Important Watershed and Yield Formulas PDF

Formulas
Examples
with Units

List of 13
Important Watershed and Yield Formulas

1) Watershed Simulation Formulas

1.1) Actual Evapotranspiration given Runoff Formula

Evaluate Formula

Formula	Example with Units
$E_{et} = P_{mm} - Q_V - \Delta Sm$	$9.5\,m^3/s = 35\,mm - 19.5\,m^3 - 6\,m^3$

1.2) Change in Soil Moisture Storage given Runoff Formula

Evaluate Formula

Formula	Example with Units
$\Delta Sm = P_{mm} - Q_V - E_{et}$	$1.5\,m^3 = 35\,mm - 19.5\,m^3 - 14\,m^3/s$

1.3) Equation for Runoff Formula

Evaluate Formula

Formula	Example with Units
$Q_V = S_r + I$	$12.05\,m^3 = 0.05\,m^3/s + 12\,m^3/s$

1.4) Net Groundwater Outflow given Runoff Formula

Evaluate Formula

Formula	Example with Units
$I = Q_V - S_r$	$19.45\,m^3/s = 19.5\,m^3 - 0.05\,m^3/s$

1.5) Runoff given Precipitation Formula

Evaluate Formula

Formula	Example with Units
$Q_V = P_{mm} - E_{et} - \Delta Sm$	$15\,m^3 = 35\,mm - 14\,m^3/s - 6\,m^3$

1.6) Surface Runoff using Runoff Formula

Evaluate Formula

Formula	Example with Units
$S_r = Q_V - I$	$7.5\,m^3/s = 19.5\,m^3 - 12\,m^3/s$

2) Yield of Catchment Formulas

2.1) Abstraction in Time given Yield of Catchment Formula

Evaluate Formula

Formula	Example with Units
$A_b = Y - R_o - \Delta Sv$	$116 = 186 - 50\,m^3/s - 20$

2.2) Change in Storage Volumes given Yield of Catchment Formula

Evaluate Formula

Formula

$$\Delta Sv = Y - R_o - A_b$$

Example with Units

$$21 = 186 - 50\,m^3/s - 115$$

2.3) Natural Flow given Yield of Catchment Formula

Evaluate Formula

Formula

$$R_N = Y - V_r$$

Example with Units

$$176\,m^3/s = 186 - 10\,m^3/s$$

2.4) Observed Runoff Volume at Terminal Gauging Station given Yield of Catchment Formula

Evaluate Formula

Formula

$$R_o = Y - A_b - \Delta Sv$$

Example with Units

$$51\,m^3/s = 186 - 115 - 20$$

2.5) Volume of Return Flow given Yield of Catchment Formula

Evaluate Formula

Formula

$$V_r = Y - R_N$$

Example with Units

$$12\,m^3/s = 186 - 174\,m^3/s$$

2.6) Yield of Catchment by Water Balance Equation Formula

Evaluate Formula

Formula

$$Y = R_N + V_r$$

Example with Units

$$184 = 174\,m^3/s + 10\,m^3/s$$

2.7) Yield of Catchment given Observed Runoff Volume at Terminal Gauging Station Formula

Evaluate Formula

Formula

$$Y = R_o + A_b + \Delta Sv$$

Example with Units

$$185 = 50\,m^3/s + 115 + 20$$

Variables used in list of Watershed and Yield Formulas above

- A_b Abstraction in Time
- E_{et} Actual Evapotranspiration *(Cubic Meter per Second)*
- **I** Net Ground Water Flowing Outside Catchment *(Cubic Meter per Second)*
- P_{mm} Precipitation *(Millimeter)*
- Q_V Runoff Volume *(Cubic Meter)*
- R_N Natural Flow Volume *(Cubic Meter per Second)*
- R_o Observed Flow Volume *(Cubic Meter per Second)*
- S_r Surface Runoff *(Cubic Meter per Second)*
- V_r Volume of Return Flow *(Cubic Meter per Second)*
- **Y** Yield of Catchment
- **ΔSm** Change in Soil Moisture Storage *(Cubic Meter)*
- **ΔSv** Change in Storage Volumes

Constants, Functions, Measurements used in list of Watershed and Yield Formulas above

- Measurement: **Length** in Millimeter (mm)
  Length Unit Conversion
- Measurement: **Volume** in Cubic Meter (m^3)
  Volume Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m^3/s)
  Volumetric Flow Rate Unit Conversion

Download other Important Runoff Volume PDFs

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

Try our Unique Visual Calculators

- Winning percentage
- LCM of two numbers
- Mixed fraction

Please SHARE this PDF with someone who needs it!

This PDF can be downloaded in these languages

English Spanish French German Russian Italian Portuguese Polish Dutch

7/9/2024 | 6:17:35 AM UTC