

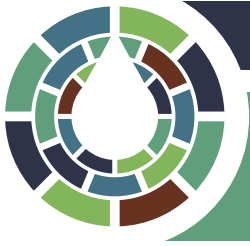
REPORT

# Water, Peace and Security



## Understanding the Pathway from Water Insecurity to Urban Migration in Southern Iraq

March | 2023



# Understanding the Pathway from Water Insecurity to Urban Migration in Southern Iraq

## Introduction: pressing concerns about water insecurity in Iraq

Although global migration is - contrary to popular discourse - remarkably stable representing on average 3% of the global population in the last 50 years, the majority of people tend to migrate within rather than across borders (*World Migration Report 2022*, 2021). Statistics published by the Internal Displacement Monitoring Centre (IDMC) report that 30 out of the 40 million internal displacements in 2020 were related to water-related hazards (IDMC, 2021). Similarly, the World Bank estimates that slow-onset climate events such as droughts could lead to 216 million internal migrants by 2050 (Clement et al., 2021). These predictions capture the growing mobilisation by the international community to understand and respond to this migratory shift, as mobility is now predominantly internal, prompted for a large part by climate and water-related events.

This paper analyses the nexus from water insecurity towards the loss of economic livelihoods in agriculture and, further, migration (or non-migration) in southern Iraq. Iraq, historically located in the fertile crescent<sup>1</sup>, draws attention because of its steep decline in water supply and related socio-economic challenges (Birkman et al., 2022). Since the 1980s, water from the Euphrates and Tigris rivers, which provide up to 98% of Iraq's water supply, have decreased by 30% (Alwash et al., 2018, p. 6; Von Lossow, 2018, p. 2). This decline of water availability is not simply the result of climate change, but also the product of anthropogenic or human factors such as intensive water usage by industries, upstream construction of dams in the river basin, and outdated and dysfunctional water infrastructures (Birkman et al. 2022).

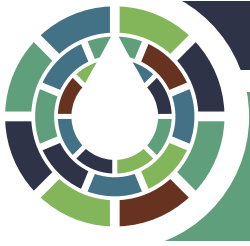
<sup>1</sup> The fertile crescent is a large geographic region in modern-day Turkey, Iran, Iraq, Syria, Israel, Jordan, and the most northern-eastern part of Egypt.

## TABLE of CONTENTS

Introduction: pressing concerns about water insecurity in Iraq	2
Pathways from water insecurity to migration	3
The water insecurity-migration nexus in southern Iraq	5
Conclusion	11
References	12

**Authors:** Toka Mahmoud, Irina Patrahau, Alicia Vignali  
**Contributors:** Laura Birkman, Judith Blaauw, Frederique de Groen, Susanne Schmeier, Tobias von Lossow, Rolien Sasse

While a direct link between water insecurity and migration cannot be drawn, water insecurity may indirectly increase migration patterns by impacting individuals' socio-economic situation (Cai et al., 2016). About 18% of Iraq's workforce is employed in agriculture (World Bank, n.d.-a). As such, the agricultural sector's intensive water usage and livelihood dependencies could subject Iraqi society to water-induced migration. This paper argues that water insecurity can prompt internal migration when economic livelihoods are harmed and individuals' adaptive capacity is weak, i.e., they lack alternative employment opportunities, a strong social safety net etc. If this adaptive capacity is strengthened by targeted policy interventions, individuals may choose alternative ways to cope with water insecurity and decide to stay rather than migrate.



## Understanding the Pathway from Water Insecurity to Urban Migration in Southern Iraq

### Pathways from water insecurity to migration

The World Bank defines water security as (1) access to adequate quantity and (2) quality of water for human well-being and socio-economic activities (World Bank, 2018).<sup>2</sup> Achieving water security is conditional on the preservation of natural ecosystems but also on peace and stability. As such, water (in)security does not only refer to the physical access to resources, but also to the socio-economic and political context contingent on governance structures. Water insecurity is affected by various stressors, whether they are human activities (e.g., government authorities, industry, and socio-economic groups) or environmental factors (e.g., climate change and related weather events) (Birkman et al., 2022).

Initially, academics explained migration through the presence of macro-level ‘push’ and ‘pull’ factors at origin and destination sites. Employment opportunities and the provision of services like education and healthcare may be pull factors in destination areas, whereas underdevelopment illustrates structural push factors in origin areas (de Haas, 2021). However, the push-pull theory fails to consider the prevalence of historical patterns and political factors as well as the individuals’ demographic characteristics, networks, or agency. It comes short of explaining the absence of migration where structural push factors exist (Jónsson, 2010).

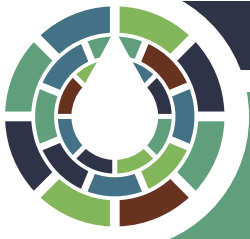
Migration has more recently been theorised as the ‘function of people’s aspirations and capabilities to migrate’ (de Haas, 2021). As such, development can be a driver of migration from a rural to an urban area, provided that individuals have the desire or aspiration to move and thus the perception that their living conditions will be improved if they choose to migrate. This explains both migration and immobility despite structural incentives such as economic opportunities and access to better services. Moreover, this migration theory denotes both structural drivers

such as basic goods and personal capabilities determined by age, network, gender, education and access to material resources (Flahaux et al., 2016). This theory assumes that migration is a choice made at the individual or household level, thus emphasizing agency in mobility patterns.

Despite an increasing body of research studying the pathways between water (in)security and migration, evidence supporting water insecurity as the sole driver of migration is absent (Borderon et al., 2018; Ash & Obradovich, 2020). Overall, in their systematic review, Obokata et al. show that migration patterns usually occur within national boundaries (Obokata et al., 2014 p.112). Moreover, in the case of identified climate or environmental stress, research shows that farmers and pastoralists may respond with migration (McLeman and Hunter, 2010). Migration is thus presented as a strategy of adaptation where water plays a central role due to the relationship between the environment and rural agrarian activities (Brown, 2008; Stoler et al., 2021). Nevertheless, although the sensitivity of rural livelihoods to water-related weather events makes a compelling case for the water-migration nexus, it is difficult to quantify migration flows and attribute movements to climate hazards (Von Uexkull and Buhaug, 2021).

The indirect relationship between water insecurity, economic livelihoods and migration has been conceptualized in Figure 1. Slow-onset weather events such as droughts cause water insecurity both in terms of water quality and quantity. Water insecurity can be related to migration due to its negative impact on human well-being through the deterioration of livelihoods, which in turn prompts individual coping mechanisms such as migration (figure 1). Reduced water quantity and quality can affect agriculture, livestock and fish industries in addition to infrastructure/water services and manufacturing, thereby creating a situation of water insecurity (Cai et al., 2016; Stoler et al., 2021).

<sup>2</sup> This report makes the distinction between water security and water scarcity, the latter of which denotes the lack of physical availability of water resources excluding socio-economic and political pressures.



