

Supplementary materials

1. Land use and land cover (LULC)

data were retrieved from the Corine Land Cover (CLC) 2018. Here we report the reclassification system:

111 112 121 122 123 124 131 132 133 141 142 1211 = urban areas

322 323 324 3241 332 333 334 331 = open spaces with little or no vegetation

221 222 223 223 224 = tree crops

231 = agricultural lands with herbaceous coverage

241 242 243 = heterogeneous agricultural lands

3211 3212 = pastures and grasslands

2111 2112 212 = agricultural areas

3111 = holm oak prevailing

3112 = deciduous oaks

3113 = mesophilic and meso-thermophilic broadleaves

3114 = chestnut woods

3115 = beech woods

3116 = hygrophilous species

3117 = non-native species

3121 3122 3123 3125 = coniferous woods

3131 3132 = mixed woods (coniferous and deciduous species)

3231 3232 = Mediterranean maquis

411 422 511 512 523 = wetlands and water bodies

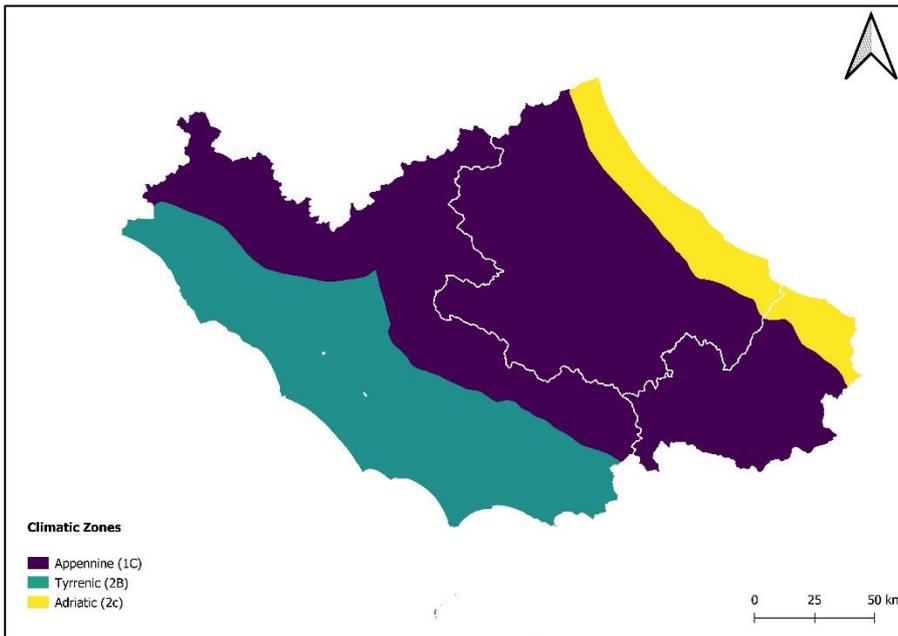
2. Data needed to run the InVest Seasonal Water Yield Model:

LULC data: see above (Land use and land cover (LULC) section 1).

DEM: raster, 20m grid, downloaded from the ISPRA (Istituto Superiore per la Protezione e la Ricerca Ambientale) website at <http://www.sinanet.isprambiente.it/it/sia-ispra/download-mais/dem20/view>.

Monthly precipitation and potential evapotranspiration: raster, 1 km grid, the maps were produced within the BIGBANG (Bilancio Idrico Gis-Based a scala Nazionale su griglia regolare) project, carried on by ISPRA. Data were downloaded at [BIGBANG40 | BIGBANG Data \(isprambiente.it\)](#).

Climatic zones: the climatic zones were obtained from the ecoregional classification of Italy (see [Classificazione dei Comuni secondo le Ecoregioni d'Italia \(istat.it\)](#) for more details). Three climatic zones were identified: 2B (Tyrrenic), 1C (Appennine) and 2C (Adriatic). Climatic zones are shown in the below figure:



Soil Hydrologic Groups: raster, 250m grid, downloaded from [Global Hydrologic Soil Groups \(HYSOGs250m\) for Curve Number-Based Runoff Modeling \(ornl.gov\)](#).

number of rain events for each climatic zone: retrieved from the ARSIAL (Agenzia Regionale per lo Sviluppo e l'Innovazione dell'Agricoltura del Lazio) network (<https://www.arsial.it/>) and AgroAmbiente Regione Abruzzo website ([AgroAmbiente Regione Abruzzo](#)).

