

# A Gender and Inclusive Climate-Migration Study in Hatra - Ninewa Governorate- Iraq

June 17<sup>th</sup>, 2023



# Executive summary

According to UNEP<sup>1</sup>, Iraq remains the fifth most vulnerable country to climate change to decreased water and food availability, and extreme temperatures. Increasing temperatures, unpredictable rainfall, intensified droughts, sandstorms and desertification are just some of the variables contributing to Iraq's climate journey. In addition, climate change impacts are further compounded by the trans-boundary water governance and misinformed management of natural resources which is leading to negative impacts on Iraqi agroecosystems and farmers, most noticeable in sustaining livelihood production.

In a country where security concerns, wars and conflicts have led to huge migrations and internal displacements and people seeking refuge externally, climate-induced migration is a rising trend. Recent studies have highlighted not only an increase in evidence of drought-induced migrations in Southern Iraq<sup>2</sup>, but also in other Governorates across the country. In 2021, the Norwegian Refugee Council highlighted through a survey carried out in Anbar, Basra, Duhok, Kirkuk, Ninewa, Salah al-Din, and Thi Qar governorates (including interviews to IDPs and returnees) that drought conditions have already impacted displacements, as 7% of 2,800 households in the sample have had a family member forced to migrate as a result of water scarcity conditions and its socioeconomic effects, affecting particularly the youth<sup>3</sup>. Another study by IOM<sup>4</sup> highlighted that in November 2021, a total of 303 families remained displaced due to drought conditions in two districts in Ninewa Governorate (al-Ba'aj and Hatra).

# Purpose

Climate change has the potential to seriously limit the transition from humanitarian aid to development. This climate vulnerability study aims to review the available evidence of climate change trends and impacts in rural areas around Hatra, Ninewa Governorate, emphasizing the gender and social inclusion factors linked to this and suggests possible measures to take in the short and long-period.

The report also aims to provide evidence-based information to feed the next programme phase in Hatra District, Ninewa Governorate, which is a strategic district for People in Need's (PIN's) past, current and future interventions. This report is the output of a two-phased approach based on FDGs, KIs and direct observations and HH survey with face-to-face interviews in the second phase. It should help to understand and gather evidence on coping mechanisms and adaptation solutions taken by local farmers, including movements and migration dynamics.

Thanks to its ongoing interventions, PIN already understood that a deeper analysis of the situation under a climate change and environmental perspective was needed in the target area and that program participants are negatively impacted by climate trends and impacts. The study strives to understand climate-related issues and how inappropriate solutions and dynamics in farmlands can exacerbate current and future vulnerabilities. Ultimately, the report aims to understand impacts and give solutions on socio-economic aspects, such as people's livelihoods, as well as their health and wellbeing, which could finally lead farmers abandoning the farmlands and amplify migration dynamics.

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<sup>1</sup>UNEP, 2019. Global Environment Outlook

<sup>2</sup><https://iraq.iom.int/news/realities-climate-induced-migration-iraqs-southern-cities-new-iom-report>

<sup>3</sup><https://www.nrc.no/globalassets/pdf/reports/iraqs-drought-crisis/iraqs-drought-crisis-and-the-daaging-effects-on-communities.pdf>

<sup>4</sup>[https://iraqdtm.iom.int/files/Climate/202112215837860\\_ET\\_ClimateDisplacement\\_Ninewa\\_Dec\\_2021\\_Public.pdf](https://iraqdtm.iom.int/files/Climate/202112215837860_ET_ClimateDisplacement_Ninewa_Dec_2021_Public.pdf)



This study also builds on the climate research recently published by the International Organization for Migration (IOM)<sup>5</sup>. One finding is that although displaced and returnee families are vulnerable to climate change and environmental degradation, stakeholders were invited to conduct “more regular, granular and comprehensive assessments” in order “to better understand and address vulnerability factors and mobility drivers among displaced families living in locations affected by climate change” to result in improved and more durable solutions on livelihoods and food security, working to counter the abandonment of agriculture livelihoods.

## Geographical area

The geographical area selected for the assessment is Hatra District, Ninewa Governorate, Iraq. Two villages were identified: Helewat and Ramadania.