# Understanding the Pathway from Water Insecurity to Urban Migration in Southern Iraq

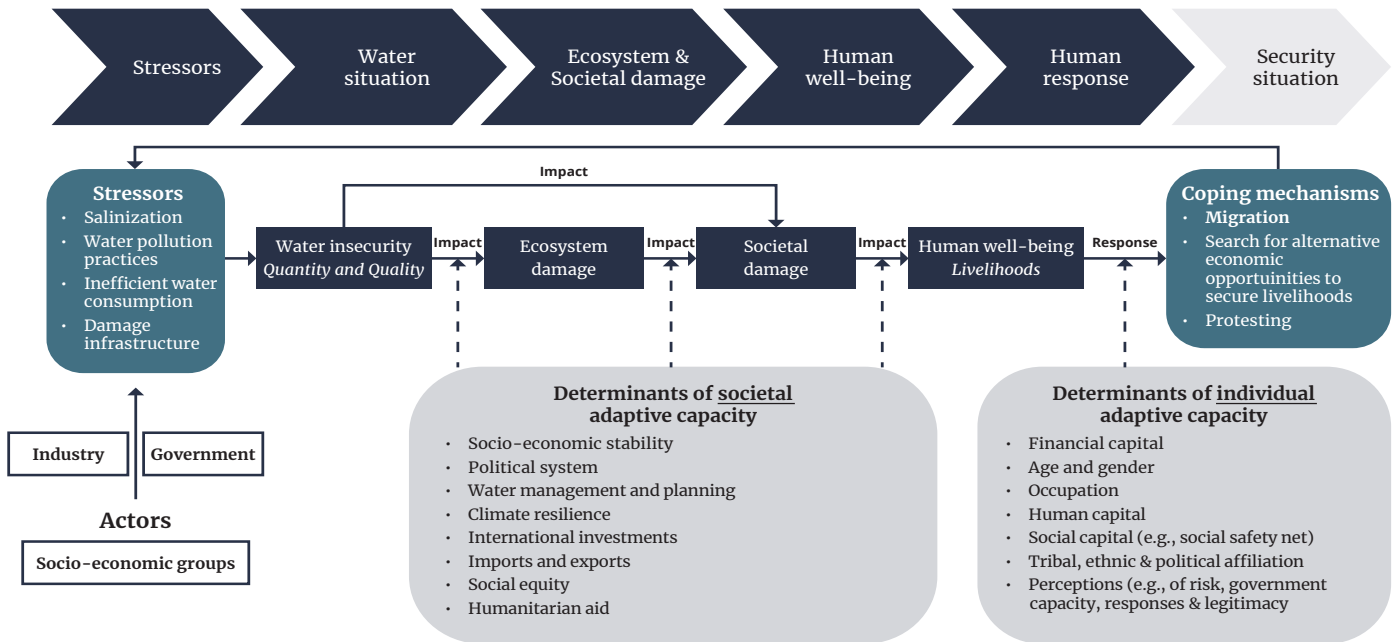


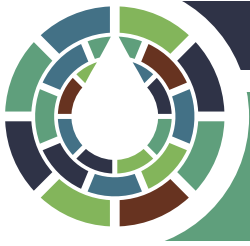
Figure 1 The nexus between water insecurity and migration.  
 Note: The impact of migration on security situation is not analysed in this brief.

Water insecurity can have adverse effects on three interrelated levels: ecosystem, society, and human wellbeing (Figure 1). The ecosystem level refers to the natural environment affected by water insecurity. At this level, water insecurity can have negative impacts on agricultural lands, pastoral lands and fisheries, which in turn affect socio-economic dynamics (Cai et al., 2016). Water insecurity can also directly impact the society as a whole, through the deterioration of manufacturing, agricultural, livestock and fish industries, and water services and infrastructure (Cai et al., 2016; Stoler et al. 2021). The deterioration of the industrial sector may have significant consequences for national food security and employment rates, both of which can further affect human livelihoods by decreasing household food supply, job security and income. As a result, migration patterns may increase.

The severity of the impact depends on adaptive capacity both at the societal and the individual household levels which shape (1) the effects of the water situation on human wellbeing and (2) the availability of different coping mechanisms (Figure 1). Thus, the determinants of adaptive

capacity can mitigate or exacerbate the impact of a water situation on migration. For example, people with more financial resources may afford to incur crop production losses in a particularly arid season, whereas citizens that lack these resources may resort to migrating to areas with more fertile grounds. As such, determinants of adaptive capacity include social and financial capital, age, occupation and tribal affiliation, as illustrated in Figure 1.

Migration is one of the responses to water insecurity, but non-migration is an equally relevant coping mechanism. Often, the most vulnerable groups do not have the resources to migrate and are constrained to stay in vulnerable situations. For instance, land tenure and home ownership play a crucial role in household decisions of migration (McLeman and Hunter, 2010). In this case, individuals may choose to stay and search for other employment opportunities, get involved in illegal activities to secure livelihoods, protest. As such, institutions, governance, economic considerations and social equity shape the extent to which water insecurity prompts migration as a coping mechanism (Jones et al., 2017). Water insecurity and migration



## Understanding the Pathway from Water Insecurity to Urban Migration in Southern Iraq

are parts of broader, more complex socio-economic and political contexts, as illustrated by the determinants of adaptive capacity and the relationship between water and economic livelihoods (Tiboris, 2020; Zaveri et al., 2021).

### The water insecurity-migration nexus in southern Iraq

Water insecurity is negatively impacting agricultural livelihoods in southern Iraq given that an important portion of rural economic activities in the region are agrarian and extensively reliant on water resources. Depending on their adaptive capacity, farmers cope with water insecurity in various ways, whether through migration or the search for alternative sources of income. Exploring rural-urban mobility or the absence thereof, in tandem with water insecurity, provides a deeper understanding of migration as a coping mechanism for farmers in southern Iraq.

### Increasing water insecurity

For over 8000 years, the Euphrates and Tigris rivers have provided Iraq with water (Mrasek, 2008). The Euphrates and Tigris originate in Turkey, run through Syria and Northern Iraq, and finally join to form the Shatt al-Arab river in Basra, southern Iraq. Without other viable alternatives, the Iraqi water dependence on the Euphrates, Tigris and Shatt al-Arab can reach 98% (Alwash, et al., 2018; Karasik & Depretto, 2019; Von Lossow, 2018).

