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Energy Injustice and Its Role for Environmental Peacebuilding

Evidence from Hadhramawt
Governorate, Yemen

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funded by

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List of Acronyms and Abbreviations

Bcm	billion cubic meters
CO ₂	carbon dioxide
EPA	Environment Protection Authority
MMF	Medical Mercy Foundation
NGO	non-governmental organization
PLC	Presidential Leadership Council

This Report discusses the crucial but understudied impact of oil extraction industries on local communities and the environment in Yemen's Hadhramawt governorate. By combining conceptual approaches of energy justice and the environmental peacebuilding literature, it provides a novel perspective on how environmental pollution via the oil industry in Yemen creates injustices and grievances and might hamper sustainable peace efforts. Using a mixed method approach of both quantitative and qualitative analyses, the empirical assessment in two districts of Hadhramawt governorate, Tarim and Sah, confirms assumptions about widespread and severe oil pollution negatively impacting the local population. Based on a household survey and additional expert interviews, it further describes potential avenues for remediation that offer recommendations for concrete action on environmental peacebuilding strategies.

Introduction

This Report explores the impact of oil extraction in the governorate of Hadhramawt. It focuses on the negative role of the oil industries with regard to environmental degradation and socio-political instability. It shows how acts of oil pollution impact local communities and the environment and exacerbate social tensions. Against this background, it intends to raise awareness about Yemen's environmental stress caused by the oil industry. It further argues that this issue must be adequately addressed as it constitutes a key prerequisite for sustainable peace in the country.

To the best knowledge of the authors, this Report is the first publication that innovatively combines different conceptual considerations as well as providing novel data on oil pollution from the Hadhramawt in Yemen. It offers a conceptual framework that brings together questions of energy justice with aspects of environmental peacebuilding. To date, the literature of energy justice has been established in isolation from broader discussions on environmental conflict and peacebuilding as empirical analyses have mainly focused on cases where military conflicts are absent. If engaged with general conditions related to case studies, advocates of energy justice point to issues such as technological capabilities, industrialization, resource endowments or certain political or cultural norms (Roberts et al. 2018). Building on this approach, this Report's empirical section starts with a broader discussion on the contextual factors of the environmental crisis and its context dependence in Yemen (i.e., oil pollution combined with military conflict). It then zooms in on two districts of Hadhramawt governorate, Tarim and Sah. A final section ends with concluding remarks and recommendations deduced from the theoretical and empirical investigation.

This Report results out of the work of a research consortium between Medical Mercy Foundation (MMF), Ettifag – for Environmental and Agricultural Consultancies and CARPO in the framework of the project ‘Impact of Oil Extraction Industries on Local Communities and the Environment in Hadhramawt, Yemen’. Ettifag, as leading implementing partner, conducted the field research which made this publication possible. The project is funded through the program ‘Conflict, Climate Change and Environment in the Middle East’ of the Robert Bosch Stiftung, which it implements in partnership with Orient Matters and the Arab Reform Initiative.

Conceptual Framework: Energy Injustice and Environmental Peacebuilding

Lately, environmental justice – the idea of “equal protection from burdens, meaningful involvement in decisions, and fair treatment in access to benefits” (Jenkins 2018: 117) – has emerged as a core concept in broader scholarly discussions on climate change and transformation. Especially in the last few years, the concept of environmental justice has diversified by including multiple topics and themes ranging from land grabbing, toxic waste, air/soil/water pollution, health issues, resource management, ecological protection and restoration to environmental activism and social movements. Additionally, the emergence of climate justice (i.e. growing concerns over climate change impacts stimulated by grassroots movements) and energy justice as separate concepts, while sharing the same ontological assumptions, facilitated the proliferation of the original environmental justice approach. Despite this ‘conceptual stretching’,¹ the proliferation provides a chance to decompartmentalize the complex and multifaceted environmental justice concept (Bickerstaff, Walker & Bulkeley 2013: 2). In this sense, energy justice includes all efforts and measures aiming to provide “all individuals, across all areas, with safe, affordable and sustainable energy” (McCauley et al. 2013: 108). In other words, energy injustice focuses on energy systems, while environmental and climate injustice take a much broader perspective that includes both energy and non-energy drivers of injustice. In fact, as Kirsten Jenkins and colleagues point out: “Energy is a new centre of gravity for justice scholars” (Jenkins et al. 2016: 175).

¹ Numerous other interpretations have been developed utilizing other concepts and approaches, including prohibitive and affirmative principles (Sovacool et al. 2013), notions of restorative justice (Heffron & McCauley 2017), spatial justice (Bouzarovski & Simcock 2017), and even calls to combine climate, environmental and energy justice under the banner of ‘just transitions’ (McCauley & Heffron 2018). These variations demonstrate a significant degree of conceptual growth of the term (as also discussed by Jenkins et al. 2020).

Within energy-justice frameworks, scholars have of late almost exclusively focused on socio-economic and political repercussions of a low-carbon transition (Bell 2017; Yenneti, Day & Golubchikov 2016; Sovacool et al. 2020; Brock, Sovacool & Hook 2021; Hoffman 2017). Such a narrow focus increasingly overlooks the dynamics of energy injustice linked to fossil fuel extraction and production – originally a core theme of this field of literature (Agyeman, Bullard & Evans 2002: 81–82). Since conventional energy will remain a necessary element in our energy systems for the time being, it is important not to lose focus on the social and environmental violations it constantly produces. Accordingly, Healy and colleagues (2019) note hidden and distant injustices throughout the whole carbon supply chain. This includes, among others, aspects such as forcible displacement and livelihood disruptions, human rights violations, public health impacts, fugitive carbon emissions, disproportionate environmental contamination or hazardous waste risks arising in upstream (exploration and production), midstream (processing and transport) and downstream (refining, marketing, distribution and disposal) businesses (ibid: 221). For Healy and colleagues, our current energy system reveals “place-specific political structures and power relations” that are disproportionately affecting ethnic minorities as well as poor and marginalized people (ibid: 230; Agyeman, Bullard & Evans 2002: 78).

These unequal power relations are a core theme of the young but nascent field of environmental peacebuilding. Building upon theoretical disciplines of international relations, peace and conflict studies as well as concepts such as ‘human security’, environmental peacebuilding engages with both the rise of environmental risks of conflict and efforts towards peace (Ide et al. 2021: 1). A recent and inclusive understanding of environmental peacebuilding thus describes all “approaches and pathways by which the management of environmental issues is integrated in and can support conflict prevention, mitigation, resolution and recovery” (ibid.: 2–3). Given its broad spectrum, a sub-differentiation between “cooperation perspective and resource risk perspective” seems appropriate (Krampe, Hegazi & VanDeveer 2021). Numerous studies discuss the reciprocal relationship of how environmental harm can lead to conflict, but research has now also expanded to include how violence and conflict increase environmental degradation by looking at resource management (e.g. freshwater scarcity, food insecurity), weather extremes and natural hazards, climate migration or the role of the environment in peace negotiations (Ide et al. 2021; Scheffran et al. 2012). Yet, somehow surprisingly, pollution as a form of “gradual yet powerful form of violence” (Fenton 2021: 3) has not been adequately addressed as a trajectory for continuing social grievances and tensions.

Against this backdrop, the following empirical assessment of two case studies in Yemen is based on an integration of both fields of literature, namely energy

injustice and environmental peacebuilding. This is for several reasons: First, although they have different backgrounds, the theoretical avenues of energy injustice and environmental peacebuilding share similarities and even complement each other. Instead of further proliferation of both broad fields, we focus on energy injustice as one specific objective, namely unjust practices surrounding energy systems, and take a specific resource risk perspective of environmental peacebuilding (Dresse et al. 2019: 110; Krampe, Hegazi & Van-Deveer 2021). Second, the more practically oriented approach of environmental peacebuilding can help overcome scholarly concerns that research insights in injustice literature too often fail to translate into policy formulation and decision-making recommendations (Heffron, McCauley & Sovacool 2015; Jenkins 2018). Third, while research on environmental conflict and peacebuilding in Yemen is prospering (Sowers & Weinthal 2021; Lackner 2019a; Al-Mowafak 2021; Bilkis & Zumbrägel 2022; Al-Akwa & Zumbrägel 2021), systematic and in-depth analyses on energy injustice in the country have not been conducted. The following empirical analysis builds upon this conceptual framework. The chapters are organized along three foci, namely: (a) the various sources of injustice; (b) the involved actors; and (c) an evaluation of potential strategies for remediation (see similar: Jenkins et al. 2016). Before that, however, a few words on methodology as well as a broader contextualization of Yemen's energy economy is indispensable.

Methodological Approach

This Report is based on a mixed-method approach that includes quantitative natural sciences and qualitative social science assessments. Accordingly, a study was conducted from May 2022 through December 2022 to assess the level of contaminants in two targeted communities in the Sah and Tarim districts in Hadhramawt governorate.² Nearly 70 percent of respondents of Tarim and Sah live less than 5 km away from the oil industry production location, while the remaining percent live within 10 km.

