

# Irrigation Management in Shadian, Balkh

August 2025 | Shadian Manteqa, Balkh Province, Afghanistan

## KEY MESSAGES

- Irrigation in Shadian appears to remain centred on natural springs and canals, with traditional managers still active in allocation, yet limited modernization suggests fragile collective systems.
- Households report adapting farming practices to water scarcity and, when necessary, relying on off-farm income as a coping mechanism rather than a stable livelihood option.
- Recurring droughts and indicative evidence of declining groundwater and soil moisture point to tightening resource constraints, and without investment in efficiency, storage, or training, agriculture may face increasing vulnerability.

## CONTEXT & RATIONALE

The convergence of prolonged environmental stress, socio-economic hardship, and limited institutional capacity has placed rural communities in Northwest Afghanistan under increasing pressure. In areas where livelihoods depend on irrigated agriculture, recurring droughts, declining surface flows, and growing competition over groundwater have intensified vulnerabilities.<sup>1</sup> To support sustainable recovery and resilience-building, the Irrigation Management Assessment aims to generate localized, evidence-based insights into water use, availability, and the governance of irrigation systems. Conducted as part of the Sustainable Rural Development V programme, the assessment seeks to inform programming and prioritization for sustainable irrigation by tracking seasonal patterns and household practices across five manteqas. The inclusion of remote sensing enhances the ability to monitor environmental change and irrigation demand over time and to triangulate these patterns with community-reported data.

