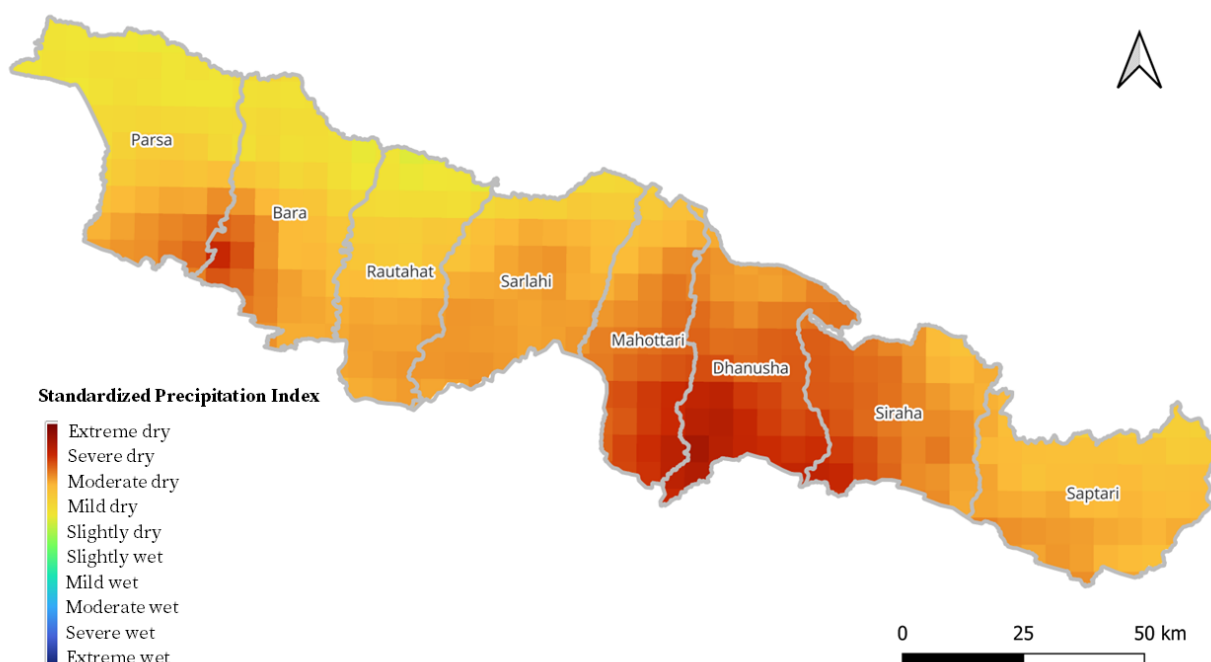
The Standardised Precipitation Index (SPI) maps (Fig 4) show large parts of the province under moderate to severe drought conditions, while the Vegetation Condition Index (VCI), derived from MODIS data and SPI, reveals extreme vegetation stress concentrated in Mahottari, Dhanusha, and Siraha districts, which as previously mentioned, are among the major paddy growing districts of the province (Fig 5).

Figure 3: Sentinel 2 images comparing the cropland situation on 15 July 2024 what that on 18 July 2025|



