

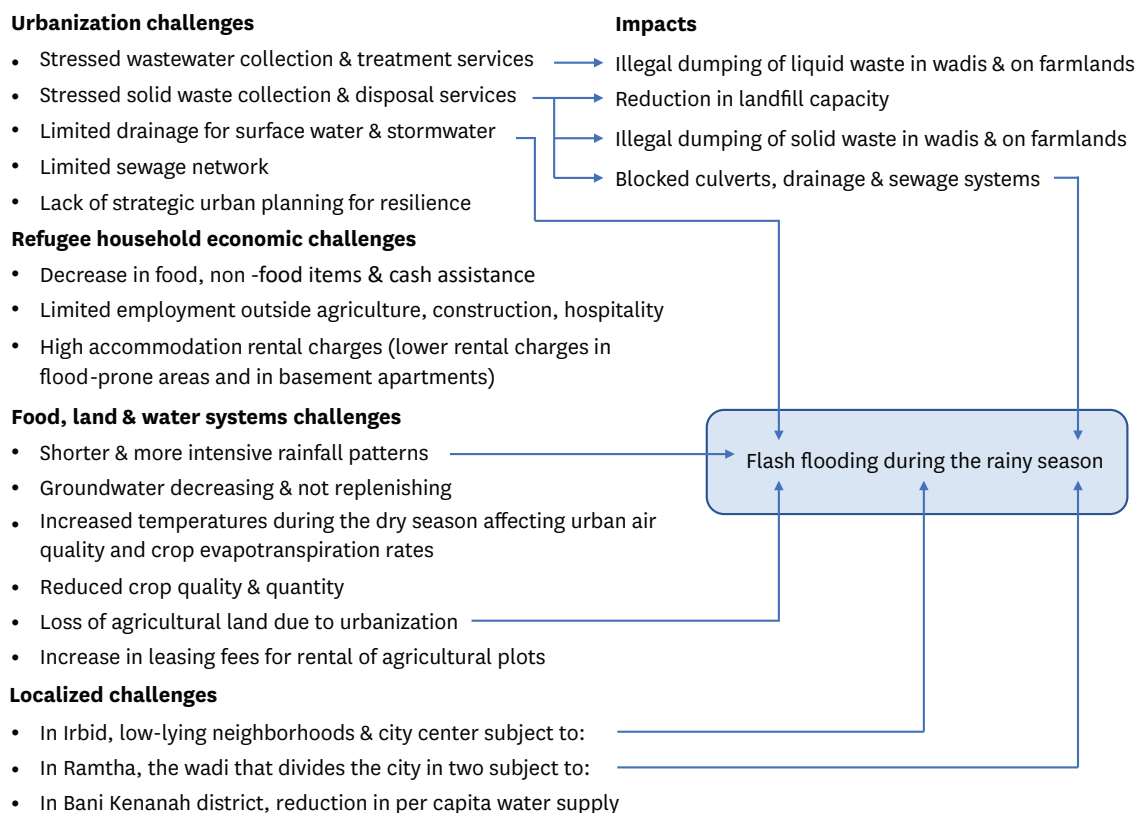
# The multiple challenges from climate change, urbanization and forced displacement in Irbid Governorate, northwest Jordan

In the last decade, Irbid Governorate has experienced rapid urbanization from mountain villages and border towns to the governorate capital itself. Irbid is a rapidly expanding city that has doubled its population since the onset of the Syrian War. The local authorities face immense challenges as they cope with these changes. To compound matters, the region is prone to water scarcity and is feeling the full brunt of climate change and its impacts on food, land and water systems, along with localized risks from flash flooding in Irbid and border towns such as Ramtha. If left unchecked, negative synergies arise, as rapid urban growth

from forced displacement places additional pressures on urban infrastructure and an already climate-stressed natural resource base (see Figure 1). It is within this dynamic context that we present the multiple challenges from climate change, urbanization and forced displacement, because understanding these linkages and the associated impacts is key to developing durable solutions that when combined can lead to resilient futures. This research, endorsed by the Ministry of Environment in Jordan and the Irbid Governorate, will support evidence-based design and the implementation of the Jordanian climate adaptation policy.



