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MINE ACTION AND CLIMATE CHANGE

A Case Study of Water in Yemen

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Abstract

The following research explores a critical intersection between the work of mine action and the climate. It addresses the amplified impacts of climate change on water in Yemen, a country afflicted by protracted conflict and growing climate threats. This study showcases the necessity of integrating climate considerations into the mine action strategies and underpins the impact of climate change on the intensity and frequency of conflicts. Furthermore, it emphasizes the disruption of human life, environment, and infrastructure due to extreme weather events associated with climate change, which can further increase the damage of landmines and explosive remnants of war, hence increasing the need to integrate mine action with relevant sectors.

Deduced from academic literature and reviews from strategic programs and policy development while supported by firsthand interviews, this thesis research suggests a multilayered approach. One that acknowledges the importance of implementing long-term planning for conflict resolution, climate adaptation, and disaster risk reduction strategies when operationalizing the humanitarian mine action missions. In the hopes of endorsing a holistic conflict mitigation approach that tackles future climate conflicts from erupting by integrating climate adaptation measures, resulting in sustainable and effective resource management while strengthening governance and initiatives for social cohesion.

The findings appear consistent with the urgent need to move beyond immediate crisis response and towards more forward-thinking strategies adept at managing the long-term consequences of the intertwining threats of conflict and climate change. This paper supports peacebuilding and development efforts while looking at some root causes of conflict in light of the rising threats of climate change in Yemen.

Keywords: Climate change, conflict, Yemen**,** Mine action, water, peacebuilding, sustainable development, resource management**,** governance**,** droughts, floods, climate mitigation, risk and disaster management.

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List of Abbreviations

CEOBS – The Conflict and Environment Observatory

CIF – Climate Investment Fund

EO – Explosive Ordnance

ERW – Explosive Remnants of War

FAO – Food and Agriculture Organization of the United Nations

GCC – the Gulf Cooperation Council

GICHD – Geneva International Centre for Humanitarian Demining

HDP – Humanitarian-Development-Peace

IDPs – Internally Displaced Persons

IACG-MA – Inter-Agency Coordination Group on Mine Action

ICRC – International Committee of the Red Cross

IED – Improvised Explosive Device

IFRC – The International Federation of Red Cross

IMAS – International Mine Action Standards

IOM – International Migration Organization

IPCC – Intergovernmental Panel on Climate Change

NGO – Non-Governmental Organization

NWRA – the National Water Resource Authority in Yemen

OCHA – United Nations Office for the Coordination of Humanitarian Affairs

PPCR – The Pilot Program for Climate Resilience

SIDA – Sweden's government agency for development cooperation

ToC – Theory of Change

UN – United Nations

UNDP – United Nations Development Programme

UNEP – United Nations Environmental Programme

UNESCO – The United Nations Educational, Scientific and Cultural Organization

UNFCCC – United Nations Framework Convention on Climate Change

UNMAS – United Nations Mine Action Service

VA – Victims Assistance

WFP – World Food Programme

WWAP – World Water Assessment Program

1. Introduction

In areas torn by conflict, such as Yemen, mine action can be a lifeline for the affected population. Its urgency produces a rare setting where the military and humanitarian work come together to mitigate the damage caused by conflicts. Mine action refers to the steps taken to reduce the social, economic, and environmental impact of landmines and explosive remnants of war (ERW) (ICRC, 2018). Mine action's efforts in providing emergency clearance of ERW and assistance to affected populations have saved many lives and prevented even more injuries. However, like many humanitarian missions, the sector is severely underfunded and faces many other challenges, especially in the face of climate disasters, which are becoming predominantly relevant in many conflict areas and can exacerbate an already dire crisis. The mine action field workers are among the first responders in post-conflicts, and in many cases during a conflict, which bears a considerable responsibility on the sector. Given the strong influence of climate change on the frequency and intensity of disputes worldwide (Scheffran, et al., 2012), establishing climate consideration may be of essence and importance to the operations of mine action and should not be neglected.

Additionally, Yemen is facing extreme weather events that are disrupting lives, displacing populations, and destroying infrastructure, while exacerbating the risks of landmines and other ERW. The increasing conflicts caused by climate change are increasing the need for mine action and heightening the load on its operations. Consequently, reducing the harm of explosive ordinances while simultaneously contributing to the peace component, which is integral to lasting stability in affected regions, must include climate considerations to circumnavigate the shifting landscape of occurring conflicts, identify root causes, and facilitate long-term durable solutions. Justifiably, there have been growing concerns that actively recognize the need to merge conflict resolution, climate adaptation, and disaster risk reduction strategies (Adger, et al., 2005), which challenges Yemen's humanitarian needs and adds to its complex phenomena and pathways. As more than ever, we are confronting global issues that require a diligent and comprehensive approach to address a nexus between policy development and strategic programming that will induce resilience and tackle root causes. This could translate differently in different contexts, but at its core, it can maintain a solid and uniform foundational standard that can be applied across sectors and contexts to mitigate these interconnected issues. It could comprise initiatives that promote sustainable resource management,

strengthen governance, and encourage social cohesion to reduce the potentiality of conflicts erupting while, in parallel, integrating climate adaptation and disaster risk reduction measures.

The current climate forecast for Yemen's present and future seem bleak and uncertain. In addition to conflicts and the dire humanitarian situation, many more threats are starting to unravel due to climate change. These impacts are expected to worsen its pre-existing vulnerabilities, as the environment is predicted to experience worsening droughts and floods, which will substantially affect the country's already scarce – and poorly managed – resources (World Bank, 2013).

In light of these circumstances, local stakeholders and the international community must look beyond the immediate crisis needs and start accounting for longer-term implications of broader threats, such as climate change. This requires a forward-thinking strategy to integrate multiple disciplines, such as climate mitigation, adaptation, and resilience-building measures, into the broader peacebuilding and developmental efforts.

1.1 Specific Aim and Research Question

This research paper will shed light on potential strategic opportunities that could improve the sector's influence and undertake the complex challenges faced by communities affected by conflict. It also aims to address conflict resolution with a new lens, shedding light on the importance of integrating climate adaptation and disaster risk reduction strategies, as they are interlocked with the mine action sector and its landscape.

Mine action remains a considerably traditional sector and thus is can be very slow to embrace change. This could be due to its intersectionality and close ties with the military/security sector (Rutherford, 2000). Therefore, endorsing such recommendations could be critical in boosting mine action interventions' efficacy, resilience, and sustainability. A more holistic lens could reflect drastically on donor relations and potentially address the issue of low funding. Considering the complex and tangled challenges of conflict, climate change, and natural disasters, the mine action sector could be at the forefront of taking a pivotal role in promoting enduring peace, stability, and global development.

Furthermore, it is noteworthy to mention that conflicts over resources have been at the core of human civilization, dating back to the earliest human societies, and are a recurrent theme throughout history (Fjelde & Uexkull, 2012). This is an old-age phenomenon, as it often emerges to gain access and control of critical resources and reflects an intrinsic struggle for survival (Chagnon, 1968). Further, analogous conflicts can be observed in the discovery of oil in the Middle East during the 20th century,

a significant instigator of regional disputes (Michael, 2001). The oil discovery increased inter-state contentions and became a source of internal tensions, and these growing disputes created significant environmental and social costs (Yergin, 1991). Similarly, the term 'conflict-minerals' is ascribed to the mineral exploitation to which many conflicts have been provoked, often to control resources such as diamonds, coltan, and gold, as in the Democratic Republic of Congo (Autesserre, 2010). This embedded struggle has caused violent altercations, political instability, corruption, and socio-economic inequalities (Custers & Matthysen, 2009).

Recently, scarcity or inequity of distribution has culminated in the prevalence of conflict, further stressing their centrality in human altercations (Zimmerer & Bassett, 2003). However, these issues are becoming more frequent due to the pressure of increasing population, environmental degradation, and climate change, all of which exacerbate the struggle for these ever-scarce resources (Philippe, 2001). Thus, shifting the resources in demand and highlighting conflicts such as the one in Darfur, Sudan, which was partly recognized due to the competition for water resources and arable land (Verhoeven, 2011). And in late March, the United Nations highlighted the localized conflicts caused by water in Yemen and reported that "about 70 – 80 percent of conflicts in Yemen are over water" (United Nations, 2023).

Additional to these efforts, it is essential to consider the needs and aptitudes of different population groups, including women, children, older adults, and people with disability, especially in displaced and marginalized communities. This is a crucial consideration to ensure potent and sustainable mine action initiatives. This entails inclusion in the decision-making process and a sensitive approach tailored to these needs in mine action policies and programs (IACG- MA, 2010).

Consequently, underlining the role of mine action, its challenges, and the opportunities it can benefit from exploring the broader conflict, humanitarian response, and post-conflict recovery landscapes. It could attain an informed future policy and practices that facilitate efficient prevention. Ultimately, this will better the sector's efforts to save lives, support development, and contribute to a more inclusive world. Thus, based on the arguments mentioned above, literature analysis, and interviews conducted with field officers and specialists, this research paper seeks to address the following overarching questions:

1. ***How can the mine action response in Yemen be improved in light of climate change?***
2. ***How can mine action in Yemen integrate climate mitigation and adaptation measures?***

1.2 Background and Context

1.2.1 Conflict, Climate, and Natural Disasters

Climate change and natural disasters are a reality many of us are facing today. And despite the local and international efforts to slow its effects, it still leads to many conflicts and persists in many countries worldwide. One of the biggest challenges is to ensure the sustainability of humanitarian assistance and developmental efforts where weapon contamination is present. In addition to threatening human life, ERW hinders access to essential resources such as water and land, thus obstructing the long-term recovery of communities affected by conflict or disaster (UNMAS & GICHD, 2014). Growing efforts to integrate mine action into climate strategies have shaped the recognition of the importance of considering human security and environmental resilience in policy and programming.