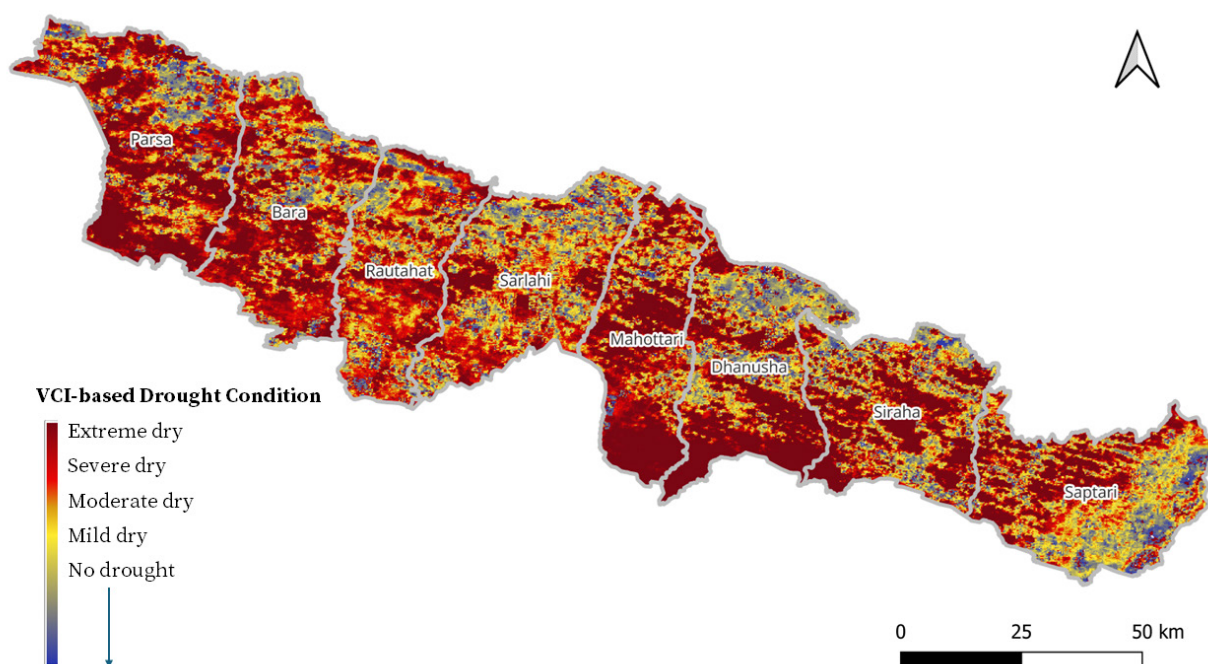
Source: Sentinel Hub EO Browser

Figure 4: Standardised Precipitation Index map of Madhesh Province for July 2025



Source: International Centre for Integrated Mountain Development

Figure 5: Vegetation Concentration Index map of Madhesh Province for July 2025



Source: International Centre for Integrated Mountain Development

Drought hits paddy production: Are we staring at a food crisis?

Known as Nepal's "Grain Basket," the Madhesh province, on an average, accounts for nearly a-third of Nepal's total paddy-growing area and about [a quarter](#) of the country's total paddy production during a normal agricultural year. But this year unusually low precipitation even during mid-monsoon has severely disrupted the rice transplantation calendar, the most time-sensitive and critical phase of the rice production cycle. This delay is not just an agricultural concern; it signals the early stages that can escalate into a large-scale food security crisis with national implications.

According to ground reports from the Ministry of Agriculture and Livestock Development (MoALD), the transplantation rate as of 27 July 2025, stood at around 52%, a drastic drop from the 92% during the same period last year.

Paddy cultivation in Madhesh is predominantly rainfed. Coupled with the ongoing monsoon failure, persistent groundwater stress and limited and fragmented irrigation infrastructure in the province, has made paddy production untenable for the local

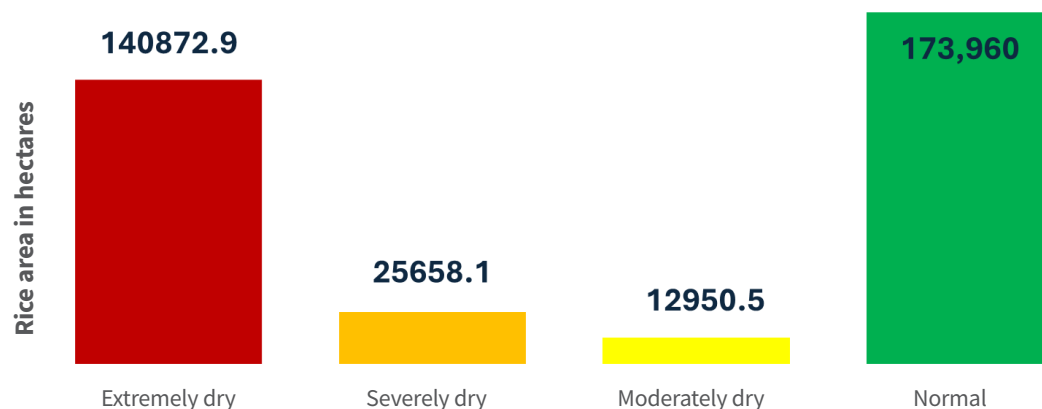
farmers. The window for effective transplantation typically falls between mid-June and July. Due to a ubiquitous lack of water, many farmers have been unable to prepare their fields or maintain viable seedbeds. As a result, the entire cropping calendar is now misaligned, further reducing yield potential and jeopardising production.

