Global Water Security Center

SONORA & SINALOA MEXICO, 2025: Dry Forecast Could Increase Violence that Drives Displacement from Irrigated Agricultural Land

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BLUF Forecast drought could reduce irrigation water supplies and increase cartel violence leveraged by Chinese mining companies. Violence tends to displace farming communities.

DRIVER | DROUGHT

Fall 2024 drought has damaged spring 2025 crop production in Sonora & Sinaloa, which has increased reliance on expensive imports.

- Sonora grows ~15% of all wheat consumed in Mexico, while Sinaloa grows the corn for 1 in 4 of the country's tortillas **(Map 1)**.
- USDA predicts a drought-driven 10% drop in corn and 22% drop in wheat production from 5-year averages.
- Current long-range forecasts suggest similar drought-related issues may impact the 2025-26 harvest. (See Supplement for 2025 rainfall forecast.)
- Major **irrigation reservoirs like the Miguel Hidalgo are at their lowest levels since 2012** **(Figure 1)**; current forecasts show little chance of a full refill this rainy season.

DRIVER | VIOLENCE

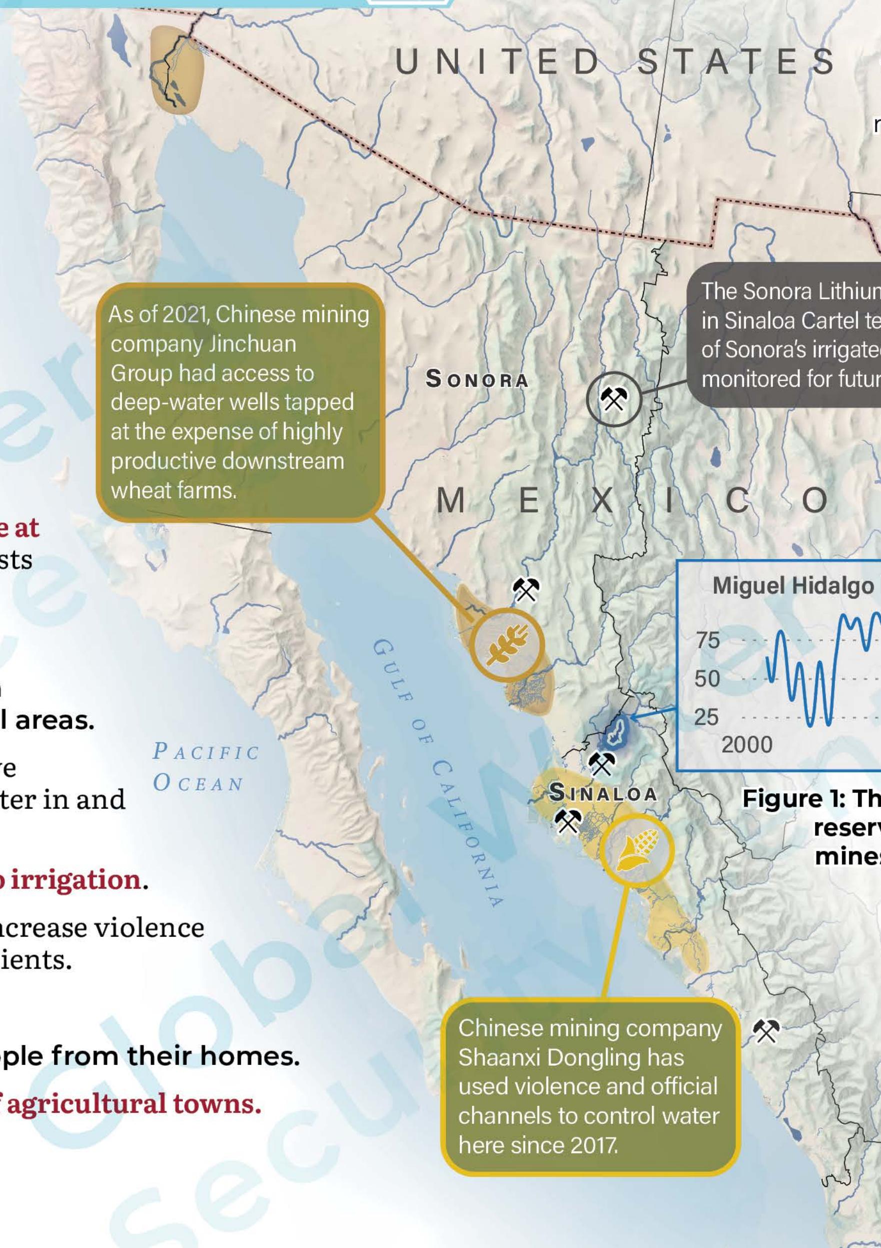
Chinese mining companies are aligning with Mexican cartels to control water near mines within agricultural areas.

- Chinese mining companies are paying cartels that have recently begun using violence to control irrigation water in and upstream of productive farmlands **(Map 1)**.
- A **return to normal rains would not solve this threat to irrigation**.
- Forecast drought may exacerbate tensions as cartels increase violence to secure dwindling water supplies for their mining clients.

