

INSTRUMENTALIZING WATER IN CONFLICT:

A HYDRO-HEGEMONIC ADVANTAGE IN MIDDLE EASTERN WARFARE TACTICS?



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List of Abbreviations

AQAP	Al-Qaeda in the Arabian Peninsula
ENSO	El Niño–Southern Oscillation
EU	European Union
EWS	Early Warning System
FSA	Free Syrian Army
GIZ	The Deutsche Gesellschaft für Internationale Zusammenarbeit
G7	Group of Seven
ICC	International Criminal Court
IPCC	International Panel on Climate Change
IDF	Israeli Defense Force
IS	Islamic State
ISIS	Islamic State of Iraq and Syria
IWRM	Integrated Water Resource Management
JFF	Joint Fact Finding
MENA	Middle East and North Africa
MJTF	Multinational Joint Task Force
NGO	Non-Governmental Organization
NSAG	Non-State Armed Group
RBO	International River Basin Organization
SIDA	Swedish International Development Cooperation Agency
SOHR	Syrian Observatory for Human Rights
UK	United Kingdom
UN	United Nations
UNFAO	United Nations Food and Agriculture Organization
UNCH	United Nations High Commissioner for Refugees
UNICEF	United Nations Children’s Fund
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
US	United States
WASH	Water, Sanitation and Hygiene
WDF	Water Diplomacy Framework
YPG	Yekîneyên Parastina Gel (People’s Protection Unit)

Abstract

Begun in 2011, the Arab Spring was a series of anti-government protests, uprisings and armed rebellions that extended across the Middle East. As a result, hundreds of thousands of people died, millions were displaced, and the region became an international hotspot of insurgent groups such as Al-Qaeda and the Islamic State. Climatic changes, which led to increased temperatures, drought and unpredictable weather patterns, further accelerated the uprisings. Water, also known as the 'new oil, became a key resource of dispute in conflict related incidents. Iraq, Syria and Yemen which had been facing a water crisis, saw militant groups and the state's itself utilizing the natural resource for strategic military and geopolitical advantages in the area. The conflict between Palestinians and Israeli's also demonstrated the fragility and intensity over water, in which its dominance seemed to be a triggering factor in the ongoing clashes. This paper will thus examine the instrumentalization of water in conflict by looking at the variety of ways it can be utilized as a tool of war and whether hydro-diplomatic measures and international treaties around water resources, systems and infrastructures are competent enough to prevent future water related infringements.

1. Introduction

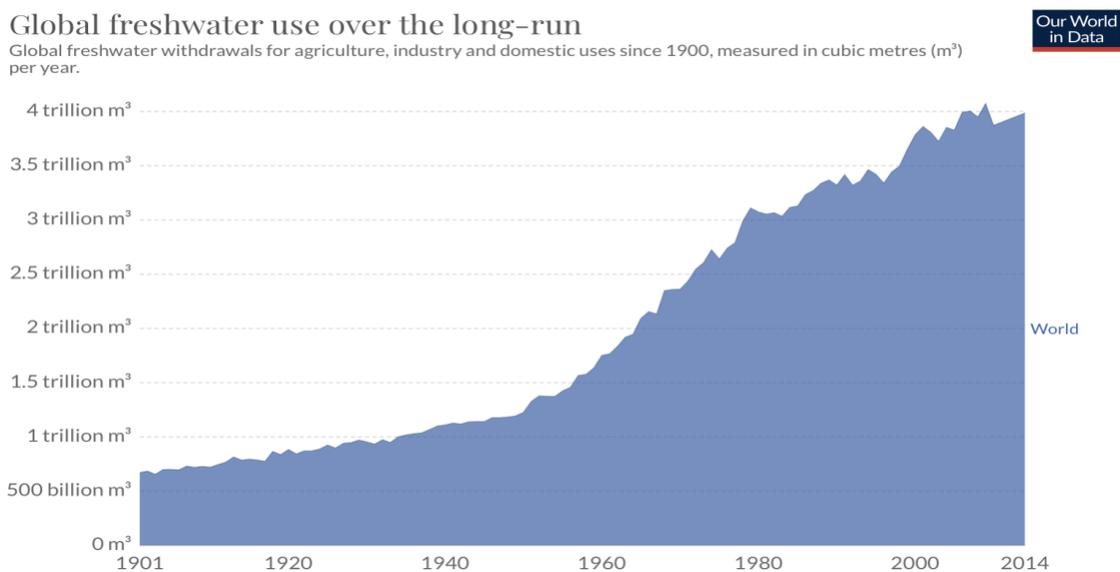
Each year about 4 billion people, almost two thirds of the world's population, experience severe water scarcity at least one month of the year (UN Water 2019). Severe water scarcity can be referred as, scarcity in accessibility due to physical shortages, or scarcity in access due to the lack of suitable infrastructures or institutional bodies to provide consistent amounts (UN Water 2019). Additionally, around 3.4 million people die a year from water, sanitation, and hygiene related causes (Hydrofinitly 2018). In 2017, a Global Burden Disease Study, a report which examines the most common yearly causes of disease related deaths, estimated that the top 5 leading causes (ischemic heart disease, neonatal disorders, stroke, lower respiratory infections and diarrhea) accounted for more than 5 million deaths worldwide (IHME 10, 2017). The similar death toll per year from WASH alone (water, sanitation and hygiene), depicts how it is an epidemic worth noting. Moreover, due to the current climatic changes, United Nations data has estimated that by 2030, water scarcity in some of the most arid places in the world will displace somewhere between 24 to 700 million people (UN Water). Humans can survive without food for around three weeks, however due to the high composition of water in a human body, around 60%, one cannot last without it for longer than a week (Spector 2018). Water is considered an increasingly scarce resource in many regions of the world, more commonly in underdeveloped countries located in the Middle East and the African Continent. Water conflicts have thus emerged over the decades between and within riparian states due to political clashes, military action or development disputes over the allocation of potable water, dam control, drainage basin exploitation and agricultural land. For instance, over the decades there have been disputes over transboundary rivers such as the Nile and Euphrates-Tigris Rivers. Additionally, at the local level, the distribution and access of water has become a key resource of dispute in the developing world (Adelphi Factbook 2019). The United Nations stated that since 1948, 37 transboundary conflicts occurred (UN Water 2019). However, this low figure should not mislead the overall magnitude of the subject at hand, as at the intrastate level, 466 water conflicts have been recorded since 2010 (The Water Conflict Chronology 2019). The conflicts can be defined as, any type of violent clash between villages, ethnic groups, governments, individuals or militias, were water related resources or infrastructures have been involved in the disputes (The Water Conflict Chronology 2019).

For the scope of this research, which will focus on the Middle East since the uprising of the Arab Spring in 2011, 200 conflicts have been recorded in the region (The Water Conflict Chronology 2019). According to the World Water's Conflict Chronology Database, part of the Pacific Institute, which is a partner of the UN and various individual countries such as Germany and Switzerland, conflict is understood in a three faceted way; were water is either utilized as a weapon, a trigger, and casualty (where water systems are deliberate or incidental targets) of conflict (Gleick & Iceland 8, 2018). This division will be utilized later in the literature review and analysis section, in order to examine and categorize the use, impact or effect that water had within a set conflict.

The MENA region (Middle East and Northern Africa), is the scarcest area in the world where more than 60% of the population has little or no access to potable water (Al-Zu'bi 2019). As many as 13 out of 22 Arab countries fall under the category of severe water scarcity, with less than 500m³ per inhabitant per year, in relation to the global average of 6000m³ (Al-Zubi 2019). For example, Yemen's groundwater resources have been diminishing rapidly since the 1970s, resulting in one of the most arid regions of the world, which consequently has intensified conflict (Adelphi Factbook 2019). For decades, public water has only been accessible to half of the overall population and 40 percent to inhabitants in rural area (Adelphi Factbook 2019). The intensity of the droughts and water mismanagement by the authorities have led to various civil clashes amongst communities for water access, further resulting in the resource's weaponization for strategic military and geopolitical advantages (Suter 2018). Other countries in the Middle East such as Iraq and Syria have experienced similar circumstances, where water has been exploited in the battlefield.

The Figure below aims to show a visual representation of the overall global freshwater use since the beginning of the 20th century up until 2014. The figure clearly shows a steep incline, especially after the 1960's, where demand rapidly grew. In the MENA region, high demand and lack of supply due to consistent periods of drought and human exploitation, have widely triggered debate on future shortages and fueling tensions.

Figure 1:



Source: Our World in Data

The shifting discourse of securitization towards the environment in recent decades has thus played an essential role in attempting to apprehend the variables which lead to conflicts over scarce resources, by introducing a more holistic and hybrid approach which shifts away from the military driven focus of security. The United Nations Human Development Report of 1994 was a first approach to broaden the term of security by focusing on 'human security'. This concept underlined key areas such as economic, food, health, community and

environmental security (United Nations Development Program 24, 1994). Scholars like Brown, Ullman, Floyd, Kaplan and Buzan have all attempted to broaden the concept of national security to include non-military threats such as environmental degradation (COT 2007). Other scholars such as Homer-Dixon from the Toronto School of Thought, studied the way by which environmental scarcity played a growing role in the emergence of violent conflict in sub-Saharan and Middle Eastern regions (Homer-Dixon 5, 1994). This connection has been noticed in many arid regions of the Middle East, who on top of socio-economic problems face persistent resource scarcities. Peter Gleick and Thomas von Lossow have further contributed to the literature by examining how in the past decade water has become a weapon and an essential tool of conflict. Since the outbreak of the Arab Spring, water, also known as the 'new oil' has largely been disputed by various factions. Internationally known terrorist groups such as the Islamic State have targeted various water infrastructures (eg. Mosul Dam in Iraq), to gain strategic control of the area (Milner 2014). Water infrastructures has thus been utilized to flood areas, to cut off supplies, to contaminate water, to recruit and to gain economic advantages (Lossow 82, 2018). For instance, in the overtaking of the Fallujah Dam in 2014, IS flooded the area, displacing 40 000 people between Fallujah and Abu Ghraib (Milner 2014).

The 'securitization of the environment' in international politics together with climate security, have become two consistent themes in the development of supranational policies (Graeger 112, 1996). For instance, the United Nations and the European Union have created a variety of frameworks such as the, United Nations Framework Convention on Climate Change and the EU Water Framework Directive. In addition to the International River Basin Organizations (RBOs), which are the institutional outcomes of riparian states trying to find cooperative water management arrangements by introducing regulations which can be internationally recognized, these developments aim to facilitate the hydro-diplomatic processes towards resource management and conflict prevention (Schmeier & Shubber 115, 2018). Hydro-diplomacy has been a critical method in water scarce regions such as in the Nile Basin and Indus cases, for co-operation and conflict resolution. Hydro-diplomacy has no single definition as it can be tailored to individual incidents, however it can be underlined that it aims to promote joint and sustainable water management provisions, while encouraging and supporting both regional and international cooperation in the context of bilateral policies and programs (European Parliament 2, 2016). The problem here is how today's 21st century globalized world is more regularly experiencing water droughts, which subsequently lead to intra and trans boundary clashes amongst states and ethnic groups. There is a shortage of water per capita in the world, therefore action to introduce common norms and crisis management on the distribution of water need to be effectively implemented and supervised both at a national and supranational level (UN Water 2014). Let alone, hydro-diplomacy is not sufficient to understand the complex phenomenon of water conflicts. The background of states or entities through socio-economic and political factors become key variables involved in the mix of apprehending why and how hydro-diplomatic measures might be applied. In the Middle East, especially after the Arab Spring of 2011, the region has faced vast instability and turmoil. Thus, the

concept of hydro-diplomacy and RBO's face a difficult task of implementation, where nation-states lack democratic values, the international system is ignored, and official institutions lack the legitimacy to enforce laws. The literature will thus aim to further cover the emergence of water governance, international regime theory, the role of geopolitics and the wide-ranging conflict spectrum. This will serve as a framework for analyzing local developments, the emergence of key patterns amongst the various cases, and for answering how water is being utilized as a trigger, casualty and weapon of conflict. Having a broad understanding of the various concepts around water governance, will be essential to fully grasp the importance of water in today's rapidly developing world, and its impact on warfare.

