

A Gender and Inclusive Climate-Migration Study

Salah al-Din Governorate – Iraq

June 17th, 2023





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Acronyms and abbreviations

CSO: Civil Society Organisation

DoA: Department of Agriculture

EWS: Early Warning Systems

IOM: International Organization for Migration

Ha: hectares

KII: Key Informant Interview

MoE: Ministry of Environment

NDC: Nationally Determined Contributions

PCM: Project Cycle Management

SAD: Salah al-Din

SDS: Sand and Dust Storms

UNEP: United Nations Environmental Programme

DoE: Department of Environment

FGD: Focus Group Discussion

IQD: Iraqi Dinars

MSD: Market Systems Development NAP: National Adaptation Plan

PIN: People in Need

Executive summary

According to UNEP¹, Iraq is the fifth most vulnerable country to climate change to decreased water and food availability, and extreme temperatures. Increasing temperatures, unpredictable rainfall, intensified droughts, sand storms and desertification are just some of the variables contributing to Iraq's climate journey.

Climate change impacts are further compounded by the trans-boundary water governance and mismanagement of natural resources which is leading to negative impacts on Iraqi agroecosystems and farmers, most noticeable in sustaining livelihood production. As a result, agriculture productivity is being reduced. The agricultural sector, the second-largest contributor to the country's GDP in an oil-based economy, is shrinking, and leading to climate and environmental migration from rural to urban areas^{2,3}. 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 3 villages in Shirqat, Baiji, Tikrit District, Salah-al-Din Governorate (SAD), emphasizing the gender and social inclusion factors linked to this and suggests possible measures to take in the short and long-term.

¹ UNEP, 2019. Global Environment Outlook

² World Vision, Save The Children, Oxfam. 2022. Unfarmed now. Uninhabited when? Agriculture and climate change in Iraq

³ IOM Iraq, 2022. Migration, environment, and climate change in Iraq



Purpose of the study

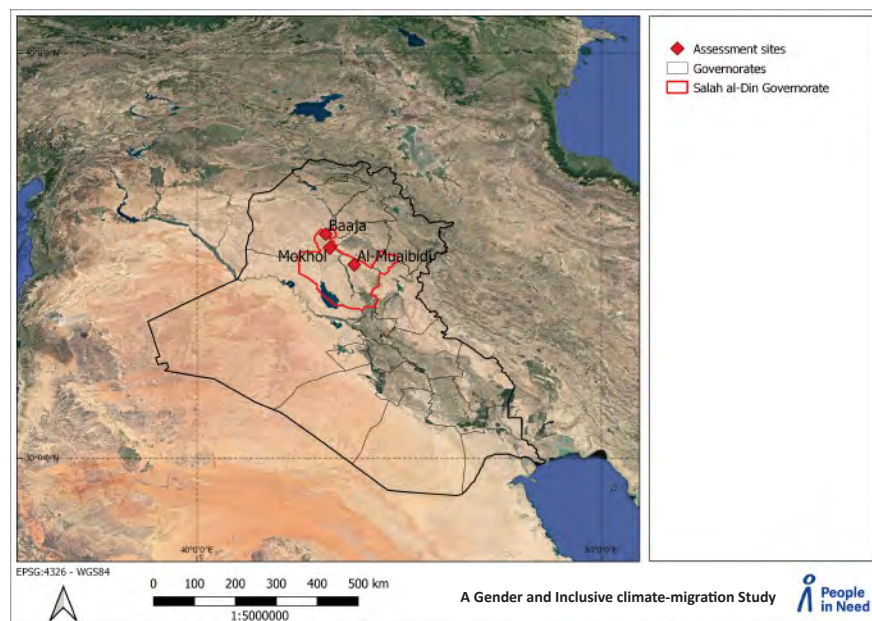
The study aims to gain a deeper understanding of migration and movement dynamics in relation to climate change impacts within the target communities in Salah al-Din, a strategic governorate for People in Need's (PIN's) past and future interventions. This report is of the output of a two-phased approach to understand and gather evidence on coping mechanisms and adaptation solutions taken by local farmers, including movements and migration dynamics, and to provide evidence-based information to support PIN's next programme phase in SAD.

