
SPATIO-TEMPORAL ANALYSIS OF DROUGHT CHARACTERISTICS USING MULTISCALE INDICES:

The Case Study of Baringo County



Presenter:

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Introduction



- Drought is a norm rather than an exception in Baringo County where it adversely affects vegetation and water resources which are key resources for pastoralism.
- There is a very high expectation that the drought disasters will happen more frequently and with a higher degree of severity than before due to the influence of the climatic changes currently being experienced.
- Spatially invariant and multiscale indices developed, such as standardized precipitation index (SPI) and standardized precipitation evapotranspiration index (SPEI), are used in spatiotemporal analysis of drought characteristics.

Objectives

Main objective

1. The main objective of this study is to assess the spatiotemporal analysis of drought using the SPI and SPEI drought indices in Baringo County.

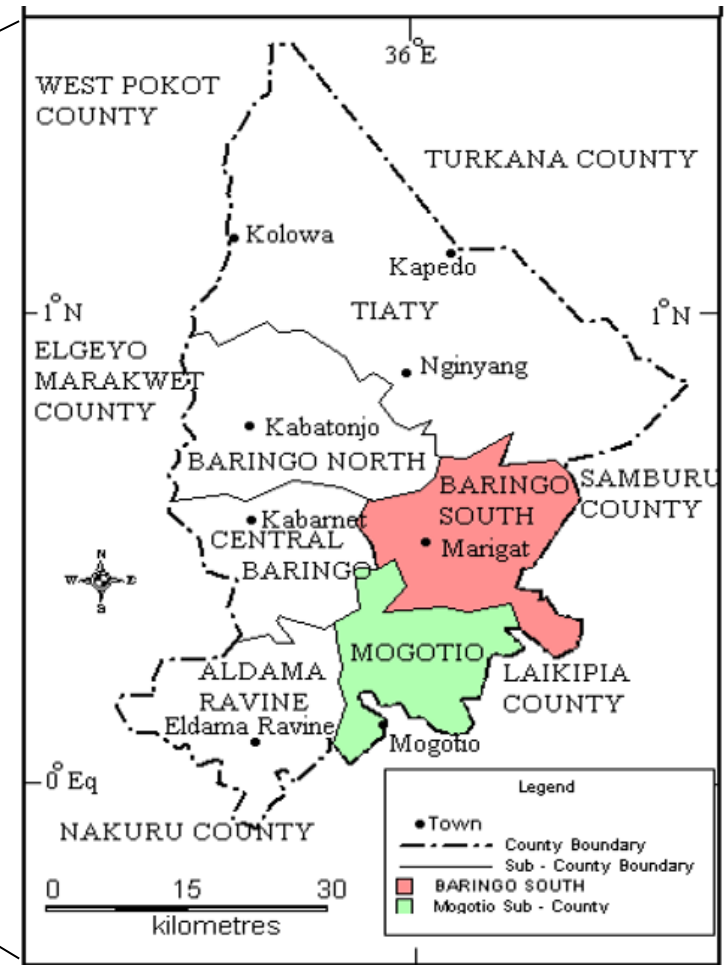
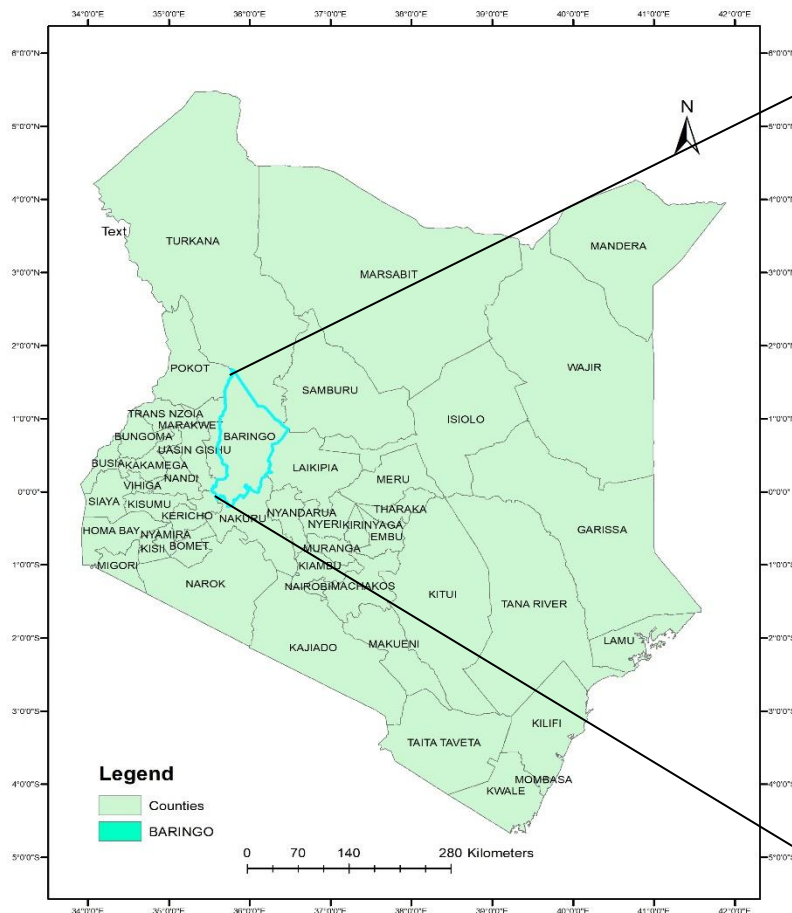
The specific objectives are:

1. To assess the temporal variations of drought using SPI and SPEI at different timescales.
2. To assess the spatial variations of drought characteristics using SPI and SPEI.
3. To analyze the consistency of drought indexes (SPI and SPEI) and vegetation indexes (NDVI and VCI) in the spatiotemporal analysis of drought.

