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Soil Loss Equation Formulas

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List of 17 Soil Loss Equation Formulas

Soil Loss Equation

Modified Universal Soil Loss Equation

1) Crop Management Factor given Sediment Yield from Individual Storm

$$\text{fx } C = \frac{Y}{11.8 \cdot \left((Q_V \cdot q_p)^{0.56} \right) \cdot K \cdot K_{zt} \cdot P}$$

Open Calculator 

$$\text{ex } 0.61 = \frac{135.7332\text{kg}}{11.8 \cdot \left((19.5\text{m}^3 \cdot 1.256\text{m}^3/\text{s})^{0.56} \right) \cdot 0.17 \cdot 25 \cdot 0.74}$$

2) Peak Rate of Runoff given Sediment Yield from Individual Storm

$$\text{fx } q_p = \frac{\left(\frac{Y}{11.8 \cdot K \cdot K_{zt} \cdot C \cdot P} \right)^{\frac{1}{0.56}}}{Q_V}$$

Open Calculator 

$$\text{ex } 1.256\text{m}^3/\text{s} = \frac{\left(\frac{135.7332\text{kg}}{11.8 \cdot 0.17 \cdot 25 \cdot 0.61 \cdot 0.74} \right)^{\frac{1}{0.56}}}{19.5\text{m}^3}$$



3) Sediment Yield from Individual Storm

$$\text{fx } Y = 11.8 \cdot \left((Q_V \cdot q_p)^{0.56} \right) \cdot K \cdot K_{zt} \cdot C \cdot P$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$\text{ex } 135.7332\text{kg} = 11.8 \cdot \left((19.5\text{m}^3 \cdot 1.256\text{m}^3/\text{s})^{0.56} \right) \cdot 0.17 \cdot 25 \cdot 0.61 \cdot 0.74$$

4) Storm Runoff Volume given Sediment Yield from Individual Storm

$$\text{fx } Q_V = \frac{\left(\frac{Y}{11.8 \cdot K \cdot K_{zt} \cdot C \cdot P} \right)^{\frac{1}{0.56}}}{q_p}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$\text{ex } 19.5\text{m}^3 = \frac{\left(\frac{135.7332\text{kg}}{11.8 \cdot 0.17 \cdot 25 \cdot 0.61 \cdot 0.74} \right)^{\frac{1}{0.56}}}{1.256\text{m}^3/\text{s}}$$

5) Support Cultivation Practice given Sediment Yield from Individual Storm

$$\text{fx } P = \frac{Y}{11.8 \cdot (Q_V \cdot q_p)^{0.56} \cdot K \cdot K_{zt} \cdot C}$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$\text{ex } 0.74 = \frac{135.7332\text{kg}}{11.8 \cdot (19.5\text{m}^3 \cdot 1.256\text{m}^3/\text{s})^{0.56} \cdot 0.17 \cdot 25 \cdot 0.61}$$



6) Topographic Factor given Sediment Yield from Individual Storm 

$$fx \quad K_{zt} = \frac{Y}{11.8 \cdot \left((Q_V \cdot q_p)^{0.56} \right) \cdot K \cdot C \cdot P}$$

Open Calculator 

$$ex \quad 25 = \frac{135.7332\text{kg}}{11.8 \cdot \left((19.5\text{m}^3 \cdot 1.256\text{m}^3/\text{s})^{0.56} \right) \cdot 0.17 \cdot 0.61 \cdot 0.74}$$

Universal Soil Loss Equation 7) Cover Management Factor given Soil Loss per unit Area in unit Time 

$$fx \quad C = \frac{A}{R \cdot K \cdot L \cdot S \cdot P}$$

Open Calculator 

$$ex \quad 0.613358 = \frac{0.16\text{t/d}}{0.4 \cdot 0.17 \cdot 0.1 \cdot 0.6 \cdot 0.74}$$

8) Equation for Topographic Factor 

$$fx \quad K_{zt} = \left(\left(\frac{\gamma}{22.13} \right)^m \right) \cdot \left(65.41 \cdot \sin(\theta)^2 + 4.56 \cdot \sin(\theta) + 0.065 \right)$$

Open Calculator 


$$ex \quad 36.4393 = \left(\left(\frac{4\text{m}}{22.13} \right)^{0.2} \right) \cdot \left(65.41 \cdot \sin(45)^2 + 4.56 \cdot \sin(45) + 0.065 \right)$$



9) Rainfall Erosivity Factor Open Calculator 

$$fx \quad R = \frac{A}{K \cdot L \cdot S \cdot C \cdot P}$$

$$ex \quad 0.402202 = \frac{0.16t/d}{0.17 \cdot 0.1 \cdot 0.6 \cdot 0.61 \cdot 0.74}$$

