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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

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

[Open Calculator !\[\]\(de95854c7ee024cfadc48187bbb781b2\_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(6a9b39b98eb945faa14c645ec99e4eaa\_img.jpg\)](#)

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



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

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

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235\_img.jpg\)](#)

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

### 4) Antecedent Precipitation Index

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

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0\_img.jpg\)](#)

$$ex \quad 96.39cm = 0.79 \cdot 95cm + 0.1 \cdot 121cm + 0.11 \cdot 84cm$$

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

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

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f\_img.jpg\)](#)

$$ex \quad 14.75cm = 0.79 \cdot 75cm + (-44.5)$$

### 6) Exponential Relationship for Larger Catchments

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

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754\_img.jpg\)](#)

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



## 7) Precipitation using Runoff from Exponential Relationship

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

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95\_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2\_img.jpg\)](#)

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

## 9) Runoff Rainfall Regression by Logarithmic Transformation

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

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7\_img.jpg\)](#)

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



## Strange's Runoff Volume Percentage

### 10) Precipitation given Runoff Volume Percentage for Damp AMC

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

[Open Calculator !\[\]\(74d4806277d7e73349d8e8c0897931e9\_img.jpg\)](#)

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

### 11) Precipitation given Runoff Volume Percentage for Dry AMC

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

[Open Calculator !\[\]\(8bba887393ca45b761e5cb49e755e762\_img.jpg\)](#)

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

### 12) Precipitation given Runoff Volume Percentage for Wet AMC

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

[Open Calculator !\[\]\(0fb13ad0bfa3d86868cdd3883e5665b3\_img.jpg\)](#)

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

### 13) Runoff Volume Percentage for Damp AMC

$$\text{fx } K_s = 0.3259 \cdot p - 5.1079$$

[Open Calculator !\[\]\(e50091943b385fe16d3277389202856f\_img.jpg\)](#)

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



#### 14) Runoff Volume Percentage for Dry AMC

$$\text{fx } K_s = 0.5065 \cdot p - 2.3716$$

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0\_img.jpg\)](#)

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

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

$$\text{fx } K_s = 0.6601 \cdot p + 2.0643$$

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5\_img.jpg\)](#)

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




## Variables Used

- **a** Coefficient 'a'
- **b** Coefficient 'b'
- **B** Coefficient 'B' in Straight-line Regression
- **c** Coefficient 'c'
- **K<sub>s</sub>** Runoff Volume Percentage
- **m** Coefficient m
- **p** Daily Rainfall (*Centimeter*)
- **P** Rainfall (*Centimeter*)
- **P<sub>(i-1)</sub>** Precipitation in (i-1)th Year (*Centimeter*)
- **P<sub>(i-2)</sub>** Precipitation in (i-2)th Year (*Centimeter*)
- **P<sub>a</sub>** Antecedent Precipitation Index (*Centimeter*)
- **P<sub>i</sub>** Precipitation in (i)th Year (*Centimeter*)
- **R** Runoff (*Centimeter*)
- **β** Coefficient β



## Constants, Functions, Measurements used

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





## Check other formula lists

- [Empirical Equations of Runoff Volume Formulas](#) 
- [SCS-CN Method of Runoff Volume Formulas](#) 
- [Rainfall-Runoff Correlation and Strange's Tables Formulas](#) 
- [Watershed and Yield Formulas](#) 

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