Study Area: Baringo County



MAP OF KENYA

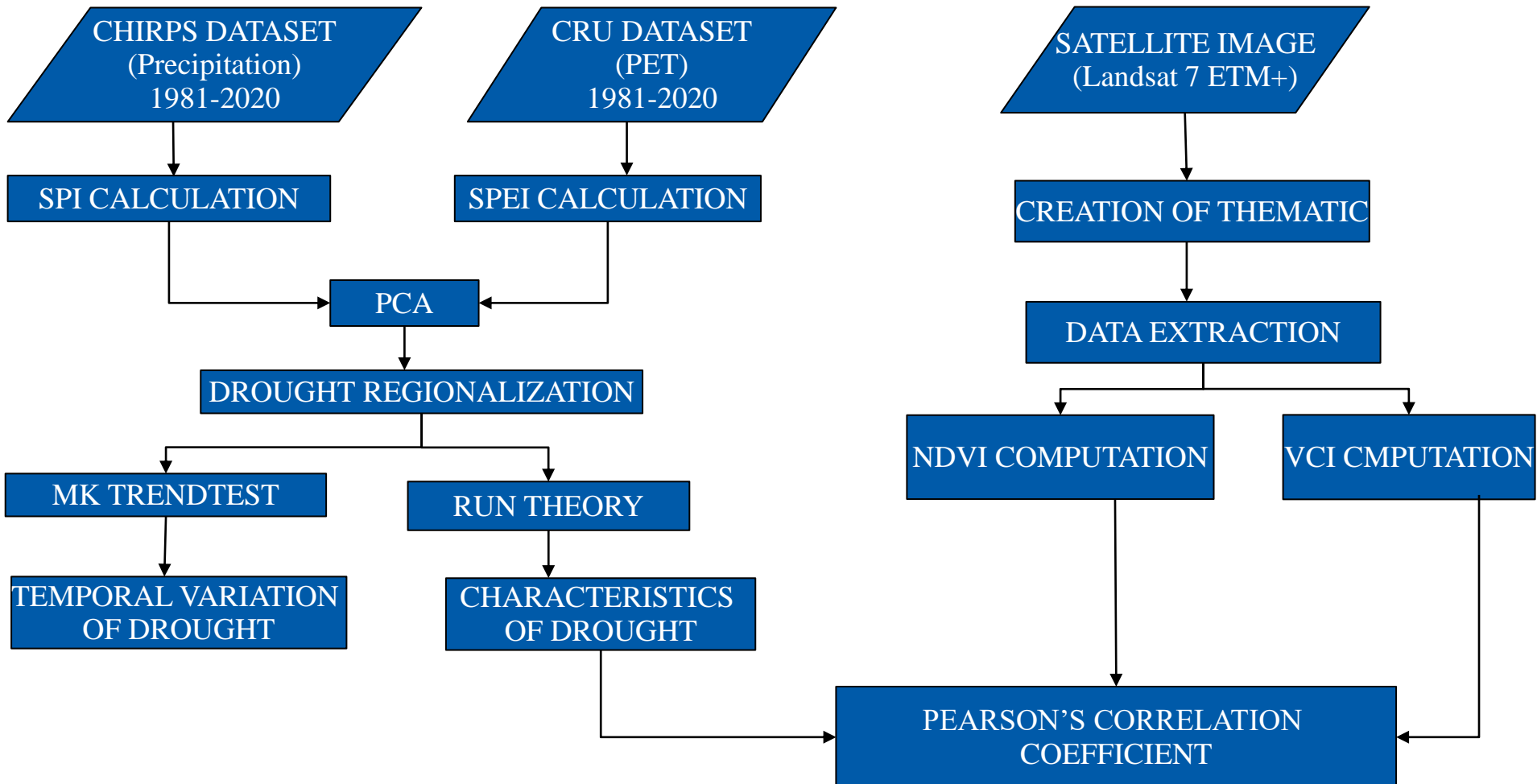


Data & Materials



Data type	Data format	Source	Purpose
Precipitation data	.csv	https://data.chc.ucsb.edu/products/CHIRPS-2.0/EAC_monthly/tifs/	To calculate SPI
Administration boundary	shapefile	Kenya open data	To define boundaries
PET data	.csv	https://data.ceda.ac.uk/badc/cru/data/cru_ts/cru_ts_4.05/d ata/pet	To calculate PET
Landsat 7 ETM+	raster	USGS earth explorer	To calculate NDVI and VCI

Overall methodology

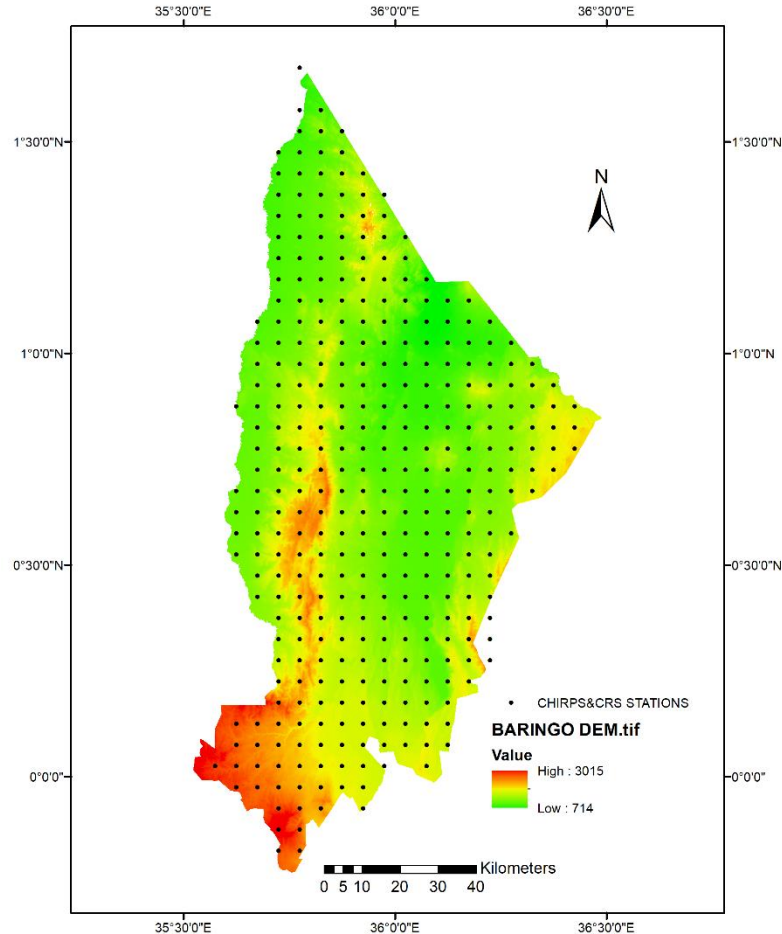


Results

CHIRPS AND CRU DATASET STATIONS



BARINGO COUNTY DEM, CHIRPS AND CRU DATA STATIONS



Interpretation of spectral ranges for SPI and SPEI

Interpretation of SPI spectral range.

SPI value	Interpretation	Abbreviation
≥ 2.00	Extremely wet	EW
1.50 to 1.99	Very wet	VW
1.00 to 1.49	Moderately wet	MW
0.99 to -0.99	Near Normal	NN
-1.00 to -1.49	Moderately dry	MD
-1.50 to -1.99	Severely dry	SD
≤ -2.00	Extremely dry	ED

Interpretation of SPEI spectral range.

SPEI	Interpretation	Abbreviation
≥ 1.00	Severe wet	SW
0.5 to 1.0	Moderate wet	MW
0 to 0.5	Near normal	NN
-0.5 to 0	Light drought	LD
-1.00 to -0.5	Moderate drought	MD
< -1.0	Severe drought	SD

Interpretation of SPI at different time scales

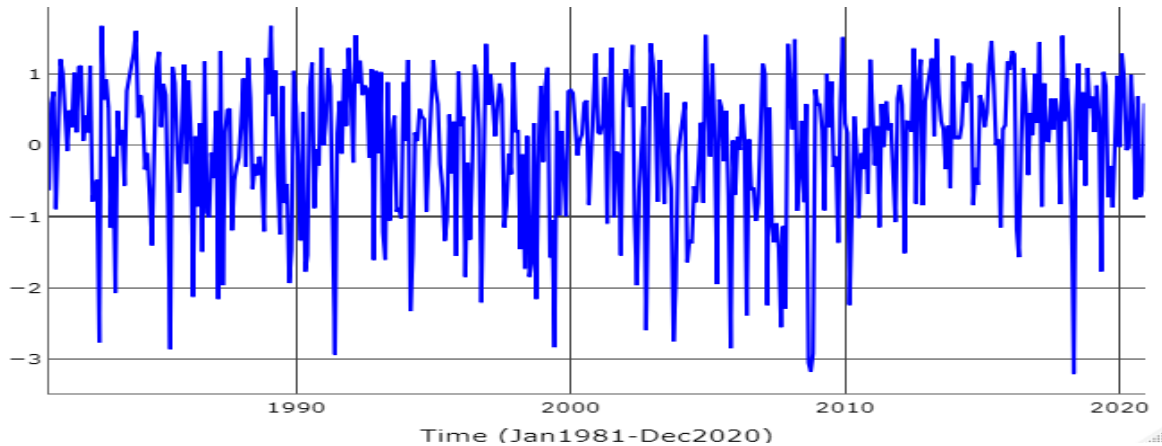


- The 1-month SPI is a short-term value and during the growing season can be important for correlation of soil moisture and crop stress.
- A 3-month SPI reflects short- and medium-term moisture conditions and provides a seasonal estimation of precipitation.
- The 6-month SPI indicates medium-term trends in precipitation.
- The 9-month SPI provides an indication of precipitation patterns over a medium time scale.
- The 12-months SPI reflect long-term precipitation patterns.