It is essential to recognize that conflicts and natural disasters, such as floods and droughts, are frequently caused by or exacerbated by climate change (Benevolenza & DeRigne, 2018). This triggered many conflicts over scarce resources between communities, primarily due to decreased freshwater sources and frequent water shortages. Furthermore, the rate of natural disasters has caused profound impacts, environmentally and economically, especially on vulnerable populations. Most of these populations live in conflicted areas and already struggle to have access to clean water and food sources after a disaster occurs, both natural or man-made, and this can further make them susceptible to diseases and famine and other vulnerabilities.

Climate change considerably affects and exacerbates humanitarian crises such as conflicts, natural disasters, and landmine contamination (SIDA, 2018). Hence, to promote resilience for the environment and humans, it is vital to integrate strategies for adaptation into our humanitarian efforts in affected areas. This method has a high potential to inhibit future vulnerabilities to climate risks, namely water scarcity and extreme weather events. It also tackles drivers of conflict by incorporating conducive developmental practices that foster peacebuilding and resource allocation. Identifying synergies across sectors that share this response's objective can lead to the effective integration of these approaches and lead to better processes in the long term that will benefit the development actors and those who respond to emergencies.

1.2.2 An Overview of the Mine Action Sector and its impact

In conflict areas, mine action comprises many activities designed to mitigate the risks posed by explosive hazards to support conflict recovery and ease the developmental process in these regions. Those activities are generally classified into five core pillars: survey and clearance, risk education, victim assistance, advocacy, and capacity building. The mine action organizations aim to protect lives and restore livelihoods to promote sustainable development in areas where conflict is evident. Such operations are often under complex and challenging conditions (GICHD, 2014).

One of the five essential activities in mine action is survey and clearance operations, which detect, remove, and destroy landmines, ERW, and IED. Thus, declaring areas and lands safe for human habitat. However, these operations can be incredibly challenging when hostilities and insecurity are ongoing, which pose limited access to these regions. Explosive Ordinances (EOs) hamper humanitarian efforts as they prevent essential services from being delivered, preventing displaced populations from returning and resettlement. This forces mine action organizations to navigate through compounded and vigorous landscapes to balance the urgent need for rapid response and maintain an imperative standard for safety, diligence, and efficiency.

Risk education programs constitute the second pillar in mine action, as it targets the affected communities to raise awareness about the dangers posed by explosive hazards and promote safe practices and livelihoods. These programs focus on mitigating the risks linked to landmines and ERWs, especially to vulnerable populations like children, internally displaced persons (IDPs), women, and returnees. Nonetheless, these efforts can be further complicated by ongoing violence, continued displacement, and the collapse of social and institutional cohesions. This entails a need for continued adaptability in the overall approach and strategies of the mine action organizations.

The third pillar is Victim Assistance (VA) programs, whose objective is to support the survivors who landmines, ERW, and IED incidents have maimed. These programs offer medical care, rehabilitation services, psychological support, and socio-economic assistance to help with reintegration. But limited resources significantly constrain the provision and assistance to these victims when the healthcare infrastructure is damaged, and hamper access to remote areas when attempting to reach affected populations.

The fourth pillar is advocacy, promoting and maintaining adherence to international legal frameworks and treaty agreements. They aim to eliminate landmines and cluster munitions use, production, and stockpiling. Additionally, these efforts raise awareness and highlight the humanitarian impact of

explosive hazards, call for ceasefires to warrant humanitarian access, and mobilize the resources for mine action initiatives.

Lastly, a critical pillar in mine action is capacity building, aimed at strengthening the technical and operational capacities of all stakeholders involved, such as national authorities and non-governmental organizations (NGOs). Similar to the VA, the limited availability of resources pose a big challenge, as it demands a fluid approach to often complex political dynamics and navigating through disruption in governance structures.

To ensure the consistency, safety, and effectiveness of mine action activities, The International Mine Action Standards (IMAS) has a set of guidelines and best practices. It provides a comprehensive reference for mine action practitioners, organizations, and governments addressing landmines and ERW globally. These standards are developed through a collaborative process involving experts from diverse backgrounds, including mine action operators, technical specialists, and humanitarian organizations. (IACG-MA, 2001).

1.2.3 Yemen as a case study

Understanding the History of Conflict in Yemen Since 1990

Yemen is located at the southern tip of the Arabian Peninsula, and its cultural history dates back thousands of years with a strategic placement at the center of essential trade paths and its fertile lands that maintained ancient civilizations and shaped its historical development (Lewcock, 1986). However, Yemen has been identified with conflict and instability in recent decades. This disparity makes it necessary to understand the historical and regional factors that have contributed and led to its situation in our present day.

In 1990, Yemen dawned on a new reality that read hope for many Yemenis, the merger of North and South Yemen, two separate nations becoming a single entity. The reunification culminated in a prolonged process of compromise and agreement and reflected the Yemeni people's desire for unity and unified national identity. However, The Republic of Yemen soon faced many challenges that touched on political instability, economic adversity, and internal conflicts (Choueiri, et al., 2002). Though this unification pledged peace and prosperity, it eventually broke into a civil war in 1994. The strain over political powers worsened the struggle as the former North and South disputed resources. This resulted in ongoing clashes that continued to shape the country's political landscape until this day.

Additionally, on the regional front, the Gulf War continued to shape the peninsula after 1990. This profoundly impacted Yemen's economy and relations with its neighboring countries, particularly Saudi Arabia (Dresch, 2000). This left Yemen facing widespread unemployment and falling oil revenues and resulted in a rising of various opposition groups. It further created a struggle to establish a stable political system and address the socio-economic disparities, which set the stage for further conflicts that continued to inflame over time.

Notably, it's crucial to touch on the interplay of Yemen's tribal allegiances, historical grievances, and socio-economic disparities that have been boiling over time. In the North, the Houthi movement had long-standing grievances against the central government in Sana'a due to marginalization, selective underdevelopment, and neglect (Salisbury, 2018). In the South, the Southern Separatist Movement had been growing a sense of individual and separate identity in response to the discontent with what was seen as a Northern centralized dominance of Southern natural resources. It thus advocated for greater sovereignty and independence (Phillips, 2011).

Fast forward to the 21st century, which witnessed escalated tensions and turmoil in Yemen as the country experienced a series of insurgencies, notably with the Houthi in Sa'ada in 2004 (Salisbury, 2015) and the protests in 2011 inspired by the Arab Spring. These events eventually led to ousting President Ali Abdullah Saleh, who had remained in power since 1978, and the implementation of a power transfer deal sponsored by the Gulf Cooperation Council (GCC) in 2012 (Juneau, 2013), to form a transitional government. However, the newly formed transitional government could not maintain the rule of law nor address the many issues confronting the nation, leading the country to further decline into chaos. This political chaos escalated into a full-blown war in 2015 that lasted nine years and counting[1], bearing devastating consequences for Yemen and its people. A convoluted web of alliances and a proxy war that tangled regional and international actors. This further intensified the crisis, leaving tens of thousands dead and millions displaced, and resulted in one of the worst humanitarian crises in modern history (OCHA, 2022).

A Situational Analysis of Yemen's Climate Projectile

In a region already experiencing adverse effects, Yemenis are highly vulnerable to climate catastrophes, devastatingly impacting the country's economy, natural resources, and people's livelihoods. Accounting for more than 75% of Yemen's total population, the rural population is

[1] In April 2023, in addition to prisoners' exchange, a Saudi and Omani delegation arrived in Sana'a, capital of Northern Yemen to hold peace talks. The outcomes, however, remain uncertain as of this moment (May 2023) in light of precieved complications. https://www.aljazeera.com/news/2023/4/11/progress-on-yemen-peace-talks-despite-prisoner-swap-delay

particularly vulnerable to climate change due to their high reliance on agriculture and pastoralism for their livelihoods (UNDP, 2014). As these sectors are strongly tied to climate conditions, any adverse impact on them seriously impacts the rural communities. The effects of climate change in Yemen are likely to exacerbate existing challenges, such as poverty, food insecurity, and conflict. Hence the urgency, as "groundwater in western Yemen is at its lowest level since satellite records began in 2002. This is despite the above-average rainfall in recent years and some recovery in the early years of the conflict due to fuel crises and social upheaval" (CEOBS, 2021)

Additionally, the decrease in rainfall in recent decades has significantly impacted agriculture and pastoralism, leading to crop failure, loss of biodiversity, and extreme water shortages. Furthermore, instability in the timing, intensity, and frequency of rainfall and changes in wind cloudiness patterns will likely cause far-reaching impacts on the country's natural resources and rural communities (Seneviratne, et al., 2012). For example, irregular rainfall patterns could lead to declining water availability for agriculture and pastoralism, further exacerbating food insecurity and poverty in rural areas. However, it's notable to mention that despite Yemen's low carbon emissions in the past 22 years, which merely exceeded 1.1 metric tons per capita (World Bank, 2020), it is far from evading the disastrous unprecedented or statistically 'once-in-a-century' events (Al Harazi, 2014).

Moreover, water conflicts in Yemen account for up to 4,000 deaths annually, as reported by the government of Yemen (FAO, 2015). Furthermore, the disputes caused by declining water resources predate 2015 and have caused rising violent localized conflicts. As Yemen's interior ministry reported, 80% of the population lacks access to clean water. As of 2015, only 8% of the global water average was available for each person annually, projected to decline to 3.8% by 2031 if the conflict persists (FAO, 2015).