The research at hand will thus aim to answer the following question: *to what extent has water become a major tool of conflict in the Middle East since the outbreak of the Arab Spring in 2011 by both state and non-state actors?* A major tool would entail, the regular instrumentalization of water resources and infrastructures during conflict, for geopolitical and military advantages. The paper will explore how water is being used as a tool of war, more specifically as; a weapon, trigger, and casualty of conflict since 2011. The paper will first provide a literature review analyzing the connection between water scarcity and conflict, as Homer Dixon theorized. Then it will look at various other concepts such as international regime theory, the conflict nexus, the shifting discourse of securitization and hydro diplomacy as a means of ameliorating water governance. The above criteria will aid in understanding the importance and delicacy of water in arid regions such as the Middle East, and why its weaponization and usage for strategic geopolitical and military means destabilizes, endangers and introduces a new wave of altercations to conventional warfare, the environment and human security. Secondly, the methodology section will demonstrate the various database used to extract the information (both qualitative and quantitative), the variables at hand, and will introduce the various hypotheses, which will be utilized as a blueprint in the analysis section. The cases that will be analyzed are; Yemen, Iraq, Syria and Israel/Palestine, all of which are within close geographical proximity, are highly arid and experience extreme weather conditions, they face institutional backlashes and are currently at some state of conflict. This research will attempt to demonstrate the dangers and implications that utilizing water as a tool of war can inflict upon states, as well as, raising the societal awareness towards environmental security measures in arid regions for peace and stability. At the end of the paper, a recommendations section will be added, in order to highlight the important of hydro-diplomatic measures, effective water governance and institutional development for tackling and minimizing the issue of water as a tool of conflict.

2. Literature Review

2.1 Water scarcity, climate change, conflict and the rise of NSAGs

The connection between resource scarcity, in this case, water and violent conflict has been difficult to apprehend as research has often concluded that inter-agency (eg. governments, RBO's) cooperation often takes place (UN Interagency Framework Team 71, 2012). However, scholars Thomas Homer Dixon, involved within the Toronto School of Thought, through a series of case studies concluded that scarcity especially when it concerns, greenhouse induced climate change (consequently increased temperatures), degradation or loss of agricultural land, depletion and pollution of fresh water supplies, can cause violent disputes (Homer Dixon 6, 1994). He provides three hypotheses which will be useful for understanding the role of water prior and post to conflict, in the latter of this research. Firstly, he emphasizes how; scarce supplies of physically controllable environmental resources such as fresh water and agricultural land, would incite interstate conflicts or resource wars. Secondly, population displacement caused by environmental factors could lead to ethnic clashes as it would create 'group identity' divides. Thirdly, extreme environmental scarcity would augment economic deficit and disrupt key societal institutions, which subsequently could lead to insurgency and civil frictions (Homer Dixon 6, 1994). The connection between securitization and water can be linked to the 1990s with scholars Starr, Bulloch, Darwish and Gleick, who stated that water takes on a strategic significance and becomes securitized, subsequently turning to be a national security concern (Bulloch and Darwish 1993 & Gleick 1993 & Starr 1991). Under globalization and climate change, 21st century society needs to critically consider environmental factors which stem behind violent conflict. Subsequently, now a days when talking about water scarcity crisis, it is usually framed within the war and peace domains, stressing how water is a potential cause of conflict (Molnar & Cuppari & Schmeier & Demuth 16, 2017). Moreover, the shifting conceptualization of the traditional paradigm of security which was solely focused on military or non-military threats, has allowed non-state actors and other agencies to voice their concerns towards allowing the securitization of water to enter the spectrum. In the journal of International Security, Gleick's paper on 'Water Conflicts' reinforces Homer Dixon's hypotheses, describing how water is such a fragile and unreplaceable resource that can create confrontations amongst communities and states. Gleick thus emphasizes how water can be a source of strategic rivalry through; the degree of scarcity, the extent to which water supply is shared by more than one region or state, the relative power of the basin state and the ease of access to freshwater sources (Gleick 84, 1993). He thus concludes that water can increase the likelihood of conflict and war. For example, in the 1980s Iran claimed to have blacked out significant portions of Iraq by bombing a hydroelectric station in Kurdistan. In the 1990s, it was also reported that Saddam Hussein was poisoning and draining the water supplies of Southern Shiite Muslims to drive them out (Lossow 86, 2016). Consequently, the term of 'environmental refugees' started being coined after large amounts of communities became displaced due to territorial scarcity (Ramlogan 85, 1996).

Today, the United Nations, the European Union, the G7 and a growing number of individual countries have classified climate change as a threat to global and national security (Adelphi 3, 2017). Links directly connecting climate change to conflict have not been securely empirically acknowledged, however the increasing number of incidents in relation to essential resource scarcity has triggered interest in the academic, political and military world. For instance, Hsiang, Meng and Cane, conducted a report in which they analyzed the impacts of El Niño/Southern Oscillation (ENSO) to variations in conflict. The report aimed to find out whether diverse weather patterns (eg. raising temperatures, rainfall), would impact human behavior and increase the likelihood of conflict. The report concludes that changes in the global climate driven by ENSO are associated with global patterns of conflict, however the results do not generalize to steady trends in average temperatures or to any specific features of anthropogenic climate change (Hsiang & Meng & Cane 440, 2011). Furthermore, they argue that environmental conditions stress the human spirit, which could lead to aggressive human behavior. Consequently, hypothesizing that El Niño can concurrently lead to unfavorable economic and psychological outcomes, increasing the likelihood of conflict (Hsiang & Meng & Cane 440, 2011). A connection is made between conflict and climate change, however the relationship remains as a catalyst rather than the major reason for the emergence of conflict. Adaptive capacity is also taken into consideration, however the results vary, as they show how some low-income countries of the variant are more prone to ENSO, while other low-income countries in the weakly affected group do not respond drastically to ENSO (Hsiang & Meng & Cane 440, 2011). Adelphi, an independent German think tank, argues that climate change does not automatically lead to fragility and conflict but rather it acts as a *threat multiplier* (Adelphi 3, 2017). Climate change has a negative effect on livelihoods in many countries through for instance food insecurity and water or land scarcities (Adelphi 3, 2017). Subsequently, both state actors and NSAGs (non-state armed groups), are able to take advantage of the situation and utilize the climatic advantages for their own military and geopolitical benefits. NSAGs are defined as; factions which aim to defy a state's monopoly of power and the institutional capacity to regulate violence throughout its borders, with the end goal of instilling diverse political, military or social objectives (Adelphi 3, 2017). Currently however, many NSAG's do not aim to acquire political control, since they can attain such power outside of formal state structures as seen with IS. Thus, groups tend to turn towards other means of action such as through, illicit economic activities and hybrid warfare tactics to acquire their objectives (eg, religion) (Adelphi 5, 2017). The German think tank argues that NSAGs are leveraging the fragility of the environment to utilize natural resources as a weapon of war (Adelphi 4, 2017). Internationally known terrorist groups such as the Islamic State, Al-Qaeda, Al-Shabaab and Boko Haram, have utilized the environment at a certain point to inflict damage to their opponents (Adelphi 4. 2017). Due to their complicity and diversified organizational structures and objectives, NSAGs have blurred the lines between intra and interstate wars, between the conventional and non-conventional warfare setting, between ideological, political and economic incentives and between armed conflict and organized crime (Adelphi 55, 2016). Large scale

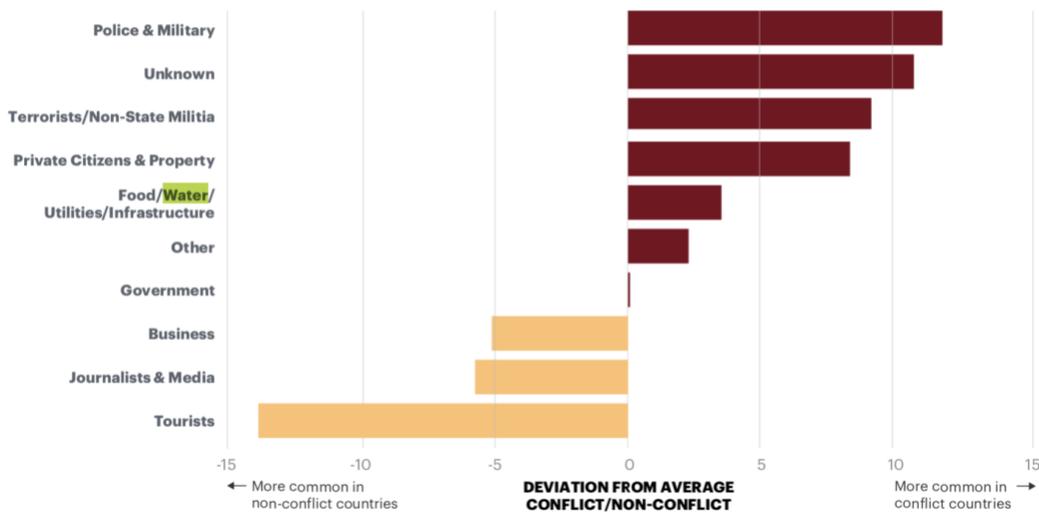
environmental and climatic changes have contributed to the creation of a hub where NSAGs can thrive and utilize new means of warfare to achieve their goals (Intelligence Community Assessment 4, 2012).

Figure 2:

The figure below shows the likelihood of certain targets being attacked during conflict by terrorist organizations. Highlighted in green, water together with food and other essential infrastructures for human security, emerges as an interest of the disputing parties in times of engagement.

Likelihood of attacking certain targets, conflict and non-conflict countries

Terrorist groups in conflict countries are much more likely to select traditional military targets.



Source: Global Terrorism Index 2019

2.2 Water as a tool of war and conflict

More recently, the Islamic State (IS) has been known for *weaponizing* water by for instance capturing the Ramadi Dam and temporarily diminishing the water of the Euphrates and Tigris by 50 percent (Lossow 87). Flooding has also been another tactic by IS to push out their rivals and gain strategic positioning. In 2016, former UN General Secretary Ban-Ki Moon stated, ‘Air strikes against water and electrical facilities in Syria and the contamination of ground water sources in Gaza are further examples of the negative impact of conflict on water’ (UN News 2016). To better understand the role of water in conflict, Lossow’s model of water instrumentalization will be examined. Lossow describes the exploitation of water as threefold; serving strategic political dimensions, tactical military considerations and psychological effects (Lossow 85). The strategic political dimension emphasizes how insurgents aim to put pressure into civilian population and governments by disrupting water and electrical supplies with the overreaching goal of gaining further support to the cause and drive out those who

oppose it (make large areas uninhabitable). Militarily, water can be deployed in a variety of ways such as for instance through flooding, water deprivation or re-directing flows. Psychologically, control over water can have vast mental effects, instilling fear to populations which dread the thought of such water facilities being in the hand of radical militias, warlords or any insurgent group. Anxiety can be a consequence, which could eventually lead to population displacement (Lossow 85, 2016). Water is not just an essential natural resource for daily consumption, it is also a resource which can inflict grave damage and be deployed as a weapon of mass destruction. Since the Arab Spring, nearly every faction in Iraq and Syria has weaponized water. For instance, Aleppo has been hit by the water weapon several times by various rebel groups, IS, the government, as well as Russian air-strikes (Lossow 86, 2016). More specifically, in 2014 water supplies in Aleppo were cut off for around 10 days, resulting in people having to drink untreated water from wells and puddles (Lossow 89).

Accordingly, water can be utilized as a weapon in a threefold way; delivering too much, too little or by contaminating it. There is too much water when for instance whoever has control of a dam reverts its water flow or by releasing large volumes of it downstream. There is too little water when pipes, springs, dams are destroyed, blocked or the water flow is diverted. Militarily, this would aim to drive out enemies from their camps into less renowned areas (Lossow 88, 2016). Finally, water can be contaminated by soiling or poisoning main supplies. Overall, The Pacific Institute (sponsored by the UN), created a Water Conflict Chronology, introducing three major categories of water conflict, and dividing water as a; trigger, weapon and casualty. These three concepts reinforce Lossow's criteria in relation to the impact, consequence and usage that water can have during confrontations. Water as a trigger or root cause of conflict occurs where; economic, physical access to water or water scarcity, triggers conflict (The Water Conflict Chronology 2019). Water as a weapon, occurs when water resources or water systems are used as an instrument in a violent conflict. Lastly, water as a casualty, refers to where water resources or systems, are intentional or incidental casualties or targets of violence (The Water Conflict Chronology 2019). Environmental terrorism, more specifically hydro terrorism, can be the term coined for the instrumentalization of water. The concept refers to the unlawful use of force against environmental resources or systems (eg. dams, reservoirs, pipelines, wells), with the intent to harm individuals or deny populations from acquiring environmental benefits, with the aims of attaining political, social or military objectives (Gleick 484, 2006). Consequently, the effects that water can have in conflict increases the necessity of improving water security and governance internationally.