Leveraging satellite-derived information¹, we assessed that an average of around 35%-40% of the rice-growing area in the province is currently under extreme drought stress (Fig 6), with the highest concentration (circa 60% -78%) of stressed rice fields being detected in the three most critically affected districts of Mahottari, Dhanusha, and Siraha (Fig. 7 and 8).

These three districts together account for nearly 39% of the total rice area in Madhesh Province, making them critical to the region's rice production. If the situation continues, a shortfall of nearly 400,000 - 450,000 metric tons in rice production is estimated, which could result in an overall drop of approximately 10% in the national rice supply. Even if monsoon rains resume in August, the prospects for recovery remain slim due to the critical stages in the rice growth cycle being missed, poor seedling development, and depleted soil moisture.

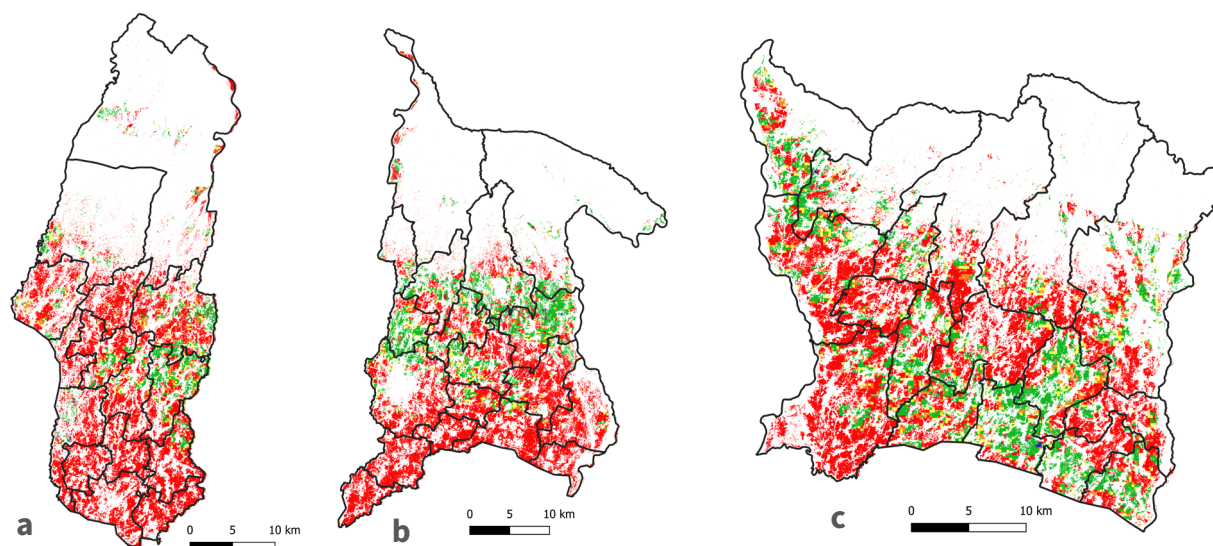
¹ MoALD and ICIMOD have been co-conducting in-season rice area mapping of 21 districts of the Terai belt, including the Madhesh province, since 2020. We have used the satellite information from this collaborative work for our analysis

Figure 6: Rice area under different stress conditions in Madhesh province.



