AGORA

Drought Impact & Resilience In Agro - Pastoral Communities

Executive Summary

In terms of climate, Afghanistan ranks as the 5th most at-risk country globally, with natural hazards exacerbated by low household resilience. Recurring droughts heighten vulnerabilities in rural areas, where livelihoods heavily depend on agriculture and livestock. In Dasht-e-Laili Manteqa, food security is classified as being in Integrated Food security Phase 3 classification (IPC Acute Food Insecurity Analysis, assessed 18 December 2024), indicating acute challenges in meeting basic needs.

Under ACTED's THRIVE program, this research examines occurrence and impact of drought in five manteqas across Balkh, Faryab, Samangan, and Jawzjan provinces. The study highlights how these regions, which are heavily reliant on agriculture and natural resources, face severe consequences from drought, including depleted water sources, degraded vegetation, and reduced crops and livestock productivity. Examples include drying springs, degraded pastures, and declining horticultural yields. Socio-economic effects include diminished financial assets, exacerbated by limited access to financial services (e.g. loans), increased illness, especially among women, child labour, and strained community cohesion due to conflicts over shrinking resource pools.

Qualitative data from a Focus Group Discussion (FGDs) with farmers and livestock owners and Key Informant Interviews (KII) paired with satellite-data analysis of temperature and precipitation trends, reveal external vulnerabilities. These include a 1°C increase in summer temperatures since 1981, declining rainfall, and heightened drought susceptibility of rainfed lands and pastures.

The 2023 drought, driven by below-average precipitation, underscores the persistent risks to agro-pastoral livelihoods. While communities employ various coping strategies, these are not always sustainable. Coping practices such as food reduction, occupational changes, child labour, and migration, reflect the limitations of these resilience frameworks. This assessment identifies priority areas for adaptive agricultural practices and sustainable natural resource management to combat the ongoing impacts of drought in the studied manteqas.

Location of Dasht-e-Laili Manteqa (Faryab Province)

July 2024

Key Findings

Water Resources: Dasht-e-Laili has limited water resources, with most of the Manteqa relying on solar-powered boreholes. In dry years, borehole overuse results in decreasing groundwater storage levels and leads to insufficient water even to meet essential household needs. Communities attempt to organise around shared needs to advocate for increased irrigation water.

Pasture Health: Drought has severe effects on the Manteqa's natural vegetation cover. The resulting lack of fodder leads to a decrease in livestock health and numbers, and forces some community members to abandon livestock herding as a source of income.

Agricultural Productivity: Despite communities reportedly shifting towards more drought-resistant crops such as wheat and barley, communities lack access to improved seeds that could enhance agricultural productivity and reduce the risk of crop failure.

Impact on Education and Child Welfare: With most livelihoods in the Manteqa depending on agro-pastoralism, the communities noted resorting to child labour and withdrawing their children from schools and universities.

Access to Financial Services: The financial strain caused by drought results in suspended debt repayments, in turn leading to reduced trust and access to financial services such as loans or store credit.

About Dasht-e-Laili

Dasht-e-Laili, located within the Faryab province, is cherished by local communities for its wide pastures. According to a 2023 IMPACT assessment the Manteqa is home to approximately 3810 households, predominantly consisting of host populations, though Key Informants mentioned the presence of displaced populations. Additionally, Dasht-e-Laili's economy relies on informal daily labour, agriculture and livestock, with 69% of KIs reporting mechanized agricultural techniques, and 60% reporting crop rotation in their villages. Land ownership is mostly communal, with most of the Lalmi (rainfed) lands and pastures being owned and managed at the village level, although some are privately managed. Notably, respondents also reported occasional disagreements around pasture use.

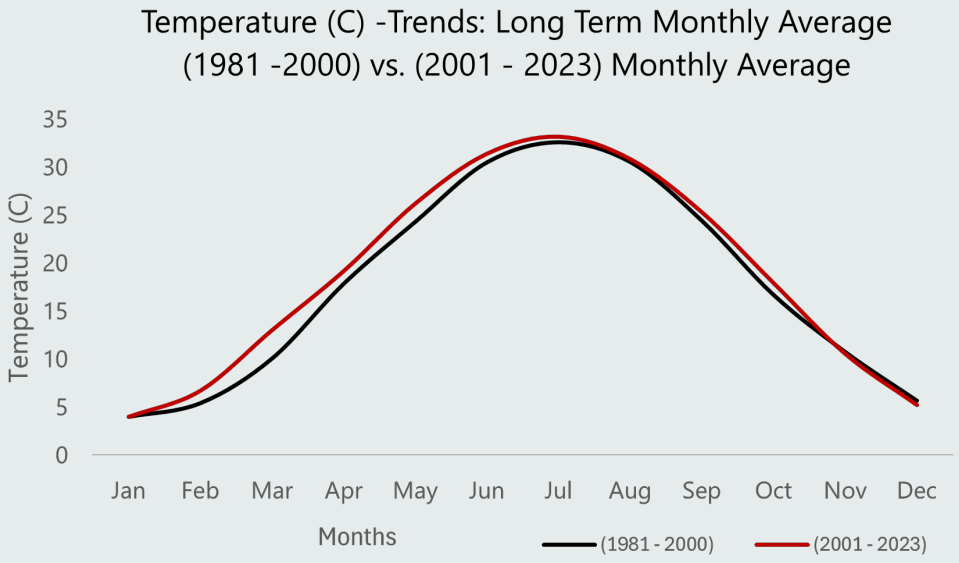
Population	24 632	**Irrigated land**	13 %
Villages	19	**Rainfed Land**	20%
IDPs	In 50% of villages	**Pasture**	51%
Food Insecurity	Phase 3 IPC AFI	**Horticulture**	0%
Irrigation Source	Water pumps, water trucking	**Minimum Expenditure Basket (Faryab 2023)**	U$239
		MEB (Faryab 2024)	U$262