In a rapid field appraisal carried out in October 2021 by PIN Iraq, farmers in al-Alam site (SAD governorate) expressed their concerns in facing new challenges and changing factors, including climate⁴. It was noted that farmers were relying on inappropriate farming solutions in the long-term, based on business-as-usual practices in soil and water management. All this could ultimately lead farmers to abandon their farmlands and amplify migration dynamics. These factors were explored deeper to gather more detailed information and fill the evidence gaps in SAD governorate.

Geographical area

The geographical area selected for the study is SAD Governorate, Iraq. Three main sites were identified: Baaja (Shirqat District), Mokhol (Baiji District), al-Muaibidi (Tikrit District).

The selection of the interested sites was made on the basis of PIN's strategic presence and identified migration dynamics indicated by local authorities and farmers' associations through previous interventions due to climate change impacts. The area is located in the central part of Iraq, bordering the Kurdistan Region, and is mostly desertic and semi-desertic along the Tigris river.



Agriculture is largely irrigated and consists of smallholder farmers or large monocultures (wheat and barley). The three sites are briefly described below in the document.

⁴ PIN- 2021- Internal Back to Office Report and Annexes.



Methodology

The methodology used to develop this report combined 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 provide 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 SAD made by PIN and BigTerra⁵.

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, Focus Group Discussions, direct observations and direct interviews through a household questionnaire.

Three tools were designed:

1. A customised list of key and probing questions for unstructured interviews to key informants within governmental 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. Five local government authorities and 2 research centres/universities were interviewed.
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. Twenty-seven men (including 2 with disabilities) and eighteen women participated.
3. A questionnaire for the quantitative data gathering with individual household interviews. Seventy-one interviews were carried out with 41 females and 30 males.

Limitations of the Methodology

Some key issues:

- Direct observations of farms and informal interviews were only possible in the first location (Baaja - Shirqat), while in the other two cases security constraints and/or unforeseen challenges did not allow a field visit.
- It was challenging to ensure women's participation and freedom of speech without men's consensus and presence.
- The local authorities are generally scarcely aware of the situation in the farmlands, so KIIs in Shirqat and Mokhol were composed by a heterogeneous group of 2-3 individuals representing both local authorities and farmers' associations.
- Interviewed key informants from research centres/universities were not integrating research on migration or any social aspects.

⁵Big Terra & PIN. 2022. Climate Report – Iraq available at <https://resources.peopleinneed.net/documents/1144-iraq-executive-summary-2.pdf>



- It was difficult to select a sufficient number of key informants, as climate change has become a recent issue in the Iraqi society and in particular in SAD.

Main findings

The secondary research⁶ highlighted SAD as one of the governorates most vulnerable to climate change. Climate parameters, trends and projections in SAD⁷ reported:

- An increasing average temperature
- Unstable annual precipitation
- Increasing variability for temperatures and precipitation
- High probability of extreme events in temperature
- High probability of intense rainfall in autumn and drought events in summer

Furthermore:

- Various projections for the future confirm stated facts.
- PIN's "Climate Report"⁸ shows in Shirqat area an average rise of minimum temperature in winter months of 1 degree Celsius which will lead to probable harm to the vernalization of crops, unreliability of precipitation patterns in November, March and April, extremization of rainfall events, and lower productivity for some crops like wheat and barley.

- Droughts are intensively affecting farmers' livelihoods as farmers are not applying measures for a wiser use of natural resources. Governmental actors also lack appropriate monitoring and strategic tools.
- 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 have intensified and become more frequent due to reduced soil moisture with impacts on health and livelihoods.
- Although environmental and climate migration from rural to urban areas in Iraq is confirmed by international NGOs and the UN's International Organization for Migration (IOM) countrywide, in SAD information is still scarce⁹.

⁶Annex 2: Brief analysis of secondary data

⁹IOM Iraq, 2022. Migration, environment, and climate change in Iraq

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

⁸PIN & Big Terra.2021. Climate Report - Iraq available at <https://resources.peopleinneed.net/documents/1144-iraq---executive-summary-2.pdf>