The selection of the two villages of Helewat and Ramadania was made mainly to: i. Consolidate PIN’s presence in the two target areas; ii. Understand different dynamics in two sites having so far predominant livelihoods (in Ramadania more farming, while in Helewat more pastoralism); and iii.

Investigate better climate change related aspects in connection to migration, with a lens on gender and social inclusion, excluding sites where these dynamics are more driven by security issues (e.g. Hatra town). A cross-check with direct observations and informal interviews was performed in Hatra’s town suburbs.

The target area is in the central part of Iraq, bordering Salah al-Din (SAD) governorate and Kurdistan Region. It is mostly desertic with very sparse and low herbaceous vegetation in some limited zones, or no vegetation at all. Agriculture is largely rainfed and consists mainly of smallholder farmers cultivating wheat and barley.



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<sup>5</sup>IOM, 2022. Factsheet: the impact of climate change on the environment in IDP and returnee locations

# Methodology

The methodology used to develop this report combines secondary data and literature review, with primary data collection and analysis.

To note, the secondary information review did not aim to be an exhaustive analysis of secondary sources but a brief examination of readily available resources online (written reports, institutional documents, papers, data analysis and projections), coupled with an internal analysis of secondary data in selected locations in Ninewa made by PIN and BigTerra<sup>6</sup>.

Primary data collection intended to gather key information on climate change impacts, vulnerabilities and migration dynamics from a variety of stakeholders through Key Informant Interviews (KIIs), Focus Group Discussions (FGDs), direct observations and direct interviews through a household questionnaire.

Three tools were designed:

1. A customised list of key and probing questions for semi-structured interviews to key informants with government officials and research centres/university representatives across six areas: climate change impacts, climate change vulnerabilities, coping mechanisms, adaptation strategies, Early Warning Systems, migration fluxes and related actions. One KII with government officials and one with local organisations (homogeneous groups of 2-5 respondents) were carried out.

2. A customised list of key and probing questions and tools to use in the FGDs across 5 areas: access and control over natural resources, decision-making power, climate hazards and expected changes, reorder to migration, and vulnerability and response. In the 2 FGDs carried out, a total of 18 men (including 2 with physical disabilities and 8 elderly) and 18 women (including 4 elderly) participated.

3. A questionnaire for the quantitative data gathering with individual household interviews. Thirty-five interviews were carried out, with 12 female and 23 male responders.

Direct observations with informal interviews in the two sites of Helewat and Ramadania.

## Limitations

No particular issues emerged, although limited knowledge on climate change related factors was evident as it has become a recent issue in the Iraqi society. Moreover, no research institutions and universities are present in the area.

The info and related conclusion below are based on an assessment with specific part of local population and do not represent the whole population in the area. Percentages are rounded for readers comfortable experience.



<sup>6</sup>Big Terra & PIN. 2022. Climate Report – Iraq available at <https://resources.peopleinneed.net/documents/1144-iraq----executive-summary-2.pdf>



# Main findings

## Desk review

The secondary research highlighted that Hatra as highly vulnerable and impacted by climate change. A brief analysis<sup>7</sup> of climate parameters, trends and projections in the Ninewa report identifies:

- Increasing average temperatures
- Unstable annual precipitation
- Significant trends for raising temperatures but uncertain or not significant for precipitation
- High probability of extreme events in temperature
- Possible increase of average precipitation and reduced consecutive dry days and increase of wet days

Furthermore:

- Projections for the future confirm these facts. Nevertheless, these are related to the Ninewa governorate, an area rather vast and heterogeneous, while the target area is closer to SAD. Therefore, it is rather safe to assume that many trends, like a possible increase of average rainfall, would instead more likely mean higher increase of variability and extreme events.
- PIN's Gender and Inclusive Climate-Migration Study in the area of Shirqat, adjacent to the area evaluated here, found an average rise of minimum temperature in winter months of 1-degree Celsius, leading to probable harm to the vernalization of crops, unreliability of precipitation patterns in November, March and April, extremization of rainfall events, lower productivity for some crops like wheat and barley.
- Reduction in soil moisture is an increasing trend due to urbanisation, improper agriculture, droughts, removal of vegetation, and upstream dams, and this can compromise agricultural productivity, ecosystem health, and food security. Sand and dust storms can also intensify and become more frequent due to reduced soil moisture with impacts on health and livelihoods.