Rainfall records have been significantly lower than historical patterns since the early 2000s (Hamid, et al., 2010). The relative decrease in water availability, mostly caused by a reduction in rainfall, signals a period of drought (Belal et al., 2014). The mapping of soil moisture and crop productivity also contribute to the measurement of droughts as a natural disaster due to its socio-economic consequences (Eklund and Thopson,

2017). In the periods between 1998–2001 and 2007–2010, Iraq witnessed severe droughts, with precipitation dropping by up to 70% (Awchi & Jasim, 2017; USAID, 2017). More recently, the winters of 2018 and 2021 recorded extremely low rainfall, up to one-third below average (Middle East Monitor, 2018; Norwegian Refugee Council, 2021). Increasing temperatures are causing more frequent and more prolonged heat waves (Tabari & Willems, 2018). Consequently, southern Iraq experiences an average of 2100 mm of evaporation annually (USAID, 2017), while it receives an average annual rainfall of less than 145 mm (Al-Rijabo & Salih, 2013). These climatic conditions can directly lead to situations of crisis and insecurity (Norwegian Refugee Council, 2021).

The decrease in water quantity is closely tied to water quality issues in southern Iraq. Sea water intrusion causes freshwater salinisation of the Shatt al-Arab, which at high tide nearly completely contaminates it. The quality of water is also affected by return flows from agricultural projects and industries' lack of wastewater treatment (Abdullah et al., 2015; Birkman et al., 2022).<sup>3</sup> This subsequently pollutes water resources as saline water is unfit for household and industrial consumption. The freshwater in the Shatt al-Arab river is in decline due to increased salinisation and southern governorates can no longer fully rely on this water source (Brandimarte, Popescu, & Neamah, 2015).

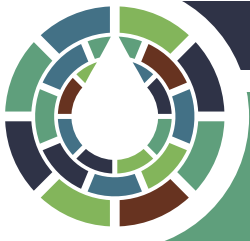
### Impacts of water insecurity on human well-being in southern Iraq

In the last decades, water insecurity has impacted the ecosystem and societal well-being in southern Iraq, which in combination have had adverse effects on human well-being.

Water insecurity has led to desertification and the degradation of agricultural land in Iraq. Reduced rain, in combination with rising temperature, increases the risk of desertification (Tabari & Willems, 2018).

<sup>3</sup> More information about the challenges posed by water quality and quantity in southern Iraq can be found in the report: 'Action Needed: Three Priorities for Iraq's Water Sector'.

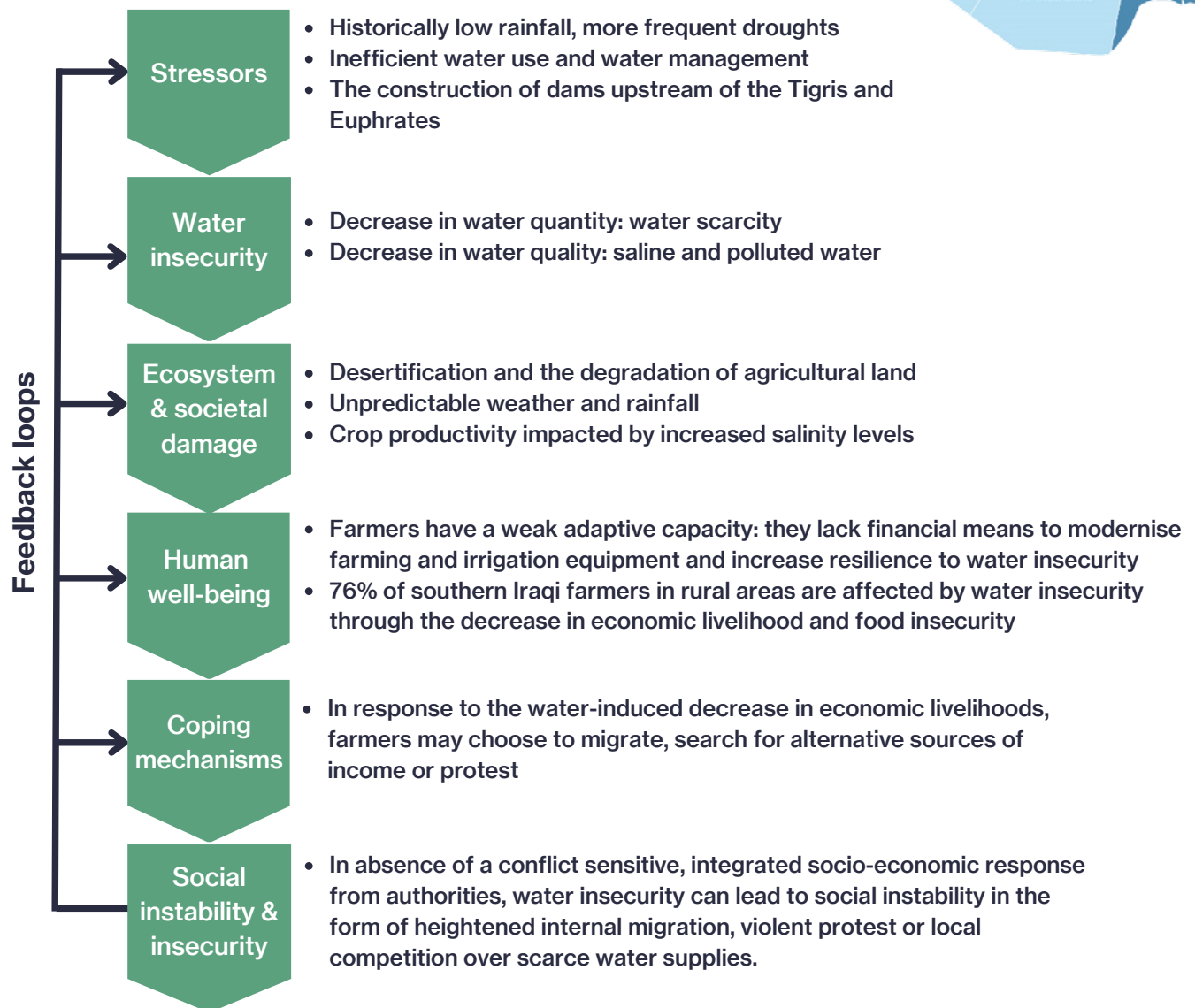
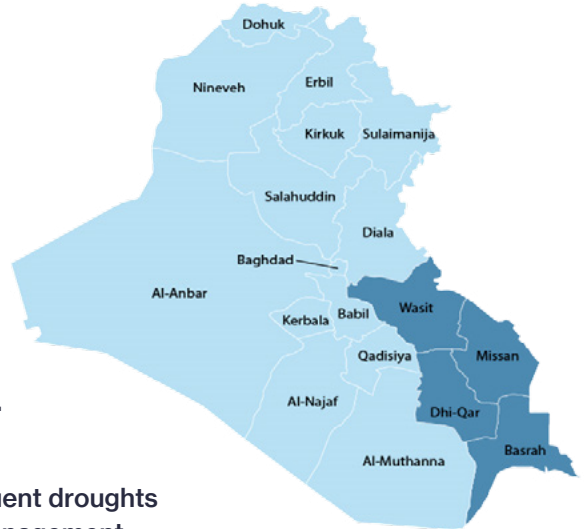


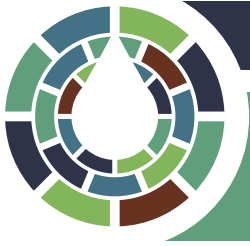


# Understanding the Pathway from Water Insecurity to Urban Migration in Southern Iraq

In southern Iraq, rural economic activities are extensively reliant on water resources. The agricultural sector's intensive water usage and dependencies could subject Iraqi society to water-induced migration.