Direct observations

“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 Baaja - Shirqat, smallholder farmers are trying to diversify the agricultural production and find alternative agriculture livelihoods. The majority of crops grown are wheat (70%), barley (60%), and okra (60%), but also cucumber, eggplant, tomato, onions, olives (40%). Chickens are owned by 80% of the respondents, cows by 70%, sheep/goats by less than 20%. Less than 20% don't own livestock at all. Support is needed for improvement and effectiveness of the solutions undertaken. Lack of water and salinization are strong barriers.
- In Mokhol - Baiji, desertification processes are intense and water resources are impacted. Smallholder farmers are present, but very limited, while large scale monocultures are more recurrent, mainly wheat and barley and to some extent eggplant, okra, tomato, and cucumber. Sprinklers and other irrigation methods are almost 50% rather than drip irrigation, which is used only by 7% of participants. Chickens and cows are owned by 30-40% of the respondents while 20% own sheep/goats and approximately 40% are without livestock. Power supply is a strong limiting factor.
- In al-Muaibidi- al-Alam - Tikrit, both smallholder farmers and larger farms are growing wheat, barley and maize. Chickens and cows are owned by 30-40% of the respondents while almost 90% own sheep/goats and less than 10% are without livestock. Desertification processes exist and encroachment of sand dunes are evident. Power supply and need for deeper wells are the main challenges.

Key findings from KIIs and FGDs

Access to and control over natural resources

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

- The main natural resources are the same in all sites: water (through wells), farmland, soil and livestock.
- Women are deemed by men to have access to the natural resources but with limited or no control and ownership. This was confirmed by female respondents. Men are generally reluctant to permit women to be interviewed or speak openly.



- Men are in charge of farming, agriculture commodities processing and marketing (main markets are in town), water management for drinking, farming and livestock, energy management and livestock management. Women are in charge of taking care of children, house chores and milking cows. In Baaija, Shirqat women also participate in farming activities, while in all locations they take care of the kitchen gardens, if any, even together with men. Interestingly, in Baiji, women cultivate an average of 7.5 different products, whereas men cultivate only 4.5 products. Female farmers demonstrate a higher tendency to retain their harvest, while 85% of male farmers are more inclined to sell more than 50% of their harvest.

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 general, there are strong gender, social and cultural norms that affect women’s participation and decision-making power at household and community level. The further south and central in SAD, the stronger these dynamics are observed.
 - Men have the decision-making power but feel that women are consulted and included in the process. Women feel that the final choice is in the hands of men and their voice is not binding.
- Men produce the income and women are consulted on how to use it, although the final decision is with men. In case of more than one wife, they are not consulted.
 - In the surveyed areas, women are limited in their role in their communities in relation to participation in meetings and institutional activities. It was acknowledged that there are some women in their communities holding positions such as teachers and doctors, and girls can attend school.

Climate trends and impacts

“What are the main climate tenders and climate change impacts? How have things changed in comparison to the past? What are other socio-economic and environmental stressors?”

- Climate change is generally overemphasised and farmers are not identifying poor natural resource management and agricultural practices as a factor. Lack of governmental support was noted as a key issue.
- Previous conflicts that disrupted the farmlands and farming assets are seen as a multiplying factor of negative impacts in Mokhol - Baiji.
- The rise in food and energy prices are deemed further economic stressors in all locations.



- In the interviews, less precipitation and unreliable rainfalls are reported as main effects in the three locations. In the FGDs, the decrease of groundwater availability, quantity and quality (salinization) are also linked to climate change, similarly to an increase of droughts, Sand and Dust Storms (SDS), temperatures and an intensification of desertification processes. SDS and desertification processes are more intense in farmlands closer to the desert (e.g. in al-Muaibidi (Tikrit) and Mokhol (Baiji) where people must abandon houses and farmland covered by the sand).
- A decrease of vegetation cover and changes in land use are noticed and linked to an impoverishment of the landscape quality.
- Ultimate impacts are seen on household financial resources, food security and health, with increased diseases witnessed than in the past (human, livestock and plants). A decrease of yield is reported in 50% of the cases in Baiji, 60% in Shirqat and almost 75% in Tikrit. In Shirqat, 50% lost the production and income, while 60% lost both in Tikrit and 75% in Baiji. In Tikrit, 60% of respondents indicated that their livestock became ill/died, much higher than in the other two locations. 5-15% of family members have respiratory issues in Baiji and Tikrit.
- Changes in people's wellbeing and family and community dynamics were noted. In Baiji, around 10% say that climate change has brought conflicts on water resources.

Main climate related vulnerabilities

“What are the main vulnerabilities that are related to changes in the climate trends and parameters? How different groups can be differently interested by such changes? Who can be more vulnerable to such changes?”

