INITIATIVE ON
Fragility, Conflict, and Migration

Climate and Water-Related Vulnerabilities in Refugee Hosting Communities in Northern Jordan: Irbid and Ramtha Municipalities

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November 2024



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Acronyms and Abbreviations

AA	Anticipatory Action
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
FGD	Focus Group Discussion
FLWS	Flood, Land and Water Systems
IWMI	International Water Management Institute
NbS	Nature-based Solutions
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations International Children's Emergency Fund
WASH	Water, Sanitation and Hygiene
WFP	World Food Programme

Summary

Jordan is one of the most water-scarce countries in the world and hosts the second-highest share of refugees per capita in the world. A fast-increasing population, rapid urbanization, and extreme weather-related hazards, such as drought and flash floods, compound the risks to already vulnerable refugee-hosting communities in Jordan. The Jordanian government as well as humanitarian and development organizations have committed to addressing these challenges by prioritizing the design and implementation of disaster risk management models which include early warning/early action and anticipatory action strategies for climate response and resilience. To design and implement disaster preparedness strategies that are sustainable and inclusive, research on the specific vulnerabilities of communities is needed. This research report provides data on climate- and water-related vulnerabilities in refugee-hosting communities in Northern Jordan to inform disaster risk management, anticipatory action, and emergency preparedness strategies that improve long-term adaptation and climate resilience.

The project is titled Anticipatory Approaches in Host Communities for Emergency Preparedness and Disaster Mitigation (AHEAD), and is part of the CGIAR Initiative on Fragility, Conflict, and Migration, which aims to address challenges in livelihood, food and climate security for vulnerable populations in fragile and conflict-affected areas. Research for this report was conducted in Irbid and Ramtha municipalities in Irbid Governorate in Northern Jordan over the course of four months. The research included a desk review of relevant literature and national policies, as well as interviews with key informants and stakeholders. This study presents a qualitative analysis of how the specific vulnerabilities of refugee-hosting communities can impact the refugee-hosting community needs during an extreme weather-related disaster, such as flash flooding in this case. Specifically, the study analyzed how climate change and water scarcity, urbanization, and socio-economic risks compound vulnerabilities in refugee-hosting communities. Mapping out these risks is the starting point for designing more inclusive and sustainable disaster risk management models and anticipatory action approaches.

Given the fact that only 18% of refugees in Jordan live in refugee camps (UNHCR 2024), and the rest live in urban areas, there is an urgent need to understand the differing needs and vulnerabilities of refugees and hosting communities living in cities. This study highlights two locations, Irbid Municipality and Ramtha Municipality and 1) the water and climate risks they face, 2) the effects of climate change on the city, 3) the existing refugee and hosting populations, 4) the available infrastructure and services, and 5) the humanitarian context. The two case studies demonstrate the challenges that these municipalities face in designing and implementing disaster risk management and anticipatory action strategies that consider these complex factors. This is followed by a section that highlights the key findings from the case studies. Finally, this study recommends anticipatory action strategies in the short term and disaster risk reduction and nature-based solutions for long-term climate adaptation and resilience. These recommendations support cross-sectoral government policy implementation and humanitarian and development organization strategies for potential pathways to disaster risk reduction through sustainable and resilience-focused activities.

Introduction

Jordan sits at the intersection of two major crises, regional conflict that has resulted in large numbers of refugees, and extreme weather-related events, such as drought, heatwaves, and flash flooding, due to climate change. Jordan hosts the second-highest share of refugees per capita in the world—more than 3 million (UNHCR 2023)—and is also one of the most water-scarce countries globally (World Bank 2023). The high number of refugees and the impact of water scarcity on the rapidly increasing population has compounded economic, social and environmental risks associated with climate and water, caused rapid urbanization, and hindered development investment in certain parts of the country. To build climate adaptation and increase long-term climate resilience in Jordan, this research report discusses the compound risks that the refugee and hosting populations face and considers what sustainable and inclusive approaches are required to support both communities to address these evolving challenges.

Jordan experiences acute water stress, and the country's groundwater sources are being used approximately twice as fast as they can be replenished (Al-Addous et al. 2023). It is estimated that climate change will cause a further 15% decline in freshwater resources by 2040. With only 61 m^3 of available water per capita per year, the water supply is significantly below the absolute water scarcity threshold of 500 m^3 per capita per year (MWI 2023). This high level of water scarcity causes extreme water stress, as the demand for water exceeds the available amount. According to the Ministry of Water and Irrigation (MWI), water usage in Jordan is distributed as follows, about 51% for agriculture, 45% for domestic and tourism purposes, and 3% for industry. Groundwater and surface water are split relatively evenly between municipal and irrigation usage, while reclaimed water is used primarily for irrigation (MWI 2023). Despite concerted efforts to reduce water stress—such as projects to "increase water supply through desalination and dam construction and decrease water usage through strengthened public water networks" (Al-Addous et al. 2023, 2)—water stress remains at an all-time high in Jordan.

In addition, Jordan hosts more than 3 million refugees, primarily from Syria (approximately 1.3 million), Iraq, Yemen, Sudan, and Somalia. Around 82% of these refugees live in Jordanian hosting communities, while 18% live in refugee camps (UNHCR 2024). There are two Syrian refugee camps in Jordan (Za'atari and Azraq), which collectively host around 120,000 refugees. The rest primarily live in the northern and central governorates of Amman, Mafraq, Irbid, and Zarqa (UNHCR 2023). This is in addition to the more than 2 million Palestinian refugees living in Jordan, 18% of whom live in camps (UNRWA 2023).

In this report, two cities in Irbid Governorate are included as case studies: Irbid Municipality and Ramtha Municipality. Irbid Governorate, in Northern Jordan, has a population of over 2 million or around 18.5% of the country's population (DOS 2023) and is severely affected by drought, water scarcity, and flash flooding (WFP 2019). The refugee influx into Irbid Governorate has increased already existing challenges in the Government of Jordan's response to drought, water shortages, and water and sanitation service gaps. For example, the increased population across the Irbid Governorate has placed great strain on already aged and poorly maintained urban infrastructures. In the peri-urban districts around Irbid, it has even led to lower domestic water per capita rates, as the system already operates at maximum capacity. It has also compounded risks around climate and water, urbanization, and development for both refugee and hosting communities.

Irbid Municipality has a population of almost 900,000 (DOS 2023) and it is estimated that there are 200,000 Syrians (including those registered with UNHCR and those not registered). Irbid hosts 18% of the total refugees in the country and 36% of the population is non-Jordanian (UN-Habitat 2022). The population of the city of Irbid has increased by more than 40% between 2012 and 2023, largely due to the Syrian refugee influx. Irbid is vulnerable to extreme weather-related events such as drought, heat waves, storms, and flash floods (UN-Habitat 2022). Ramtha Municipality has a population of almost 300,000 (DOS 2023) and around one-third of the population are Syrian refugees. The population of Ramtha city has increased by almost 50% between 2012 and 2023 due to its location close to the Syrian border. In addition, Ramtha is one of the areas in Jordan most vulnerable to flash flooding (WFP 2019; UNDP 2022), primarily because the city is divided by Wadi Shiyah, which is highly susceptible to flooding during the winter season.

To face these challenges, reduce the impact on infrastructure and people's livelihoods, and build climate resilience, both Irbid and Ramtha need well-planned and sustainable disaster risk management (DRM) models. These models need to include early warning/early action and anticipatory action (AA) strategies and plans that are inclusive, address the specific needs and vulnerabilities of the community, and are responsive to the changing conditions on the ground. To design, fund, and implement these types of emergency preparedness plans in northern Jordan, well-researched data on the water and climate-related vulnerabilities in refugee and hosting communities are needed. This report offers a first look at these vulnerabilities and what guidance they offer for disaster risk management and anticipatory action strategy planning and implementation.

During COP27 in Sharm El Sheikh in 2022, His Majesty King Abdullah II of Jordan announced the Climate-Refugee-Nexus Initiative, a global initiative aimed at building financial support for refugee-hosting countries that are most negatively affected by climate change, with the goal of increasing their resilience and climate adaptation (MoEnv 2023). In Jordan, this initiative will support the government, and humanitarian and development partners in collectively identifying intervention areas within refugee and hosting communities, enabling them to better respond to the specific vulnerability context and increase their resilience. Given the ongoing uncertainty about how water resource management can be effectively incorporated into anticipatory action policies and programming, this research report provides data on the water and climate-related vulnerabilities in refugee-hosting communities and the compound risks these vulnerabilities create. This report focuses on two urban areas in Northern Jordan to inform and promote inclusive, long-term climate resilience through disaster risk management and anticipatory action strategies and approaches.

Background

Geography and Environment

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. The municipalities of Irbid and Ramtha have been identified as some of the areas facing the highest climate change risk in Jordan, especially to water scarcity, drought, unpredictable rainfall, and flash flooding (UNDP 2022). Eighty-three percent of the population of Irbid Governorate lives in urban areas (DOS 2023).

Jordan has a mostly arid climate with long, hot, dry summers and short, cool winters. The climate is affected by the country's location between the subtropical aridity of the Arabian desert areas and the subtropical humidity of the eastern Mediterranean area. About 70 percent of the average rainfall in the country occurs between November and March, while June through August are often rainless (Al Azzam and Al Kuisi 2021). Jordan is impacted by extreme weather hazards including droughts, heatwaves and extreme temperatures, and flash floods and landslides. The dominance of arid conditions and irregular rainfall distribution is the main limiting factor affecting agricultural production. Rainfall varies from season to season and from year to year and precipitation is often concentrated in heavy rainstorms, causing erosion and local flooding, especially in the winter months, which is forecasted to intensify considerably in the next 20 years (World Bank 2022).