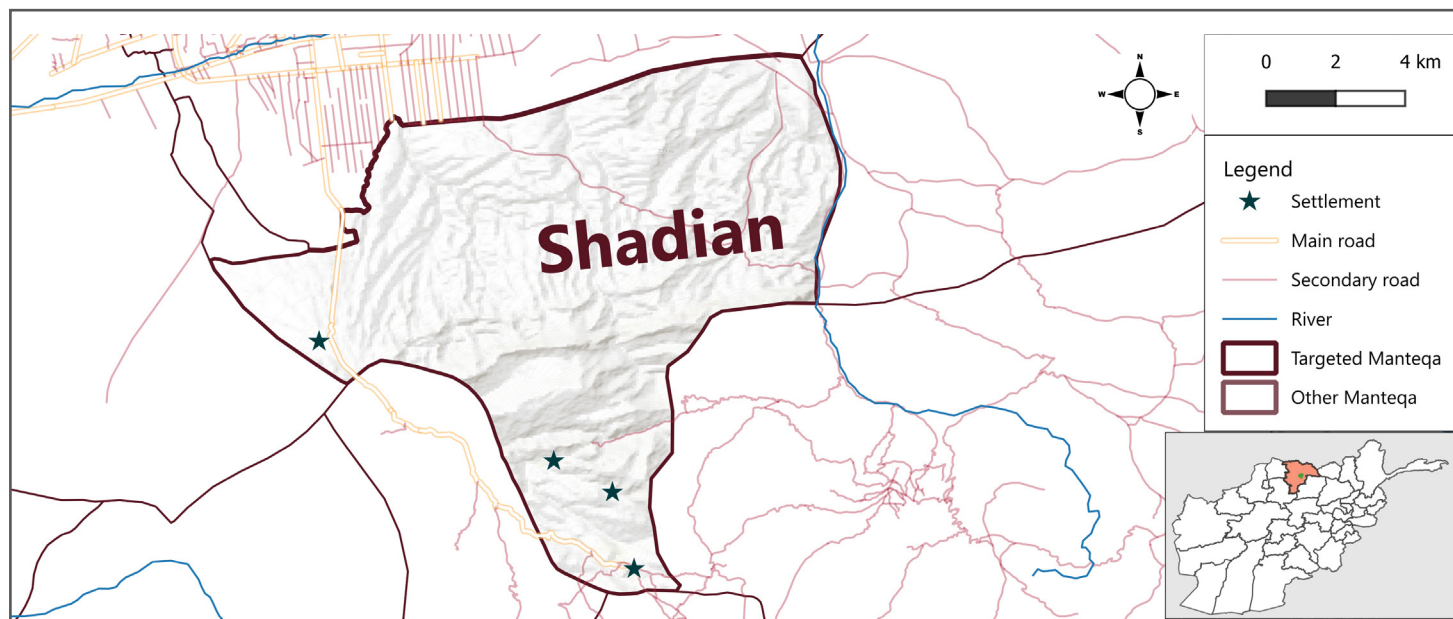
## ASSESSMENT OVERVIEW

This assessment aims to analyze seasonal and year-round patterns of irrigation water use and access, evaluate drivers of variability and scarcity, including climatic and socio-economic pressures, and examine local governance structures and community capacities to inform sustainable irrigation interventions across five manteqas in Northwest Afghanistan.<sup>2</sup> The selected manteqas have been targeted to implement a pilot of Acted's THRIVE initiative to support rangeland restoration in cooperation with local communities.

### Methodology

The Irrigation Management Research Assessment uses a mixed-methods approach combining a household survey, Key Informant Interviews, and remote sensing indicators to assess irrigation sources, systems, management, and performance in five manteqas in Northwest Afghanistan. Data collection took place between 26 May and 13 June 2025. All findings presented here should be considered indicative. For an overview of the methodology, please see [below](#).

Map 1: Shadian Manteqa

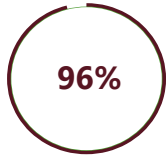


# IRRIGATION INFRASTRUCTURE AND COORDINATION

## Introduction

Shadian is located in Balkh Province, comprising 6 villages with an estimated 925 households (6,250 individuals).<sup>3</sup> Around 12% of the population are returnees and less than 3% are internally displaced persons (IDPs).<sup>4</sup> According to a previous assessment, most of Shadian's residents rely on livestock and agriculture for their livelihoods, and around 1% of its area is considered irrigated land, all of which is located around the manteqa's settlements.<sup>5</sup>

## Water sources and infrastructure



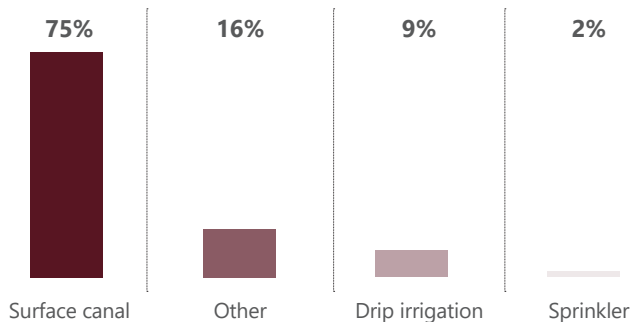
Almost all surveyed households identified natural springs as their main irrigation source.

As per a previous REACH assessment, some water sources become inaccessible in drought years, suggesting that spring water availability and irrigation agriculture are affected by climate variability.<sup>7</sup>

KIs confirmed natural springs as the primary water source, with some mentioning the existence of surface and underground canals fed by rain and snowmelt, as well as water storage systems to bridge dry periods.

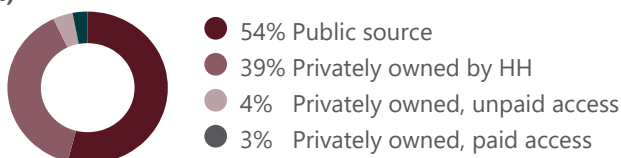
The chart below shows the proportion of households reporting the use of irrigation systems for distributing water to fields. Multiple responses were allowed. The results suggest that flooding fields by opening canal gates are a common practice, with some surveyed HHs also using more advanced systems like drip irrigation and sprinklers.

### Irrigation systems used (% of surveyed HH)<sup>6</sup>



When asked about the ownership of these sources, more than half of respondents indicated public ownership, and most others that sources are owned privately by the HH or by others with unpaid or paid access. Only a small minority suggested they paid for irrigation water access of privately owned sources.

### Reported ownership of water source (% of surveyed HH)

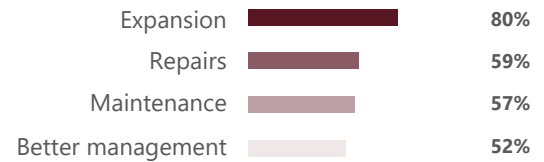


## Maintenance of irrigation infrastructure

KIs indicated that existing water infrastructure is maintained through financial contributions from farmers and landowners. Such maintenance includes repairs and regular removal of sediments, as well as improvements by constructing more modern irrigation infrastructure or recommending drought-adapted crops.