The objective of the study was to identify the source and levels of those contaminants and how they affect the surrounding community. Despite

² During the inception workshop, the local authority and participants suggested to target these two districts as well as to focus on two specific sub-districts, namely Mashgha and Nismah villages, as they are close to the oil field areas. The criteria behind the selection of these areas is that their location is based nearby oil company sites, agricultural lands and drinking wells that are potentially contaminated and there is interest to know the source of pollutants.

challenges and high risks of conducting analyses on the ground due to a high level of insecurity and sometimes unclear local competences of authorities, the technical team of Ettifag, in collaboration with MMF, was able to extract soil, water and plant samples from the two areas. The soil and water analyses showed low to medium levels of iron, copper, zinc and lead, and a slightly high manganese concentration. Regarding analyses of plants (maize and lintel), all elements were within normal standards, except magnesium, which was high in maize plants (over 1.2 ppm). Due to limited tools and lab technologies as well as the fact that contaminants tend to be washed downstream during rainy season, the random sample analyses led to inconclusive results. In addition, further qualitative approaches were conducted through a household survey (100 participants); six focus group discussions; and 30 key informant interviews during September and November 2022. Prior to the field research, the field team was trained on data collection techniques and using the Kobo toolbox,³ risk mitigation, data entry and cleaning. Targeted stakeholders included representatives from offices of the national government (e.g. Ministries of Culture or Commerce), a number of local authorities, as well as the education and health sectors.

Yemen's Political Economy and Environmental Crisis

The ongoing war, now exceeding eight years, has vastly hit Yemen's economy and infrastructure. According to the United Nations, over 150,000 people have been killed as a direct result of the war in Yemen. A further 227,000 people have died due to ongoing famine and lack of healthcare facilities secondary to the war (UNDP 2021). Additionally, many more have lost their property and suffer from the deteriorated public services. Conflicts over water resources and income opportunities are a daily reality for millions of Yemenis. The country's economy is largely rural based with around 70 percent of Yemenis living in non-urban areas, of which 55 percent work in the agricultural sector (Lackner 2019b). Modern industrial sectors are only nominally developed. In the mid-1980s, small amounts of oil were discovered in Marib, followed by the discoveries in the 1990s of larger amounts in an area northeast of al-Mukalla in Hadhramawt. Exporting around 540,000 barrels per day, Yemen's oil production peaked in 2003 and then gradually declined (Burrows 2014).⁴

³ A software used to collect and manage data for surveys, monitoring, evaluation and research.

⁴ The exact amount of oil resources are not made public and remain a subject of speculation.

In 2014, the country produced an estimated 167,000 barrels per day; however, oil production collapsed in 2015 and did not resume until late summer 2016. Currently, it is estimated that Yemen is able to produce around 50,000–60,000 barrels per day (World Bank 2022: 4). Already from 2005 onwards, the government also “started increasing public ownership of some of the largest oilfields in order to boost earnings from the hydrocarbon sector” (ibid.). Given its high economic value, the government prioritizes and protects a functioning hydrocarbon sector at all costs, as will be shown later in greater detail.

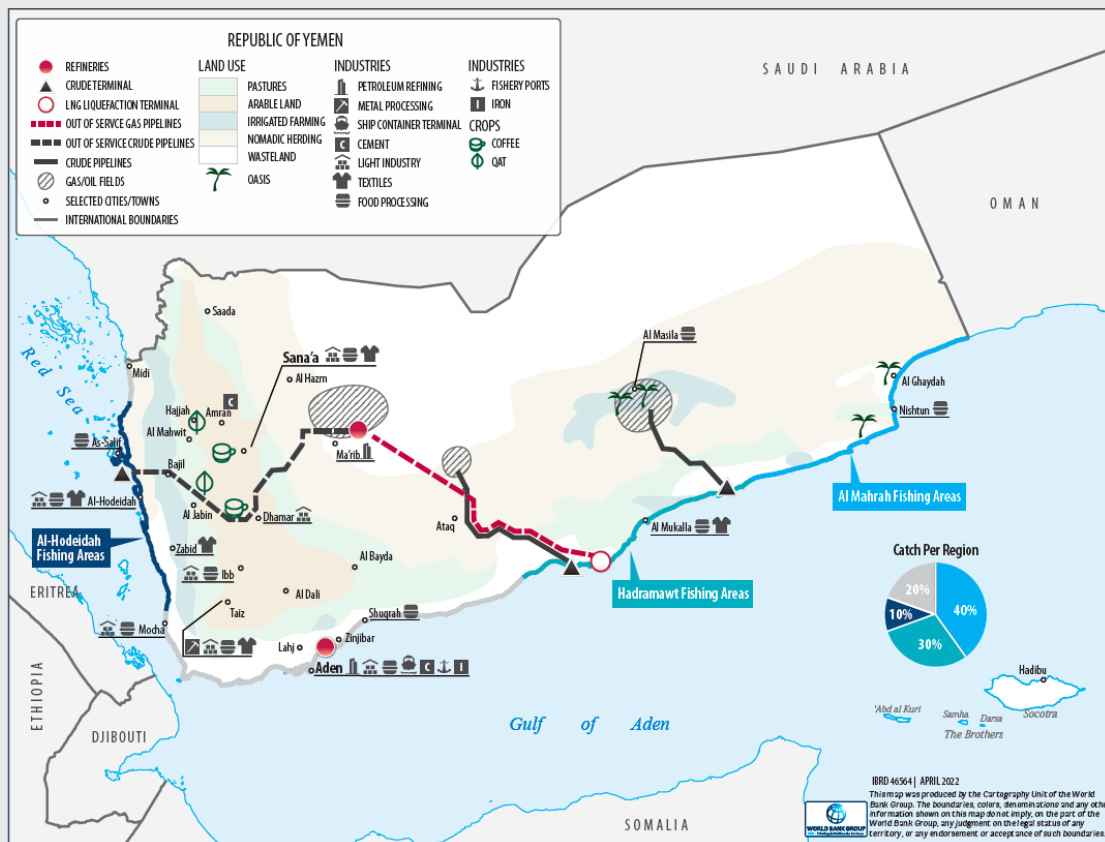


Figure 1: Geographic distribution of economic activity
Source: World Bank 2022: 5

Yemen’s ecosystem is unique: The mountainous heights, eastern plains and coastal regions each have their own climate and ecological conditions. However, the country faces a multitude of environmental crises that includes both slow-onset climate risks (e.g. sea level rise, desertification and soil deterioration) and short-period climate risks (e.g. heat waves, floods or storms). These threats put further strain on an already tense resource situation. Once blessed with more water resources than other surrounding arid countries, the country now faces severe water scarcity, as almost twice as much water is annually consumed than is replenished (Lackner 2021: 15). In 2010, for example, 3.5 billion cubic meters (bcm) were consumed, but only 2.1 bcm replenished. The

1.4 bcm shortfall was pumped from nonrenewable fossil aquifers (World Bank 2014). In 2010, the World Bank estimated that groundwater reserves would be depleted around 2040 (Center for Civilians in Conflict 2022: 1).

Furthermore, there are growing concerns over food insecurity as natural resources and livelihoods are gradually shrinking. Ecological deterioration caused by climate change as well as socio-economic dynamics are key triggers for Yemen's environmental crisis. For instance, growing demand through population growth as well as the introduction of new technology causing an overextraction of groundwater are both as responsible for the water crisis as effects of climate change (Lackner 2021: 7–8). The economic downfall as a consequence of the war and its political economy have accelerated the practice of farmers replacing crops with more water-intensive but lucrative qat trees (Abdullah & Al-Khader 2022). This expansion of qat production has severely increased the problem of water scarcity and has also resulted in growing insecurities over food supplies (Zabara & Zumbärgel 2022: 11; Salisbury 2011: 5). These examples show the complex and intertwined entanglement of climate change, resource scarcity and political economy. In addition, it is well documented how (civil) wars increase environmental harm and have a disastrous impact on public health (Ghobarah, Huth & Russett 2003; for the Yemen case, see: Zabara & Zumbärgel 2022: 13–14). One only has to imagine the disastrous harm of the approximately more than two million landmines that are scattered on farmland or near water resources across the country (Center for Civilians in Conflict 2022: 14–16). Also to consider are the strategic airstrikes and destruction of sensitive human security-related infrastructure. For instance, the main water station of Sa'da City was destroyed in an air strike, leaving more than 200,000 people affected by cut-off water supply (The Water Diplomat 2022). Additionally, hundreds of wells, water pumps and other irrigation systems have been destroyed (Sowers & Weinthal 2021: 169), as have farms, markets and agricultural and irrigation offices (Yemen Data Project 2022). In fact, numerous environmental problems hamper growth in the agricultural sector – soil erosion, sand dune encroachment and deforestation –, but the greatest problem by far is the scarcity of water. Today, due to the pressure on access to natural resources (most critically groundwater and land), few rural households can survive on agriculture alone (Al-Wadaey, Bamatraf & Mukred 2014).

