

Thiessen Polygon Method

The arithmetic average method is the most approximate approach since rainfall varies in intensity and duration from place to place. Consequently, rainfall recorded by each rain-gauge station should be weighted according to the area it is assumed to represent.

The Thiessen polygon method is a more common technique for weighting rain-gauge observations according to area. It is also referred to as the weighted mean method and is more accurate than the arithmetic average method.

Procedure

Connect Stations: Join adjacent rain-gauge stations (A, B, C, D, etc.) with straight lines.

Bisect Lines: Construct the perpendicular bisectors for each of these connecting lines.

Form Polygons: A Thiessen network is thus constructed. The polygon formed by the perpendicular bisectors around a station encloses an area that is geographically closer to that station than to any other. Calculate the area (A) of each of these polygons.

Calculate Weighted Values: Multiply the area of each Thiessen polygon by the rain-gauge value (P) of the enclosed station.

Determine Total Area: Find the total area (ΣA) of the basin.

Compute Average Precipitation: Calculate the average rainfall using the following equation:

$$P_{avg} = \frac{A_1P_1 + A_2P_2 + A_3P_3 + \dots + A_nP_n}{A_1 + A_2 + A_3 + \dots + A_n}$$

$$= \frac{\Sigma (AP)}{\Sigma A}$$