(a) TEMPORAL VARIATIONS EVOLUTION OF SPI AND SPEI FOR 1-MONTH TIMESCALE



SPI-1 TEMPORAL EVOLUTION



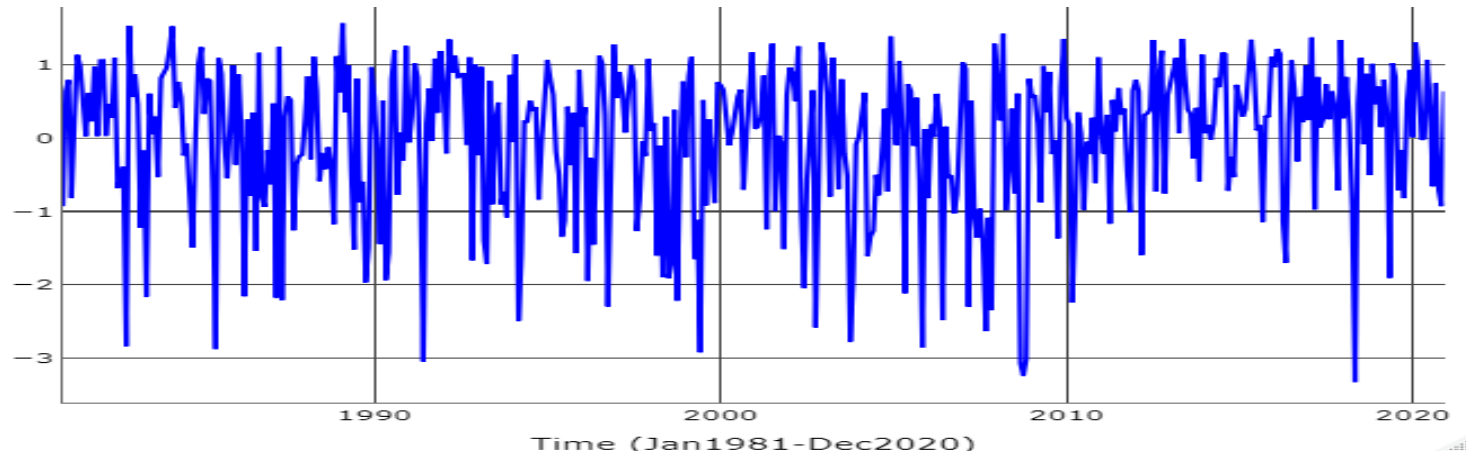
SPEI-1 TEMPORAL EVOLUTION



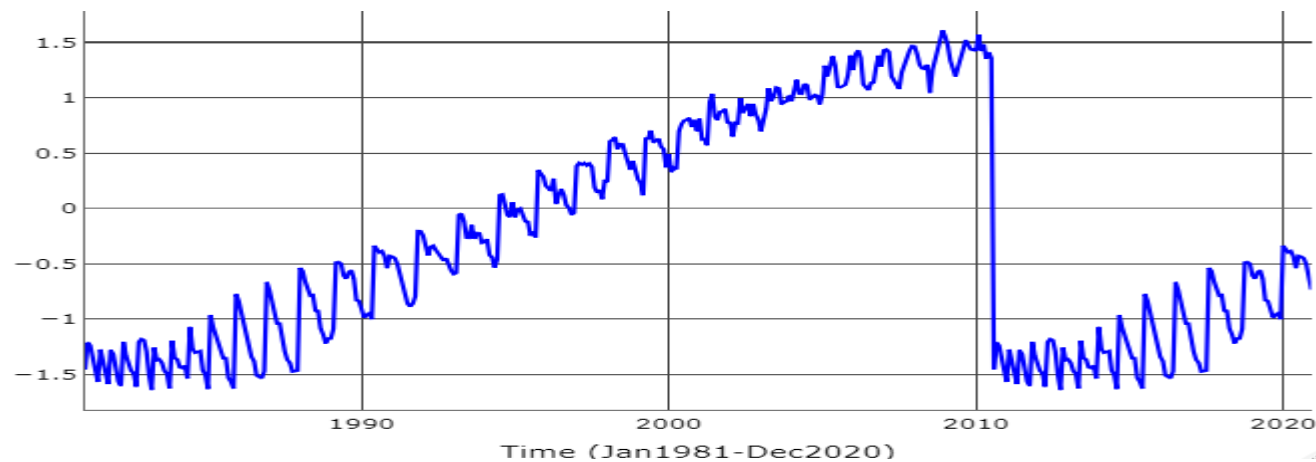
(b) TEMPORAL VARIATIONS EVOLUTION OF SPI AND SPEI FOR 3-MONTH TIMESCALE



SPI-3 TEMPORAL EVOLUTION



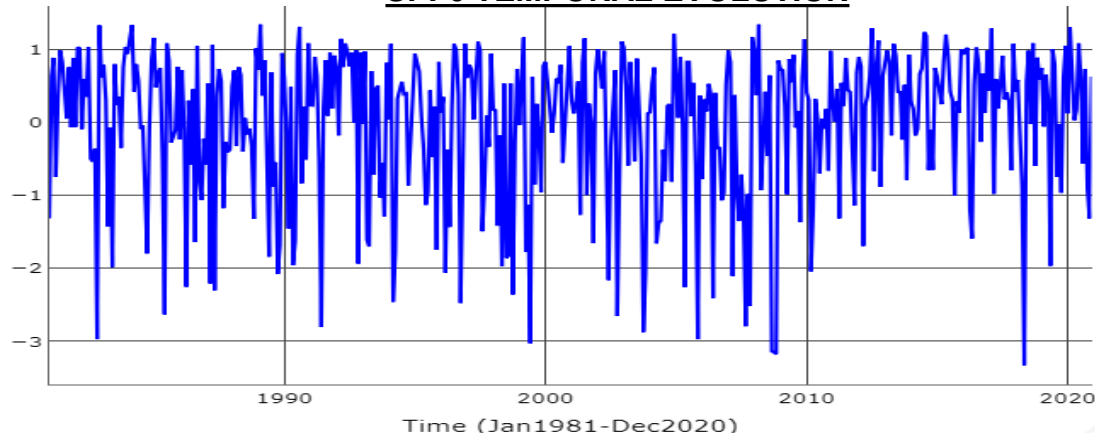
SPEI-3 TEMPORAL EVOLUTION



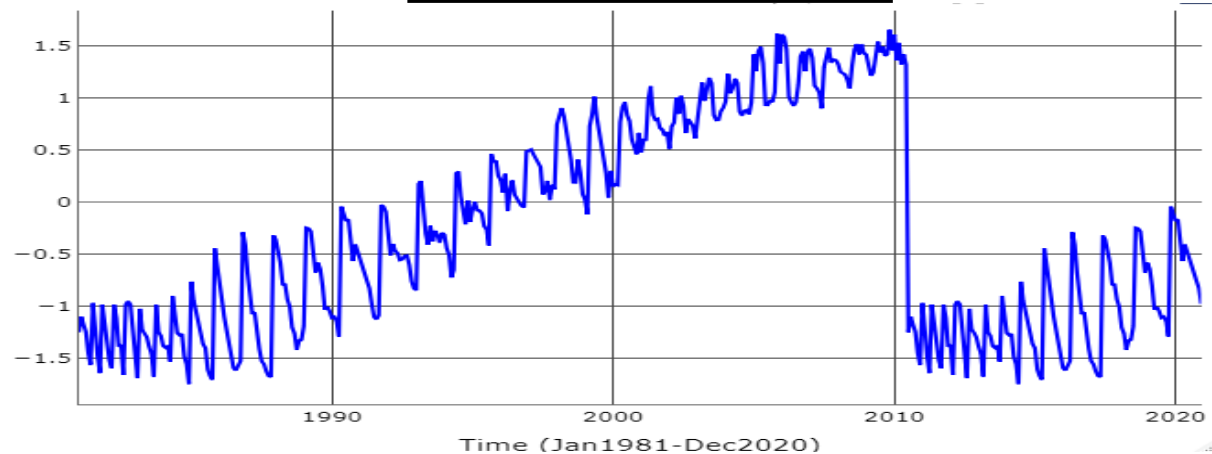
(c) TEMPORAL VARIATIONS EVOLUTION OF SPI AND SPEI FOR 6-MONTH TIMESCALE