A conflict sensitive, integrated socio-economic response from both authorities and the private sector is necessary to strengthen the resilience of rural communities in southern Iraq to water-induced stress.





## Understanding the Pathway from Water Insecurity to Urban Migration in Southern Iraq

Currently, an estimated 92% of Iraq is subject to desertification (Karasik & Depretto, 2019; USAID, 2017). Moreover, increased seawater intrusion damages water quality and degrades surrounding agricultural land. Salinization has left about 54% of the Iraqi agricultural land threatened (Birkman et al., 2022). Estimates suggest that around 100 square kilometres of fertile land are lost yearly due to salinisation (Karasik & Depretto, 2019). The Ministry of Planning estimates that around 250 square kilometres of fertile land are lost yearly due to deteriorating water quality and quantity, as well as high levels of urbanisation (Ministry of Planning, 2013).

Ecosystem-level effects – reduced water quantity and quality and the associated land degradation – are detrimental to Iraqi agricultural production (USAID, 2017). Rural areas tend to be disproportionately hit due to their high dependence on agriculture (Guiu, 2020). High salinity levels significantly affect southern Iraq's agriculture because most crops have low salt tolerance (International Organization for Migration and Deltares, 2020). The last two decades saw a 50% drop in agricultural production capacity due to salinisation (Karasik & Depretto, 2019; Von Lossow, 2018). Particularly in times of drought, agricultural production suffers dramatically. During the 2007–2010 drought, the 2009 rice and wheat harvests were considered the worst in a decade (Hamid et al., 2010). More recently, the low rains of the winter of 2018 resulted in an estimated 26.8% loss in the wheat harvest and 37.1% in the barley harvest compared to the previous year (Agrarian Reform Directorate, 2018).

Ecosystem and societal level impacts have consequences for individual well-being, as water insecurity has affected 76% of southern Iraqi farmers in rural areas (IOM, 2022). Affected individuals report reduced water supply and water salinisation as the main issues damaging their agricultural livelihoods, alongside issues related to the local climate, unpredictable weather, and pests (IOM, 2022). On top of this, farmers in the south often have to endure

reductions in water quantity due to sudden transboundary changes (Kool et al., 2020). In one incident, farmers reported the death of their palm trees within days after being irrigated from Shatt al-Arab (Al-Rubaie, 2022). The sudden diversion of water and the subsequent seawater intrusion was a result of closing a dam upstream of the Karun River, one of the tributaries of the Shatt al-Arab in Iran.

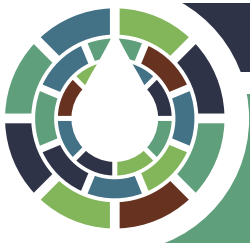
As 75% of farmers rely on crop production as their primary income source,<sup>4</sup> the decline in agricultural livelihoods has a significant impact on individual wellbeing (Lucani, 2012). A survey conducted in 2020 among 385 households from the southern provinces showed that many farmers who had previously considered farming the primary source of their incomes have now significantly reduced their farming activities (Guiu, 2020). Respondents to other studies indicated that they are now farming only 7–12 acres, while they could previously farm up to 150 acres (Bouknight, 2018).

### Weak adaptive capacity of farmers

Agriculture governance in Iraq has been inconsistent in the last decades, leading to a system shaped by inefficient water use, outdated technology and limited economic benefits. Farming in southern provinces is primarily small-scale and owners usually have limited financial resources (Guiu, 2022; Wille, 2019). On average, an Iraqi farmer earns about \$100 per month, while the average national wage is \$900 per month (EPIC, 2017). As such, most farmers lack the financial means to modernise their farming and irrigation equipment to one that is more water-efficient or can endure or purify water quality (Bouknight, 2018; Guiu, 2022; Wille, 2019).

The adaptive capacity of farmers to water insecurity is negatively impacted by water governance in Iraq. The Ministry of Planning, Ministry of Finance and Ministry of Water Resources share the responsibility of allocating

4 The remaining 25% relies on both livestock and crop production.



## Understanding the Pathway from Water Insecurity to Urban Migration in Southern Iraq

water quotas to provinces and do so based on bottom-up requests from the provinces (Von Lossow et al., 2022). However, the ministries lack sufficient coordination and up-to-date information to effectively decide the required or adequate water needs (Birkman et al., 2022). In response to this situation, citizens often cope by breaching water quotas through illegal water tapping or the diversion of river flows. So far, the government has had limited capabilities to solve this issue (Birkman et al., 2022).

When authorities do not – or cannot – intervene, tribal leaders play a key role in resolving water allocation issues. In general, the Iraqi constitution recognises the role of tribes in ‘the development of society’<sup>5</sup> (Constitute Project, 2005). In this context, tribal leaders may be involved in water allocation decisions between local farmers and provinces. The empowerment of tribal entities over time has generated parallel governance structures that pose several challenges for centralized water allocation, especially in the south, where the historical absence of effective governance allowed tribal leaders to establish their own water governance mechanisms (Birkman et al., 2022; Dockx, 2019; Hasan, 2022).

### Water-induced migration and non-migration

In the mid-1980s, the Iraqi government started several agricultural projects, including building irrigation systems for small-scale farming (Telleria, 2014). Back then, the Iraqi government also introduced subsidies and state purchasing programs for farming wheat and barley (EPIC, 2017). The State Organization for Soils and Land Reclamation (SOSLR) reclaimed 6,030 square kilometres around the same period- from 1974 to 1987 (Nuri & Ali, 2008). This corresponds to the sudden increase in the rural population growth rate (and the simultaneous decrease in the urban population growth rate) in 1985 (Figure 2).

In 2019, the International Organization for Migration (IOM) identified 5,347 internally displaced families from southern provinces due to the declining access to water and its resulting seawater intrusion and pollution (IOM, 2019). Moreover, it is estimated that 20,000 individuals, mostly from agricultural communities, were internally displaced in 2012 in Iraq due to prior droughts (IOM and Deltares, 2020). This is visible in Figure 2, as the urban population growth rate has increased more than in rural areas after 2010. Looking at urban-rural demographic changes can serve as a proxy for analysing the pathway from water-induced loss of agricultural livelihoods to migration in Iraq.