According to FGD participants, the Manteqa's reliance on rainfed agriculture leaves it acutely vulnerable to environmental shocks, particularly drought, with iwater scarcity identified as a critical challenge. Climate change has exacerbated these issues, contributing to rising temperatures and erratic precipitation patterns over the past four decades—a trend projected to persist until 2040. Agro-pastoral communities in Dasht-e-Laili, whose livelihoods are heavily dependent on agriculture and livestock, face heightened vulnerability within this context due to their reliance on weather-sensitive income sources. Drought-induced poverty, for example, is pervasive within agro-pastoral communities. Consequently, families often resort to drastic coping strategies, including sending their children abroad for work or selling their livestock or household items.

Overall, the findings of this assessment suggest that the community's resilience framework lacks recourse to sustainable adaptive practices, such as constructing check dams or water reservoirs, that could mitigate the impacts of drought and decrease its vulnerability to future shocks.

Temperature

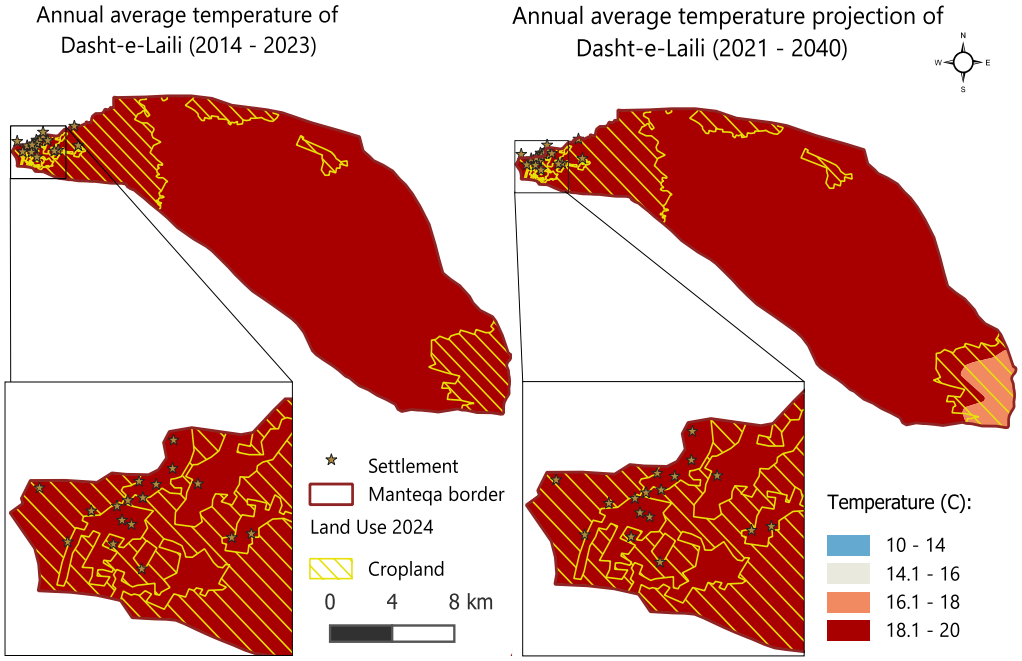
Dasht-e-Laili has experienced a slow warming trend over the past four decades. The annual average temperature increased from 18°C in 1981-2000 to 19°C from 2001-2023, underscoring the region's warming trajectory. Seasonal data for 2001-2023 show deviations from historical norms, affecting agricultural cycles.



In 2001-2023, temperatures showed deviations from the historical average (1981-2000) particularly during winter, early summer, and autumn.

- Winter (Jan-Mar): Temperatures averaged 2°C above the historical mean (6°C), disrupting winter crop cycles and reducing the chilling period required for certain crops. This warming trend also limits snowpack accumulation, essential for spring water supply and early-season irrigation.
- Summer (Jun-Aug): Temperatures were 1°C higher than the historical average of 31°C, particularly in June and July, increasing water demand for crops and livestock, potentially lowering yields where water resources are limited.
- Autumn (Sep-Nov): Autumn temperatures were 1°C above the historical average (17°C), especially in September and October, delaying cooler temperatures needed for winter crop planting and reducing soil moisture retention.

