



THE MANAGEMENT OF SCARCE WATER RESOURCES

DURING PROTRACTED ARMED CONFLICTS
IN THE ARAB REGION

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ABSTRACT

This paper investigates the complex challenge of managing scarce water resources during protracted armed conflicts. It covers the whole of the Arab region, as all the region's countries are affected directly or indirectly by protracted conflicts and, to some extent, by water scarcity. The paper builds on the premise that water scarcity cannot be addressed by simply improving infrastructure, especially during protracted armed conflicts, which are characterized by their longevity, intractability and mutability and by the fragmentation of the parties and stakeholders involved. The paper reviews the definitions of the terms "water scarcity", "protracted armed conflict" and "water management", and it advocates for basing the debate in the Arab region because of the region's characteristics: notably its dependency on virtual water,¹ its high rates of demographic growth and rapid urbanization, the weaponization of its water infrastructure, the inefficient use of its water and the existence of contested transboundary water resources. Overarching issues, such as climate change and epidemic disease, are also discussed, together with their interrelationship with water scarcity. The paper concludes by arguing for the need to address the management of scarce water resources during protracted armed conflicts in a cross-cutting way. In so doing, it critically reviews the recommendations made in wider research into water governance, community engagement, the sharing of knowledge about water resources and international law; and, ultimately, it identifies research gaps and presents a set of open questions.

¹ Virtual water is the water required to produce food and other commodities and is sometimes referred to as embodied or embedded water. Countries facing water shortages import a large proportion of their food to compensate for the lack of water to produce it.

1. INTRODUCTION

This paper serves as a background document for the panel session “The Management of Scarce Water Resources during Protracted Armed Conflict”, which will take place during the “Water Scarcity: A Challenge to Sustainable Development in the Arab Region” event. This high-level meeting is being held as part of the 13th session of the Arab Ministerial Water Council in Cairo on 17 November 2021. The 13th session aims to build on the intersection of two topics of great relevance to the Arab region, namely the management of scarce water resources and protracted armed conflicts.²

Importantly, the paper addresses the whole Arab region as all countries in the region are either directly or indirectly affected by protracted conflict (indirectly because of migration movements or delicate geopolitics). Furthermore, all countries in the region are, to some extent, affected by water scarcity: 18 out of 22 Arab countries fall below the renewable freshwater resources scarcity annual threshold of 1,000 cubic metres per capita per year (ESCWA, 2020).³ Of these 18 countries, 13 experience “absolute water scarcity”,⁴ falling below the threshold of 500 cubic metres per capita per year (FAO, 2016; ESCWA, 2020).⁵ Most countries in the region are dependent on virtual water, which means they import food and other commodities – the production of which requires water – from other regions and, to a lesser extent, from other countries in the Arab region itself (Timmerman, 2013; Antonelli and Tamea, 2015).

The effects of water scarcity include reduced or inequitable access to drinking water, reduced or inequitable access to water for irrigating crops (possibly with consequent malnutrition), sanitation issues and the spread of disease (WHO and UNICEF, 2021). Water scarcity, however, also affects poverty and education (UNICEF, 2021a). For example, households may spend most of their income on water or they may lose their livelihoods in the agricultural sector because of a lack of water. Conversely, in rural contexts, households may spend a significant amount of time fetching water from distant sources, which leaves them little time to build their livelihoods (in the case of adults) or to study (in the case of children). It is of relevance to this paper that the literature suggests that inequitable access to scarce water resources, particularly in the agricultural sector, might trigger conflict (Haddadin, 2001; Raleigh and Urdal, 2007; Sirin, 2011; Borgomeo *et al.*, 2020) although it is important to note that this has not yet occurred in the region partly because of virtual water and food imports from water-rich regions (see also Allan, 2003). If conflict does occur, it may lead to migration and the misuse (and destruction) of natural habitats with a resultant biodiversity loss (Borgomeo *et al.*, 2020; Molden, 2020).

There is common agreement (see, for example, Molden, 2020) that, in such a complex picture, water scarcity cannot be solved simply by improving physical water infrastructure. Further complexity arises in protracted conflicts where water infrastructure may be weaponized or become a casualty of the conflict itself (Gleick, 2019). As the International Committee of the Red Cross (ICRC) posits, protracted conflicts may have a direct and/or indirect impact on urban services and their management, with the two types of impact interacting and accumulating over time, leading to the deterioration of services. The fragility and instability of countries affected by protracted armed conflict mean that the focus is often on short-term solutions to be implemented by governments and humanitarian organizations, who are often not in a position to develop a holistic vision nor find the means to include a sustainable form of water stewardship. This, in turn, results in little or no investment in sustainable or integrated water management strategies. This issue is particularly relevant today; climate change and the COVID-19 pandemic are both challenges that demand longer-term planning and integration with shorter-term investments. While the purpose of this paper and the panel discussion is not to focus on climate change and the pandemic, it will be apparent how these challenges exacerbate existing and deep-rooted issues related to water scarcity.

2 This paper uses the term “armed conflict” interchangeably with the term “conflict”, referring to all forms of conflict involving the use of armaments.