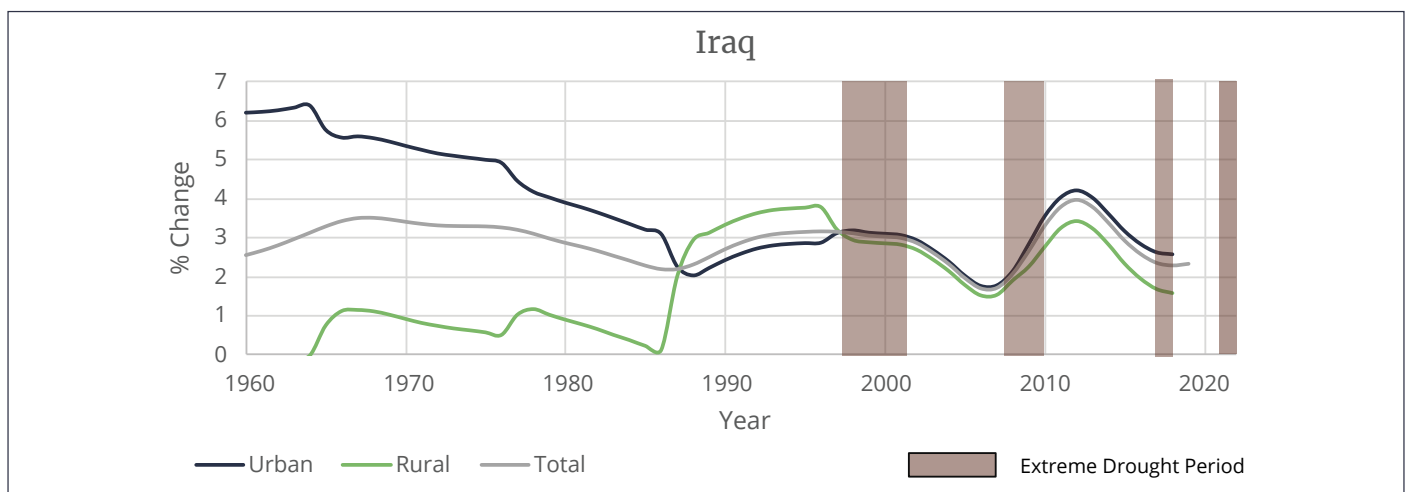


Figure 2 Population Growth Rates in Iraq. Source: World Bank

5 Article 45 (2) of the Iraq Constitution of 2005 states: “The State shall seek the advancement of the Iraqi clans and tribes, shall attend to their affairs in a manner that is consistent with religion and the law, and shall uphold their noble human values in a way that contributes to the development of society. The State shall prohibit the tribal traditions that are in contradiction with human rights.”





## Understanding the Pathway from Water Insecurity to Urban Migration in Southern Iraq

Data on water-induced migration in Iraq tends to focus on internal displacement in water-insecure governorates with less focus on the socio-economic and political drivers that contributed to these migration streams (IOM, 2019; IOM and Deltares, 2020). Periods of extreme drought cannot solely account for significant changes in rural-urban growth rates in Iraq, especially when considering the Iraq war (2003–2011) and ensuing political, social and economic instability. While water insecurity can lead to migration, this is not the only coping mechanism that people may resort to. Water-dependent livelihoods can be secured through alternate coping mechanisms, preventing the onset of large-scale migration. A recent survey conducted by the NGO Social Inquiry and the IOM (2022) highlights that although the rural population in southern Iraq fears their villages are hollowing out due to migration, overall, households in Basra do not see themselves migrating in the coming five years. One of the coping mechanisms that can prevent internal displacement in a situation of water insecurity is the search for alternative livelihoods, described below.

### Explaining immobility

For nearly two decades, the Iraqi government has focused most of its resources on security expenditure and investments in the oil sector (EPIC, 2017). The lack of investment in agriculture was compounded by years of drought. Even though the government embarked on an agricultural initiative in 2005 to support small-scale farmers, the percentage of employment in agriculture has fallen dramatically since the 1990s, from around 31–32% to under 20%. (Figure 3). This coincides with the increase in urbanisation in the late 1990s (Figure 2).

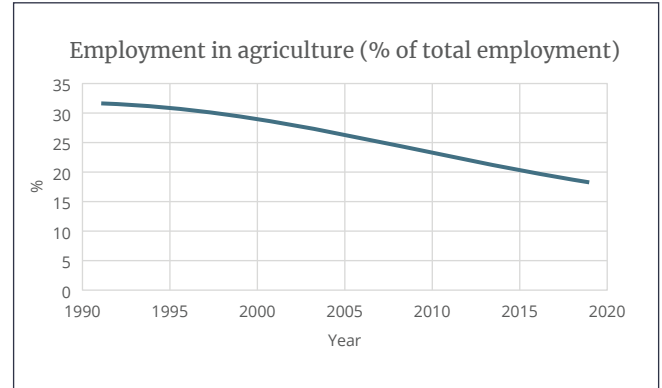


Figure 3 Employment in agriculture in Iraq. Source: World Bank

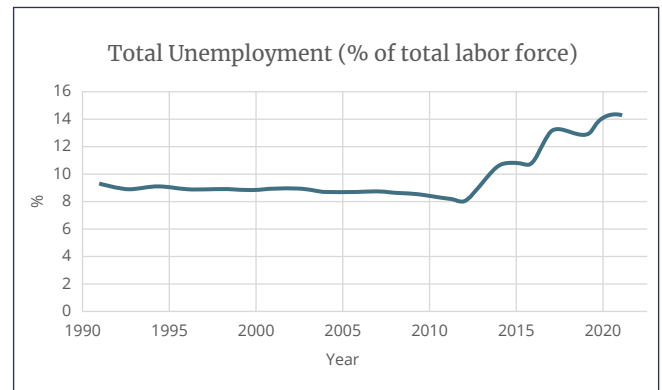
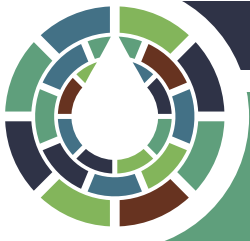


Figure 4 Total unemployment rate in Iraq. Source: World Bank

The initiative in 2005 introduced a credit policy for investment in small-scale agriculture with low-interest rates (Telleria, 2014). However, most beneficiaries were not small-scale farmers; they were investors who took the loans through informal channels and even bribery (El-Kaaby, 2015; Hasan, 2022). In 2020, the Iraqi Commission of Integrity announced that a 7-year prison sentence was issued for the former director of the Agriculture Bank (he left the country before being arrested) for damaging nearly 600 million Iraqi Dinars of public money through the agricultural initiative (Iraq News Agency, 2020).

Thus, farmers were left with inadequate seeds, fertilisers, and outdated equipment (EPIC, 2017; Telleria, 2014). Farmers point out the absence of functional policy and support in the agricultural sector which drags their livelihoods (Guiu, 2019, p.16).



