TARGET: DEVELOP CURVE NUMBER GRIDS OVER INDIA

# DATASETS

LULC from ISRO’s NRSC (56 m)

Soil Data from ISRIC’s SoilGrids (250 m)

# METHODOLOGY:

**Step 1: Reclassify LULC classes to the five major classes depending upon the following table obtained from literature.**

|  |  |  |  |
| --- | --- | --- | --- |
| LULC Categories | Class | Recategories | Reclass |
| Build up | 1 | Buildup | **1** |
| Kharif | 2 | Agri | **2** |
| Rabi | 3 | Agri | **2** |
| Zaid | 4 | Agri | **2** |
| Double/triple | 5 | Agri | **2** |
| Current fallow | 6 | Agri | **2** |
| Plantation/orchad | 7 | Agri | **2** |
| Evergreen forest | 8 | Forest | **3** |
| Decidious forest | 9 | Forest | **3** |
| Scrub/deg forest | 10 | Forest | **3** |
| Littoral swamp | 11 | Forest | **3** |
| Grassland | 12 | Forest | **3** |
| Shifting cultivation | 13 | Agri | **2** |
| Wasteland | 14 | WasteLand | **4** |
| Rann | 15 | WasteLand | **4** |
| Water bodies max | 16 | Water | **5** |
| Water bodies min | 17 | Water | **5** |
| Snow Cover | 18 | Snow | **6** |

**Step 2: Reclassify the soil texture classes into Hydrological Soil Groups (HSG) using following table (USDA, 2009):**

|  |  |  |
| --- | --- | --- |
| Texture Class | Runoff Potential | HSG Group |
| Sand | Low | **A** |
| Sandy loam | Moderately Low | **B** |
| Loamy sand | Moderately Low | **B** |
| Loam | Moderately High | **C** |
| Silt loam | Moderately High | **C** |
| Sandy Clay Loam | Moderately High | **C** |

|  |  |  |
| --- | --- | --- |
| Clay Loam | Moderately High | **C** |
| Sandy Clay | High | **D** |
| Silty Clay loam | Moderately High | **C** |
| Clay | High | **D** |
| Silty Clay | High | **D** |
| Silt | Moderately High | **C** |

**Step 3: Assign Curve Numbers (CN) to each pixel corresponding to the lookup table showing below (Ranjan et al., 2018)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **LULC Class** | **LULC Code** | **Hydrological soil group** | | | |
| **A** | **B** | **C** | **D** |
| 1 | Built-up | 1 | 63 | 75 | 88 | 90 |
| 2 | Agricultural | 2 | 50 | 69 | 78 | 85 |
| 3 | Evergreen Broadleaf Forest | 3 | 34 | 60 | 73 | 79 |
| 4 | Shrubland/Wasteland | 4 | 48 | 68 | 75 | 80 |
| 5 | Water Bodies | 5 | 97 | 98 | 99 | 100 |
| 6 | Snow and Ice/Glacier | 6 | 67 | 77 | 82 | 84 |

**Step 4: The CN Grid assigned corresponding to the above table is considered as average CN or class II (CNII). To estimate CNI and CNII i.e., Curve Numbers corresponding to AMCI and AMCIII**

CN is a dimensionless run-off coefficient that depends on land use, soil and antecedent moisture condition (AMC). Antecedent moisture is the relative dryness or wetness of a catchment which changes continuously and has a significant effect on the run-off process28. AMC can be divided into three classes.

AMCI is considered for the dry condition with five-day antecedent rainfall, i.e. AMC is less than 13 mm. When AMC is more than 28 mm, it may be a wet condition (AMCIII) and when 13 mm ≤ AMC < 28 mm, it can be considered as average (AMCII)29. For AMCII CNs have been proposed based on a combination of LULC and soil group conditions. For AMCI and AMCIII, CN can be derived by the following equations (Amutha et al 2009, Mishra et al 2006):

𝐶𝑁𝐼𝐼

𝐶𝑁𝐼 =

2.281 − 0.0128 ∗ 𝐶𝑁𝐼𝐼

𝐶𝑁𝐼𝐼𝐼 =

𝐶𝑁𝐼𝐼

0.427 − 0.00573 ∗ 𝐶𝑁𝐼𝐼