A major topic that has not gained much public and scholarly attention in Yemen – with the notable exception of Fararah & Khateeb (2018), Altamimi, Nor & Hassan (2019), al-Eryani (2020) and Müller (2023) – is the continued environmental pollution from oil extraction. There are mainly oral accounts about severe contamination by the oil companies in the oil-producing governorates

Hadhramawt, Shabwa and Marib. Without any environmental regulations and standards, negligent practices including widespread gas flaring and reinjecting toxic chemicals underground to drill more oil are widely implemented (Fararah & Khateeb 2018). At the same time, reports over spreading diseases and health issues have increased among local communities but have remained largely unheard (Lackner 2021: 8–9; Fararah & Khateeb 2018). As Helen Lackner (2021) notes from several field trips in these governorates, people were unable to address their issues in the dysfunctional Yemeni legal system as they often lack specialized legal counselling (especially in contrast to the companies) and are unable to provide proof over the conducted environmental harm as no data is available (ibid: 10).

Impact of the Oil Extraction Industries in Hadhramawt

Of all regions in Yemen, the eastern Hadhramawt governorate is the largest. It covers about 30 percent of the whole area of Yemen and extends northwards deep into the Empty Quarter (*Rub' al-Khali*) and south to the coastal areas. It is organized into 13 directorates in Wadi Hadhramawt and the surrounding desert areas as well as 13 directorates in the coastal plain and mountainous regions. The governorate is officially under the authority of the Presidential Leadership Council (PLC) of Yemen, but the overall administrative capacity is rather weak given the fact that many of its districts lie in remote and inaccessible regions. More recently, Hadhramawt has seen increasing political and military tensions between various parties to the conflict and their respective regional allies, who seek to establish control over this resource rich governorate.

Oil was discovered during the 1990s and commercially explored by the end of the last century. For instance, oil production started at Masila 14 oil block in 1991 by Canadian Occidental Petroleum (now Canadian Nexen Petroleum). From 1998 onwards, Total E&P Yemen (Total Fina Alf) further exploited a number of oil fields (Al-Eryani 2020:11).⁵ It is estimated that the large Masila oil field alone contributes around 20 percent of revenues (Lackner 2021:22). During the early 2000s, several other oil production blocks were inaugurated. The Yemen concession map consists of 105 blocks (producing, under exploration

⁵ Further information provided by Abdulghani Gaghman.

and open). However, most of the producing blocks are located in two main sedimentary basins; the Marib-Shabwah basin and the Say'un-Masila basin (Altamimi, Nor & Hassan 2019: 926; further: Al-Eryani 2020).

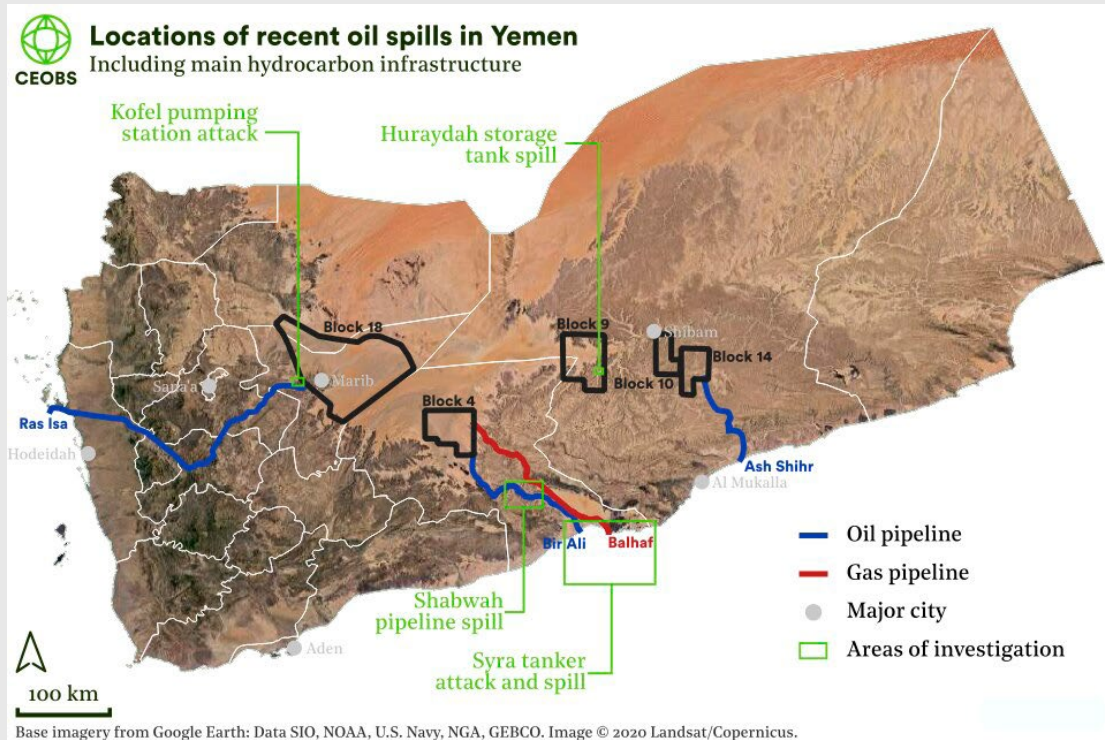


Figure 2: Overview of oil spills in Yemen

Source: CEOBS 2020

Major oil companies that were present in Hadhramawt include Western firms such as Canadian Nexen (Canada) (end of concession in 2011), Total Energies (France) (end of concession in 2013), DNO ASA (Norway) (left Yemen in 2014 due to force majeure) and Calvalley (Canada). State-owned PetroMasila is currently the main company operating all the fields in Hadhramawt except block (9) which operated by Calvalley. PetroMasila also operates the al-Shihr Terminal on the Arabian Sea, to where crude oil, produced from its and other blocks in the region, is transported by a 137 km pipeline for storage and export.⁶

The activities of the oil companies have shaped the geological landscape of the region through the construction of service tracks, pipeline inspections and access roads. Bulldozers have eliminated trees and bushes that previously acted as natural barriers to flooding, which Hadhramawt frequently experiences (Al-Akwa & Zumbrägel 2021: 4). The discovery of oil and its commercial exploitation has also dramatically increased the water crisis in the region since much water is constantly needed along the whole oil value chain

⁶ Information provided by Abdulghani Gaghman.

(Altamimi, Nor & Hassan 2019). Clean water is extracted from the water aquifer while simultaneously waste oil and dispose water is reinjected into the groundwater – mainly into the Harshiyat Sandstone formation, which is a very close to the al-Mukalla formation from which most Hadhramis receive their drinking water (ibid: 926; also: Zabara & Zumbrägel 2022). The fact that the percentage of produced water in comparison to produced oil is above 90 percent makes it an environmental issue as a strict strategy is needed to reinject or dispose of this water or treat it chemically. The produced water contains soluble and non-soluble oil, suspended solids, dissolved solids, and various chemicals used in the production process. Water contaminated with waste oil might contain heavy metals and toxic chemical substances, such as chromium, copper, cadmium, mercury, and lead among others, that cause cancer, kidney disease and liver disease (Altamimi, Nor & Hassan 2019: 927; further: Lackner 2021). Frequent cases of cancer have been reported especially among women and children (Müller 2023). Moreover, many cancer cases have occurred even at far distances from oil production sites, also as a result of climate change: Flash floods, which have lately occurred more frequently in Hadhramawt, mix with waste and byproducts from oil refining and are transported over long distances. This is particularly true for the area of Wadi Hadhramawt, where floods wash out liquids emerging from the drilling and operation equipment. Additionally, waste from the cleaning of the wells usually contaminates water flowing into wadis, thus polluting the soil and groundwater resources and ultimately damaging farmland and vegetation (Al-Akwa & Zumbrägel 2021: 4; Al-Eryani 2020: 13). The petroleum industry has thus had a negative impact on the environment and community. Between 2005 and 2014, in Hadhramawt governorate, the impact of environmental pollutants increased diseases such as cancer, kidney disease, and liver disease (Altamimi, Nor & Hassan 2019; Müller 2023).

Until today, however, research has not adequately addressed these acts of energy injustice in Yemen (exceptions: Fararah & Khateeb 2018; Altamimi, Nor & Hassan 2019; Al-Eryani 2020; Müller 2023). Reasons for this are manifold: Oil operations are highly securitized spatial sites, which are often restricted to outsiders and sometimes even political stakeholders. Furthermore, involved people are often hesitant to share information due to a fear of retaliation. In the words of Yasmeen Al-Eryani: “The oil sector in Yemen is a red line for researchers and anyone else who attempts to investigate its operations” (Al-Eryani 2020: 9). This problem of access leads to a general lack of baseline data beyond the current circumstantial evidence gathered. In the following, we intend to partially fill this research gap by combining quantitative and qualitative approaches to adequately assess the impact of oil extraction industries on local communities and the ecosystem.