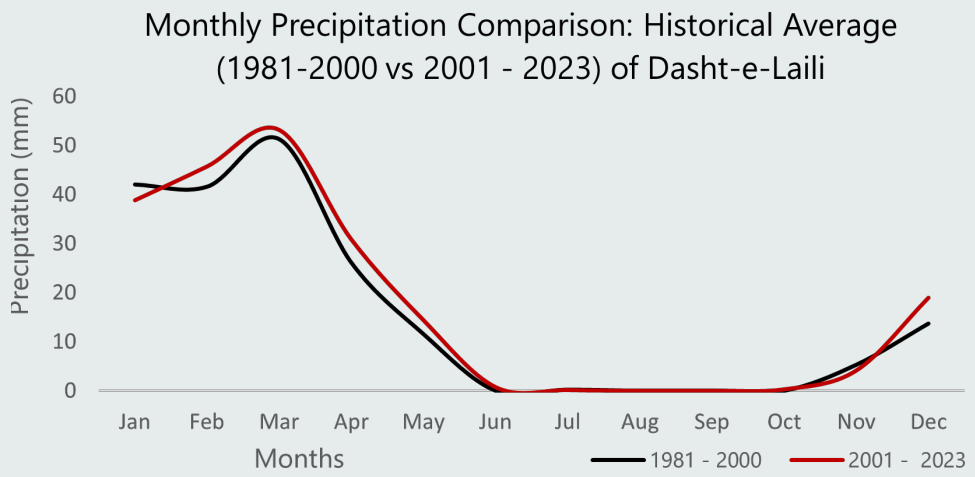
Predictive Forecast



Projections for 2023-2040 (ERA5 & WorldClim, assessed 2024) indicate that average temperatures across the entire Manteqa will remain consistently around the highest annual averages recorded in Dasht-e-Laili (18-20°C). With residents already relying on water trucking and pumps for cropland, improved water storage infrastructure, irrigation and natural resource management mechanisms will become essential to sustain agricultural livelihoods.

Precipitation

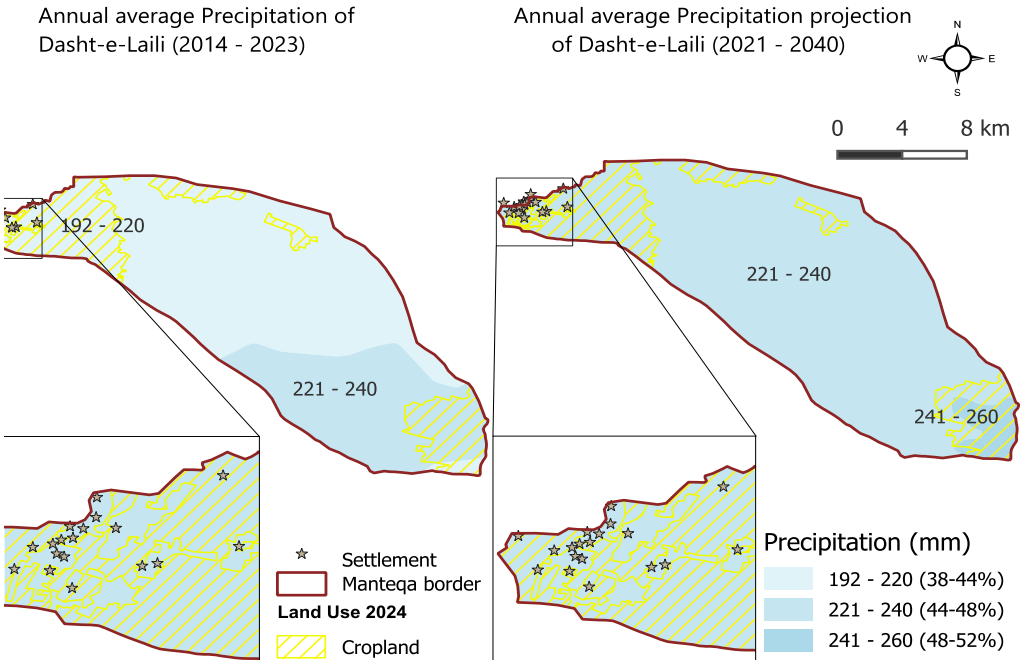
Dasht-e-Laili's average annual precipitation was 217 mm from 1981 to 2000, with significant fluctuations rather than a clear trend. Since then, precipitation has increased to 233 mm from 2001 to 2023. In contrast, 2023, a drought year, saw a historic low of only 118 mm.



The 2001-2023 pattern reveals a shift in both the timing and volume of rainfall, affecting planting cycles. It also contributes to increased soil moisture retention at peak levels, helping to mitigate the risk of drought during periods of high rainfall.

- Winter (Jan-Mar): From 2001 to 2023, precipitation from January to March averaged 46 mm, closely matching the historical average of 45 mm. March experienced a more pronounced peak that supports spring vegetation.
- Summer (Jun-Sep): Almost no rainfall was recorded in both periods mentioned above. This absence of summer rain leads to water stress on crops, as June to August are the hottest months when water demand is highest.
- Autumn (Nov-Dec): A slight increase in average monthly precipitation from 2001-2023 (24mm, versus 22mm historically) from October to December increases moisture replenishment needed for winter planting and may increase benefits for early-season growth.

