



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

Efficient irrigation practices are based on a comprehensive understanding of water loss and water consumption for which the remote-sensed actual evapotranspiration is a proper proxy. By utilizing MODIS remote sensing imagery, actual evapotranspiration data was retrieved, which is a meaningful proxy to estimate water loss from soil. Cropland extent information was collected from ESA WorldCover, a land cover dataset based on Sentinel-1 and Sentinel-2 data ^{1,2}. Through the integration of these datasets, a bivariate map with a hexagon grid (cells of 90 square kilometers) showcasing water loss patterns and cropland distribution. This approach contributes valuably to the Afghanistan Emergency Food Security Project's (OSRO/AFG/213/WBK) objectives, aiding in informed irrigation and water management strategies.

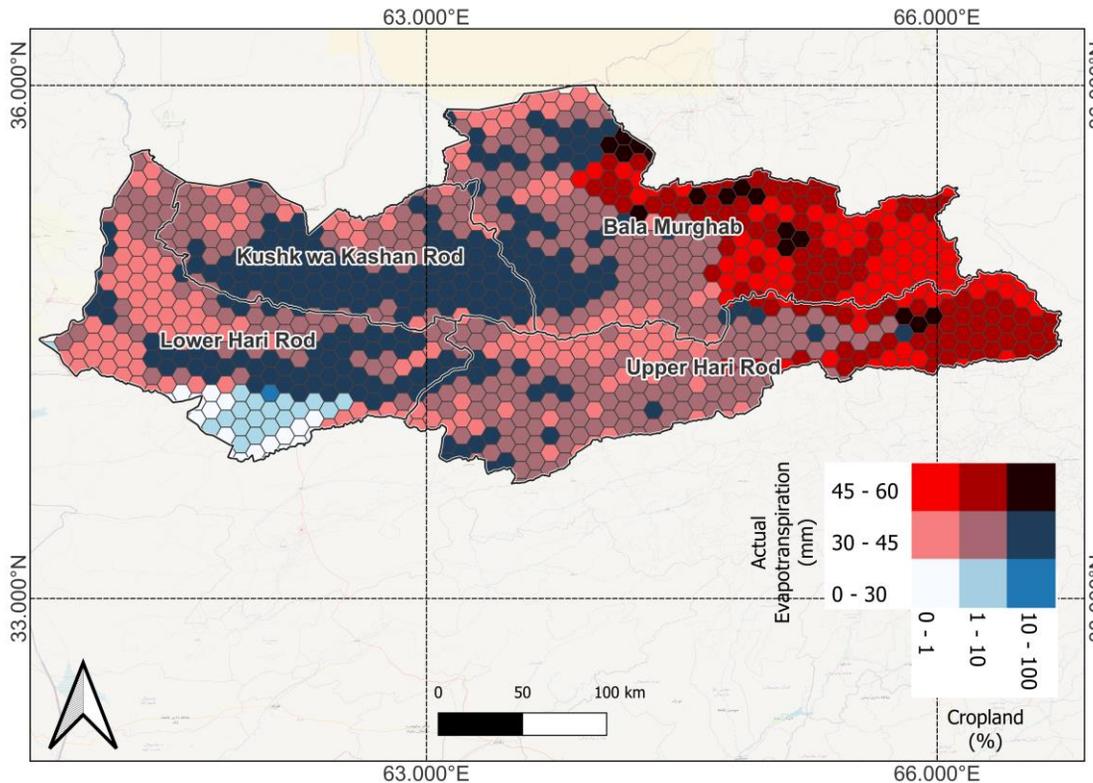


Figure 1: Bivariate map of seasonal cumulative actual evapotranspiration (mm) and cropland land area extent (%) during winter season (10-2021 to 04-2022) in Harirud-Murghab River Basin.

Key Findings

- The analysis shows that the cropland area extent is highest in Kushk wa Kashan, covering 32 percent of the sub-basin area, followed by Lower Harirod with 15 percent.
- The highest cumulative actual evapotranspiration is observed in Bala Murghab with 44 mm, followed by Upper Harirod with 43 mm and Kushk wa Kashan Rod with 39 mm.
- This emphasizes the need to maintain irrigation infrastructure in high-demand basins like Kushk wa Kashan Rod.

Table 1: Mean values of seasonal cumulative actual 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	Actual evapotranspiration (mm)	Cropland extent (%)	Cropland extent (km ²)
Bala Murghab	44	9	2 173
Kushk wa Kashan Rod	39	22	2 924
Upper Hari Rod	43	5	1 070
Lower Hari Rod	35	15	2 709

Prepared by Dario Spiller, Qiyamud Din Ikram, Kaustubh Devale, Sayed Sharif, Hashmatullah Omid, Maziar Karimi, and Matieu Henry for the Afghanistan Emergency Food Security Project. Food and Agriculture Organization of United Nations, Rome, Italy.

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.

Disclaimer: The boundaries and names shown, and the designations used on these map(s) do not express any opinion whatsoever on the part of FAO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers and boundaries. Dashed lines on maps represent approximate border lines for which there may not yet be full agreement. 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.