



Yemen is facing one of the worst humanitarian crises in the world due to a combination of prolonged conflict, economic crisis and recurrent climate change-related natural hazards. These hazards include temperature increases, rising sea levels and changing patterns in rainfall, causing floods, droughts, reduced water availability and soil degradation. Climate change exacerbates vulnerabilities, threatens livelihoods and influences existing conflicts.

- Extreme weather events have destroyed irrigation facilities and led to the loss of agricultural livelihoods in Yemen, thereby increasing food and livelihood insecurity.
- Protracted conflict, climate-related disasters and acute water shortages have exacerbated forced migration and displacement in the country.
- As climate change puts additional pressure on water and land resources, local armed actors may adapt their tactics accordingly and target critical environmental infrastructure and natural resources for their gain.
- Informal and local resolution mechanisms play an important role in preventing conflict over land and water in Yemen, but they have been slowly degraded by a centralized patronage network and armed conflict. In the absence of strong environmental governance and early-warning systems, climate-related extreme weather events are likely to lead to increased natural resource disputes.

Yemen is in the midst of a protracted political, humanitarian and developmental crisis, including a prolonged armed conflict characterized by competition over state control between the internationally recognized Yemeni government, headed by the Presidential Leadership Council and supported by the Saudi Arabian-led coalition, and the Houthis movement with links to Iran. From April to October 2022, a United Nations-brokered truce resulted in a significant reduction in violence. While the truce formally expired in October, most of its elements continue to hold. In parallel, Oman has facilitated negotiations between Saudi Arabia and the Houthis, increasing expectations of progress towards ending the conflict. The conflict has led to the destruction of key infrastructure and disrupted the provision of already limited social services. The international community should increase its support for addressing food insecurity, water challenges, and lack of access to healthcare and other basic social services, while also emphasizing long-term, climate-resilient and sustainable development in Yemen.

RECOMMENDED ACTIONS:

- ▶ The Yemeni authorities, international partners and the United Nations system should undertake a comprehensive climate- and environment-related peace and security risk assessment, factoring in risks for particularly vulnerable groups such as women and girls, youth, migrants and minorities. The assessment could inform early warning systems, disaster risk reduction and responses to mitigate climate-related peace and security risks. It should be repeated regularly, for example, every second year.
- ▶ The UN system and international partners should take urgent steps to increase humanitarian assistance that addresses climate- and environment-related food insecurity and related livelihoods needs. The needs of women and girls, youth, migrants and minorities should be given particular attention.
- ▶ The UN system and international partners should increase funding for context-sensitive early recovery and longer-term development initiatives, strengthening local civil society organizations that work with community-led, resilient and climate-smart food and water security initiatives.
- ▶ The Yemeni authorities, international partners and the UN system should help strengthen of local systems and mechanisms for preventing, resolving and managing local grievances and conflicts related to land, water and natural resources. Resilient, efficient and locally anchored natural resource governance mechanisms could play a pivotal role in handling such conflicts. Inclusive conflict resolution mechanisms that involve women, girls, migrants, minorities and youth should be a priority.
- ▶ International partners should urgently facilitate access to development-oriented climate finance and related technical support to the Yemeni authorities and local civil society organizations. Climate finance benefiting the peace process, local peace agreements and dispute resolution mechanisms should be prioritized, as well as adaptation to reduce dependence on oil.

Figure 1. Key statistics

Climate and environment

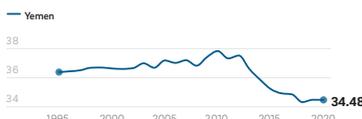
- Projected mean annual temperature increase of 1.2–3.3°C (2060)
- Long dry periods, severe droughts, and desertification
- Flash floods, heavy storms, and increasing water scarcity
- Agriculture provides employment for nearly 60% of Yemeni households

Population

Total population	34.3 million (2023)
Internally displaced population	4.5 million (2022)
Population in acute food insecurity (IPC phase 3 and above)	17.0 million (2022)

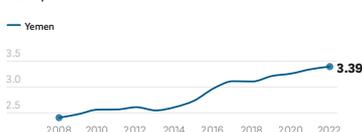
ND-GAIN Country Index

The ND-GAIN Country Index captures a country's vulnerability to climate change and other global challenges, and its readiness to improve resilience. It is a score out of 100; the higher the score, the less vulnerable and more ready the country.