SPI-6 TEMPORAL EVOLUTION



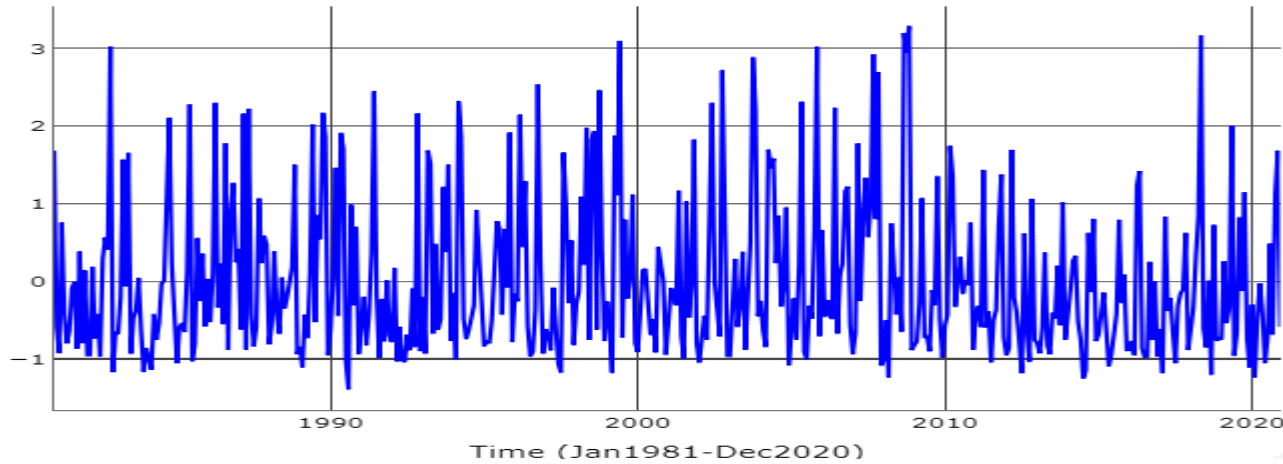
SPEI-6 TEMPORAL EVOLUTION



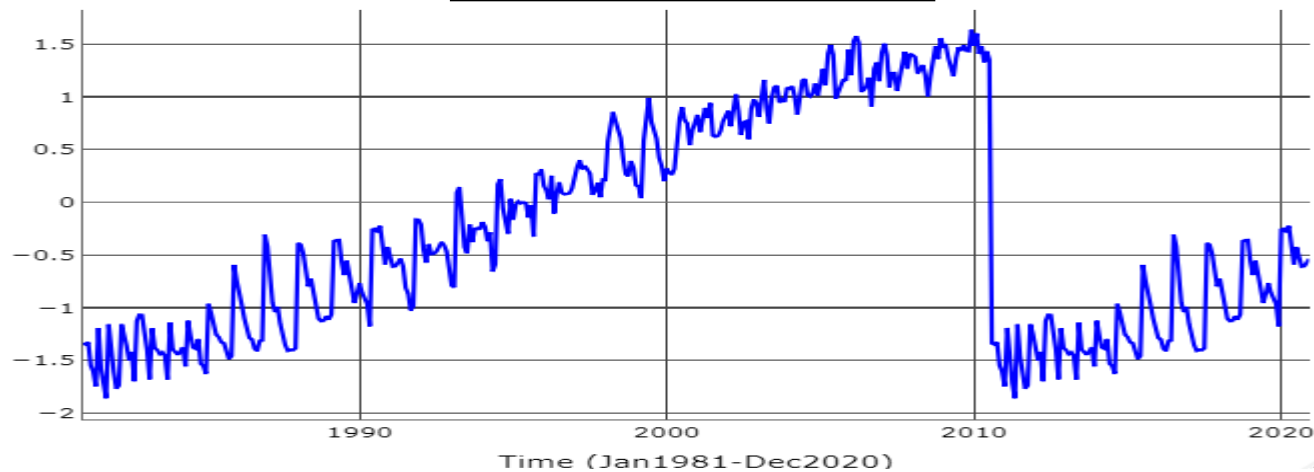
(d) TEMPORAL VARIATIONS EVOLUTION OF SPI AND SPEI FOR 9-MONTH TIMESCALE



SPI-9 TEMPORAL EVOLUTION



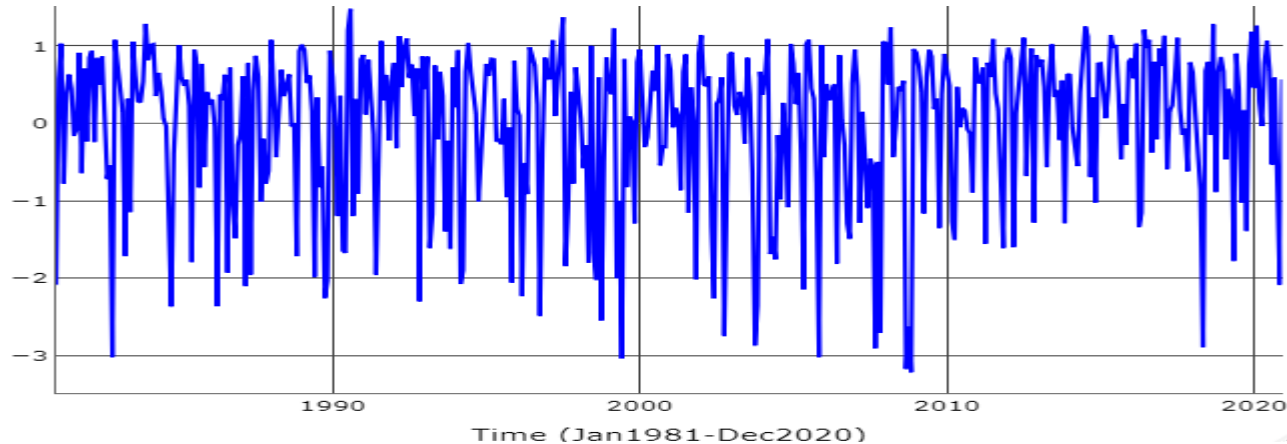
SPEI-9 TEMPORAL EVOLUTION



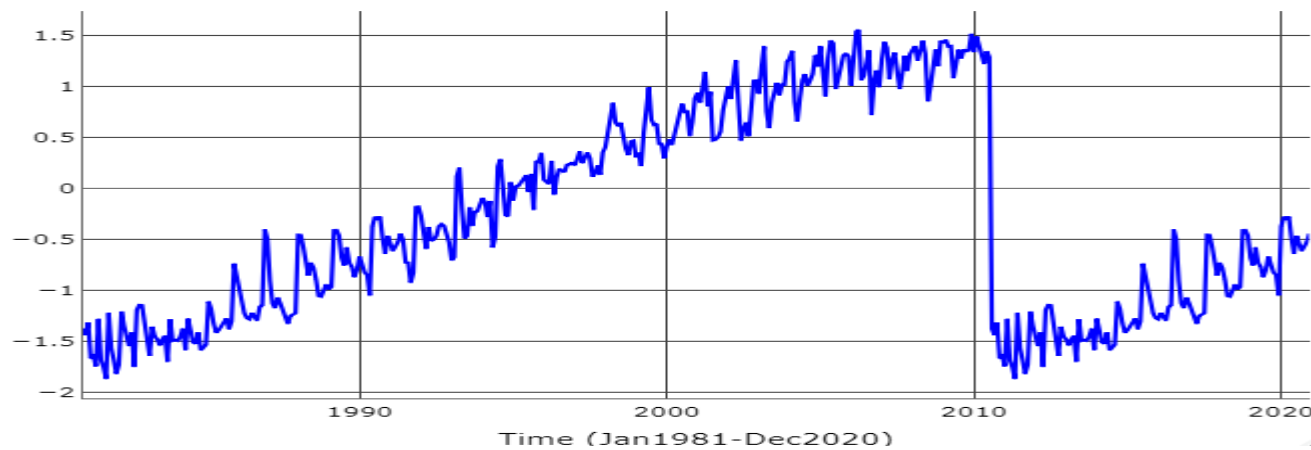
(e) TEMPORAL VARIATIONS EVOLUTION OF SPI AND SPEI FOR 12-MONTH TIMESCALE