3 United Nations Economic and Social Commission for Western Asia (ESCWA).

4 This definition originally stems from Falkenmark’s 1989 indicator for water stress.

5 United Nations Food and Agriculture Organization (FAO).

This paper attempts therefore to examine this complexity by focusing on several variables that affect water scarcity and the management of scarce water resources in protracted conflicts. It starts by discussing the concept of water scarcity as embedded within complex governance dynamics. It then reviews the implications of water scarcity and the challenges of managing scarce water resources in protracted conflicts, considering these complex issues within the context of the Arab region, examining data and current challenges from the region. The paper concludes by reviewing policy recommendations as currently formulated in research and by identifying gaps in research in order to stimulate, through specific questions, the panel discussion at the 13th session of the Arab Ministerial Water Council.

2. DEFINING WATER SCARCITY, PROTRACTED ARMED CONFLICT AND WATER MANAGEMENT

2.1. DEFINING WATER SCARCITY

Water scarcity can be defined as the lack of sufficient available water resources to meet the demands of water within a region (UNEP, 2011) – for all uses, be these domestic, industrial or agricultural. In the literature (Raleigh and Urdal, 2007; UNEP, 2011; Hussein, 2018), water scarcity is driven at the same time by the depletion of usable freshwater resources and the growing use of freshwater itself. One common cause of water scarcity is its overuse, with practices such as flood irrigation that do not optimize resources and cause water to be wasted,⁶ and water contamination, as wastewater may be discharged back into nature without first being treated.

The term “water scarcity”, overall, can refer to a physical (or absolute) scarcity of water resources or to a scarcity in access to such resources (UN-Water, 2018).

In the case of the former – a physical (or absolute) scarcity of water resources – natural water resources are insufficient to satisfy demand. This form of scarcity can either be supply induced or demand induced (Homer-Dixon, 1999): supply-induced scarcity is caused by resource depletion and degradation, which is the case across most of the Arab region; demand-induced scarcity is caused by rapid population growth, either as a result of a natural demographic increase or immigration. The Middle East is the crossroads of intraregional and transregional migration routes. Countries of origin, transit and destination intersect in the region, which bears witness to mixed population movements caused by protracted conflicts and violence and other socio-political, economic and environmental factors. It hosts and produces a significant portion of the world’s migrants, including refugees, asylum seekers and other people fleeing armed conflict and in need of international protection; as well as migrants transiting through or stranded in conflict areas and confronted with major protection concerns.

In the second case – a scarcity in access to resources – we refer to economic scarcity (FAO, 2009), where water resources are sufficient but poorly managed, for example, because organizations lack the capacity to ensure a regular water supply or there is a lack of investment in adequate infrastructure (UN-Water, 2018), which leads to poor water integrity and little or no involvement of civil society in the management process. According to UNDP (2013), poor management is most often found to be the cause of water scarcity, which is to say that countries often lack the means to provide and distribute water in an accessible manner, rather than there being a lack of water itself. This form of scarcity is loosely linked to what we can define as structural scarcity (Homer-Dixon, 1999), which is an uneven distribution of resources – possibly created artificially by powerful stakeholders who retain water resources for exclusive use. This is typically the case with upstream or downstream countries, whose shared (scarce) water resources might lead either to cooperation or to conflict (see Delbourg and Strobl, 2012).

6 Agricultural practices such as irrigation are highly disputed, with experts stressing the need to assess the sustainability of irrigation – balancing a population’s food needs with the risk of excessive water consumption (see, for example, Mancosu *et al.*, 2015).

The concepts of economic and structural scarcity are important as they remind us that the limited availability of resources should be framed within socio-economic and governance-related dynamics. While tangible, a condition of scarcity is embedded into complex social organizations and economic processes and therefore subject to power relations (Neumayer, 2002; Nunez Ferrera, 2014; Till, 2014). Moreover, the condition of scarcity is subjective, as – beyond sheer numbers – different stakeholders might experience scarcity differently (Neumayer, 2002). This argument is central to this paper and we shall use it as the basis of a discussion with the panel members.

Importantly, the term “water scarcity” is often used interchangeably – inappropriately (Schulte, 2014) – with “water stress” and “water risk”. Water stress considers several physical aspects related to water resources: not only scarcity itself, but also water quality, environmental flows and accessibility. Of the 17 countries experiencing the highest levels of water stress in the world, 12 are in the Arab region (Hofste, Reig and Schleifer, 2019). Water risk refers instead to the probability of an entity experiencing a deleterious water-related event because of scarcity, pollution, poor water governance (see subsection 2.4), inadequate infrastructure or climate change. Again, as with the concept of structural scarcity, it is important to discuss how water risk is felt and experienced by different sectors of society.

2.2. DEFINING PROTRACTED ARMED CONFLICT

While there is not a commonly accepted definition of protracted armed conflict, it is possible to identify a few features that characterize it. The ICRC (2016) states that protracted armed conflicts are long-lasting and intractable, with the parties involved typically fragmenting and mutating over time. Other recurring features are the uneven spreading of the conflict across a country or region and the varying intensity of the conflict over time. The intensity of a protracted conflict is not usually constant but rather seasonal or episodic: “... relative peace can last for months at a time, or exist across large parts of a conflicted territory, while violence rages in specific and frequently changing ‘hot spots’” (ICRC, 2016, p. 10).