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<sup>7</sup><https://climateknowledgeportal.worldbank.org/country/iraq>

<sup>8</sup>IOM Iraq. 2022. Migration, environment, and climate change in Iraq

<sup>9</sup>IOM, 2022. Factsheet: the impact of climate change on the environment in IDP and returnee locations

Although environmental and climate migration from rural to urban areas in Iraq is confirmed by international NGOs and IOM<sup>8</sup>, the information collected is at preliminary stages.

- According to IOM, water scarcity led to significant displacement in two districts of Ninewa, Al-Ba'aj and Hatra at the end of 2021, with recorded 1,818 people (303 families) displaced due to drought conditions, with a rate of displacement higher than normal.
- A recently published factsheet by IOM<sup>9</sup> confirms PIN's findings on more emphasis given to climate-related hazards in Hatra than environmental degradation factors. IOM's conclusions and solutions to tackle climate change impacts in Iraq are aligned with PIN's main recommendations – both in SAD and Hatra Climate change report.

## Site characteristics

*What are the main farming features visible/present? What are the main environmental and climate characteristics of the area? What are the key changes in respect to the past?*

- In Ramadania, local farmers are trying to reconvert their rainfed land into irrigated farmlands to overcome the lack of precipitation and increase wheat and barley yields (almost only crops cultivated) to be sold to governmental buyers, constructing wells and ponds. Power supply remains an issue for water pumping. Livestock has decreased from the past and new drinking infrastructure is need for livestock.
- In Helewat, farmers reported no irrigated farmland present and the traditional livelihood is primarily focused on pastoralism, with sheep being the main livestock. Cattle is almost not present. Transhumance has become more difficult, becoming discouraged and expensive compared to the past as grazelands have decreased, and fodder is nowadays bought from Mosul and stocked. Droughts and erratic rainfall have affected pastures and livestock heads are diminishing.

## Access to and control over natural resources

*What are the roles and tasks of men and women at the household level? Are there inequalities in access and control on natural resources?*

- Main natural resources are similar in the two sites: water (rainwater and underground), soil and farmland, livestock (sheep) and grazeland. In Helewat, agriculture is entirely rainfed and livestock is of paramount importance, more than in Ramadania.
- Water is not available in the villages as the water supply system was sabotaged by ISIS in recent years. Currently, families buy water, and for agriculture, either use rainwater or underground water (in Ramadania), despite rather high salinity.
- The majority of women in both locations work on household chores and family care from early morning until the end of the day. Men have aggregative moments in Ramadania and farming activities, while they are more concentrated on livestock grazing in Herewat.
- Men oversee farming and agriculture practices, water management for drinking, livestock management and energy management. Women lead on childcare, household chores and livestock at home (milking cows, if any, and taking care of chickens). Nevertheless, most women help men in some stages of agriculture, but men have full control and ownership.

## Decision-making power

*Who is taking decisions in the household and in the community? How would you describe men and women's role in decision making?*

- In both villages, most of women help men in the harvest season, as well as in farming and crop stocking, but they have no control on financial resources. Wives are consulted before a decision is taken but husbands lead and decide ultimately.
- Community-wise, women are not able to take leadership positions, express their opinion in social situations or interfere in the problems that occur in the village. There are no women in decision-making positions or with work roles.

- No women study and the majority are illiterate in both villages. Some families even prevent their daughters from accessing education, while others prevent both boys and girls because of the distance of the school from the village they live in.

## Climate trends and impacts

*What are the main climate trends and climate change impacts? How have factors changed in comparison to the past? What are other socio-economic and environmental stressors?*

- Climate change is perceived for its multiplier impacts but no adequate consideration is given to improper natural resource management and agricultural practices in loco. Lack of governmental support is seen as a key issue and policies to restrict shepherds' movements a barrier to overcome in a changing climate.
- The authorities noted respiratory issues and a limitation of movement due to an increase of sandstorms in summer. This is leading to a decline in economic security. The District's Veterinary Department reported an increase in the percentage of diseases spread among animals and zoonotic diseases with a negative impact on human health, such as haemorrhagic fever, due in part to the movement of livestock across the country, seeking scarcely available grazelands.
- Less precipitation and unreliable rainfall were reported as the main impact in the interviews. Men in the FGDs remark a better financial situation in the past, with more livestock heads (sheep), more reliable and abundant rains, and higher agricultural productivity.
- Droughts have increased and when agriculture is only rainfed (Helewat), this brings heavy repercussions on the households' financial stability and food security. In the past two years, women in both villages have noticed a rise in temperature in summer and a decrease in rainfall in winter, and they link this to an increase of sandstorms. An increase in the salinity of the soil is also seen as an impact.

