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Estimation of Water Stress and Identification of Priority Areas for Irrigation over the Drought Prone Semi-Arid Region of India

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Introduction

- Drought and water stress are one of the highest destructive climate based hazards.
- Agro-economic countries like India are highly sensitive to water crises and droughts.
- Over the Marathwada region of India, significantly depleting groundwater level and low amount of monsoon rains demands for a good irrigation system for maximum crop cultivation and day-to-day activities.
- Therefore the present study gives the new approach to priorities area's for irrigation.

Crop Yield degradation



Desertification



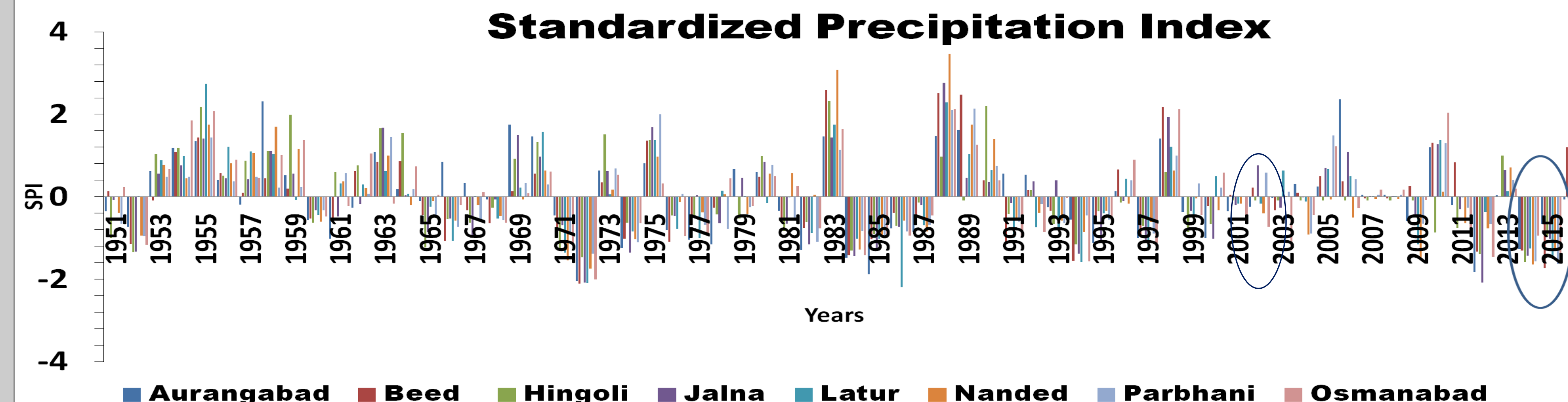
Farmer Suicides



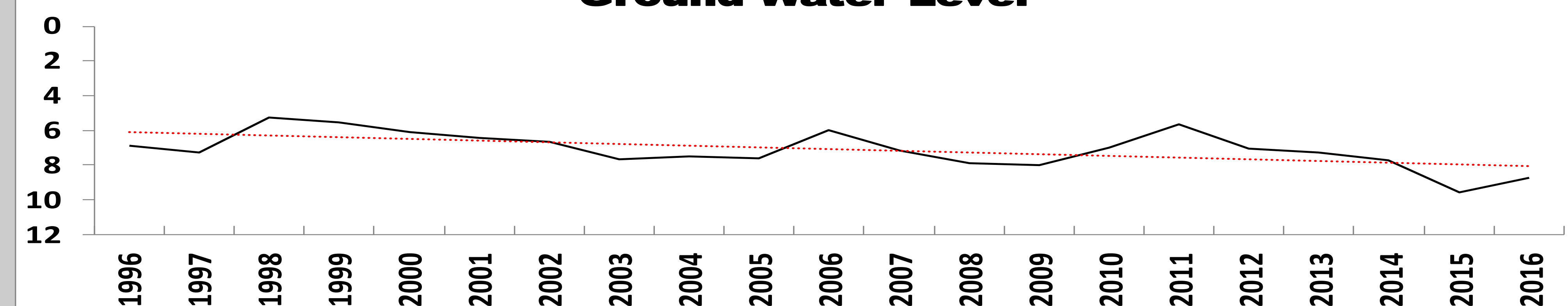
Socio-economic



Standardized Precipitation Index

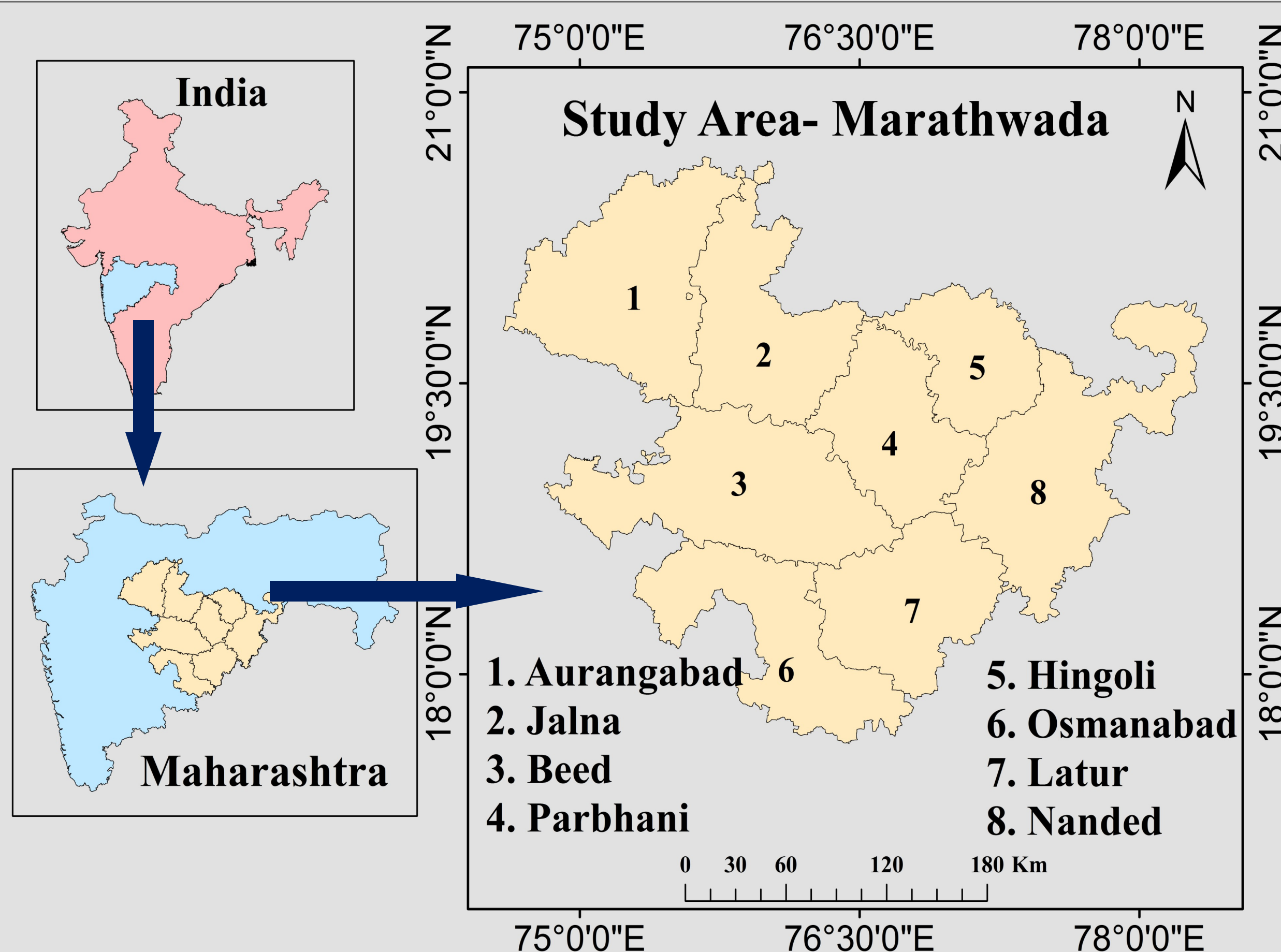