Whatever the intensity of a conflict, its duration will result in an incremental impact – referred to below as a cumulative impact – on infrastructure, basic services, livelihoods and community resilience, which typically affects all sectors, including education, law and order, food security, physical and mental health (ICRC, 2016), not to mention widespread human displacement. It is also important to note that a recurring lack of respect for international humanitarian law (IHL) is often a feature of long-lasting conflicts (ICRC, 2016).

Protracted armed conflict is therefore understood as having humanitarian consequences (ICRC, 2015b, 2016; Diep *et al.*, 2017; World Bank, ICRC and UNICEF, 2021), although this acknowledges the need to go beyond the traditional binary paradigm of relief versus development (ICRC, 2016), with humanitarian actors incorporating life-sustaining measures in their life-saving responses and trying to adapt their planning cycles to accommodate multi-year programming and budgeting. With this in mind, the ICRC (2016) has set as an objective the establishment of a series of development holds, which aim to prevent development reversals within the framework of the Sustainable Development Goals (SDGs) – an approach that requires developing, at scale, multiple partnerships and short- and long-term responses (ICRC, 2016).

2.3. UNDERSTANDING WATER SCARCITY IN PROTRACTED ARMED CONFLICTS

Water and protracted armed conflicts interact in multiple ways, which can cause or exacerbate conditions of water scarcity. This paper focuses on this relationship, with research increasingly recognizing the potential role of water in peacemaking strategies (see Carius, Dabelko and Wolf, 2004). A recent publication (Bor-gomeo *et al.*, 2021) has built a timeline of historical events that shows how the presence of water and water scarcity have far more often led to cooperation than to conflict. The report concludes by stating that research and policy should focus more on water as a possible factor in enhancing good governance and international relations: something this paper expands on in section 4, while the focus here is on the complex interaction between water and conflict.

Starting with Gleick's seminal work (1993, 2019 and Gleick, Iceland and Trivedi, 2020), researchers have focused on three major types of interaction between water and conflict (although they do overlap in many conflict-related events): namely, water as a trigger of conflict, water as a weapon of conflict and water as a casualty of conflict. Water is a trigger of conflict where economic or physical access to water (i.e. water scarcity) triggers violence. Water is a weapon of conflict where water resources are used as a tool in violent conflict, for example, by manipulating infrastructure, contaminating water resources or withholding water supplies (see also UNICEF, 2021b).⁷ Water is a casualty of conflict where water resources or water systems are the intentional or incidental casualties or targets of violence. Water scarcity may be further exacerbated when water-supply networks and installations are damaged or destroyed by parties to a conflict.

As Gleick points out, the main issue “... is not wars over water, but the role that water plays in worsening conflicts or triggering conflicts, or being used as a weapon or a target of war, like we see on the Tigris and Euphrates,⁸ but there are other regions ... where pastoralists and farmers are in conflict over control of water, over access to water points” (Gleick, 2015). Conflict contributes to the worsening of water scarcity, creating difficulties in access and possible damaging local infrastructure. As Gleick reminds us though, there are other factors to the interaction between conflict and water: “[A]s the world grows, as population grows, the economy grows, as demand for water grows, the scarcity of water is more and more likely to lead to conflicts of one kind or another” (Gleick, 2015). In the literature (Diep *et al.*, 2017; Borgomeo *et al.*, 2020), we can identify a series of recurring factors that contribute to exacerbating water scarcity in protracted conflicts, besides conflict itself, which are explored below.

Demographic growth – because of displacement, for example – is a major cause of water scarcity as it leads to an increased demand for water,⁹ which in turn may lead to groundwater aquifers becoming depleted, particularly when their water is used faster, such as for agriculture, than the time it takes for them to be replenished through precipitation.

Water scarcity is also triggered by pollution, when oils, chemicals and explosives contaminate water sources; this includes contamination by faecal matter, especially in areas with poor sewerage, and this particular issue worsens when people are displaced. Water is often wasted through leaks because water infrastructure is in a state of disrepair and the operating and maintenance costs are high – and the risk of damage only increases during a conflict. Importantly, high operating and maintenance costs may contribute to forms of structural scarcity when they are not reflected in higher water prices. This imbalance often leads to an inefficient use of water by richer households, who are not incentivized by price to use water efficiently, which means it is economically unsustainable for the water service provider to operate (because they cannot maintain the infrastructure), which ultimately leads to higher costs for households with access issues, who are then forced to resort to alternative providers, such as water tankers, or to spend time accessing water from an alternative source (ICRC, 2015b). Problems related to the electricity supply could also be a cause of water scarcity, as water and sanitation are both reliant on electricity.

Additionally, during a protracted conflict, the natural environment comes under threat. For example, forested watersheds may suffer deforestation and, when people are displaced, there is an increase in urbanization. As a consequence, forests no longer exist to naturally filter pollutants, nor act as buffer against rain and storms, which contributes to water supply being regulated.

Climate change and global warming are also having an impact, with dry regions becoming drier and precipitation becoming more unpredictable and extreme. While protracted conflict and climate change do not necessarily have a direct relationship with each other (Raleigh and Urdal, 2007; Slettebak, 2012; Fetzek and Mazo, 2014), conflict does influence all the factors that contribute to water scarcity, as outlined below.

7 King (2015) analyses water as weapon and offers further subcategories, such as when the weaponization is strategic, tactical or unintentional, and when water is used for psychological terrorism, extortion or for incentivizing conflict.