- The continuous lack of rain and occurrence of droughts are seen in combination to amplify the negative impacts on people's wellbeing and livelihoods. An increase in prices is remarked by local organisations as a linked consequence to the economic, social and health situation. A decrease of yield is reported by 50% of the interviewees and loss of production by more than 90%.

## Main climate related vulnerabilities

- *What are the main vulnerabilities that are related to changes in the climate trends and parameters? How are different groups affected by such changes? Who can be more vulnerable to such changes?*
- All family members are considered vulnerable to climate change impacts because the first effect will be on the head of the family and this in turn has cascade effects upon the rest of the family. Lack of livelihoods and sources of income, lack of education, decline in agricultural production, responses such as finding daily jobs in town or migration sums up how climate change impacts communities with multiplying effects on vulnerability.
- The elderly are considered the most vulnerable group by almost 50% of responders.
- Children are also mentioned by the authorities amongst the most vulnerable. In a climate change context and with no or distant schools, dropouts can increase, and children forced to find daily jobs in town.
- Women are also reported amongst the most vulnerable by the authorities, but not by the villages. Nevertheless, lack of income can lead to tension inside the house women in Helewat report, and even evolve into gender-based violence.
- Psychological issues may emerge with unemployment and scarce income opportunities or in people suffering of respiratory diseases during sand and dust storms and this can lead to less motivation to find work opportunities, in a loop.
- Displaced people could become more vulnerable due to climate change.

## Coping mechanisms

*What are farmers doing to cope with a sudden-onset climate shock? How are other stakeholders interven-ing to help farmers in this?*

- Across the two locations, coping mechanisms to suddenly respond to climate shocks are mainly: borrowing money from relatives (almost 70%), reducing farming area (60%), relying on NGO assistance (>50%) and selling livestock (>30%) or other assets.
- Moving to find daily jobs, buying less food as well as spending their savings (10%) are also mentioned but less frequently in the interviews. Loans (hard to get) are infrequently mentioned, while micro-credit systems are not present.
- Some families during sandstorms try to protect family members by covering windows and doors as a temporary measure.
- Displacements are also an immediate response that the authorities had to rely on. Two out of the three main displacements mentioned by the governmental authorities are related to lack of rain and intense droughts (in 2008-2010 and 2021-2022).
- No early warning systems (EWS) exist and farmers rely on word of mouth and Facebook to get alerts of climate hazards. Seasonal trends and availability of natural resources rely more on traditional knowledge and behaviours. The Department of Agriculture measures weather parameters and publishes its advice through social media but there are no other means of communication and often these recommendations are not considered by the communities.





## Adaptation strategies and solutions

Longer-term solutions are minimal in Ramadania or non-existent, and reliance is more on external aid or migration for non-farming jobs and reliance on remittances. The example in Ramadania is related to the creation of a new borehole for irrigation water whilst a drinking water solution for the livestock in the wadi remains embryotic.

There is high risk that coping mechanisms for a sudden climate shock become long-term strategies, eroding natural resources and resilience capacities, and bringing issues to food security and nutrition.

- Local authorities report no action from the government on climate-induced displacements or plans to reduce climate change impacts and reverse migration in the district. No governmental social protection schemes and safety nets exist while local authorities have not provided concrete support to the displaced families or farmers and shepherds affected by climate change. The action is limited to awareness raising messages and pushing for better understanding the dynamics and collecting necessary data and information.
- Some local NGOs (e.g. Dijla Agricultural Association) work on climate change adaptation solutions in water and agriculture but rely on external support rather than joint efforts with governmental actors.
- Farmers do not use specific strategies and lament lack of support. Most stop farming when rain is not sufficient and there are droughts. In Helewat, agri-pastoralists rely entirely on rainfed agriculture and pastoralism, and they can become highly vulnerable if the coping strategy is to sell all their livestock and stop agricultural production in dry periods. Selling sheep could be a negative coping mechanism evolving to no adaptive capacity, if protracted.
- Solutions lack support in instruments for the local authorities and knowledge and skills by the farmers. Knowledge is passed on by family members in 96% of the cases, while some knowledge is transferred to men also by NGOs and neighbours. A centralised system makes sub-national governmental institutions lack resources to work on local instruments and customized action. Conservation and regenerative methods are still not adequately known and farmers often misinterpret the type of solution applicable.