Ground Water Level



Study Area

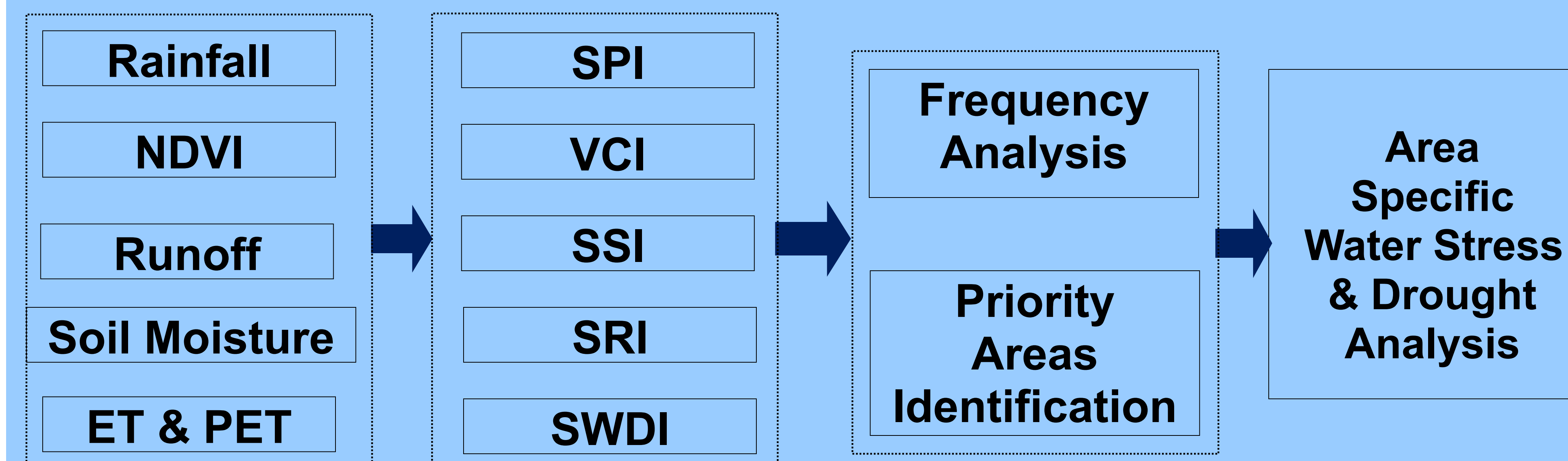
- This study has been carried out over the sub-divisions of Marathwada-Maharashtra, India.
- The overall geographical area covered by Marathwada is 64434 Sq. Km.
- This area lies on the lee ward side of the Western Ghats and forms the central portion of Maharashtra.
- Maximum Temperature= 43°C,
- Minimum Temperature =11°C.
- Annual average precipitation ranges between 600mm to 700mm.