8 As mentioned elsewhere in this paper (see also the concept of hydro-hegemony), tensions over the use of water have not resulted in international conflict, although upstream countries are often in a position where they could create monopolies.

9 For the same reason, economic growth leads to an increased demand for water, partly because there is a greater demand for desirable water-intensive products (such as meat) among richer populations.

2.4. DEFINING WATER MANAGEMENT AND WATER GOVERNANCE IN PROTRACTED ARMED CONFLICTS

Water management in this paper refers to the actions undertaken by a range of stakeholders to distribute water while preserving water sources and balancing supply and demand to ensure sustainability. In conflict situations and conditions of water scarcity, we can define water management as those actions that guarantee both the supply of water and the functioning of its support systems, which are necessary for seamless service provision (Schillinger *et al.*, 2020). This includes critical people (staff), critical hardware (infrastructure, including aqueducts and shallow wells in rural contexts, but also machinery and equipment) and critical consumables (fuel and water-treatment chemicals). These three critical components face short-term disruption and long-term deterioration (ICRC, 2015b). Conflict can disrupt any one of the three critical components directly (for example, if infrastructure is damaged by violence) or indirectly (for example, if staff are absent for security reasons). Both direct and indirect effects will have a cumulative impact on water management that becomes more difficult to address and ultimately hard to reverse once it has led to a progressive deterioration.

We can therefore define good water management¹⁰ in a protracted armed conflict as one that avoids vicious cycles of cumulative impact on the three critical components (people, hardware and consumables), while at the same time preserving water sources rather than spoiling or depleting them in order to meet demand. Based on the points highlighted above, we can also define good water management as a condition where the resilience of water and sanitation services is supported and equal distribution and access is achieved, countering any form of structural scarcity. The idea of access is also key for a number of researchers (see, for example, Molden, 2020) who emphasize how the good management of scarce water resources means a limited supply can be shared equitably among users.¹¹

As we discussed water scarcity is embedded in complex social organizations and economic processes, but we also need to think of the management of scarce water resources in the context of the wider dynamics of water governance. Water governance refers to the range of political, social, economic and administrative systems that are in place to develop and manage water resources at different levels of society. As mentioned by Schillinger *et al.* (2020), water governance includes the role of the government but it is not limited to it: and this paper looks at governance as a complex system made up of relations between both formal and informal stakeholders, including public organizations, international organizations, local non-governmental organizations, the private sector (especially as water and sanitation service providers), local communities and individuals, and tribal institutions and clan structures. To this list, we should add all parties to a conflict, as they certainly influence governance and water governance dynamics.

Governance interacts with and is affected by conflict in several ways; protracted armed conflict weakens governance structures, reducing the capacity of government agencies, for example. Authors such as Schillinger *et al.* (2020) highlight how the interaction between (water) governance and conflict can also create space for new actors to emerge and can lead to a shift in power dynamics, with a possible renegotiation of the role of the state. This is the case, for example, with informal water providers (see section 3 below), whose role in delegitimizing state institutions has sometimes been raised (Schillinger *et al.*, 2020). At the same time, the weakening of governance structures can have an indirect impact on water management itself (World Bank, ICRC and UNICEF, 2021).

Understanding governance and its role is therefore a key factor in the quest for the good management of scarce water resources.

¹⁰ Conversely, poor water management is generally understood as management that overuses water, damages freshwater ecosystems to the point of destruction and therefore increases water scarcity, and it focuses on emergency measures rather than sustainability in the longer term (World Wildlife Fund, 2019).

¹¹ It is also possible to separate the idea of good water management, focusing on the resource itself, from the proper operation and maintenance of the delivery infrastructure. This allows us to identify a crucial problem: system monitoring and data collection are typically absent in situations of conflict as the instruments and measuring devices are in a state of disrepair. This issue is addressed in subsection 4.3.

3. CURRENT ISSUES RELATED TO WATER SCARCITY AND PROTRACTED CONFLICTS IN THE ARAB REGION

The Arab region is one of the most water-scarce regions on the planet and is affected by a high number of protracted conflicts. As previously stated, 13 Arab states suffer absolute water scarcity, with less than 500 cubic metres of renewable water resources available per person each year. Just a few Arab countries can overcome or mitigate this scarcity, through existing economic means and/or institutional capacity; some countries use advanced and expensive technology countrywide, particularly seawater desalination and wastewater reuse. Most Arab countries depend on virtual water as they rely on a significant amount of imported food and other commodities. (Timmerman, 2013; Antonelli and Tamea, 2015).

Several countries and contexts in the Arab region have suffered and been directly affected by protracted armed conflict. In addition, most countries have been indirectly affected by protracted armed conflict, being for instance the host countries of many migrants, including refugees. The ESCWA highlights how instability in the region has slowed down progress on SDG 6, which relates to the availability and sustainable management of water and sanitation for all. UNICEF (2021b) illustrates how, in the region, water infrastructure is often used as a weapon or can become a casualty of conflict, with attacks on water and sanitation infrastructure as well as service provider personnel by parties to the conflict.

Conflict increases the severity of the existing water crisis by pushing the region's water resources and delivery systems close to breaking point. When there is a severe reduction in access to water, there are interconnected consequences: increased competition for scarce water resources, which may lead to social grievances and fuel existing tensions and further conflicts; further deterioration in water quality; environmental issues, such as desertification and biodiversity loss; and hindered economic growth and food security.

