Food and Agriculture Organization of the United Nations

Assessing water demand in Harirud-Murghab River Basin during winter season 2021-22

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 Harirud-Murghab River Basin. This analysis contributes to the Afghanistan Emergency Food Security Project (OSRO/AFG/213/WBK).

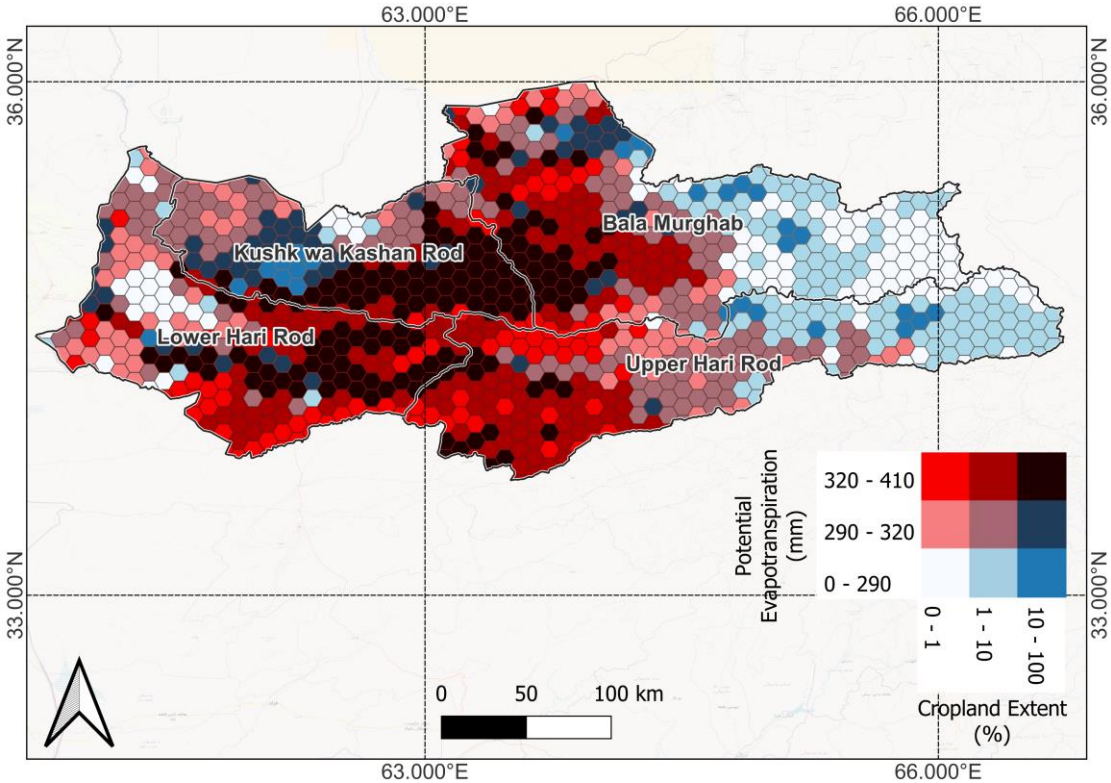

Figure 1: Bivariate map of seasonal cumulative potential evapotranspiration (mm) and cropland land area extent (%) during winter season (10-2021 to 04-2022) in Harirud-Murghab River Basin.

Results

Cropland area extent was higher in Kushk wa Kashan Rod, covering 22 percent of the sub-basin area, followed by Lower Hari Rod with 15 percent. The higher cumulative water demand in cropland was found 327 mm in Lower Hari Rod, followed by Kushk wa Kashan Rod with 318 mm. The results highlight the importance of maintaining irrigation infrastructure and access to water in high water demanding basins (Lower Hari Rod and Kushk wa Kashan Rod) 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 winter season (10-2021 to 04-2022) by sub-basins.

Sub-basin	Potential evapo-transpiration (mm)	Cropland extent (%)	Cropland extent (km²)
Bala Murghab	295	9	2173
Kushk wa Kashan Rod	318	22	2924
Upper Hari Rod	300	5	1070
Lower Hari Rod	327	15	2709

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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

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[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.