The Sources of Energy Injustice in Yemen's Oil Industries

There are several sources of injustice derived from the oil extraction industries in Yemen's Hadhramawt. The different dimensions are related to each other and maybe even have reinforcing effects. For instance, contamination of the ecosystem through oil pollution leads to social injustices such as health problems. This often impacts especially poorer people, who are economically disadvantaged and/or politically marginalized. This entanglement should be noticed when looking at the following dimensions that we have differentiated into (a) environmental destruction, (b) health concerns and (c) socio-economic impact.

Environmental Destruction

Acts of environmental pollution associated with oil production are manifold. Water is an indispensable element in the oil extraction process. So-called produced water is a by-product that is often also present in the reservoirs alongside gas and hydrocarbons. In some cases, it is reinjected into the reservoir to maintain pressure and exploit the remaining oil and gas. In others, it is disposed of or stored in open-air ponds. According to Al-Eryani, there are great doubts that costly and complex technologies of treatment and reuse of produced water following high environmental standards have been applied in the Yemen (ibid: 15). Local teachers and health workers who participated in



Figure 3: Satellite image of apparent holding ponds, Block 51, Hadhramawt
Source: Al-Eryani 2020: 20

the group discussions undertaken as part of this research also affirmed that the produced water has been “discharged into the ground” and also referred to “the holes that are dug in order to collect oil waste, which may leak into the valleys and pastures during the rainy season”.⁷



Figure 4: Zoom in of one holding pond, Block 51, Hadhramawt
Source: Al-Eryani 2020: 21

The produced water from the oil extraction contains high amounts of salinity, hydrocarbon residue and other chemicals. Sometimes the salinity is also visible on the soil as we documented during a visit (see Figure 5).

Through leakages and spillages, petroleum and byproduct from exploitation processes can enter the environment and seriously damage the surrounding ecosystems. According to a farmer during the group discussions: “They [the oil companies] are fully responsible for oil pollution, especially because they do not take any step towards protecting the environment. Oil leakage is also neglected. One of the worst practices during oil extraction is that the well or pipe is injected with a lot of water until the oil reaches the surface, which leads to pollution as it mixes with groundwater”.⁸ An official employee of the Ministry

⁷ Focus group discussions with local teachers and health workers in Sah, October 2022.

⁸ Focus group discussion with farmers, Sah, October 2022.



Figure 5: Salt residues on the soil

Source: Photo taken by the authors, November 2022



Figure 6: Drinking water contaminated with iron

Source: Photos taken by the authors, November 2022

of Culture in the local authority also observed during an expert interview: “We used to drink the water of the public water network directly, without filtering, and the taste was palatable. But now there is a lot of difference in taste and other things. Also, the atmosphere has become ‘greasy’, difficult to breathe in, indicating an accumulation of gases”.⁹ All of the participants of our group

⁹ Interview with a representative from the Ministry of Culture, Sah, 17 November 2022.

discussions mentioned that the water “changes its color from time to time”. During a visit, we noticed what the local population meant (see Figure 6).

Reinjecting produced water in the underground aquifers can lead to soil erosion, toxicity, eutrophication, and acidification. Moreover, it can mix with groundwater aquifers and contaminate non-renewable freshwater resources (Al-Eryani 2020: 23–25). Residues (mostly iron) are often visible in the drinking water and water tanks.



Figure 7: Water tank with iron residues

Source: Photo taken by the authors, November 2022

The flaring of gas that is produced as a byproduct of oil production (associated gas) is another problem. According to a recent study of the World Bank, gas flaring plunged in 2015 when many foreign companies withdrew from Yemen but has recently resumed (World Bank 2022: 16). Gas flaring is a common practice as it is a relatively safe method to dispose of the associated gas. However, it is wasteful and polluting. While there are methods to utilize this gas either by reinjecting it into the reservoirs or using it for gas power generators, which would help to provide the communities with electricity and mitigate its ecological damage, it is again doubtful that these costly practices are implemented in Yemen (Al-Eryani 2020: 28). Gas is also being burned and not further utilized because companies and the government “could not agree

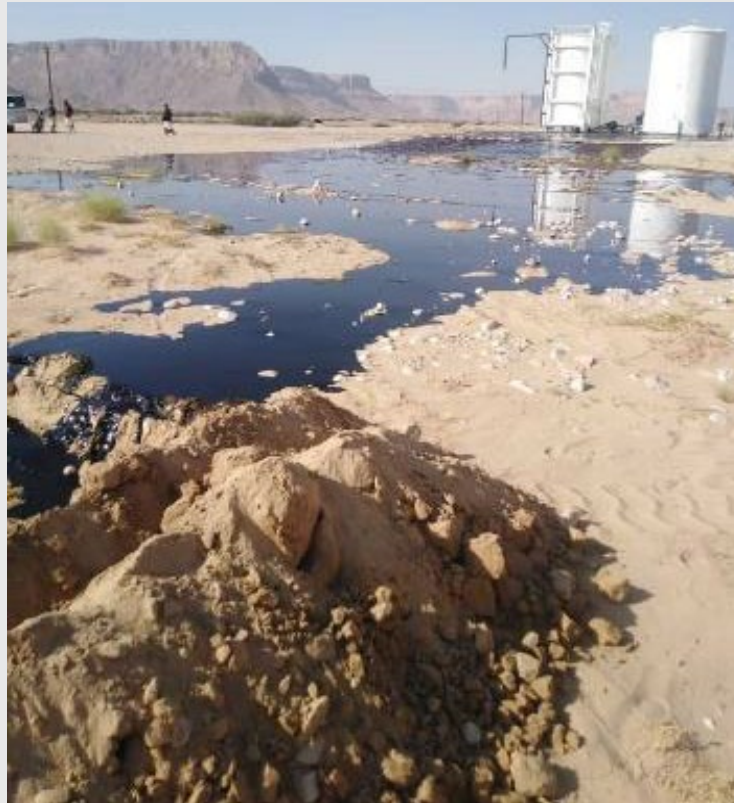


Figure 8: Crude oil spill in Huraydha, Hadhramawt

Source: CEOBS 2020

on how to share the profits” (World Bank 2022: 4). During the group discussions with farmers and workers, a farmer mentioned that he had observed that “there was a gas flame above the mountain overlooking the houses”.¹⁰

Lastly, industrial waste and negligence in disposing industrial waste material (e.g. barrels, chemicals, plastic and metal pieces) also lead to environmental hazards (Al-Eryani 2020: 25). An official from the office of the Cleanliness and Improvement Fund in Say’un agreed with this statement: “The company’s waste contains dangerous pollutants for human and animal health, so it is injected back into the ground, causing it to mix with groundwater, and this in turn leads to the spread of dangerous diseases such as cancer.” He further sees the responsibility lying with the company as they fail “in the process of proper disposal of waste and emissions”.¹¹

The negative effects of the oil extraction industries on the surrounding environment have also been noticed by the majority of respondents of the household survey that was implemented in the two districts of Hadhramawt governorate. A significant portion of respondents mentioned an increase of environmental disasters from the oil industry in the area with deteriorating

¹⁰ Focus group discussion with farmers, Sah, October 2022.

¹¹ Interview with a representative from the Cleanliness and Improvement Fund, Say’un, 16 November 2022.

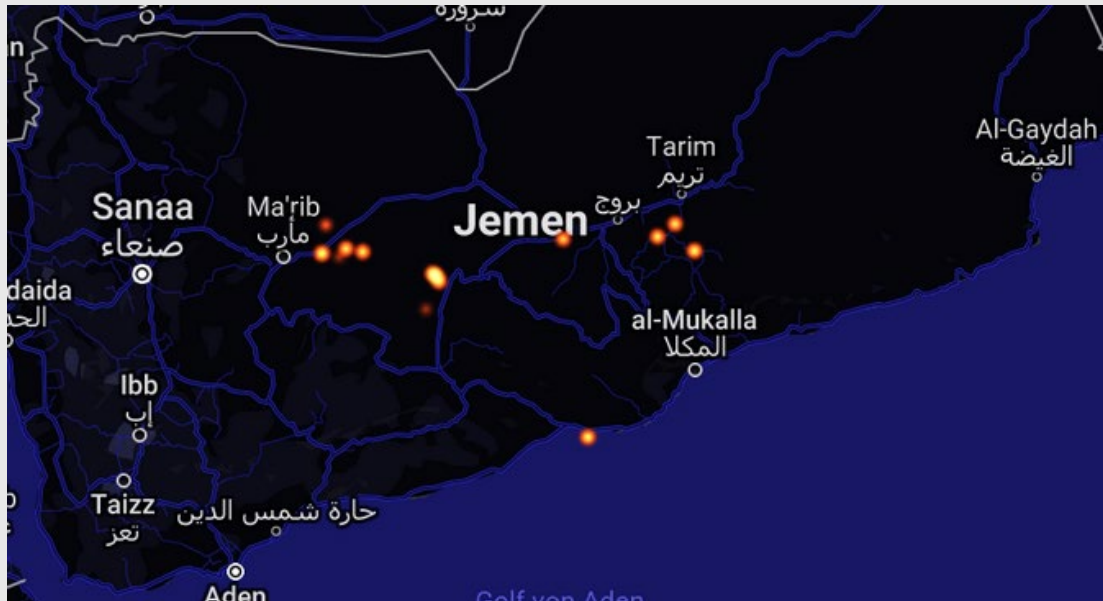


Figure 9: Satellite image of gas flaring in Yemen

Source: Sky Truth: Satellite-detected natural gas flaring, accessed 6 April 2023

effects on agriculture productivity and water resources (see also: Müller 2023). Environmental disasters from the oil industry, observed in the past, now involve about 62 percent, compared to 51 percent of Tarim's and Sah's respondents respectively.