- All participants shared concerns of their own vulnerabilities from climate change. However, people with disabilities, chronic health issues (e.g. respiratory diseases in case of SDS), the elderly and children are seen as the most vulnerable in their community. Existing diseases are seen as amplifying vulnerabilities in 50-60% of the cases. In particular, children experienced responsibilities of house tasks (girls, in particular in Baaja - Shirqat), child labour (boys, in particular in Mokhol - Baiji), and psychological stress.
- Women are highly vulnerable due to increased farming activities (Baaja - Shirqat), increased/new household tasks, and decreased/changed household dynamics and spaces in urban settings, leading to psychological stress.
- In households with already low incomes, climate change will exacerbate their vulnerabilities. In Tikrit, half of respondents deem that some ethnic/disadvantaged groups are more impacted.
- No early warning systems (EWS) exist and farmers rely on word of mouth and Facebook to get alerts of climate hazards, seasonal trends and extreme weather events.



Coping mechanisms

“What are farmers doing to cope with a sudden-onset climate shock? How are other stakeholders intervening to help farmers in this?”

- Across all locations coping mechanisms exist and are various, with some peculiarities. This includes:
 - Relying on savings or borrowing money from friends and relatives.
 - Selling livestock (from 25% in Baiji to 40-50% in the other locations).
 - Eating less food and reduction in its quality in about 10 to 20% in the cases.
 - Using less oil and meat, and not consuming vegetables.
 - Maximising the usage of water resources, including water fetching from wells in Baaja – Shirqat, and increased agricultural assets, e.g. sprinklers in Mokhol – Baiji. In general, extracting more water is reported in 40-50% of the cases.
 - In Shirqat, removal of children from schools or asking children for more support is mentioned in 20% of the cases.
- Loans and micro-credits are generally not available, but around 10% reported to ask for loans in Shirqat. Farmers mainly rely on community and family support for extra credit, particularly in Baiji and Tikrit with around half or the respondents mentioning this. Use savings is more common in Baiji and Shirqat (30-40%).
- Moving to the towns and searching for non-farming temporary jobs is mentioned by 10 to 20% of respondents in case of sudden climate hazards impacting the household economy. In all locations, there are daily temporary or more permanent movements and migration. In Mokhol – Baiji, families rely on temporary jobs taken by men and boys.
- Reduced farming areas is common, with 40-50% of cases. Furthermore, while in Baaja – Shirqat farmers reported to maximise their cooperation with other farmers (for example, operating the wells alternatively to ensure a minimum amount of water to everyone), in Mokhol – Baiji, they share the land with the sprinkler owners.

Adaptation strategies and Solutions

“What are farmers doing to adapt to climate change and its effects and impacts (long-term)? How are other stakeholders intervening to help farmers in this?”

Some longer-term solutions exist but are embryotic and scattered, and are more present in Shirqat, e.g. diversification of agricultural production, additional wells and reduced water usage for irrigation, etc. Furthermore, farmers in all locations are diversifying income through daily labour work, driving taxis and selling petrol.



There are more coping mechanisms than adaptation solutions and 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.

- Some solutions being taken by farmers include:
 - Diversification of agricultural production (in Baiji and Shirqat, 30% of the respondents see this positively, but none in Tikrit)
 - Additional wells created (particularly in Tikrit, where 60% of respondents see this solution positively, with multiplication and construction of deeper wells in al-Muaibidi) and reduced water usage for irrigation, mentioned particularly in Baiji (>30%). In Shirqat, drip irrigation is more common than in other areas (70%).
 - Sharing of resources is not so commonly seen as a good solution but in Mokhol – Baiji, farmland is shared with sprinklers' owners for farming and pastures.
- As still embryotic and scattered, if not properly planned and managed, these solutions can become inadequate practices (e.g. if groundwater recharge is not duly considered when constructing a new well).