The Arab region is characterized by rapid urbanization, sometimes unplanned, which is straining service networks in formal and informal settlements and sprawl areas (Borgomeo *et al.*, 2020; ESCWA, 2020). As Borgomeo *et al.* report, “[t]hrough population growth is expected to slow down in the coming decade ... [b]y 2050, [the] urban population is projected to double from 2017 levels, with 75% of the region's population living in cities”. This will only put further pressure on scarce water resources and, what is also striking, is that 92 per cent of the region's population is projected to be living on 3 per cent of its surface area.

With this scenario in mind, Borgomeo *et al.* (2020) identify a series of important issues that are currently affecting water management in the Arab region, particularly in countries with protracted armed conflicts. The first issue is inequitable access to water services. They warn that the relatively positive statistics¹² mask a reality where the quality and reliability of water services is highly inequitable, especially between urban and rural areas. While the data are not sufficiently disaggregated to give a straightforward picture (most are collected at household level, see ESCWA, 2020), women and children are disproportionately impacted by access issues because of existing hardships, the time spent fetching water for the household and its cost in terms of missed opportunities, higher exposure to disease and, for women and girls, their difficulty in managing menstrual hygiene. While it is difficult to find data that is disaggregated by gender at household level, it is important to explain how water scarcity is a gendered issue. Women (and girls) face the risk of maternal

¹² In 2015, Arab countries achieved the Millennium Development Goals related to water and sanitation (Borgomeo *et al.*, 2020).

morbidity and mortality, especially in rural areas, they are disadvantaged in the agricultural sector because of inequitable access to land tenure titles and water rights (ESCWA, 2020) and they may be more exposed to contaminated water (Pouramin, Nagabhatla and Miletto, 2020). Despite the gains made as part of the Millennium Development Goals, which saw a significant improvement in access to water and sanitation services (especially in urban areas, where near-universal access was reached by 2010), there was a failure to develop services (and therefore access) that were resilient to potential hazards (World Bank, ICRC and UNICEF, 2021).

The second issue is water quality. In most Arab countries, both surface water and groundwater are polluted by industrial waste and the unregulated use of pesticides and fertilizers. They are also seriously affected by salinization because of human activities, such as overexploiting soil and overpumping. In some places, such as the Gaza Strip, the level of nitrates in the water may be 12 to 16 times more than tolerable limits (ESCWA, 2020). Both salinization and pollution may be exacerbated during protracted armed conflict.

The third issue is the lack of capacity for dealing with water stress and variability. Arab countries have long invested in water storage – to the point of having the highest proportion of surface water stored in reservoirs in the world – but this volume of stored surface water is still relatively low when considered on a per capita basis. In addition, the groundwater situation is precarious; studies report that it has been systematically depleted across the region (Doell *et al.*, 2014). This is particularly the case in countries with a protracted armed conflict and hand-dug wells, for instance, have been documented as a widespread coping mechanism against scarcity, while aggressive water pumping is making the situation worse (NASA, 2013; Schillinger *et al.*, 2020).

A fourth issue is inefficient water use and management. Agricultural practices are unsustainable and unproductive and consume on average about 80 per cent of the region's water (ESCWA, 2020). Much of the water that enters supply systems is also lost through leakage and unregistered usage. This non-revenue water has an impact on the financial viability and stability of service providers (Borgomeo *et al.*, 2020). The situation for providers is rendered even more complex if their high-tech wastewater treatment plants are paralysed (during conflict) and when off-grid power costs escalate. They are also affected by cashflow issues when their costs rocket but their revenues fall (World Bank, ICRC and UNICEF, 2021).¹³ Informal water providers often fill this gap in supply by using water trucks, for example. This usually leads to an increase in water prices and the informal water providers may assume a position of power, possibly becoming crucial allies of political elites (Schillinger *et al.*, 2020).

In addition to these issues, it is important to highlight the limited progress in developing an integrated water resources management (IWRM) approach to manage the high number of transboundary water sources in the region (Borgomeo *et al.*, 2020). The IWRM approach is important because it creates a framework for addressing differing demands and pressures on water resources, across sectors and at different scales, ensuring equitable, sustainable and efficient use and management (ESCWA, 2019). Of 22 Arab countries, 14 share a surface water basin, but only a limited number of operational agreements are in place (ESCWA, 2020).¹⁴ Underground aquifers are obviously shared internationally too,¹⁵ although the actual quantity of underground water is unknown (Voss *et al.*, 2013) which makes the production of neutral and reliable scientific data crucial, as we argue below in section 4. Transboundary dependency is connected to the idea of water as potential trigger to conflict (Gleick, 2019), although there is no evidence thus far of international conflict having been sparked by shared water basins (Borgomeo *et al.*, 2020). The risk of conflict and social unrest has, however, been acknowledged (Haddadin, 2001; Raleigh and Urdal, 2007; Sirin, 2011). The notion of hydro-hegemony (Zeitoun and Warner, 2006) is crucial, as powerful actors at international level might be able to retain control over a water basin using a series of tactics at multiple levels, such as organizational pressure and coercion. As noted in subsection 2.4, this paper proposes that we do not confine the discussion to transnational boundaries and that we also include those tangible and intangible borders and boundaries that are part and parcel of

13 The World Bank, the ICRC and UNICEF (2021) have spoken of “five pernicious problems” in regards to water management in conflict: besides the four points mentioned here, another point refers to “inadequately governed water resources management” – an issue that this paper discusses in sections 2 and 4.