Incidents of flooding are common in Jordan and can be very damaging (see Figure 1). Over the last decade, shorter but more intense rainstorms have resulted in an increase in flash flooding, making it Jordan's most disastrous natural hazard, occurring at a frequency that now surpasses previous records (Al Azzam and Al Kuisi 2021). Flooding often follows heavy rainfall events during the winter. Floods in Jordan can cause injury, destroy agricultural land and infrastructure, and slow economic productivity. Between 1963 and 2019, the Jordanian Civil Defense reported 20 major floods and storms, which resulted in 451 deaths and affected approximately one million people through flash flooding (Shawaqfah et al. 2020). During the period 2018–2019, three large floods killed 70 people and led to the evacuation of more than 4,000 people. The floods affected over 350,000 people, with total financial losses estimated at USD 3 million (Shawaqfah et al. 2020; Gammoh et al. 2023). In another instance of flash flooding in 2018, the Civil Defense Forces had to rescue 1,000 factory workers in Irbid Municipality who were trapped by rising water. Due to Jordan's topography, soil conditions, rapid urbanization, and increasingly frequent rainfall events, it is predicted that inundation will worsen in areas already vulnerable to flash flooding, including the cities of Irbid and Ramtha in northern Jordan (Al Azzam and Al Kuisi 2021).

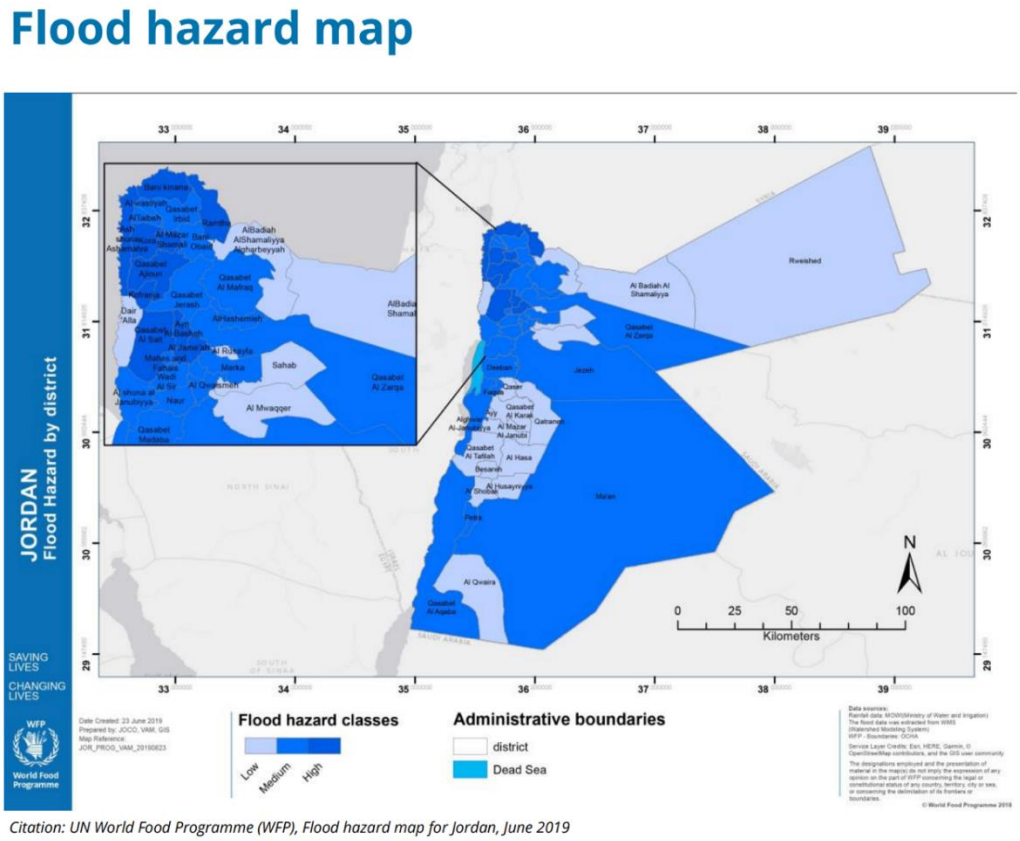


Figure 1. WFP flood hazard map for Jordan, showing Northern Jordan as the region with the highest risk of flooding
Source: WFP 2019

Another major impact of climate change on Jordan has been to its water supply. Jordan is one of the most water-scarce countries in the world, and water stress is a key limiting factor in the country's development and economic growth. The country's renewable water supply currently meets only about two-thirds of the population's water demands, with water-stress levels—defined as water withdrawals as a proportion of available water resources—increasing from 80% to 100% in the last two decades (UNICEF 2022). A study by Yoon et al. (2021) predicts that water-stress levels in Jordan will increase at an average annual rate of 1%–1.5% until 2100, leaving more than 90% of low-income households in Jordan critically vulnerable to water shortages. Jordan's water stress significantly impacts various sectors, especially the service sector and agriculture. It also directly correlates with food insecurity, higher infant mortality, educational attainment, and increased exposure of women and girls to health risks, as well as reduced educational and livelihood opportunities (UNICEF 2022). While access to safe drinking water has increased to almost 85% in Jordan, many urban households rely on expensive water which is delivered by tanker trucks and obtained through both formal and informal markets. Urban residents often question the quality of the water sources and complain of experiencing water contamination (UNICEF 2022, 19-21). For example, "in a study conducted in the Al-Mafraq Governorate of Jordan, 43% of respondents have experienced water contamination" (UNICEF 2022, 21).

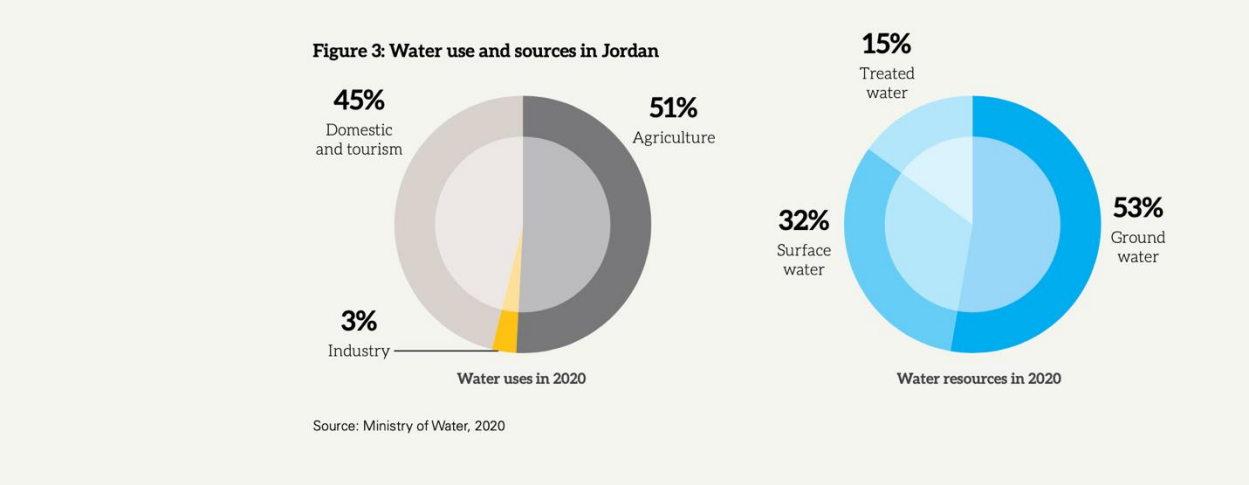


Figure 2. Water use and sources in Jordan; *Source*: UNICEF 2022

Northern Jordan is the center of this crisis, as it is both host to a significant number of refugees, and the region most affected by flash floods, droughts, and water scarcity. "Jordan's underlying water scarcity is a key component of its drought exposure and sensitivity: renewable water availability per capita is now 60% lower than in 1990. While economy-wide water use efficiency (in terms of economic productivity) has decreased in the last decade, this is likely due to the major increase in the share of the municipal water supply sector overall. This is driven by urbanization and refugee influxes, which put immense pressure on the already-strained water supply infrastructure" (Fragaszy et al. 2022, 4). This study of drought vulnerability in Jordan, conducted by IWMI, highlights the link between Jordan's political economy and drought risk. For example, during droughts, "municipal supply, industry, and tourism are favored above irrigation uses because their economic productivity is higher" (Fragaszy et al. 2022, 4).

However, while the discourse emphasizing the negative impact of the refugee influx on water resources is significant in Jordan (Hussein et al. 2020), it is important to note that the issue of water-intensive agriculture, is just as, if not more important, to Jordan's water scarcity issue (see Figure 2). Al-Addous et al. (2023, 18) suggest the main reasons behind the growing domestic and agricultural water demand could be "government mismanagement of water resources, the expanding process of urbanization, the expansion of agriculture activities, the inefficient agricultural sector, the negative effects of climate change, as well as the influx of refugees". Mismanagement, in this case, is referring to Jordan's overexploitation of its water resources by 10% to 100% (Al-Addous et al. 2023, 19). Ultimately, the strain on water resources and the extreme water scarcity that Jordan is currently experiencing is a multi-faceted and complex problem that needs to be addressed across sectors and institutions.

Refugees and Hosting Communities in Jordan

There are currently around 3 million refugees in Jordan, and approximately 760,000 of these refugees are registered for support from UNHCR (UNHCR 2023). Of the refugees supported by UNHCR, Syrians form the largest community. An estimated 1.3 million Syrian refugees live in Jordan, both registered and unregistered. While the majority (82%) live in urban areas, around 18% (approximately 120,000) live in two refugee camps, Za'atari and Azraq (UNHCR 2024). In addition, more than 2 million Palestinian refugees live in Jordan, the largest population of Palestinian refugees among all UNRWA countries of operation. Approximately 10% of Palestinian refugees live in camps, most of which were established following the wars of 1948 and 1967 (UNRWA 2023). Jordan has historically received many refugees due to regional conflicts, but increasing economic pressures and extreme weather-related events, such as severe drought and flooding, continue to severely strain the country's resources. In addition, changes in donor priorities have led to cuts in humanitarian funding, resulting in a reduction in cash assistance and social services for refugees (WFP 2023). This combined

pressure on refugees and hosting communities creates compound risks, making it challenging for both international organizations and local governments to respond to the diverse needs of these communities.

