SAARC

Disaster Management Centre (IU)

IWMI International Water Management Institute

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GUJARAT INSTITUTE OF DISASTER MANAGEMENT
BUILDING RESILIENCE

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UNITED NATIONS Office for Outer Space Affairs

Regional Workshop

on

Assessing Drought Risks using Earth Observation Data

&

Launch of South Asia Drought Management System (SADMS)

Utility of SADMS tool for operational drought decision support across South Asia

Date: 31st August to 2nd September, 2022

Gandhinagar, Gujarat, India

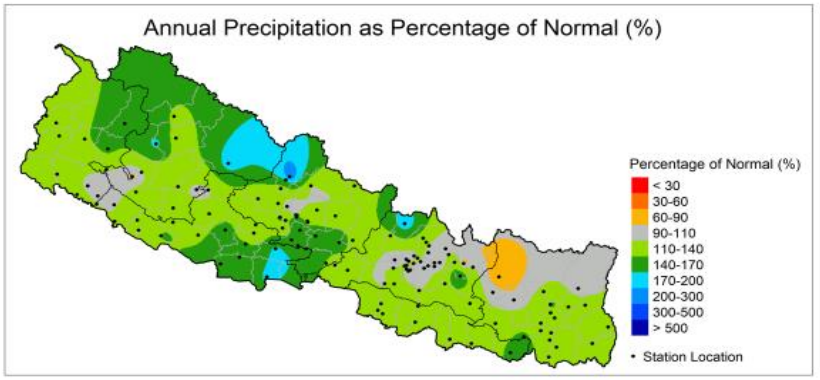
Session – II Country presentation (Earth Observation data for Drought Monitoring)

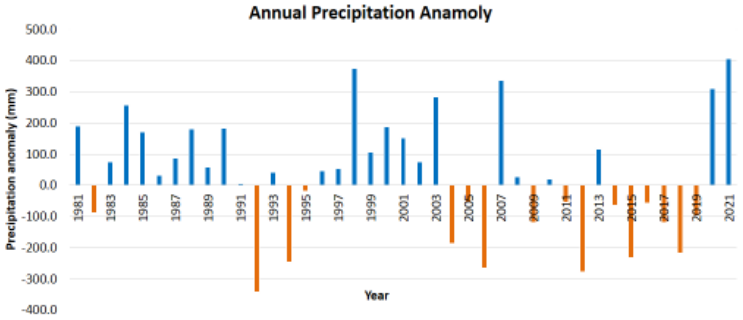
NEPAL

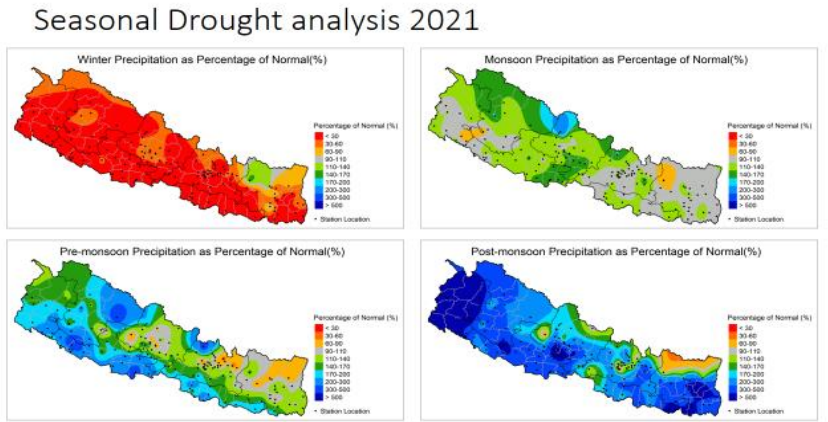
Earth Observation data for Drought Monitoring

Drought History and its Impact

1992 was the worst drought year in the history of Nepal. More than 44 percent of the locations in the country were occupied under drought conditions during these extreme drought events (Bagale et al). The interdecadal increase of drought characteristics was prominent after 2004, revealed by the SPEI12 with aggravated and prolonged drought episodes. The summer drought index (SPEI4-Sep) showed an interannual variation in the Western region at a seasonal timescale, whereas decadal variation in the Central and Eastern regions. Meanwhile, summer drought events increased five times in the Central region, two times in the Eastern Region, and did not observe any change in the Western region after 2004(Hamal et al. The temporal evolution of SPEI time series has revealed frequent occurrences of drought episodes during the cropping cycle of summer maize and winter wheat crops(Hamal et al., 2020). Studies shows significant impact of drought episodes in crop yielding periods . Similarly impact of drought on water resources, ecology and socio economic conditions of the people are immense.