SPI-12 TEMPORAL EVOLUTION



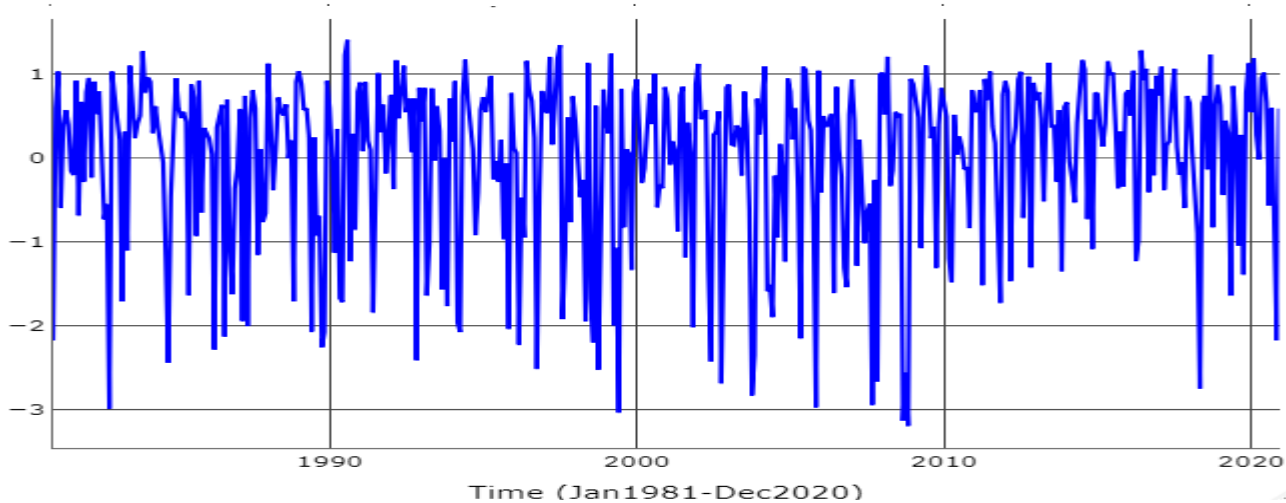
SPEI-12 TEMPORAL EVOLUTION



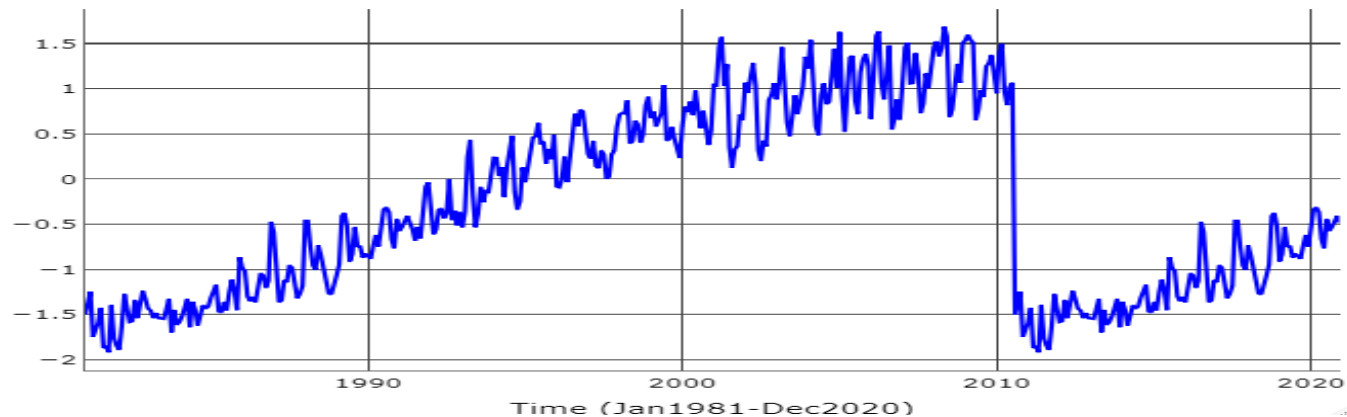
(f) TEMPORAL VARIATIONS EVOLUTION OF SPI AND SPEI FOR 24-MONTH TIMESCALE



SPI-24 TEMPORAL EVOLUTION



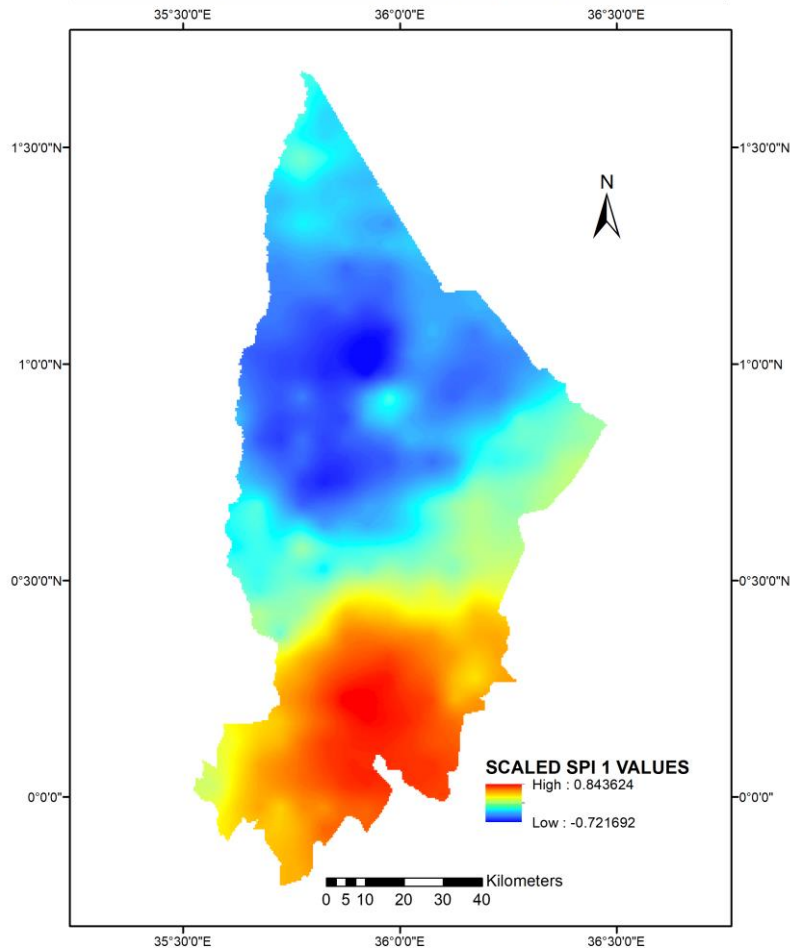
SPEI-24 TEMPORAL EVOLUTION



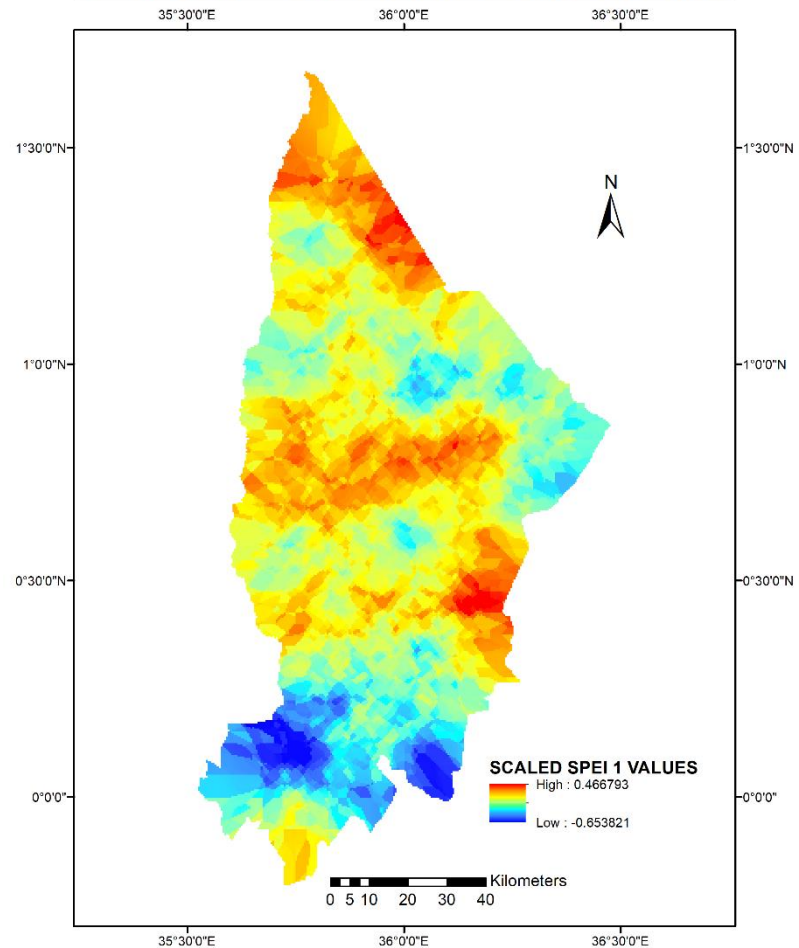
(a) SPATIAL VARIATIONS OF SPI AND SPEI FOR 1-MONTH TIMESCALE



SPI 1 SPATIAL VARIATION IN BARINGO COUNTY