2.3 Water governance, security and international law

When talking about transboundary river basins, the 1997 Conventional Law of the Non-Navigational use of International Watercourses, also referred as the UN Watercourses Convention, is an international treaty which aims to prevent interstate clashes, obliges states to notify and inform, share data, to resolve disputes peacefully

and to cooperatively manage international rivers (Gleick 106, 1993). Thus, at a transboundary level even though treaties are usually non-binding, institutional arrangements have been put in place to facilitate the negotiation process. For instance, the concept of equitable utilization within good governance and the principle of limited territorial sovereignty, stresses how each basin state should have an equal and reasonable share of the basins. (Gleick 106, 1993). At a localized level, nation-states are the determining actors unless human rights laws or other significant global regulations are broken (eg. access to potable water, equitable distribution). Subsequently, a wide range of scholars have linked water security with international politics. For example, Schulz supports that a hydro political security complex can emerge when states that are geographically part-owners and technical users of shared river basins, begin to consider the possible security issues that the basin might instill upon the two nations (Ribeiro & Sant'Anna 584, 2014). Zeitoung and Warner (2006), advocate that there are three types of control over water; shared (cooperation exists), consolidated in the stronger riparian favor (minimal cooperation), and contested (competition is fierce) (Ribeiro & Sant'Anna 586, 2014). Within these types, Pestre provides four attitudes that states may take; imperialist (imposes its national values and models to be adopted by the international community), defensive (protect economic and political values), Concessions (bargaining) and internationalist position (states agree about finding common goals) (Ribeiro & Sant'Anna 586). The international regime theory can thus be utilized to aid in the application of the institutional arrangements between riparian states and for better grasping the common perspectives, shared expectations and cooperative policies towards water governance.

Jus in bello, the laws in waging war, are a set of norms that impeded certain types of actions, weapons and behaviors mainly against; civilian populations, prisoners of war, medical staff and facilities, non-military property and infrastructure (including water resource and systems) (Gleick 1763, 2019). Contemporary international efforts have primarily focused on management practices and policies rather than on the prevention and conflict that impact water supply. Current laws at the moment can be found under the Geneva (Protocol I and II) and Hague Conventions. The Hague Convention highlights the rules relating to the methods and means of warfare, while the Geneva Convention examines the victims of war (both human and infrastructural) (Lorenz 7, 2003).

The use of water infrastructures and water resources, within the context of armed conflict has been tackled, amongst others, by the International Law Association in the Madrid Rules of 1976. The rules introduced two prohibitions for the protection of civilians and the environment (Geneva Water Hub 20, 2019). First of all, the rule prohibits the diversion of water for military purposes which might endanger the civilian population or cause substantial damage to the ecological areas (Water Hub 20). Secondly, causing floods and other interferences with the hydrologic balance should be prohibited, when once again the civilian population or the environmental surroundings are put in danger (Geneva Water Hub 20, 2019). Additionally, the Hague Convention II prohibits using poison (contaminating water) as a weapon. Article 48 and 56 of the Additional Protocol I of the Geneva

Convention, also aims to prohibit and protect civilian population and water infrastructures (eg, dams) from military attacks (Geneva Water Hub 27, 2019). However, up to date, there is only one example where the International Criminal Court directly addressed a violation of international humanitarian law in the context of instrumentalizing water for strategic geopolitical or military means. Two warrant arrest were sent in 2009 and 2010 to Omar Hassan Ahmad Al Bashir, President of the Republic of Sudan, for contaminating wells and water pumps of the towns and villages, in an attempt to destroy Masalit, Fur and Zaghawa ethnic groups (International Criminal Court 2009). The multiplicity of water attacks that the world has faced in the last decade, demonstrates how there is a lack of enforcement of the international laws. These laws are thus limited in territories where there is a lack of legitimacy and formal governmental structure. For instance, Gleick argues that contemporary international humanitarian laws inadequately protect water systems in the framework of civil war or local conflicts (Gleick 1738, 2019). He further states that enforcement of these laws of war and punishment of violators is subjective and rare, as highlighted in the ICC example. Moreover, when looking at non-democracies and insurgent groups such as the Islamic State, who abide by their own Islamic laws, and have demonstrated no territorial boundaries (blurring traditional state borders); how are these international regulations supposed to enforce such norms?

2.4 The conflict spectrum

Before tackling the phenomenon of hydro-diplomacy it is important to understand the conflict spectrum. Hydro-diplomatic measures will vary depending on the context of the case at hand, thus tailored down approaches will be essential for an effective implementation of the measures. According to CNA, a non-profit research and analysis organization based in the US which develops actionable solutions to national security matters, the conflicts can be fourth-fold; 1) civil unrest and instability, 2) localized violence, 3) terrorism, insurgencies and civil wars, 3) state on state conflict (CNA 13, 2017). Within this conflict spectrum, various factors are determined to drive conflict, these encompass; economic, social, political and security issues. Together with water stress, these are key indicators in the emergence of intra and inter state clashes. Thus, in order to understand the best practices behind water allocation one must apprehend the local situation. More explicitly, the poverty-conflict nexus by Ikejiaku, can help to understand how socio-economic factors could be the underlying cause of conflict. Two theories will be of use; firstly, the relative deprivation theory which informs how people are bound to rebel when they realize that there is a large gap between what they are getting and what they should get (Ikejiaku 131, 2012). And secondly, the Marxian theory, which highlights how economic inequality, will eventually lead to rebellion as the working class has nothing to lose (Ikejiaku 132).

2.5 Hydro diplomacy: attempting to reduce the exploitation of water resources and water systems

Hydro-diplomacy is considered a key instrument to achieve water security, a common interest in both policy and scholarly research. Water diplomacy studies usually take a hydrological or technical standpoint with the focus on water quantity and quality, infrastructural adaptability for flood protection, wastewater treatment, water collection and hydropower generation (Kim & Swain 101, 2018). The framework of Integrated Water Resource Management (IWRM) takes a multi-level and multi-agency approach, utilizing a broad range of actors such as, third party mediators, non-state actors, academics and civil society groups (Kim & Swain 102, 2018). It is thus a multi-stakeholder platform with the aims of solving conflict disputes and incorporating mechanism for negotiation, monitoring and integration, from an interstate, intrastate and communal level. To prevent conflicts over water, international organizations have invested in projects to provide enhanced and systematic training to water professionals in developing countries. For instance, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), is a leading donor agency in the development of water co-operation and governance in the more conflicting arid regions of the world (Kim & Swain 1013). On top of involving international organizations, there are also international water laws which mainly underline; an equitable and reasonable use, no significant harm and peaceful water dispute resolutions (Kim & Swain 104). The United Nations Security Council debate in 2016 on water, peace and security employed a normative rhetoric that conflict around water is intolerable (Kim & Swain 104, 2018). Therefore, stressing how environmental security in terms of water management is a critical component to the national security of states and the well-being of individuals. Subsequently, converting water as an essential component in peace and conflict studies.

Islam's and Susskind's Water Diplomacy Framework (WDF) provides an alternative to the approach of water governance and management. In relation to Gleick's *stochastic hydrology* which highlights the uncertainty associated with water management and supply, WDF similarly hypothesizes that water challenges stem from complex, interconnected, uncertain, unpredictable and boundary crossing system dynamics (Islam & Susskind 590, 2018). The above can thus be utilized as tools to identify the parameters of management problems. Islam and Susskind categorize complex problems as; a) interconnected with many variables, processes, actors and institutions, b) that cross scale, domains and boundaries, c) for which identification of casual connections is nearly impossible, and d) for which historical records are not reliable indicators for the future (Islam & Susskind 590, 2018). They further argue that complex water problems, hydrological, climatic, ecological social and political processes interact non-linearly. Thus, a multidisciplinary and comprehensive approach must be applied, tailored specifically per case in order to find optimal solutions to the water crisis. Within this realm, the authors argue that *negotiation theory* is an effective concept for the complexity of the crisis. The theory stresses upon stakeholder identification and participation, joint fact finding and creative options, emphasizing how its

applicability can demonstrate how water governance and management can be operationalized in practice (Islam & Susskind 591, 2018). Join-fact finding (JFF), aspires to bring experts, policymakers and stakeholders in a shared environment to analyze scientific and technical data (Islam & Susskind 594, 2018). Aiming to increase the chances that science will not be pushed out in favor of politically driven arguments. Thus, JFF attempts to make objective concluding remarks on the allocation and management of water sources in scarce regions. JFF can more flexibly be applied in international organizations such as the UN and EU and can be institutionalized in RBOs, however in less democratic states where political and institutional boundaries become blurred, this becomes a difficult task to deploy.

3. Methodology

3.1 Variables

The *independent variable* of this study will be water availability. Water availability has been picked as the independent variable because water resources itself are a key factor of conflict in the Middle East. Moreover, climate change has fluctuated water availability, making the natural resource a gold mine of competition in both states and non-state actors. In 2016, Basra, Iraq, reached a record high temperature of 53.9 Celsius, one of the hottest temperatures ever recorded in the Eastern Hemisphere (Samenow 2016). Additionally, Germany's Max Planck Institute (aims to look at the advancement of science and environmental developments), estimates that by 2050, temperatures in the MENA region will be 4 Celsius higher than today (Broom 2019).

The *dependent variable* will be the extent to which water is exploited in the context of conflict. Thus, how is water being used as a tool of war. More specifically, it will examine whether water is being used as a trigger, weapon or casualty of conflict. The World Water Conflict Chronology Database of the Pacific Institute will be utilized to analyze these findings. This dependent variable has been picked because it will help to examine how water has shifted the security complex and whether it has introduced a new form of hybrid warfare.

Other key variables which will be analyzed to gain more in-depth knowledge of the crisis are; the ethnographic composition of states, the government type, the access to freshwater resources, the emergence of insurgencies, climate change and the number of dams that each region has.

- The ethnographic composition has been selected because it will help to understand whether ethnic and community disputes over natural resources have aided in the exploitation of water supplies. Moreover, it will also contribute in understanding the conflict spectrum and the current geopolitical and security complex of the case at hand.
- The government type has been selected because the fragility of legitimacy of state institutions will serve as a cornerstone for understanding why and how water infrastructures have been targeted, whether state actors have contributed to the incidents and whether international regulations can be effectively enforced to those who break them.
- The access to freshwater resources has been selected because it will provide an understanding of the current human security situation (according to Sustainable Development Goal 6), and moreover why water scarcity can be such a dangerous tool.
- Climate change has been selected because it directly links the reasons to why the precipitation levels are decreasing, and the regions are becoming more arid. Investigating climate change will also introduce the new phenomenon of environmental terrorism and help to understand whether non-state and state actors are exploiting climatic changes for geopolitical and military advantages.
- The number of dams per case has been selected because it will depict how well equipped each country is with water systems and how these might become prone to attacks.

3.2 Type of research and data collection

This paper will utilize a cross case study method. This method will help to increase reliability and the likelihood of the overall conclusion from being contradicted. According to Yin, analytical conclusions arising from two or more case studies will be more powerful and forthcoming than single cases (Yin 49, 2018). Additionally, triangulation will be utilized in order to further reinforce the data found. The theory will be reinforced by finding multiple documents that derive to the same conclusion in order to find common patterns. Furthermore, the application of various empirical cases will aid in generalizing the results. Moreover, the research paper will utilize a qualitative comparative analysis and a quantitative casual-comparative method. A qualitative perspective will be deployed to analyze past historical conflicts or agreements of the chosen cases, to clearly define concepts such as the weaponization of water, environmental terrorism, hydro diplomacy, securitizing the environment, riparian states, ‘conflict’ and moreover to understand the current political and socio-economic

situations of the various regions at hand. Thus, data will be collected by compiling documents on; existing academic literature, government or institutional reports, policy documents, newspaper articles and NGO statements. Amongst other search engines, Leiden's University Catalogue, Factiva and LexisNexis will be utilized to find the necessary information. From a quantitative standpoint, the research will aim to empirically back the literally findings, through numerical figures of how water has been instrumentalized and on the relation between water availability and its exploitation. The Water Conflict Chronology, from the Pacific Institute (sponsored by the United Nations) will be utilized as the main database to extract the information on any water related conflicts. The database provides historical and contemporary records of conflicts where water has been utilized as a tool of action. It divides incidents into three categories; trigger, weapon and casualty (The Water Conflict Chronology 2019). Water as a trigger occurs when physical access to water or scarcity triggers conflict. Water as a weapon occurs when water resources or systems are utilized as instruments of war in a violent conflict. And water as a casualty occurs when water resources or systems are either intentional or unintentional targets of violence (The Water Conflict Chronology 2019).

