



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 land¹. 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).

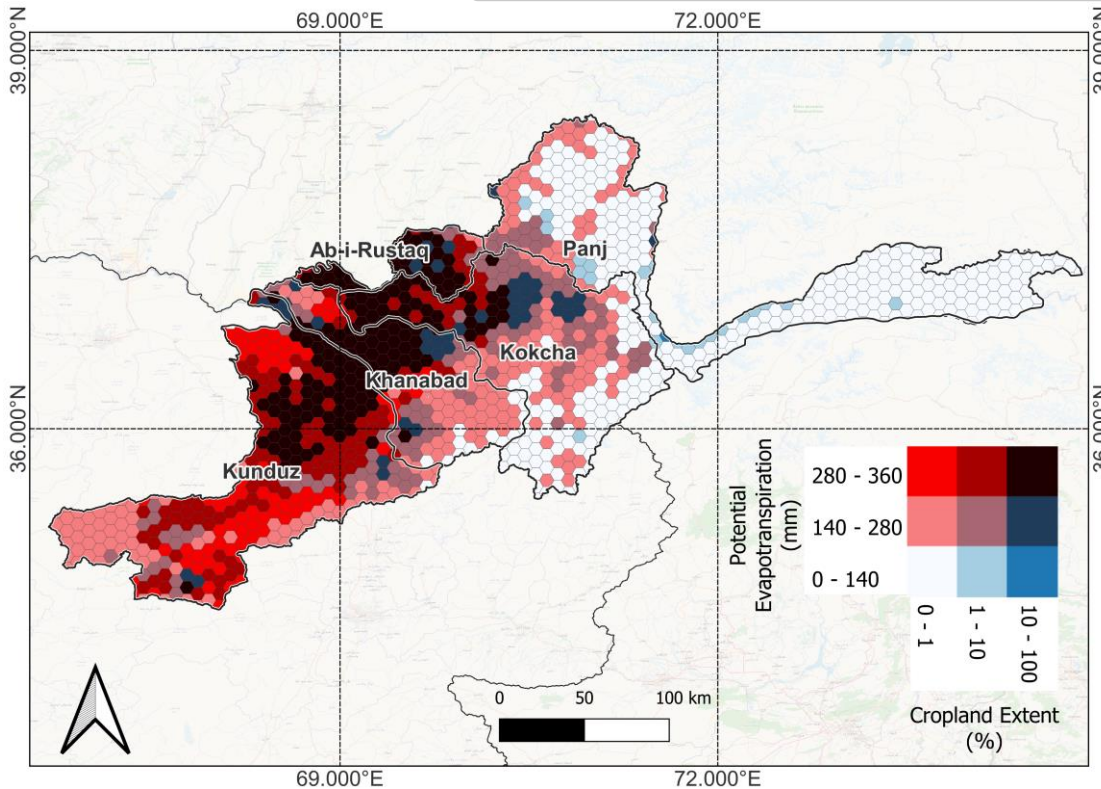


Figure 1: Bivariate map of seasonal cumulative potential evapotranspiration (mm) and cropland land area extent (%) during winter season (10-2021 to 04-2022) in Amu Darya River Basin.

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 293 mm in Ab-i-Rustaq, followed by Kunduz with 283 mm and Khanabad with 243 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 evapotranspiration (mm) and cropland area extent (percentage of the sub-basin area and extent in km²) during winter season (10-2021 to 04-2022) by sub-basins.

Sub-basin	Potential evapotranspiration (mm)	Cropland extent (%)	Cropland extent (km ²)
Ab-i-Rustaq	293	44	1622
Khanabad	242	16	1933
Kokcha	196	8	1765
Kunduz	283	11	3155
Panj	109	1	158

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¹ Xiang, K., Li, Y., Horton, R., & Feng, H. (2020). Similarity and difference of potential evapotranspiration and reference crop evapotranspiration—a review. *Agricultural Water Management*, 232, 106043. <https://doi.org/10.1016/j.agwat.2020.106043>

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.

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Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.