The Jordan Response Plan (JRP), led by the Ministry of Planning and International Cooperation (MoPIC), represents a partnership between the Government of Jordan and the international community. It was established in 2015 to protect Syrian refugees in Jordan and vulnerable Jordanian citizens affected by the Syrian refugee crisis. The main objectives of this plan are strengthening program design and implementation, meeting the protection needs of Syrian refugees and vulnerable Jordanians, and supporting national systems to maintain service provision. The JRP highlights the disproportional negative effects of climate change stressors, including water shortages, and land and air pollution, on Jordan's most vulnerable populations, which include Syrian refugees and hosting communities. As the policy document states: "prior to the Syrian crisis and to the flow of refugees to Jordan, the environmental situation of the country was extremely challenged due to the natural aridity, recent drought episodes which increased the obvious impact of the climate change. Increased population numbers, combined with increased municipal and wastewater generated have also created an added pressure on the greenhouse gas emissions. This pressure has the potential to impact the country's economic development activities and costs, human health and overall sustainable development" (MoPIC 2020, 94). In essence, the rapid growth in population has increased pressures on infrastructures and resources, directly impacting a range of urban services, such as water, sanitation, livelihoods, and markets.

Both refugees and the hosting community in Irbid Governorate are vulnerable due to high unemployment rates. However, conditions are often worse for Syrians, as they rely on informal work, face lower mandated minimum wages, and encounter challenges in getting work permits, all of which contribute to poor working conditions when they do find work (Adam-Bradford et al. 2023; Stave et al. 2021). The unemployment rate in Jordan is 22.3%, while in Irbid Governorate it stands at 20.9%. Among Jordanians, the rate is 21.5%, and for non-Jordanians, it is 18.9% (DOS 2023). According to the 2024 Vulnerability Assessment Framework (VAF) (UNHCR 2022b), only 7% of refugee respondents in Jordan have a valid work permit. Gender was found to be a strong predictor of labor force participation and employment: only 7% of interviewed refugee women (excluding Palestinians) participate in the labor force, compared to 55% of men. This is likely due to the social acceptance within Syrian refugee families of women not participating in the labor force outside the home, especially when living outside their home country.

Fifty-three percent of Jordanians are considered vulnerable to food insecurity; for example, residents in rural governorates are particularly susceptible due to rural poverty (Fathallah and Robertson 2021). Food security, as defined by FAO (2006), exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Sixty-two percent of Syrians (registered refugees with UNHCR) interviewed for the 2022 VAF report (UNHCR 2022b) face either high or severe levels of food security vulnerability. The high proportion of refugees resorting to reduced food coping strategies may be a result of price hikes originating from the COVID-19 pandemic and Jordan's reliance upon imported food (UNHCR 2022b). These conditions equally affect vulnerable Jordanians, particularly those in rural areas and the urban poor. Examples of negative food coping strategies in Jordan include eating cheaper food items, borrowing food, and having fewer and smaller meals (Olaimat et al. 2022). In addition, due to funding cuts, the humanitarian sector has recently reduced aid in the form of food and non-food items, and cash assistance support for refugees in Jordan, which has increased food insecurity in refugee communities.

Disaster Risk Management (DRM) and Anticipatory Action (AA) in Jordan

Disaster Risk Management (DRM) is the application of disaster risk reduction policies and strategies to prevent new disaster risks, reduce existing disaster risks, manage residual risks, and strengthen resilience to minimize disaster losses (UNDRR 2016). Anticipatory action (AA) refers to steps taken to prevent or mitigate potential disaster impacts before a shock occurs, or before acute impacts are felt. These actions are carried out in anticipation of a hazard, based on predictions of how the event will unfold. AA is increasingly recognized as part of the solution to reducing the impacts of climate change and extreme weather events (IFRC 2020). For AA to be effective, it needs to be properly applied within a DRM model (McTough 2024). AA can improve climate resilience by predicting potential risks, such as drought or flash floods, and implementing preventative measures and plans to mitigate these risks. Enhanced AA can significantly improve the condition of refugee populations and hosting communities by enabling early response to emerging crises, protecting vulnerable populations, promoting dignity and empowerment, utilizing resources efficiently, and building community resilience. Finally, AA allows for the timely deployment of resources, proactive risk mitigation, and the inclusion of refugees in decision-making processes, resulting in better protection, reduced harm, increased self-reliance, and long-term stability for refugees and hosting communities.

In recent years, the Jordanian government, in collaboration with humanitarian and development organizations, has begun planning strategies and policies to implement a cross-sectoral DRM model, including early warning/early action, anticipatory action, and early response measures. The Ministry of Water and Irrigation (MWI), the Ministry of Environment (MoEnv), and the National Center for Security and Crisis Management (NCSCM) have all recently produced strategy documents that highlight the importance of emergency preparedness, AA, and DRM to increasing climate resilience and reducing the country's vulnerability to climate-related risks. Jordan's *National Disaster Risk Reduction Strategy* (2023–2030), developed by the National Center for Security and Crises Management (NCSCM), notes several challenges in design and implementation, including the lack of a mechanism to ensure coordination between different sectors, a weak capacity to enforce existing disaster risk reduction (DRR) systems, and the lack of a specified budget. The gaps in existing disaster risk reduction and anticipatory action include climate adaptation strategies and climate resilience

programming. There is an opportunity in this space to develop nature-based solutions (NbS) that address climate risks such as flash flooding and water scarcity. 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).

Water and Climate-Related Vulnerabilities

The research conducted for this report focused specifically on the water and climate-related vulnerabilities that refugee and hosting communities face in Irbid Governorate. Vulnerability is defined as a condition brought about by physical, social, economic, environmental and political factors or processes that increase the susceptibility of a community or individuals to shocks or hazards (IPCC 2022). Refugees and hosts, in the case of this study, live in the same challenging environment and share many of the same resources. However, because of the specific needs and vulnerabilities in each community, and access to different social protection systems, refugees and hosting communities often have different experiences and are exposed to compounded risks in diverse ways.

Vulnerabilities may be

1) environmental (e.g., proximity to fragile infrastructure and ecosystems or environmental degradation and pollution),
2) economic (e.g., livelihood opportunities, competition, or limited assets),
3) institutional (e.g., lack of access to information and finance or legal difficulties for refugees), or
4) psycho-social (e.g., conflict between hosts and displaced persons) (Schindler et al. 2023).

Climate- or conflict-related stress or shock increases the risk to the refugee and hosting communities. In the cases of Irbid and Ramtha, these shocks include floods, drought, extreme temperatures, population influx, and environmental degradation (UN-Habitat 2022). The risks to refugee and hosting communities are compounded by the already existing systematic vulnerabilities in Irbid Governorate, which include food and water insecurity, loss of livelihoods and assets, and chronic illness and poor health. Refugee-specific vulnerabilities include unidentified health conditions, higher rates of post-traumatic stress disorder and trauma, lack of trust in the institutions conveying information and services, and a disproportionate number of women-led households with young children and dependents (Easton-Calabria 2022). Our research also indicated that there may be existing vulnerabilities in the hosting community, such as gender inequality, chronic health issues, challenges to livelihoods, and tensions between Jordanians and Syrians living in close quarters.

Irbid Governorate currently experiences three significant climate related-challenges, including

1) shorter and more intensive rainfall patterns,
2) groundwater decreasing and not replenishing, and
3) increased temperatures during the dry season affecting urban air quality and crop evaporation rates (MoEnv and UNDP 2022a).

Urbanization is also impacting water issues with consequences for climate vulnerability. As the population in urban areas has increased, additional burdens have been placed on urban infrastructure, particularly in the management of solid waste and wastewater. These services are under strain, leading to the illegal dumping of both liquid and solid waste. Even when drainage and sewage infrastructure is in place, coverage may be limited, leading systems to fail during heavy rains. Additionally, sewage systems may flood, resulting in the contamination of surface waters. Drains, culverts, open channels, and sewage systems are increasingly blocked by discarded trash and rubbish, contributing to flash flooding. When an emergency or disaster, such as a flash flood, occurs, existing stresses on food, land and water systems are compounded by vulnerabilities in both refugee and hosting communities. The residents of Irbid and Ramtha who are already facing health, livelihood, or food security challenges, or who live in the most flood-prone areas, are at a higher risk of injury, loss of property or livelihood in the event of an extreme weather hazard. Recent examples include flooding in downtown Irbid, which resulted in the evacuation of several families, and flash flooding in Ramtha, where houses along an open water drainage channel were inundated. The flooding was caused by a blockage at the entry point into a culvert, creating a dam effect and flash flood conditions. In the absence of disaster preparedness plans, DRR, or funded AA strategies, the most vulnerable are often the first to suffer, whether due to loss of livelihoods or assets, injury, or health impacts.

National Climate and Water Policies and Strategies

Based on a review of current national climate and water policies (see Annex 1), there is a shared view across sectors that the large number of refugees hosted by Jordan has a significant impact on the country's economy, environment, and resources. As a result, refugee issues need to be integrated into all forms of future planning. Officially, refugees are considered part of Jordan's national identity, and the country remains a symbol of hospitality for the refugees it hosts across the Kingdom. This level of integration is also required in the planning and design of climate resilience strategies and DRM plans, ensuring that vulnerabilities to climate risks are addressed for all. Such efforts can lead to innovative and sustainable solutions that build resilience for both hosting and refugee communities. However, many of the policies remain generic and broad when addressing refugee and hosting community issues. There is still a need for clearer design and implementation planning to ensure that the specific vulnerabilities of refugee-hosting communities

are adequately addressed at an operational and practical level. We argue there are four main gaps in Jordan's DRR policy environment, which are also highlighted in national policies:

1. Lack of operational coordination across sectors and between central and local governments for early warning, DRR, and climate adaptation policies.
2. Insufficient climate information for forecasting extreme events.
3. Inadequate technical tools and information platforms to support national and local decision-making processes and individual responses (e.g., no impact-based forecasting).
4. Limited community-based DRR approaches, particularly those tailored to refugee-hosting communities.
5. Absence of a common strategy for interventions by humanitarian and development organizations.