During the field study, some of the interviewees also mentioned the impact on the region's biodiversity. For instance, a government official in the Valley and Desert districts of Hadhramawt mentioned the "impact on wild animals, which are almost non-existent at present".¹² The loss of ibex populations, which were widely spread across Wadi Hadhramawt, is one vivid example. Another interviewee further elaborated: "Hunters used to go to the nearest mountain and find ibex. Now, we do not have any ibex because of the companies."¹³ A government official in the field of education in Say'un summarized the environmental impact of the oil industry in a nutshell: "Oil pollutants are the principal types of pollutants for the environment due to their multiplicity of methods. What is burned pollutes the air, and what is injected into the ground pollutes water and soil."¹⁴ In addition, rising temperatures have affected area beekeepers who used to produce honey in Hadhramawt. Now most of beekeepers have moved outside the hottest areas to ensure good production of honey (Nasher & Al-Muslimi 2023).¹⁵

¹² Interview with a representative from the Office of Civil Service and Insurance, Say'un, 16 November 2022.

¹³ Interview with a representative from the Ministry of Culture, Sah, 17 November 2022.

¹⁴ Interview with a representative from Ministry of Education, Say'un, 24 November 2022.

¹⁵ Ibid.; Interview with a representative from the Ministry of Culture, Sah, 17 November 2022.

Health Concerns

The destruction of the environment caused by the oil industries has a direct influence on the health of people living close to the oil facilities. As Müller and Al-Eryani report in their studies relying on documents and interviews, statistics show “an alarming increase in numbers of patients” who have suffered from different types of cancer such as breast cancer, lymphoma, leukemia or brain cancer (Al-Eryani 2020: 29; Müller 2023). So far, exact data and statistics are hard to receive and often remain classified.¹⁶

Our findings based on different data collections, such as household surveys, focus group discussions and key informant interviews, support this observation. According to the analysis, a very high number of family members suffer from allergies, followed by bronchial distensions and diabetes. Further negative health impacts observed in their families by the respondents to the household survey included anemia (average of 53 percent in both districts), colon and neurological diseases (average of 73 percent in both districts), respiratory diseases (average of 91 percent in both districts) and clots in the heart or brain (average of 57 percent in both districts).

Also, further interviews supported the assumption that there is “no doubt” that the increase of cancer cases is related to the oil companies’ practices because of “the lack of complete combustion of the gas, and the injection of water and its return to the wells.”¹⁷ Accordingly, a representative of the hospital in Sah confirmed: “We are sure that there is air pollution resulting from burning gases to extract oil.” He further referred to “the large number of respiratory diseases in Sah, whether they are young or old, as well as the increase in cases of kidney failure. This was not known or present to us before the companies [came to Hadhramawt].”¹⁸ Similarly, a representative of the office of the Hadhramawt Foundation for Cancer Control agreed that the “presence of pollutants (...) is harmful to health, and the evidence is an increase in the number of cancers, kidney failure and respiratory infections.”¹⁹ In Say’un, a representative from the education sector observed that “recently, cancerous tumors have spread.”²⁰

16 According to one interview partner, asked how the oil companies affect health issues in the region: “In theory it affects, but in practice there are no very accurate measurements to measure the effect.” Another interviewee shared this opinion: “There is no scientific study confirming that the main reason for the spread of diseases, especially cancers, is the oil companies.” Interviews with representatives from the Public Authority for Water Resources, Say’un, 17 November 2022, and the Hadhramawt Foundation for Cancer Control, Say’un, 21 November 2022.

17 Interview with a representative from the Education and Examinations Department, Sah, 17 November 2022.

18 Interview with a representative from Sah Hospital, Sah, 15 November 2022.

19 Interview with a representative from the Hadhramawt Foundation for Cancer Control, Sah, 16 November 2022.

20 Interview with a representative from the Ministry of Education, Say’un, 24 November 2022.

Socio-economic Impact

In addition to environmental and health-related repercussions, there are also socio-economic implications. Although the oil industry is a key part of Yemen's economy, it is the larger rural population that faces negative repercussions in terms of job opportunities. During manifold discussions and interviews it became clear that the local communities initially hoped for economic prosperity with the arrival of the oil companies. However, they soon realized that the presence of the companies brought detriment to their living conditions. As a representative from the Ministry of Culture explained: "People were hoping, with the presence of companies, that there would be a renaissance and development for the region with many services, but we were surprised or shocked by the increase of diseases and lack of services. Our share of oil will be like any other directorate and even less, even though we are in the oil concession area."²¹ A community leader agreed: "We were supposed to be better off and enjoy services instead of the bad situation we are in now."²² It was noted that the presence of the oil companies gave some people jobs in these companies, but only "a very small percentage", the "unemployment among young people remains high."²³ In contrast, a representative of Say'un's Social Affairs and Labor Office emphasized that the oil companies had a "significant impact in creating job opportunities."²⁴

Especially many farmers complained over a loss of farmland due to the widespread pollution of soil, water and air. During a group discussion with farmers, it was mentioned, for instance, that "in the field of agriculture, agricultural products used to be exported abroad. Now, only sheep's clover is grown. If there are varieties, they are limited and are almost sufficient for the farmer's family only."²⁵ Low crop productivity has been mentioned as a key reason for the dire economic situation in Hadhramawt following the arrival of oil extraction activities (Müller 2023; see also figure 12). Accordingly, a representative of the Agriculture and Irrigation Office in Sah summarized that "nothing is positive" about the presence of the oil companies and that this area is "no longer a zone for exporting agricultural crops."²⁶ Similarly, an official of the Education and Examinations Department in Sah expressed that "the extinction of many agricultural crops" has been caused "by the dumping of petro-

²¹ Interview with a representative from the Ministry of Culture, Sah, 17 November 2022.

²² Interview with a community leader, Sah, 20 November 2022.

²³ Interview with a representative from the General Administration of Literacy in the Valley and the Desert, Sah, 17 November 2022.

²⁴ Interview with a representative from the Social Affairs and Labor Office, Say'un, 16 November 2022.

²⁵ Focus group discussion with farmers, Sah, October 2022.

²⁶ Interview with a representative from the Agriculture and Irrigation Office, Sah, 15 November 2022.

leum waste in agricultural lands,”²⁷ while another interviewee referred to the “the disappearance or lack of agricultural crops such as bananas and corn.”²⁸

The results of the household survey also support previous statements. In both villages, a significant majority noticed a change in the economic situation with the advent of the oil companies. About 65 percent of respondents in Tarim and 73 percent of respondents in Sah stated that the presence of the oil industry has negatively affected the economic situation of the local community. Major aspects mentioned included low crop productivity and a general loss of jobs.

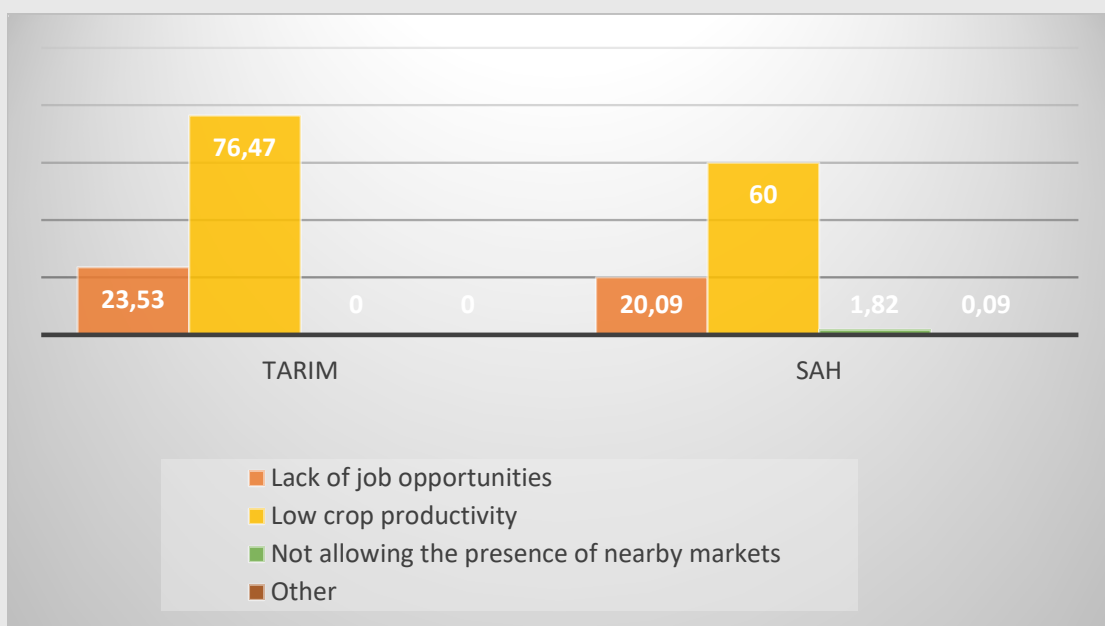


Figure 10: In what way has the presence of oil companies affected the economic situation? (measured in percent)²⁹