- Conservation and regenerative methods are still not adequately known and farmers often misinterpret the type of solutions applicable. Some nature-based solutions at the landscape level have been taken by the desertification centre in Baijito stop the desertification by building green walls and mini-green belts to halt the sand coming towards the farmlands and roads.
- Some coping mechanisms that are also taken as a longer-term solution are: in Shirqat, asking children to support (mentioned in 20% of the cases), eating less food (particularly mentioned in Tikrit, 46%), eating less quality food (from 20 to 40%, still with the maximum percentage in Tikrit). Moving to another location is mentioned in 30% of the cases in Baiji and 40% in Tikrit, and 20% and Shirqat.
- Around 50% of respondents in Shirqat and Baiji think the solutions implemented in both the short and long-term have impacted some household members, and almost 75% in Tikrit.
- Awareness raising on climate change is seen as the main action from the government, and solutions suggested cannot benefit by the governmental instruments in place (policies, strategies, plans, actions points, finance schemes, laws and regulations). 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.
- The governmental support with seeds and fertilisers, delivery of basic goods and specific safety nets for poor households have decreased in years both in quantity and quality, due to lack of internal and external funding.



- The main needs reported by the farmers are financial resources for investments and inputs/assets, but in particular the need to improve awareness and skills on how to apply the methods. On the contrary, the linkage to markets is commonly given less importance. The hard solutions suggested by local farmers and institutions are particularly linked to financial support for investments, new water resources and assets/inputs. In particular:
 - Installation/rehabilitation of greenhouses.
 - More water efficient irrigation systems with sprinklers and drip irrigation.
 - Solar energy systems in irrigation, water desalination systems (for human consumption in Baaja - Shirqat, and drip irrigation).
 - Construction/rehabilitation of wells.
 - Provision of inputs (seeds, ploughing tools, etc.)
 - Mechanisation, construction/rehabilitation of storage facilities.
 - Food processing facilities (e.g. olive press in Baaja - Shirqat).
 - In al-Muaibidi – Tikrit, facilitation of governmental procedures for farmers and planting trees are also seen as fundamental.

Migration

“What are the migration dynamics (permanent/temporary) and how is migration influenced by climate change? What is the resulting income used for? How do migration dynamics affect different groups of people (by gender, age, etc.)?”

Migration or increase movements is seen as a long-term solution to environmental degradation and climate change impacts by around 20-50% of the farmers, with the highest percentage in Tikrit, followed by Shirqat and Baiji, with women generally more skeptical than men on this solution.

Nevertheless, although dynamics are different in the 3 sites, the common point is that 60-80% of farmers would stay in their farmlands and see migration as a last resort. Temporary migration is therefore preferred. Climate migration is in many cases linked to other aspects such as environmental issues, security and economy, and there are increasing climate-driven displacement (in Shirqat, 20% of respondents reported this case). Governmental institutions and research do not have clear information on migratory fluxes and socio-economic drivers.

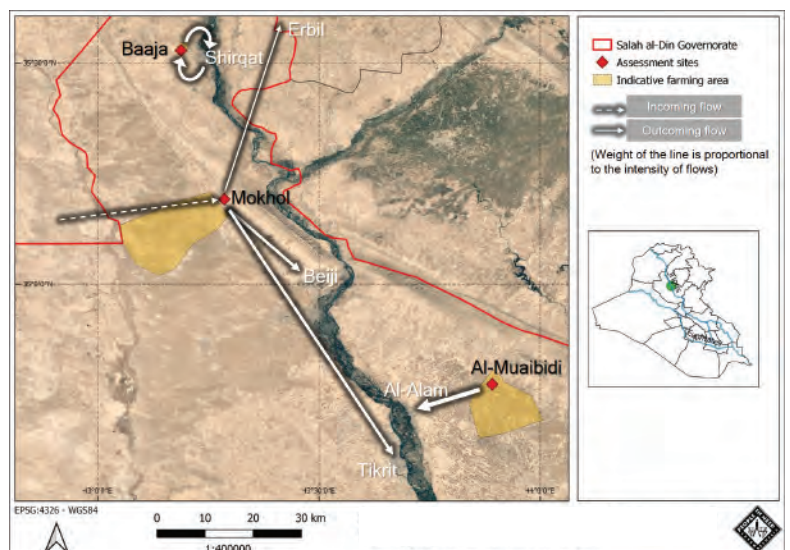


- Not enough capital and uncertain success are among the main discouraging factors toward migration, while money saved and relatives/friends support are the main supporting factors.
- No agricultural production (100% in Tikrit and Shirqat) and no income are among the main drivers to move away. No livestock and better farming conditions can also play a role.
- In Shirqat, finding a more permanent farming livelihood is the main scope when moving, while in the other locations even temporary non-farming jobs (taxi driver, services, etc.) are considered.
- The money earned is mainly given to the household (80%) and men are responsible on its use (in Shirqat and Tikrit in 100% of the cases). Basic needs and essential goods are prioritised, e.g. school fees, doctors and medicines, food, bill payments, debts, etc. 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 shared concern in the sites when a member of the household moves to another place. In Shirqat and Tikrit, respondents also mentioned children helping more on the farms (girls particularly, >40% of the cases), earlier marriages for girls (mentioned in Tikrit by more than 40% of female respondents), girls who have to help more with household chores, people with disabilities/diseases who receive less support, women burdened by extra tasks, etc.