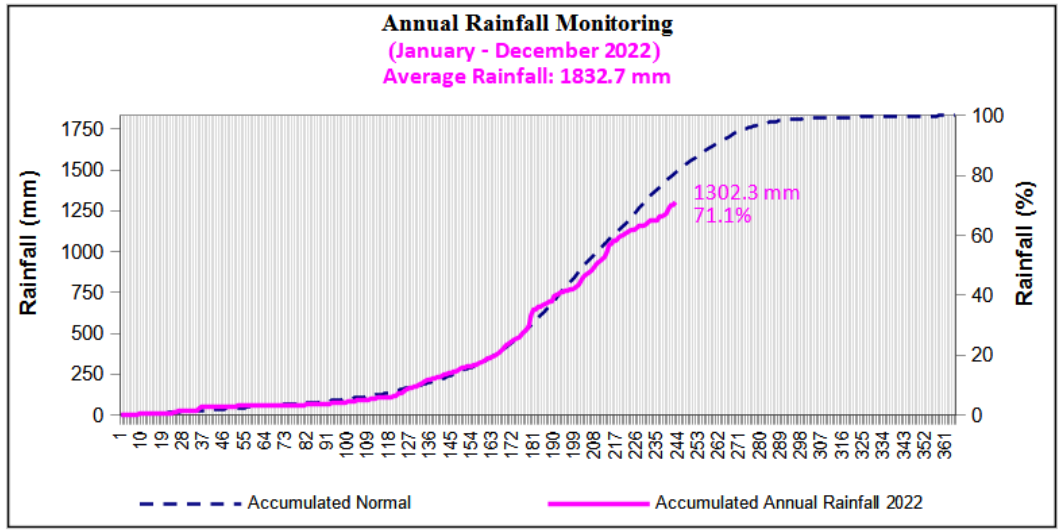






Drought History and its Impact

Rainfall information from major 20 stations (16 synoptic + 4 climate)



Annual Normal rainfall: 1832.7 mm
Observed Rainfall (January 1 – August 31, 2022): 1302.3 mm
Percentage of Annual Normal: 71.1%
Daily Accumulated Normal Rainfall (January 1 – August 31, 2022): 1482.9 mm
Percentage of Normal for the same period (January 1 – August 31, 2022): 87.8%