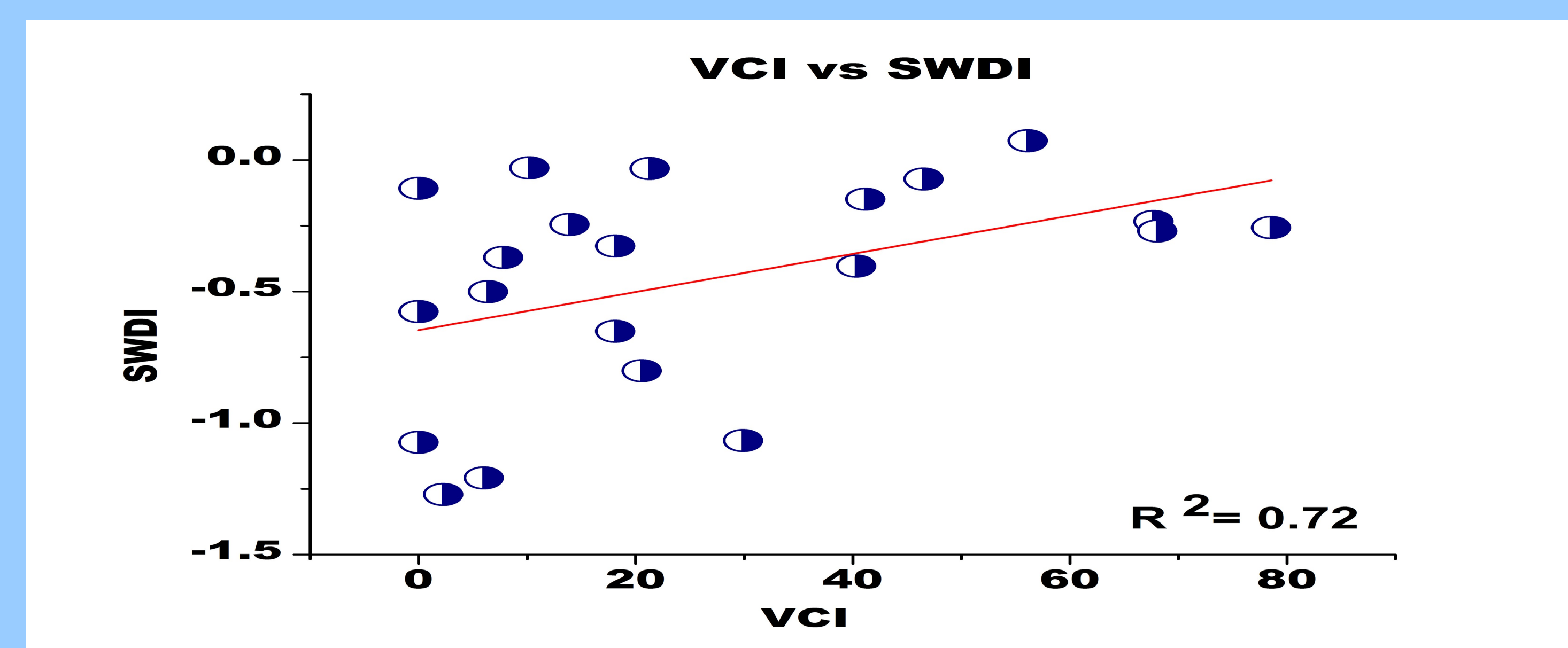
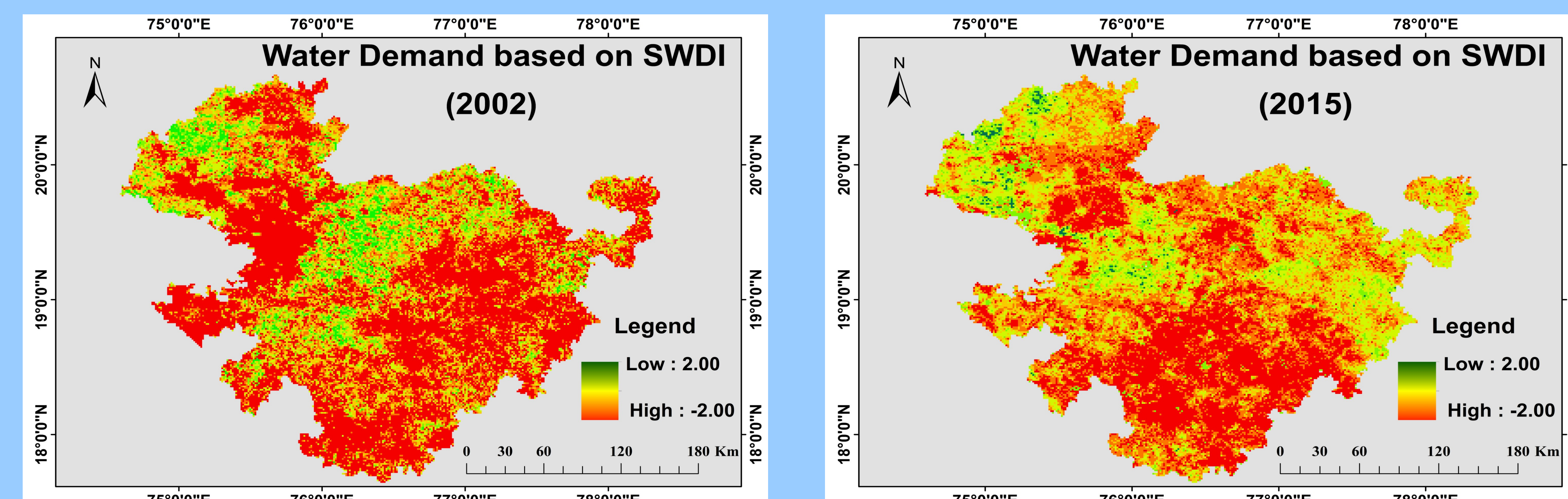
Data Used

No.	Data	Period	Details
1	Rainfall	1951– 2017	IMD (Station based), TRMM(0.25*0.25 degree)
2	Ground Water	1996-2016	Water Res. Info. system
3	ET, PET, NDVI, LST	2001-2017	MODIS (0.5 & 1 km)
4	Soil Moisture, Runoff	2001-2017	MERRA (0.5*0.5 degree)