## Understanding the Pathway from Water Insecurity to Urban Migration in Southern Iraq

Since 2003 the number of public sector jobs in Iraq increased three-fold because of growing oil revenues (Al-Mawlawi, 2019). This allowed the Iraqi government to increase its spending on employee compensation nine-fold (Al-Mawlawi, 2019). Public sector jobs provided an escape route for many who abandoned farming or started considering it a secondary source of income (Guiu, 2020; World Bank, 2012). Public sector jobs were an attractive alternative to Iraqi citizens as they provided a better salary (on average 30% more than the private sector) and fewer working hours (Hasan, 2022; World Bank, 2012) than other sectors. Moreover, they are less dependent on the volatility associated with agriculture in times of water insecurity.

However, in recent years the jobs provided by the public sector have become unable to

appease the high unemployment rate and growing population (Al-Faour, 2022). Since the international economic crisis in 2014-2015, oil prices have been in steep decline. As a result, the number of available public sector jobs fell significantly, and total unemployment rates experienced a steep increase (Figure 4). The political instability during the ISIS takeover in 2014 further intensified the problem.

The fall of the public sector in 2014-2015 coincides with the sudden spike in urbanisation reported in data from Iraq's Central Statistical Organization (CSO) (Figure 5). Many farmers from southern Iraq forced to leave their lands and search for income opportunities in the cities (Birkman et al., 2022; Indhar, 2018).

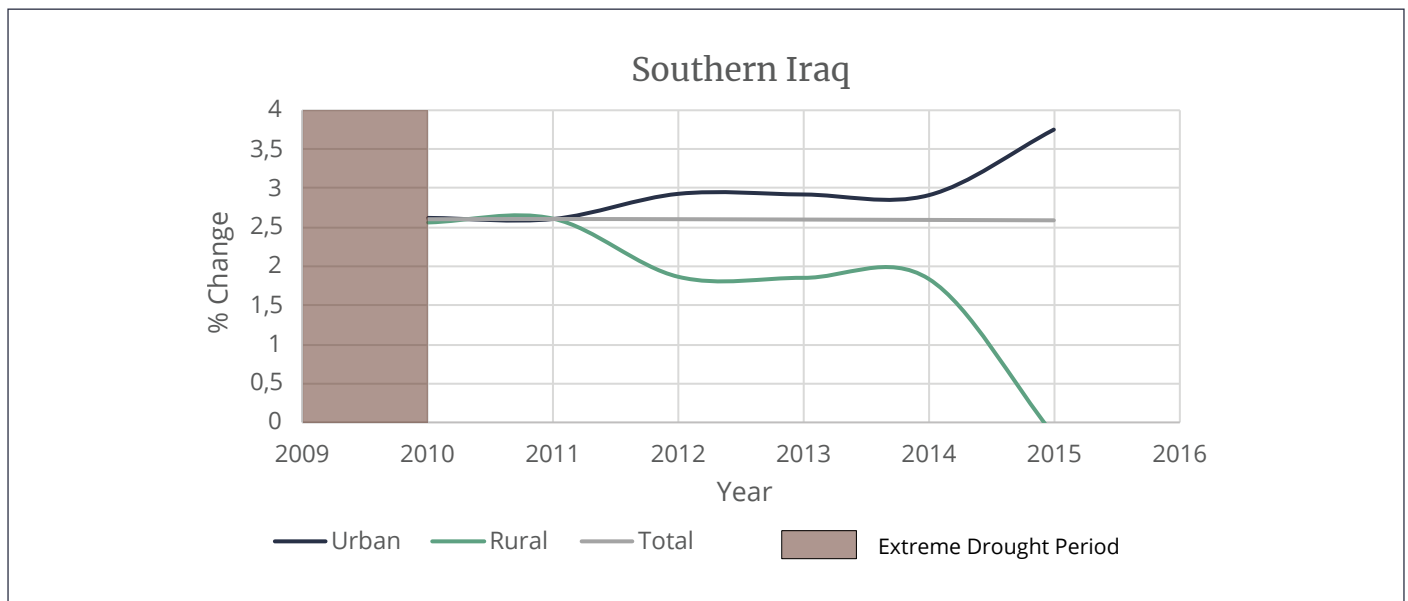
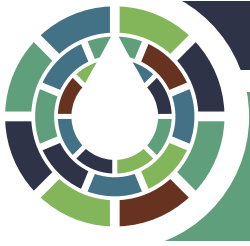


Figure 5 Population Growth Rates in southern Iraq (Missan, Muthanna, Dhi-Qar, Basra; Source: CSO. Note: The data provided by CSO starts only from the year 2009, and data for the years 2016, 2017 and 2018 are missing



## Understanding the Pathway from Water Insecurity to Urban Migration in Southern Iraq

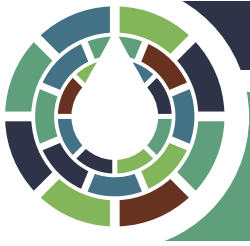
### Conclusion

Water insecurity shapes migration patterns, but the broader socio-economic and political contexts condition this relation. The reduction in access to water due to socio-economic and political factors or the deterioration of water quantity and quality, can lead to a situation of water insecurity. In turn, this can impact livelihoods, health, energy and food security, which, depending on the intensity of water stress and the resilience of the affected groups, can lead to migration and social instability. Individuals' resilience to water insecurity and the (perceived) options available to cope and adapt determine their reaction to water insecurity. As such, individuals, influenced by (filtered) information, perceptions, past experiences, assess whether responding through migration would mitigate their water stress.

In the context of southern Iraq, heightened water insecurity over the last decades led to the loss agricultural output and, in some cases, the loss of economic livelihoods of farmers in rural areas. Alternative employment opportunities in the public sector offered a temporary solution to people in rural areas, who – until at least 2014-

2015 – chose not to migrate despite their main occupation being hampered by water insecurity. Nonetheless, offering public sector jobs as a way to cope with the decline of industries is hardly a sustainable adaptation to changing climate conditions.

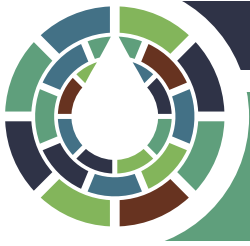
Rather, an integrated socio-economic approach is crucial to strengthening communities' resilience to climate change and water insecurity, thus preventing water-induced migration in the long term. In southern Iraq, farmers are forced to adapt to changing conditions by reducing the amount of summer crops that are no longer productive due to heat waves, even if their livelihoods are deteriorated (Guiu, 2020). To mitigate this issue, technologies and agricultural practices which decrease the water intensity of crop farming is an avenue to explore. Moreover, substituting current crops to more resilient and less water-intensive crops furthermore provides long term adaptation to increasing droughts. These local coping mechanisms should be complemented by the development of a centralised agricultural support policy that promotes innovation, facilitates the adoption of new technologies and mitigates financial burdens on farmers.