Low-quality student housing hosting Syrian refugees in the Al Afrah neighborhood in Irbid city, Jordan. The suburb has limited infrastructure and is subject to flash flooding during the winter rains (photo: IWMI).



**Figure 1.** Range of challenges and associated impacts in Irbid Governorate.

Source: Meetings with staff from Irbid Governorate, Irbid Department of Environment, Irbid Municipality, Beni Kenanah District, Al Kafarat Municipality, Al Ekaider Landfill Site, Yamook Water Company, Irbid Compost Plant and United Nations High Commissioner for Refugees (UNHCR) Irbid Office.

## Geography

Irbid Governorate is in northwest Jordan and has the second largest population in the country after Amman Governorate. Irbid Municipality is the administrative hub of Irbid Governorate, 70 km (43 miles) north of the capital, Amman, and 20 km (12 miles) south of the Syrian border. Ramtha Municipality is a smaller city in the Irbid Governorate 16 km east of Irbid city. Bani Kenanah district consists of a group of rapidly urbanizing villages in the Irbid Governorate on the northwestern edge of Jordan overlooking the Sea of Galilee and the Golan Heights, 20 km (12 miles) north of Irbid city (see Figure 2). Districts of Irbid and Ramtha municipalities and Bani Kenanah district have been identified as some of the areas facing the highest climate change risk in Jordan (UNDP 2022).

## Demographics and displacement trends

Jordan is one of the countries most affected by the refugee crisis in the Middle East and North Africa (MENA) region and hosts the second-highest share of refugees per capita in the world—more than 3 million (UNHCR 2023). Jordan has a long history of receiving refugees, since the 1948 Arab-Israel War, due to its border with the region now known as the occupied Palestinian territories and Israel. Jordan received further Palestinian refugees following the 1967 Arab-Israel War. Then, in recent years,

the stability of Jordan has again attracted refugees but from its borders with Iraq and then Syria (Simpson and Zayed 2019). Today, there are two main Syrian refugee camps in Jordan (Za'atari and Azraq), which collectively host around 120,000 refugees. A third camp (Mrajeeb Al Hood) was established to cope with overflows and hosts around 4,000 refugees. Refugees not in camps live mainly in the northern and central governorates of Amman, Mafraq, Irbid and Zarqa. Around 83% of the refugees in Jordan live in urban and peri-urban areas and only 17% live in camps (UNHCR 2023). Approximately 760,000 are registered to receive support from UNHCR (UNHCR 2023). In addition to these numbers, more than 2.3 million Palestinian refugees are living in Jordan, the largest number of all countries where the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) operates. Approximately 18% of Palestinians live in overcrowded and highly impoverished camp communities established in the wake of the wars in 1948 and 1967 (UNRWA 2023). In 2022, UNICEF provided support to 9,749 beneficiaries living in informal tented settlements (ITS). The beneficiaries were mainly Syrian seasonal agricultural laborers but these ITS communities often live in the most vulnerable conditions to be found in Jordan (UNICEF 2022). Both Palestinians and Syrians are living in these spaces, they are often without registered refugee status, making accurate estimates of numbers difficult.



