Global Water Security Center

Afghanistan: Rising Temperatures Limit Legal Crops That Could Replace Opium

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BOTTOM LINE:

Many analyses of the Taliban's recent opium-poppy ban fail to consider the impacts of climate change. Yet, rising temperatures and insufficient water resources constrain growth of legal alternatives to the high-value, fast-growing, hardy opium poppy, which could exacerbate the wealth disparities and violent conflict spurred by the ban.

BACKGROUND:

Poppy has been an economic lifeline to rural Afghan households since 1990. In 2022, agriculture contributed 25% to Afghanistan's GDP, half from poppies—with 61% of households relying on agricultural income. Long-term ban maintenance will require climate resilient crop substitution and off-farm livelihood opportunities.

Warmer temperatures could diminish yields of high-value substitutes, such as nut and fruit crops, limiting viable alternatives to sufficiently support Afghan farmers and the overall economy.

- Helmand province, the epicenter of poppy production, has warmed an average 2°C since 1990, with an additional mean increase of 0.5°C projected by 2035. **Warmer winters could devastate high-value nut crops** (pistachios, walnuts, almonds) through insufficient chill hours.
- **Rising summer temperatures can damage and reduce yields of spring wheat, Afghanistan's main source of calories and core Taliban crop substitute**. High heat can also cause sunburn and reduced yields in fruit cash crops.

Irrigation falls short at critical times due to lack of available water.

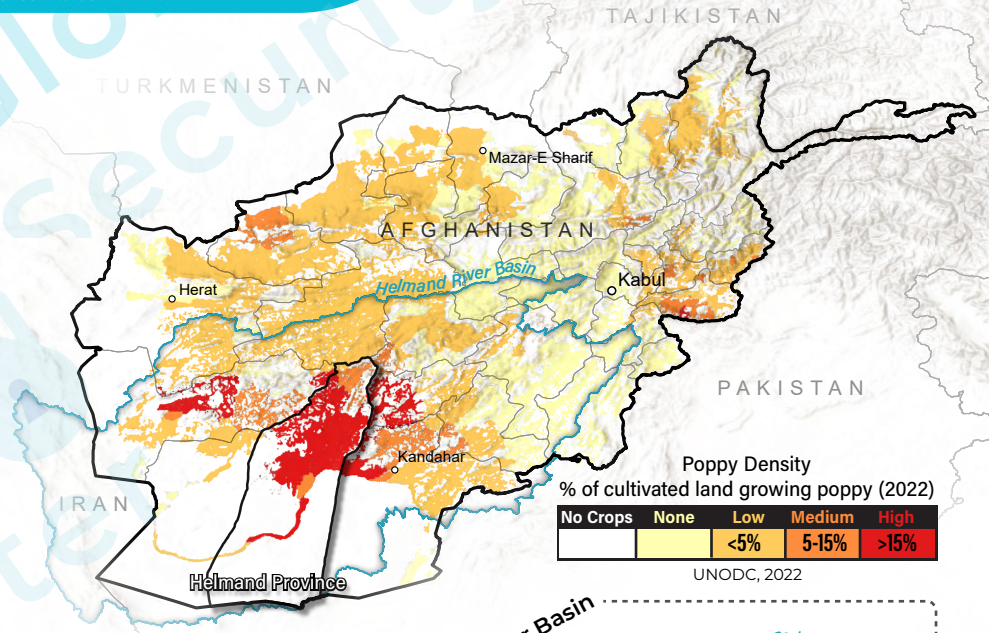
- Rainfall has decreased on average 2.5 mm annually in arid regions of the Helmand, totaling 87 mm decline since 1990. **Irrigated wheat and rice production has periodically suffered lower yields from erratic rains and shortages of irrigation water**.
- Warmer spring temperatures can lead to premature, faster snowmelt, potentially causing spring flooding and reducing already-low irrigation water supply in summer.

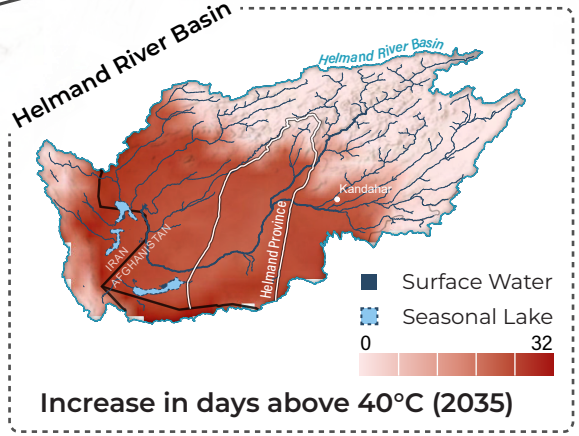
Without a sufficient crop-substitution program or off-farm livelihood opportunities, a prolonged poppy ban could lead to unrest and mass migration. Poor rural households, more than 50% of the population, bear the brunt with worsening food insecurity and degrading living conditions.

- Landowners have benefited from the ban by selling held-back opium stocks at inflated prices, **widening wealth disparities**; this buffer will erode as inventories are depleted.
- **Violence broke out between poppy farmers and the Taliban, which implemented the current ban**, in northeastern Badakhshan province in May 2024, killing two people. Poppy plantings have allegedly already resumed in 29 of 34 provinces, **potentially setting up more conflict between farmers and the Taliban**.
- Increased use of Helmand River water for agriculture could exacerbate transboundary water relations with Iran, a recent source of violent conflict.

Map of Poppy Density in Agricultural Areas

In 2022, 40% of the global opium supply came from Helmand Province. Poppy can withstand extreme heat and little water, making it an economic lifeline for rural Afghan households. Days above 40C are projected to increase by 24 days in arid-hot zones, most of Helmand Basin, reaching nearly 90 extreme heat days annually by 2035.





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Data Analysis Methods:

SCOPE: This product was developed to provide information on Helmand Basin in Afghanistan related to the constraints presented by climate change on the cultivation of legal crops to in lieu of poppy.

DATA SETS:
ERA5 Historical Weather Data [1990-2023] - daily values for precipitation, maximum temperature, minimum temperature, average temperature
NASA Earth Exchange Global Daily Downscaled Projection CMIP6: SSP245, Projections 2025-2045, Historical 1985-2014, 17 models

METRIC CALCULATION: Each metric was calculated for the ERA5 historical range (1990-2010) to get a reference ‘2000’ value. The metrics were also calculated for CMIP6 historical range (‘2000’) and the future time period (‘2035’). The CMIP6 future time period was compared to the CIMP6 historical time period to calculate the projected difference. These differences were then added back to the ERA5 historical values to get future projections. The Difference in Days Above 40C was calculated by taking the difference in the number of days when maximum daily temperature meets or exceeds 40 C. The mean of the annual count of days the CMIP6 future projections (2025 to 2045) is subtracted from the CMIP6 historical (1990 to 2010) mean annual count.

STATISTICAL ANALYSIS: Historic trends (1990-2023) through time were examined for mean annual temperature and total annual precipitation. For these metrics, we used values averaged over the country by Koppen-Geiger Zones. Linear models were applied to these metrics over time with a significance threshold of $p<0.05$.