- The aim to engage in solutions that can support existing livelihoods is predominant, but emphasis is given to more water availability and quantity rather than better management. Solutions can become inadequate practices (e.g. if groundwater recharge is not duly considered when constructing a new well) if they lack consistent instruments by the local government and knowledge and skills by the farmers.
- Particularly mentioned and considered as longer-term solutions are: reliance on NGOs (>60%), digging a new well (40%), eating less food (>30%), eating less quality food (40%), moving to another place (20%) and saving water (20%).
- Around 65% of respondents indicated the solutions implemented in both short and long-term have impacted some household members.
- The main needs reported are connected to new water resources, followed by financial resources for investments and inputs/assets. Money to invest, connections to the market and skills to apply the methods were emphasised. In contrast, awareness and skills on how to apply the methods are commonly given less importance.





# Migration

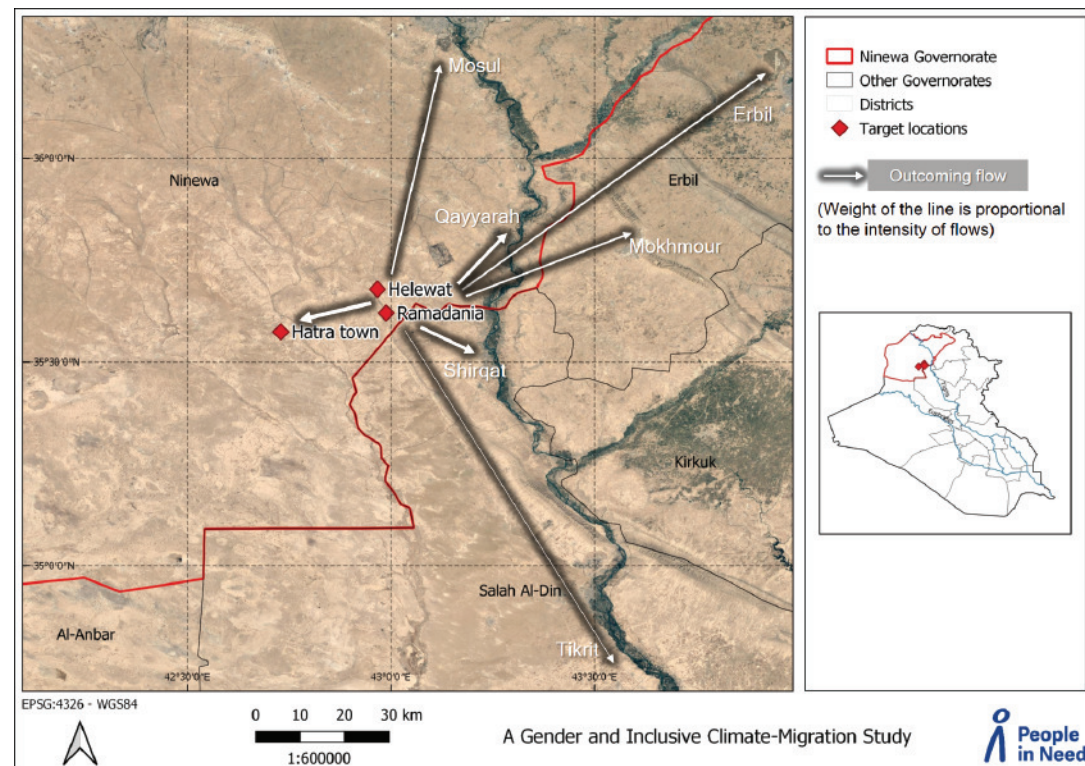
*What are the migration dynamics (permanent/temporary) and how is migration influenced by climate change? How do migration dynamics affect different groups of people differently (gender, age, disadvantaged, etc.)?*

One of the solutions can be to migrate or increase movements and this is seen as a long-term solution to environmental degradation and climate change impacts by around 30% of the farmers. Though, women seem generally more sceptical than men overall.