1.3 Literature Review

1.3.1 Mine Action and Peacebuilding

From clearing landmines and ERW to assessing and encompassing hazardous spaces and possible contaminations, mine action activities provide crucial safety for people and ease recovery. It is essential in enabling development by restoring livelihoods and facilitating safe returns for IDPs (Downs, 2009). The mine action as a sector is committed to reducing humanitarian, social, economic, and environmental impacts of EOs, ERWs, and improvised explosive devices (IEDs), and plays a critical role in global security (UNMAS, 2019). However, its scope goes beyond safety and security. Mine action is essential for peacebuilding as it lowers violence and contributes to security conducive

to peace (UNMAS, 2019). In many contexts, due to being perceived as neutral and humanitarian-centered, it contributes to peace through confidence-building among former adversaries as it is influential in promoting dialogue and cooperation and provides employment in post-conflict settings (Zeller & Maspoli, 2016).

Conflicts cause significant economic consequences on people, physical assets, and institutions are considerable. Thus, growth, capital, employment and livelihoods, and government systems are broken down (Collier, 1991). Additionally, infrastructure is a major casualty, and resources transition from production to destruction, reducing food, water and employment availability as well as levels of education and dynamic skills. Hence, countries that emerge from violent and deadly conflicts have a complex nature of post-conflict recovery. They constitute 'normal economies in distress' but require a long transition to normalcy (Ohiorhenuan, 2011). As a prerequisite for economic recovery, post-conflict economies must sustain growth through attaining substantial employment rates and horizontal inequalities (Collier, et al., 2009). Therefore, utilizing clearance and land release to reuse resources like agricultural and residential land, and focusing on infrastructure development can increase productivity and integration into value chains and markets (GICHD, 2021). However, this can only be successful by ending the conflict, then proceeding to clear any threats of ERW and landmines to allow the return of economic activity to facilitate development (World Bank, 2011). According to the World Bank, the countries that carry a successful implementation of mine action programs do develop noticeable economic growth and development. Ohiorhenuan (2011) noted that the contribution of sequenced and creative economic and social policies results from overlapping progression leading to recovery.

Incorporating mine action into peacebuilding is highly advantageous; however, the component of economic recovery remains a challenge that stands in the way of achieving its integration. Among many things, effective cooperation is vital. This includes humanitarian and development stakeholders, national and local governments, and inclusive communities (Zeller & Maspoli, 2016). In other words, mine action has the opportunity to be utilized as a platform for negotiation and cooperation, as it can promote capacity building and local ownership and participate in the broader social, economic, and political progress (Ditel, 2022).

1.3.2 International and Humanitarian efforts for Climate Action

Conflict, climate change, and natural disasters are challenges that extensively impact countries (UNEP, 2023). These challenges can affect one another and create a vicious cycle that impedes development, peace, and stability on a global level. International efforts have been initiated in

response to the need for collective action on climate change. One such initiative is the United Nations Framework Convention on Climate Change (UNFCCC), the foundation for international collaboration on climate change. And despite its extended commitment through The Kyoto Protocol, which laid legal obligations for developed countries to reduce emissions, the convention's effectiveness and limitations have been questioned (Agrawala & Andresen, 1999; Oberthür & Ott, 1999). Additionally, it did not consider climate change's potential impacts on conflict, security, and development despite its implications, effectiveness, and implementation being extensively reviewed (Grubb, 2003)

The Paris Agreement, which is more recent, has set out to address progressive global warming issues, has also been questioned in literature for its potential effectiveness, goal attainment, and what it means for individual countries (Falkner, 2016; Bodansky, 2016). Additionally, it has been criticized for not having targets with a legal bind, and instead depending on the voluntary contribution of nations (Szira & Alghamdi, 2020). However, having lower per capita emissions, yet high vulnerability to climatic hazards and adverse economic effects, the least developed countries have thus expressed concerns (Okonkwo, 2017). Despite the criticisms, the Paris Agreement remains a milestone in addressing global climate change.

Despite setbacks in international efforts, these milestones encouraged several humanitarian organizations to increasingly take active steps to address the issue and integrating adaptive strategies into their work. Literature on the Red Cross Climate Centre and other organizations explore these responses. For example, The Red Cross Climate Centre has supported vulnerable populations adapting to extreme weather (Van Aalst, 2006). Subsequently, humanitarian organizations have recently responded to the increasing need for climate inclusion, establishing The Climate and Environment Charter for Humanitarian Organizations. It is an important document that reflects the growing threat facing humanity by drawing a framework that supports collective action that responds to climate and environmental crises. It comprises seven commitments focusing on local leadership, evidence-based solutions, and cross-sector collaboration for humanitarian organizations (ICRC & IFRC, 2023). It highlights the disproportionate effects of these crises and calls for collective action to protect vulnerable populations.

However, (CEOBS, 2020) pointed out that climate change remains a substantial destabilizing force without tangible strategies, as conflicts can have severe environmental impacts, emphasizing the need to mitigate these effects. Auspiciously, in the same year, the U.S. Department of State produced The Global Fragility Strategy, which recognized the impact of environmental issues on peace and conflict

and advocated for effective environmental governance and natural resource management (U.S. Department of State, 2020).

Finally, the IPCC's latest report from March 2023 has identified gaps between the global climate ambitions and the national commitments, further stressing that climate change impacts disproportionately affect the most vulnerable populations and systems. It claimed with 'high confidence' that "the magnitude and rate of climate change and associated risks depend strongly on near-term mitigation and adaptation action" (IPCC, 2023, p. 56). The report also showcased that "accelerated support from developed countries and multilateral institutions is a critical enabler to enhance mitigation and adaptation action and can address inequities in finance, including its costs, terms and conditions, and economic vulnerability to climate change" (IPCC, 2023, p. 82). Despite the urgency, climate-related issues are lagging and are not comprehensively part of the conversation. This includes the mine action sector, as the United Nations Mine Action Strategy 2019-2023 (UNMAS, 2019), did not include climate-related topics or goals, despite the climate being a primary driver for conflict, and in many cases central.

1.3.3 Water, Conflict, and Climate Change in Yemen

Yemen is alarmingly one of the most water-scarce nations globally, which significantly adds to its vulnerability in the face of its current trajectories of conflict and natural disasters (United Nations, 2023). The ongoing war has damaged the country's water infrastructure, which left millions with no access to clean and safe drinking water. This has caused widespread waterborne diseases, such as cholera, affecting hundreds of thousands of Yemenis (Burki, 2021). The relationship between climate change and water availability and resources is widely discussed. Extreme weather events that cause water scarcity, unpredictability, and pollution show how they are intricately linked (UNESCO (WWAP), 2020). However, the National Water Resource Authority (NWRA), which operates under Yemen's Ministry of Water and Environment, is crucial in regulating the country's water resources (NWRA Yemen, 2009).

Additionally, due to Yemen's geographical location, socio-economic status, and ongoing conflict, it is highly vulnerable to the impacts of climate change. The country has been experiencing increasing temperatures, changing patterns in rainfall, and rising sea levels, all of which have severe implications for agriculture, water resources, and food security (World Bank, 2016). Moreover, Prolonged conflict and water scarcity have contributed to the country's instability and crisis (Douglas, 2016). And the per capita renewable water resources are among the lowest globally (UNDP, 2022). In addition to

climate change, practices such as over-extraction of groundwater for agriculture, inefficient water management, and pollution have greatly exacerbated water scarcity (FAO, 2019).

“In August 2021, the report by the Intergovernmental Panel on Climate Change starkly warned of increasingly extreme heatwaves, droughts, and flooding, and that the role of human influence in the climate system is undisputed. Global temperatures have risen by an average 1.1 degrees Celsius since the nineteenth century and continue to rise” (Cottrell & Stowe, 2021). And 3.3 to 3.6 billion people in highly vulnerable contexts experience mortality from floods, droughts, and storms, 15 times more in these contexts (IPCC, 2023). Further, water shortage, in specific, is of critical concern, and its scarcity is an issue that is rapidly worsening in Yemen as the country is already ranked among the most water-stressed nations globally (UNDP, 2019). Due to climate change, water availability is projected to decline, which could trigger increased competition for it as an essential resource leading to further inflamed conflicts (Gleick, 2014). By extension, this could worsen food insecurities by negatively affecting agricultural production, leading to widespread famines and malnutrition across Yemen.

Looking at the Yemeni conflict from a historical lens, we notice that disputes over resources and economic disparities became more prevalent over time, especially after the 1990 unification, which initiated an undertone of control over resources. Most oil reserves were located in the South, incentivizing the North to share these profits, leading to stirred tensions and passive (controlled) conflicts under an authoritarian regime (Day, 2012). Conflicts over scarce and essential resources, such as water and arable land, have further fuelled local conflicts and intensified the propensity for violence (Schwartzstein, 2019). Population growth, urbanization, and unsustainable agricultural practices have all factored into the long-standing concern of water scarcity in Yemen. The depletion of water resources since 1990 has increased due to mismanagement, weak governance, and conflict (UNDP, 2021). Growing tensions among local communities have been fuelled by insufficient and depleting water supply. Feeding struggles to control water resources added to the already inflamed and growing political instabilities with looming civil wars. Inadequate water supply led to consequences for agriculture, public health, and overall socio-economic development. Driving famine to the forefront of many concerns for Yemenis, with millions facing severe food insecurity due to the conflict (WFP, 2023).