Predictive Forecast

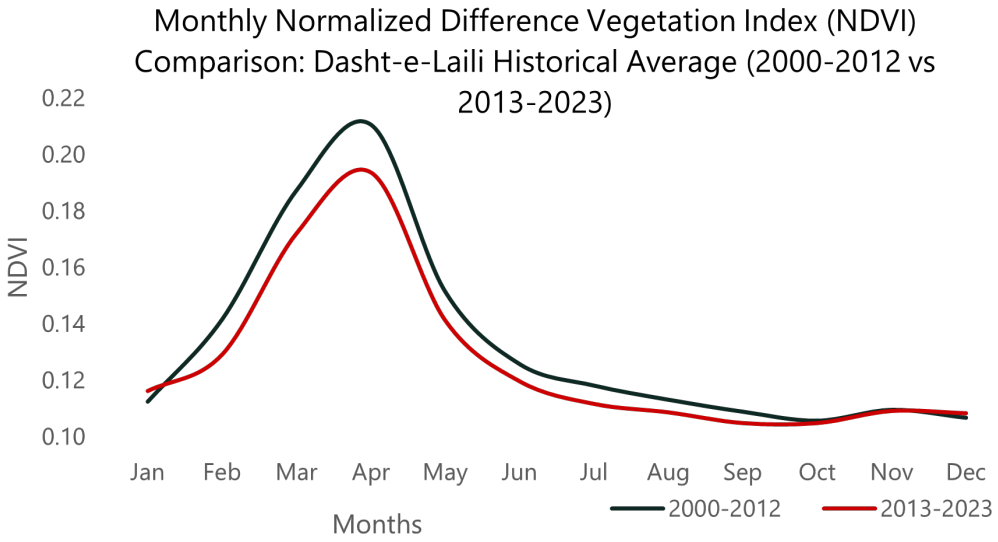


Projections (CHIRPS & World clim, assessed, 12 Nov 2024) indicate a small but continued increase in average annual precipitation across most of the Manteqa. In the north of Dasht-e-Laili, levels could remain around 221-240 mm, with a slight increase especially in the north of Dasht-e-Laili over its historical average from 2014-2023 (192-220mm). While this relative increase may contribute to rangeland health and sustain some rainfed agriculture, effective management of the Manteqa's natural resources will be essential to ensure sustainable levels of demand pressure.

Understanding Drought Occurrence Trends and Conditions in Dasht-e-Laili

Farmers and livestock owners identified environmental changes such as reduced rainfall late in the year (October-December), as well as warmer weather as key indicators of drought. FGD participants also emphasized a decrease in available water, reduced forage and a loss of yields in drought years.

Drought Season and Growing Season according to Climatic parameters



Community vs. Remote Sensing on Drought Years:

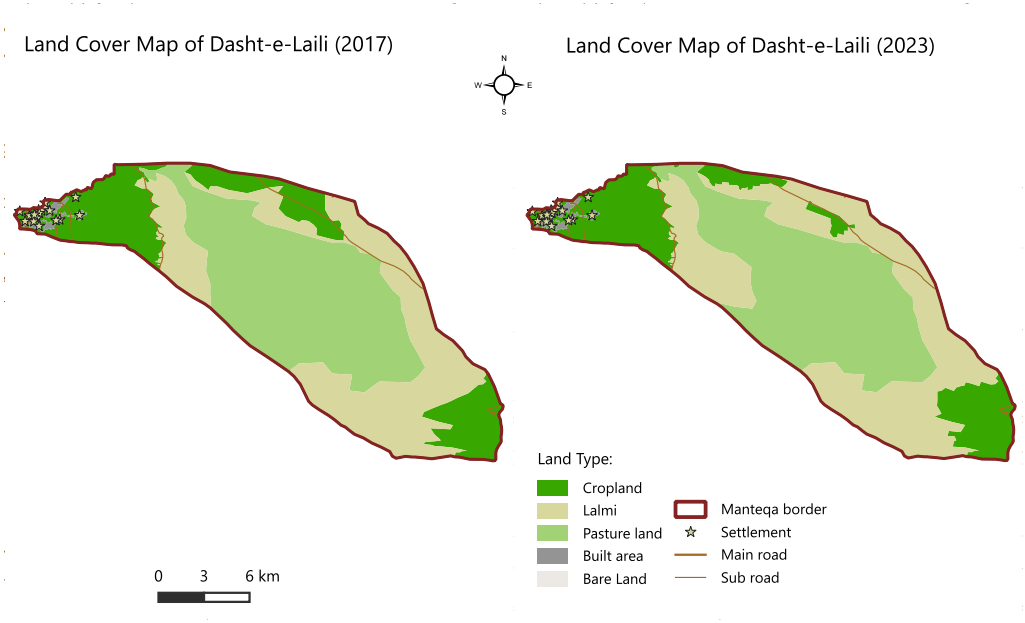
Local indicators such as a decrease in rainfall and suppression of vegetation largely align with remote sensing (RS) data:

- **2020-2022**: Farmers and livestock owners, relying on vegetation, crop yields, and precipitation (especially from October to December), perceived these years as drought-affected, which is supported by NDVI data (Average of 0.12) showing weak to moderate vegetation health. Precipitation for these year was also below normal, at 184 mm.
- **2023**: Both FGD participants and RS data identify 2023 as a severe drought year. The annual NDVI value of 0.1, indicating barren land, corresponds with the lowest recorded precipitation in 4 decades (118 mm).