The Involved Actors and the Question of Responsibility

When considering the stakeholders directly or indirectly involved in the oil extraction industries in Yemen, one has to differentiate between at least two broad groups. On the one hand, next to the oil industry itself, there are the political and economic elites who are benefitting from the oil business. The close

²⁷ Interview with a representative of the Education and Examinations Department, Sah, 17 November 2022.

²⁸ Interview with a representative from the Ministry of Culture, Sah, 17 November 2022.

²⁹ Household survey, conducted in Sah and Tarim between September and December 2022.

entanglement of the public and private spheres in the oil sector has been noted (Al-Eryani 2020: 20). The oil industry makes up the main source of government revenue, and authority over the sector is extremely centralized and prone to political corruption and patronage networks. Accordingly, as in other neighboring countries, only a small segment of the political and economic elite benefit from the oil industry while a much larger part of the population is negatively affected (Salisbury 2011; Sana'a Center for Strategic Studies 2018; World Bank 2022). Peter Salisbury (2011) notes that, among other benefits, "favored actors in Yemen are allowed access to key sectors of the economy", such as control of oil concessions and oil distribution rights (ibid: 10).

On the other hand, there are the local communities, who are suffering greatly from the negative effects of the industrial activities. As has already been argued in this Report, the most affected and vulnerable people include farmers who own agricultural land. These farmers are no longer able to till their fields due to a degradation of water quality and crop productivity, leading ultimately to a loss of income and livelihoods. Similarly, young women and girls, with their responsibility to obtain water for household use, are another vulnerable group. With a decrease of freshwater resources that are partially contaminated, they need to take longer routes, forcing girls out of school.

The majority of our interviewees agreed that there are barely any communication or coordination mechanisms between these two interest groups. This has also been confirmed by a study by Fahmi Shaaban Fararah and Omar Ali Khateeb, who conducted a survey in Sah district in 2018. Their research finds that the oil companies need to respond more strongly to "the host communities' feedback and grievances" through more transparent communication and the offering of charity activities (Fararah & Khateeb 2018: 47). A few of our interviewees, however, asserted that there is coordination and that "some communities and concession areas have some support, especially in the health, educational, developmental and relief aspect".³⁰

Another central aspect refers to the question of who bears the main responsibility for the deteriorating health, ecological and economic situation. Not surprisingly, the majority of interview partners, who are not involved in the oil extraction business, declared that it lies with the oil companies that are not doing enough to solve the problem.³¹ According to one interviewee, "oil companies are ethically, legally and technically responsible for complying with and fulfilling local and international laws and best practices to protect the

³⁰ Interview with a representative from the Social Affairs and Labor Office, Say'un, 16 November 2022.

³¹ Interview with a representative from the Hadhramawt Foundation for Cancer Control, Say'un, 21 November 2022.

environment and to ensure they cause no harm to the communities around their areas of operation.³²

Another interview partner noted that “companies are trying, but within narrow limits, to contribute to education by distributing school bags as part of a disclaimer of responsibility.”³³ Another interviewee noted the concrete examples of “drilling water wells and building additional classrooms” as “simple interventions” by the oil companies.³⁴ Also, a representative of a hospital in Say’un mentioned “simple projects” of the oil companies in the concession area, but at the same time expressed that “companies must bear their great responsibility and repair the environmental and psychological damage.”³⁵ Other interviewees shared these observations and expressed the wish that the “very limited” help from the oil companies would be expanded, including, for instance, comprehensive hospital treatment of people suffering from cancer at the expense of companies.³⁶ A representative of a local non-governmental organization (NGO) made a number of straightforward suggestions:

“Certainly, it [the oil company] must bear the largest part of the responsibility, as it is the cause of these disasters. It must have plans related to the safety of the environment and reduce the severity of the environmental disasters that it causes, and it must adopt a financial allocation as insurance for any consequences that may be caused by its actions, and it should use this allocation for treatments, if any.”³⁷

A representative of a charity organization in Say’un also sees the main responsibility with the companies but also refers to “the absence of the state, which led to lax commitment of those companies to international standards and regulations.”³⁸ A representative of another local NGO also sees responsibility with the state authorities and referred to the “the lack of public safety standards” to contain the environmental damage.³⁹ Indeed, it was noted that oftentimes even the local authorities barely have jurisdiction. Given the strong

32 Interview with a representative from the Public Authority for Water Resources, Say’un, 17 November 2022.

33 Interview with a representative of a high school, Say’un, 24 November 2022.

34 Interview with a representative from the Development Association, Sah, 16 November 2022.

35 Interview with a representative of a hospital, Say’un, 22 November 2022; interview with a representative of a hospital, Say’un, 21 November 2022.

36 Interview with a representative from the Office of the Ministry of Commerce and Industry, Say’un, 16 November 2022; interview with a community leader, Sah, 20 November 2022.

37 Interview with a representative from the Tamkeen Development Foundation, Say’un, 21 November 2022.

38 Interview with a representative from the Dar al-Shifa Charitable Foundation, Say’un, 23 November 2022.

39 Interview a representative from the Gifted Academy Foundation, Say’un, 23 November 2022.

dominance of the oil industry, even governmental institutions, such as the Environment Protection Authority (EPA), have no access to data of pollutants to inform mitigation measures. Furthermore, interventions to ensure water and food security and conduct needs assessments supported by international NGOs are mainly directed to local NGOs who are almost powerless against the oil industry (Al-Eryani 2020).⁴⁰

Our household survey clearly revealed that the overwhelming majority of respondents believes that the oil industry is a factor of the environmental crisis in Yemen. Around 50 percent of Tarim’s and 60.4 percent of Sah’s respondents believe that the oil industry strongly bears responsibility for environmental disasters.

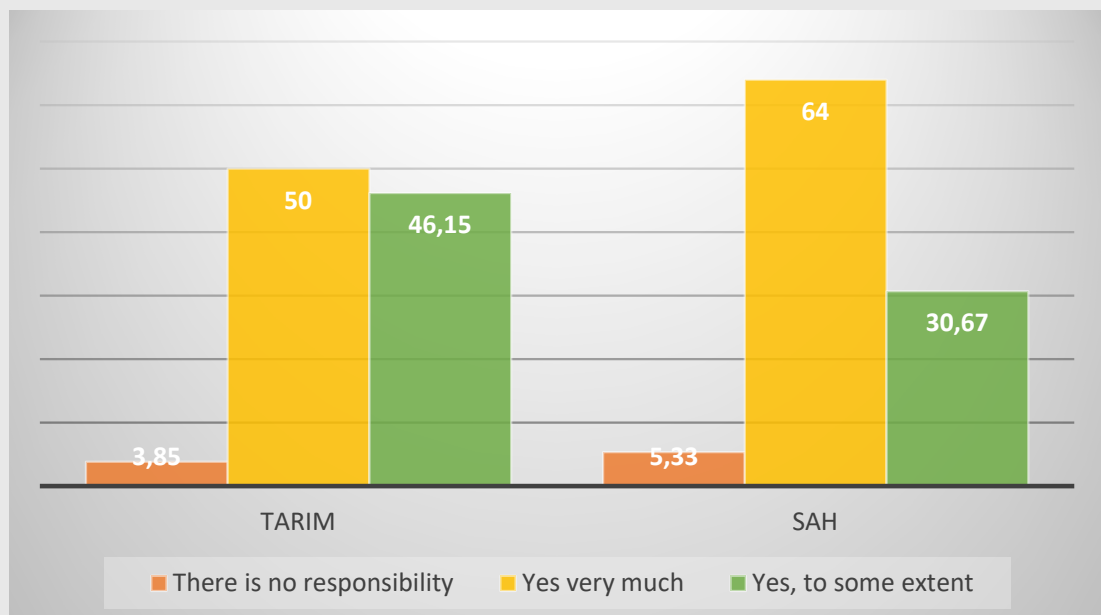


Figure 11: Do you believe that oil companies and factories bear responsibility for environmental disasters? (measured in percent)⁴¹

Almost all respondents (i.e. 96 percent) expressed the conviction that no preventative measures such as monitoring CO₂ emissions, avoiding gas flaring and groundwater or soil injection of oil waste as well as limiting freshwater extraction from geological formations are currently taken by the oil industry to protect the society from disasters.