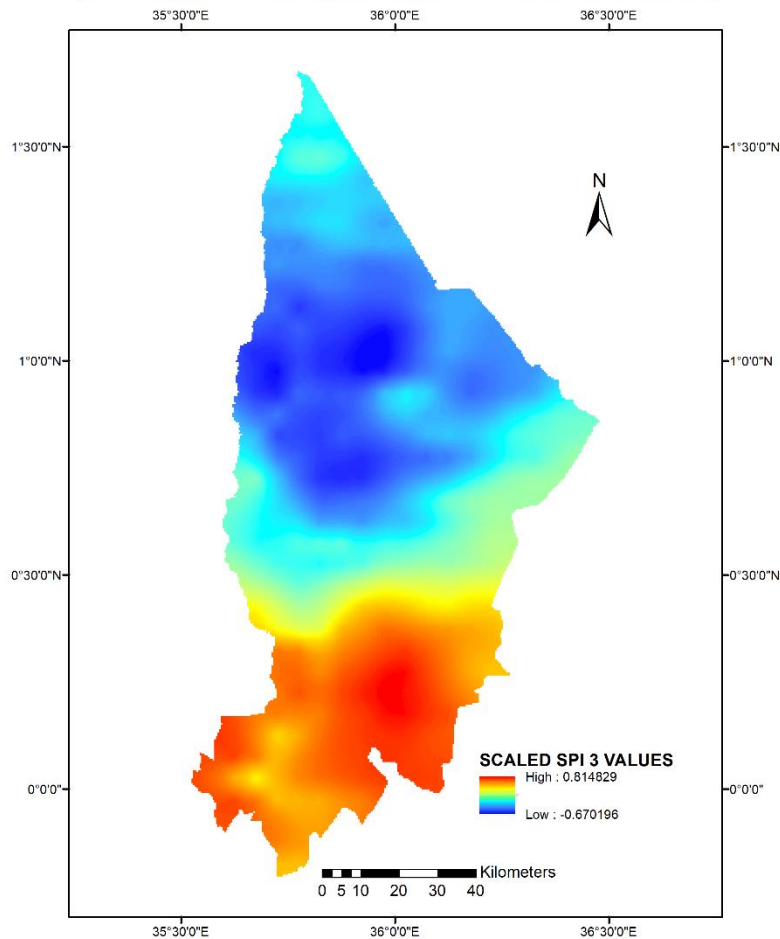
SPEI 1 SPATIAL VARIATION IN BARINGO COUNTY



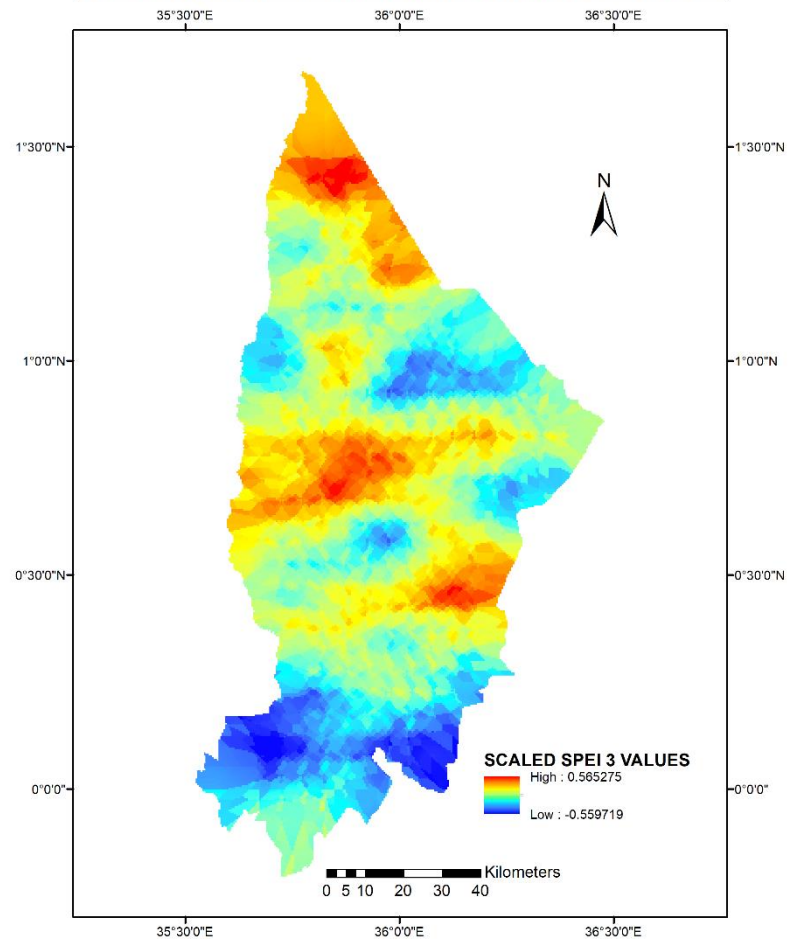
b) SPATIAL VARIATIONS OF SPI AND SPEI FOR 3-MONTHS TIMESCALE



SPI 3 SPATIAL VARIATION IN BARINGO COUNTY



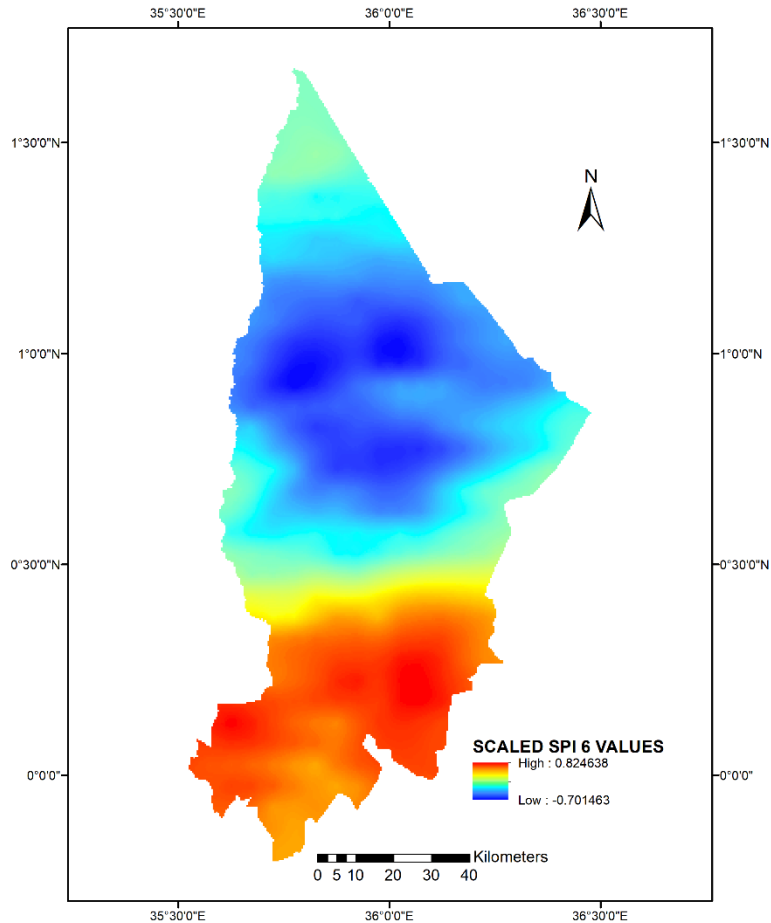
SPEI 3 SPATIAL VARIATION IN BARINGO COUNTY



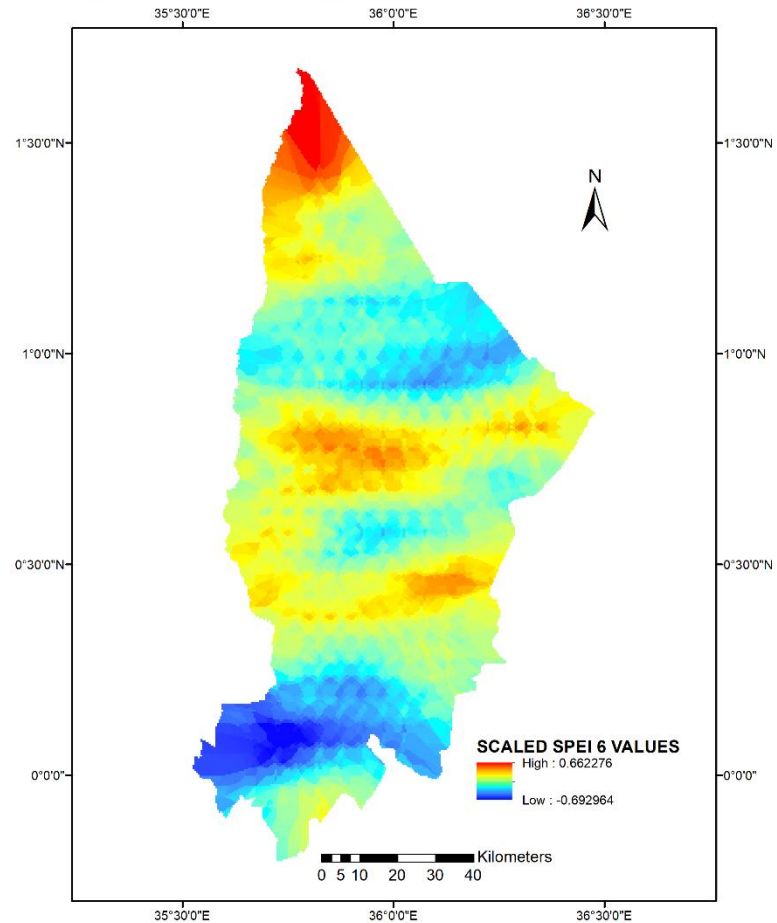
c) SPATIAL VARIATIONS OF SPI AND SPEI FOR 6-MONTHS TIMESCALE



SPI 6 SPATIAL VARIATION IN BARINGO COUNTY