- Continuous dry weather is causing crop failure in western region .
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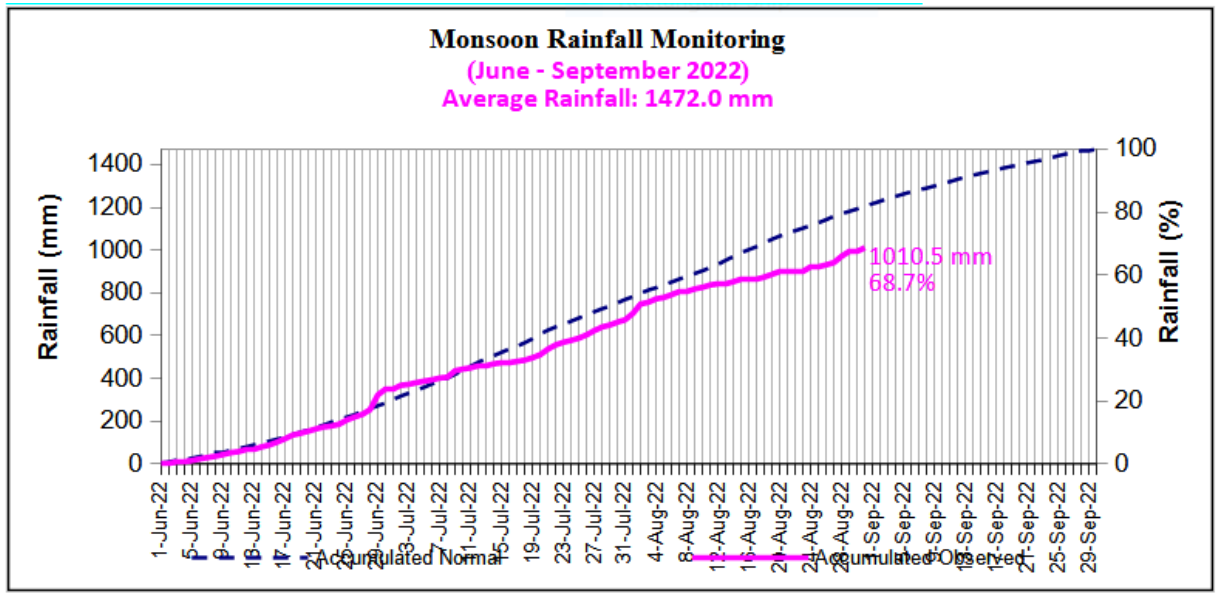
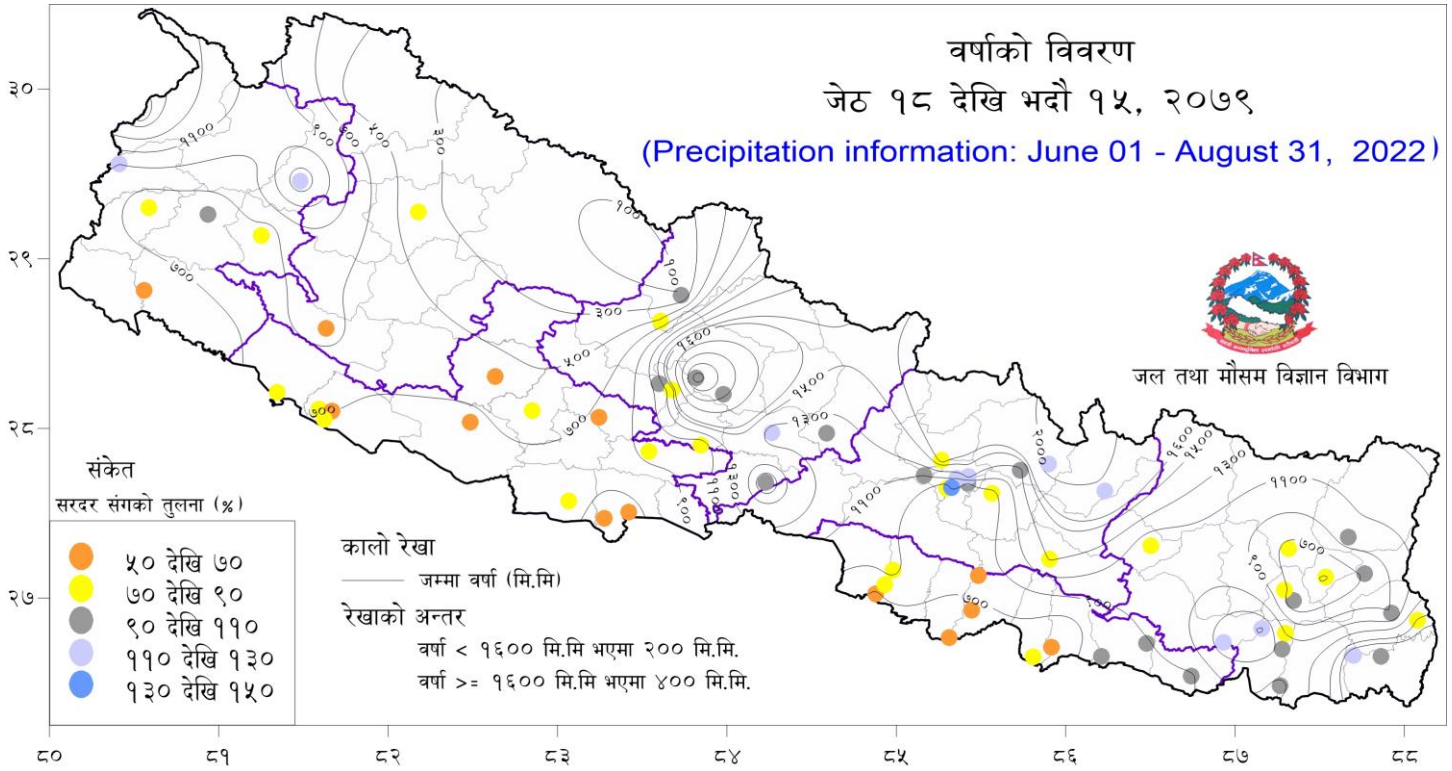
Drought History and its Impact



Monsoon Normal rainfall: 1472.0 mm
Observed Rainfall (June 1 – August 31, 2022): 1010.5 mm
Percentage of Monsoon Normal: 68.7%
Daily Accumulated Normal Rainfall (June 1 – August 31, 2022): 1205.0 mm
Percentage of Normal for the same period (June 1 – August 31, 2022): 83.9%

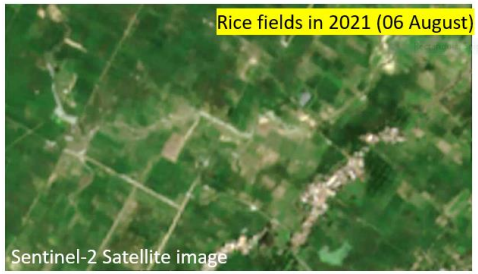
Though seasonal model forecasts still shows normal to above normal rainfall, rainfall anomalies suggests greater chance of below normal rainfall.