14 Importantly, 60 per cent of surface water comes from outside the Arab region itself (ESCWA, 2020).

15 The ESCWA (2020, p. 86) states: “The number of shared groundwater resources in the Arab region exceeds that of shared surface water basins, with at least 40 shared aquifers present in 21 out of 22 Arab countries.”

many sovereignty claims, such as those involving tribes and clans.

Climate change adds another layer of complexity. Temperatures in the region have been increasing since the 1970s (Borgomeo *et al.*, 2020) and the trend is set to continue. The frequency of extreme temperatures and the length of dry spells will accelerate surface water loss and threaten agricultural production. Precipitation patterns are also changing across the region, with droughts possibly decreasing water run-off by as much as 75 per cent (Waha *et al.*, 2017). Data predictions show an average 10 per cent decrease in rainfall each year over the next 50 years, but droughts and flash floods will become more frequent (ESCWA, 2020). Sea levels are also rising, which puts coastal zones at risk of flood and storm damage, but it also leads to further salinization in coastal aquifers (Borgomeo *et al.*, 2020). People in conflict-stricken areas are particularly vulnerable to threats, shocks and stresses because of weakened governance structures and increasingly inequitable access to resources such as water (Peters *et al.*, 2019; ICRC, 2020). While there is no evidence of a direct correlation between climate change and an increased risk of conflict, when resources (including water) become more scarce, tensions and social unrest are often heightened, although several authors have argued that climate change is actually a factor in increased cooperation among stakeholders at both national and international level (Narum, 1993; Walker, Glasser and Shubhada, 2012; Galán-Martín *et al.*, 2018).

We can also add infectious diseases into the mix, which is particularly relevant given the current pandemic. Generally speaking, diseases are both an effect of water scarcity and one of its causes; respectively because poor access to clean water may result in poor hygiene and the spread of germs, and because the spread of an infectious disease may lead to an increase in water consumption.¹⁶ The World Bank, the ICRC and UNICEF (2021) similarly state that “[i]n countries experiencing protracted conflicts, children under 5 years of age are more than 20 times more likely to die from diarrheal disease linked to unsafe water and sanitation than violence in conflict”. While UNICEF has identified behaviour change and knowledge promotion as top strategies for increasing handwashing during the pandemic, it also acknowledges that millions of people lack the water required for handwashing. While COVID-19 has been highlighted as a possible driver to help accelerate the adoption of water security policies (Frank, Swatuk and Leaning, 2021), it has also been widely reported that the pandemic has led to an increase in gender-based violence against women. While this has been noted in many countries for different reasons, the risk to women in some countries is also linked to water scarcity and an increase in water demand. Yemeni women, for example, have been affected because an increase in water prices and demand has meant they have to travel longer distances and/or to unsafe areas in order to fetch water (Habib, 2020).

¹⁶ In Jordan, for instance, water consumption has greatly increased during the COVID-19 pandemic and its related lockdown (Weldali, 2020).

4. POLICY RECOMMENDATIONS AND WATER MANAGEMENT PRACTICES: IDENTIFYING GAPS AND FORMULATING QUESTIONS

This section reviews the policy recommendations and water management practices that are currently emerging in related research. Based on this, the main questions for the panel are:

1. What is good water resource management during a protracted conflict when water is scarce?
2. What are the greatest challenges in these situations?

Having considered good water resource management, we shall now consider how managing scarce water resources during protracted armed conflicts is a far more complex matter. The challenges involved relate to four key areas: a) water governance at multiple levels; b) community engagement and education in the management of scarce water resources; c) knowledge and data relating to water scarcity in protracted armed conflicts; and d) international law and water scarcity.

The following subsections – each section reviews policy recommendations and leads to a further set of questions – will help to stimulate a discussion among panel members. While we do not include any recommendations related to the challenges created by climate change and infectious diseases such as COVID-19, it is important to keep in mind how these cross-cutting issues add further complexity and tensions to the issues explored below.

4.1. WATER GOVERNANCE AT MULTIPLE LEVELS

All the works reviewed by this paper are ultimately about the implementation of robust water governance structures within countries and across countries – especially in the case of transboundary water resources and of conflict affected and displaced communities. Most experts in the field (ICRC, 2015b; Diep *et al.*, 2017; World Bank, ICRC and UNICEF, 2021) call for cooperation among water and sanitation providers, government bodies and humanitarian and development actors during the different stages of protracted armed conflict. The ICRC (2016) underlines how actors should develop emergency-preparedness plans in case of acute crisis, making a distinction between the pre-crisis stage (where partnerships are established for knowledge-sharing) and the protracted crisis stage (where actors collaborate to establish development holds). The World Bank, the ICRC, and UNICEF (2021) are proponents of coordination among actors in order to align operations to improve the resilience of water and sanitation service providers, with an all-hazard approach that takes into account not only conflict but also environmental variables (see, for example, Zio, Piccinelli and Sansavini, 2012). The FAO (2012) remarks how organizations should adapt to approaches where public, private and other operators can carry out management tasks jointly.