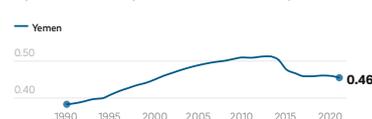
Global Peace Index (GPI)

The GPI ranks 163 countries according to their level of peacefulness. It is a score out of 5; the lower the score, the more peaceful the country.



Human Development Index (HDI)

The HDI measures a country's achievement in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living. It is a score out of 1.0; the higher the score, the higher the level of human development.



Sources: World Bank, Climate Change Knowledge Portal, 'Country: Yemen, Rep.—Current climate: Climatology', accessed 15 May 2023; World Bank, Climate Change Knowledge Portal, 'Country: Yemen, Rep.—Vulnerability', accessed 15 May 2023; United Nations Children's Fund (UNICEF), 'Yemen country office: Humanitarian situation report (end of year), 31 Dec. 2022', 28 Feb. 2023; UN Development Programme (UNDP), *Human Development Report 2021/2022* (UNDP: New York, 2022); UN Population Fund, 'World Population Dashboard: Yemen', accessed 9 May 2023; Integrated Food Security Phase Classification (IPC), 'Yemen: Acute food insecurity projection update Oct.–Dec. 2022', accessed 15 May 2023; Vision of Humanity, 'Global Peace Index 2022', accessed 11 May 2023; and Notre Dame Global Adaptation Initiative (ND-GAIN), 'ND-GAIN Index country rankings 2020', accessed 15 May 2023.

Climate exposure: Trends and projections

Yemen has an arid, subtropical climate. Due to large topographical differences within the country, temperatures and levels of rainfall vary greatly between regions. The El Niño Southern Oscillation contributes to climate variability: rainfall increases in El Niño years and decreases in La Niña years.

Temperature: The mean annual temperature is slightly above 25°C, with the warmest period occurring between June and August.¹ In the western highlands, temperatures tend to be significantly lower than in the hot coastal lowlands. Since 1971, temperatures in Yemen have increased at an average rate of 0.42°C per decade.² The mean annual temperature is expected to increase by 1.2–3.3°C by 2060.

Precipitation: Mean annual precipitation is approximately 190 mm. The central area of the country receives very little rainfall, whereas the coastal areas receive about 80 per cent of the annual rainfall during winter. In the highlands there are two distinct rainy seasons: April–May and July–September.³ Rainfall in Yemen tends to be seasonally intense and consists of short-lived heavy storms, followed by lengthy dry periods. Heavy rainfall often leads to flash floods, causing soil erosion and related environmental degradation; and dry periods lead to widespread drought, desertification and land degradation. Both negatively impact agricultural production.⁴ Flash floods also contribute to the destruction of infrastructure and forced internal displacement.

Socioecological vulnerabilities

About 60 per cent of Yemen's population live in rural areas and nearly one third of the population work in the agricultural sector with small-scale subsistence farming.⁵ However, the productive agricultural land is concentrated in the hands of just a few wealthy families.⁶ The country is dependent on imports for as much as 90 per cent of its basic food staples, making it particularly vulnerable to the increasing international prices of, for instance, wheat and fuel.⁷

Since the intervention of the Saudi Arabian-led coalition in 2015, much of Yemen's key infrastructure for food, water and energy has been destroyed.⁸ After years of violent conflict, recurrent natural hazards, economic collapse and dysfunctional public services, an estimated 21.6 million people will require humanitarian assistance in 2023.⁹ About 80 per cent of the population have limited access to food, drinking water and healthcare.¹⁰ Yemen is considered one of the world's most food-insecure countries.¹¹ It is also one of the world's most water-scarce countries due to natural ecological characteristics, poor water management and infrastructure, rapid population growth, the armed conflict, and water-intensive cash-crop production.¹² This humanitarian crisis makes the country particularly vulnerable to extreme weather events such as droughts, flash floods and heatwaves. Climate change and environmental degradation have exacerbated water scarcity in the country and its associated conflicts.¹³

In 2022, Yemen experienced severe droughts as well as intense flooding, which resulted in damage to infrastructure (e.g. homes and shelters, roads and bridges, and irrigation and sewage systems) and the

proliferation of diseases (e.g. cholera, dengue, malaria and diphtheria).¹⁴ The extreme weather exacerbated the existing humanitarian crisis in the country and negatively affected over 517 000 people.¹⁵

Climate-related peace and security risks

Climate change can undermine development gains, affect the dynamics of conflict and disrupt fragile peace and reconstruction processes. The causal relationship between climate change and conflict is not linear or predetermined, however, researchers have identified multiple pathways through which climate change interacts with political, social and environmental stresses to compound existing vulnerabilities and tensions.¹⁶

This fact sheet uses four interrelated pathways to analyse the complex relationship between climate change, peace and security: (a) livelihood deterioration, (b) migration and mobility, (c) military and armed actors, and (d) political and economic exploitation and mismanagement.