⁴⁰ Interview with a representative from the Ministry of Public Works and Highways, Sah, 20 November 2022.

⁴¹ Household survey, conducted in Sah and Tarim between September and December 2022.

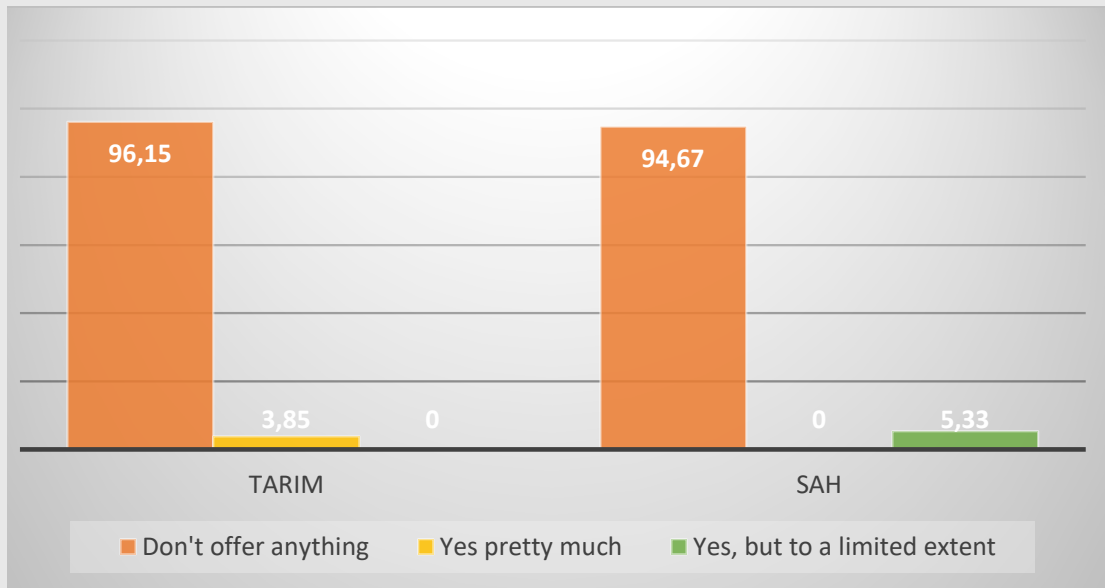


Figure 12: Do oil companies and factories provide preventive methods that protect society from ecological disasters? (measured in percent)⁴²

Other voices added that it is not the responsibility of the oil companies alone to improve the environment and living conditions, but that “everyone bears responsibility.”⁴³ In this regard, local people should “report any environmental disaster resulting from oil pollution,” as well form “civil society organizations against environmental pollution.”⁴⁴ Another concern, which was shared by



Figure 13: Burning household waste near population centers in Sah district
Source: Photos taken by the authors, March 2023

⁴² Household survey, conducted in Sah and Tarim between September and December 2022.

⁴³ Interview with a representative from the Social Affairs and Labor Office, Say’un, 16 November 2022.

⁴⁴ Interview with a representative from the Public Authority for Environmental Protection, Say’un, 17 November 2022.

many, was about waste management in general, underscoring the general environmental awareness of the local communities. In this sense, it has been reported that local communities also disposed their waste in an inappropriate manner, such as burning plastic waste, which further exacerbated an already bad situation.⁴⁵

Room for Remediation

This Report has already indicated that there is currently no or only limited cooperation and coordination between the different pertinent stakeholders. This section dives deeper into the analysis of what existing channels of communication and interaction do exist and what needs to be done to improve them and potentially lower grievances between the different actors.

When analyzing the negative effects of the oil extraction industries in Yemen, the lack of political will to implement safety measures and proper legislative procedures has been emphasized in literature. Employees of local EPA offices have been denied access to visit the oil facilities or receive specific reports and documents. Also, local complaints by residents over oil leakages or spillages as well as disease outbreaks often remain unanswered (Al-Eryani 2020: 32–34). For instance, in her study, Al-Eryani cites the deputy minister of the Water and Environment Ministry: “Without a pro-environment delegation within the government, oil company operations would continue to go unchecked” (ibid: 33).

This failure of proper jurisprudence is also a familiar problem in our analyzed districts. Here, interview partners referred to the lack of a “control body that stops the cause of oil problems or disasters.”⁴⁶ It was further mentioned that there are no direct communication channels between local communities and the oil companies. In a group discussion with local teachers, participants stated that “there are representatives of the companies, but we cannot communicate with the company directly.”⁴⁷ Others stressed that communication runs through the local authority, where “you get a response, but it is not satisfactory.”⁴⁸ Some other interviewees added that a response takes a long

45 Interview with a representative from the Office of the Ministry of Commerce and Industry, 16 November 2022; interview with a representative of a civil society organization, Say’un, 23 November 2022; interview with a representative from the Hadhramawt Foundation for Cancer Control, Say’un, 21 November 2022.

46 Interview with a representative from the Land, Survey and Urban Planning Authority, Sah, 16 November 2022.

47 Focus group discussions with local teachers and health workers in Sah, October 2022.

48 Interview with a representative from the Land, Survey and Urban Planning Authority, Sah, 16 November 2022.

time and sometimes there is no follow-up.⁴⁹ Also, it has been mentioned that employees at the local authority tend to not act out of fear of repercussions, such as losing their jobs.⁵⁰ Another interview partner explained that the communication is mostly ineffective “due to the lack of influence of the authority on these companies.”⁵¹ Furthermore, it was suggested that there are no responses from the oil industry to “make sure that no one listens to their complaints.”⁵² In a similar vein, it was expressed that “the oil companies surround themselves with a false halo in order to prevent communication between them and society.”⁵³

Others stressed that the level of coordination between local communities and oil companies is very limited and only happens in the case of an emergency.⁵⁴ An interesting distinction was made in terms of the individual oil companies. According to one interview partner, although all had been “not responsive to the local community,” some companies could deliver support and listen to the communities’ complains if coordination and communication was in place with the local authorities.⁵⁵

The majority of people also agreed that there are no formalized legal ways of filing lawsuits.⁵⁶ They referred to a lack of “fairness” and that “oppression and threats” are common instruments if local residents tend to make a complaint and take it to court.⁵⁷ In our group discussions with local teachers, it was mentioned that “complaints were submitted to the local council regarding the oil companies, but they were not submitted to the court.”⁵⁸ In another group discussion with housewives it was added that because of those incidents “our confidence in government agencies to do something is almost non-existent.”⁵⁹ One interview partner told the story, “There was a shepherd

49 Interview with a representative from the Agriculture and Irrigation Office, Sah, 15 November 2022; interview with a presentative from the Tayyiba Association for the Disabled, Sah, 17 November 2022.

50 Interview with a representative from the Ministry of Public Works and Highways, Sah, 20 November 2022.

51 Interview with a representative from the Dar al-Shifa Charitable Foundation, Say’un, 23 November 2022.

52 Interview with a representative from the Ministry of Culture, Sah, 17 November 2022.

53 Interview with a representative from the Tamkeen Development Foundation, Say’un, 21 November 2022.

54 Interview with a representative from the General Administration for Women’s Development, Sah, 16 November 2022; interview with a school principal, Sah, 17 November 2022.

55 Interview with a community leader, Sah, 20 November 2022.

56 For instance: interview with a representative from the Hadhramawt Foundation for Cancer Control, Sah, 16 November 2022; interview with a representative from the Department of Education Guidance, Sah, 21 November 2022; interview with a representative from the Office of Civil Service and Insurance, Say’un, 16 November 2022.

57 Interview with a representative from the General Administration for Women’s Development, Sah, 16 November 2022.

58 Focus group discussions with local teachers and health workers in Sah, October 2022.

59 Focus group discussions with housewives in Sah, October 2022.

whose two camels died because they drank from a polluted water pond. He filed a complaint with the company directly and was compensated with a sum of money. But the people and authorities prevented him from submitting the complaint to the court.”⁶⁰ Another interviewee told us:

“In the area of Rasab, the houses were cracked because the nearest site for the company is 500 meters away from the first house. A complaint was submitted to the authority, and they were compensated, but the compensation was not according to the damage. It [the company] was supposed to build houses for them in areas far from the oil wells and not provide a small sum of money.”⁶¹

In contrast, an official from the Ministry of Water and Environment in Say’un explained that there is a formal body, the Coordination Office, which manages the interaction between local residents and the oil companies. Furthermore, he referred to a formal process, where the local authorities form a committee to verify the problem and compose the accusations, which are then forwarded to the oil companies.⁶² Another interviewee described that “complaints are supposed to be submitted through the Office of Social Affairs and Labor, then communication with the companies is made. But this [process] does not happen.”⁶³ Having said that, most of the interviewees agreed that there are not many complaints by residents. As one interview partner further explained: “Unfortunately, the local community is preoccupied with the deterioration of living and economic conditions, as well as the state of war that the country is going through, so there is only frequent talk in their gatherings about the bad influence of oil companies.”⁶⁴

Many of the findings of the expert interviews resemble those of the household survey. According to the results, a major concern that was shared by the majorities of respondents in Tarim and Sah related to the non-existent communication between local communities and oil companies. A significant part of respondents declared that there are no mechanisms at all (Tarim: 62 percent and Sah: 55). Others pointed out that there are limited mechanisms (Tarim: 35 percent and Sah: 45). In both districts, a large majority also declared that they have not discussed problems resulting from oil extraction with the involved companies (Tarim: 80 percent and Sah: 90). Equally high were those who knew of a member of the community submitting a grievance to the courts (Tarim: 88 percent and Sah: 92 percent).