Additionally, AQUASTAT, a database part of the UN's Food and Agricultural sector will be utilized to analyze the precipitation forecast over the past decade as well as the surface water produced per country. Furthermore, to increase the reliability of the findings, AQUEDUCT, a Water Risk Atlas part of the World Resource Institute, will also be applied. This database will be of use to analyze potential water scarce areas in the Middle East. AQUEDUCT uses a scale ranging from -1 (low) to 5 (extreme) water risk. The World Bank and Our World in Data will be further utilized to analyze precipitation patterns and freshwater resources. Moreover, the Global Dam Watch, a partner of the United Nations and the European Commission Research Center, will be utilized to analyze the location and number of dam's in each of the cases. Lastly, the Global Terrorism Index will also be used to analyze what have been the main targets of terrorist attacks. In the 2019 report, on various occasions, food/water infrastructures emerged as key targets.

3.3 Measurements

A series of indicators will be used in order to grasp why water is such an important resource for stability and conflict and moreover the extent to which it has become a tool of war. These include, climate change, degree of scarcity, precipitation forecast, groundwater resources, power of basin states, access to freshwater sources, population growth, government type, terrorism threat level, the ethnographic composition, the institutional development of a country and the likelihood of conflict. These indicators will thus allow a broader interpretation of the regional situation and will help in the understanding the role of water within conflict and whether it has been instrumentalized for geopolitical and military purposes. Hydro-diplomacy will serve as the

key mechanism for evaluating the conflict and as the potential peace building process. The hydro-diplomatic processes will thus consist of; pinpointing the conflict at hand, finding a water dispute resolution, conflict prevention, water cooperation and lastly a joint water management policy, if applicable (Molnar & Cuppari & Schmeier & Demuth 19, 2017). A cross case analysis will be employed as a means of gathering an abundant amount of data, to demonstrate an ongoing pattern of violent disputes over water, categorizing whether water has been instrumentalized and for stressing the need of further securitizing the environment.

3.4 Hypotheses

I. As various scholars such as Gleick and Dixon, and international organizations such as the United Nations and the European Union have stated, in today's rapidly developing world, water ('the new oil'), is a highly disputed resource. Poverty, fluctuating weather patterns and weak institutional structures have all weakened water commodities. Thus, the following hypothesis has been created:

H1: Water scarcity is a key factor in conflict related issues.

With this hypothesis, the research aims to identify the casual link between water scarcity and conflict and whether its allocation has become a primary focus in disputes.

II. Since the rise of the Islamic State during the Arab Spring, water has become an extremely important resource during the years of conflict. The weaponization of water dates back to Saddam Hussein's reign, although in the past decades numerous incidents have occurred. Dams are being utilized as key military points which are then utilized to flood or prevent water access to communities. This has led to increased international concern, as it goes against key humanitarian laws under the Geneva and the Hague Conventions. Thus, the second hypothesis emphasizes;

H2: Water is being instrumentalized as a tool of war by states and insurgent groups to gain military and geopolitical advantages.

With this hypothesis, the research aims to identify the various ways by which water is being exploited by both state and non-state actors.

III. Databases have not only pointed out the exploitation of water resources and systems by insurgent groups such as the Islamic State, but they have also highlighted on numerous occasions state like actors to partake in such action. Thus, the third hypothesis emphasizes:

H3: Non-state actors are more likely than state actors to violate the rules of war in relation to water issues

With this hypothesis, the research aims to compare who is more likely to break international norms.

IV. Up to date, there have been few disputes over transboundary river basins. Some global hotspots have occurred around the Nile Basin and Euphrates-Tigris River. However, as of now, there have been no inter-state wars (Bernauer & Bohmelt & Koubi 3, 2012). Thus, the fourth hypothesis emphasizes:

H4: Violent water disputes are more prone to emerge at the intrastate level than the interstate level.

With this hypothesis, the research aims to analyze whether the instrumentalization of water and disputes over the natural resource occur more often at the intra state level (between different ethnic groups, communities, insurgencies) or the inter-state one.

V. Research institutes such as Adelphi, sponsored by the German Federal Foreign Office and CNA (a non-profit research and analysis organization), have examined the role of climate change and conflict by attempting to find a causal link between them. The fifth hypothesis will thus state the following:

H5: Climate Change acts as a threat multiplier by making the weaponization of water more lethal than during stable environmental patterns.

With this hypothesis, the research aims to extract whether climate change is a factor which makes water more susceptible to its exploitation and whether it magnifies the intensity of its instrumentalization.

3.5 Case Selection

Selecting one or more cases allows for comparison and thus for a greater analytical spectrum to test the hypothesis. In order to provide stability and reliability to the findings the cases should include both similar characteristics but also certain deviations in their features in order to effectively test whether the phenomenon at hand is applicable at a wider context (Resodihardjo 30, 2009). Variation is thus introduced by examining multiple countries in the Middle East. This leads to the question of whether the instrumentalization of water as a tool of war is only deployed and susceptible in a certain region or it can be generalized into a wider geographical scope. Additionally, it can help in understanding the connection, if applicable, between water and conflict, and to depict whether hydro-diplomatic measures and the securitization of the environment have to be specifically tailored to the country at hand or whether the similar country backgrounds (eg. governance, drought, fragility), means that an overreaching policy will aid in the reduction of tensions. The following cases have thus been selected; Israel and Palestine (Gaza, West Bank), Yemen, Iraq and Syria. The Middle East has been chosen as the area of analysis due to the aridity of the region, its susceptibility to conflict, low democratization level and resource scarcity. It is thus a strategic geopolitical area where the discourse and application of environmental security, in relation to water can be a cornerstone and framework, if successful, for future conflict resolution policies and crisis management. Each case has been chosen due to the similarity of patterns that have emerged at a local level. For instance, Syria, Yemen and Iraq have been perpetrated by civil conflict for many years, and Israel and Palestine are facing localized violence, civil unrest and ethnic clashes. Most of the cases are intra state, however disputes over the Euphrates Tigris between Syria and Iraq have been ongoing for years, creating a susceptibility to interstate confrontations. Notably, the cases cover most of the conflict spectrum as described by the CNA institute. This can be useful for understanding how water is being instrumentalized in various contexts, for diverse means and reasons.

3.6 Limitations

To assess the limitations of this study, both validity and reliability need to be considered. The reliability of this study will be centered around the Water Conflict Chronology in connection with the various other databases such as The World Bank and AQUEDUCT. This will reinforce the possible findings that one data set might deliver. Amongst many others, partners of the databases include the United Nations Development Program, the European Union, the German Federal Foreign Government, the Hague Center of Strategic Studies, the World Resources institute and the Global Water Partnership. This emphasizes a high level of credibility when retrieving the necessary information on the exploitation of water and violent conflict in the Middle Eastern region. A drawback could be finding communal information on certain indicators in the chosen cases, were due to the current situations (eg. civil war, democratic deficit), the information gathered could be unreliable or outdated.

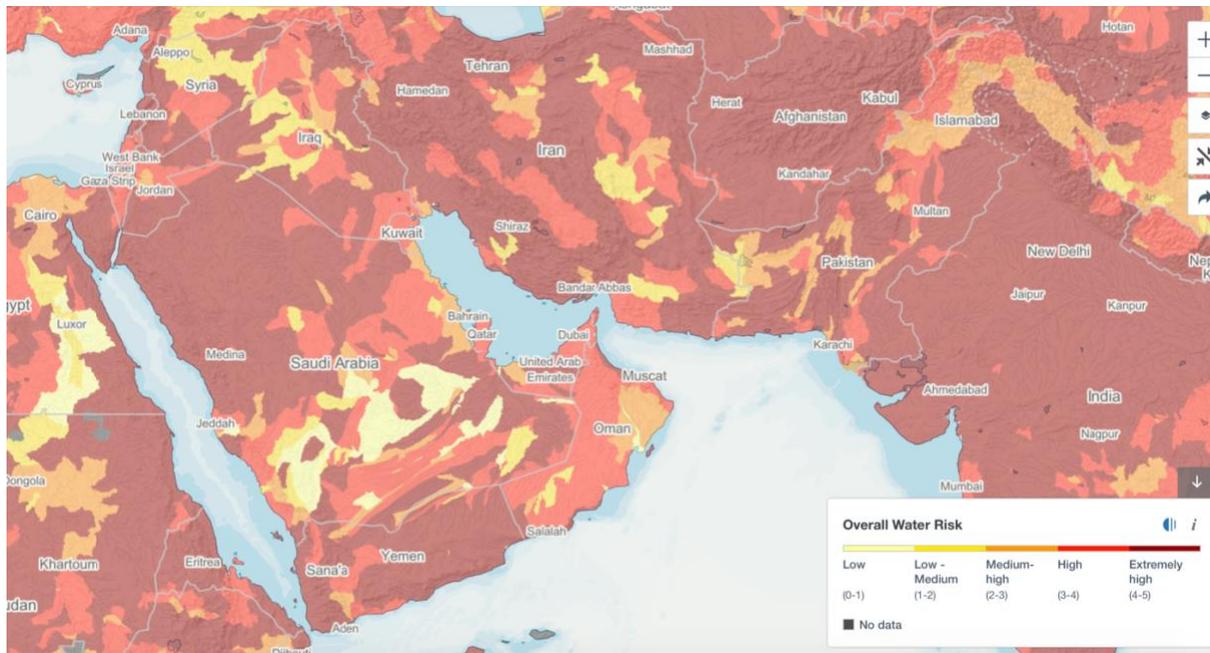
Another drawback could be the heavy reliance on the Water Conflict Chronology database. Although it is sponsored amongst others by the UN, the German government and the World Resource Institute, it could potentially miss out localized events of a smaller nature, as the above point stresses. Thus, field work or close relation to INGOs and governments working in close proximity with the cases at hand would have aided in delivering a more accurate assessment. Lastly, not having interviews restricted to an extent the possibility to analyze the information from a wider spectrum. Questioning officials could have brought an alternative perspective to the analysis, in which verbal information could have served as an introduction to not yet written information or discarded facts from previous research.

According to Yin, there are three types of validity: construct (logical conceptual model), internal (cause / effect measurement) and external (applicability in other cases) (Yin 40). Together with the application of IR theory, the conflict spectrum and the evolving securitization discourse, the paper will offer construct validity. Internal validity will be covered by the various measurements utilized in relation to the variables and indicators which can lead to violent conflict and subsequently the application of hydro diplomatic measures. Lastly, external validity will be covered through the wide range of cases stressing the importance and generalization of water management for the securitization of human beings and the environment. Nevertheless, to assure further validity, a more detailed study of hydrology might be needed, to completely understand water distribution and access. Overall, an in-depth analysis of the variables and indicators through a range of databases, should make the information retrieved factually and logically sound.

4. Case Studies

This section will analyze four case studies; Yemen, Syria, Iraq and Israel/Palestine by which water has been exploited or instrumentalized as an object of war for military and geopolitical advantages. It is worth noting that not every single water related incident has been written down. It is rather a compilation of the major incidents as well as a summary of events which occurred on numerous times. Below, Image 1 (part of AQUEDUCT) shows the overall water risk in the chosen cases as well as the whole Middle Eastern area, in order to portray the aridity of the region which subsequently makes water an extremely competitive and dangerous commodity. As the image shows, most of the cases are located within the high and extremely high-water risk, other than a few regions within Syria and Iraq which are in the low-medium spectrum.