Source: ICIMOD

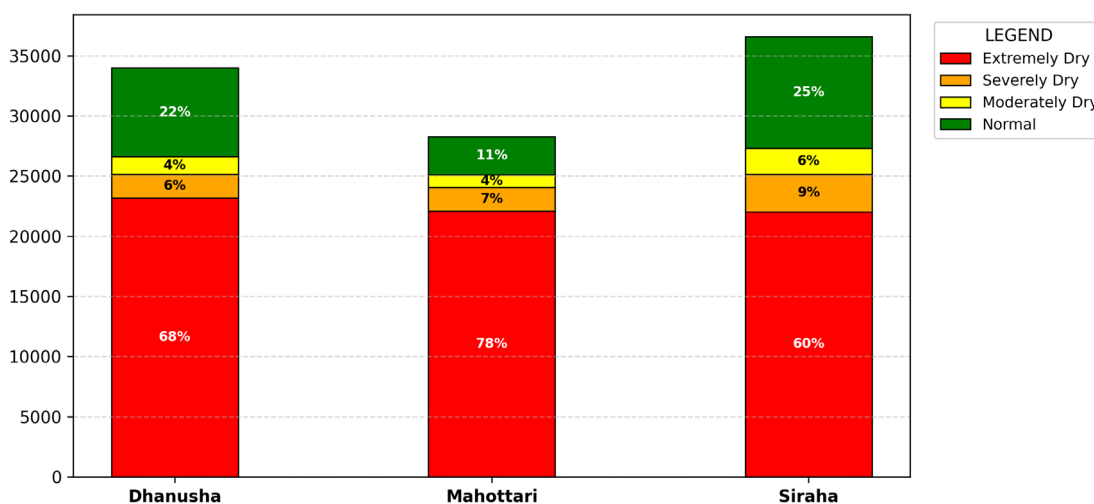
Figure 7: Rice area under different stress conditions in Mahottari (a), Dhanusha (b) and Siraha (c) districts



Source: ICIMOD

■ Extremely dry
 ■ Severely dry
 ■ Moderately dry
 ■ Normal

Figure 8: Percentage of rice area under different stress conditions in Dhanusha, Mahottari and Siraha districts of Madhesh province



Source: ICIMOD

Reduced rice availability in the domestic market is likely to lead to an inflation in food prices, disproportionately affecting low-income and vulnerable households. Smallholder farmers are already facing severe income losses, and many may be forced to abandon their fields or migrate in search of alternative livelihoods. Disruptions to seasonal labour patterns and rural employment opportunities may further deepen socio-economic stress in the region. Additionally, the shortfall in domestic rice production may prompt Nepal to increase rice imports, thereby straining the national trade balance and putting pressure on public food distribution systems.

Government's mitigation schemes stress tubewell² installation and small irrigation projects

- Madhesh provincial government declared the province “drought affected” on 26 June 2025; the Provincial Disaster Management Committee (PDMC) formally requested federal support on 22 July 2025.
- Government of Nepal declared Madhesh a “disaster-threatening area” on 24 July 2025, under Section 32, Subsection 1, of the Disaster Risk Reduction and Management Act of 2017, for rapid mobilisation of financial resources, relief materials, and administrative coordination for drought management.
- Prime Minister, KP Sharma Oli announced expedited boring of [500 deep tubewells in the affected areas](#)
- Ministry of Land Management, Agriculture and Co-operatives (MoLMAC) has earmarked around NPR 17 Crore (170 million) for shallow tubewell installation and small irrigation support program.
- MoLMAC and Agriculture Knowledge Centres have issued a notice regarding an expedited 7-day early application window for all applicant beneficiaries for installation of deep and shallow tube wells in the affected districts.
- Around 75 small irrigation schemes with a total budget of NPR 240.75 Lakhs (24 million) are planned for Mahottari and Dhanusha program areas.

ICIMOD's interventions for data driven drought monitoring and technical support

ICIMOD is continuing its comprehensive assessment of the drought situation using Earth Observation technologies and climate indicators, including Sentinel-2 and MODIS satellite imagery, to detect vegetation stress and anomalies in greenness levels. We are integrating this analysis with the [National Agriculture Drought Watch Nepal](#), which provides dynamic, science-based drought monitoring for early warning and decision support.

