Food and Agriculture Organization of the United Nations

Assessing water demand in Amu Darya River Basin during summer season 2022

Source: Global Administrative Unit Layers from Natural Earth with disputed areas.

Better understanding of cropland water demand provides useful guidance for efficient irrigation practices. Potential evapotranspiration can be defined as a proxy of cropland water demand, i.e., the amount of water that can be transferred to the air from land[1]. Potential evapotranspiration was retrieved from MODIS remote sensing imagery and cropland extent from a land cover dataset based on Sentinel-1 and Sentinel-2 data[2,3]. A bivariate map with a hexagon grid (cells of 90 square kilometers) is shown to analyze the water demand and the cropland distribution in the Amu Darya River Basin. This analysis contributes to the Afghanistan Emergency Food Security Project (OSRO/AFG/213/WBK).

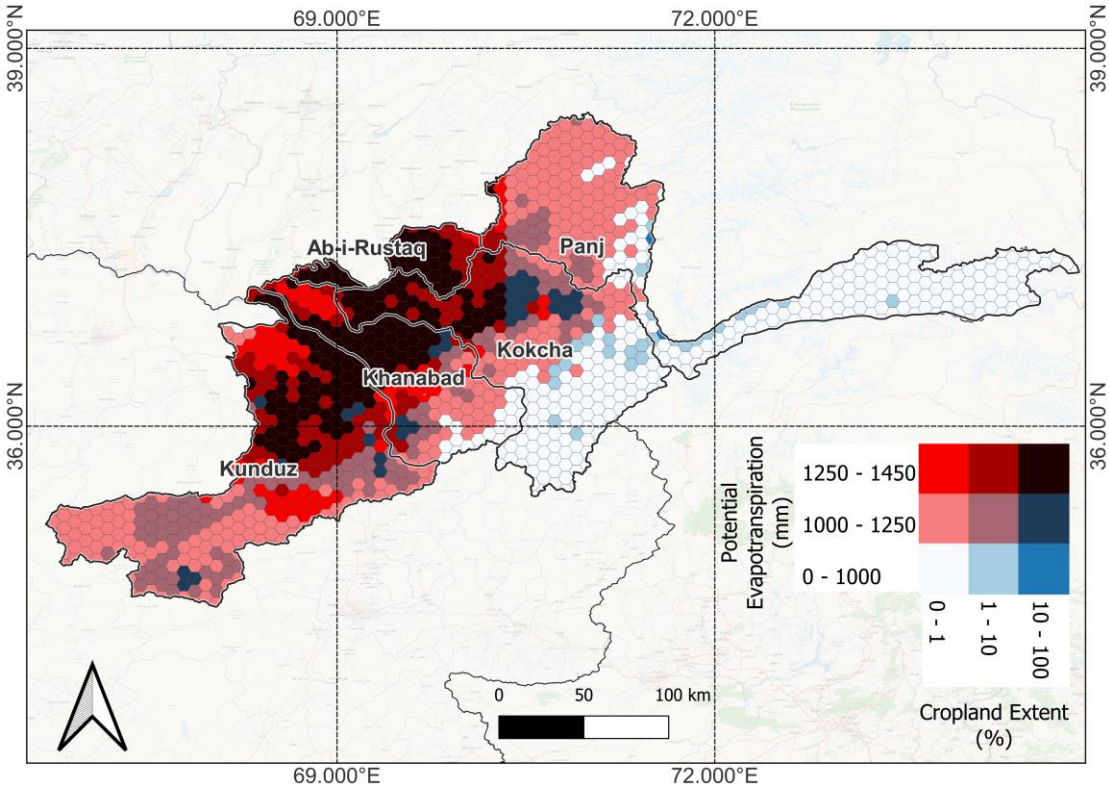

Figure 1: Bivariate map of seasonal cumulative potential evapotranspiration (mm) and cropland land area extent (%) during summer season (05 to 09, 2022) in Amu Darya River Basin.

Results

Cropland area extent was higher in Ab-i-Rustaq, covering 44 percent of the sub-basin area, followed by Khanabad with 16 percent, and Kunduz with 11 percent. The higher cumulative water demand in cropland was found 1 336 mm in Ab-i-Rustaq, followed by Kunduz with 1 223 mm and Khanabad with 1 209 mm. The results highlights the importance to maintain irrigation infrastructure and access to water in high water demanding basins (Ab-i-Rustaq, Kunduz, and Khanabad) as compared to others.

Table 1: Mean values of seasonal cumulative potential evapo-transpiration (mm) and cropland area extent (percentage of the sub-basin area and extent in km²) during summer season (05 to 09, 2022) by sub-basins.

Sub-basin	Potential evapo-transpiration (mm)	Cropland extent (%)	Cropland extent (km²)
Ab-i-Rustaq	1 336	44	1 622
Khanabad	1 209	16	1 933
Kokcha	1 075	8	1 765
Kunduz	1 223	11	3 155
Panj	993	1	158

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[2] Running, S., Mu, Q., Zhao, M. (2017). MOD16A2 MODIS/Terra Net Evapotranspiration 8-Day L4 Global 500m SIN Grid V006. NASA EOSDIS Land Processes DAAC. Accessed 2023-05-26 from https://doi.org/10.5067/MODIS/MOD16A2.006
[3] Zanaga, D., Van De Kerchove, R., Daems, D., De Keersmaecker, W., Brockmann, C., Kirches, G., Wevers, J., Cartus, O., Santoro, M., Fritz, S., Lesiv, M., Herold, M., Tsendbazar, N.E., Xu, P., Ramoino, F., Arino, O., 2022. ESA WorldCover 10 m 2021 v200.