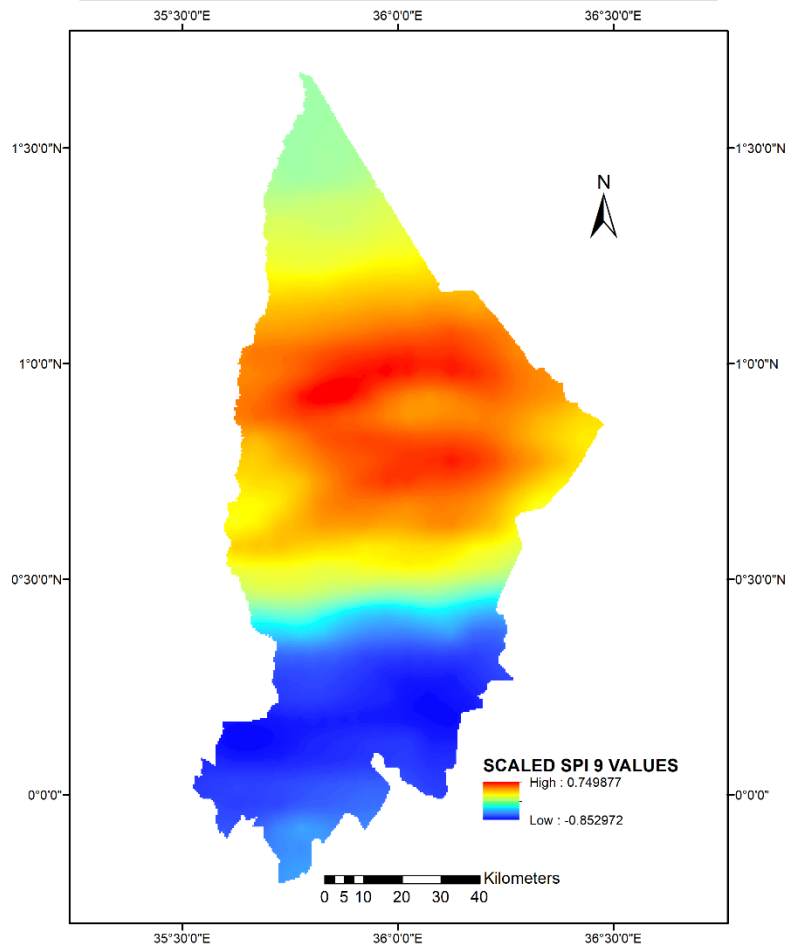
SPEI 6 SPATIAL VARIATION IN BARINGO COUNTY



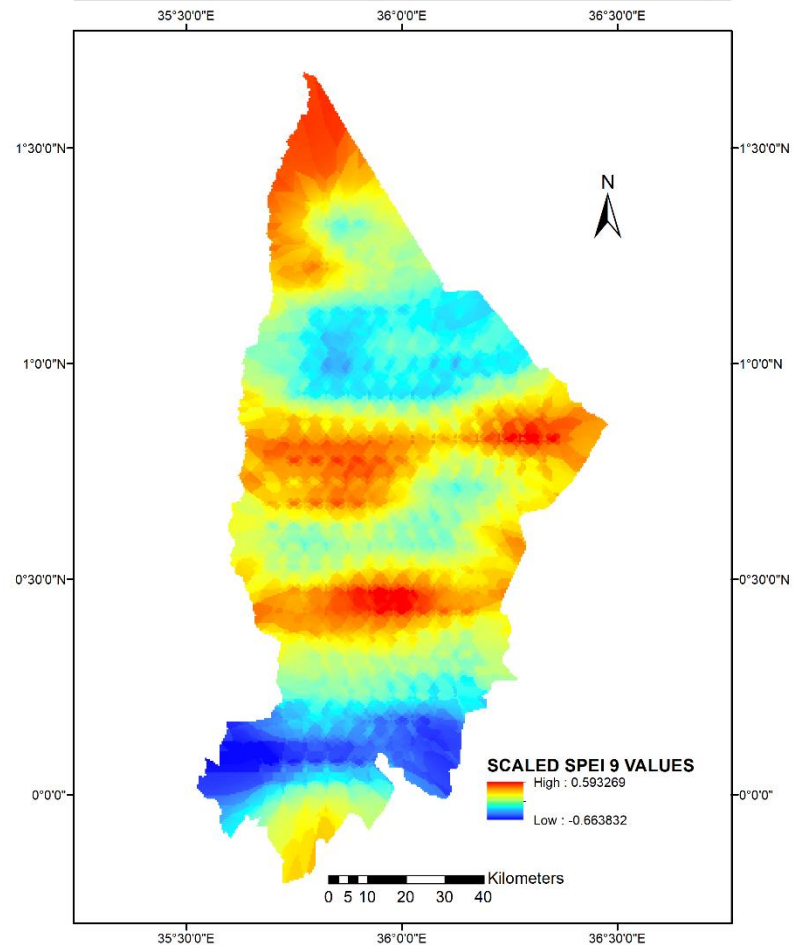
d) SPATIAL VARIATIONS OF SPI AND SPEI FOR 9-MONTHS TIMESCALE



SPI 9 SPATIAL VARIATION IN BARINGO COUNTY



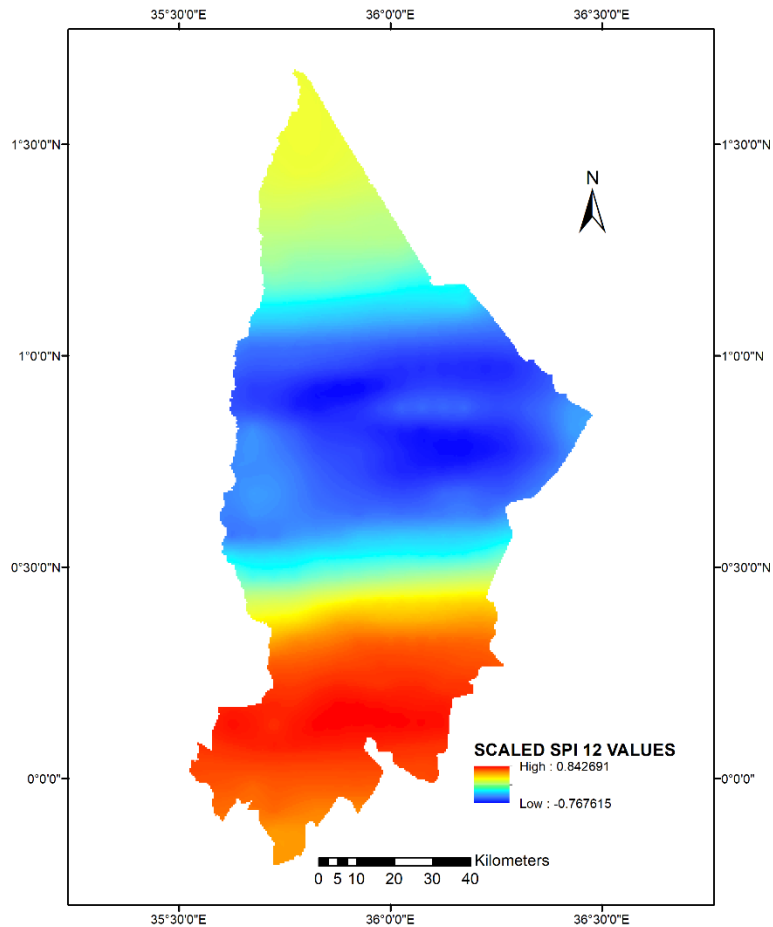
SPEI 9 SPATIAL VARIATION IN BARINGO COUNTY



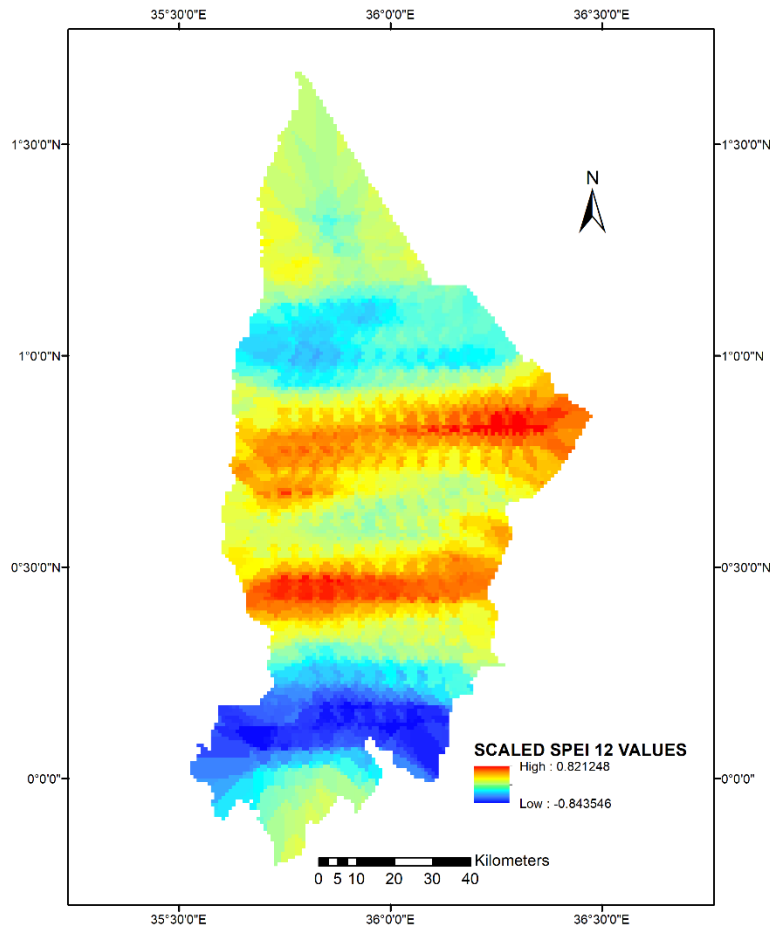
e) SPATIAL VARIATIONS OF SPI AND SPEI FOR 12-MONTHS TIMESCALE



SPI 12 SPATIAL VARIATION IN BARINGO COUNTY