Image 1:



Source: Aqeduct 2019

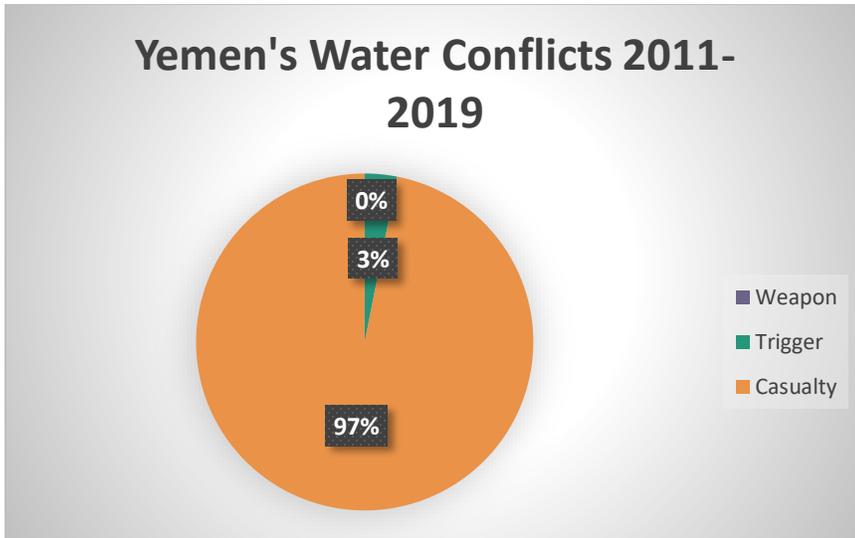
Case 1: Yemen

An ex-colonial British colony, home to 28 million people, Yemen is one of the poorest countries in the Middle Eastern region. Today, Yemen has been devastated by civil war due to the ongoing clashes between President Hadi's forces and those allied to the Houthi rebel movement. It is estimated that close to 100 000 people have been killed and 50 000 have been injured since 2015 (Austin 2019). Additionally, the conflict and blockade inflicted by the clashes has triggered a catastrophic humanitarian crisis, leaving 70% of the population in need of aid (Nations Online 2019). Moreover, Oxfam informed that conflict and fuel shortages triggered 3 million people to lose access to drinking water, subsequently increasing the Yemeni population without access to water to 16 million (Oxfam 2015). The UN has estimated that water shortages have enabled competing actors to utilize this essential resource as a weapon in violent conflict. Before the war, Yemen was considered to be one of the world's most severely water stressed countries, with public water accessibility limited to below half of the population (Suter 2018). Today, the civil war together with water mismanagement, drought and the utilization of water as a weapon (diverting flows, taking control over dams), have intensified the conflict. Yemen's fragility dates back to 2011 Arab Spring, when political and economic instability forced authoritarian president Ali Abdullah Saleh, to hand over power to his deputy Abdrabbuh Mansour Hadi (BBC 2019). Hadi struggled to overcome key societal problems such as dealing with jihadist attacks and separatist movements in the South, increasing corruption, unemployment and food insecurity. The Houthi movement (a minority Shiite community), attempted to take advantage of the situation by taking control over the northern heartland of Saada province. Together with many disillusioned ordinary Yemen's, including Sunni's, a country wide movement began in 2014 and 2015, taking

over control of Sanaa (BBC 2019). Mid 2015, Mr Hadi was forced to flee abroad, alarming various Middle Eastern countries who in a Saudi led coalition (receiving logistical and intelligence support from the US, UK and France), led an air campaign aimed at restoring Hadi to power (BBC 2019). It is estimated that a total of 20,330 air aids have occurred since; 7003 (military coalition), 6365 (non-military) and 6962 (unknown) (Yemen Data Project 2019). Al-Qaeda in the Arabian Peninsula (AQAP), have captured most of Yemen's southern territory since 2011's revolution. Since then, AQAP has often attempted to gain support and recruit Yemeni's by providing basic services (water, electricity, fuel and security) in impoverished areas (Fenton-Harvey 2018). Today, AQAP and other rebel groups continue to conduct unconventional military tactics to expand their networks and push out the local forces.

Currently in Yemen, water scarcity is apprehended as one of the nation's key economic, health and national security issues (ICRC 32, 2015). Caroline Pellaton, the International Community Red Cross coordinator in Yemen, predicts that by 2025, Sana'a, the capital, will have no more water (ICRC 33). In 2013, it was reported that most rural conflicts were due to water related issues (Schaar 16, 2019). The government has further stated that a higher amount of people have died in recent years due to disputes over water than in the civil unrests of 2011 and 2012 (ICRC 32, 2015). Additionally, a report in Al-Thawre in 2015, a Yemeni pro-government newspaper, projected that 70 to 80% of conflicts in rural areas have been due to water (Whitehead 2015). The Yemeni Ministry of Interior further reinforced the facts above, by stating that 4 000 people die every year over violent land and water disputes (this figure however is outdated and likely underestimated as currently, numbers could vary) (Whitehead 2015). Yemen is also home to a variety of ethnic groups; the Maqils (the Arabian nomadic group), Yemenite Jews and the Afro-Arabs of African descent. Furthermore, religion in the country is made up of two Islamic Groups, the Shia (47% of the population) and Sunni (53%) (Migiro 2019). This diverse range of communities and traditions have escalated the conflict over water, leading to further clashes and exploitation of the resource (Schaar 109,2019). According to the Water Conflict Chronology Database, there have been 129 conflicts surrounding the exploitation of water (Water Conflict Chronology 2019). The section below will be divided into two categories; water as a trigger or casualty of conflict. As up to date, the database does not provide any examples of how water has been weaponized. It is worth noting that only the major conflicts over water will be discussed due to the numerous disputes over the years. The figure below provides an estimate of how Yemen's water conflicts have been categorized:

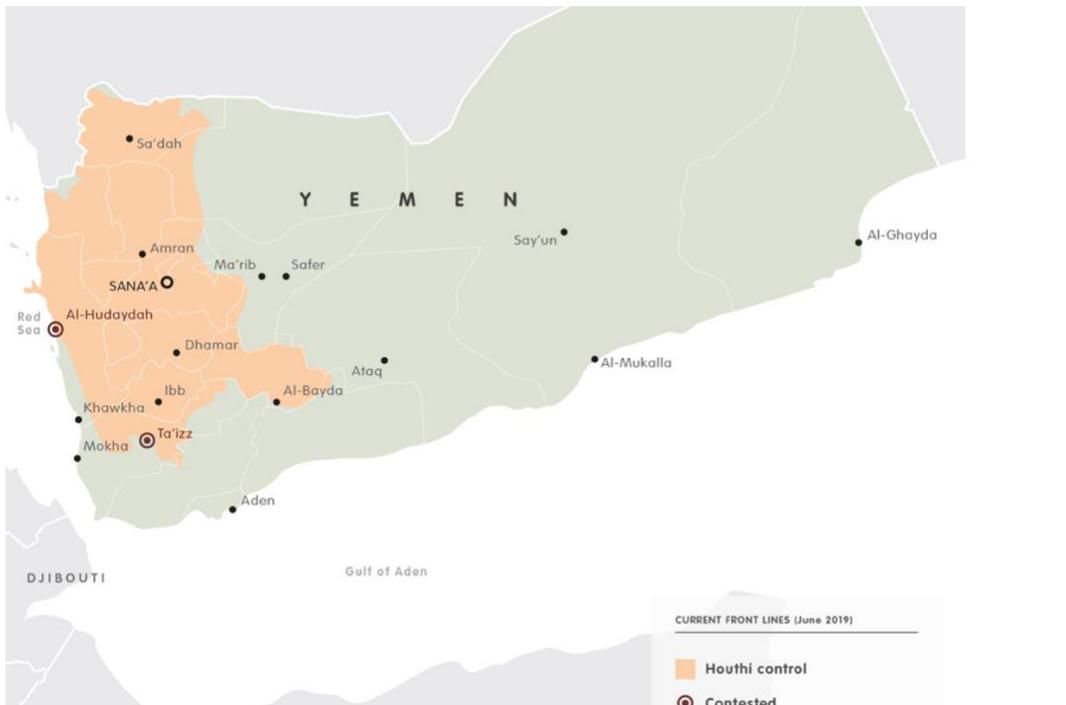
Figure 3:



Source: Water Conflict Chronology 2019

Image 2:

The map below offers a visual representation of the current front lines between the Houthi rebels controlling the Yemeni Capital on the Western side of the country and the Saudi led coalition supporting president Hadi. The visual will aid to pinpoint the location of the various water related incidents.



Source: European Council on Foreign Relations 2019

Water as a trigger of conflict

According to various online sources compiled by the Water Conflict Chronology Database, there have been four main instances where water has been utilized as a trigger of conflict. The first major dispute was in 2013, where conflicting water supply from shared mountain springs in villages Marzouh and Qaradth resulted in the deaths of 6 inhabitants and many injured (Friedman 2013). Former Minister of Water and Environment, Abdul Rahman al-Eryani said; ‘wherever in Yemen you see aquifers depleting, you have the worst conflicts’ (Water Conflict Chronology 2019). Two years later, 2015s civil war, had devastating effects to the countries water supplies. The United Nations Food and Agriculture Organization (UNFAO), estimated about 20 million were left without access to water due to the ongoing conflict (Water Conflict Chronology 2019). Additionally, the Yemeni interior minister claimed that up to 4000 people die annually due to water related violence (Water Conflict Chronology 2019). According to The Guardian, these figures tend to be old and underestimated, thus the numbers could vary (Whitehead 2015). They also do not represent a direct link to the ongoing civil war, but rather to the problem of water scarcity throughout the Yemeni territory over the years. However, following the 3 years of aerial bombings in Yemen, the water infrastructures have been gravely damaged leaving around 19 million people without access to clean water (Suter 2018). Thus, the civil war has taken a significant toll in relation to water management and availability. In 2017, there were a series of protest in Crater and Aden, which eventually turned violent (roadblocks, setting tires on fire), in which citizens demonstrated over access to water and increased salaries (Water Conflict Chronology 2019). Lastly, in 2018, two main events have been recorded. Firstly, ongoing clashes have occurred between tribesmen and pro-Houthi forces over a water project which led to a series of injuries on both sides (Water Conflict Chronology 2019). Secondly, two people were killed in the in Bai Bait Al-Hadi Village, Al-Qiblah, Ar Rujum District, Al-Mahwit governorate, due to disputes over watercourses. As of 2019, there has not been a report recorded in relation to water being used as a trigger of conflict. Further field research and local databases from credible experts might be needed to find out if there have been any water related disputes.

Water as a casualty of conflict

Water as a casualty of conflict has emerged the most (125 incidents) since 2011’s Arab Spring. This has been largely due to the number of air raids, especially after 2015, by the Saudi led coalition and non-military groups which destroyed key water infrastructures (eg. wells, damns, tanks, trucks). In 2011, escalating violence led to water and power shortages in Sana’a, this was repeated in 2013 where armed gangs sabotaged various water pipelines from the capital to Ta’izz (Water Conflict Chronology 2019). 2015’s civil war, resulted in many

destructions of major water resources and systems. To name a few, Saudi air raids destroyed a water plant killing 14 workers by which they claimed rebel groups were constructing bombs. Human Rights Watch, later found no evidence of such claims, stating that it was solely a water plant (Water Conflict Chronology 2019). Additionally, many other water tanks were hit by airstrikes in Al Sab'ain District in Sana'a, in the Craiter District in Aden and in the Harad District in Hajjah. Water trucks were further destroyed, a water factory was hit by air raids in the Sirwah district of Marib and a state-run water utility was attacked due to escalating conflict in Yareem District (Water Conflict Chronology 2019). In 2016, further air raids deprived clean water access to 20 million people, damaging the Marib Dam (main dam in the country; yellow point in Figure 5). The Al-Hayathim and Mahalli dams were both destroyed in air raids in the district of Sana'a. In 2017, two civilians were killed in airstrikes which targeted a water and electricity system in Magbana, Taiz (Water Conflict Chronology 2019). Moreover, further air raids by the Saudi coalition forces destroyed key water systems in the capital, Najil, Al Hawak and in Saadah and Sahar (killing five and injuring 11) (Yemen Data Project 2019). Additionally, it was reported that Al-Qaeda affiliated militants demolished various water tankers that belonged to Houthi militants and the Yemeni army in Wald Rabi, Al Bayda and Lawdar (Yemen Data Project 2019). Throughout 2017, the country experienced many other bombings and destructions of water projects. Lastly, in 2018, Saudi led coalition airstrikes killed Houthi fighters attempting to destroy a water dam. Moreover, five farmers were killed after a water well had been damaged in Al-Jah in Bayt (Water Conflict Chronology 2019). Furthermore, pro-Houthi forces also reportedly destroyed water tanks in Bani Zuhayr village and took over control a water project in Sadah.