UNICEF (2021b) also emphasizes equitability and transparency in the management of scarce water resources, with the ICRC (2016) and others (see, for example, Diep *et al.*, 2017) specifically advocating for affected communities to be involved in the management process. Other researchers (Pouramin, Nagabhatla and Miletto, 2020) advocate for including the female perspective to help elevate gender-based priorities in the management of water resources.

Some experts (see, for example, Gleick, Iceland and Trivedi, 2020) believe that any discussion about water governance must also involve customary forms of governance and management, which may be rooted in local clan-like or tribal structures of power and in customary law. While we expand on the possibility of integrating knowledge from local communities in the management process (see subsection 4.2), we want to highlight the shortcomings in thinking about governance only in connection with state-related actors, international organizations and service providers and local communities simply as the end users.

With this in mind, we ask the panel:

1. What does good and inclusive governance of scarce water resources look like?
2. What are the challenges in achieving such governance and how do we overcome them?
3. While operating during a conflict, how do we ensure a do-no-harm approach?
4. How can we promote water as a cooperation-building tool?
5. How can we ensure customary forms of governance are included?
6. How can we include (often informal) private-sector water service providers and make them agents of positive change in good water management?

Questions 1–5 are linked to subsection 4.2, which focuses on community engagement. Here, we must remember the role of law enforcement bodies in the dynamics of governance as they have the potential to either safeguard or jeopardize the rights of certain populations to access water (OHCHR, 2006; Rishmawi, 2019).

4.2. COMMUNITY ENGAGEMENT AND EDUCATION IN THE MANAGEMENT OF SCARCE WATER RESOURCES

It is important to expand on the potential role of local communities in the management of scarce water resources. They should not be considered simply as affected communities who receive humanitarian and development assistance, but rather as stakeholders who can play an active part in management of scarce water resources and in the programme design, implementation and monitoring that aims to address such scarcity. The ICRC (2015b) emphasizes how communities and individuals should be considered as capable, proactive and resourceful, and therefore as the main agents of their own future (ICRC, 2016).

There is a need, therefore, to develop new ways of listening to the views of communities and individuals and to involve them in the design, implementation and evaluation of humanitarian and development work – possibly capitalizing on new technologies and media (ICRC, 2015b). This reflects the recent emphasis on the use of citizen science in situations of protracted conflict (Tidball and Krasny, 2010; Weir, McQuillan and Francis, 2019), especially when the intensity of the conflict means that empirical data are not easily accessible or available.

The need to include local communities in the process, particularly the most vulnerable and marginalized, has also been acknowledged by UNICEF (2021b). Similarly, the World Bank, the ICRC and UNICEF (2021) have emphasized the need to gather knowledge on the locations and conditions of internally displaced people, refugees and host communities. The ICRC (2015b) has stressed that involving affected people throughout all stages of urban services provision – from conception to implementation to management – is key to an effective and sustainable response, while physical proximity between service provider and affected people is beneficial.

Local communities play a fundamental role in managing water demand and education on how to reduce water consumption and wastewater is crucial; it could also be linked to a fostering of trust in the organizations involved in water management. Educational policy is key to empowering citizens in sustainable water management (Borgomeo *et al.*, 2020) but, in the Arab region, evidence shows that unsustainable behaviour and consumption patterns persist (Borgomeo *et al.*, 2020). As the FAO stated in 2012: “Efforts for a new water management culture are needed, including public awareness campaigns, educational programmes, capacity building and training at all levels, including water users groups.” Such efforts could foster acceptability of development programmes and provide feedback to urban service providers.

Based on this, we ask the panel:

1. How do we effectively engage communities in managing scarce water resources? What is the role of educational policy in this process?
2. How do we move beyond a simplistic understanding of local communities as affected people?
3. In such processes, how do we handle differences between rural and urban settings? And how do we engage fractured or fragmented communities?

The last question aims to emphasize how community involvement in urban areas is very different from the participatory processes used in rural settings. Communities in urban settings are often fractured and it would be more accurate to talk of groups of residents or neighbourhoods. Moreover, in the context of a protracted conflict, host and refugee communities are often co-present, which increases the complexity and fragmentation of interests (Nielsen, 2014; Jahre *et al.*, 2018). In some neighbourhoods, local residents may have developed a sense of distrust or resentment towards the service providers working with humanitarian actors (Schillinger *et al.*, 2020). These reflections prompt one more question:

4. How do we coordinate neighbourhood-level responses with larger-scale ones?

4.3. KNOWLEDGE AND DATA RELATING TO WATER SCARCITY IN PROTRACTED ARMED CONFLICTS

Researchers (Gleick, 2019; Schillinger *et al.*, 2020) have emphasized the need to increase knowledge about water resource management during protracted armed conflict, noting the relatively low number of studies on the subject and how data are often non-existent or incomplete. Researchers and practitioners have suggested involving local communities in the collection of data (CEOBS, 2016), while another solution lies in the use of remote-sensing technologies (Quinn *et al.*, 2018; Avtar *et al.*, 2021). These technologies could allow water resources to be monitored and analysed from a distance and could help predict the possibility of a conflict-related water crisis.