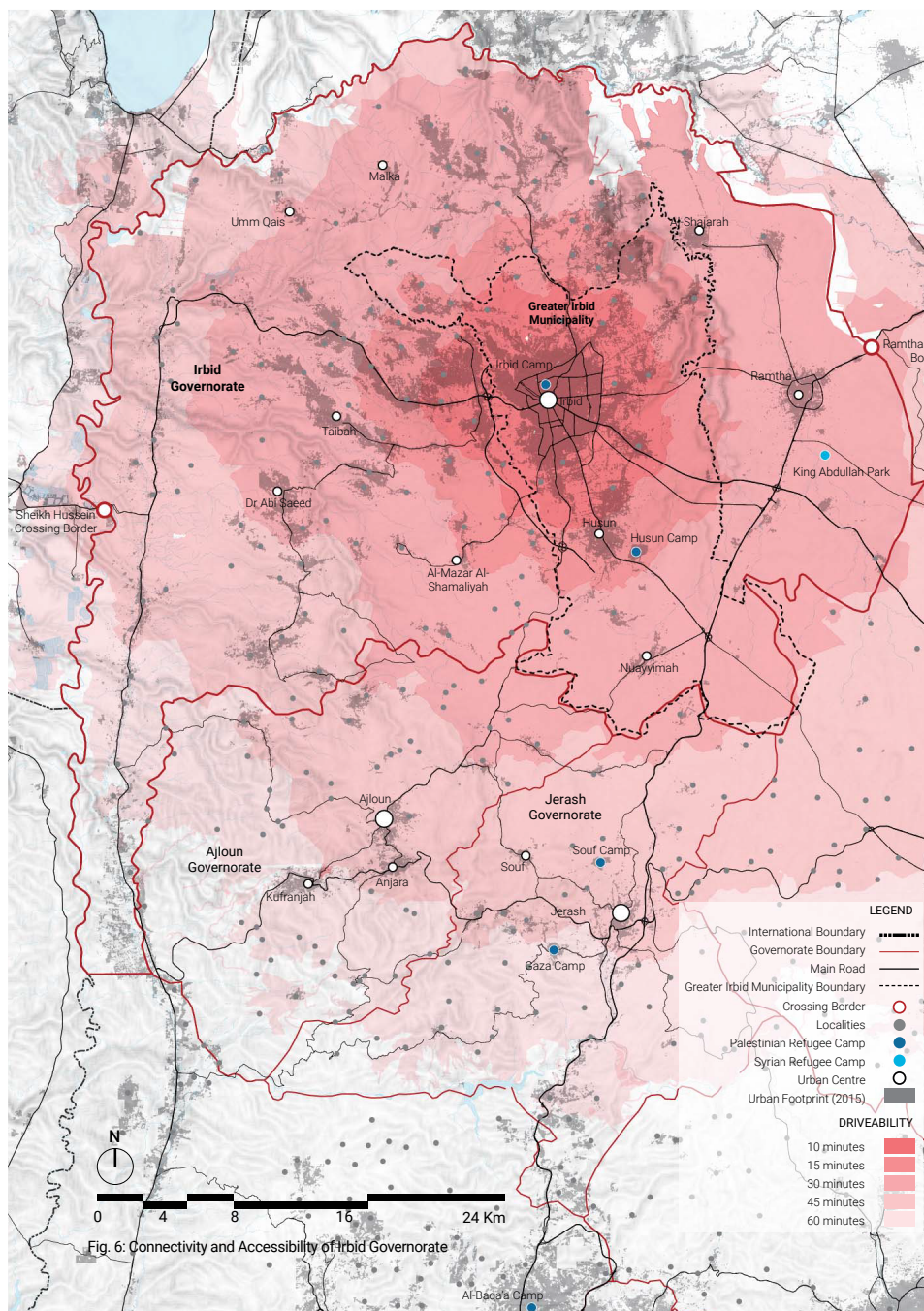


Fig. 6: Connectivity and Accessibility of Irbid Governorate

**Figure 2.** Map of Irbid Governorate in Northwest Jordan.

Source: UN-Habitat 2022, 51.

## Refugee population in Irbid Governorate

Irbid has been receiving Palestine refugees since 1951. The early refugee population then grew following the founding of Yarmouk University in 1976, which attracted more Palestinian refugees as well as Iraqis, global economic migrants and rural Jordanians. From 1990, the refugee population expanded with thousands of refugees from Iraq, Somalia, Sudan and Yemen (Simpson and Zayed 2019). There are also two large Palestinian refugee camps, Irbid Camp and Husun Camp. When the Syrian civil war began in 2011 and Syrians began crossing the border into Jordan, Irbid was already facing the challenges of severe drought, water scarcity and increased urbanization (Simpson and Zayed 2019). These

challenges have continued as a result of the influx of Syrian refugees. Today, Jordanians and Syrians share neighborhoods, resources, and livelihood opportunities in areas across the governorate, with the highest concentrations of refugees (both Syrian and Palestinian) in the cities of Irbid, Ramtha and Bani Kenanah district. There are around 128,000 Syrian refugees registered with UNHCR in Irbid and over 60,000 Palestinian refugees in Irbid Governorate. The total population is around 2 million. Irbid hosts nearly 20% of the total refugees in the country and is a priority area for the government and international agencies addressing development and humanitarian programming. The population of Irbid city increased by almost 34% between 2012 and 2022, largely due to the Syrian refugee influx (World Population Review 2023).