Methodology

Study Locations

The study locations for this research are two different urban areas in Northern Jordan, Irbid Municipality—the largest city in Irbid governorate—and Ramtha Municipality—a smaller city in Irbid governorate but with a population size that has doubled since the start of the Syrian War (Malkawi 2015). These two locations are both located in the north and host the largest population of refugees outside of Amman (UNHCR 2023); both locations are extremely vulnerable to droughts and floods. Irbid and Ramtha also lack water security and have an aging water supply infrastructure with high leakage, and limited wastewater treatment facilities. The capacity of these systems has not matched the growth in population, resulting in less water per capita. This increases competition for access to the safe water needed for drinking, sanitation and hygiene purposes, as well as agriculture and industrial processes, thereby undermining social and economic development (UNICEF 2022). Both locations are also prone to severe flooding during the rainy season, which causes the flooding of homes (especially ground floors), causes injuries, and affects the residents' mobility and access to jobs, transportation, and services. The top priority in disaster planning for both Irbid and Ramtha is to manage domestic water supply shortages, especially during the hot, dry months, and to address flooding in winter. Both areas faced severe water shortages even before the refugee crises, and the arrival of refugees has further strained per capita supply. The combination of a high refugee population and water- and climate-related challenges was a primary factor in selecting Irbid and Ramtha as case studies for this research. The selection was made in consultation with local and national authorities, as well as humanitarian actors in the country, including UNHCR.

Data Collection and Analysis

This report is based on data collected from 1) climate and water-related vulnerabilities in the area; 2) national policy and strategy documents on climate, water, and DRR; 3) key informant interviews and focus group discussions (FGDs) on the socio-economic conditions of refugee and hosting communities; and 4) existing response mechanisms.

First, desk research was conducted to source journal articles, organization reports, and national documents discussing water and climate risk in Jordan, specifically focusing on Irbid and Ramtha. Emphasis was placed on documents addressing refugee-hosting communities, as well as disaster preparedness, DRR, and AA. Second, policy and strategy documents containing information on water resource management, climate change adaptation, DRR, and refugee response were identified. These documents were identified through discussions with key informants familiar with the most relevant policies and strategies referenced in local, national, and regional discussions on these topics. A total of 10 national policy and strategy documents were reviewed (see Annex 1, tables 4–7).

Finally, field research was conducted between October 1, 2023, and January 31, 2024. During this period, interviews were carried out with key informants and stakeholders in Irbid and Ramtha, including 20 interviews with representatives from 12 local NGOs and 8 governorate offices. The government offices included all departments directly involved in refugee management. In selecting local NGOs, attention was given to their geographical coverage and efforts were made to include those with gender inclusion components in their programs. Additionally, four FGDs were held in Irbid and Ramtha with both Syrian refugees and Jordanian hosting communities. These key informant interviews involved technical staff from local government departments related to the environment and water, as well as local NGOs. The FGDs involved residents of the study areas.

Data analysis in this study employed several key methods to understand the complex dynamics of climate change and water scarcity in refugee and hosting communities in Irbid Governorate. These included thematic analyses of academic articles, policy documents, organizational reports, interviews with key stakeholders, and FGDs to identify recurring themes. Using an inductive analytical approach, distinct types of climate-related risks affecting refugee and hosting communities were identified. This typology, first developed in a policy brief (Adam-Bradford et al. 2023), was further expanded upon in this research report. The economic conditions and social dynamics between refugee and hosting communities that influence the viability and sustainability of disaster preparedness planning were also analyzed, along with the challenges and opportunities present in existing disaster response mechanisms for extreme weather-related events, such as droughts and floods.

The following section presents our findings on the main risks, categorized into three areas: climate change and water scarcity, urbanization, and socio-economic factors.

Research Findings: Risks

The main risks identified through desk research, policy review, and field research are those related to climate change and water scarcity, urbanization, and socio-economic factors. Our research found that the refugee influx has exacerbated pre-existing challenges, including local and national responses to drought, managing water shortages across multiple sectors and users, and rectifying water and sanitation service gaps. Improving disaster risk management (DRM) and anticipatory action (AA) is crucial to enhancing the well-being of refugees and hosting communities by proactively considering their needs and minimizing the impacts of climate shocks, such as severe droughts and flooding. The following sections review each set of risks, highlighting the risks for the hosting community and Syrian refugees in Irbid Governorate, including both Irbid and Ramtha municipalities (see Table 2). This section maps out the risks as a starting point for designing more inclusive and sustainable AA approaches to build climate resilience in both refugee and hosting communities.

Climate Change and Water Scarcity

Irbid Governorate is experiencing several risks due to climate change and severe water scarcity (MoEnv and UNDP 2022; World Bank 2022). These risks include:

1) Shorter, more intensive rainfall patterns that result in periods of drought and flash flooding.
2) Increasing temperatures during the dry season, which affect urban air quality and increase crop evapotranspiration rates.
3) A decline in the groundwater replenishing rate.
4) Reduced crop quality and yield.

Overall, the lack of climate information for forecasting extreme weather events makes it very difficult for local communities to enact effective community-based responses to prepare for and mitigate these risks.

Urbanization

Of course, water is scarce, as water comes only once a week…We are buying water. It arrives, but it is not enough, and there are no pumps to fill the tanks, so we have to buy water.

Syrian refugee living in Irbid

Irbid Governorate has experienced rapid urbanization over the past decade, increasing risks for inhabitants of both the Irbid and Ramtha municipalities. Even rural districts, such as Bani Kenanah, are feeling the effects of this rapid urbanization. The urbanization is a result of the large population increase from refugee influxes, rural-to-urban migration, and a shift away from agricultural livelihoods. For the municipalities, this urbanization poses immense challenges, including:

1) Ineffective and failing wastewater collection and treatment services, along with stressed solid waste collection and disposal services, negatively impacting water, sanitation, and hygiene (WASH) services.
2) Limited drainage systems, with only partial coverage for surface and stormwater management.
3) A lack of strategic urban planning for resilience.
4) Inadequate consideration of the circumstances and needs of refugees in urban planning.
5) Loss of agricultural land caused by poor policies, limited planning, and urbanization.
6) Increase in leasing fees for rental of agricultural plots.
7) Land degradation and groundwater exploitation.

According to FGDs with refugee and hosting communities in Irbid, both groups complained about insufficient solid waste management for the growing population, leading to almost daily flooding and terrible odors during the rainy season. Both groups also reported long delays in building or repairing water networks, which leave neighborhoods vulnerable to further flood damage, poor water quality, or extensive periods of insufficient water supply. Jordanians also complained of air pollution, mosquitos, the lack of green spaces, poor WASH services, and a notable rise in temperatures during the summer months.

A Syrian participant in the FGD shared: “Syrian refugees are more exposed to the challenges of climate fluctuations. For example, Syrian rent apartment buildings that are more exposed to floods due to the cheap rent. ” While this Syrian refugee highlighted the specific vulnerabilities Syrians experience in Irbid, the participant also added that, ultimately, both Syrian refugees and Jordanians use similar strategies to cope with water shortages. For instance, when faced with a water supply shortage, both communities rely on private water trucks that bring water to their neighborhoods. This statement reflects that, while Syrian refugees have distinct experiences and vulnerabilities, there is a shared exposure to extreme weather-related shocks among both groups.

The pace and extent of urbanization in Irbid Governorate has made it challenging for the municipal authorities to improve WASH services, implement effective urban planning, and mitigate environmental degradation. This has had significant negative impacts on both refugee and hosting communities in Irbid and Ramtha municipalities, reducing residents’ resilience to extreme weather-related events, such as urban flooding, drought, and extreme temperatures. These challenges are compounded by other risks, including pollution, food insecurity, unemployment, and cultural tensions.

Socio-Economic factors

More than a decade after the start of the Syrian war, conditions for Syrian refugee households in Jordan have changed in a some key ways, while remaining similar in others (see Table 1). First, Syrians have experienced a decrease in food, non-food items, and cash assistance over the past few years, primarily due to decreased funding for international humanitarian organizations like the World Food Programme (WFP), which is currently facing a funding shortfall of over 60%, the highest in its history (WFP 2023). Second, until 2021, Syrians in Jordan were only allowed to obtain work permits in agriculture, construction, and manufacturing. However, starting in mid-2021, the Jordanian government began granting Syrians work permits in all sectors open to non-Jordanians. Still, there are extremely limited employment opportunities outside the originally available sectors (UNHCR 2022a). Jordanians in the FGDs also noted that Syrians are often willing to perform a wider range of jobs for lower wages, putting Jordanians at a disadvantage. This has led to competition and conflict between refugees and hosting communities over access to social services and employment (Adam-Bradford et al. 2023). Additionally, our research found that landlords are generally charging higher rents due to the increased demand driven by population growth. Lower rents are typically only available in flood-prone areas, so these are often taken by refugees with limited financial resources. The general lack of housing options due to the population surge affects both communities, including low-income Jordanians living in Irbid and Ramtha.

Mitigating the effects of climate extremes and ensuring water security is complicated by several differences between refugees and members of the host community. These differences are summarized in Table 1.

	Irbid and Ramtha
Refugee households	Decrease in food, non-food item and cash assistance Difficulty finding jobs outside of agriculture, construction, and hospitality Higher rents or housing only available in flood-prone areas Competition and conflict over access to social services and employment
Hosting community households	Lack of affordable rent due to population increase Lack of employment opportunities due to refugees willing to work for less Increase in pressure on water supply and solid waste management.

Table 1. Socio-economic risks in Irbid and Ramtha municipalities for refugee households and hosting community households. *Source*: Focus group discussion with Wadi Al-Shiya residents in Ramtha.

In an FGD conducted in Ramtha with Jordanian residents living along Wadi Shiyah, who experience annual flooding, participants shared that the city has been significantly affected by the Syrian war and the influx of Syrian refugees. From the outset, Syrians have shared resources with Jordanians, such as livelihoods, housing, and water supplies. This has increased pressure on sewage networks, streets, and has driven up demand for accommodation and food products, leading to rising prices.

Participants highlighted that many of the Syrians who came to Ramtha during the war were technicians and skilled workers, possessing skills that were not previously available in Ramtha. As a result, Syrians in some cases found better job opportunities than Jordanians, especially in construction. More recently, Syrians have shifted to working in agriculture, renting significant portions of available agricultural land. The participants noted that the crops grown by Syrians consume a large amount of water and that there is an overuse of chemical fertilizers. However, they acknowledged that most commercial farming practices in northern Jordan use inefficient irrigation systems, regardless of the crops being grown. The Jordanians interviewed felt that they were losing out on opportunities for livelihood and employment.