Image 3:

This satellite map of Yemen shows the aridity of country, while pinpointing in yellow, the Marib Dam, the only major water dam in the country.



Source: Global Dam Watch

Water as a weapon of conflict

As of now, there have been no records which show how water has been utilized as a weapon of conflict in the escalating Yemeni violence. This could be due to the aridity of the country and the lack of hydraulic plants for strategic military deployment. Additionally, this could also be due to the limited available data and the difficulties of extracting reliable and up-to-date information of the case at hand. It is important to pinpoint however, that although an example has not been provided, it should not be ignored in future assessments.

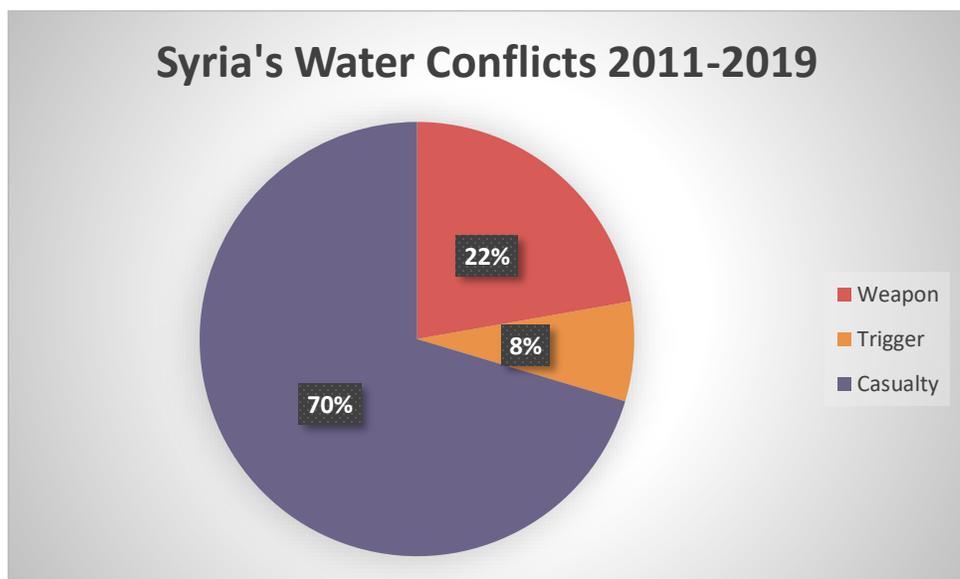
Case 2: Syria

Since the start of the war, the Syrian Observatory for Human Rights (SOHR) has estimated the death toll to be as high as 511,000 up until 2018 (Al-Faqir 2018). Moreover, according to the United Nations High Commissioner for Refugees (UNHCR), the years of fighting have internally displaced 6.6 million and externally 5.6 million people, (Al-Faqir 2018). In Syria as well as the other Middle Eastern regions, water is a scarce and precious resource. Between 2006 and 2011, Syria faced the worst drought in 60 years (Lossow 86, 2016). Together with the war and the emergence of insurgent groups such as IS, the water crisis has become a severe dilemma for the Syrian population. Reservoirs and dams have been demolished, water infrastructures have been overtaken by IS to gain strategic advantages (depriving thousands of inhabitants of potable water) and equitable water management has been largely ignored (Lossow 86, 2016).

In 2011, the Syrian people massively protested, in connection to Tunisia's and Egypt's uprisings, against the current socioeconomic policies, political repression and sectarian tensions that had been hampering Syrian society due to Bashar al-Assad regime (CNA 33, 2017). According to CNA, a non-profit research organization working together with the United States government, the above tensions, together with poor water management, insecurity and high levels of drought, further escalated the conflict (CNA 33, 2017). Within the Syrian Civil War, a variety of factions (state and non-state actors), have been involved in the conflict. When the war began, the four main factions fighting for territory were; ISIS, the Kurdish Forces, the Assad government and other opposition groups (Editors of the Encyclopedia Britannica 2019). Since then, the involvement of various state and non-state actors has multiplied. Insurgent groups like Al-Qaeda (Jabhat Al Nusra) have taken advantage of the situation by for instance exploiting scarce water resources to recruit and gain power. Moreover, state actors such as Russia and the United States have conducted air strikes and provided weaponry (eg. US to YPG) on numerous occasions (CNA 33, 2017). The involvement of these major powers, to an extent has impacted water stress in the country. Former US President Barack Obama, linked climate change to the Syrian conflict, stating that it was a contributing factor to the escalation (Hendrix 251, 2017). Adelphi further argued how water scarcity also played a key role in the outbreak of the civil war and up to today still plays a key strategic significance to the factions involved

(Adelphi 20, 2016). In 2014, local officials estimated that they lost 40% of the available freshwater to various disruptions in water facilities, caused partly by the conflict and old infrastructure (ICRC 14, 2015). Gleick and Iceland, from the World Resources Institute, argue that water has been used as tool of war, were pressure over the scarce and essential resource is rapidly growing, especially due to population growth, environmental degradation and rising consumption (Gleick & Iceland 2, 2018). According to the Water Conflict Chronology Database, there have been 27 conflicts surrounding the exploitation of water since 2011, contributing to escalating tensions during the civil war (Water Conflict Chronology 2019). The figure below provides an estimate of how Syria's water conflicts have been categorized:

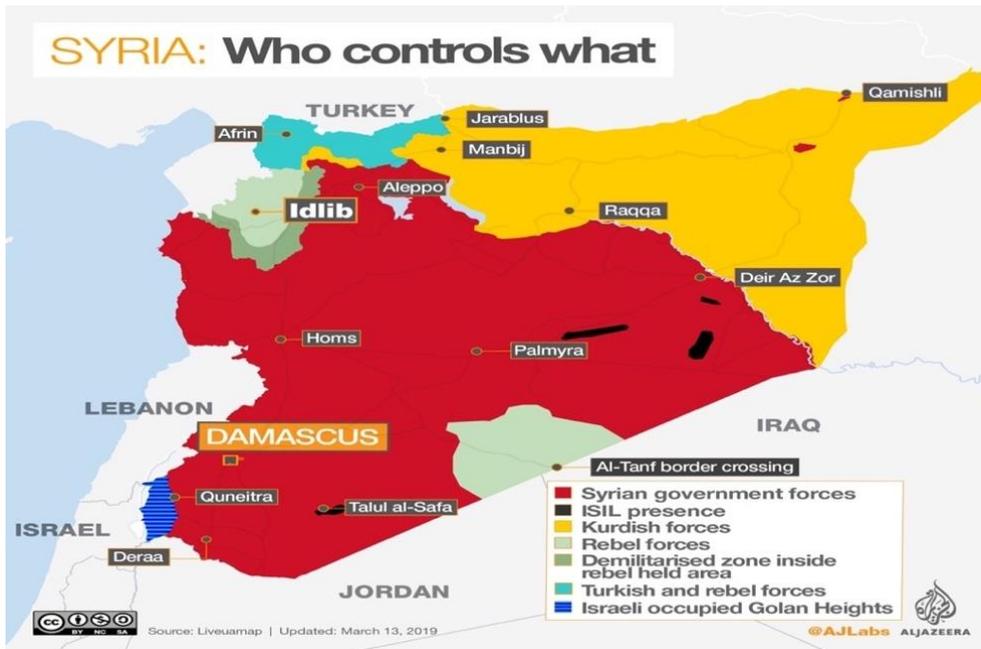
Figure 4:



Source: Water Conflict Chronology 2019

Image 4:

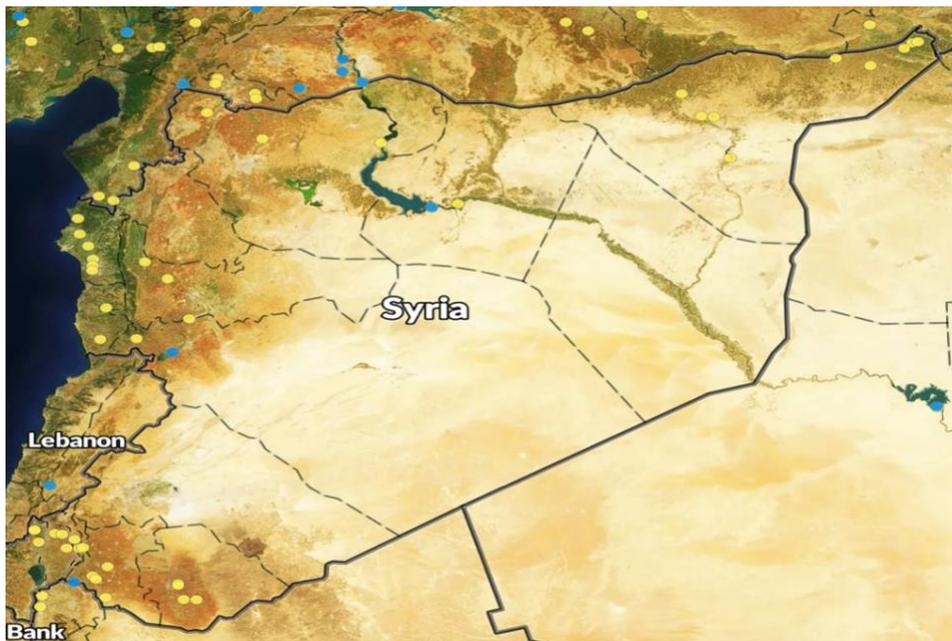
The map below offers a visual representation of the current frontlines between the various state and non-state forces operating in Syria. The map is largely divided into seven different factions.



Source: Al Jazeera 2019

Image 5:

Syria is home to around 80 dams. The Euphrates and Tigris River are key sources of the country’s total allocation of water. The satellite picture below shows in blue and yellow dots, the location of Syria’s dams and reservoirs.



Source: Global Dam Watch

Water as a trigger of conflict

In 2011, drought continued to escalate conflict. Political tensions increased due to the severity of the drought and around 1.5 million people, mostly farmers, were forced to flee their residence (Water Conflict

Chronology 2019). That same year political unrest began in Dara'a which soon after led into a civil war to overturn the regime of President Bashar al-Assad and its ruling party Ba'ath (Water Conflict Chronology 2019). Thus, on top of socio-economic and political factors which drove people to protest, drought which had exacerbated the country over the years, was a triggering factor to the public discontent against Al-Assad's party. In a broader context, water mismanagement and overexploitation which subsequently lead to the depletion of the natural resource, became a threat multiplier to the ongoing Syrian uprising (De Chatel 532, 2014). The Syrian's government failure to address this humanitarian and environmental crisis was thus a catalyst which further escalated tensions.

Water as a casualty of conflict

In 2012, fighting between the various groups damaged key pipelines in the city of Aleppo, resulting in almost three million inhabitants to suffer from water shortages (Water Conflict Chronology 2019). Later that year, Syrian rebels fighting Assad's regime managed to overrun government forces and take over control the Tishrin hydroelectric dam on the Euphrates River. The dam supports a large portion of electricity to the country and is considered a strategically important post for the Syrian regime (Water Conflict Chronology 2019).

In 2014, Assad's government reportedly bombed pumping stations in Aleppo, cutting off the water supply of the city once more. However, the Syrian Ministry of Foreign Affairs, reportedly blamed opposition forces for such attack (Water Conflict Chronology 2019). In 2015, fighters from the Jabhat al-Nursa, the Syrian branch of Al-Qaeda, bombed the major pipeline which carried water from the Euphrates River to the city of Aleppo. The bombing resulted in the contamination of the water, which sickened a hundred people (Water Conflict Chronology 2019). That same year, Russian forces bombed water treatment facilities in Aleppo. Reportedly mistaking it for an oil production facility, the treatment plant is one of the most important facilities in Syria, drawing its water from the Euphrates River and producing an average of 18 million liters of drinking water at a daily basis (Water Conflict Chronology 2019). According to UNICEF, the bombing caused severe damages, cutting off water supplies to around 3.5 million people (Water Conflict Chronology 2019). In late 2015 and early 2016, the Syrian rebel faction cut off water supply in the capital of Damascus. The rebel group cut off water from a spring in Ain al-Fijah, which resulted in a 90 percent reduction of the river flow into Damascus. This lasted three days in which the city faced high water shortages (Water Conflict Chronology 2019). In 2016, the Islamic State attempted to extend their territory by attacking the Tishreem Dam on the Euphrates River. However, the attack was countered by airstrikes which subsequently led to 14 IS deaths (Water Conflict Chronology 2019). That same year IS attacked a water plant in Deir ez-Zor which left hundreds of people dead, including Syrian soldiers, IS militants and civilians (Water Conflict Chronology 2019). From late 2016, to early 2017, the water supply in Damascus was again targeted, consequently leading to constant water shortages and cuts. The water from the Wadi Barada

and Ain al-Fija springs, which produced a total of 70% of the water to Damascus, was cut off due to the attack (Water Conflict Chronology 2019).