Around 60% of respondents would stay in their farmlands and see migration as a last resort, preferring to continue with their ancestors' livelihoods. Temporary or permanent migration are equally mentioned, if need be, even overcoming cultural barriers that prevent ex-Bedouins to settle. Climate migration has now become a large issue, in many cases linked to environmental concerns, security and economy, and there are increasing climate-driven displacement. Returnees are currently interested by reverse movements, bringing families to consider moving again out of their farmlands. Governmental institutions do not have clear information on migratory fluxes and socio-economic drivers though.

- Not enough capital and uncertain success are among the main discouraging factors to move, while money saved and relatives'/friends' support are the main helping factors.
- No agricultural production and better farming conditions (>60%) are followed by hard living conditions (50%) and no livestock (33%) as main drivers. Farming, but also non-farming job opportunities, can favour people's migration, although farming livelihoods are preferred when moving.
- The money earned is mainly given to the household (80%) and men are only responsible on how to use it in 40% of the cases. Basic needs and essential goods are prioritised, e.g. buying food (100%), followed at 40% by paying bills, repaying debts, paying doctors/medicines, paying for special healthcare for people with disabilities/illness, and far fewer purchasing agricultural inputs/assets. Money is therefore more used to face contingent issues rather than investing in long-term solutions in farmlands.

- Children not going to school become a concern when a member of the household moves to another place (particularly girls, mentioned in >50% of the cases). Respondents also frequently mentioned children helping more on the farms (according to female respondents: boys >80% and girls 100%), earlier marriages for girls (mentioned by almost 70% of female respondents), girls who have to help more with house chores and women burdened by extra tasks if men and youth move to other places, replacing the men in their traditional duties (>30%). Some local organizations reported children dropping out of school, unrecorded children, and an increase of gender-based violence cases. Child labour is also becoming more frequent, as there are now families reported in Ramadania who have started to send their children to Erbil and Tikrit for daily work, relying on this income.



- The difficulties worth noticing after the migration to another place are: not enough income (80%), no housing facilities (70%), no farmland (>50%), and then, at around 50%, no support from the government, no spaces, fewer social interactions and no possibility to keep livestock, the latter two particularly mentioned by women.
- According to governmental officials, most of the observed movements in Hatra District happen from the farmlands to urban areas due to lack of rain, sandstorms and desertification (primarily to Hatra town, Qayyarah and Shirqat) in search of alternative sources of income. Migration involving all family members were due to a decline in the economic situation, health and education of the families themselves. Therefore, also the existence of health, market and education services can favour migration dynamics.

In Ramadania, moving away is a last resort and, typically, people move to get education and market services to Shirqat and Qayyarah, for health services to Qayyarah and Mosul, and for longer jobs opportunities to Erbil and Mokhmour. In Helewat, routes and dynamics are similar to Ramadania, but the lack of primary education opportunities can further facilitate migration. The examples vary from youth migrating temporarily in search for an employment and transfer money earned to families migrating temporarily or permanently to Shirqat, Erbil or Mokhmour to find farming or non-farming jobs (working in agricultural, construction and services or as a taxi drivers).

## Conclusions and recommendations

In this section, some conclusions and recommendations to tackle climate hazards, increase climate resilience and reduce migration fluxes which are specific for the targeted area are reported. In general, the primary recommendations given for Salah al-Din in PINs A Gender and Inclusive Climate-Migration Study are still valid in the concerned area, although there are some site-specific dynamics, and socio-economic and environmental characteristics which lead to peculiar solutions.