The compounded risks of development and poverty reduction, along with climate change, water scarcity, and urbanization (listed above), make refugee and hosting communities in Irbid and Ramtha particularly vulnerable to extreme weather-related events, such as urban floods, droughts, and extreme temperatures. The following section discusses the existing climate hazards faced by both case study locations, how these hazards lead to disasters or emergencies, and the current, yet inadequate, emergency response mechanisms.

Mapping Disaster Risks

Disaster Risk Management (DRM) and Anticipatory Action (AA) in Jordan are currently fragmented and not well localized. Many national policies, such as those from the Ministry of Water and Irrigation (2023), the Ministry of Environment (2022) and the National Center for Security and Crisis Management (2023), emphasize the importance of disaster preparedness to address the challenges posed by water scarcity and climate change. Additionally, the latest three-year strategies from major international organizations, including UNICEF, WFP, and UNHCR, have incorporated AA into their programming goals. To develop sustainable and inclusive disaster preparedness and AA approaches, and to build climate resilience and long-term adaptation, there needs to be a clear understanding of the climate risks that each case study location is facing, how and why disasters and emergencies occur, and what disaster response mechanisms are currently implemented.

	Climate risks	Climate change impacts	Refugee and hosting communities	Infrastructure and services	Humanitarian context
Irbid Municipality	- Urban flash floods. - Water scarcity. - Drought. - Heatwaves.	- Shorter and more intense rainfall. - Groundwater decreasing and not replenishing. - Reduced crop quality and loss of agricultural land. - Water loss and low-pressure pumping.	- Total population of 900,000 - Approximately 200,000 Syrian refugees, with about 128,000 registered with UNHCR. Hosts nearly 20% of the total refugees in the country. - Population increased almost 34% between 2012–2022, largely due to the Syrian refugee influx.	- Refugees and hosting communities receive public & WASH services. - Wastewater collection & treatment services are stressed. - Solid waste collection and disposal services are stressed. - Limited drainage for surface water & stormwater. - Limited sewage network	- Decrease in food & non- food items & cash assistance. - UNHCR supports around 128,000 registered refugees with social protection, education & livelihood support. - Estimated equal number of unregistered refugees who receive the same social support as Jordanians.
Ramtha Municipality	- Flooding of Wadi Al-Shiyah. - Urban flash floods. - Water scarcity. - Drought. - Heatwaves.	- Seasonal floods. - Spreading of rodents and insects. - Unbearable sewage smell.	- Total population of 300,000. - Approximately 100,000 Syrian refugees make Ramtha one of Jordan's most integrated cities. - Strong social and economic connections between two communities. - Wadi conditions affect low-income residents and - Syrian refugees living in the area in tents (residents total around 10,000).	- Refugees and hosting communities receive public and WASH services. - Wastewater collection and treatment services are stressed. - Solid waste collection and disposal services are stressed. - Limited drainage for surface water & stormwater. - Limited sewage network.	- Decrease in food & non-food items & cash assistance. - Unemployment rate is 40%. - Many residents of Wadi Al-Shiyah are truck drivers, whose jobs were hit badly due to border closures. - Around 2000 families were affected by border closures.

Table 2. Overview of case study locations: Irbid and Ramtha municipalities

In the two case studies below, Irbid Municipality and Ramtha Municipality, we examine 1) the climate hazards, 2) the causes that result in a disaster or emergency, and 3) existing emergency response strategies and their effectiveness.

Irbid Municipality: Urban Flash Floods

Flash flooding is one of the primary climate-related risks facing Irbid Municipality. These events occur in low-lying, flood-prone areas of the city, including the business center and surrounding residential neighborhoods, such as Al Afrah. Flood-prone areas tend to have lower rental fees, attracting high numbers of Syrian refugee residents. Shorter, more intense periods of heavy rainfall during the winter months have led to an increase in flash floods (Al Azzam and Al Kuisi 2021). The city's steep, undulating topography accelerates surface water flow during rainfall, while impermeable surfaces such as buildings, car parks, pavements, and roads prevent water infiltration and further enable rapid surface runoff. The limited drainage infrastructure quickly reaches full capacity during even light rains, leaving the system completely inundated during heavy rains. Furthermore, not all areas have drainage systems. These factors create conditions that increase the risk of flooding. As a result, when intense rainfall occurs, flash flooding becomes inevitable.

Urban planning in Irbid has historically overlooked flood resilience, with flood-prone areas not being properly zoned to prevent inappropriate development. As Al Azzam and Al Kuisi (2021, 81) note: "Recently, flash-flood problems in Jordan have largely increased due to different factors such as the continuous changing in land use/land cover due to inadequate enforcement laws, urbanization activities' expansion in flash-flood prone areas, low-quality constructions, and the increasing of the urbanization density". However, flood hot spots are now being mapped as part of a broader flood management initiative by the Department of International Programs and Development at Irbid Municipality.

In the event of an emergency or disaster, the Civil Defense serves as the lead responding agency, with Irbid Municipality providing support through the provision of human resources and logistics. At the municipal level, an incident coordinator is appointed to serve as the direct link to the Civil Defense. Through this coordinator, teams and vehicles are mobilized to assist with evacuations and clean-up efforts. Due to the frequency of flash floods during the winter, the municipality's reactive response mechanisms have become routine. For example, following a flash flood event in the city in 2023, the municipality responded swiftly, evacuated the affected area, allowed the floodwaters to recede, and then completed the clean-up process within three weeks.

Ramtha Municipality: Flooding of Wadi Shiyah and Urban Flash Floods

The main climate risks for Ramtha Municipality are the flooding of Wadi Al-Shiyah and flash flooding in flood-prone areas. The Wadi Al-Shiyah covers an area of 15.8 km^2 and is a sub-catchment of the Al-Shumar watershed, which spans 330 km^2 (Makhamreh et al. 2020). The Al-Shumar watershed is located within the Governorates of Irbid to the north and Mafraq to the southeast. In Ramtha, the wadi floods from two different directions. First, it receives upstream flows from the sub-catchment, causing a steady rise in water levels until peak flows are reached. Second, the wadi collects surface water runoff from within the city, flowing laterally down to the wadi (see Figure 3 for an illustration of these flows). Both types of surface water flows contribute to flash flooding, impacting urban infrastructure. When the main wadi channel floods during heavy rainfall, it affects bridges, roads, and residential housing along its banks. During these events, the city is divided into east and west, disrupting the economy and essential services, as movement between the two areas is impossible until the waters recede.

Surface water and stormwater flows within the city also contribute to flash flooding. As surface water flows from the east and west parts of the city toward the wadi, it encounters blockages and obstacles, that can result in intense flash floods affecting residential homes en route to the wadi. Recent examples included blocked channels, drains, and culverts, which, instead of allowing for safe drainage, resulted in flash floods impacting properties near the wadi. These locations face flood risk from both the rising waters of the wadi and surface water runoff, which flows adjacent to their properties, following the steep slopes into the wadi.

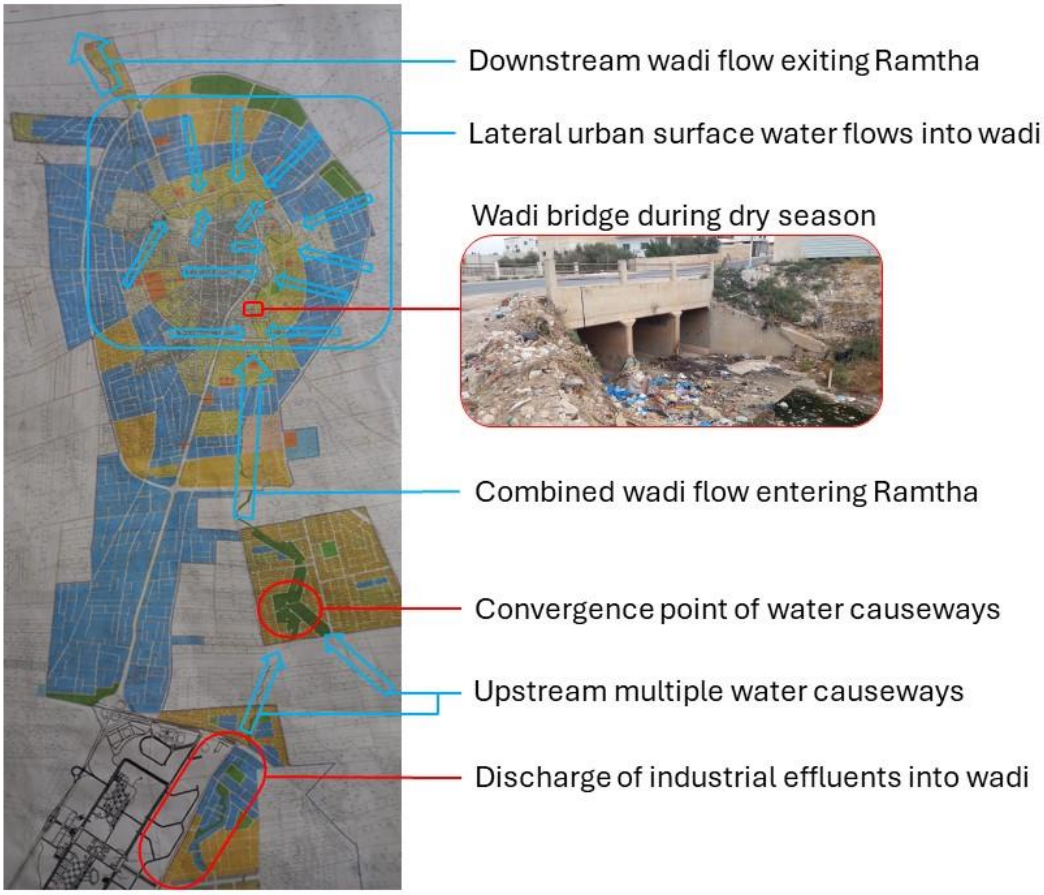


Figure 3. Features of Wadi Al-Shiyah in Ramtha. *Source:* Adapted from the Ramtha land zone map

Like Irbid, Ramtha's urban characteristics, including undulating topography, impermeable surfaces, ineffective drainage, blocked surface channels, drains, and culverts, all contribute to flash flooding during intense rainfall. As a result, Ramtha is highly susceptible to floods and therefore has been classified as having a high flood hazard level (WFP 2019; Al Azzam and Al Kuisi 2021).