Livelihood deterioration

Research shows that the effects of climate change can worsen livelihood conditions, especially for groups that are dependent on renewable resources, and contribute to marginalization. They can also fuel grievances in the absence of alternative sources of livelihood and income.¹⁷

In Yemen, climate-related stressors have significantly worsened livelihood conditions. For instance, droughts, floods and subsequent loss of agriculture have exacerbated livelihood insecurity and increased food insecurity.¹⁸ Between January and June 2022 the country experienced moderate to severe droughts and unprecedented rises in temperature, negatively affecting all of its agricultural regions.¹⁹ This was the third driest period in Yemen for almost 40 years, after 2014 and 2000.²⁰ It resulted in the loss of crops and the reduced availability of forage for livestock. Furthermore, by mid July 2022 the country had experienced rainfall that was nearly 300 per cent above normal, leading to floods in several areas. Normally dry areas such as Hadramawt and Al Maharah were also subjected to the heavy rainfall.²¹ By the end of August it was estimated that more than 300 000 people, most of them internally displaced persons (IDPs), were affected across 146 districts and 18 governorates.

Climate-related stressors also have an adverse effect on existing tensions in communities. Yemen's agricultural sector is dominated by smallholder and irrigated farming using groundwater. Therefore, the destruction of irrigation facilities by floods and storms may negatively impact social cohesion within the affected communities, as competition over arable land and water increases.²²

Reduced agricultural outputs have contributed to food insecurity in a country where nearly 17 million people, or over 53 per cent of the population, were estimated to suffer from acute food insecurity between October and December 2022—classified by the Integrated Food Security Phase Classification as 'crisis' (IPC phase 3) or worse.²³ Women bear a disproportionate burden in terms of socio-economic hardships

¹ World Bank, Climate Change Knowledge Portal, 'Yemen, Rep.—Climate change overview: Country summary', accessed 15 May 2023.

² World Bank (note 1).

³ World Bank (note 1).

⁴ World Bank (note 1).

⁵ World Bank, 'Rural population (% of total population)', Data, accessed 26 May 2023.

⁶ United States Agency for Development (USAID), 'Landlinks: Yemen', July 2010.

⁷ Lackner, H., 'Global warming, the environmental crisis and social justice in Yemen', *Asian Affairs*, vol. 51, no. 4 (2020); and Integrated Food Security Phase Classification (IPC), 'Yemen: Acute food insecurity projection update Oct.–Dec. 2022', accessed 15 May 2023.

⁸ Kimball, A. M. and Jumaan, A., 'Yemen: The challenge of delivering aid in an active conflict zone', *Global Security: Health, Science and Policy*, vol. 5, no. 1 (2020).

⁹ United Nations Population Fund (UNFPA), *2023 UNFPA Humanitarian Response in Yemen* (UNFPA: Jan. 2023).

¹⁰ UNFPA (note 9).

¹¹ IPC (note 7).

¹² Gaston, E. et al., *Climate-security and Peacebuilding: Thematic Review*, United Nations University Centre for Policy Research (United Nations University: 2023).

¹³ Glass, N., 'The water crisis in Yemen: Causes, consequences and solutions', *Global Majority E-Journal*, vol. 1, no. 1 (June 2010).

¹⁴ United Nations Children's Fund (UNICEF), 'Yemen country office: Humanitarian situation report (end of year), 31 Dec. 2022', 28 Feb. 2023; and United Nations Office for the Coordination of Humanitarian Affairs (OCHA), 'Yemen: From severe drought to intense flooding, Yemen teeters on the brink', 5 Sep. 2022.

¹⁵ OCHA, 'Yemen humanitarian update', no. 3 (Mar. 2023).

¹⁶ van Baalen, S. and Mobjörk, M., 'Climate change and violent conflict in East Africa: Integrating qualitative and quantitative research to probe the mechanisms', *International Studies Review*, vol. 20, no. 4 (Dec. 2018).