Adding to Yemen’s challenge with climate, is its locust infestations (FAO, 2010/23), which have damaging consequences on crops and livelihoods and lead to lowered food production and property damage. Yemen is also prone to floods (OCHA, 2020), which also cause severe damage to resources

and human life. With poor and inadequate infrastructure, this multilayered natural disaster is a wasted resource and causes further damage to the limited resources (ICRC, 2020). Given the country's ongoing conflict and low greenhouse gas emissions (AL-wesabi, et al., 2022), efforts to mitigate climate in Yemen are negligible. Dismissing the vitality of climate mitigation efforts and prevent resilience building to the impacts of climate change. However, The Pilot Program for Climate Resilience (PPCR) has led the initiative in Yemen to help integrate climate resilience and adaptation planning and capacity into Yemen's water and agricultural sectors (CIF, 2021).

Lastly, as EOs and ERWs limit access to water sources, the damaged water infrastructure has led to widespread displacement, disease outbreaks, and exacerbated food insecurity. Making water scarcity an issue that is directly linked to the conflict (United Nations, 2021).

1.3.4 Gender, Displacement, and IDPs

Studies have shown that conflict-related displacement often leads to changes in gender roles and responsibilities within communities, impacting women and girls in particular (Mansour, et al., 2020). In Yemen, the protracted conflict and resulting displacement have disrupted social structures and increased the risks IDPs face, including exposure to landmines and ERW contamination (UNDP, 2023). Therefore, integrating a gender perspective in mine action and climate resilience programs is essential for addressing IDPs' diverse needs and experiences (Anon., 2018). Further, the importance of gender mainstreaming in mine action activities has been emphasized by the United Nations Mine Action Service, highlighting the need to consider the different roles, responsibilities, and vulnerabilities of women, men, girls, and boys in program design and implementation (UN, 2019). Integrating a gender perspective involves recognizaing the specific risks women and girls face in conflict-affected areas and ensuring their meaningful participation in decision-making processes related to mine action and climate resilience (UNDP, 2022).

As Yemen is experiencing the impacts of climate change, it adds another layer of complexity to the situation. These climate-related challenges further exacerbate the vulnerabilities of IDPs, particularly women, and girls, who often face increased risks of gender-based violence, limited access to resources, and inadequate shelter and sanitation facilities (UNDP, 2022). Hence, in response to these challenges, efforts are being made to integrate gender-responsive approaches in mine action and climate resilience programs. For instance, initiatives are being undertaken to provide gender-sensitive risk education and training to enhance the safety and awareness of IDPs, including women and girls, regarding the risks of landmines, ERW, and climate-related hazards (UNDP, 2022). "After experiencing displacement, women are often left alone to run the household while the men go out to

find new sources of income. Women and children must bear the burden of collecting water, which prevents many children from going to school" (IOM, 2022). Additionally, empowering women as agents of change and decision-makers is crucial for ensuring inclusive and sustainable mine action and climate resilience efforts in Yemen (Mansour, et al., 2020).

Consequently, gender considerations are integral to addressing the challenges IDPs face in the context of mine action, climate change, and Yemen. Integrating a gender perspective in program design and implementation is crucial for effectively addressing affected populations' diverse needs and vulnerabilities. By adopting gender-responsive approaches, including women's meaningful participation and empowerment, mine action and climate resilience efforts can become more inclusive, equitable, and sustainable (UN, 2019).

2 Theoretical Frameworks and Concepts

Complex global challenges require robust theoretical frameworks. Hence, considering the interconnected nature of this paper's topic, it aims to integrate three such frameworks - the Theory of Change (ToC), the Humanitarian-Development-Peace (HDP) Nexus, and the Interdisciplinary Theory – which has the potential to construct a comprehensive approach towards the attainment of a necessary goal (OXFAM, 2019; Peek & Guikema, 2021; Taplin & Clark, 2012)

With an approach focused on the outcome, the Theory of Change lucidly grasps and delivers steps leading to a desired output. It identifies principal assumptions, external factors, and needed actions to induce sustainable change in a given context (Vogel, 2012). This process promotes cooperation between stakeholders to enhance interventions' efficiency and accountability. The Humanitarian-Development-Peace Nexus aims to integrate humanitarian aid, development cooperation, and peacebuilding to address complex and interconnected crises (OXFAM, 2019). By complementing a ToC approach within the Nexus, stakeholders can distinguish different pathways and locate potential risks, leading to more effective strategies where root causes are addressed rather than just the symptoms. Whereas the Interdisciplinary Theory offers tools and insights from various disciplines to encourage an approach geared toward encompassing sustainable development (Peek & Guikema, 2021). Strategies that are structured, informed, and enriched have much higher chances of bettering intervention effectiveness while addressing symptoms and underlying causes and significantly contributing to achieving lasting, sustainable change that is more aligned with the humanitarian and developmental goals and values.

In the context of mine action, climate change mitigation and adaptation, integrating these three theories/frameworks can be particularly effective, for instance, in the case of a long-term goal that aims at a resilient future to climate and a world free of explosives and landmines threats. The Nexus would address immediate mine clearance, peacebuilding (through safe communities), and sustainable development by guiding interventions through land release permitting its use productively. In parallel, climate mitigation and adaptation efforts would address the immediate climate risks, reducing conflicts over resources, impacting peace efforts, and advocating for sustainability. Finally, the Interdisciplinary Theory would ensure that the interventions incorporate the necessary scientific, sociological, political, and economic insights will have a greater chance of leading to more effective and sustainable outcomes.

2.1 Theory of Change (ToC)

The Theory of Change (ToC) offers an extensively comprehensive methodology effective for planning, participation, and assessment and is often used in nonprofit and governmental sectors to instigate change. ToC aids in outlining long-term goals and then strategically mapping backward to evaluate the preconditions that are imperative to achieving these goals (Taplin & Clark, 2012).

To apply Toc within the context of mine action and climate mitigation and adaptation while keeping in mind the "if, then, because" approach, a ToC framework would take the following shape:
Long-term Goal (including subgoals): A world free from the threat of landmines ERW), in addition to a resilient, climate-sustainable future, in line with the International Campaign to Ban Landmines' aspirations (ICBL, 1997).
Preconditions and Pathways of Change (outcomes): There are essential steps to remember when reaching this long-term goal, and they can be split into two sections.

1) For the mine action component: For the detection and removal of mines, this will include technological advancement to secure both national and local capacities, reinforce policy adjustments to ban the use of landmines and explosive ordnance, strengthen governance and spread education and raise awareness of their dangers (GICHD, 2014).
2) The climate mitigation and adaptation component: involves the reduction of greenhouse gas emissions, which can be achieved through renewable energy, the developing and implementing climate-smart agricultural practices, building an infrastructure that is resilient to climate change, promoting policies for low-carbon consumption, and spreading education and raise awareness about climate change and its impacts (IPCC, 2018).

Interventions/approach ("if"): This is the place for specific actions, such as the development and implementation of training programs or other relevant programs, petitioning for policy changes or adjustments, financing research, investing in technologies, or establishing partnerships with other organizations for collective action, which will achieve the above preconditions (Anderson, 2004).
Assumptions ("then"): Here, we include the preconceptions, the expected outcome initiatives, and why the suggested actions are believed to lead to the desired change. Brest (2010) points out that assumptions are subject to continuous revision throughout the process and must be made explicitly.
Indicators ("because"): Finally, here we propose measurable signs that indicate the change and achievements; this will assist in providing ways to gauge the progress and evaluate the effectiveness of the interventions, as per Kusek & Rist (2004).

It is, however, essential to keep in mind when developing a ToC framework to gather input collaboratively from all relevant stakeholders. This method ensures that it is grounded tangibly in realistic contexts in which it will be implemented (Taplin & Clark, 2012). It will prevail as a document open to editing, should it be necessary, throughout the process. This further supports the need to incorporate interdisciplinary theory into this framework, which will be discussed further.

The overall benefit of ToC is its delivery of a well-defined roadmap, starting with the end goal and then tracing backward in time to distinctly identify the necessary preconditions or pathways that led to that goal. This detailed approach allows all stakeholders to align their actions with their strategic objectives, promoting systematic progression towards a change that is inclusive and desired by multiple actors while staying focused simultaneously on evaluation and adaptation (Stein & Valters, 2012).

2.2 Humanitarian-Development-Peace Nexus (HDP)

The Humanitarian-Development-Peace (HDP) Nexus, also called the Triple Nexus, is a paradigm shift that embodies the core values of humanitarian action, sustainable development, and peacebuilding. The Triple Nexus approach has been strongly supported by UNMAS and other organizations, to protect civilians by creating the conditions conducive to delivering humanitarian assistance, and support the implementation of the Revitalized Agreement and the peace process (UNMAS, 2021). The Nexus embraces the interrelation of these three components and reinforces their mutual elements and inseparability rather than isolation (OXFAM, 2019). This view has gained increased attention and acknowledgment during policy discussions, particularly in the United Nations and other global institutions (Cabot Venton, et al., 2012).

In the context of mine action and climate mitigation and adaptation, conceptualizing the HDP Nexus provides a well-rounded methodology that addresses the three following concerns:

a. Humanitarian Action: As saving lives and reducing harm from unexploded ordnance are the main drivers in mine action (UNMAS, 2019), it rings true for immediate responses to climate change, as it is reflected in its perpetual measures that protect lives and livelihoods from extreme weather events and other threats induced by climate (IPCC, 2018).
b. Sustainable Development: We cannot think of long-term sustainable development without thinking of mine action and its pivotal role in facilitating safe return for displaced people, contributing to infrastructure redevelopment, and resuming agriculture (United Nations, 2016). Analogously, climate mitigation and adaptation are also imperative for long-term sustainable development, as they ensure the protection of natural resources, reduce poverty and inequality, and create economic opportunities within the renewable energy sectors (Stern, 2006).
c. Peacebuilding: EOs and ERWs can continue to prompt conflict and insecurity even when the conflict is over. And to achieve peace and begin the peacebuilding process, they must be removed and cleared. Simultaneously, as conflicts exacerbate vulnerability to climate change, equitable efforts towards climate mitigation and adaptation enable peace and promote social and environmental justice (Gleditsch, 2012).