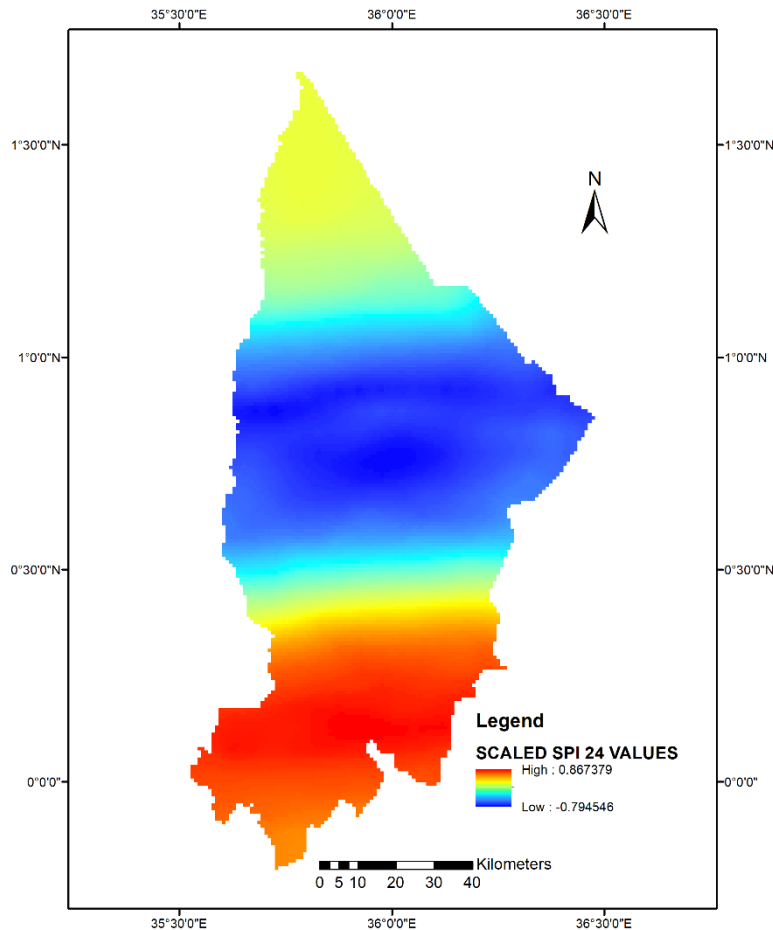
SPEI 12 SPATIAL VARIATION IN BARINGO COUNTY



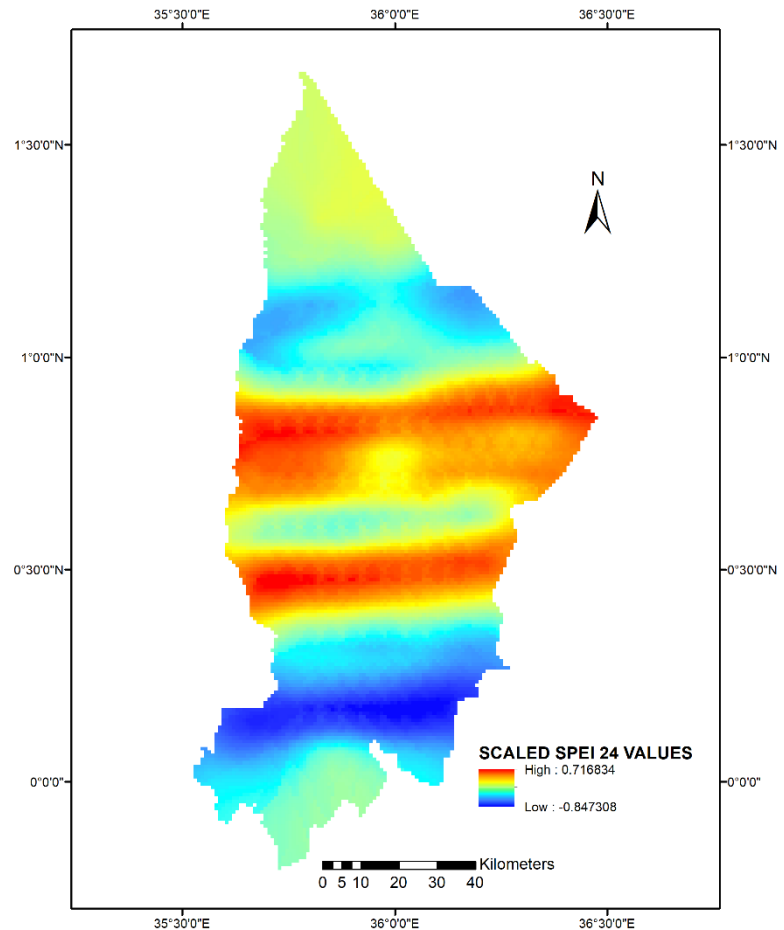
f) SPATIAL VARIATIONS OF SPI AND SPEI FOR 24-MONTH TIMESCALE



SPI 24 SPATIAL VARIATION IN BARINGO COUNTY



SPEI 24 SPATIAL VARIATION IN BARINGO COUNTY



To be completed results



1. Spatial distribution of correlation between SPI and SPEI and NDVI and VCI.

Thank you for your attention! Questions?



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