In 2017, the Syrian Arab News Agency, stated that a US led coalition against IS destroyed a critical pipeline which went into the city of Raqqa (Water Conflict Chronology 2019). That same year US and Syrian troops attacked IS forces which had been controlling the Tabqa Dam. However, reports vary on whether the air strike was intentionally targeting the water facility (BBC 2017). A year later, 2018 provided further examples of water infrastructures being victims of attacks. Water facilities and hospitals were targeted in an offensive led by Turkey in the Afrin and Tal Rifaat districts (Water Conflict Chronology 2019). Lastly, in 2019, a water station in Basida, Idlib Governorate, serving 80000 people was damaged due to the ongoing violence (UNOCHA 1, 2019). Further violence in northwest of Syria resulted in the damage and destruction of 29 water systems, serving more than half a million people (Water Conflict Chronology 2019).

Water as a weapon of conflict

In Syria, water has been weaponized in multiple occasions. In 2014, the Free Syrian Army (FSA) cut off water supplies from Ain al Fijah spring, a major spring near Damascus, subsequently driving out Syrian government forces of Wadi Barada villages (Reznick 2016). That same year IS contaminated drinking water supplies in the Balad District of the Salahaddin Governorate, Aleppo, Zeri ez Zor and Raqqa (UN Security Council 7, 2017). Similarly, in addition of being a casualty of conflict, the blockage of Ain al Fijah spring which delivers water to Damascus citizens, depicts how water is weaponized by attempting to drive out the opposition. In 2016, further attacks destroyed major water infrastructures in the country. Officials report that around half of the country's water access had been destroyed since the outbreak of the war (Water Conflict Chronology 2019). A year later IS flooded the nearby villages of Deir Hafer Plain, east of Aleppo, by pumping water from Lake Assad into the Al-Jar channel with the objectives of withholding the Syrian Arab Army from gaining further territory (Water Conflict Chronology 2019). Lastly, in 2018, the Afrin Dam on the Afrin River was occupied by Turkish forces and their Syrian Allies in order to gain an strategic advance of the region and flood out if necessary rebel forces (Water Conflict Chronology 2019).

Case 3: Iraq

Iraq is home to three major groups; Arabs, Kurdish and a variety of other ethnicities (eg Turkmen, Yezidi, Persian). Additionally, most of the population are Shia Muslims (64-69%) (Central Intelligence Agency 2020). In 2011, Syria's civil war rapidly sparked tensions in Iraq, however no until the steep raise of IS in 2014 (Salafist Jihadist following a Sunni doctrine) in Syria which resulted in a transboundary occupation, in which the faction conquered major cities such as Mosul, Fallujah and Ramadi (BBC 2018). For instance, when IS took over Mosul,

they gained control over the large dams in the city which approximately generated 75% of Iraq's electricity (Lossow 86, 2016). Iraq's water infrastructures have been delapidated, resulting in multiple infrastructural collapses as a consequence of poor maintenance, delayed modernization and the ongoing conflict (Lossow 86, 2016). Since the liberation of Mosul from IS in 2017, Iraq has been in its re-building phase, however other problems have risen. Dam building in Turkey and Iran has contributed to a significant reduction in the inflow of water from the Euphrates and Tigris. Moreover, extremely salinized water resources and environmental degradation is endangering the extinction of agricultural practices and livelihoods in the Marshes area. Lastly, the Tigris upstream flow from Baghdad will demand cautious cooperation with the Kurdistan regional government and central authorities (Lossow 5, 2018). All this together with the possible environmental-terrorism threat and fragile governance, make Iraq a complex territory for diminishing conflict through hydro-diplomatic measures.

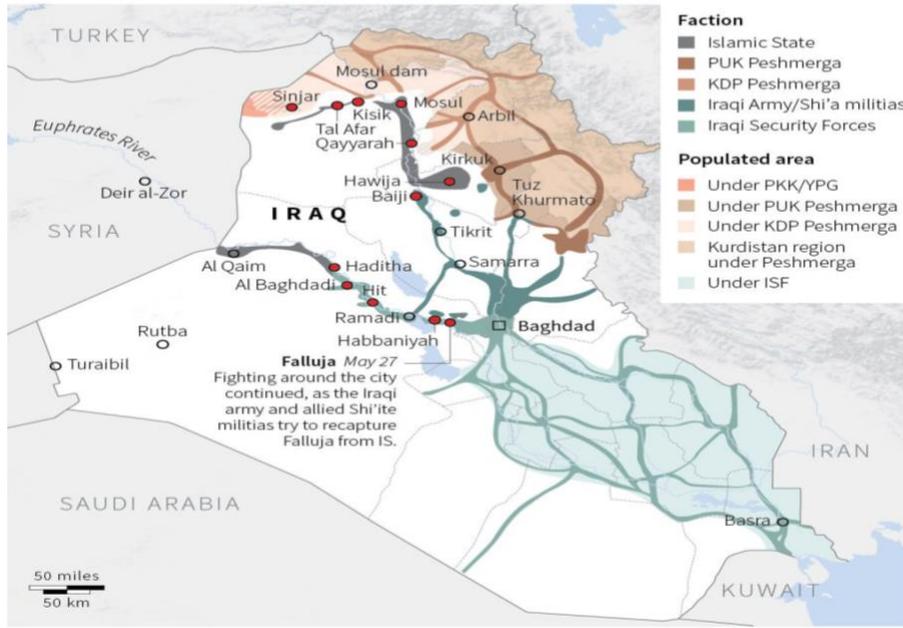
Around 70% of Iraq's water comes from external sources, predominantly originating in Turkey and Iran (Burden 2019). Turkey's dominant position over Iraqi water security has given them the opportunity to frame Iraq's domestic politics including; Kurdish nationalism, and the bilateral accords with Iran, Saudi Arabia and other states (Baconi 14, 2018). Moreover, due to climate change and the continuous periods of drought, the flow of water from the Euphrates and Tigris rivers have declined by 80% since 1975 (Burden 2019). This 80% is utilized for agriculture which supports 13 million out of the 39 million people, a major problem which has perpetrated Iraq over the years as population growth has increased by 10 million since 2011 (World Meters 2019). Dating back to the 1970s, water disputes already perpetrated the Iraqi community. Turkey's Southeastern Anatolia project, which comprised of 22 dams and 19 power plants, largely limited Iraq's water flows from the two major rivers (Burden 2019). Records also show that Iran has built around 600 dams in the past few decades, in which rivers such as the Karun and Kark, no longer flow into Iraq. In 2018, Hassan al-Janabi, Iraq's Minister of Water Resources claimed that the dams in both Turkey and Iran had caused the Iraqi water levels to drop 40% in the last couple of years (Burden 2019). Coupled with Iraq's rapidly growing population, climatic changes and civil conflict, this is postured to have grave consequences. On top of its transboundary river problems with Turkey, Iran and the ongoing conflict in Syria, insurgencies such as IS and AL-Qaeda have instrumentalized water to their advantage, in an attempt to diminish the distribution of freshwater supplies. This past decade has not introduced the first water related incidents, as back in the 1990s, Saddam Hussein drained the marshlands in southern Iraq with the objectives of destroying the livelihood of Shiites and to displace them, as a retribution for rebelling against his regime (Geneva Water Hub 3, 2016).

Image 6: The map below offers a visual representation of the various factions that control Iraq since 2016. Since 2017 the Iraqi government has regained control of most IS claimed territory, retreating the militia to Syrian frontlines (The Guardian 2017).

Iraq's control by faction

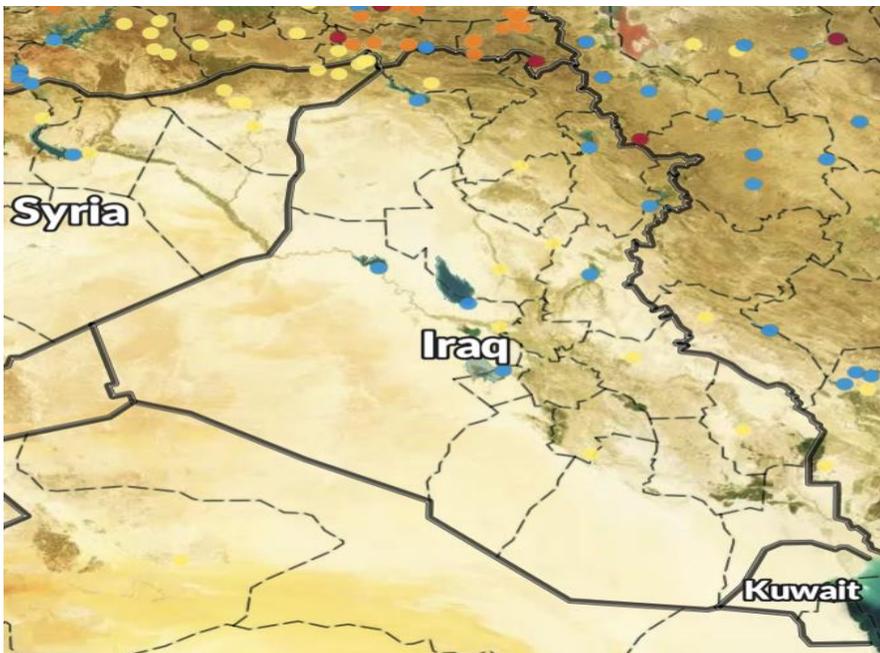
Control areas as of May 23.

• U.S.-led coalition air strikes from May 19 to 25



Source: Business Insider 2016

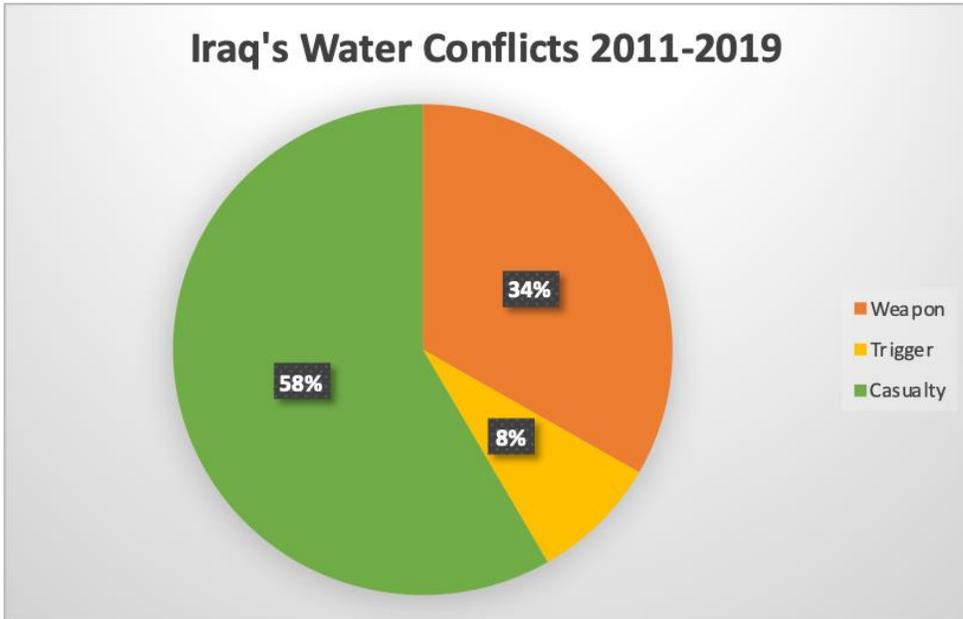
Image 7: Iraq is home to around 30 dams and reservoirs (shown below by the yellow and blue dots), by which the Euphrates and Tigris river encompass 100% of the country's surface water (Water Fanack 2016). Both the Euphrates and Tigris are transboundary rivers which originate in Turkey and flow through war torn Syria. The rivers and hydraulic infrastructures around the country have become key strategic hubs as well as key targets of military operations.