The HDP Nexus approach addresses these three dimensions and encourages their integration simultaneously. It pairs and connects, such as when mine clearance is combined with reforestation efforts that support climate mitigation, as it produces green jobs that are conducive to sustainable development while fostering social structures integral to peace through its participatory practices.

Nevertheless, it is essential to remember that it can be very challenging to operationalize the HDP Nexus due to its need for adjacent coordination across multiple stakeholders. Conventional sectors require a solid inclination to transcend limitations and equalize short-term needs with long-term goals, which can potentially challenge a sector that is as traditional as mine action. Additionally, its necessity for conflict attention and sensitivity, power and inequity issues can benefit the sector. However, attention must be advised during the design and implementation stages; otherwise, it could unintentionally increase conflicts or harm vulnerable populations (Metcalfe-Hough, et al., 2019).

The acknowledgment and interconnection between the three fields: humanitarian action, sustainable development, and peacebuilding, incorporates an understanding of the scheme and application of the

ToC suggested interventions. This structure that the HDP nexus demonstrates complements the ToC, leading to a maximized effectiveness impact (Taplin & Clark, 2012).

2.3 Interdisciplinary Theory

Applying an interdisciplinary theoretical framework becomes paramount when addressing a global issue as intricate as mine action. Complex and intertwined issues dictate the understanding that can only be delivered through a group of academic disciplines to bring unique insights (Repko & Szostak, 2016). This includes the entirety of the process, from assessment and mapping to detection and clearance of landmines, all the while including other considerations, including climate mitigation and adaptation for local communities.

In 2018, the IPCC identified Environmental Science and Climate Studies as the fundamental guide for the complex dynamics of climate change, its causes, impacts, and potential solutions. This scientific knowledge can raise important notifications that intersect climate change with the assessment and clearance processes, which become relevant when drafting climate mitigation and adaptation policies.

Alternatively, Engineering and Technology can address the technical aspects of the process while providing better alternatives for sustainably developed technologies (Bhander, et al., 2003). The interdisciplinary framework can bring innovative resolutions and incorporate climate-friendly technologies into the sector. Looking into Geography and Geology could also prove beneficial, as it will give a nuanced understanding of the physical ecological landscape (Foley, et al., 2011). This will aid the mine action operations while detecting landmines and include the demographics of the natural resources susceptible to climate change.

Political Sciences, on the other hand, provide vital accounts of policy and regulations at all levels that are continuously impacting mine action, climate change mitigation, and adaptation (Hochstetler & Milkoreit, 2014). This reflection is crucial to navigating challenging political undercurrents, forming global cooperation mechanisms, and carefully address fragile governance systems.

Additionally, Anthropological Sociology is vital for spotting social vulnerabilities and blind spots caused by ERW and climate change. These efforts can have massive outcomes on livelihoods, as well as the patterns of migration, and can enforce positive cultural practices (Scheffran, et al., 2012). Viewing these issues from their social context supports an approach that is human-centered in respect to its environment. Moreover, economy should also be in the interplay and central, from the lens of

economic recovery and sustainability, further along the line. It ensures that developing nations do not remain in a state of survival but can one day have a robust economy. Like climate, economic drivers of conflict are also on the rise, which can benefit both the mine action sector and climate change strategies in the long run (Sachs, 2015). There is also the urgency of considering public health and the risks landmines and ERW pose to human life and well-being as well as climate change (Costello, et al., 2009), especially in the case of waterborne diseases that are more prevailing in regions hit by conflict and climate change. Through this lens, we can have a holistic understanding of the risks and how to mitigate them.

And finally, the distinctive angle that Psychology can provide to cement practices related to implementing climate-friendly behaviors and ensure their sustainability. As well as reduce the impact of landmines on communities (Swim, et al., 2009), to assist in providing a bigger picture that is more vivid and coherent.

The interdisciplinary theoretical framework emphasizes the importance of cooperation, communications, and synthesis through its application across fields. This will warrant efficiency and inclusivity when addressing the challenges posed by EO, ERWs, and climate change (Repko & Szostak, 2016).

3 Methodology

3.1 Research Design, Approach, and Validity

To investigate the complex and interconnectedness between mine action, climate change, and their effects on water availability in the Yemeni context. The research paper in this study took on a critical science design and approach and followed the qualitative methodology. “Many case studies will use sociological and anthropological field methods, such as observations in natural settings, interviews, and narrative reports” (Scheyvens, 2014, p. 153). Thus, utilized secondary data from academic literature and policy documents while supplementing them with interviews.

The literature data offered a research-based analysis and the study of guidelines and frameworks. At the same time, the interviews provided firsthand, in-depth insights and perspectives from individuals with a tangible experience of the applicability of the data in the field. However, this case study aimed at creating a general entry point into the current sectoral responses to the issue of global climate change and the perception of its urgency in Yemen and how it’s being operationalized. Furthermore,

to certify the validity of the results, comparing and cross-verifying the data across different informants strengthened the consistency and reliability of the findings. Discrepancies between informants' views were not seen as undermining their validity but rather as providing a better understanding of the complex issues through different lenses (Creswell & Cheryl, 2017). This approach provided a good understanding of the various ways in which different sectors operate.

This design is suitable for small studies that seek to better understand the interviewees' contextual application in the field. Using a descriptive approach implies a focus on what the interviewees believe to be true, based on what they've experienced and have applied in practice. Thus, enhancing the understanding between the theoretical frameworks in the current strategies and the actuality of their application or success in the field (De Vaus, 2013).

3.1 Sampling and Data Collection

The sample for this study comprised ten individuals from different backgrounds (see Appendix 1). The participants include practitioners working in the field of mine action, both within Yemen and globally, and specialists in the water and environmental sector with knowledge of the Yemeni context. The interviews, each lasting approximately one hour, were conducted either in person or online, depending on the location and availability of the participants. Conducting interviews online proved advantageous, as it facilitated the participation of local practitioners. Thus two interviews were conducted in the local language (Arabic), providing added value in terms of cultural understanding and nuanced insights, allowing "an alternative for hard-to-reach groups (due to practical constraints, disability, or language or communication barriers) who may be marginalized from qualitative research" (Creswell & Cheryl, 2017, p. 455).

The interviews were designed to follow a semi-structured format. This approach enabled interactivity, providing flexibility, adaptability, and the capacity to delve into complex phenomena (Bryman, 2012, p. 399). Unlike structured interviews, the semi-structured approach adopted in this study allowed for the emergence of new questions during the interview. It facilitated in-depth discussions based on the participant's subjective experiences and positions. This approach ensured that key points were addressed while providing the flexibility to explore the multi-faceted issues. The interview guide, presented in Appendix 2, consisted of 29 questions categorized into five sections: 1) Yemen, 2) Mine action, 3) Water and Environment, 4) Intersectional questions that explore the relationship between climate and mine action, and 5) Additional questions for the interviewer to reflect on during the

interviews. On average, each participant addressed approximately ten questions directly or indirectly related to their respective experiences.

However, given the backgrounds of the participants, some interviews were allowed to transition into an unstructured and open discussion format. This flexible approach enabled the interviewees, who brought nuanced understandings based on their backgrounds and expertise, to guide the conversation and highlight topics the interviewer may not have initially considered. As a result, this approach facilitated the collection of context-specific data (Creswell & Cheryl, 2017), capturing the multi-faceted nature of the humanitarian sector both in Yemen and globally. The interactivity and flexibility of this approach yielded valuable insights, offering a range of perspectives on these crucial issues. This method effectively highlighted the significance of qualitative methodologies for exploring complex, interconnected, and context-specific topics. By employing this approach, the study demonstrated the importance of qualitative research in deepening our understanding of such intricate subject matters (Creswell & Cheryl, 2017).

3.2 Coding and Data Analysis

Following the data collection, interviews were recorded[2] and subsequently transcribed. This process ensured accurate documentation of the interview contents. The next step involved coding the transcriptions and organizing them into thematic subjects for analysis, which was divided into themes, sub-themes, and indicators, as well as extracting some sample quotes. Braun and Clarke (2006) state that an accessible and theoretically flexible approach to qualitative data identifies, analyzes, and traces patterns. Employing an inductive approach to analyze the data and identify general themes, followed by more focused sub-themes and indicators. This approach captured important patterns and allowed for information extraction as needed (Braun & Clarke, 2006). This iterative analysis derived themes and patterns in light of the complex dynamics of the mine action sector and climate and provided an understanding of the sectors' inner workings in Yemen.

3.3 Ethical Considerations

Given the sensitive nature of the study, several ethical considerations were taken into account. Informed consent was obtained from all participants before the interviews, ensuring they understood the purpose of the research, their role, and their right to withdraw at any time (Creswell & Cheryl, 2017). However, despite offering valuable input, some participants did not consent to be recorded;

[2] Following the ethical considerations standard.

thus, confidentiality was maintained, and any identifying information was concealed. Furthermore, the study was conducted respectfully and sensitively, recognizing the potential sensitivities around topics related to tribalism, as well as sensitivities around gender and political views, which are inherently challenging and culturally trepidatious topics in Yemen. This was in adherence to the principles of beneficence, ensuring the absence of any potential harm to the participants (Bryman, 2012). Given the study context, it was essential to pay special care to ensure that the participants' experiences and perspectives were handled accurately and respectfully. Overall, the study aimed to uphold ethical standards in all stages of the research process.

4 Findings

4.1 Climate Change and Mine Action

4.1.1 The Environmental Impact

The results indicate a crucial association between the shifts in climate and its consequences on mine action. In addition, there appears to be a general agreement regarding the imperative need for incorporating these considerations within mine action endeavors as a more comprehensive and efficient approach in areas affected by conflict.