Some (Damkjaer and Taylor, 2017; Schillinger *et al.*, 2020) have also noted that any analysis related to water scarcity should be multidimensional and include fields such as food security, physical and mental health, environmental protection and energy. This approach reflects, in part, the call by the ESCWA to devise operational strategies that combine water, energy and food security, which would allow for new perspectives alongside strictly water-related empirical insights.

While studies on water and conflict in the Arab region have dominated (Schillinger *et al.*, 2020), the research has often focused on local or subnational levels, which overlooks a holistic perspective on freshwater and its use and results in data on a specific and limited geographical area. There has also been a discussion about the relationship between research by academics and research conducted by non-governmental organizations and other actors from outside academia (Gleick, 2019; Schillinger *et al.*, 2020). Research would be better structured within conceptual and analytical frameworks so that evidence from different sources can be compared, findings be generalized and retrospective comparisons be made. The accessibility of any data would not just be relevant to the work of humanitarian professionals, but to all stakeholders, primarily water and sanitation service providers.

Any database – but preferably one that allows for multiple contributors and is updated in real-time – would present an opportunity to analyse and understand the complexity of water systems in their entirety while improving the resilience of water and sanitation service providers.

With this in mind, we ask the panel:

1. How can we create comparable and accessible data?
2. How do we ensure collaboration among multiple partners while following data protection rules?

4.4. IHL AND WATER SCARCITY

IHL is a set of rules that seeks, for humanitarian reasons, to limit the effects of armed conflict. It contains provisions on the protection of civilians, civilian infrastructure and natural resources during armed conflict. IHL applies only to situations of armed conflict, whether international (between two states) or non-international (between a state and an organized armed group or between such groups). It also applies to other bodies of international law, such as international human rights law (ICRC, 2021).

While IHL contains no provision explicitly protecting the right to safe drinking water, the obligation under IHL to treat individuals in the hands of the enemy humanely includes an obligation to provide a minimum level of health and hygiene, including safe drinking water.¹⁷ IHL further provides for access to humanitarian relief, including water.¹⁸

Additionally, water facilities, rivers, lakes and groundwater resources are generally considered civilian objects protected against direct attacks.¹⁹ Even when an attack is directed against a military objective, it is prohibited to carry out an attack that may be expected to cause incidental damage to civilian objects (i.e. water and its related infrastructure) that is excessive in relation to the concrete and direct military advantage anticipated. The expected effects of an attack include foreseeable reverberating effects on civilian objects.²⁰ This means that any attack affecting a source of water must consider the impact of that attack on the availability of water to the civilians who depend on it.

IHL also prohibits depriving civilians of water as a military strategy as it explicitly prohibits the use of starvation as a method of warfare.²¹ Additionally, water and its related infrastructure is further protected from attack or destruction as IHL prohibits attacking, destroying, removing or rendering useless objects indispensable to the survival of the civilian population.²²

Finally, as water is part of the natural environment, it is protected by the prohibition on the use of methods or means of warfare that are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment.²³ IHL also prohibits the use of poison or poisoned weapons, or the use of chemical or biological weapons.²⁴

In light of the above framework, we ask the panel:

1. How can the legal protection afforded to water be strengthened in domestic law?
2. Which authorities and ministries should collaborate to ensure that the law protecting water and its infrastructure are respected during conflict?

17 Customary IHL, Study Rule 87; Geneva Convention IV, Article 3; Additional Protocol I, Article 75(1); Additional Protocol II, Article 4(1).

18 Customary IHL, Study Rule 55; Geneva Convention IV, Article 23; Additional Protocol I, Article 70(2).

19 Customary IHL, Study Rules 7, 9 and 10; Additional Protocol I, Article 52.

20 Customary IHL, Study Rule 14; Additional Protocol I, Article 51(5)(b).

21 Customary IHL, Study Rule 53; Additional Protocol I, Article 54(1); Additional Protocol II, Article 14.

22 Customary IHL, Study Rule 54; Additional Protocol I, Article 54; Additional Protocol II, Article 14.

23 Customary IHL, Study Rule 45; Additional Protocol I, Article 55(1).

24 Hague Convention of 1899, Article 23; Hague Convention of 1907, Article 23(a); Customary IHL, Study Rules 72, 73 and 74.

5. CONCLUSIONS

We hope that this paper offers useful insights into the complexity of managing scarce water resources during protracted armed conflicts. It is clear that the current situation goes beyond the conventional notions of pre-, during and post-conflict responses and requires a link to be made from relief to rehabilitation to sustainable development. Tackling water scarcity and its inequitable distribution requires a holistic approach and not just a focus on developing infrastructure. Of equal importance are organizational development and inclusive governance, and the education and inclusion of the end user. Acknowledging and recording issues at different levels – from the local to the transnational – and gathering data and evidence are also critical, particularly if issues and data can be updated and monitored regularly. Compliance with IHL is, of course, also vital. Tackling these challenges is not easy, particularly given the poor resilience of many water and sanitation service providers. The paper acknowledges these challenges and raises questions for panel members, who are invited to address them and use them as a basis for further reflection.

There is one other urgent question, which has only been touched upon above: what are the implications of the most pressing challenges of our time – climate change and the current pandemic – for the management of scarce water sources?

Policy recommendations and good practice can help us adapt to climate change and mitigate the impact of the current pandemic. To do so, however, also requires investment in staff training, community engagement and education, and more systematic and evidence-based collaboration among all those involved.

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