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COMPUTATION OF KARL PEARSON'S COEFFICIENT OF SKEWNESS AND BOWLEY'S COEFFICIENT OF SKEWNESS BETWEEN RAINFALL AND GROUND WATER LEVELS - A CASE STUDY

Statistics

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ABSTRACT

Present paper deals with the Computation of Karl Pearson's Coefficient of Skewness (SK_P) and Bowley's Coefficient of Skewness (SK_B) to analyze Rainfall (RF) and Ground Water Levels (GWLs) in Anantapuramu district based on the data collected from January 2007 to December 2016. For the purpose of analysis the district is divided into five Zones or Revenue Divisions (RD) namely, 1. Anantapuramu RD 2. Penukonda RD 3. Kadiri RD 4. Kalyandurg RD 5. Dharmavaram RD. I have calculated for the Karl Pearson's Coefficient of Skewness (SK_P) and Bowley's Coefficient of Skewness (SK_B) between Rainfall and Ground Water Levels and compared among them by using the data.

KEYWORDS

Rainfall, Ground Water Level, SKP, SKB.

1. INTRODUCTION

In this paper, I will main focus on Karl Pearson's Coefficient of Skewness (SK_P) and Bowley's Coefficient of Skewness (SK_B) to analyze Rainfall (RF) and Ground Water Levels (GWLs) in Anantapuramu district based on the data collected from January 2007 to December 2016. For the purpose of analysis the district is divided into five Zones or Revenue Divisions (RD).

The data is collected on Average Rainfall and Average Ground Water Levels are given in the following Table-1.1 for a ready reference [1, 2, 3, 4, 5, 6, 7, 8 and 9].

Table-1.1 Average Rainfall and Average Ground Water Levels data from 2007 to 2016

Year	Zone-I		Zone-II		Zone-III		Zone-IV		Zone-V	
	RF (in mm)	GWL	RF (in mm)	GWL	RF (in mm)	GWL	RF (in mm)	GWL	RF (in mm)	GWL
2007	65.60	10.57	58.20	22.58	67.20	14.23	52.00	14.97	60.50	17.03
2008	53.90	9.96	77.90	20.73	65.20	9.27	61.30	10.88	62.70	9.09
2009	45.40	12.17	50.60	17.53	46.30	11.08	57.10	9.58	38.70	10.24
2010	53.90	12.74	71.50	15.02	70.80	12.03	64.60	8.58	56.30	11.79
2011	39.50	12.69	42.30	15.20	48.90	11.48	31.80	8.93	36.60	12.84
2012	43.20	14.98	43.40	20.49	45.30	16.08	40.50	13.76	41.90	13.22
2013	35.00	15.94	52.30	23.03	47.10	18.69	34.80	16.98	38.10	14.30
2014	31.10	15.87	30.30	23.40	27.10	21.16	37.10	18.92	22.80	16.30
2015	44.10	14.90	62.60	26.88	66.30	25.80	46.00	19.26	54.30	17.66
2016	33.50	15.57	33.40	27.27	32.30	15.35	25.70	19.51	30.10	16.15

2. STATISTICAL ANALYSIS

To analyze **Rainfall** and **Ground Water Levels** through Karl Pearson's Coefficient of Skewness (SK_P) and Bowley's Coefficient of Skewness (SK_B) for different zones we can consider given as follows:

The Karl Pearson's Coefficient of Skewness (SK_P) is defined as:

$$1.\ SK_P = \frac{\bar{x} - M_o}{\sigma} \quad \ldots. (2.1)$$

$$2.\ SK_P = \frac{3(\bar{x} - M_d)}{\sigma} \quad \ldots. (2.2)$$

$$\bar{x} = \frac{\sum_{i=1}^{n} f_i x_i}{N} \quad \ldots. (2.3)$$

$$\sigma^2 = \frac{1}{N}\sum f_i x_i^2 - (\bar{x}^2) \quad \ldots. (2.4)$$

$$Mode = M_o = l + \frac{\Delta_1}{\Delta_1 + \Delta_2} \times c \quad \ldots. (2.5)$$

$$\Delta_1 = f - f_1 \quad \ldots. (2.6)$$

$$\Delta_2 = f - f_2 \quad \ldots. (2.7)$$

$$Median = M_d = l + \frac{\frac{N}{2} - m}{f} \times c \ldots. (2.8)$$

$$Where\ c = 1$$

Where l = Lower limit of the Median Class
N = Total of the Frequencies
m = Cumulative Frequency up to the Median Class
f = Frequency of the Median Class
f_1 = Frequency up to the Median Class
f_2 = Frequency below to the Median Class
c = Class Interval of the Median Class

The Bowley's Coefficient of Skewness (SK_B) is defined as:

$$SK_B = \frac{Q_3 - 2Q_2 + Q_1}{Q_3 - Q_1} \ldots. (2.9)$$

$$Q_1 = l + \frac{\frac{N}{4} - m}{f} \times c \ldots. (2.10)$$

$$Q_2 = Median\ (M_d)$$

$$Q_3 = l + \frac{3(\frac{N}{4}) - m}{f} \times c \quad \ldots. (2.11)$$

A: For Average Rainfall

Zone-I, II, III, IV and V

Zones	Zone-I	Zone-II	Zone-III	Zone-IV	Zone-V
1.SK_P	-0.12	-0.15	-0.23	0.44	-0.11
2.SK_P	0.37	0.48	0.38	0.61	0.41
3.SK_B	-0.002	0	0	0.003	0

B: For Average Ground Water Levels

Zone-I, II, III, IV and V

Zones	Zone-I	Zone-II	Zone-III	Zone-IV	Zone-V
1.SK_P	-0.47	-0.52	-6.73	-0.97	0.29
2.SK_P	-0.25	-0.39	-0.56	-0.61	-0.31
3.SK_B	0	0	0.002	0.002	0

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