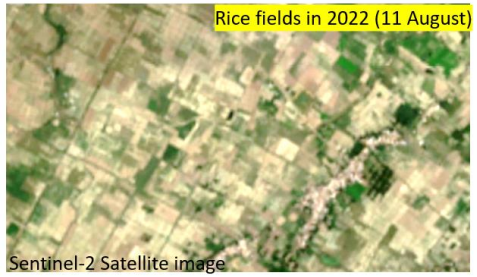
Drought History and its Impact



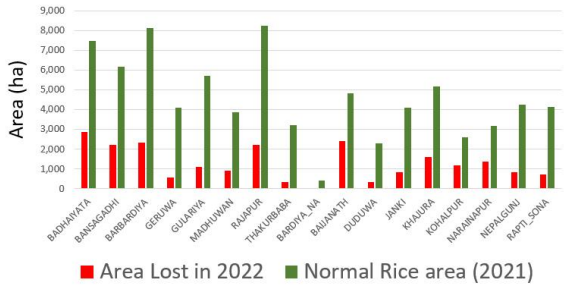
Drought History and its Impact

Rice crop plantation loss in Banke and Bardiya Districts under ongoing drought conditions





Satellite image based assessment of Banke and Bardiya districts shows that at least 30% of the area which was being cultivated in recent years is left uncultivated (fallow) this year due to lack of water at the transplantation stage.



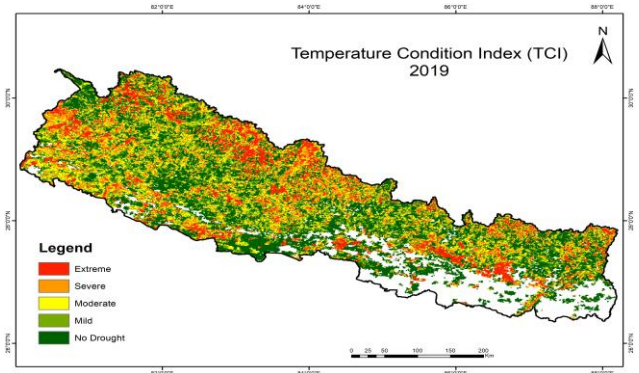
Palika wise crop area loss as of 11 August 2022

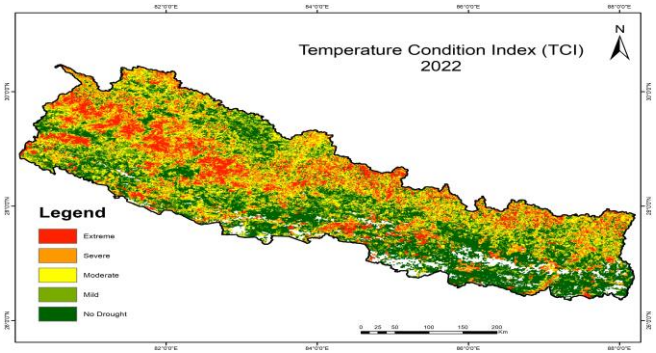
- Though seasonal model forecasts still shows normal to above normal rainfall, rainfall anomalies suggests greater chance of below normal rainfall.

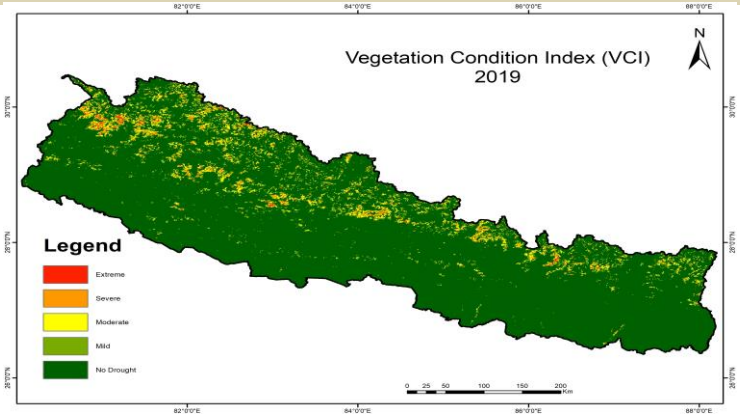
Current capabilities of drought monitoring using earth observation data