IMPACT | DISPLACEMENT

Crop declines and violence may combine to drive people from their homes.

- Violence has been shown to **drive the abandonment of agricultural towns.**



Map 1: Drought and Violence Threaten Irrigated Agriculture in Sonora & Sinaloa
Lack of rain and low reservoirs have impacted crop yields. Cartels are using violence to control irrigation water to ensure supplies for Chinese mining. (See Supplement for 2025 rainfall forecast.)

Figure 1: The Miguel Hidalgo irrigation reservoir is near Chinese-owned mines in Sinaloa Cartel territory.
Low reservoirs may exacerbate violence at the nexus of Chinese mining and cartel activity, but high water levels would not stop the issue. Such violence was occuring before 2021, when levels were high.

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Map data copyrighted OpenStreetMap contributors and available from https://www.openstreetmap.org

Made with Natural Earth. Free vector and raster map data @ naturalearthdata.com.

Data Analysis Methods:

DATASETS: Historical Weather Data from ERA5 [1990-2023] - daily values for precipitation and average temperature.

METRIC CALCULATION: Baseline (sometimes called "normal") and representative future values for each year of interest are calculated using 21-year time intervals around the date of interest. Our historic normal is based on the year 2010 (2000-2020) using ERA5 data.

Precipitation
Mean Annual Precipitation: The sum of the total daily precipitation for each year, averaged over the time period of interest.
Normal Monthly Precipitation: The sum of the total daily precipitation within each month for each year, averaged over the time period of interest.
Precipitation anomaly: The summed monthly difference from the 1991 – 2020 reference period (for NMME data only).

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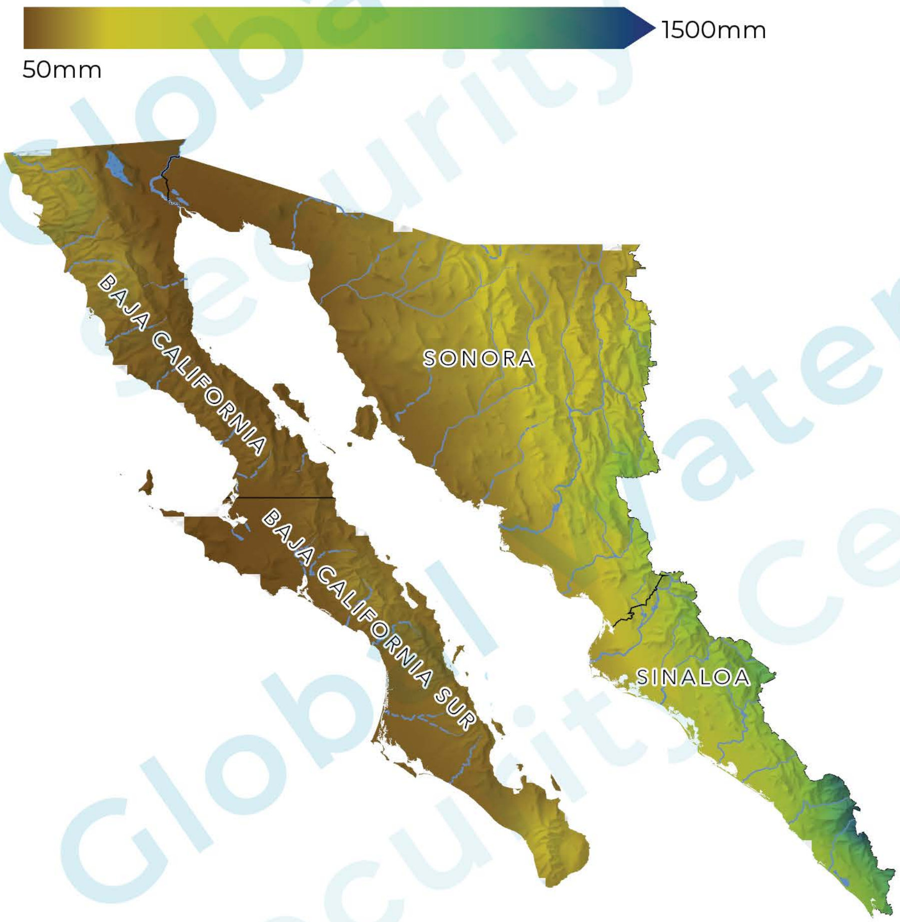
Supplement: Rainfall Forecast in Mexico

Average annual rainfall

Sonora and Sinaloa states are quite dry. Average annual rainfall in Sonora is ~335 mm and in Sinaloa is ~790 mm. Rainy season is in summer, and the wettest months are June through September.

Because these regions are so dry, even small differences in rainfall can make a big impact.



Difference from average rainfall, March—November

The forecast in Sonora suggests an average rainfall deficit of ~28 mm, but higher deficits in the headwaters in northeastern Sonora mean less water in downstream irrigation reservoirs.

The forecast in Sinaloa suggests an average rainfall surplus of ~7 mm, but deficits fall over the corn growing regions in the northwest which will increase the dependence on irrigation water.