¹⁷ Mobjörk, M., Krampe, F. and Tarif, K., 'Pathways of climate insecurity: Guidance for policymakers', SIPRI Policy Brief, Nov. 2020.

¹⁸ International Committee of the Red Cross (ICRC) and Yemen Red Cross Society (YRCS), 'Yemen: People taking stock of lives and livelihoods lost after weeks of record floods', 24 Aug. 2022.

¹⁹ OCHA (note 14).

²⁰ OCHA (note 14).

²¹ OCHA (note 14).

²² Homaid, M., 'Communities bring life back to lands destroyed by the impacts of climate change', International Organization for Migration (IOM) Yemen, accessed 19 Apr. 2023.

²³ IPC (note 7).

exacerbated by climate change because they do not have the same access to resources, protection and basic services.²⁴ Yemen was ranked as one of the least gender-equal countries (155 out of 156 countries) by the 2021 Global Gender Gap Report.²⁵

The UN system and international partners should take urgent steps to increase support for humanitarian assistance that addresses food and water insecurity. Longer-term, context-sensitive development and early recovery support to local civil society organizations working with food and water security and related livelihood initiatives should be prioritized.

Migration and mobility

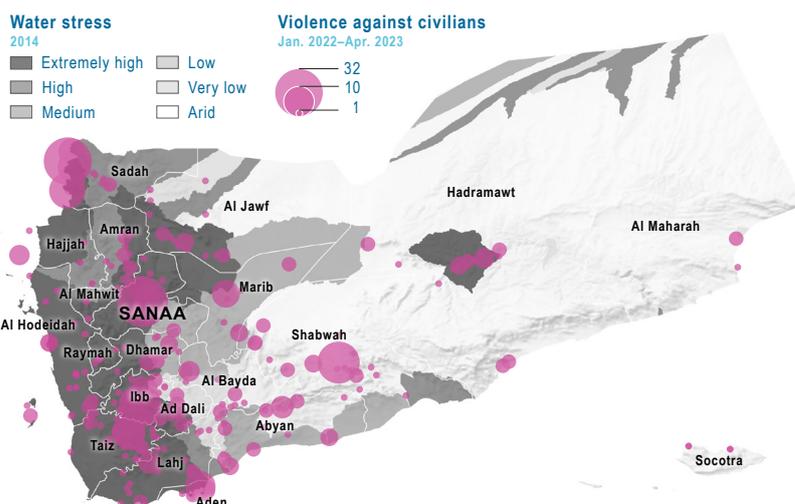
Climate change can affect migration and alter mobility patterns, as well as increase the risk of conflict when migrants and IDPs come into confrontation with other groups due to social, political and economic challenges.²⁶

Approximately 4.5 million people have been displaced in Yemen, predominantly due to conflict.²⁷ Most live in makeshift camps and informal settlements, making them particularly vulnerable to extreme weather and natural hazards.²⁸ Climate-related disasters and acute water shortages have exacerbated forced migration and rural and urban displacement. For instance, between February and September 2020, countrywide floods during two rainy seasons led to the secondary displacement of 230 000 IDPs living in camps.²⁹ The floods caused severe damage to shelters, livestock and agricultural land.³⁰ In 2022, droughts and floods led to a 93 per cent increase in primary and secondary displacement, mainly in the Al Hodeidah, Al Jawf, Marib and Taiz governorates.³¹

Yemen has also experienced large-scale rural–urban migration due to deteriorating rural conditions, partly caused by limited access to water, electricity, markets and basic services. In addition, it hosts close to 100 000 refugees and asylum seekers from other countries, such as Somalia and Ethiopia.³² The flow of IDPs and migrants to host communities increases the pressure on food, shelter and basic services such as water, energy and healthcare, as well as increasing competition over humanitarian aid in already resource-strained areas. This could have an adverse effect on social cohesion and, in some cases, contribute to local conflict.³³

Women, children, and ethnic and religious minorities are particularly vulnerable to the interlinked impacts of conflict, climate change and displacement. Child marriage is prevalent across Yemeni society, and young girls from displaced families experience child marriage at a higher rate.³⁴ The particular vulnerabilities and needs of women, girls and minorities should be factored in when supporting and planning both short-term humanitarian assistance and long-term development programmes addressing IDP communities in Yemen.

Figure 2. Water stress and conflict in Yemen



Note: Violence against civilians refers to the number of violent incidents committed by armed actors against civilians.
Sources: Armed Conflict Location & Event Data Project, 'Data export tool', accessed 15 May 2023; and World Resources Institute, 'Aqueduct 3.0', accessed 15 May 2023.