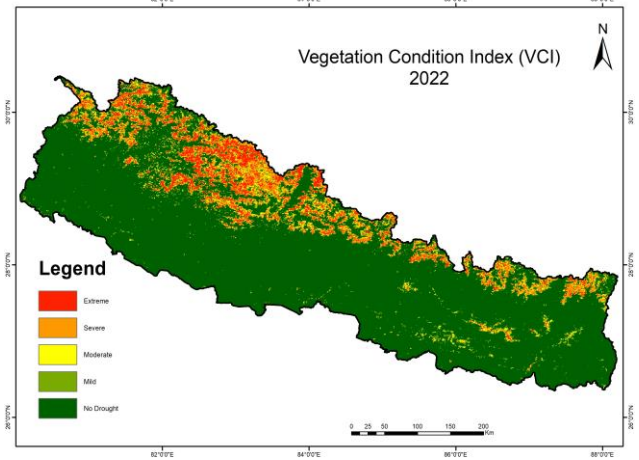
- Recently drought monitoring case study using earth observation data was done using google earth engine .
- We are preparing to produce drought monitoring products after completion of this workshop.

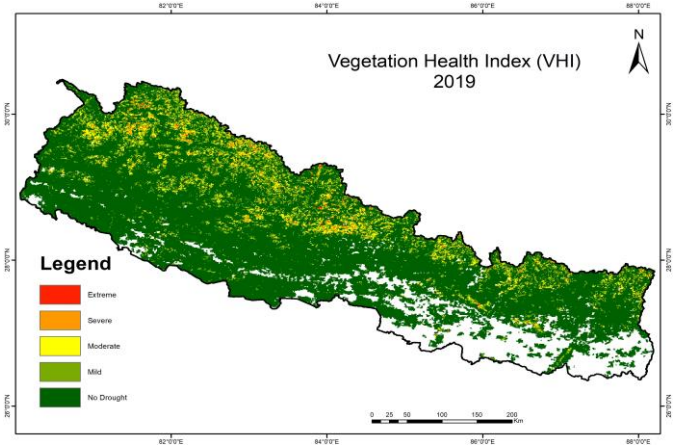
Examples of the use case of drought monitoring applications

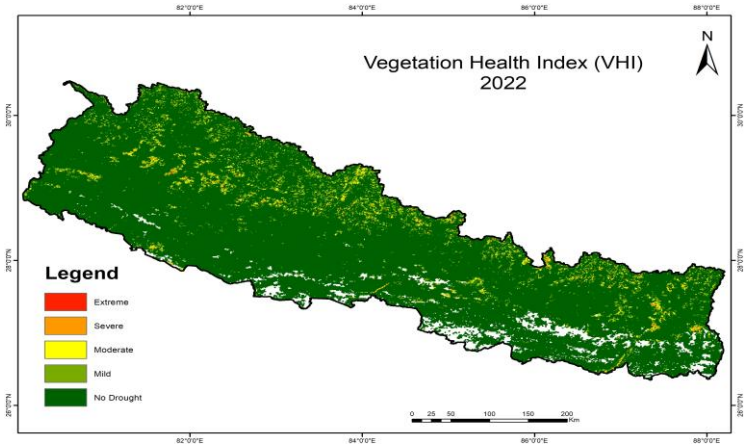












Multi-sectoral usage of available Drought Monitoring systems

The impacts of climate change are increasing rapidly and so is the frequency of drought but the current adaptation strategies are not sufficient to adapt with these changes. Most of the adaptation strategies are short-term, reactive, and based on weak knowledge. Moreover, the adaptation strategies should integrate environmental, sociocultural, and economic aspects to ensure its effectiveness and better outcome. Finally, integrating traditional knowledge and modern technologies for the sustainable and effective outcomes is essential in the long-run in the sector of

- Agriculture
- Water Supply Systems
- Hydropower generations
- Public Health and Transportations, and
- Ecology

Future needs and expectations

- Sharing of knowledge
- Trainings
- Capacity Building

Reference

Adhikari, D., Prasai, R., Lamichhane, S., Gautam, D., Sharma, S., & Acharya, S. (2021). Climate Change Impacts and Adaptation Strategies in Trans-Himalaya Region of Nepal. *Journal of Forest and Livelihood, 20*(1).

Hamal, K., Sharma, S., Pokharel, B., Shrestha, D., Talchabhadel, R., Shrestha, A., & Khadka, N. (2021). Changing pattern of drought in Nepal and associated atmospheric circulation. *Atmospheric Research, 262,* 105798

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Thank you