**Calculating Evapotranspiration**

The potential evapotranspiration, Ep, was calculated using the Thornthwaite empirical method, which requires only the temperature data of the region of interest. This method uses a monthly time step.

where L is the mean day length (in hours), N is the number of days in the month, Tm is the mean daily air temperature (deg. C), and I is the heat index, which is calculated as shown below. The parameter *a* is calculated based on this heat index.

A set of python functions developed by Mark Richards were used to apply the Thornthwaite method to the present study, requiring only the latitude and mean monthly temperatures for the region of interest [1]. All required temperature data was obtained from The World Bank Climate Change Knowledge Portal [2].

Once the potential evapotranspiration was calculated for each month, the values were multiplied by a crop coefficient (Kc) and the area of agricultural land to yield the total crop evapotranspiration:

The crop coefficient was set to 1.20, corresponding to the maximum mid-season value recommended for both maize and sorghum, two of Burkina Faso’s major crops [3]. The area of crop land (Acrop) was set to 121,430 km2, as recorded in 2020 by The World Bank [4].

**Results**:

|  |  |  |
| --- | --- | --- |
| **Month** | **Potential Evapotranspiration (mm/month)** | **Crop Evapotranspiration**  **(\*1010 m3/month)** |
| January | 101.33 | 1.48 |
| February | 160.31 | 2.34 |
| March | 318.77 | 4.65 |
| April | 394.79 | 5.75 |
| May | 371.18 | 5.41 |
| June | 246.20 | 3.59 |
| July | 180.71 | 2.63 |
| August | 150.07 | 2.19 |
| September | 162.38 | 2.37 |
| October | 212.34 | 3.09 |
| November | 172.63 | 2.52 |
| December | 110.10 | 1.60 |

**Sources**

[1] <https://pyeto.readthedocs.io/en/latest/thornthwaite.html>

[2] https://climateknowledgeportal.worldbank.org/country/burkina-faso/climate-data-historical

[3] https://www.researchgate.net/publication/235704197\_Crop\_evapotranspiration-Guidelines\_for\_computing\_crop\_water\_requirements-FAO\_Irrigation\_and\_drainage\_paper\_56

[4] https://data.worldbank.org/indicator/AG.LND.AGRI.K2?locations=BF