## Understanding the Pathway from Water Insecurity to Urban Migration in Southern Iraq

### References

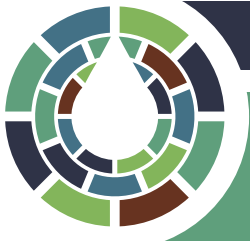
- Abdullah, A. D., Masih, I., van der Zaag, P., Karim, U. F., Popescu, I., & Al Suhail, Q. (2015). Shatt al Arab River system under escalating pressure: a preliminary exploration of the issues and options for mitigation. *International Journal of River Basin Management*, 13(2), 215–227.
- Al-Faour, N. (2022). What prevents Iraq from meeting the mounting youth employment challenge. *Arab News*. <https://www.arabnews.com/node/2011051/amp>
- Al-Rijabo, W. I., & Salih, H. M. (2013). Spatial and temporal variation of rainfall in Iraq. *J. Appl. Phys*, 5(4), 01–07.
- Al-Rubaie, Azhar. 'From Palm Trees to Homes: Iraqi Agricultural Land Lost to Desert'. Retrieved on 16 February 2023 from <https://www.aljazeera.com/news/2022/5/26/climate-change-ravages-iraq-as-palm-trees-make-way-for-desert>
- Alwash, A., Istepanian, H., Tollast, R., & Al-Shibaany, Z. (2018). Towards sustainable water resources management in Iraq. <https://iraqenergy.org/2018/08/30/towards-sustainable-water-resources-management-in-iraq/>
- Ash, K., & Obradovich, N. (2020). Climatic stress, internal migration, and Syrian civil war onset. *Journal of Conflict Resolution*, 64(1), 3–31.
- Awchi, T. A., & Jasim, A. I. (2017). Rainfall Data Analysis and Study of Meteorological Draught in Iraq for the Period 1970–2010. *Tikrit Journal of Engineering Sciences*, 24(1).
- Belal, Abdel-Aziz, Hassan R. El-Ramady, Elsayed S. Mohamed, and Ahmed M. Saleh. 'Drought Risk Assessment Using Remote Sensing and GIS Techniques'. *Arabian Journal of Geosciences* 7, no. 1 (1 January 2014): 35–53. <https://doi.org/10.1007/s12517-012-0707-2>.
- Birkman, L., Kool, D., & Struyken, E. (2022). *Water challenges and conflict dynamics in southern Iraq: An in-depth analysis of an under-researched crisis*. <https://waterpeacesecurity.org/files/208>
- Borderon, M., Sakdapolrak, P., Muttarak, R., Kebede, E., Pagogna, R., & Sporer, E. (2018). A systematic review of empirical evidence on migration influenced by environmental change in Africa.
- Bouknight, S. (2018). Water is Life; In Iraq, it's Running Dry. *Inside Arabia*. <https://insidearabia.com/water-is-life-in-iraq-its-running-dry/>
- Brandimarte, L., Popescu, I., & Neamah, N. K. (2015). Analysis of fresh-saline water interface at the Shatt Al-Arab estuary. *International Journal of River Basin Management*, 13(1), 17–25.
- Cai, R., Feng, S., Oppenheimer, M., & Pytlikova, M. (2016). Climate variability and international migration: The importance of the agricultural linkage. *Journal of Environmental Economics and Management*, 79, 135–151.
- Clement, V., Rigaud, K. K., de Sherbinin, A., Jones, B., Adamo, S., Schewe, J., Sadiq, N., Shabhat, E. (2021). Groundswell Part 2: Acting on Internal Climate Migration. <https://humantraffickingsearch.org/wp-content/uploads/2021/09/Groundswell-Part-II.pdf>
- Constitute Project. (2005). *Iraq's Constitution of 2005*. Constitute Project. [https://www.constituteproject.org/constitution/Iraq\\_2005.pdf?lang=en](https://www.constituteproject.org/constitution/Iraq_2005.pdf?lang=en)
- CSO, Central Statistical Organization Iraq. (n.d.) *Population Distribution by Governorates and Region for 2009–2021*. [http://www.cosit.gov.iq/?option=com\\_content&view=article&id=977&catid=87&lang=ar](http://www.cosit.gov.iq/?option=com_content&view=article&id=977&catid=87&lang=ar)
- World Bank. (n.d.-a). Employment in agriculture (% of total employment) – Iraq. <https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?locations=IQ>
- World Bank. (n.d.-b). Rural Population – Iraq. <https://data.worldbank.org/indicator/SP.RUR.TOTL?locations=IQ>
- World Bank. (n.d.-c). Urban Population – Iraq. <https://data.worldbank.org/indicator/SP.URB.TOTL?locations=IQ>