Drought and crop growing seasons in Dasht-e-Laili were identified using climatic parameters including the Land Surface Temperature, NDVI, and Standardized Precipitation Index. The growing season generally lasts from March to August, with drought conditions most common in the hot summer months (June to August). This overlap shows that drought directly impacts crop growth.

From March to May, the optimum green months, the average NDVI value for 2013–2023 was 0.17, slightly lower than the 2000–2012 average of 0.18. Values in this range suggests minimal vegetation cover, potentially indicating drier conditions, land degradation, or an increase in non-vegetative surfaces such as bare soil. Average summer precipitation is almost absent with high temperatures and low soil moisture leading to both pressure on rangelands and heat stress on crops, reducing yields and increasing crop failure risks. Seasonal drought patterns, particularly in summer, overlap with the crop-growing and harvesting periods, affecting crop resilience. Monitoring NDVI fluctuations is crucial to understanding drought impacts, though seasonal cycles, such as harvesting times, should be cross-checked to distinguish between drought effects and natural vegetation changes.

Mapping Drought Effects on Natural Resources in Dasht-e-Laili

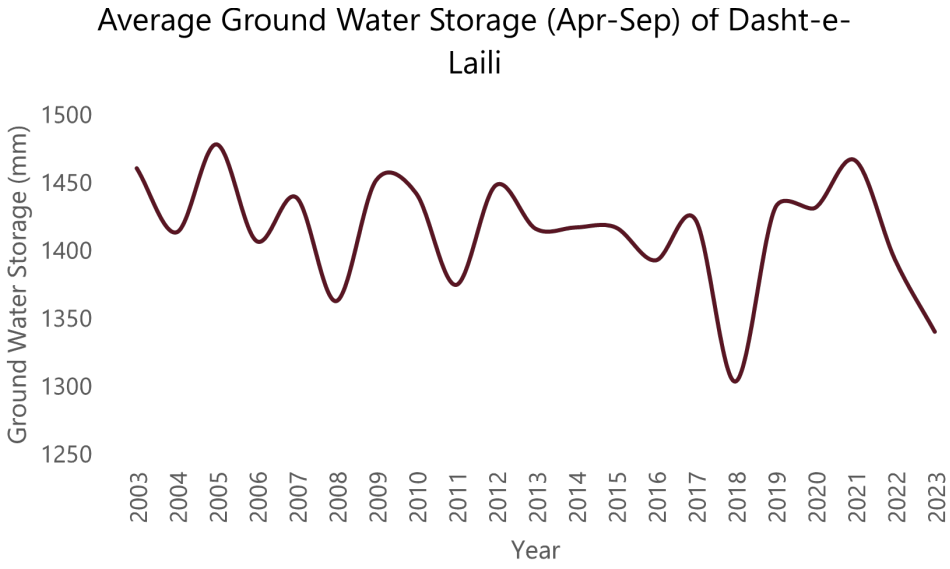


Drought Impact on Land and Vegetation

A comparison of 2017 and 2023 landcover maps reveals a reduction in cropland in the North and Southeast of the Manteqa. With irrigation agriculture almost exclusively relying on borewells and 2023 being a particularly dry year (118mm), this reduction is likely to be a direct result of depleting groundwater storage levels that prohibit irrigating crops. As per a 2023 profiling of the Manteqa, Key Informants describe a lack of irrigation water as a primary barrier to agricultural productivity (IMPACT Manteqa Profiling, 2023). Landcover imagery for both years also show a slight reduction of pastures in favour of rainfed agricultural land in the center of the Manteqa.

Average Groundwater Storage:

Groundwater storage (GLDAS, assessed Dec. 2024) from (2003-2023) in months of April to September shows fluctuating levels rather than a steady trend. Groundwater storage peaked in 2005 following favorable rainfall, but severe droughts, particularly in 2008-2011, 2018, and 2023, have caused a concerning decline. Despite occasional recoveries, there is a long-term downward trend in groundwater levels, highlighting the need for effective water management in drought-prone periods.

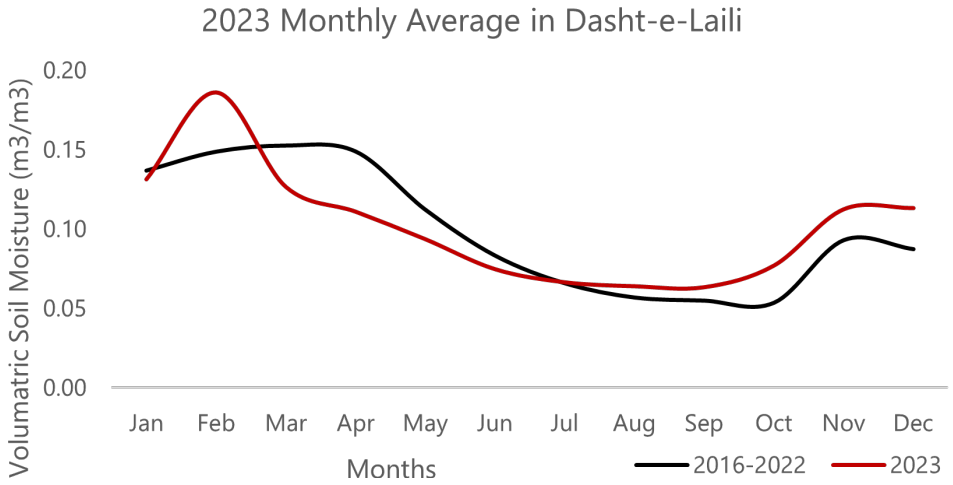


Water Sources and Availability:

According to a 2023 Manteqa Profiling by IMPACT, Dasht-e-Laili primarily relies on deep solar-powered wells for irrigation. These wells supply irrigation for agriculture but do not allow for horticulture, with water resource management handled by village elders and Mirab. According to FGDs participants, water in Dasht-e-Laili is particularly vulnerable to drought conditions, as its reliance on borewells means that drought years have had cascading effects. They reported a reduction in the availability of drinking water, irrigation capacity, and a negative impact on local ecosystems, emphasizing the need for sustainable water management strategies to ensure water safety and agricultural livelihoods.

Soil Moisture:

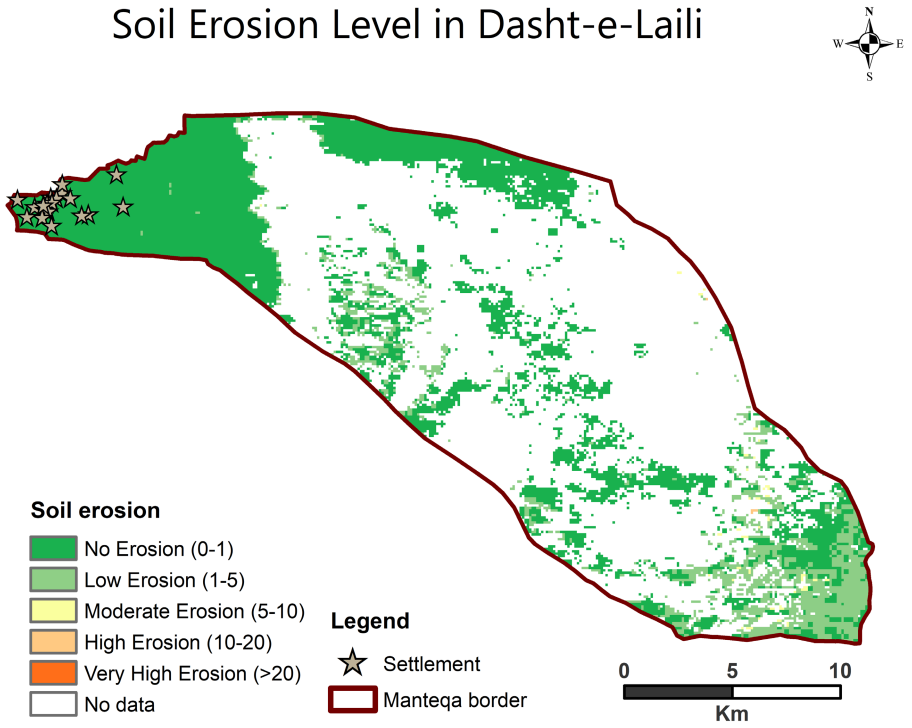
Soil moisture trends are critical for understanding climate impacts. Declines in moisture can lead to more frequent droughts, while increases may cause waterlogging and erosion. In 2023, soil moisture peaked in early February 2023 and subsided earlier and more severely than the February and March peaks in earlier years (2016-2022). Shifting soil moisture trends affect crops needing moisture closer to planting. Tracking these changes helps identify fields, pastures, and horticultural areas most prone to soil dryness and informs adaptive strategies.



Soil Erosion:

Much of Dasht-e-Laili's croplands and pastures are not affected by erosion (GloSEM 1.3). Low erosion levels can be observed in the Manteqa's south, which may have an impact on agricultural activities in these areas. In contrast to RS data, KIs from the Manteqa described its landscape as badly eroded, with 73% reporting a risk of erosion.

Factors such as intensive farming and overgrazing contribute to soil vulnerability. To prevent further degradation, sustainable land management practices are crucial, particularly in areas prone to heavy rainfall and runoff.



Mapping Drought Effect on Natural Resources in Dasht-e-Laili

Impact on Agro-pastoralism

Production/Crop Health:

Drought significantly reduces crop growth, particularly on infertile rainfed lands, leading to sparse vegetation, poor yields, and lower income for farmers. Weak crop growth and the spread of plant diseases impact market prices and agricultural sales. To adapt, farmers are shifting to more drought-resistant crops like wheat and barley, though access to improved seeds remains limited.

Pastoralism:

According to FGDs participants, drought has severely impacted pastures, leading to sparse grass and vegetation, which affects livestock health. Animals face poor nutrition and heightened disease risks, reducing their market value and leading to livestock losses. The decline in livestock quality and numbers in drought periods weakens income and food security for agro-pastoral households that depend on pastures for fodder, and has resulted in some herders to abandon livestock farming as a source of income.