The difficulties after the migration include: no farmland (60-86%), not enough income (50-80%), no housing facilities (around 70%), no support from the government (40-50% in Shirqat and Baiji). In general, women report fewer social interactions and no possibility to keep livestock. In Baiji, less social interactions are strongly mentioned, particularly by women (67%).

Some peculiar migration dynamics are common in the targeted sites:

- In Shirqat – Baaja, both men and women’s movements are more localised and daily-based from areas where people live (a few kms away) to their farmlands (presenting very harsh conditions to live in). If they move away, finding another farming area becomes the priority.



- In al-Muaibidi – Tikrit, it is estimated that 70% of farmers have migrated with their families, mainly to al-Alam urban area and if not to a far town/city, abandoning the farmlands deemed no longer profitable. Increasing difficulties (e.g. new habits and behaviours) have emerged and an extra burden could be allocated to women's tasks.



Recommendations

In this chapter, the main recommendations to key stakeholders to tackle climate hazards, increase climate resilience and reduce migration fluxes from the farmlands in SAD are noted below:

Recommendations to governmental bodies

The promotion of good governance approaches is crucial to ensure that farmers feel included and supported. Farmers' associations need to be capacitated and backed by investments in the strategic sector of agriculture. Governmental extensionists must build a mutual trust with farmers to avoid continuation in solutions that are unsuitable for the area and the changing climate.

- Work on transboundary water governance and build on existing climate change documents, frameworks and platforms (e.g. NDC, NAP, COP 27, Green paper) to integrate migration perspectives and dynamics.
- Ensure the design of local instruments with bottom-up and decentralised approaches to ensure the translation for the materialisation of national and international commitments.
- Provide financial resources and capacity building to sub-national governmental bodies to implement the expected policies, strategies and tasks to boost proper water management, climate-resilient agriculture, diversification of the sector and local production and consumption.
- Invest in strengthening rural and urban infrastructure and services (e.g. water and sanitation, energy, transport, telecommunications, health and social services) to increase resilience of farmers in farmlands (to discourage farmers migrating) and accommodate and enhance resilience of farmers in urban areas after migrating.
- Create ad-hoc power and water payment systems, and explore water tariffs, monitoring schemes and water payment mechanisms on consumers.
- Promote investments in nature-based solutions to increase resilience to climate change in the long-term by applying monitoring protocols and support. Concentrate the efforts on combating environmental degradation and restoring ecological conditions regardless of climate change scenarios.



- Strengthen and tie local stakeholders together, creating the necessary collaboration with central authorities and investing on participatory policy and decision-making processes. Cross-ministerial climate change policy is needed to ensure a common ground and shared vision across concerned Ministries.
- Building on existing resources, such as technical capacities at the desertification centre and at the University of Tikrit, and existing analysis available at the DoE (database on desertification areas in SAD) is encouraged.
- Systematise gender and social inclusion perspectives and actions in governmental approaches and instruments.

Recommendations to international donors and actors such as NGOs

As farmers' main focus is to increase the quantity of water for farming, solutions on soil and water conservation and climate-smart practices should be widespread and adopted instead. To ensure their adoption is fundamental to leverage behavioural changes, e.g. Social and Behavioural Change approaches, and long-term support.

In the short-term:

- Rehabilitate water systems damaged by the conflicts and respond to imminent droughts, using acquired methods such as cash and voucher assistance.
- Rehabilitation of physical infrastructure (e.g. irrigation and drainage) should prevail on the construction of new ones and new groundwater wells should be backed by hydrological evidence.
- Provide inputs and tools, construct storage systems and provide food processing tools locally.