Surveyed HH reported that irrigation systems in the manteqa could benefit from improvements such as expansion (80%), repairs (59%) and maintenance (57%), but also from better management (52%). Since most HHs seem to rely on shared infrastructure, these findings suggest that existing systems may be overextended or degraded, with limited funds available for desired improvements.

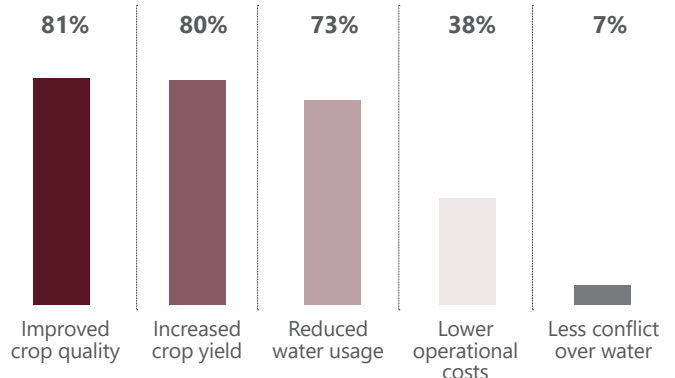
### Desired irrigation infrastructure improvements (% of surveyed HH)<sup>6</sup>



KIs echoed the need for repairs and expansion of existing infrastructure and the use of more efficient systems like drip irrigation, but also highlighted a need for training for farmers to improve knowledge and reduce water wastage.

Survey results further hint at reasons for these perceived needs, with most respondents pointing to improved crop quality (81%), increased yields (80%), reduced water usage (73%), and lower operational costs (38%) as expected outcomes. These findings indicate that the constraints placed by the state of existing systems may limit agricultural productivity in the manteqa.

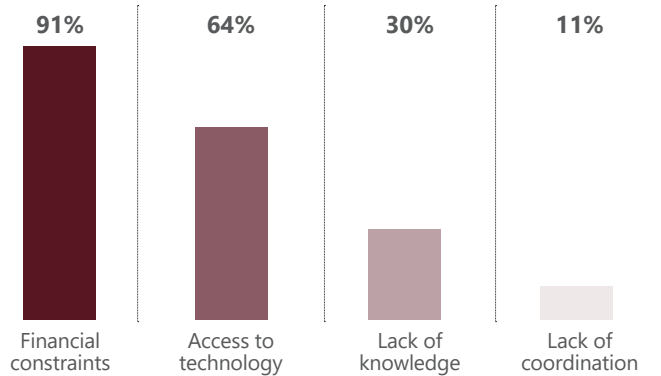
### Expected outcomes of the desired irrigation infrastructure improvements in the manteqa (% of surveyed HH)<sup>6</sup>



# IRRIGATION INFRASTRUCTURE AND COORDINATION

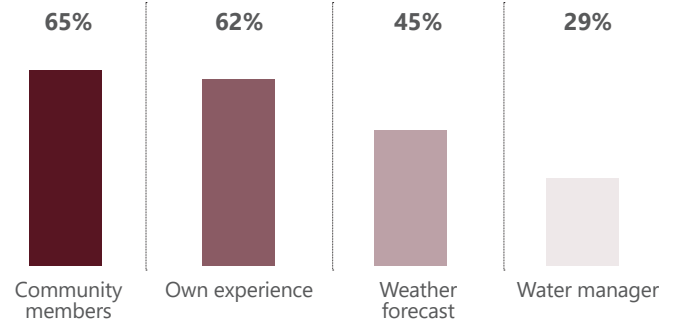
Barriers to implementing such improvements were overwhelmingly reported as financial (91%). Other reported constraints included a lack of access to more efficient technology for irrigation systems (64%) and insufficient knowledge (30%) to implement changes. Based on these findings, agricultural extension services may prove very effective in supporting households to overcome such constraints.