10) Slope Steepness Factor given Soil Loss per unit Area in unit Time Open Calculator 


$$fx \quad S = \frac{A}{R \cdot K \cdot L \cdot C \cdot P}$$

$$ex \quad 0.603303 = \frac{0.16t/d}{0.4 \cdot 0.17 \cdot 0.1 \cdot 0.61 \cdot 0.74}$$

11) Slope Length Factor given Soil Loss Per Unit Area in Unit Time Open Calculator 

$$fx \quad L = \frac{A}{R \cdot K \cdot S \cdot C \cdot P}$$

$$ex \quad 0.100551 = \frac{0.16t/d}{0.4 \cdot 0.17 \cdot 0.6 \cdot 0.61 \cdot 0.74}$$

12) Soil Erodibility Factor given Soil Loss Per Unit Area in Unit Time Open Calculator 

$$fx \quad K = \frac{A}{R \cdot L \cdot S \cdot C \cdot P}$$

$$ex \quad 0.170936 = \frac{0.16t/d}{0.4 \cdot 0.1 \cdot 0.6 \cdot 0.61 \cdot 0.74}$$



13) Soil Loss Per Unit Area in Unit Time

$$fx \quad A = R \cdot K \cdot L \cdot S \cdot C \cdot P$$

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

$$ex \quad 0.159124t/d = 0.4 \cdot 0.17 \cdot 0.1 \cdot 0.6 \cdot 0.61 \cdot 0.74$$

14) Support Practice Factor given Soil Loss per Unit Area in Unit Time

$$fx \quad P = \frac{A}{R \cdot K \cdot L \cdot C \cdot S}$$

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

$$ex \quad 0.744074 = \frac{0.16t/d}{0.4 \cdot 0.17 \cdot 0.1 \cdot 0.61 \cdot 0.6}$$

Rainfall Erosivity Factor

15) Kinetic Energy of Storm given Rainfall Erosion Index Unit

$$fx \quad K_E = EI_{30} \cdot \frac{100}{I_{30}}$$

[Open Calculator !\[\]\(104fbf564e2e5a8fbd84f31656d114c7_img.jpg\)](#)

$$ex \quad 100J = 0.0025 \cdot \frac{100}{15cm/min}$$

16) Maximum 30 Minutes Rainfall Intensity given Rainfall Erosion Index Unit of Storm

$$fx \quad I_{30} = \frac{EI_{30} \cdot 100}{K_E}$$

[Open Calculator !\[\]\(21226b58c700e5231ab98d27101bac58_img.jpg\)](#)

$$ex \quad 15cm/min = \frac{0.0025 \cdot 100}{100J}$$



17) Rainfall Erosion Index Unit of Storm

[Open Calculator !\[\]\(feabb98897b440bc8695a03336a6e2df_img.jpg\)](#)

$$\text{fx } EI_{30} = K_E \cdot \frac{I_{30}}{100}$$

$$\text{ex } 0.0025 = 100J \cdot \frac{15\text{cm}/\text{min}}{100}$$










Variables Used

- **A** Soil Loss Per Unit Area in Unit Time (*Ton (metric) per Day*)
- **C** Cover Management Factor
- **El₃₀** Rainfall Erosion Index Unit
- **I₃₀** Maximum 30-Minutes Rainfall Intensity (*Centimeter per Minute*)
- **K** Soil Erodibility Factor
- **K_E** Kinetic Energy of the Storm (*Joule*)
- **K_{zt}** Topographic factor
- **L** Slope Length Factor
- **m** Exponent Factor
- **P** Support Practice Factor
- **q_p** Peak Rate of Runoff (*Cubic Meter per Second*)
- **Q_v** Runoff Volume (*Cubic Meter*)
- **R** Rainfall Erosivity Factor
- **S** Slope-Steepness Factor
- **Y** Sediment Yield from an Individual Storm (*Kilogram*)
- **γ** Field Slope Length (*Meter*)
- **θ** Angle of Slope



Constants, Functions, Measurements used

- **Function:** **sin**, $\sin(\text{Angle})$
Sine is a trigonometric function that describes the ratio of the length of the opposite side of a right triangle to the length of the hypotenuse.
- **Measurement:** **Length** in Meter (m)
Length Unit Conversion 
- **Measurement:** **Weight** in Kilogram (kg)
Weight Unit Conversion 
- **Measurement:** **Volume** in Cubic Meter (m^3)
Volume Unit Conversion 
- **Measurement:** **Speed** in Centimeter per Minute (cm/min)
Speed Unit Conversion 
- **Measurement:** **Energy** in Joule (J)
Energy Unit Conversion 
- **Measurement:** **Volumetric Flow Rate** in Cubic Meter per Second (m^3/s)
Volumetric Flow Rate Unit Conversion 
- **Measurement:** **Mass Flow Rate** in Ton (metric) per Day (t/d)
Mass Flow Rate Unit Conversion 



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- [Soil Loss Equation Formulas](#) 

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