Moreover, the adoption of standardized strategies centered on environmental conservation was suggested; this supports CEOBS's (2020) point on the destabilization of climate caused by the absence of a tangible integrated system. These protocols could include appropriate waste disposal techniques and safe practices when handling hazardous materials. Findings also supported the United Nations (2021) view on how limited access to water resources can be far deadlier than violence in war-torn countries, thus is crucial to incorporate ecological factors into the broader discussions concerning vulnerability, displacement, and resilience in conflict-prone areas for more effective strategies. This will help improve environmental protection while implementing mine action programs in these regions. However, it is observed that countries like Yemen need institutional frameworks accountable for sustainable mine action processes, which shows promise in efforts such as The Global Fragility Strategy by the U. S. Department of State (2020) to support countries with weak environmental governance such as Yemen, and reinforce effective policies and regulations.

While the impact of mine action on natural disasters remains under debate, indirect connections have been identified. For example, minefields can hinder the construction of flood-resistant structures, highlighting the need to address these issues holistically and minimize a very high causality rate, as

emphasized by the IPCC in 2023. The finding also highlights the need for improved management strategies to better adapt to the effects of climate change on natural disasters, which have put Yemen at risk of floods and droughts, and damaged livelihood, especially where conflict is prevalent, also pointed out by (Grubb, 2003). Additionally, environmental contamination is another negative effect caused by detonated landmines, which affects water availability and quality (Burki, 2021).

Further, findings show that the effectiveness of coordination between clusters within organizations like UNMAS is questioned. Despite discussions around the need to integrate sectors in support of the Sustainable Development Goals (SDGs) and the Triple Nexus, tangible action appears to be lacking. Further supporting the need for initiatives such as The Climate and Environment Charter for Humanitarian Organizations. Moreover, there seem to be limitations within the cluster system where not all sectors are represented or lack the willingness to cooperate, as pointed out by Respondent 4 (10.04.2023), who argued that a potential solution is to revamp the cluster system to encourage greater collaboration between sectors.

4.1.2 Peacebuilding, Policy & Integrated Programming

The research demonstrates that the capability of this Nexus is observed, specifically in aiding issues such as water. “Perhaps the triple nexus might be that connecting factor between what we could eventually call mine action towards more development activities where I would say environment and water fit” (Respondent 6, 14.04.2023). The results highlight the significance of promoting peace and stability with the aid of the Nexus, as Gleditsch (2012) stipulated, recognizing that armed conflicts can exacerbate pre-existing problems, and sustainable solutions require a secure and calm atmosphere which is not the case in Yemen. Additionally, the interviews touched on how the Triple Nexus is effective in mine action “as this opens a discussion that looks into also peace and conflict dynamics” (Respondent 2, 31.03.2023). Thus, mine action should not restrict its scope solely to immediate contamination concerns but instead expand it towards conflict prevention through active collaboration with other entities involved in peacebuilding and conflict resolution efforts, as also pointed out by (Zeller & Maspoli, 2016). The study findings indicate that emergency assistance efforts are primarily short-term, relief-based rather than promoting long-term sustainability goals, according to Respondent 3 (09.04.2023), a view further supported by GICHD (2014).

However, a relatively new concept, integrated programming, according to Respondent 8 (19.04.2023), has observed favorable outcomes in applying mine action in other developmental sectors. Such an approach involves demining activities followed by restoration of livelihoods,

agriculture, and shelter provision. Aiming to transition from pure humanitarian aid to sustainable development activities, which could address the potential challenges on rural populations (UNDP, 2014). In addition, these organizations should improve coordination with different clusters within international bodies like the United Nations, working towards integrating their services across sectors, including the SDGs and the Triple Nexus, to maximize the effectiveness of its impact (Taplin & Clark, 2012).

Despite the significance of this integration, clear roles and partnerships are required for effective management to ensure better information exchange and enforcement across entities. However, Respondent 5 (13.04.2023) pointed out the recurrent challenges that persist despite these efforts in Yemen. The respondent argues that Yemen is highly bureaucratic, and a lack of transparency prevents smooth integration. This reflects the importance of enforcing legally binding agreements and resolutions (Szira & Alghamdi, 2020). Better urban planning policies and more vigorous enforcement of existing water management laws are needed, for example, to avoid construction in flood-prone areas and ensure responsible water use is a prevalent issue in Yemen (OCHA, 2020). Hence, Respondent 3 (09.04.2023) argues that mandating a water regulation body akin to a 'water police' such as the Ministry of Water and the Environment in Yemen. However, such bodies lack funding and resources due to a lack of recognition.

4.1.3 Collaborations and Multisectoral Stratigies

The study supported solid recommendations for strategic development that can encompass individual countries' needs holistically, which is strongly advocated by organizations such as CEOBS (2020). The findings show that strategy should map a clear course for transitioning from humanitarian aid to development and peacebuilding, also called *exit-strategies*. "Mine action can help mitigate climate issues, as one of the sectors that arrive to the field first, they have access where most organizations or sectors can't get. With this advantage of time, mine action can incorporate environmental or climate considerations, with the help of partners that could contribute to better climate mitigation long term" Respondent 8 (19.04.2023). Mine action organizations could play a crucial role in ensuring access to safe water sources, calling for collaboration between peacekeeping missions and humanitarian aid. Mine action should not be limited to immediate tasks of contamination removal but instead expand their utility. It should also consider its broader role within the triple Nexus of humanitarian action, development, and peace in conflict-affected contexts. It is recommended that environmental safety must maintain high standards, mainly when dealing with weapons and

explosives. Strengthening collaboration with other sectors overlapping with the organization's work, such as economic recovery and protection sectors, is observed to show advantageous results.

According to Respondent 1 (28.03.2023), in areas where mine action operations combined their efforts with other sectors when a disaster occurred, such as in the case of an earthquake in Afghanistan, many lives were saved, and livelihoods were adequately restored, which ensured longer-term development. However, as Respondent 1 elaborated, "This is highly context-dependent on the guidelines of mine action authorities in each countr", which was also observed in CIF's (2021) Climate Resilience initiatives. Integrated strategies, peacebuilding efforts, and conflict resolution initiatives are weakened in contexts such as Yemen in light of its fragile governance. Further enforcing the need for initiatives that call for collective action to protect vulnerable populations, as demonstrated by the ICRC & IFRC efforts (2023), to strengthen the role of local leadership and national authorities. Nonetheless, these situations must be delivered through innovative resolutions incorporating climate-friendly technologies into the sector. Emphasizing the importance of an interdisciplinary framework in such contexts. As pointed out by Bhander, et al., (2003), it addresses the technical aspects of the process while providing better alternatives for sustainably developed technologies.

4.2 Capacity Building

Building capacity through understanding the interplay between mine action, climate change, and conflict dynamics among field staff is crucial for more effective responses in complex situations. Respondent 5 (13.04.2023) argues that such knowledge can extend the local capacities through the informed knowledge that can be shared, strengthening local engagement and feedback. This can be observed in higher reporting incidents and greater response to activities such as risk education.

Deepening community engagement in the mine clearance process fosters practices that support development. While expanding the scope of mine action organizations to include services like economic recovery and shelter could aid community development and recovery. This can support mine action's utility to promote capacity building and local ownership and participate in the broader social, economic, and political progress (Ditel, 2022). This is further supported by Respondent 3 (09.04.2023), who concurred that capacity building in local communities ensures long-term independent sustainability.

However, investments in training are required for grasping new concepts, like the Triple Nexus approach, and applying it to the field. Nonetheless, despite the efforts of (UNMAS, 2021) and other

organizations to operationalize the Nexus, it proves difficult to apply in specific contexts, for example, when conflict is still ongoing. “I don’t think anybody in Yemen is doing a good job of applying the Nexus in the mine action sector. It’s very unfortunate. We need to fix it. Again, just because we’ve only really just started on any kind of actual technical work, we’re only just now starting to have conversations about what it would look like if we integrate it now that we are able to do stuff, and how do we integrate these other concerns now that we’re able to do anything because there was kind of a stall period of several years where there were mine action actors here, but not actually doing any Explosive Ordnance Disposal (EOD) or Manual Mine Clearance. These questions were kind of moot until just now. So, in terms of development, it kind of just comes back to doing joint assessments of sites or integrating questions from other sectors into our assessments” Respondent 7 (17.04.2023). Such statement supports the IPCC (2018) recommendations, which identified Environmental Science and Climate Studies as the fundamental guide for the complex dynamics of climate change, its causes, impacts, and potential solutions. The findings showcased the lack of scientifically-backed impact assessments and the need for standardized tools to measure economic impact and environmental considerations. Therefore, stressing the need for partnerships that are not exclusively developmental and encourage partnerships with academic institutions and research centers that can deepen sectoral knowledge. Further supporting (Repko & Szostak, 2016) argument, leading to more enlightened policies and strategies to confront the multidimensional crisis in Yemen.

4.2.1 Governance, Resources Management & Infrastructure

According to findings, Yemen suffers from “an absence of an environmental protection authority and indifference towards environmental impacts of demining, which impact the environment in multiple ways” Respondent 9 (02.05.2023). And while organizations like the Yemen Mine Action Center (YEMAC) receive considerable international funding, others, like The National Water Resource Authority (NWRA), do not. Respondent 3 (09.04.2023) points out that despite NWRA being the main regulatory body for water under Yemen’s Ministry of Water and Environment, it remains critically underfunded. Which “enables the conflict parties to exploit water access as a negotiation tool, reportedly” (Respondent 9, 02.05.2023).