**% of HH by reported barriers to implementing improvements to irrigation infrastructure<sup>6</sup>**



Surveyed households reported learning about the availability of irrigation water at the start of the season from other community members (65%), in addition to drawing on their own experience (62%), weather forecasts (45%), and water managers (29%). This indicates that water access decisions are shaped more by informal judgment than institutional planning, which may contribute to uneven access and reduce accountability in allocation.

**% of surveyed HH by reported information sources for availability of irrigation water at the start of the planting season<sup>6</sup>**

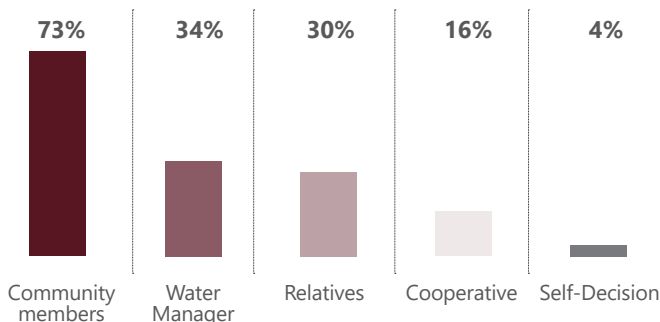


## Water allocation and decision-making

Key Informants indicated that decisions around irrigation water in the manteqa were based on customary practices and formal water laws. They described water allocation as depending on land ownership with adjustments made based on seasonal fluctuations of available water, and direct coordination between villagers and water managers.

Only 35% of surveyed households reported consulting formal water managers before using water sources. In contrast, 73% said they spoke with other community members, likely due to the high prevalence of publicly owned water infrastructure in the manteqa. Very few households appear to make decisions independently, underscoring the importance of informal coordination for water use in Shadian.

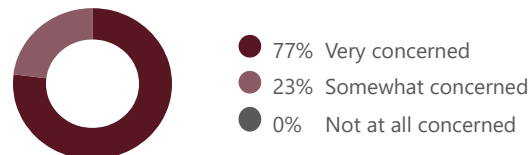
**% of surveyed HH that reported consulting other actors for irrigation water use<sup>6</sup>**



Key Informants highlighted the role of local water managers (*Mirab Bashi* and *Chakbashi*) that engage with communities on irrigation water through local councils (*jirga*) and meetings. They also pointed out that no other institutions responsible for water management exist in the manteqa.

Almost all surveyed households expressed concern about future irrigation water availability. With most seeming to rely on natural springs and canals fed by rainfall and snowmelt, their water supply, and by extension, their livelihoods remains highly exposed to climate variability, erratic precipitation, and drought and leaves little buffer against seasonal or long-term shifts in water availability.

**% of surveyed HH by reported level of concern about future irrigation water availability**



## SUMMARY

- Natural springs and canals fed by rainfall and snowmelt appear to be the main irrigation sources, with irrigated land limited and concentrated near settlements.
- Most sources are reportedly public and shared, though some private arrangements exist, which may influence how water infrastructure is maintained.
- Respondents indicated needs for expansion, repair, and improved management of irrigation systems to support yields and water efficiency.
- Financial constraints, limited access to technology, and gaps in knowledge were the main reported barriers, suggesting agricultural extension services could help address some challenges.
- Water allocation seems to rely largely on customary practices and local managers, with informal coordination shaping access and leaving households sensitive to drought and climate variability.

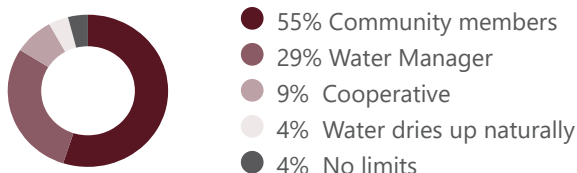


# WATER AVAILABILITY AND FARMING PRACTICES

## Availability of Irrigation Water

Most surveyed households reported limits on irrigation water imposed by community members (55%), water managers (29%), and cooperatives (9%). Only 4% reported no limits, while others noted natural constraints such as drying up. These findings suggest that water availability is generally constrained, requiring communities to adapt their farming practices to seasonal and institutional limitations.