Similar to Irbid, Ramtha's existing emergency response measures are focused on reactive responses, with the municipality supporting Civil Defense during flash flood events. Ramtha also lacks an effective strategy for managing the flooding wadi. Flood resilience is not integrated into urban planning, and little disaster preparedness is conducted, such as coordinating the clearance of surface water channels, drains, and culverts before the rainy season (see Figure 4) (Al Azzam and Al Kuisi 2021).

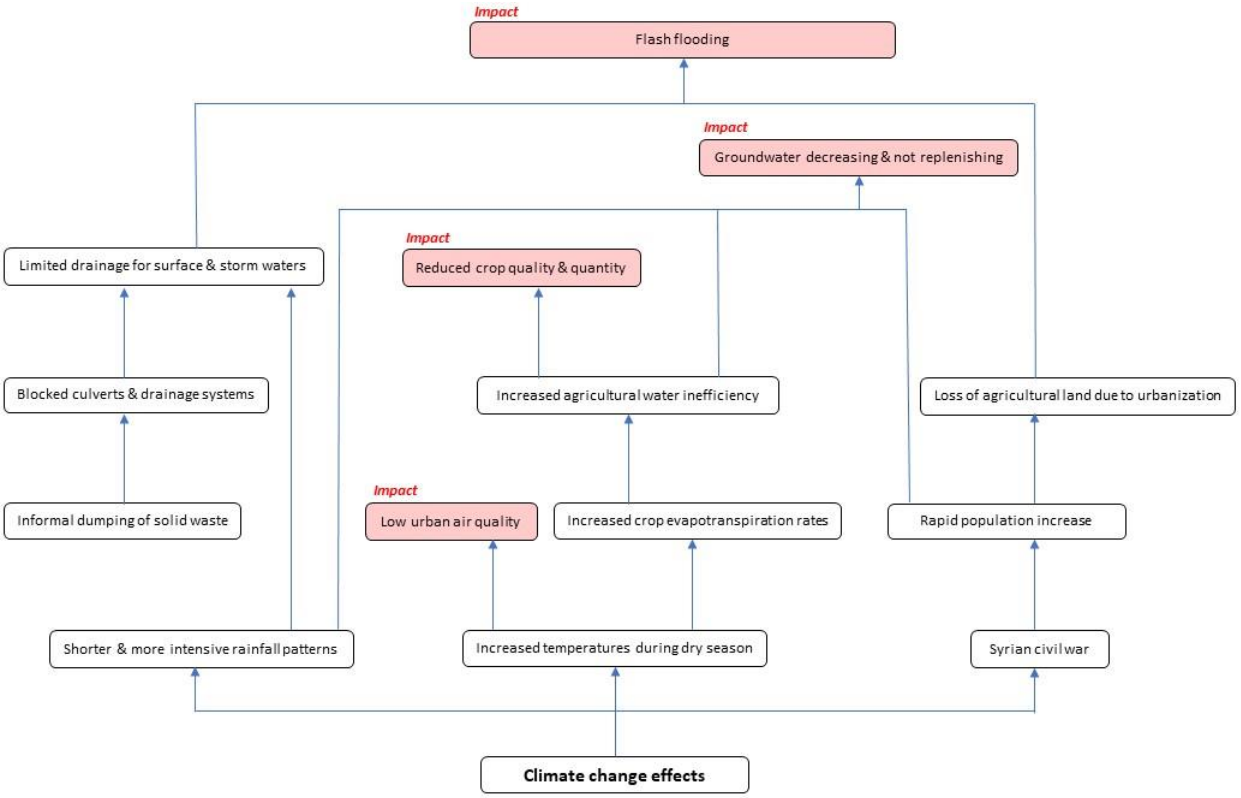


Figure 4. Problem tree demonstrating the interrelated causes; *Source:* Authors

Recommendations for Building Disaster Risk Management and Climate Resilience

To promote climate adaptation and to address the risks laid out in this report, we recommend adopting Anticipatory (AA) approaches to reduce disaster impacts in the short term, alongside Disaster Risk Management (DRM) and Nature-based Solutions (NbS) to build long-term resilience (see Table 3). While AA is a proactive and essential component of disaster management, it must be paired with longer-term solutions to build resilience and sustainability. The differing vulnerabilities of refugees and hosting communities should be reflected in the design and implementation of all stages of DRM, including indicators such as gender, age, livelihood opportunities, and dependency ratios. Finally, it is imperative that DRM models and AA strategies prioritize community resilience and long-term climate adaptation. This requires the creation of institutional structures that foster an enabling environment, ensuring that policies are operationalized at the community level, thus building resilience from the bottom up. AA approaches can serve as a vital entry point in this process, laying the groundwork for longer-term DRR.

AA approaches involve several key steps: 1) establishing triggers for action, 2) identifying pre-agreed activities, 3) securing pre-committed funding, 4) monitoring early warning signs, and 5) provision of humanitarian aid (Alexander 2000; OCHA n.d.). The challenge of AA lies in developing a clear understanding of the specific vulnerabilities of affected communities and recognizing the complex nature of different types of emergencies. The data presented in this research report provides a foundation for developing AA strategies that integrate the specific needs of both refugee and hosting communities.

AA is not a substitute for DRR but should rather be seen as a component of a longer-term risk reduction strategy that builds resilience. It should also be linked to longer-term adaptation strategies that may mitigate the impacts of extreme climatic events or even prevent crises from occurring altogether. Mitigation measures include land use and zoning practices that prevent construction in flood-prone areas, as well as the implementation and enforcement of building regulations. NbS offer innovative and low-cost solutions to mitigate and prevent extreme climatic risks.

In the long term, NbS are crucial for developing climate resilience and adaptation in the Jordanian context. A range of potential nature-based innovations and solutions, based on data gathered from the case study locations, which could be considered for investment, is outlined in Table 3.

The NbS suggested for Irbid and Ramtha municipalities present potential pathways for DRR through sustainable, resilience-focused green investments. These NbS could help protect lives and infrastructure by preventing damage and offering direct benefits, such as improved health, increased income, and enhanced food security for both refugee and hosting communities. The data generated by this study indicates that flash floods pose the greatest risk to the livelihoods, wellbeing, and assets of both communities in these locations.

Implementing these solutions is a critical step toward addressing these risks, preventing further damage, and promoting resilience by enabling communities to prepare for future disasters more effectively and sustainably. Moreover, these solutions lay the groundwork for a more comprehensive DRM model that incorporates AA and early warning/early action approaches, ensuring proactive measures are taken before disasters occur and supporting long-term strategies for climate resilience and adaptation.

	NbS Technique	Humanitarian sector benefits	Climate change adaptation / hazard risk mitigation benefits
Irbid	Integrated flood management at the watershed level Sustainable urban drainage systems (e.g., use of natural water features and plants to manage surface water flows) Urban greening and agroforestry (e.g., constructing parks and tree planting) Kitchen, rooftop, and community gardens	Protects human life; prevents damage to all infrastructure, including shelters; public health Prevents damage to all infrastructure, including shelters; public health Increased income generation; contribution to food security	Reduces flooding risk and degradation, improves groundwater infiltration Reduces flooding risk and degradation; greening element protects from high wind events, reduce urban heat island effect Enhances the immediate environment at the city level, contributing to reduction in the urban heat island effect Enhances the immediate environment at the household level, creating microclimates such as cooling shade in summer
Ramtha	Integrated flood management at the watershed level Protection and restoration of the urban wadi through maintaining healthy urban surface water flows Kitchen, rooftop, and community gardens	Protects human life; prevents damage to all infrastructure, including shelters; public health Protects housing/shelters; direct health benefits from improved environmental sanitation Increased income generation; contribution to food security	Reduces flooding risk and degradation, improves groundwater infiltration Reduce risk of flash flooding; reduced risk of drought and water insecurity, of food insecurity and other secondary impacts Enhances the immediate environment at the household level, creating microclimates such as cooling shade in summer

Table 3. Potential NbS interventions for Irbid and Ramtha municipalities

Conclusion

This report provides data on climate- and water-related vulnerabilities in refugee-hosting communities in Irbid and Ramtha, aiming to inform disaster risk management, anticipatory action, and nature-based solutions that support long-term adaptation and climate resilience investments and policies. The identified risks in the Irbid region are related to climate change and extreme weather-related hazards, rapid urbanization and population increase, and socio-economic factors. The data in this report show that the challenges to building resilience in refugee and hosting communities include the increasing climate change impacts on food, land, and water security, the absence of integrated resilience-building approaches tailored to refugee-hosting communities, rapid population growth and urbanization, and the lack of a cross-sectoral policy framework for DRR or a common strategy for humanitarian and development interventions. These challenges must be addressed to design interventions that meet the specific vulnerabilities and needs of refugee and hosting communities in Irbid and Ramtha, as outlined in this report.

To build climate resilience in refugee and hosting communities, scalable interventions are needed that integrate localized, impact-based weather and climate information systems with community-based DRR and NbS. These interventions must be context-specific, taking into account the unique needs and vulnerabilities of the communities. This research lays the foundation for further investigation, with the goal of building a larger evidence base for integrated resilience-building approaches, including AA and NbS. A comprehensive evidence base, featuring a diverse set of localized case studies, would demonstrate how resilience to climate impacts can be enhanced through localized and integrated AA approaches, early warning systems, and innovative NbS. This evidence base would also create the potential for scaling DRR models to other urban areas in Jordan and beyond.

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Annex 1

Review of government and international organization documents on refugee and hosting community issues in Jordan

This review focuses on national policies and international organization documents related to the water, agriculture, and environment sectors, as well as disaster risk reduction and climate adaptation in Jordan. It examines how these existing policies, strategies, and plans address the needs of both refugee and hosting communities. The project—"*Jahez (Ready)"*—aims to improve anticipatory action and climate change adaptation in refugee-hosting landscapes in Jordan. This annex serves to identify the existing research and strategic approaches, and the gaps that offer opportunities for the project to build upon.