Agriculture

The absence of springs or wider irrigation networks means that cultivation in Dasht-e-Laili is restricted to select areas, with insufficient water for widespread horticulture. At the same time, the reliance on borewells across the entire Manteqa heightens the risk of water storage depletion during drought periods, posing challenges to sustaining agriculture and water security, including for drinking water.

Water availability heavily influences agricultural practices, with crops like wheat, barley, and maize, being prevalent. FGD participants and KIs noted the negative impact of extreme heat and storms on crops including wheat and asafoetida during drought years.

Cropping Calendar (Faryab Province)

Fruit Crops: Apples, peaches, apricots and cherries grow from February to March and are harvested by June, making them moderately drought resistant. Pistachios and grapes harvested in July, face greater drought risk. Almonds and melons, with a March to September growing and harvest season, are highly vulnerable to late summer drought.

Vegetable Crops: Winter vegetables (October to February) are less affected by drought. Summer crops like onions (January to July) and tomatoes (March to August) are highly drought-sensitive due to their summer harvest. Late summer vegetables (August / September to November/ December) face moderate drought risk, avoiding peak heat.

Cereals and Cash Crops: Wheat and barley (September to July/ August) grown on rainfed land are vulnerable to late-season drought and summer heat during harvesting. Wheat on irrigated land (January to July) is comparatively less exposed to drought, much like corn, millet, and mungbean (June to August) due their short season.

Basic Needs and Community-Level Impact

Financial constraints hinder the ability of Dasht-e-Laili's communities to respond to drought periods, such as buying fodder or water to sustain livestock. Drought-related crop failures and livestock health issues further decrease household income, impacting food security and social well-being. Drought has led to a significant reduction in the sale of agricultural and livestock products, causing financial strain and eroding trust with shopkeepers due to unpaid debts.

Human well-being and social sphere:

FGD and KI participants noted that the economic stability of agro-pastoral communities in Dasht-e-Laili is heavily reliant on agriculture and livestock, both of which have been weakened by drought. The drop in food production reduced access to nutritious food, affecting health. Limited income also restricts access to healthcare and education, with children dropping out of school to support their families.

Drought has increased tensions and conflicts over limited resources, particularly water, straining community relations and public trust. Social activities and banquets have been impacted, reflecting broader strains on collective well-being.

Factors that may exacerbate vulnerability to drought

- Increased pressure on finances means that debt repayments are impacted by drought, which in turn reduces the trust necessary to give loans to other community members.
- The reprioritization of household expenses during droughts increases barriers to education and healthcare services, and reportedly even results in child labour.
- Limited income during drought periods results in community members not being able to meet basic needs, including food.
- When one resource—such as water, pasture, or soil—is stressed, it creates a domino effect that destabilizes the entire system. For instance, the decline in water levels not only reduced agricultural output but also degraded soils and diminished livestock viability.

Vulnerabilities

Factors That Contribute to Vulnerability/Sensitivity to Drought

- Communities lack methods and resources to store rainwater, putting pressure on the management of the limited existing water resources in dry years.
- Water levels in boreholes have dropped significantly, and some villages have seen water sources dry up completely.
- Despite changes in crop selection, relatively more resistant staple crops like wheat, barley, and maize are reportedly particularly affected by drought, leading to reduced agricultural productivity.
- Some community members reportedly rely on vegetation cover for fuel, putting pressure on the Manteqa's natural resources.

Understanding Coping Mechanisms and Adaptive Strategies in Dasht-e-Laili

Coping mechanisms are strategies available to communities to offset the adverse impacts of a shock, such as selling livestock, decreasing expenses, and taking livestock to other areas for water and fodder. Households prioritize positive coping mechanisms but resort to negative ones when these are exhausted.

Adaptation involves long-term planning, oriented towards sustainable livelihood security, and leads to using resources efficiently and sustainably. In Dasht-e-Laili, FGD participants noted that options to respond to drought are severely limited by a household's financial capacity and their ability to provide labour for additional income. In practice, this means that drought disproportionately affects widows, IDPs, landless households, and women-headed households who are not able to migrate or pursue alternative livelihoods.

Coping Mechanisms and Adaptive Practices Reported by FGD Participants

	Coping Mechanisms	Adaptive Practices
	• **Water storage and conservation efforts:** During drought periods, community members report attempts to conserve water through more efficient use of available resources. Depleting ground water levels through borewell overuse indicate that these efforts may benefit from initiatives to strengthen systematic water management mechanisms at the communal level.	• **Community-led advocacy:** Communities have reportedly organized around the shared need for an increase in irrigation water for better representation vis a vis relevant stakeholders.
	• **Loans:** To meet urgent expenses and cope with rising prices during droughts, community members report taking out loans. At the same time, limited income during drought periods impacts trust, and with it access to financial services.	• **Drought-adapted agricultural practices:** Mulching to preserve soil moisture and changes in crop selection in favor of more drought resistant crops such as wheat, barley and maize versus cotton or mung bean have helped mitigate some of the impacts of drought, but extreme weather events remain a challenge for crop yields.
	• **Sale of assets:** Droughts have a direct financial impact and often lead to the sale of assets such as livestock to buy food, fodder, water (including for livestock) and other essential resources.	• **Migration:** The importance of agriculture and pastoralism for livelihoods in Dasht-e-Laili means that community members resort to migration to other locations in Afghanistan or to other countries due to drought.
	• **Diet change:** Drought periods are often accompanied by changes in diets to less varied and nutritious foods, and reductions in the frequency of meals both due to financial constraints and conscious efforts to reduce expenses in times of increased market prices.	• **Unequal livelihood options:** The financial strain that drought periods cause is especially severe for population groups that have reduced options to pursue alternative livelihoods or rely on community support, such as women, IDPs, and people with disabilities.
	• **Access to education and child labor:** To reduce expenses and increase available income, community members reportedly withdraw their children from schools, or even resort to child labor.	