Some key conclusions from the findings show that:

- Farmers and shepherds, all returnees after the liberation, would aim to stay in their villages without ending to reverse migration dynamics towards urban areas. Nevertheless, lack of livelihoods together with distance from main economic centers and lack of education, health and market facilities, push them to move away. Solutions should be multifaceted and integrated far beyond environmental, social dynamics and livelihoods aspects, but entailing infrastructure and services for education and health.
- Being historically transhumant herders and former Bedouins, communities have settled permanently in some areas and cannot move in search of suitable grazelands like in the past. The disappearance of erratic pastoralism has made them more sedentary and reliant on larger farming activities, and people have always dealt with difficult soil conditions and lack of water. Nowadays, the tendency is to sell livestock to cope with emerging challenges without restocking it, with a preference for farming which is considered more profitable. Due also to climate change impacts that are exacerbating an already challenging scenario, people may end up migrating. However, a shift from agricultural livelihoods is seen as challenging due to lack of capacities, and people are often unconfident and unwilling to explore non-farming opportunities.
- The above context and the long-term assistance may finally represent a boomerang effect to the transition to development strategies and leave farmers and shepherds with more reliance on external aid or migration. The latter could return in heavy gendered and protection side effects, with women increasing their tasks and responsibilities, and increase of child labour and removal of children from school. In addition, no safety nets after a natural disaster and social protection schemes that could accompany people to long-term solutions exist.
- Similar dynamics in the two villages lead to similar conclusions, although more accentuated site-specific livelihoods are evident in the two villages (farming in Ramadania and pastoralism in Helewat) and therefore these should lead to site-specific solutions. Less facilities in Helewat with no irrigation and only rainfed production prevent from enhancing reliance on farming.



Similar to Salah al-Din, the promotion of good governance approaches is crucial to ensure that farmers and shepherds feel included and supported in Hatra District. Farmers' associations need to be capacitated and backed by investments in a strategic sector as agriculture, and they should provide necessary assistance to these villages. Governmental extensionists must be capacitated and, in turn, build mutual trust with farmers to avoid continuing unsuitable solutions for the area and the changing climate.

As farmers' main focus is to increase the quantity of water for farming, as well as shepherds would like to have access to increased amounts of water to enhance farming potential, solutions on soil and water conservation and climate-smart agriculture practices should be widespread and adopted instead. Ensuring their adoption is fundamental to leverage behavioural changes and provide long-term support to overcome failure during the first years. Diversification of livelihoods and agriculture production together with nature-based solutions to restore agroecosystems and overcome desertification processes are needed to build climate resilience.

In addition to practices already recommended in SAD, particular emphasis in Hatra should be given to:

- Rehabilitate previous water schemes and infrastructures destroyed by ISIS.
- Provide tools and inputs, conditioned upon their usage in agriculture, but avoid distribution of livestock heads if not backed by long-term programmes at landscape scale.
- Invest in the diffusion of drought and salt-tolerant species and varieties.
- Dig wells only if backed by hydrogeological studies and chemical-physical analysis to understand salinity and sulphur, in particular. Pilot small-scale water desalination plants or ad-hoc facilities to reduce salts concentration. Provide water reservoirs and tanks.
- Collect runoff rainwater through small catchments and small earth dams. In Ramadania, further studies could develop small water catchments from the existing wadi during the rainy season. Water can be stored for livestock drinking or used even in agriculture, depending on the amount collected and evaporation rate. Measurements and calculation could give an idea of the potentialities for this community infrastructure.

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- Invest in small livestock potential exploring poultry value chains for self-consumption and as an alternative income generation. Explore value chains of camels and ostriches. Understand the feasibility of having one or two cows per household for milking and dairy products purposes.
- It is key to adopt an Integrated Rangelands Management approach to reestablish grazing potential for the livestock. Restoring grazelands and pastures is fundamental not to lose this livelihood in an area which is hardly convertible to other agricultural livelihoods. It is recommended to better understand and apply ad-hoc initiatives on grazelands' health, livestock pressure and dynamics, by:



- Designing and applying grazelands plans to manage access to grazing lands;
- Rehabilitation/construction and community maintenance and control of infrastructure such as livestock water points;
- Seeds spreading by the shepherds of improved, more nutritious and climate-resilient (to drought, salt and heat) fodder species to restore potential pastures;
- Establishment and conditional regulation of set-aside areas/closures to be used as “grass banks” during dry spells and droughts;
- Understanding and aligning to traditional dynamics is key to ensure a considerable impact;
- Designing and applying controlling and regulatory schemes, e.g. bylaws and their enforcement through rangeland units;
- Understanding zero-grazing potential and supporting local and small-scale fodder production;
- Properly storing fodder with necessary small-scale infrastructures;
- Investing in veterinary and livestock extensionist services;
- Conduct market studies and provide TVET on selected value chains.