Military and armed actors

When climate change affects the availability of natural resources, armed groups often adapt their tactics accordingly. Competition over access to, or distribution of, scarce natural resources can be a driver of violent conflict. Climate-related natural hazards such as floods and droughts, as well as rises in temperatures, lead to the increased scarcity of fresh water and fertile farmland, thereby exacerbating existing tensions.

In Yemen there has been a significant rise in intertribal conflicts over contested groundwater resources, especially in cases of groundwater-fed irrigation projects.³⁵ In 2010, the Yemeni government estimated that about 4000 people were killed on an annual basis due to conflicts concerning water or land.³⁶ As the effects of climate change are expected to intensify over the coming years, water-related conflicts in the country can be expected to increase.

Attacks on, or fighting for control over, critical environmental infrastructure in Yemen may also escalate as climate change puts additional pressure on natural resources, in turn increasing the leverage and effect that potential control over such infrastructure may entail. For example, Saudi Arabian-led military air strikes have reportedly targeted water-bottling plants in Houthi-controlled areas.³⁷

As a result of the protracted armed conflict in the country, Yemen is heavily contaminated by landmines and explosive remnants of war, including unexploded ordnance.³⁸ Such explosive remnants of war exist throughout the country in villages, towns and cities, threatening both people and livestock.³⁹ The intense rainfall and flash floods that hit Yemen in 2022 led to erosion, which resulted in landmines and

²⁴ Geneva Centre for Security Sector Governance (DCAF), *Women Speak: The Lived Nexus between Climate, Gender and Security* (DCAF: Geneva, 2022).

²⁵ World Economic Forum, *Global Gender Gap Report 2021*, Insight Report (World Economic Forum: Geneva, Mar. 2021).

²⁶ Mobjörk, Krampe and Tarif (note 17).

²⁷ United Nations High Commissioner for Refugees (UNHCR), 'Yemen: Overview of Jan.–Dec. 2022 activities', 2022 Fact Sheet.

²⁸ Murugani, V. et al., *Food Systems in Conflict and Peacebuilding Settings: Case Studies of Venezuela and Yemen*, SIPRI Report (SIPRI: Stockholm, Dec. 2021).

²⁹ International Displacement Monitoring Centre (IDMC), *GRID 2021: Internal Displacement in a Changing Climate* (IDMC: Geneva, 2021).

³⁰ IDMC (note 29).

³¹ OCHA (note 15).

³² IOM Yemen, 'Quarterly migration overview: July to September 2022', 2022.

³³ United Nations Development Programme (UNDP), *Water Availability in Yemen* (UNDP: New York, 2021).

³⁴ UNICEF, *Falling through the Cracks: The Children of Yemen* (UNICEF: Mar. 2017).

³⁵ Weiss, M. I., 'A perfect storm: The causes and consequences of severe water scarcity, institutional breakdown and conflict in Yemen', *Water International*, vol. 40, no. 2 (Feb. 2015).

³⁶ Small Arms Survey, 'Under pressure: Social violence over land and water in Yemen', Yemen Armed Violence Assessment Issue Brief no. 2, Oct. 2010, p. 2.

³⁷ Sowers, J. L., Weinthal, E. and Zawahir, N., 'Targeting environmental infrastructures, international law, and civilians in the new Middle Eastern wars', *Security Dialogue*, vol. 48, no. 5; and UNICEF, 'Drinking water systems under repeated attack in Yemen', 1 Aug. 2018.

³⁸ Lackner (note 7).

³⁹ Lackner (note 7).

unexploded ordnance being washed up on roads and in civilian areas, including agricultural ones, causing numerous injuries and fatalities.⁴⁰ This put additional pressure on the already fragile agricultural sector.

International partners and the UN system should support the strengthening of local systems and mechanisms for resolving and managing local grievances and conflicts related to land, water and other natural resources. Resilient, efficient and locally anchored mechanisms for natural resource governance could play a pivotal role in preventing, managing and resolving related conflicts. Support to local civil society organizations in Yemen that work with community-led, resilient and climate-smart food and water security initiatives should be scaled up.