In Irbid, there are two camps. Irbid Camp is one of the four original camps set up by the Jordanian government to house Palestinians displaced in 1948. Today, it has almost 31,000 inhabitants, making it the sixth-largest Palestinian refugee camp in Jordan. Husn Camp, also known locally as Martyr Azmi el-Mufti Camp, was one of the six emergency camps set up in 1968 to accommodate Palestinians who were displaced from the West Bank, including East Jerusalem, and the Gaza Strip, as a result of the 1967 Arab-Israeli War. Husn camp has around 29,000 inhabitants, making it the seventh-largest Palestinian refugee camp in Jordan (UNRWA 2023). Irbid is an important agricultural area for Jordan, but Jordan is one of the fifth most water-scarce country in the world and is severely affected by droughts. The refugee influx has exacerbated the host community's existing challenges in responding to droughts, managing water shortages for multiple sectors and users, and rectifying water and sanitation service gaps.

## Climate and hydrology: Challenges and impacts

Water scarcity makes Jordan particularly vulnerable to climate change as even the slightest changes can have profound impacts at the watershed level, with serious implications for agricultural, industrial and urban water demands (Hadadin et al. 2010; MoE and UNDP 2022; World Bank 2022). For example, the fluctuating precipitation resulting from adverse climate change impacts coupled with the increasing frequency of droughts is imposing an “unprecedented strain on the fragile natural water resources” (MoE and UNDP 2022).

In the context of Irbid Governorate, three evidence-based observations have been repeatedly made by technical staff in environment- and water-related departments:

- shorter and more intensive rainfall patterns;

- groundwater decreasing and not replenishing; and
- increased temperatures during the dry season affecting urban air quality and crop evaporation rates (MoE and UNDP 2022).

## Impacts

Changes in rainfall patterns have contributed to an increase in flash floods in urban areas. This has become a regular problem in some parts of Irbid, including the downtown city center and other low-lying parts of the city. In the winter months during intensive rainfall periods, areas of the city are subject to flash floods that cause immense localized damage that result in families being evacuated and temporarily relocated while those parts of the city remain underwater. Flash flooding is not unique to Irbid and some border towns are equally affected. Ramtha is a case in point. Ramtha is divided into east and west by a wadi, a riverbed that remains dry except in the rainy season, that snakes through the city, flowing from south to north. This wadi is dramatically affected by changes in rainfall patterns and is now regularly subject to flash flooding during the rainy season. Floods can cover all the road bridges that cross the wadi, virtually cutting the town in two during the floods. The houses along the wadi are also subject to flash flooding and occupants cope with water damage on an annual basis. These flooding events are compounded by insufficient and blocked urban drainage systems and disrupted transportation networks.

## Impacts on water

The unprecedented strain on the fragile natural water resources has “severe implications on the availability of safe drinking water and Jordan’s long-term ability to supply water for agriculture” and will amplify the decline in groundwater level in the main aquifers. These are currently dropping at



The Yarmouk River forms the border between Jordan and Syria. Photo taken from the village of Agraba in Bani Kenanah district, Jordan. Koayiah in Syria can be seen in the top right (photo: IWMI).



an average rate of 2 meters per year (MoE and UNDP 2022). In Irbid Governorate, 54% of the land use is classified as agriculture (MoE and UNDP 2022), so any water shortage for agriculture will directly impact Syrian refugees because of their high engagement in this sector, particularly in village districts such as Bani Kenanah. Seasonal agriculture also remains an important livelihood strategy for residents of Husn Camp, where people cultivate agricultural plots surrounding the camp. From 2016, the Government of Jordan has implemented a “set of accelerating measures through the Jordan Response Plan to offset the increasing demand from refugees and host communities by expanding groundwater wells and enhancing sewer and greywater networks” (MoE and UNDP 2022, 15).