% of surveyed HH by imposed limits on irrigation water

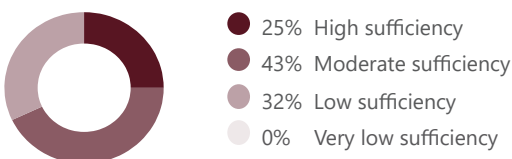


Among those facing restrictions, a large majority (81%) reported a daily time limit of just 30 minutes. These limits fall at the lower end of what is common in the region and, given the relatively small land areas cultivated, suggest that irrigation agriculture may be heavily constrained by water availability.

On average, surveyed HH irrigate **10 jerib** on **18 Days** per year.<sup>9</sup>

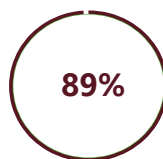
While many households appear able to cultivate under current conditions, shortages and limited predictability may still constrain stability. Surveyed households reported differing levels of irrigation water sufficiency, with most falling in a moderate range and smaller shares reporting either high or low sufficiency.

Aggregated irrigation water sufficiency (% of surveyed HH)



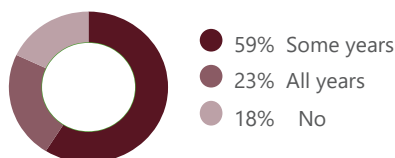
*This measure combines household experiences of sufficiency, seasonal variation, duration of shortages, and predictability at planting to reflect the overall stability of irrigation supply.*

Nearly all surveyed households also reported adjusting their farming practices in recent years, with many also diversifying income sources to meet household needs. Reported changes in farming practices seem to be reactive to water scarcity, while reliance on additional off-farm work suggests that agriculture alone may not always provide sufficient income for households.



of surveyed HH reported a change in agricultural activities to secure sufficient income or yield in the past 5 years.

% of surveyed HH with member taking up additional work due to insufficient farm income in the past 5 years

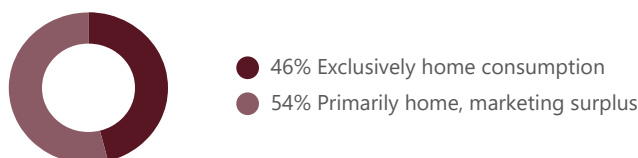


## Cropping Patterns and Agricultural Activity

According to findings from an earlier REACH profiling, cereals (wheat and barley), and root crops are widely grown in the mantega.<sup>8</sup>

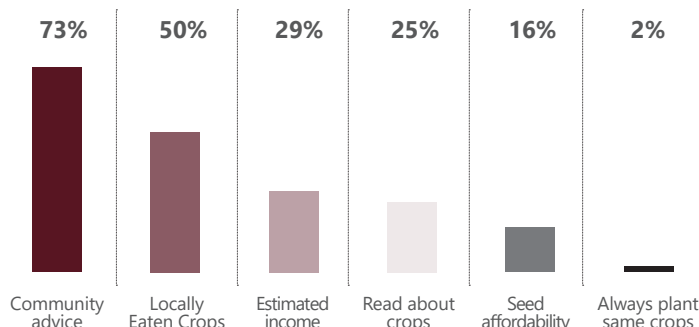
Farming in the area seems to serve both subsistence and economic purposes. While 46% of households reported farming exclusively for home consumption, more than half suggested cultivating primarily for household use but also selling surplus on the market. This indicates that even subsistence-oriented farming contributes to local economies, with market engagement shaped by water access, land size, and seasonal conditions.

Reasons for farming (% of surveyed HH)



Crop choices seemed to be driven mainly by community advice (73%) and preference for locally eaten crops (50%). Economic and informational factors such as estimated income (29%), reading about crops (25%), and seed affordability (16%) play a secondary role, and only 2% consistently plant the same crops.

Reasons for crop selection (% of surveyed HH)<sup>6</sup>



# WATER AVAILABILITY AND FARMING PRACTICES

## Evapotranspiration as an Indicator

Evapotranspiration (ET) is the combined transfer of water from land to the atmosphere through soil evaporation and plant transpiration. It serves as a proxy for crop water demand and thus provides an indication of irrigation pressure across the manteqa.

