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Rainfall-Runoff Correlation and Strange's Tables Formulas

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List of 15 Rainfall-Runoff Correlation and Strange's Tables Formulas

Rainfall-Runoff Correlation and Strange's Tables

Rainfall-Runoff Correlation

1) Annual Precipitation in (i-1)th year given Antecedent Precipitation

Open Calculator

fx $$P_{(i-1)} = \frac{P_a - a \cdot P_i - c \cdot P_{(i-2)}}{b}$$

ex $$121\text{cm} = \frac{96.39\text{cm} - 0.79 \cdot 95\text{cm} - 0.11 \cdot 84\text{cm}}{0.1}$$

2) Annual Precipitation in (i-2)th year given Antecedent Precipitation

Open Calculator

fx $$P_{(i-2)} = \frac{P_a - a \cdot P_i - b \cdot P_{(i-1)}}{c}$$

ex $$84\text{cm} = \frac{96.39\text{cm} - 0.79 \cdot 95\text{cm} - 0.1 \cdot 121\text{cm}}{0.11}$$

3) Annual Precipitation in i-th year given Antecedent Precipitation

Open Calculator

fx $$P_i = \frac{P_a - b \cdot P_{(i-1)} - c \cdot P_{(i-2)}}{a}$$

ex $$95\text{cm} = \frac{96.39\text{cm} - 0.1 \cdot 121\text{cm} - 0.11 \cdot 84\text{cm}}{0.79}$$

4) Antecedent Precipitation Index

Open Calculator

fx $$P_a = a \cdot P_i + b \cdot P_{(i-1)} + c \cdot P_{(i-2)}$$

ex $$96.39\text{cm} = 0.79 \cdot 95\text{cm} + 0.1 \cdot 121\text{cm} + 0.11 \cdot 84\text{cm}$$

5) Equation of Straight-line Regression between Runoff and Rainfall

Open Calculator

fx $$R = a \cdot P + (B)$$

ex $$14.75\text{cm} = 0.79 \cdot 75\text{cm} + (-44.5)$$

6) Exponential Relationship for Larger Catchments

Open Calculator

fx $$R = \beta \cdot P^m$$

ex $$14.60758\text{cm} = 4 \cdot (75\text{cm})^{0.3}$$

7) Precipitation using Runoff from Exponential Relationship

Open Calculator

fx $$P = \left(\frac{R}{\beta}\right)^{\frac{1}{m}}$$

ex $$81.92898\text{cm} = \left(\frac{15\text{cm}}{4}\right)^{\frac{1}{0.3}}$$

8) Precipitation using Runoff in Straight Line Regression between Runoff and Rainfall

Open Calculator

fx $$P = \frac{R - (B)}{a}$$

ex $$75.31646\text{cm} = \frac{15\text{cm} - (-44.5)}{0.79}$$

9) Runoff Rainfall Regression by Logarithmic Transformation

Open Calculator

fx $$R = m \cdot \exp(\ln(P)) + \exp(\ln(\beta))$$

ex $$26.5\text{cm} = 0.3 \cdot \exp(\ln(75\text{cm})) + \exp(\ln(4))$$

Strange's Runoff Volume Percentage

10) Precipitation given Runoff Volume Percentage for Damp AMC

Open Calculator

$$p = \frac{K_s + 5.1079}{0.3259}$$

$$3.101534\text{cm} = \frac{5.0 + 5.1079}{0.3259}$$

11) Precipitation given Runoff Volume Percentage for Dry AMC

Open Calculator

$$p = \frac{K_s + 2.3716}{0.5065}$$

$$1.4554\text{cm} = \frac{5.0 + 2.3716}{0.5065}$$

12) Precipitation given Runoff Volume Percentage for Wet AMC

Open Calculator

$$p = \frac{K_s - 2.0643}{0.6601}$$

$$0.444736\text{cm} = \frac{5.0 - 2.0643}{0.6601}$$

13) Runoff Volume Percentage for Damp AMC

Open Calculator

$$K_s = 0.3259 \cdot p - 5.1079$$

$$0.1065 = 0.3259 \cdot 1.6\text{cm} - 5.1079$$

14) Runoff Volume Percentage for Dry AMC

Open Calculator

fx $K_s = 0.5065 \cdot p - 2.3716$

ex $5.7324 = 0.5065 \cdot 1.6\text{cm} - 2.3716$

15) Runoff Volume Percentage for Wet AMC or Antecedent Moisture Condition

Open Calculator

fx $K_s = 0.6601 \cdot p + 2.0643$

ex $12.6259 = 0.6601 \cdot 1.6\text{cm} + 2.0643$

Variables Used

- **a** Coefficient 'a'
- **b** Coefficient 'b'
- **B** Coefficient 'B' in Straight-line Regression
- **c** Coefficient 'c'
- K_s Runoff Volume Percentage
- **m** Coefficient m
- **p** Daily Rainfall *(Centimeter)*
- **P** Rainfall *(Centimeter)*
- $P_{(i-1)}$ Precipitation in (i-1)th Year *(Centimeter)*
- $P_{(i-2)}$ Precipitation in (i-2)th Year *(Centimeter)*
- P_a Antecedent Precipitation Index *(Centimeter)*
- P_i Precipitation in (i)th Year *(Centimeter)*
- **R** Runoff *(Centimeter)*
- **β** Coefficient β

Constants, Functions, Measurements used

- Function: **exp**, exp(Number)
  Exponential function
- Function: **ln**, ln(Number)
  Natural logarithm function (base e)
- Measurement: **Length** in Centimeter (cm)
  Length Unit Conversion

Check other formula lists

- **Empirical Equations of Runoff Volume Formulas**
- **Rainfall-Runoff Correlation and Strange's Tables Formulas**
- **SCS-CN Method of Runoff Volume Formulas**
- **Watershed and Yield Formulas**

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