As senior staff at Irbid Municipality have highlighted, these measures are yet to have a positive impact due to the extensive coverage required and the slow process of enhancing the urban drainage networks. Yamouk Water Company officials also expressed concern over unlicensed and illegal groundwater wells often used for irrigating cash crops. All these pressures will likely be exacerbated by the projected adverse impacts of climate change (MoE and UNDP 2022).

For the Irbid region of northwest Jordan, this does not bode well, as the climate projections to 2100 indicate that Jordan is likely to experience the following:

- 2.1 °C increase in air temperature for the Representative Concentration Pathway 4.5 Scenario.
- Drier climate with an average decrease in annual rainfall of 21%.
- More frequent droughts with an increase in the maximum number of consecutive dry days and Standardized Precipitation Index magnitudes.
- More severe land degradation.
- A shift in rainy seasons at the end of both wet seasons, thus impacting all sectors but mainly water, agriculture, biodiversity, marine environment and health (MoE and UNDP 2022).

Urbanization has affected all areas of Irbid Governorate and at multiple scales. With a current population of around 2 million people, rapid urban growth has profoundly impacted the delivery of urban services, particularly environmental sanitation systems. Urbanization is consuming large tracts of agricultural land and contributing to an increase in leasing fees for agricultural plots. A lack of strategic urban planning for building resilience compounds all these problems.

For example, the rapid increase in the volume of solid waste produced daily is now affecting collection and disposal services. Irbid city’s sanitation experts point to how this has led to a reduction in the capacity of the Al Ekaider Landfill Site that services the Governorate and how that will shorten its lifespan from 10 to 5 years. The strain on solid waste management has also led to the illegal dumping of solid waste in wadis and on farmland, blocks culverts, and drainage and sewage systems, further exacerbating flash flooding.

Wastewater collection and treatment services are equally stressed and lead to illegal actions from private sector providers, such as discharging sludge tankers in wadis and on farmland instead of disposing it at the wastewater treatment plant to avoid disposal charges. The limited sewer network adds to the challenge of delivering effective wastewater disposal services. Surface water and stormwater drainage systems are also limited, thereby increasing the risk of flash flooding during the winter periods. Some of these problems have been highlighted in a recent World Bank report:

“Jordan’s three largest cities, Amman, Irbid and Zarqa, which play an outsized role in the economy, will all experience increased hazard exposure under future climates. All three cities will become drier but will experience more extreme precipitation events, which can worsen flooding. The built-up area exposed to pluvial flood hazards has increased and will continue increasing under all climate scenarios, disproportionately affecting low-income households. Air pollution is also a serious concern in all three cities. The average particulate matter 2.5 (PM 2.5) concentration has increased to levels well above the World Health Organization (WHO) guideline threshold for health outcomes, set at 10 micrograms per cubic meter of air, standing at 43, 32 and 21 micrograms per cubic meter of air in Zarqa, Amman and Irbid, respectively. Climate change will also heighten urban heat further. Zarqa has already seen a 3 °C rise in surface temperature over the past eight years. Jordanian cities must invest in climate change adaptation measures while limiting greenhouse gas (GHG) emissions” (World Bank 2022)

## Refugee and host economies: Challenges and impacts

Refugee populations are vulnerable to unemployment and poor working conditions when they do find work. The widespread reliance on informal employment diminishes the rights of refugee workers, alongside a mandated lower minimum wage. With the introduction of the Refugee Compact in 2016, changes are now clearly evident. For example, recent analyses show “clear positive impacts of the work permit scheme with respect to improving decent work for Syrian workers in Jordan” (Stave et al. 2021). However, further innovation is needed in the employment sector and “decent work for Jordanians is still considerably more prevalent compared to Syrians in most areas, and improvements should be made through more innovative work permit schemes” (Stave et al. 2021).

Syrian refugees have also experienced a decrease in food and non-food items and cash assistance support from the humanitarian sector due to international funding limitations and reductions. Coupled with the limited employment opportunities outside the construction, hospitality and agriculture sectors, these factors place further burdens on refugee economies.

Yet another impact is the steep increases in rental charges throughout the Governorate. In Irbid city, lower rental units are found in flood-prone areas such as the residential areas near Yarmouk University. These changes apply equally to host community residents, although their vulnerability is often overlooked or simply not recognized.