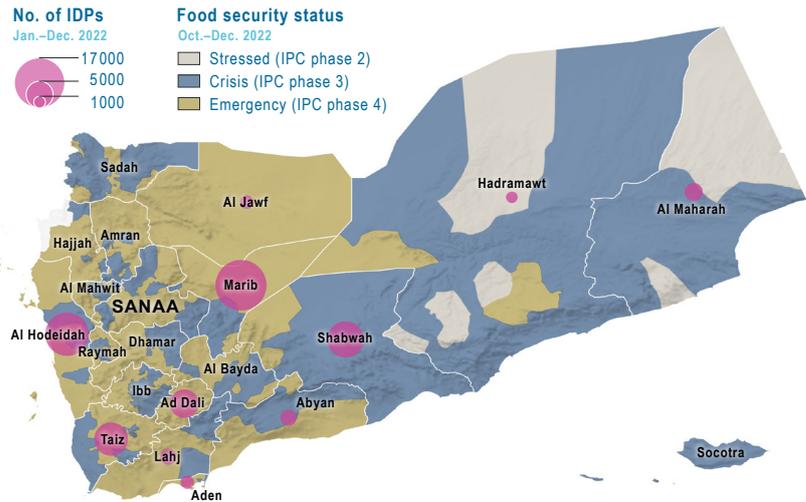
Political and economic exploitation and mismanagement

Weak water and natural resource governance systems in Yemen have led to the degradation of groundwater resources, exacerbating the risk of intertribal and intercommunal competition over water access in the context of a changing climate. Furthermore, long-term mismanagement of water resources and misguided agricultural expansion policies have substantially increased the agricultural sector's vulnerability to drought.

Intercommunal conflict over water and land in Yemen has become increasingly deadly during the last decade, and local conflict has become intertwined with the dynamics of civil war. Existing tensions between social groups have been exacerbated since the start of the civil war, and the stress on water and arable land has led to an eruption of communal violence.⁴¹ Traditionally, informal, tribal-oriented dispute resolution mechanisms have been important in preventing conflict over land and water, but these informal institutions have been slowly degraded due to the armed conflict and marginalization by central political elites.⁴²

In the 1970s Yemen's oil-based economy incentivized agricultural expansion by introducing diesel-pumped irrigation systems, which enabled the cultivation of water-intensive crops such as fruits, vegetables and khat.⁴³ Consequently, decades of groundwater

Figure 3. IDPs and food insecurity in Yemen



IDP = Internally displaced person.
 Note: The food security status reflects the level of food deprivation in a given area, according to the Integrated Food Security Phase Classification (IPC).
 Sources: IPC, 'Yemen: Acute food insecurity projection update Oct.–Dec. 2022'; and International Organization for Migration (IOM), Displacement Tracking Matrix, 'Yemen—Annual Rapid Displacement Tracking Dataset (2022)'.

overextraction have led to a decline in groundwater resources, worsening the vulnerability to drought.⁴⁴ The cultivation of khat, which is particularly water-intensive, contributes to the conflict economy because armed actors receive a fee in return for protecting the distribution networks.⁴⁵ Khat has become the preferred crop over food and other cash crops because it remains highly profitable even during civil war; it is also closely connected to political and economic patronage networks.⁴⁶

In order to help mitigate the consequences of climate change and environmental degradation and to prevent the further exacerbation of social tensions and livelihood vulnerabilities, international partners and the UN system should continue to support efforts to identify, analyse and respond to climate-related peace and security risks in Yemen. One of the ways in which this can be done is by supporting the Yemeni authorities so that they can regularly undertake comprehensive climate- and environment-related peace and security risk assessments.

⁴⁰ US Department of State, 'US conventional weapons destruction in the Middle East and North Africa: Clearing improvised explosive devices and explosive hazards, promoting environmental resiliency', Fact Sheet, 4 Apr. 2022.
⁴¹ Al-Mowafak, H., 'Yemen's water crisis: A new urgency to an old problem', PeaceLab, 6 Apr. 2021.
⁴² Weiss (note 35).

⁴³ Weiss (note 35).
⁴⁴ Conflict and Environment Observatory, 'Yemen's agriculture in distress: A case study of wadis Zabid and Rima, the Tihamah', Oct. 2020.
⁴⁵ Murugani et al. (note 28).
⁴⁶ Coppi, G., 'The humanitarian crisis in Yemen: Beyond the man-made disaster', IPI, 30 Jan. 2018.

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The Climate, Peace and Security Fact Sheets aim to generate reliable, relevant, timely and actionable information and analysis on climate-related peace and security risks in selected countries and regions on the United Nations Security Council agenda.

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