Methodology Overview

The overarching objective of this exploratory assessment was to enhance understanding of, and inform, the development of sustainable and adaptive agricultural practices and natural resource management strategies to combat drought impact across five manteqas in Northwest Afghanistan.

The goal is to provide a foundational understanding of community-level resilience and vulnerability, within the context of how drought affects the local environment and livelihoods of affected populations in the selected manteqas. As such, the assessment focused on:

i. Understanding how affected communities defined 'drought' and 'drought periods' by creating a comprehensive list of community-based 'drought indicators.

ii. Evaluating community perception of the impact of drought on critical agricultural and natural resources — namely pastures, forests, fields, horticulture, and water sources — and socio-economic dynamics (such as livelihoods and family structures) to estimate the exposure of agro-pastoral communities to these adverse effects; and,

iii. Mapping the existing community-based drought resilience infrastructures and how they interact with international, national and sub-national drought resilience frameworks.

This assessment combines primary data collected through Focus Group Discussions and expert interviews with secondary geospatial data from satellite imagery and previously collected information in the relevant manteqa or district. This research was conducted in 5 manteqas where ACTED promotes sustainable agro-pastoral livelihoods.

The remote sensing analysis leveraged publicly available databases, primarily Google Earth Engine (GEE), to collect information on various climatic parameters such as temperature, precipitation, and NDVI. This data helps in understanding how shifts and anomalies in climate patterns contribute to drought conditions. The data was processed using GEE's geospatial processing services. For drought assessment, MODIS Moderate Resolution Imaging Spectroradiometer Land Surface Temperature (LST) data is used to identify drought manifestations, such as vegetation health, through indices like the Vegetation Health Index (VHI). Additionally, the Standardized Precipitation Index (SPI) is applied to detect precipitation anomalies using CHIRPS (Climate Hazards Group InfraRed Precipitation with Station data) datasets. The analysis focuses on different land cover types, including croplands, forests, and rangelands, utilizing Copernicus land cover data.

The primary data was collected in July 2024. For each manteqa, two agricultural service providers, such as NGO workers and local government authorities, were purposefully sampled based on their expertise of the research topics and Manteqa. They were interviewed using a semi-structured interview tool. In Dasht-e-Laili, a focus group discussion (FGD) was conducted with farmers and livestock owners, in addition to two key informant interviews (KIs) with district agriculture staff. Eight participants were purposefully selected considering geographic representation, even distribution between the livelihoods of interest (agriculture and pastoralism). The inclusion of women and sharecroppers depended on access and presence of sharecroppers in the Manteqa. Following data collection, a content analysis identified the main themes, trends, and factors contributing to drought vulnerability and resilience.

Limitations

This research uncovered climate-related factors that may negatively contribute to vegetation growth and health. However, the exact effects of drought on crop yields or pasture growth are difficult to predict, because it depends on when water or nutrient shortage occurs, vegetation's sensitivity, and human practices. The research scope is limited to natural resources and agriculture. The impact on other sectors, such as domestic water availability, and hygienic practices, are excluded from the analysis. Similarly, the cascading impact of drought on other areas such as energy consumption, migration patterns, social structures, market prices, health, etc., are not included.

Future analysis should consider the effect on ecosystems and biodiversity of drought and dry spells, and the available groundwater and surface water, which could not be included in this research. Due to the qualitative nature of the assessment, the findings are not representative of the Manteqa population. The available climate change predictions of Afghanistan should be treated with uncertainty as they are dependent on a multitude of factors, including the actual global warming rate (RRC).

Crop Calender

Crop Type	Crop	Growing Months	Harvesting Months	Drought Vulnerability
Fruits	Apricots, peaches & cherries	January – March	June- July	Moderate
	Almonds	February – April	September	High (Passes through peak summer)
	Grapes	Jan - March	August	High (late season, overlaps drought)
	Melons	March - April	June - August	High (summer harvest)
Vegetables	Winter Varieties	October – January	January – February	Low (harvested in cooler months)
	Eggplant, onion	January – March	June	High
	Tomatoes	March – April	June – August	High (summer harvest)
	Other Summer Vegetables	March – April	June – August	High
	Late Varieties	July – August	October – December	Moderate
Cereals	Wheat (rainfed)	September – June	June – July	High (harvest in summer)
	Barley (Fall season)	September – October	May/ June	Moderate (early harvest)
Cash Crops	Saffron	August – September	August – September	Low (late season, sensitive crop)