In the long-term:

Natural resource management, technical and engineering solutions, policy, governance, economic and financial approaches, political and legal frameworks and instruments, should be combined for a more effective intervention. It is key to invest and promote solutions to reduce water consumption, water wastage and increase retention at local scale. This could restore/increase soil productivity with both soft and hard solutions in combination with the gendered and social inclusion and migration dynamics.

- Improve disaster risk management systems with a particular focus on the improvement of Early Warning Systems. Ensure community ownership and input in EWS.
- Support awareness raising and behavioural change campaigns and activities with a focus on water saving in schools, mosques and markets.
- Invest in water reuse and reduction systems, supporting small-scale wastewater and reuse systems for irrigation also piloting nature-based solutions (e.g. vegetation-filtering parcels) – exploring rainwater harvesting and small catchment systems.
- Increase investment in capacity building of local authorities, private sector, general public on climate-smart practices in different sectors. Capacitate and improve extension services for farming and livestock, both for governmental and private extensionists.



- Capacitate local CSOs to advocate on climate change and environmental topics, in particular on inclusive water policies, favouring debate across water bodies and actors and application of small-scale solutions.
- Invest in nature-based solutions (NbS), in particular Ecosystem-based Adaptation (EbA) solutions, creating green belts and green walls with indigenous trees and bush species to increase biodiversity, decrease evaporation, maximise shadowing effects, as breaking-wind action, to stop desertification processes. Create buffer areas with agroforestry practices (orchards and rotational parcels with crops, vegetables, pastures).
- Make sure that groundwater supply systems (wells) are supported by evidence by implementing hydrological feasibility studies, understanding water cycle dynamics and risks of over exploitation due to insufficient recharge capacity and decrease of the groundwater tables.
- Install solar pumps through off-grid systems to self-rely on an electricity source at farm level .

- With experts, support systematic monitoring of water parameters, for both surface and groundwater. Simple kits may be used to collect field information (e.g. oxygen dissolved, Ph, TDS, electroconductivity, temperature, ORP, turbidity) while laboratory analysis have to be requested in case need is to measure for instance heavy metals content, BOD and COD, specific water pollutants.
- With experts, support monitoring of biological, physical and chemical soil parameters and characteristics both with field observations and rapid field kits (to understand the pedology, texture and basic parameters such as Ph and organic content), and laboratory analysis (to investigate content in nutrients, organic matter, lime, texture, heavy metals and pollutants, EC, infiltration rate, saturation, moisture, Cation-exchange capacity – CEC).

It is key to assess and understand gender, age, disability, social inclusion norms and the impact that they have on access to opportunities, decision making processes, burdens, etc. Tackling gender issues is crucial. Women must be empowered and have an active role in controlling resources and be part of the decision-making processes to reduce their vulnerability also to climate change. Marginalised and disadvantaged groups, including minorities, people with a disability and people with health-related illnesses are greatly vulnerable to climate change and ad-hoc approaches should be envisaged.

- Systematically mainstream gender and social inclusion perspectives and actions in project cycle management and or aim for transformative gender-based and inclusive interventions.
- Ensure customised climate vulnerability studies that can include gender and social inclusion perspectives and migration dynamics.
- Improve knowledge of gender-based approaches that are key for women's empowerment and ensure representation of gender, youth, disadvantaged and minority groups into policy and decision-making processes.
- Customise gender-based household and community activities (e.g. vegetable gardens) that can return in specific climate actions with food security and nutrition co-benefits.

- Involve communities with innovative approaches, e.g. women-led natural resource management groups that can have psychological, physical and societal benefits and help the diffusion of key messages on environmental protection and climate change.
- Support the establishment of women saving groups and explore formal microcredit women-led associations at the community level. This needs to consider gender norms and roles, ensuring male engagement and support (allies).
- Work closely with existing CSOs on marginalised and disadvantaged groups, including minorities, people with disabilities and people with health-related illnesses to tackle specific issues and ensure inclusive mechanisms.
- Migration fluxes and customised solutions in original sites have to be coupled with ad-hoc approaches and solutions in migratory places, where social tensions and higher competition for resources can arise.
- Provide psychosocial support to help internal migrants and members of households ensure psychological relief and recovery after traumatic dynamics and build people's resilience.
- Apply DNH and conflict sensitive programming, understanding the link to war, impunity, existing community tensions, land disputes and how this is/will be further exacerbated by climate change.
- Engage in social protection approaches for climate risk management.

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