### 2021–2022

Maximum ET reached 4.73 mm in 2021 and 4.53 mm in 2022. Both years were marked as drought-affected, with below-normal rainfall (247 mm) and weak vegetation growth.<sup>10</sup> Groundwater decline and limited irrigation supply constrained ET, making the 2022 dip more a result of water shortages than reduced climatic demand.

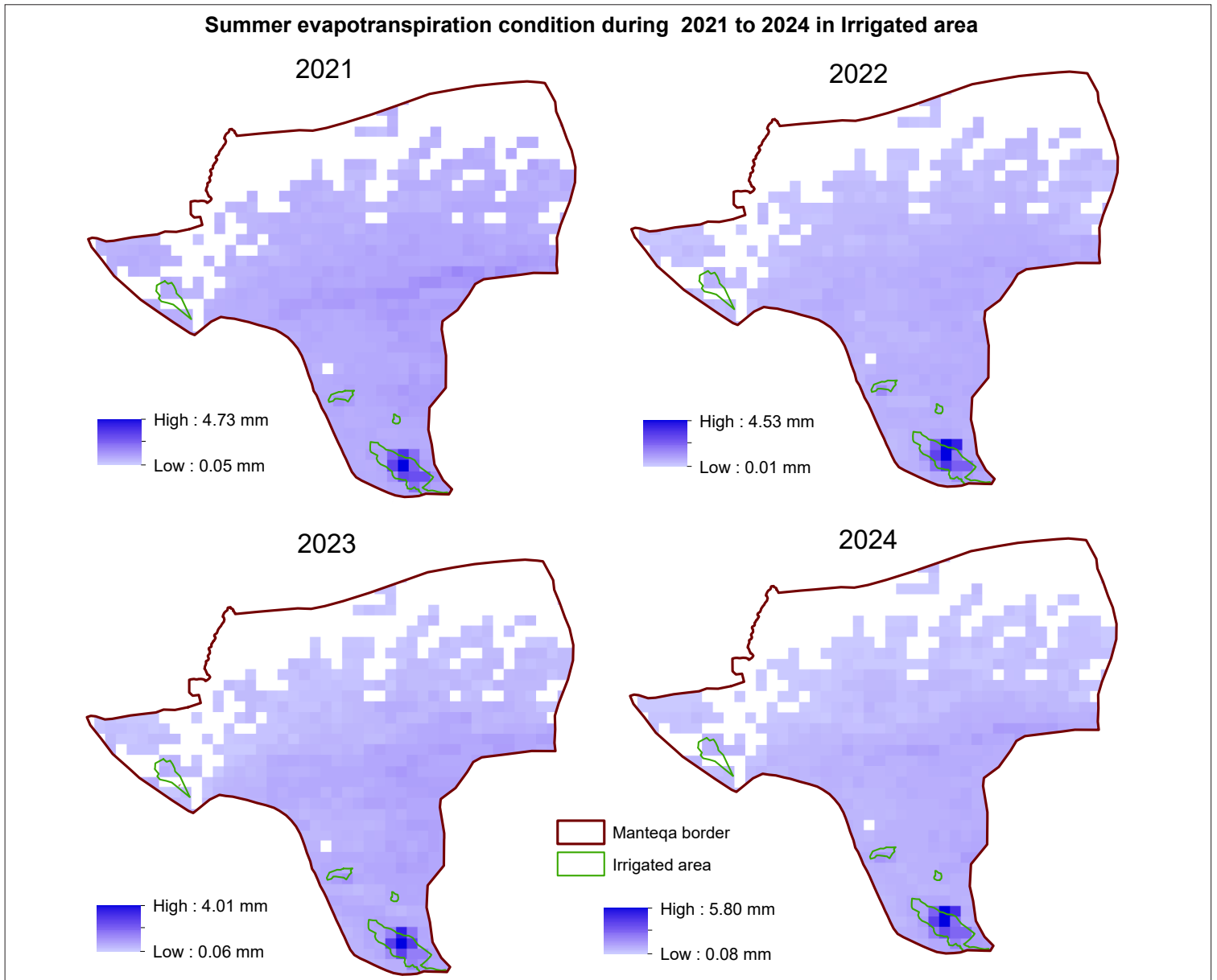
### 2023–2024

Maximum ET declined to 4.01 mm in 2023, a severe drought year marked by only 192 mm of rainfall, below-average soil moisture, and a sharp drop in groundwater storage.<sup>11</sup> These supply constraints limited crop water use despite high evaporative demand. In 2024, ET rose to 5.80 mm as improved rainfall and vegetation supported greater water use, and communities did not classify the year as drought-affected. However, continued groundwater decline indicates that the rebound was rainfall-driven rather than a sign of stronger water security.

### Implications

ET patterns from 2021–2024 showed how rainfall variability and limited irrigation drive water use in Shadian. Drought years through 2023 suppressed ET as groundwater and soil moisture declined, while the 2024 rebound reflected better rainfall rather than stronger water security. With groundwater still falling, irrigation agriculture remains highly vulnerable, and future shortfalls will intensify pressure on already scarce reserves.

Map 2: Summer evapotranspiration condition, 2021-2024

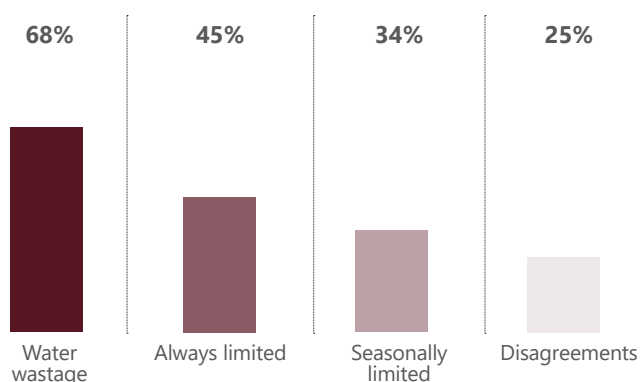


# WATER AVAILABILITY AND FARMING PRACTICES

## Challenges

The most frequently cited issue was water wastage, reported by 68%. Many also noted limited availability, with 45% experiencing consistent shortages and 34% reporting seasonal constraints. Additionally, 25% mentioned disputes over water sources, indicating that shared and limited access may not only contribute to agricultural challenges, but also to local tensions.

### Biggest challenges with irrigation water (% of surveyed HH)<sup>6</sup>



KIs pointed to water wastage and a lack of knowledge on the use of irrigation water as the biggest challenges in the manteqa. In contrast to surveyed HHs, they reported no disagreements but highlighted potential tensions in the absence of good coordination around shared water use.