Context

Jordan is one of the most water-scarce countries in the world, currently facing a severe water crisis. With only 61 m^3 of available water per capita per year, the country's water supply is significantly below the absolute water scarcity threshold of 500 m^3 per capita per year (MWI 2023). Jordan also hosts the second-highest share of refugees per capita in the world—more than 3 million people (UNHCR 2023), including 1.36 million Syrians (MoPIC 2020). In addition to these numbers, there are around 3 million Palestinian refugees living in Jordan, 2.3 million of whom are registered with the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA), making Jordan home to the largest number of Palestinian refugees among all UNRWA countries (UNRWA 2023). Approximately 83% of refugees in Jordan live in urban and peri-urban areas, while only 17% reside in camps (UNHCR 2023). These two factors—Jordan's status as a climate hotspot and its large refugee population—underscore the urgent need for inclusive, sustainable anticipatory action and climate change adaptation strategies that support both refugees and hosting communities.

Jordan's *National Climate Change Policy 2022–2050* (2022, 13) states that "Jordan's ambitions towards sustainable development are challenged by multiple biophysical and socioeconomic realities, including water scarcity, rapid population growth and urbanization, high unemployment rates (24.8% in 2021), especially among women and young people, migration, limited economic resources (fragile and limited natural resources), ongoing regional conflicts, low levels of technology adoption, reliance on expensive imported energy, widespread poverty (14.4% in 2010 and 15.7% in 2019), in addition to [natural] disasters (e.g., earthquakes, land degradation, flash floods, landslides, and recurrent droughts), of which many are compounded by climate variability". The policy highlights the compounded vulnerabilities faced by inhabitants of Jordan, including climate change, extreme weather events, and a large population of refugees. It directly links water scarcity to the influx of Syrian refugees, which has contributed to a huge population growth, with the country's population doubling between 2008 and 2020. However, the policy does not mention other refugee populations, such as Palestinians, though it emphasizes the importance of including vulnerable communities, like refugees and women, in efforts to build a more climate-resilient society (p. 19).

According to the World Bank's *Jordan Country Climate and Development Report* (CCDR 2022, 30), the key priorities for adapting to water scarcity by 2030 include ensuring the fiscal sustainability of the water and energy sectors, boosting system-wide resilience with a focus on drought, and reducing fresh water use in urban areas and the agriculture sector while safeguarding livelihoods. The CCDR promotes pathways towards adaption, resilience, and low-carbon growth that prioritize water efficiency and conservation, as extreme water scarcity will prevent growth in the agri-food sector, impacting food security, rural employment, and vulnerable groups, including refugees (p. vi). The combination of exponential population growth, rapid urbanization, and increasing water insecurity are having the biggest impact on poor households, refugee households, and female-led households. Furthermore, UNICEF's study *Tapped out: The costs of water stress in Jordan* (2022) found that the "increased water stress can also fuel competition between different water users and potentially generate negative long-term effects on the sustainability of natural resources and economic and social development" (p. 15).

Given these circumstances, there is an urgent need for programs and policies that target vulnerable communities to ensure climate resilience and long-term adaptation, benefiting the country as a whole. Many of the policies reviewed reflect the opinion that these influxes of refugees—most recently Syrians, and before that Iraqis, Yemenis, Sudanese, Somalis, and Palestinians—are a drain on the country's limited resources. However, less attention is given to shared vulnerabilities and potential opportunities for durable solutions, presenting a potential gap. The policies reviewed in this report overwhelmingly refer to the Syrian refugee population, with fewer references to Palestinian refugees, or other refugee populations in Jordan. Notably, many Palestinians in Jordan, protected by UNRWA, hold citizenship, but not all. Those who do not have citizenship are more vulnerable as they do not have the same opportunities for employment, healthcare, education, and housing.

A central concern in many of these strategies is how to increase coordination and shared decision-making across sectors, ministries, and between central and local governments. For example, the Economic Modernisation Vision 2033 calls for the establishment of the Water-Energy-Food (WEF) Nexus council, and the Ministry of Planning and International Cooperation (MoPIC) is actively investing in efforts across all sectors to institutionalize the WEF Nexus within the government. However, only one document reviewed, *Jordan's National Climate Change Policy 2022*–2050, mentions anticipatory approaches. This highlights a clear gap that can be filled by anticipatory action plans and long-term adaptation strategies, such as developing technical tools and information platforms to support national and local decision-making processes. These strategies would enhance integration going forward, especially for refugee-hosting communities.

Policy Report Summary

The *Economic Modernisation Vision* (2033) is a multi-sectoral strategy convened in 2022 by His Majesty King Abdullah II, aiming to establish a framework for an inclusive national vision across all sectors. It is built on two main strategic pillars: 1) accelerated growth by unleashing Jordan's full economic potential, and 2) improving the quality of life for all citizens. While two of its strategic objectives focus on sustainable practices and the efficient use of resources, the strategy is almost exclusively focused on Jordanian citizens. Refugees are mentioned only once in the document, identified as one of the causes of population growth and high unemployment rates (p. 17). This limited focus on refugees leaves considerable room for development in terms of integrating vulnerable groups into future economic planning. Notably, this document is frequently referenced in almost all the other documents.

The *National Water Strategy 2023–2040* (2023), published by the Ministry of Water and Irrigation (MWI), proposes an integrated approach to water resource management across sectors, addressing issues such as DRM, climate change adaptation, and gender. The strategy consistently highlights the strain on the country's water supply and infrastructure caused by the influx of Syrian refugees. It references the Government's *Jordan Response Plan* (JRP) for Syrian refugee response and resilience strengthening in hosting communities, drawing a clear connection between water-related vulnerabilities and refugee-hosting communities. The strategy also notes that agricultural water requirements represent around 60% of total national water needs and suggests introducing a more realistic and sustainable regime of water use in agriculture (p. 26). MWI aims to develop and implement a policy and activities to adapt to water scarcity, including measures such as wastewater reuse and desalination of brackish water (p. 48). However, given the lack of "climate information, knowledge and tools," and "weak national capacity to develop sectoral adaptation," MWI is not able to support adaptation decisions and actions (p. 48). The strategy emphasizes the need for a WASH response plan that optimizes available resources to benefit the entire population, including Jordanians, Palestinians, Iraqis, and the rapidly growing Syrian refugee population. While the strategy largely focuses on the impact of Syrian refugees on the water sector, it highlights a policy gap in addressing other refugee populations, such as Palestinians. The strategy also calls for gender mainstreaming in the water sector (p. 53).

Jordan's *National Disaster Risk Reduction Strategy* (2023–2030), developed by the National Center for Security and Crises Management (NCSCM), outlines a strategic framework aligned with other national strategies and policies. It includes tools for implementing the strategy and a three-year action plan (2023–2025). The strategy lists Jordan's strengths as its high institutional capacity, state-of-the-art institutions, and political will to prioritize DRR. However, it also highlights several weaknesses, including the absence of a coordination mechanism between different sectors, weak capacity to enforce existing DRR systems, lack of a specified budget, and the strain of the refugee crisis—especially the Syrian refugee influx (p. 16)—which has placed an additional burden on infrastructure and resilience systems (p. 22). The strategy recommends including vulnerable groups, such as women, children, and refugees, but lacks specific implementation details. The implementation strategy emphasizes *decentralization* (in line with the 2016 Decentralization Act), creating partnerships, leveraging data and smart solutions, resource mobilization and financing, and delegating responsibilities across national and local governments and development sectors. Notable examples include Activity Title 2, a detailed risk analysis, which should have occurred in 2023 (p. 33), and Activity Title 5, a review of relevant policy documents (p. 36), which is scheduled to occur in 2024.

Jordan's National Climate Change Policy (CCP) 2022–2050, published by the Ministry of Environment (MoEnv), clearly recommends adaptation policies and actions aimed at reducing vulnerability and increasing resilience to climate change impacts and climate variability. These policies emphasize the need for inclusive, proactive measures that take into account gender, children, and other vulnerable groups, such as refugees. However, none of the adaptation and mitigation policies and actions reviewed specifically mention refugee-hosting communities or account for their particular vulnerabilities (see sections 2.1 and 2.2). The CCP refers to the refugee population as an "emerging issue" and a significant variable in the implementation process (p. 46). While the policy includes a section on policies and actions for mainstreaming gender, children, and youth, it does not adequately address refugee vulnerabilities. Notably, this is the only document reviewed that mentions anticipatory approaches, stating that "implementation of the Climate Change Policy 2022–2050 should use anticipatory approaches to develop scenarios, including worse case ones in order to test the resilience of socio-economic sectors and ecosystem functioning" (p. 46).

The National Climate Change Adaptation of Jordan (2022), issued by the MoEnv, was prepared based on the Climate Vulnerability Assessment of the Third National Communication Report and represents the first National Adaptation Plan (NAP) for Jordan. The document envisions a cross-sectoral and multi-institutional strategy that builds adaptive capacity to reduce Jordan's vulnerability, especially by including gender and the needs of the most vulnerable. One of the central goals of the NAP is to "mainstream gender, children and young people and other vulnerable groups (especially refugees) considerations, to increase their adaptive capacity and strengthen the economic stability of the most affected populations in Jordan" (p. 14). Water resource management goals include integrating climate adaptation and resilience into policy and institutional reforms in the water sector by adopting a vulnerability approach (p. 34). Urban resilience and disaster risk reduction goals include enhancing the resilience of urban infrastructure to climate change impacts and supporting sustainable urbanization through improving readiness and increasing community participation at all levels (p. 42–43). This strategy encourages the inclusion of vulnerable groups, including women and refugees, in the planning and design of adaptation measures (p. 62). This integration plan (p. 62–65) serves as a potential entry point for further opportunities.

Jordan's Fourth Communication on Climate Change (2022), co-produced by the MoEnv and UNDP, contains a detailed overview of the current climate, demographic, political, economic, and sectoral conditions in Jordan. The document contains a significant amount of disaggregated data on vulnerable groups, including women and refugees, with information broken down by governorate and rural/urban areas. For instance, Irbid and Ramtha municipalities and Bani Kenanah district are identified as some of the areas facing the highest climate change risk in Jordan. In Section 4, Climate Change Impact, Vulnerability & Risk Assessment, the report draws attention to the social and economic causes of increased vulnerability to climate-related and environmental hazards and proposes several adaptation measures. These measures include poverty alleviation and income diversification, improving access to basic services, enhancing nutritional status, supporting income-generating activities and employment, promoting gender equality and food security, reducing rural migration, improving urban/rural planning and infrastructure, and strengthening social safety nets (p. 405–406). Although suggested measures for implementation are provided (p. 501–503), none specifically address refugee-hosting communities. However, Section 1.3 Vulnerability and Assessment calls for further vulnerability assessments in a holistic manner.