## Next steps

This research study was conducted under the Anticipatory Approaches in Host Communities for Emergency Preparedness and Disaster Mitigation (AHEAD) project as part of the CGIAR Initiative on Fragility, Conflict, and Migration (FCM). Currently, research under the project focuses on water- and climate-related vulnerabilities in communities that host refugees and internally displaced persons (IDPs) in order to identify pathways of risk and resilience building, which can be used to strengthen anticipatory action, disaster risk management and climate adaptation initiatives. The research in Jordan, with support from the Ministry of Environment and the Irbid Governorate, aims to support the inclusive implementation of the Jordanian climate adaptation policy. Other research countries include Ethiopia, Nigeria and Pakistan. The next phase of the project will consist of three action research-based activities, as follows:

## Development of an Integrated Host Community Vulnerability Framework

Research on the water- and climate-related vulnerabilities of host communities is urgently needed to develop and implement anticipatory action strategies that include the needs of host communities, refugees and internally displaced persons (IDPs), especially in fragile and conflict-affected areas. Developing a replicable and scalable mixed-methods model—an Integrated Host Community Vulnerability Framework (IHCVF)—will provide a framework for initial data collection. The data will cover all types of hosting contexts, including rural, urban and peri-urban settings, and a range of hydrometeorological hazards including floods, droughts and heatwaves.

## Assessment of how the IHCVF can be aligned with anticipatory action approaches and other disaster risk management tools

Anticipatory action is a relatively new field within the humanitarian space, and there remains a general lack of literature or understanding of anticipatory action in host communities. The IHCVF will address these knowledge gaps and inform the anticipatory action approach for host communities. An assessment will be undertaken to align the IHCVF with anticipatory action approaches and other disaster risk management tools.

## Identification of gaps in anticipatory action approaches and other disaster risk management tools

This is also an opportunity to identify gaps in the current anticipatory action and early warning approaches and other disaster risk management tools, including disaster risk reduction programs. These gaps may include climate adaptation strategies and innovative approaches to embed resilience programming in food, land and water systems through nature-based solutions (NbS).

Some examples of climate adaptation activities and NbS that could be appropriate in the Irbid regional context include: i) protection and restoration of wetlands and watersheds for reduced flooding and increased water security; ii) providing space for rivers and wadis to flow naturally to enable flood protection and water security; iii) agroforestry systems for increased food security, environmental health and well-managed evapotranspiration; iv) green belts as shelters from sand and providing shade; and v) urban green and blue spaces to help climate regulation, health, social development and green jobs, for example urban agriculture and a bio-circular economy (Sphere 2023).



The wadi divides Ramtha, Jordan, into east and west. It regularly floods during the winter season, reducing mobility and causing widespread damage to residential housing (photo: IWMI).





Composting urban organic waste in Irbid, Jordan. The Irbid Composting Plant only processes a fraction of the city's total organic waste but scaled-up, compost from this cash-for-work project could provide important inputs for climate-smart agriculture and other nature-based solutions (photo: IWMI).

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## Authors

Andrew Adam-Bradford, Senior Lecturer, Centre for Development and Emergency Practice (CENDEP), Oxford Brookes University, Oxford, UK; Alexandra Schindler, Consultant, International Water Management Institute (IWMI); Abdullah Anagreh, Consultant, IWMI; and Sandra Ruckstuhl, Senior Researcher, IWMI, and Co-Lead of the CGIAR Initiative on Fragility, Conflict, and Migration.

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## Contact

**Sandra Ruckstuhl**, Senior Researcher, IWMI, and Co-Lead of the CGIAR Initiative on Fragility, Conflict, and Migration ([s.ruckstuhl@cgiar.org](mailto:s.ruckstuhl@cgiar.org)).

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**International Water  
Management Institute (IWMI)**

### Headquarters

127 Sunil Mawatha, Pelawatte,  
Battaramulla, Sri Lanka

### Mailing address:

P. O. Box 2075, Colombo, Sri Lanka

Tel: +94 11 2880000

Fax: +94 11 2786854

Email: [iwmi@cgiar.org](mailto:iwmi@cgiar.org)

[www.iwmi.org](http://www.iwmi.org)