



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.

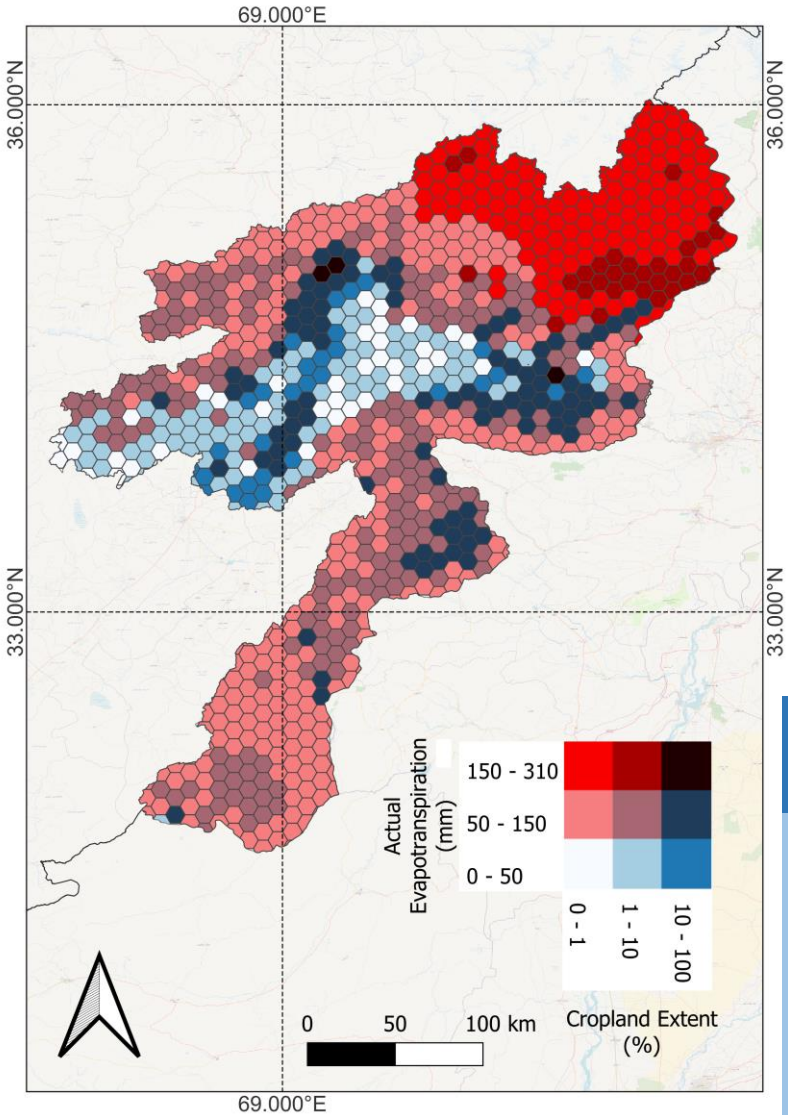


Figure 1: Bivariate map of seasonal cumulative actual evapotranspiration (mm) and cropland land area extent (%) during summer season (05 to 09, 2022) in Kabul River Basin.

Key Findings

- The analysis shows that the cropland area extent is highest in Ghorband aw Panjsher, covering 10 percent of the sub-basin area, followed closely by Kabul and Chak aw Logar Rod, both with 9 percent.
- The highest cumulative actual evapotranspiration is observed in Kunar with 196 mm, with Alingar with 146 mm, and Shamal and Ghorband aw Panjsher with 95 mm and 90 mm.
- This emphasizes the need to maintain irrigation infrastructure in high-demand basins like Ghorband aw Panjsher and Shamal. Further research is required to understand the factors contributing the differences in sub-basins like Kabul and Chak aw Logar Rod, where a substantial cropland extent coexists with a comparatively lower rate of actual evapotranspiration.

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 summer season (05 to 09, 2022) by sub-basins.

Sub-basin	Actual evapotranspiration (mm)	Cropland extent (%)	Cropland extent (km ²)
Gomal	78	1	126
Kunar	196	3	364
Shamal	95	7	720
Kabul	59	9	1 227
Alingar	146	2	151
Chak aw Logar Rod	48	9	908
Ghorband aw Panjsher	90	10	1 318

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¹ 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>

² 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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