The *Updated submission of Jordan's 1st Nationally Determined Contribution 2021,* which is directly linked to the NAP, raises the macroeconomic GHG emission reduction target from 14% in the 1st NDC (published in 2016) to 31% by 2023. This updated submission considers the factors that disproportionately impact vulnerable communities due to climate change. It also acknowledges the increased strain on natural resources and the municipal waste growth rate caused by the refugee influx. Adaptation measures proposed include engaging local communities, enhancing early warning systems in impoverished areas, improving the social protection system for vulnerable groups, integrating climate adaptation into national poverty reduction policies, developing an inventory of climate resilient traditional techniques (such as natural resources management in the water and agriculture sectors, and utilizing traditional knowledge for local adaptation measures), and integrating human rights protection (p. 51–54).

The *Jordan Green Growth National Action Plan 2021–2025: Water Sector*, produced by MoEnv and MWI*,* builds on the 2017 National Green Growth Plan spearheaded by MoEnv, with support from the Global Green Growth Institute (GGGI). The plan's five national objectives are sustainable economic growth, social development and poverty reduction, climate change adaptation and mitigation, resource efficiency, and enhanced natural capital. The GGNAP recognizes that the "existing context of social inequities, water scarcity and climate change are likely to have more disproportionate impacts on women, children, refugees and displaced communities" (p. 3). The goal is to increase climate resilience and build capacity among vulnerable groups, including *integrating* refugees into Jordan's social fabric (p. 10). Adaptation measures include traditional water storage, aquifer recharge and groundwater storage, soil water storage, water harvesting with supplementary irrigation for droughts, and climate-proofing measures to improve water use efficiency in rain-fed agriculture, which accounts for 60% of Jordan's cropland (p. 11). Of the 19 actions identified for the water sector, two directly address refugee-hosting communities: Water Sector Green Growth Action #WR04 in Zarqa river basin (p. 36) and #WR14 in Al-Azraq (p. 56). Both actions emphasize green jobs, with proposals to generate additional employment opportunities in these communities for sustainable economic growth.

The World Bank's *Jordan Country Climate and Development Report* (2022) integrates Jordan's climate vulnerabilities and development goals into one strategic framework. The report contends that for Jordan to meet its climate and development goals, policy and investment improvements are needed in these sectors: water, energy, agriculture, transport and urban development. The goals are organized along two nexuses: the water-energy-food security nexus and the urban-transport-energy nexus. The project's aim of improving AA and climate change adaptation in refugee-hosting landscapes is highly relevant to both nexuses, especially in connecting the goal of increased sustainability in the water sector (first nexus) and transforming urban areas into greener cities that are more resilient to climate change (second nexus). Under the pathways for adapting to water scarcity, Priority 3 is to strengthen monitoring and early warning systems for drought (p. 28).

The UN Jordan's *Annual Results Report* (2022), highlights notable achievements from 2018 to 2022, in collaboration with the Government of Jordan and key UN Country Team partners, including UNRWA. The report emphasizes a commitment to join initiatives that link humanitarian responses and systems and the UN's development work, especially around equal access for services to refugees and supporting government planning and policymaking in both the humanitarian and development sectors. Throughout the report, the connection between climate resilience, vulnerable groups such as refugees, and urbanization is emphasized. Many of the projects include refugees (particularly Syrians and Palestinians) in the implementation process, across different organizations and opportunities (social and economic). The UN has also provided support to the government in implementing Jordan's Nationally Determined Contributions (NDCs) to enhance DRR.

Summary of potential points of intersection between national policies and the Climate Refugee Nexus Initiative

During COP27 in Sharm El Sheikh in 2022, His Majesty King Abdullah II of Jordan announced the Climate-Refugee-Nexus initiative, aimed at supporting refugee-hosting communities disproportionately affected by the climate crisis. This initiative is part of the package of solutions for the COP28 Declaration on Climate Relief, Recovery and Peace. The policies reviewed in this document inform the proposed outcomes of the *Jahez* project, with the objective of improving AA and climate change adaptation to build resilience in both refugees and their hosting communities in Jordan.

Every national policy reviewed refers to refugee communities as vulnerable populations, and all but two also address hosting communities (see Table 3). There is a shared view across sectors that the considerable number of refugees Jordan is hosting has significantly impacted the country's economy, environment, and resources. As a result, there is agreement that refugees must be included in planning for the future. However, many of these policies remain broad and general in their approach, lacking specific and actionable plans for addressing the unique vulnerabilities of refugee-hosting communities. There is still a need for more detailed operational and practical strategies to account for these challenges at the ground level.

The main challenges in the policy environment for DRR in Jordan, which inform points of intersection between these national policies and the Climate-Refugee-Nexus initiative, include:

- Lack of operational coordination across sectors and between central and local governments for early warning systems, DRR, and climate adaptation policies.
- Insufficient climate information for forecasting extreme events, limiting the ability to plan effectively.
- Absence of community-based DRR approaches, particularly those specifically tailored to address the unique vulnerabilities of refugee-hosting communities.

Policy Name	Year	Author
Economic Modernisation Vision	2023	Government of Jordan
National Water Strategy 2023–2040	2023	MWI (Ministry of Water and Irrigation)
Jordan National Disaster Risk Reduction Strategy (2023–2030)	2023	NCSCM (National Center for Security and Crisis Management) and UNDP (United Nations Development Programme)
National Climate Change Policy of the Hashemite Kingdom of Jordan 2022–2050	2022	MoEnv (Ministry of Environment) and UNDP (United Nations Development Programme)
Jordan's Fourth Communication on Climate Change	2022	MoEnv (Ministry of Environment) and UNDP (United Nations Development Programme)
The National Climate Change Adaptation Plan of Jordan	2022	MoEnv (Ministry of Environment)
Updated submission of Jordan's 1st Nationally Determined Contribution	2021	MoEnv (Ministry of Environment)
Jordan Growth National Action Plan 2021–2025: Water Sector	2021	GGGI (Global Green Growth Institute)

Table 4: Government policies and strategies reviewed

Policy Name	Year	Author
Annual Results Report Jordan	2023	United Nations Jordan
Country Climate and Development Report	2022	The World Bank

Table 5: International Organization policies and strategies reviewed

Topic	*Economic Modernisation Vision (2023)*	*National Water Strategy 2023-2040*	*Jordan National Disaster Risk Reduction Strategy (2023-2030*	*National climate change policy of the Hashemite Kingdom of Jordan 2022-2050*	*Jordan's Fourth Communication on Climate Change*	*The National Climate Change Adaptation Plan of Jordan*	*Updated submission of Jordan's 1st Nationally Determined Contribution*	*Jordan Growth National Action Plan 2021-2025: Water Sector*	*Jordan Green Growth National Action Plan 2021-2025: Agricultural Sector*
Vulnerable Groups:									
Women	x	x	x	x	x	x	x	x	x
Children	x	x	x	x	x	x	x	x	x
Disabled			x	x	x	x	x		
Elderly			x		x	x			
Refugees	x	x	x	x	x	x	x	x	x
Displaced Persons		x	x		x		x	x	x
Hosting Communities		x	x	x	x	x	x	x	
Poor households		x			x				
Vulnerable households				x	x		x		
Female-led households				x	x	x			
Rural households					x				
Urban households					x				

Risks:									
Floods		x	x	x	x	x	x	x	
Heatwave			x		x	x	x		
Drought			x	x	x	x	x	x	x
Geographical Region:									
North		x	x		x		x	x	x
Center		x	x		x		x	x	x
South		x	x		x		x	x	x
Sectors:									
Agriculture	x	x	x	x	x	x	x	x	x
Urban	x	x	x	x	x	x	x	x	x
Water	x	x	x	x	x	x	x	x	x
Health	x	x	x	x	x	x	x	x	
Socioeconomic		x		x	x	x	x		
Access to:									
Sustainable Funding		x				x			
Information/ Knowledge		x	x		x	x	x		
Decision-Making		x	x	x	x	x	x		x
Anticipatory Action:									

Early warning / Early action			x	x	x	x	x		x
Anticipatory Action				x					
Disaster Risk Management		x	x	x	x		x		
Disaster Risk Reduction			x	x	x	x			
Mitigation and Adaptation								x	x

Table 6: Summary of thematic spread across policies in Jordan

Topic	*Annual Results Report Jordan (2023)*	*Country Climate and Development Report (2022)*
Vulnerable Groups:		
Women	x	x
Children	x	
Disabled	x	
Elderly		
Refugees	x	x
Displaced Persons	x	
Hosting Communities	x	x
Poor households	x	x

Vulnerable households	x	x
Female-led households		
Rural households		
Urban households		
Risks: Floods	x	x
Heatwave	x	x
Drought		x
Geographical Region:		
North	x	
Center		
South		
Sectors: Agriculture	x	x
Urban		x
Water	x	x
Health	x	x
Socioeconomic		

Table 7: Summary of thematic spread across World Bank and UN reports in Jordan

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Suggested citation

Adam-Bradford, A.; Schindler, A.; Anagreh, A.; Ruckstuhl, S. 2024. *Climate and water-related vulnerabilities in refugee hosting communities in northern Jordan: Irbid and Ramtha municipalities.* Colombo, Sri Lanka: International Water Management Institute (IWMI). CGIAR Initiative on Fragility, Conflict, and Migration. 31p.

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Acknowledgements

The authors gratefully acknowledge inputs from the staff of the Jordan Ministry of Environment, Jordan Ministry of Water and Irrigation, Irbid Governorate, Irbid Department of Environment, Irbid Municipality, and the United Nations High Commissioner for Refugees (UNHCR) Irbid Office. The authors are also grateful to the staff of IWMI who reviewed and provided comments on this publication.

Project

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.

Donors

This study was carried out under the CGIAR Initiative on Fragility, Conflict, and Migration, which is grateful for the support of CGIAR Trust Fund contributors (https://www.cgiar.org/funders).

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We would like to thank all funders who support this research through their contributions to the CGIAR Trust Fund: www.cgiar.org/funders.

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