## Understanding the Pathway from Water Insecurity to Urban Migration in Southern Iraq

- Dockx, P.-J. (2019). *Water Scarcity in Iraq: From Inter-Tribal Conflict to International Disputes*. [http://www.ipcs.org/issue\\_briefs/issue\\_brief\\_pdf/ipcssr203\\_contested%20waters%20project\\_water%20scarcity%20in%20iraq\\_p%20jan-dockx\\_may%202019.pdf](http://www.ipcs.org/issue_briefs/issue_brief_pdf/ipcssr203_contested%20waters%20project_water%20scarcity%20in%20iraq_p%20jan-dockx_may%202019.pdf)
- Eklund, Lina, and Darcy Thompson. 'Differences in Resource Management Affects Drought Vulnerability across the Borders between Iraq, Syria, and Turkey'. *Ecology and Society* 22, no. 4 (2017). <http://www.jstor.org/stable/26798992>.
- El-Kaaby, S. (2015). The agricultural initiative on 20/8/2008, Iraq. *Sout el-Iraq*. <https://www.sotaliraq.com/2020/09/15/المبادرة-الزراعية-في-20-9-2008-والك-الله-يالع>
- EPIC. (2017). Iraqi Agriculture in Crisis. <https://enablingpeace.org/agriculture-crisis/>
- Flahaux, Marie-Laurence, and Hein De Haas. 'African Migration: Trends, Patterns, Drivers'. *Comparative Migration Studies* 4, no. 1 (22 January 2016): 1. <https://doi.org/10.1186/s40878-015-0015-6>.
- Guiu, R. (2020). *When Canals Run Dry, Displacement Triggered by Water Stress in the South of Iraq*. <https://www.internal-displacement.org/sites/default/files/publications/documents/202002-iraq-slow-onset-report.pdf>
- Haas, Hein de. 'A Theory of Migration: The Aspirations-Capabilities Framework'. *Comparative Migration Studies* 9, no. 1 (24 February 2021): 8. <https://doi.org/10.1186/s40878-020-00210-4>.
- Hamid, B., Lief, J., Murtaza, N., & Toensing, C. (2010). Iraq's Water Woes: A Primer. *Middle East Report*, (254), 19-23.
- Hasan, S. (2022, March 28, 2022) Dean of Faculty of Agriculture, Basrah University- Personal Communication /Interviewer: T. Mahmoud. Interview about the socio-political and economic contexts in southern Iraq.
- IDMC. (2021). *Global Report on Internal Displacement 2021: Internal displacement in a changing climate*. [https://www.internal-displacement.org/sites/default/files/publications/documents/grid2021\\_idmc.pdf](https://www.internal-displacement.org/sites/default/files/publications/documents/grid2021_idmc.pdf)
- Indhar, H. (2018). Iraq's treasured amber rice crop devastated by drought. <https://phys.org/news/2018-07-iraq-treasured-amber-rice-crop.html>
- International Organization for Migration and Deltares. (2020). *Water Quantity and Water Quality in Central and South Iraq: A Preliminary Assessment in the Context of Displacement Risk* <https://reliefweb.int/report/iraq/water-quantity-and-water-quality-central-and-south-iraq-preliminary-assessment-context>
- IOM. (2019). Assessing Water Shortage-Induced Displacement In Missan, Muthanna, Thi-Qar And Basra. <https://reliefweb.int/report/iraq/assessing-water-shortage-induced-displacement-missan-muthanna-thi-qar-and-basra-4-apr>
- Iraq News Agency. (2020). Iraqi Integrity: The Former Director of the Agricultural Bank Sentenced to Prison for Damaging Nealy 600 Million Dinar of public money. *Iraq News Agency*. <https://www.ina.iq/114254--.html>
- Jones, B. T., Mattiacci, E., & Braumoeller, B. F. (2017). Food scarcity and state vulnerability: Unpacking the link between climate variability and violent unrest. *Journal of peace research*, 54(3), 335-350.
- Jónsson, Gunvor. 'The Environmental Factor in Migration Dynamics: A Review of African Case Studies'. *IMI Working Paper Series* 21 (2010). <https://www.migrationinstitute.org/publications/wp-21-10>
- Karasik, T., & Depretto, J. S. (2019). Climate Change Is Exacerbating Iraq's Complicated Water Politics. *Fair Observer*. <https://www.fairobserver.com/politics/iraq-climate-change-water-conflict-islamic-state-middle-east-news-61551/>
- Kool, D., Birkman, L., Torossian, B., Schaffrath, J., Sasse, R., & Schmeier, S. (2020). Interprovincial Water Challenges in Iraq. <https://waterpeacesecurity.org/info/working-paper-08-19-2020-Interprovincial-Water-Challenges-in-Iraq>
- Lucani, P. (2012). *Iraq: Agriculture sector note*. <https://reliefweb.int/sites/reliefweb.int/files/resources/Iraq%20Agriculture%20Sector%20Note.pdf>
- McLeman, Robert A., and Lori M. Hunter. 'Migration in the Context of Vulnerability and Adaptation to Climate Change: Insights from Analogues'. *WIREs Climate Change* 1, no. 3 (2010): 450-61. <https://doi.org/10.1002/wcc.51>





## Understanding the Pathway from Water Insecurity to Urban Migration in Southern Iraq

- Middle East Monitor. (2018). FAO: Iraq lost 40% of its agricultural production. *Memo Middle East Monitor*. Retrieved from <https://www.middleeastmonitor.com/20180214-fao-iraq-lost-40-of-its-agricultural-production/>
- Ministry of Planning. (2013). *National Developmental Plan 2013-2017*. <https://mop.gov.iq/en/page/view/details?id=88>
- Mrasek, V. V. (2008). Climate Change Threatens Cradle of Civilization. *Spiegel International*. <https://www.spiegel.de/international/world/the-not-so-fertile-crescent-climate-change-threatens-cradle-of-civilization-a-547763.html>
- Norwegian Refugee Council. (2021). *Iraq's drought crisis and the damaging effects on communities*. <https://www.nrc.no/globalassets/pdf/reports/iraqs-drought-crisis/iraqs-drought-crisis-and-the-damaging-effects-on-communities.pdf>
- Obokata, Reiko, Luisa Veronis, and Robert McLeman. 'Empirical Research on International Environmental Migration: A Systematic Review'. *Population and Environment* 36, no. 1 (September 2014): 111-35. <https://doi.org/10.1007/s11111-014-0210-7>.
- Stoler, J., Brewis, A., Kangmennang, J., Keough, S. B., Pearson, A. L., Rosinger, A. Y., . . . Stevenson, E. G. (2021). Connecting the dots between climate change, household water insecurity, and migration. *Current Opinion in Environmental Sustainability*, 51, 36-41.
- Tabari, H., & Willems, P. (2018). More prolonged droughts by the end of the century in the Middle East. *Environmental Research Letters*, 13(10), 104005.
- Telleria, R. (2014). Agricultural Policies and Institutions in Iraq-A Historical Perspective. *Beirut, Lebanon: International Center for Agricultural Research in the Dry Areas (ICARDA)*.
- Tiboris, M. (2020). Water Insecurity and Climate Change as Emerging Human Migration Pressures. *Loyola University Chicago International Law Review*, 16(1), 87.
- USAID. (2017). *Climate Change Risk Profile: Iraq*. <https://www.climatelinks.org/resources/climate-risk-profile-iraq>
- Von Lossow, T., Patrahau, I., Birkman, L., Kock, K., Kool, D., & Schmeier, S. (2022). *Water governance in Iraq: Enabling a gamechanger* (Water, Peace and Security). The Hague Centre for Strategic Studies & Clingendael Institute.
- Von Lossow, Tobias. (2018). 'More than Infrastructures: Water Challenges in Iraq'. The Hague: Planetary Security Initiative. <https://www.clingendael.org/publication/more-infrastructures-water-challenges-iraq>
- Von Uexkull, N., & Buhaug, H. (2021). Security implications of climate change: A decade of scientific progress. In (Vol. 58, pp. 3-17): SAGE Publications Sage UK: London, England.
- Human Rights Watch. (2019). *Basra is Thirsty: Iraq's Failure to Manage the Water Crisis*. Human Rights Watch. <https://www.hrw.org/report/2019/07/22/basra-thirsty/iraqs-failure-manage-water-crisis>
- World Bank. (2018). *Beyond Scarcity: Water Security in the Middle East and North Africa*. World Bank. <https://doi.org/10.1596/978-1-4648-1144-9>
- World Migration Report 2022*. (2021). International Organization for Migration. <https://www.iom.int/wmr/interactive>
- Zaveri, E., Russ, J., Khan, A., Damania, R., Borgomeo, E., & Jägerskog, A. (2021). Ebb and Flow, Volume 1. In: Washington, DC: World Bank.

### Water, Peace and Security (WPS) Partnership

The Water, Peace and Security (WPS) partnership helps stakeholders to identify and understand water-related security risks and undertake timely, informed and inclusive action for conflict prevention and mitigation. The WPS Partnership is funded by The Netherlands Ministry of Foreign Affairs. The views and opinions expressed in this report do not necessarily reflect the opinions or policies of our donor.