Misunderstandings around water resource management can exacerbate conflicts and delay development (Stern, 2006). As observed with the SFO Safer oil supertanker in the Red Sea, and a misinterpreted drought incident in Taiz, reported by Respondent 9 (02.05.2023). Therefore, strengthening transparency around water management and developing equitable water access

mechanisms is recommended for conflict resolution (Adger, et al., 2005). Additionally, the study addressed agricultural issues, as the conflict and climate changes have caused farmers to abandon their lands, according to the World Bank (2020), which in turn lessens their ability to absorb water, leading to increased flash floods which have been growing dramatically in the last two years (Respondent 10, 03.05.2023). Moreover, the ongoing war has reduced the water supply and intensified pollution and cholera outbreaks supporting the (WFP, 2023) report.

For Respondent 10 (03.05.2023), the dire need for improved water collection and management infrastructure is apparent in everyday life in Yemen. Traditional, cost-effective structures like small dams and decentralized water systems could manage and distribute water resources more effectively to support an infrastructure that is poor and inadequate (ICRC, 2020). Hence, more attention must be given to the mine action programs tailored to local dynamics and capacities, considering the prevalence of resource conflicts, notably on water (United Nations, 2023). According to Respondent 10 (03.05.2023), who firmly believes that acknowledging and navigating the socio-political realities in conflict-affected states is potentially more conducive than strictly following global standards. As well as collaborating with local institutions such as NWRA and promoting effective resource management in Yemen.

However, as reported by Respondent 7 (17.04.2023), a recent development warrants further investigation. The United Nations Development Programme (UNDP), the international assigned body for mine action operations in Yemen, recently informed[3] the local Mine Action Authority that they are pulling out their support due to funding constraints and other unspecified reasons. The implications and repercussions of this situation for Yemen's mine action sector remain unclear. This abrupt withdrawal of support from UNDP's Project Emergency Management Program prompts stakeholders to reconsider their operational models in mine action, particularly in Yemen. Donors such as the State Department must understand the linkages between mine action, environmental considerations, and climate change, supporting integrated programs that tackle these intertwined issues.

4.2.2 Gender, Displacement, and IDPs

The study showed that collaboration between policymakers, NGOs, and international donors could streamline these processes and increase efficiency (Respondent 4, 10.04.2023). It's essential to be

[3] Upon further investigation, UNDP informed the Mine Action National Authority in Yemen in April 2023. And reportedly to pull the plug off the program in two months' notice, in June 2023.

mindful of gender dynamics when designing and implementing programs (UN, 2019). Establishing safe and accessible water sources within communities can mitigate risks for women and girls who are often responsible for fetching water (IOM, 2022).

Gender roles and societal norms significantly influence women's participation in mine action. "Where gender dynamics are quite difficult because of the culture and society's limitations on women. Specifically, it restricts the role and function of women in society. There's a GMAP, the Gender Mine Action Program, which has a very thorough booklet on how we try as a sector to bring this gender balance and bring the women participation into mine action, especially in countries like Yemen" Respondent 4 (10.04.2023). Showcasing the importance of The Gender Mine Action Program (IACG-MA, 2010) in balancing these dynamics and facilitating women's involvement.

Furthermore, displaced women and children not only carry the burden of finding and fetching water but being away from their familiar habitat can exacerbate the risk of being killed or injured by landmines and ERW, says Respondent 9 (02.05.2023). The potential impact of climate change on displacement is a subject of significant discussion, as changing climate conditions could disrupt farming and livelihoods, likely shifting demographics. The interconnection between climate change, durable solutions, and mine action emerges as a key area of exploration, particularly given the interests of donors and NGOs (Anon., 2018).

Mine action, when integrated with climate considerations, can help prevent displacement and contribute to sustainable solutions for displacement. Such an integrated approach could attract donor interest and provide a more comprehensive response to displacement issues. There seem to be a growing interest among organizations to focus on displacement issues, incorporating climate and conflict resilience as strategic priorities. These entities are working to integrate and coordinate their activities in various areas, aiming to create a holistic, multi-faceted approach to complex issues.

5 Limitations

The first limitation of this study relates to methodological generalizability. Given the scope of the topic and the limited number of personal accounts, it is essential to note that these accounts may not be representative of the entire sector. However, they can serve as valuable contributions to future research, providing insights into field experiences that reflect the realities of implementation in contexts like Yemen. Furthermore, the method primarily draws on interpretations of narratives and anecdotes, thus further studies are required. In addition, a limited body of literature exclusively discusses the intersection of climate and mine action. Most of the available literature focuses on

environmental factors but not the climate exclusively, as mine action is conventionally seen as an emergent response to man-made disasters.

It is important to acknowledge that this study did not include perspectives from government officials and national authorities. Despite attempts to engage with these stakeholders, obtaining information on political accountability, governance, and power dynamics proves challenging in Yemen due to the political sensitivities.

6 Discussion and Concluding Remarks

This paper was conducted qualitatively, including interviews and a literature review that included strategies, frameworks, articles, and scientific papers, which revealed consistent findings. The theoretical frameworks proposed in this study further supported the results and showed promise. The 'Triple Nexus' proved to be already in practice; however, it is weakened due to challenges of operationalizing, hence further favoring the incorporation of the Theory of Change and Interdisciplinary Theory, which can further strengthen and complement the feasibility of HDP Nexus.

Yemen's precarious position stems from its intersection between climate change and mine action with added geopolitical complexities. This situation is aggravated by political instability, ongoing conflict, and economic challenges hampering efforts to address these issues. The results show that due to Yemen's intricate economic, political, and social issues, it has become even more crucial for mine action efforts to cope with climate change. This requires a careful and proactive approach that involves incorporating assessments of climate-related risks throughout all stages of mine action initiatives – from the planning phases up until monitoring the programs. Understanding how the potential impacts of mine action activities are intertwined with those brought about by changes in weather patterns enables the development of comprehensive risk management strategies. Moreover, a critical aspect of progressing in this field involves leveraging innovative technology. This can mitigate the challenges brought by the changes in landscapes due to climate change, which are increasingly moving landmines and ERW.

An integrated solution must consider conflict-sensitive measures to tackle the issues caused by climate change and contamination, to support the complex situation in Yemen. Thus, the advanced mine action approach is also recommended to incorporate the development of resilience as an essential element. One way to achieve this is by adaptability to climate change strategies and equipping communities with skills in mine risk education. This can enable the communities to adjust to living around the contamination and create a sustainable ecosystem that can assist them in coping

with the effects on their environment. By bringing together stakeholders working on mine action and climate change, it is possible to achieve better results.

Additionally, collaborations between mine action groups and environmental organizations can help prevent mine action from worsening the effects of climate vulnerabilities. These partnerships may reveal possibilities for supporting both adaptation and mitigation strategies related to climate. To effectively combine mine action and climate mitigation, it is crucial to implement environmentally friendly practices throughout mine action operations. One approach may be to include the scientific sector, potentially providing valuable strategies and tools that can replace operations machinery and practices. These options, however, should be explored thoroughly for their potential to reduce the environmental impact associated with mine operations, including the destruction of hazardous materials.

In addition, when planning for climate adaptation in mine action initiatives, it is vital to consider the predicted changes in weather patterns. For instance, if an area is projected to experience more frequent flooding due to climate change, clearing mines from that location should be prioritized since this could prevent further displacement of mines and ultimately reduce the risks associated with them. As well as in the cause of droughts so that displaced populations can have safer access to water sources. To incorporate the effects of climate change into Yemen's mine action operations, it is essential to thoroughly comprehend the interconnection between these two fields and devise comprehensive solutions, preferably with scientific tools and guidance. This would call for innovative thinking, a dedicated drive towards sustainable methods, and a willingness to collaborate across different sectors.

Accordingly, the connection between mine action and climate change is also highlighted through the urgency for eco-friendly and long-lasting methods in mine-related initiatives. Such practices may encompass proper disposal of waste materials and carefully managing dangerous substances to prevent further exacerbations of global climatic changes. In particular, in conflict areas like Yemen, the impact of climate change on water sources coupled with landmine contamination could spur severe repercussions on populations that reinforce the significance of sustainable institutional frameworks for managing mines effectively. Effective strategies should be further advocated and developed to mitigate natural disasters resulting from unpredictable climate patterns.

Governance, resource management, and infrastructure development, specifically on water, are crucial aspects of this discussion. Inefficient handling of water resources can intensify conflicts that require mere access to water to promote peace. Additionally, relevant factors include agricultural concerns, establishing decentralized systems for better water distribution, and constructing water points.

However, the unexpected termination of UNDP's Project Emergency Management Program in Yemen due to financial limitations could lead to a potential looming crisis, necessitating a reassessment of the operational models in the mine action sector.

The effects of gender dynamics on internally displaced individuals pose a significant risk to their survival. With traditional societal expectations and the roles they play, it considerably affects women's participation in mine action. Consequently, implementing more initiatives such as the Gender Mine Action Program becomes crucial for promoting gender equality and supporting women's involvement in these activities. Additionally, the impact of climate change on farming and livelihoods could lead to increased displacement. This highlights the importance of addressing these issues by implementing a comprehensive plan considering environmental factors. Such an approach should include a mine action strategy to mitigate the effects of climate change, prevent unnecessary displacement, and provide sustainable solutions for those affected. The results highlight the complex issues surrounding mine action in areas like Yemen that are affected by conflicts and are environmentally fragile. It stresses the importance of enhancing capacities, implementing effective governance, managing resources efficiently, aiding in developing critical infrastructure, and considering gender-based perspectives and displacement concerns while formulating any strategy. Moreover, the frequency and severity of natural disasters caused by extreme weather patterns that result in displacement and the damage of critical infrastructure hampers demining efforts significantly.