⁶⁰ Interview with a representative from the Agriculture and Irrigation Office, Sah, 15 November 2022.

⁶¹ Interview with a representative from the Health Office, Sah, 16 November 2022.

⁶² Interview with a representative from the Public Authority for Environmental Protection, Say’un, 17 November 2022.

⁶³ Interview with a representative from the Office of Civil Service and Insurance, Say’un, 16 November 2022.

⁶⁴ Interview with a representative from the Ministry of Education, Say’un, 24 November 2022.

In order to complain or report pollution from oil extraction, local authorities are seen as the main channel of communication (instead of directly addressing the oil companies). Around 42 percent of respondents in Tarim mentioned this form of communication and 31 percent in Sah. Other forms of communication also varied between the two districts: In Tarim around 12 percent said that they go directly to the company office. While this was not mentioned in Sah, other forms included complaining via telephone (5 percent) and speaking to a local community representative (28 percent). However, as mentioned above, local institutions such as the EPA are often not able to provide assistance.

When it comes to remedies, the respondents of the survey and interviews mentioned a number of immediate actions that should be taken in order to minimize the risks associated with the oil industry. Almost all respondents (96 percent) strongly agreed about isolating oil industry production areas from residential areas as a technical necessity. Further suggestions included installing early warning and better monitoring systems to prevent pollution, assuring more participant involvement in the planning process of oil infrastructure, developing more legislative laws and regulations to limit pollution as well as organizing training and refresher courses and programs for oil workers.⁶⁵

Conclusion and Policy Recommendations

This Report seeks to support peace-building efforts to mitigate harm caused by oil extraction in Hadhramawt governorate. It has been shown above that the presence of the oil industry has created an unequal distribution of environmental benefits and ills. Furthermore, an uneven distribution of associated responsibilities is another element of injustice. Against this backdrop, we seek to develop processes how to fill these gaps.

While facing a devastating humanitarian crisis caused by the long-term war, Yemen also encounters a number of further environmental threats. Whereas some of these have been part of broader discussions, others are rather hidden and silent, certainly also due to the financial interest involved. The oil industry is one of Yemen's most important economic sectors, but its industrial activities are not sufficiently monitored, causing environmental harm and exacerbating the suffering of rural communities. Without adequately and comprehensively addressing these issues, social tensions and grievances are likely

⁶⁵ Interview with a representative from the Agriculture and Irrigation Office, Sah, 15 November 2022; interview with a representative from the Office of the Ministry of Commerce and Industry, Say'un, 16 November 2022; interview with a representative from the Ministry of Culture, Sah, 17 November 2022.

to continue or increase with the potential of negatively affecting peacebuilding, post-conflict reconstruction and reconciliation processes. In the words of Julian Agyeman and colleagues: “A truly sustainable society is one where wider questions of social needs and welfare, and economic opportunity are integrally related to environmental limits imposed by supporting ecosystems” (Agyeman, Bullard & Evans 2002: 78).

As this Report suggests, tackling oil pollution (and environmental protection more broadly) is an integral part of a broader peace process. It is not enough to implement solutions that only fix the problems in the short-term (for instance through better technology and innovation or higher standards and regulations). Instead, it must “acknowledge past injustices” and address “the root causes of potential conflicts by focusing on equitable resource distribution as a prerequisite for sustainable development and peace” (Dresse et al. 2019: 110).

Our various research activities (including household surveys, key informant interviews, group discussions, on-the-job trainings with government employees, mediation workshops with involved stakeholders as well as awareness-raising campaigns conducted between August 2022 and March 2023) have resulted in the development of a number of suggestions on how to improve the situation. The following policy recommendations are structured along the three focal points of the empirical investigation, namely the source, involved actors and strategies for remediation, and address national and international policymakers, civil society actors as well as key stakeholders from the oil industries.

Fixing the Sources of Injustice

- ◆ Oil companies should stop all procedures that don't comply with local and international conventions to protect the environment and cause harm for the communities.
- ◆ The severe effects of oil extraction require more public attention to put more pressure on national authorities and operating oil companies. Investigative journalists and civil society can play a crucial role in raising awareness and fill this knowledge gap. Support to these actors from international environmental and human rights organizations as well as donor support regarding capacity-building and project implementation could go a long way in ensuring the necessary attention to these crucial issues and pressure oil companies to undertake action and implement measures to minimize the degree of pollution.

- ◆ More academic research is needed to advance and improve data collection to comprehensively analyze the environmental, health and socioeconomic impact of the oil industry's activities. Information by scholars and analysts regarding accountability of the hydrocarbon business in Yemen should be shared with professional institutes such as Extractive Industries Transparency Initiative (EITI). The organization has delisted Yemen in 2017 due to political instability but invited it to reapply once the situation has improved. It does welcome information-sharing on the situation in Yemen, however.
- ◆ Once greater political willingness to act has been achieved, local and national authorities could conduct assessment studies, install monitoring processes (e.g. sensors, monitoring systems, GIS Technology) to uncover oil leakages and spillages and implement better tools and measuring devices (e.g., environmental laboratories). Preventive safety measures as well as early warning systems to protect local communities should be implemented.

Addressing the Stakeholders' Different Responsibilities

- ◆ Civil society actors, the international community and local environmental research and consulting firms (such as *Holm Akhdar*) could help to increase the pressure on oil companies to take responsibility for the caused ecological and social harm and provide treatments for people with incurable diseases. As a first step, the number of hospitals and amount provided to support medical care should increase in the areas of investigation.
- ◆ Mediation efforts on the local level could aim for an agreement by all concerned parties in regard to environmental protection, coordination and corporate social responsibility.
- ◆ Oil companies should work on restoring livelihoods that had been destroyed by oil pollution. For instance, oil companies could set up or support programs to restore fertile farmland. Those interventions include crop and tree cultivation, enhancing irrigation systems (e.g., terrace rehabilitation and rainwater harvesting projects) as well as climate change adaptation measures such as combating flash floods through the creation of dams and diversion channels. Finally, oil companies could also provide further job opportunities for the people in the region.
- ◆ The authorities on all levels should ensure by way of monitoring that oil companies adhere to international conventions for occupational and community safety. This includes the conduct of proper environmental impact assessments, comprehensive waste management plans and warranties that the entire oil operation is performed with adhering to the international safety and ecological standards. Capacity-building for the respective authorities on all levels is necessary.

- ◆ Authorities should also promote transparency and accountability to address the level of corruption and clientelism in the oil sector. This could be done by establishing clear and comprehensive laws against corruption and ensuring its implementation. Furthermore, an independent anti-corruption agency with adequate resources could be created as well as the enforcement of ethical business practices.
- ◆ Local civil society actors should be supported to develop or expand activities to increase the awareness in the affected local communities about waste management. Designated places for waste disposal should be installed and education programs should be conducted to properly dispose waste instead of burning it close to villages and residents. International donors and organizations should focus more on supporting those initiatives.

Room for Remediation

- ◆ Local and national institutions must be empowered in terms of financial, human and technical resources. They must be seen as a legitimate interlocutor between the profit-oriented oil companies and local communities. International assistance and capacity-building programs can help in achieving these goals.
- ◆ Foreign countries and international organizations such as EITI should help Yemen in implementing and enforcing sound environmental regulations and standards for oil extraction. Here, international and national governmental agencies must put more pressure on oil companies to comply with environmental standards in their oil exploration and extraction operations.
- ◆ More environmental dialogue workshops that bring together different stakeholders are needed. These trust-building forms of cooperation and communication can help to decrease grievances among the different actors.
- ◆ Better and more formalized ways of communication between oil companies and local communities are needed. Here, complaints mechanisms must be adopted. It has been reported that such an oversight body (a so-called oil office, acting as neutral interlocutor between local communities and oil companies) exist in Say'un. This body, which includes stakeholders from the oil companies and representatives from the local communities, should be revitalized and expanded to other areas. Frequent meetings and the creation of working groups should ensure the implementation of accountable practices of oil resource management.

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