## Conclusion

Shadian Manteqa's irrigation appears to remain dependent on natural springs and canals, while traditional water managers continue to organize access, yet their capacity to modernize or expand systems seems limited. Households adapt to seasonal variability and uncertain availability by adjusting cropping practices and diversifying income, while relying more on community networks for information than on formal planning or monitoring. Prolonged droughts have reduced soil moisture and groundwater reserves, and both local reports and remote sensing indicate that water use has been constrained under such conditions, with only temporary recoveries when rainfall improved. These fluctuations may sustain agriculture in the short term, yet they do not suggest stronger water security, as structural shortages and fragile shared systems continue to limit irrigation capacity. The gradual decline of groundwater further implies that farming lacks a reliable foundation, and without investment in storage or efficiency, households may remain highly exposed to rainfall variability and repeated drought. If irrigation infrastructure is not improved, efficient practices not encouraged, and farmer knowledge not strengthened, there is a risk that groundwater depletion and climate pressures will gradually erode the stability of agricultural livelihoods in the manteqa.

## SUMMARY

- Irrigation access appears limited, with most households facing strict time restrictions and shared allocation, suggesting significant constraints on farming.
- Many households reported moderate sufficiency but still adjusted practices or diversified income, indicating that agriculture alone may not ensure stable livelihoods.
- Cereal and root crops dominate production, serving both household needs and local markets, with choices guided mainly by community advice and subsistence priorities.
- Evapotranspiration data show suppressed water use during drought years and a rebound in 2024 linked to rainfall, though groundwater decline points to continued vulnerability.
- This pattern suggests that temporary recovery does not signal stronger water security, and pressure on limited reserves remains high.
- Water wastage, shortages, and coordination challenges were cited as key issues, with both households and informants pointing to gaps in knowledge and management that compound scarcity.