A comprehensive and interconnected approach is essential in tackling the interrelated issues of climate change, mine action, and how they affect a country like Yemen. Climate change affects each nation uniquely with varying degrees of intensity, making it a global challenge to confront. However, despite having intrinsic low carbon emissions, it remains prone to the effects of climate change, and conflicts only exacerbate it further and distract any potential for development. This worsens the challenges of floods, water shortages, food insecurity, and health hazards. Therefore, cooperative efforts between nations are crucial; international collaboration is needed to address climate change collectively and extend support towards mine action programs operating in areas affected by conflict.

Ensuring the global community's effective participation in addressing climate change challenges requires more than just financial support through increased funding. It necessitates sharing knowledge and skills and strengthening capacity building among affected societies. Additionally, a comprehensive understanding of local contexts is essential when developing intervention strategies,

which must also involve active engagement from local communities throughout all stages of implementation.

The impact of changing weather patterns and increased natural disasters may displace mines and ERWs, increasing their danger level and creating complications during clearance efforts. Additionally, the clearance process involves activities like destruction or elimination, which may contribute to greenhouse gas emissions resulting in further concerns for global warming. Mitigating the dangers of mines and explosive remnants of war proves crucial to mine action in Yemen. As it struggles with the severity of these hazardous remnants, which resulted from years of conflict, presenting a severe risk to civilians and vulnerable populations, and obstructing developmental procedures. Mine action is essential to physical security as it creates opportunities for establishing peace, stability, and economic growth in Yemen.

Moreover, there is a need to give more attention to the connection between peacebuilding and climate action. Climate change adaptation and mitigation efforts should be planned while considering their potential to promote peace, and similarly, accounting for steps to build sustainable peace that consider the consequences of climate change. It is crucial to ensure these initiatives are supported by thorough research and continuous monitoring. This way, we can measure their efficiency, adjust them when needed and gain insights from favorable outcomes and setbacks — reflected in the 'triple nexus' approach, which combines mine action with development and peace. Utilizing the ToC to tackle immediate contamination concerns while addressing long-term conflict prevention and resolution is suggested. This integrated programming can aid in transitioning from short-term relief efforts to sustainable development. However, the integration may face obstacles such as bureaucratic barriers and lack of transparency, particularly in Yemen, as results show, highlighting the significance of enforcing laws and urban planning policies to implement this approach better. According to the research, utilizing a multisectoral approach can ease the shift from humanitarian aid toward development and peacebuilding. Through such attempts, the mine action sector can have significant potential to guarantee environmental protection and access to water resources. While in parallel, it can decrease the load on its operations over time. Yet, successfully implementing such cooperative methods relies heavily on contextual factors and could face difficulties, particularly in politically vulnerable countries like Yemen. Henceforth, it is crucial to prioritize collective engagement efforts along with strengthening local leadership to achieve desired outcomes. Albeit, this requires further in-depth studies to determine how to address active peace and development amid political fragility and, in this case, high level of bureaucracy.

A prevalent theme in this study highlighted the importance of enhancing capacities for mine action operations in the field, especially regarding conflict dynamics and climate change.

By translating the strategies from a political language made by policymakers, field officers will better understand the application of these policy-level strategies. Hence, making it possible to strengthen and influence local capabilities, foster community participation, and promote adequate responses such as risk education. However, implementing these strategies requires investments in training and openness to new concepts and learning, like the 'triple nexus' approach. However, an emergence in environmental science and climate studies can facilitate understanding and inclusion while addressing these issues effectively and at the roots. This multidimensional approach to peace, humanitarian, and development efforts can prove challenging to operationalize in specific contexts, highlighting the need for continued research, development, and adaptation.

In conclusion, addressing the complex economic, political, and social challenges in countries like Yemen requires a comprehensive and intentional approach. One that looks at root causes when addressing change and development through adaptation, peacebuilding, and durable solutions. The interrelated effects of climate change and conflict must be considered for developing effective humanitarian interventions and lasting recovery. While implementing multisectoral approaches can promote safer, sustainable communities and lasting peace through enhanced community participation and strengthened local leadership and international cooperation to achieve better outcomes.

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Appendices

Appendix 1: List of Interviewees

Name	Date of Interview	Background	Sector	Country of Work
Respondent 1	28.03.2023	Programme & Operations Coordinator	Humanitarian Disarmament and Peacebuilding	Denmark
Respondent 2	31.03.2023	Regional Coordinator in Europe	Humanitarian Disarmament and Peacebuilding	Denmark
Respondent 3	09.04.2023	Researcher	Environmental Management	Yemen
Respondent 4	10.04.2023	Regional Coordinator in the Middle East	Humanitarian Disarmament and Peacebuilding	Yemen
Respondent 5	13.04.2023	(This section is hidden)[4]	Humanitarian Disarmament and Peacebuilding	Yemen
Respondent 6	14.04.2023	Humanitarian Mine Action Manager	Humanitarian Disarmament and Peacebuilding	Yemen
Respondent 7	17.04.2023	Country Coordinator	Humanitarian Disarmament and Peacebuilding	Yemen
Respondent 8	19.04.2023	Head of the Department and Global Co-coordinator for the Area of Responsibility	Humanitarian Disarmament and Peacebuilding	Denmark
Respondent 9	02.05.2023	Specialist	Economic Recovery in the Green Sector	Yemen
Respondent 10	03.05.2023	Specialist	Water, Sanitation & Hygiene (WASH)	Yemen

[4] Hidden, in accordance with the ethical considerations.

Appendix 2: Interview Guide

Pre-interview guidelines:

- All interviewees were notified that the interviews would be recorded, so permission was taken prior to the session. And in the cases where permission was not granted, interviews were not reordered, accordingly.
- All interviewees were given sufficient background about the author as well as the planned topic and aim of this thesis. Further, they were informed that the interviews are conducted for the sole purpose of providing data to support this study and thus will not be used otherwise.

Category 1: General questions about Yemen:

1. How is Yemen vulnerable to climate-related impacts, and what are the projected climate changes for Yemen in the coming years on Yemen's natural resources, economy, and people's livelihoods?
2. What are the challenges faced by rural communities in Yemen, and how can a proactive approach to climate change in Yemen reduce their vulnerability and build a more resilient and sustainable future?

Category 2: Questions relating to both mine action and water:

1. How can the mine action and conflict mitigation sector contribute to the environment and climate developmental process in Yemen, especially in the context of water shortage?
2. What are the constraints and entry points for policymakers, mine action organizations, UN agencies, and donor partners in addressing the water crisis in Yemen, and what recommendations can be made to improve the situation?
3. In your experience, what are the most pressing challenges facing humanitarian stakeholders in Yemen in terms of addressing the intersection of mine action and water scarcity?
4. How have gender dynamics played a role in shaping the impacts of conflict and climate change on water availability and mine action efforts in Yemen?

Category 3: Questions related solely to mine action:

1. What are the shortcomings within the mine action sector in terms of mitigating the effects of climate change, and what could be done to address them?

2. How has the mine action sector contributed to conflict mitigation and environmental protection in Yemen, and what are the potential negative impacts of their activities?

3. How can the mine action sector be better integrated with broader humanitarian, peace, and development efforts in Yemen to maximize impact and minimize negative consequences?

4. In what ways can mine action organizations contribute to conflict mitigation and climate developmental processes in Yemen?

5. What negative impacts can clearance methods used by mine action organizations potentially have on the environment, and how can these organizations adopt mitigation measures to ensure they do no harm?

6. How effective have the five pillars of mine action (Clearance, Risk Education, Victim Assistance, Advocacy, and Stockpile Destruction) been in Yemen, and what steps can be taken to improve their efficacy?

7. What steps do you think could be taken to better integrate climate change considerations into mine action efforts in Yemen, and how might this contribute to long-term development goals?

8. What role do you see for local communities and civil society actors in shaping responses to the intersection of mine action, conflict, and climate change in Yemen?

Category 4: Questions related solely to water and the environment:

1. How can targeted research be conducted to create a model specific to the type and severity of the water crisis in Yemen, as well as the intersectionality of socio-economic restraints and challenges?

2. What are some of the most effective strategies for addressing the water crisis in Yemen and ensuring sustainable water use in the country?

3. How can the international community support Yemen in addressing its water crisis?

4. What are the long-term implications of the water crisis on the health, economy, and social fabric of Yemen?

5. How can Yemen's government and international aid organizations work together to prevent a humanitarian disaster caused by the water crisis?

6. What are the challenges faced by Yemen in implementing sustainable water management practices?

7. How can technology be leveraged to mitigate the impact of the water crisis in Yemen?

8. How can the global community address the root causes of the water crisis, such as climate change and unsustainable resource use?

9. How can international organizations work with local stakeholders to develop sustainable and equitable water management solutions in Yemen?

10. How have conflict and climate change impacted water availability in Yemen, and what are the implications for rural communities who rely on agriculture and pastoralism for their livelihoods?
11. According to you, what are the most important environmental challenges in Yemen at the present time, and how has the conflict exacerbated them?

Category 5: Questions for me to reflect on during the interviews:

1. How can targeted research create a model specific to the type and severity of the water crisis, as well as the intersectionality of socio-economic restraints and challenges in Yemen?
2. What insights can be gained from leading organizations in mine action, their projects, and outputs in terms of the constraints and categorizations of these efforts?
3. How can the Humanitarian-Development-Peace Nexus approach be used to coherently address people's vulnerability before, during, and after crises, and what challenges does it pose to the status quo of the aid system in Yemen?
4. What potential solutions can be offered to address the complex relationship between mine action and water scarcity in Yemen, and how can semi-structured interviews with key informants be used to provide a good understanding?