As part of its ongoing efforts, ICIMOD has engaged with line ministries, disaster management agencies, and regional partners to facilitate coordinated responses. The organisation is providing technical support for data interpretation and facilitating risk communication as part of its assistance strategy for recovery. Simultaneously, we have also identified an array of recommendations for short to long term policy interventions for adaptation, based on our analysis of the situation in Madhesh.

Short term recommendations:

- Deployment of agricultural relief measures including rapid dissemination of short-duration rice varieties, seed replacements, and access to alternative irrigation solutions such as mobile pumps, drip irrigation, sprinklers, and water harvesting systems.
- Activation of contingency planning. If rice transplantation cannot be completed timely due to water scarcity and ageing of rice seeds, government should encourage farmers to shift to other suitable and less water-intensive crops as advised by agriculture experts and commit to buy the harvest later. This will at least help farmers to mitigate the losses incurred in this season.
- Arrangement of alternative sources of drinking water supply through water tanks, and food aid.
- Heat stress and its impact on public health are a challenge in Madhesh. Health services facilities should be enhanced and made free and affordable for all.

²A type of water well with long stainless steel tube or pipe bored underground. The lower end of the tube is fitted with a strainer, and a pump lifts water for irrigation. The required depth of the well depends on the depth of the water table

Long term adaptation

- Encourage direct rice seeding method (DSM) to replace the tradition method of transplantation by seedbed preparation, through proper capacity-building training of farmers. DSM enables planting as soon as water is available, devoid of the challenges of seed aging during delayed rainfall or limited irrigation.
- Farmers should be encouraged in crop diversification in order to make agriculture in this climate-distressed province more resilient to weather shocks. Simultaneously, the government should also prioritise the use of early disaster warning information to strengthen preparedness of the agricultural sector for disaster mitigation.
- Extant policies for sustainable mining in the Chure Hills and along the beds of the rivers flowing through Madhesh should be implemented with due diligence. These policies are crucial for groundwater recharge and levels in the province.
- Nature-based Solutions (NbS) for groundwater recharge such as, recharge dams, trenches and ponds should be increased through watershed management planning.. Experts can provide consultation and training on this approach.
- Overuse of groundwater for irrigation is also a reason for falling groundwater level. Farmers should be sensitised on the long-term effect of groundwater overuse. This will help to reduce misuse of water and arrest the rate of decline of ground water level.
- Prioritising the completion of the [Sunkoshi Marin Diversion Project](#) that has the capacity of providing irrigation to 122,000 hectares of land in the districts of Bara, Parsa, Rautahat, Sarlahi, Mahottari, and Dhanusha.
- Renovation and periodic cleaning of the irrigation canals from [Gandak Nahar](#) to Madhesh province to ensure water availability in Bara, Rautahat and Parsa districts.

ICIMOD's Call for Action

ICIMOD will continue to provide updates on drought outlook using the National Drought Watch. It will also assist local and national authorities with technical guidance on crop damage assessment, impact analysis, and adaptation planning. Additional efforts will focus on investing in resilient agriculture through climate-smart practices, improved water management infrastructure, and diversification of cropping systems, which will be key to reducing vulnerability in the face of future climate variability.

Considering the unfolding crisis, ICIMOD calls for immediate and coordinated action from all stakeholders. We urge:

- Government agencies to scale up emergency support, accelerate implementation of drought contingency plan, and invest in long-term water resilience.
- Development partners with the mandate to align support for food security, facilitate rapid impact assessment to support government response.
- Local institutions and farmers to adopt climate-resilient farming practices, support ground-level drought monitoring, NbS and participate in preparedness initiatives.
- Scientific and technical bodies, and academicians, to strengthen early warning systems, data sharing, and collaborative risk modelling.

ICIMOD remains committed to supporting evidence-based decision-making and regional knowledge exchange to strengthen resilience across the Hindu Kush Himalaya region.

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