## METHODOLOGY OVERVIEW

The Irrigation Management Assessment utilized manteqas as the primary unit of analysis. Manteqas are locally recognized geographic areas smaller than districts but larger than individual settlements, defined by shared natural resources, socio-economic ties, and customary governance structures. In the five assessed manteqas, data was collected through a combination of household (HH) surveys and key informant interviews (KIIs), including local water managers and irrigation governance stakeholders.

The sampling approach for the HH survey employed a two-stage stratified cluster methodology. Settlements were first randomly selected within each mantaqa, followed by random selection of households within those settlements. A minimum of six households were surveyed per settlement, with quotas split evenly between households engaged in irrigated agriculture and those relying on pasture-based livestock. To ensure inclusivity, female enumerators conducted interviews with women where access was permitted, including remote interviews in restricted areas. In Shadian, a total of 56 HH interviews were conducted, 9 of which with female-headed households. Key Informant interviews were

conducted with 2 local water managers and 2 district-level officials from the relevant line department involved in natural resource management.

In parallel, remote sensing analysis was conducted using evapotranspiration estimates to assess spatial and temporal variation in irrigation performance. This geospatial component enabled triangulation of field data with satellite imagery to identify patterns in water use and stress over time.

### Limitations:

- With exact figures for the target population unknown, findings presented here should be considered indicative.
- Access constraints limited in-person interviews with women in some areas, potentially affecting gender-disaggregated insights.
- Remote Sensing data relies on coarse resolution (500m x 500m), providing limited insights into sub-mantaqa-level trends.

For more information, please refer to the [TOR](#).

## Endnotes

1 Drought Impact and Resilience in Agro-Pastoral Communities in Northwest Afghanistan: Shadian Mantaqa Profile. REACH Afghanistan, May 2025. [Link](#)

2 A mantaqa is a locally recognized geographic area made up of several villages, defined by natural features and shared identity, history, and resource management practices; it functions as a basic reference point for inhabitants and is reinforced by customary governance structures that support community resilience.

3 Mantaqa Profiles. REACH Afghanistan, 2024. Available on request

4 Pasture and Irrigation Management. REACH Afghanistan, 2024. Demographic indicators were captured across both assessments and are considered statistically representative at 95/5.

5 Mantaqa Profiles. REACH Afghanistan, 2024. Available on request.

6 Respondents could select multiple options.

7 Drought Impact Shadian Mantaqa Profile.

8 Mantaqa Profiles. REACH Afghanistan, 2024. Available on request.

9 A jerib is a unit of land measurement equivalent to roughly half an acre.

10 Drought Impact Shadian Mantaqa Profile.

11 Drought Impact Shadian Mantaqa Profile.

## About AGORA

AGORA is a joint venture between Acted and IMPACT Initiatives created in 2016 to operationalise our motto « Think local, Act global ». It is **an innovative area-based approach** that aims to **better address the relief, environmental and development needs of people in fragile contexts through a NEXUS approach**.

The key value added of AGORA is:

- Working at the **right geographical scale**, enabling both meaningful engagement with local actors and the ability to scale-up the action
- Contextualizing action through a strong evidence-base and reliance on **local knowledge** to inform programme approaches
- **Putting local actors at the centre** by strengthening their capacity, enabling them to identify their own needs and response priorities through participative research and planning approaches, and to participate and monitor implementation
- **Linking local and external actors** so that the latter can contribute resources and capacity to implement local solutions and response priorities.

AGORA strengthens territorial resilience by enabling a wide range of programmes, including strengthening local governance, improving basic services and livelihoods, climate change adaptation and mitigation, improving natural resources management, disaster risk reduction and management, anticipatory action, or supporting durable solutions to displacement.

AGORA has already been piloted in **17 countries through 20 projects**, reaching approximately **1,8 million direct beneficiaries** and supporting **nearly 1,294 organisations**.