Monthly Kc for each LULC class: for forested areas, Kc is computed according to the following equation:

$$\begin{cases} \frac{LAI}{3} & \text{when } LAI \leq 3 \\ 1 & \end{cases}$$

Leaf Area Index (LAI) data were downloaded from the Copernicus Global Land Service website, at <https://land.copernicus.eu/global/index.html>.

For agricultural, crop trees, heterogeneous agricultural lands values were taken from the Abruzzo Region website, at [NOTE TECNICHE GENERALI \(regione.abruzzo.it\)](http://regione.abruzzo.it).

For bare soil, urban areas and wetlands and water bodies we used the default Kc values of 0.5, 1 and 1 respectively.

Curve Number (CN): CNs were taken at: [neh630ch9cov \(usda.gov\)](http://neh630ch9cov.usda.gov).

Alfa, Beta and Gamma parameters are $\alpha = 1/12$; $\beta = 1$; $\gamma = 1$.

3. Data needed to run the InVest Carbon Storage and Sequestration Model:

LULC data: see above (Land use and land cover (LULC) section 1).

Above-ground, soil and dead carbon stock of all forest classes: we used data from the INFC (Inventario Nazionale delle foreste e dei serbatoi forestali di carbonio, National Inventory of forests and forestry carbon pools, <https://www.sian.it/inventarioforestale/jsp/biomasse.jsp?menu=3>). For each forest class, we averaged the values from the three Administrative Regions covering the study area (Lazio, Abruzzo, Molise). Data are reported in biomass; therefore, we converted it into carbon by applying the following equation, which is reported in the INFC itself:

$$\text{Carbon} = 0.5 \times \text{biomass}$$

Below-ground carbon stock for forest classes was computed using the root/shoot ratio.

Ratios were taken from [https://annforsci.biomedcentral.com/articles/10.1007/s13595-015-0486-5#:~:text=As%20for%20the%20root%2Fshoot,\(e.g.%2C%20Caravaca%20et%20al](https://annforsci.biomedcentral.com/articles/10.1007/s13595-015-0486-5#:~:text=As%20for%20the%20root%2Fshoot,(e.g.%2C%20Caravaca%20et%20al) and

https://www.ipccnggip.iges.or.jp/public/gpplulucf/gpplulucf_files/Chp3/Anx_3A_1_Data_Tables.pdf.

For crops and arable land, the above-ground carbon stocks, the below-ground carbon stocks and the dead organic carbon were retrieved from:

Sallustio, L., Quatrini, V., Geneletti, D., Corona, P., & Marchetti, M. (2015). Assessing land take by urban development and its impact on carbon storage: Findings from two case studies in Italy. *Environmental Impact Assessment Review*, 54, 80-90.).

For tree crops, the **Above-ground and below-ground** were retrieved from:

<https://agrireregionieuropa.univpm.it/it/content/article/31/54/nuovi-fattori-di-emissione-la-biomassa-epigea-nei-sistemi-arborei-perenni>

For crops, arable land and tree crops, the soil carbon stocks were retrieved from:

Chiti, T., Gardin, L., Perugini, L., Quarantino, R., Vaccari, F. P., Miglietta, F., & Valentini, R. (2012). Soil organic carbon stock assessment for the different cropland land uses in Italy. *Biology and Fertility of Soils*, 48(1), 9-17.

For **non-native species**, the **Above-ground carbon stock** was retrieved from: https://www.venetoagricoltura.org/upload/Veneto_Agric_cap1.pdf. Due to the lack of data, we used the values from deciduous broadleaves for soil carbon stock and dead organic matter carbon stock.

For **grassland and pastures** and urban areas we used the values reported by Sallustio, L., Quatrini, V., Geneletti, D., Corona, P., & Marchetti, M. (2015). Assessing land take by urban development and its impact on carbon storage: Findings from two case studies in Italy. *Environmental Impact Assessment Review*, 54, 80-90.).

For the **Mediterranean maquis**, we used data reported in Costa, G., & La Mantia, T. (2005). The role of the Mediterranean maquis in carbon sequestration. *Forest@-Rivista di Selvicoltura ed Ecologia Forestale*, 2(4), 378-387.

For **urban areas, wetlands and water bodies** we used the default value of 0.

4. Data needed to run the InVest Urban Flood risk mitigation Model:

LULC data: see above (Land use and land cover (LULC), section 1).

Soil Hydrologic Groups: see above (section 2)

Curve Number: see above (section 2)