Methodology

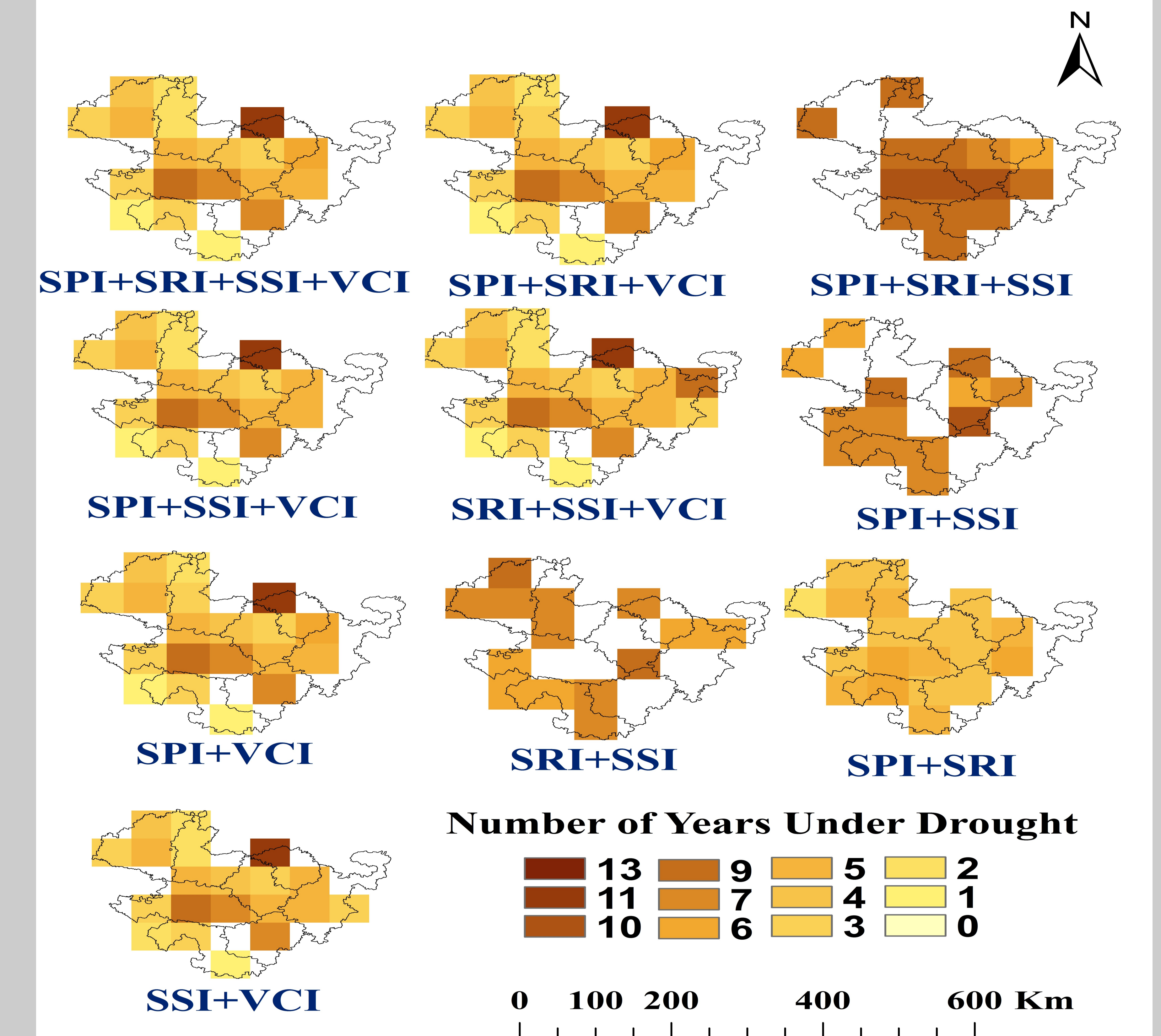


Results



Index	Relationship	Sign	Significance
SPI vs SRI	73%	+ve	No
SPI vs SSI	37%	+ve	No
SPI vs VCI	41%	+ve	No
SWDI vs VCI	83%	+ve	Yes

Concurrent Droughtst & Drought Years



Conclusions

- The newly developed Standardized Water Demand Index (SWDI) is highly correlated with the vegetation stress (VCI), therefore it can be used to estimate the water stress combine with the other drought indices.
- From last two decades, high intensity of water stress and droughts was noticed over the adjoining years eg. 2002-2003, 2008-2009 and 2014-2015.
- 2015 was one of the most drought-affected years since last two decades, in which 53% of the study area was under high water stress.
- As per the various drought indices, Nanded, Parbhani and Latur are the areas which are highly under water stress. From last 17 years, post-monsoon season as a whole, seven times moderate to extreme drought condition was noticed over the 19% of the study area.
- This high frequency of severe to extreme drought is a major concern towards agriculture, which also demands for good irrigation and better management policies.

Acknowledgement

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