Source: Global Dam Watch

According to the Water Conflict Chronology Database, there have been 41 conflicts surrounding the exploitation of water since 2011 (Water Conflict Chronology 2019). The figure below provides an estimate of how Iraq's water conflicts have been categorized:

Figure 5:



Source: Water Conflict Chronology 2019

Water as a trigger of conflict

According to the available data, water as a trigger of conflict has occurred three times over the last few years. In 2017, conflict over water quotas led to the death of two and injured eight, between the tribes in Suq Al-Shoyokh, ThiQar (Water Conflict Chronology 2019). In 2018, it was recorded that a female activist working towards acquiring better government services (eg reliable drinking water) was assassinated. That year, tens of thousands fell ill from contaminated water in Basra, subsequently leading to violent civil protest, with 15 dead and hundreds injured (Water Conflict Chronology 2019).

Water as a casualty of conflict

In 2012, Al-Qaeda claimed responsibility for firing a mortar round which hit a water facility near the city of Mosul, killing one security guard (Water Conflict Chronology 2019). In 2013, four water projects employees were kidnaped by unknown assailants dressed as police officers. Although the reasons were uncertain, this could have been to gain strategic knowledge and professional expertise of the water works at hand (Water Conflict Chronology 2019). 2014 marked a period in which the Islamic State began to widely target water infrastructures.

That year IS seized the Fallujah dam, and advanced towards the Haditha dam, Iraq's second largest dam. Although they failed to conquer it, consequences could have been largely devastating as opening the gates would flood major cities around the territory (Water Conflict Chronology 2019). Since then, IS has been fighting to gain control of the Euphrates river dam which is about 120 miles north of Baghdad. That same year IS took control over Mosul Dam, the largest in the country. Over several weeks, the US and Kurd forces attacked the region, subsequently regaining control of the dam. The US conducted further air strikes close to the Fallujah Dam, a dam which was essentially built by IS to regulate downstream water supplies and to augment the flow of the Euphrates Tigris into Abu Ghraib canals, with the end goal of flooding local Shiite communities (Water Conflict Chronology 2019). Moreover, in less than a week several water projects were struck by explosives in the Al-Shirwat District, Saladin. Additionally, a blast in a purification plant contaminated local water, subsequently leading to 20 plus people being hospitalized due to poisoning (Water Conflict Chronology 2019). Lastly in 2014, fighting continued over the Haditha Dam between IS and government forces leading to the death of 70 people including IS militants and security forces (Water Conflict Chronology 2019). In early 2015, IS destroyed numerous wells, pumps and pipes in key points of the country. Soon after, an assessment by the Iraq Food and Security Cluster Partnership stated that out of the 450 deep wells only 50 were still usable (Water Conflict Chronology 2019). That same year, IS continued to strike the Mosul Dam on the Tigris, resulting in the death of 16 Kurdish Peshmerga soldiers, and driving out 1200 people who lived and operated in the area (Water Conflict Chronology 2019). Later in 2016, IS once again destroyed multiple pipelines which distributed freshwater in Mosul, leaving more than half a million people without access to the resource. Lastly, in 2017, IS further destroyed water purification plants near Mosul, injuring a policeman in a bombing of water, gas and oil pipelines near Dibis Kirkuk (Water Conflict Chronology 2019).

Water as a weapon of conflict

As above mentioned, IS seized the Fallujah dam in 2014. The militants closed 8 out of the 10 gates, with the objective of causing upstream flooding's and cuts in downstream water supply (Water Conflict Chronology 2019). The results were quite catastrophic as the militants managed to inundate 100km of land, placing parts of the city of Abu Ghraib under 4 meters of water. Furthermore 10 000 properties and 200 square kilometers of farmland were affected by the flood, killing a vast amount of livestock (Water Conflict Chronology 2019). Additionally, water for millions of people in the cities of Karbala, Najaf and Babil were cut off. That same year IS blocked access to water in a predominantly Christian town of Qaraqosh, driving out more than 50 000 residents (UN Security Council 6, 2017). Furthermore, IS intentionally contaminated water with crude oil in the Balad District of Salahaddin Governorate and in Baghdad (UN Security Council 6, 2017). In 2015, IS deployed similar tactics to those employed with the Fallujah dam, by redirecting the water flows of the Ramadi Dam, with the objective of facilitating a military movement across the Euphrates Tigris. As a result, multiple downstream

communities faced water shortages. Following the operation, IS continued to cut water irrigation systems and treatment plants in predominantly based Shia downstream provinces of Babil, Karbala, Najaf and Qadisiya, endangering Iraqi food production. In 2015, IS captured the Tharthar Dam on the Tigris River near Fallujah in the Anban province, resulting in the death of 127 Iraqi soldiers (Water Conflict Chronology 2019). It is recorded that the militants opened at least one floodgate, to draw out downstream communities (Water Conflict Chronology 2019). Lastly, in 2017 IS was accused of cutting off the water flow and diverting a river in Abu Karmath and Muqdadiyah, Diyala (Water Conflict Chronology 2019).

Case 4: Israel / Palestine

More than half of Israel's water is derived from aquifers, river flows, floodwater and wastewater recycling. To protect the sources, the Israeli government has been limiting the utilization of water in both the Jewish settlers and Arabs of the West bank (Al-Shalalfeh & Napier & Scandrett 117, 2018). However, throughout the years this has been largely disproportionate in favor of the Jewish side, as settlers consume four times more water than Palestinians (Homer-Dixon 7). Since 1967, Palestinians have not been permitted to drill new wells for agricultural purposes, consequently leading to increased levels of resource scarcity and drought (Al-Shalalfeh & Napier & Scandrett 120, 2018). Dixon thus argues that political and violent tensions have emerged over the years due to resource and land disputes. He concludes by affirming how both water scarcity and the subsequent economic effects have contributed to the grievances behind the intifada in the West Bank and Gaza (Homer-Dixon 7). During the Six Day war of 1967, Israeli forces managed to seize the Gaza Strip and the Sinai Peninsula from Egypt, the Golan Heights from Syria, and the West Bank and East Jerusalem from Jordan (History 2018). The war ended with a UN agreement, introducing a ceasefire, however it disrupted the geopolitical backdrop of the Mideast. Consequently, the occupation of the West Bank and Gaza put all-natural resource under Israeli command. 158 water sources and projects were under the Israeli army's command, and Palestinians had to request special permits for any future water projects (Al-Shalalfeh & Napier & Scandrett 120, 2018). In 1981, the Israeli cabinet adopted a 'Drobless plan', which aimed to increase the number of Israeli settlers in the West Bank. This violated Article 49 of the Geneva Convention of 1949, which stated "the occupying power shall not deport or transfer parts of its own civilian population into the territory it occupies" (Al-Shalalfeh & Napier & Scandrett 120, 2018).

Forty years later, the implementation of the Oslo Accords in 1993 and 1995, which aimed at introducing a peace process and Palestinian self-determination, was also ignored as the Israeli settler populations saw rapid increases. Before signing the agreements, there were around 255,172 settlers, in 2012, the settler population was estimated to be 547,000 and today the EU has recorded that there are approximately 630,000 settlers in the West Bank and Gaza in some 143 settlements (EEAS 2019). This large displacement has not only increased political

tensions, but it has also put vast pressure in the irrigation of the land, in which drought and fluctuating weather patterns have contributed in the decline of water availability (European Parliament 2, 2016). The World Health Organization sets a variety of living standards such as for instance the recommended minimum daily domestic consumption of water which is around 100 liters per person (United Nations 2, 2010). While Israeli consume around 300 liters, settlers 369 and Palestinians in the West Bank 73 (Al-Shalalfeh & Napier & Scandrett 120, 2018). The rising settler occupation has served as a backdoor of Israeli politics and military to continue with their expansionist policies. It is estimated that around 42.8% of the West Bank land between built up areas and land reserves are controlled by settlers (Al-Shalalfeh & Napier & Scandrett 120, 2018). In 2011, the United Nations reported that 56 springs within area C had been either taken by settlers or put in risk. Due to this, many foreign governments and international non-governmental organizations tend to regularly distribute water tankers, drilling cisterns and constructing filling points for Palestinian communities (Al-Shalalfeh & Napier & Scandrett 121, 2018). Gaza, another key Palestinian region, which encloses around 1 million people has also largely been affected by Israeli military action. Due to the existing blockade of Gaza, Israeli has full dominance over its borders, water and airspace. This highly limits the amount of water flow into the territory, as seen with the Israeli ban on the Mountain Aquifer (one of the two in the country) to transfer water from the West Bank to Gaza (Al-Shalalfeh & Napier & Scandrett 120, 2018). Amnesty International reported that 95% of Gaza's municipal well water was unsuitable for water construction (Al-Shalalfeh & Napier & Scandrett 122, 2018). Israeli thus has a hydro-hegemony over Palestinians water resources, which has served as a geopolitical and military tool over the years, further escalating the conflict. This has raised international concerns in which the UN, EU and various individual countries have repeatedly raised concerns about the water shortages and differences amongst the two factions. Former EU Parliament president, Martin Schulz, in his 2014 speech in the Knesset (Israel's Parliament), addressed the water issue, reiterating the significant difference (European Parliament 3, 2016).

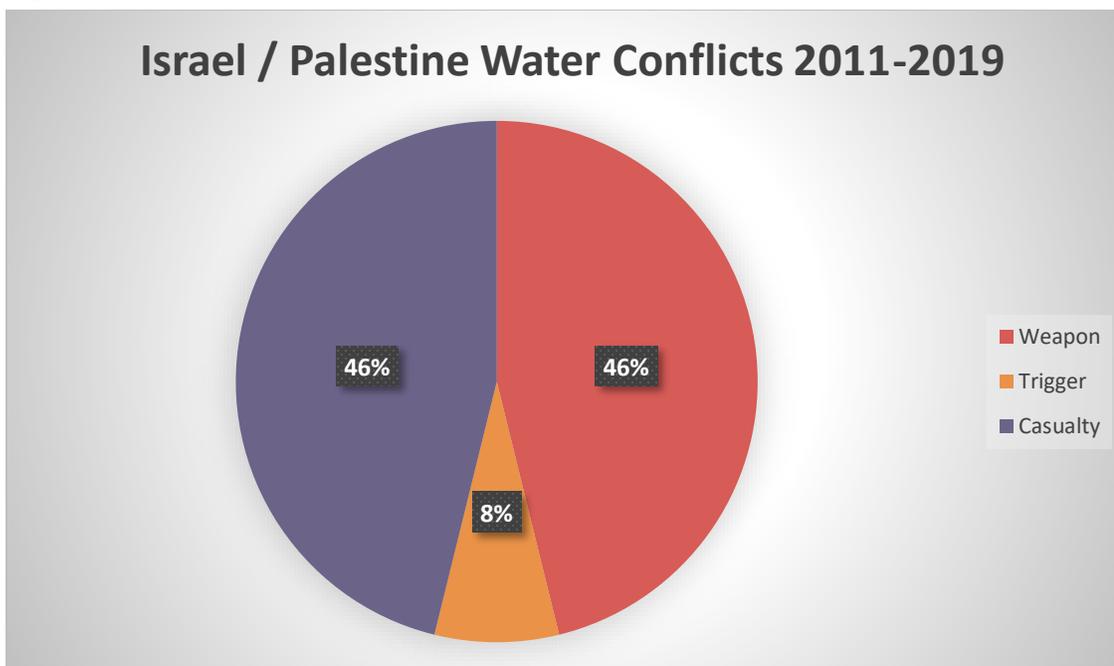
Image 8: The map below offers a visual representation of Israel as well as the Palestinian territories in the West Bank and Gaza. This map will facilitate to pinpoint key water conflicts throughout the regions.



Source: Nations Online

According to the Water Conflict Chronology Database, there have been 7 conflicts surrounding the exploitation of water since 2011 (Water Conflict Chronology 2019). The figure below provides an estimate of how Israel/ Palestine water conflicts have been categorized:

Figure 6:



Source: Water Conflict Chronology 2019

Water as a trigger of conflict

Only one example has been recorded of how water is a trigger of conflict. This happened last year, in 2019, when a homemade explosive detonated at a spring, killing an Israeli teenager and injuring two family members (Water Conflict Chronology 2019). For an extended period, springs in the West Bank have been hotspots of conflicts between Israeli and Palestinians, who during the warm and long summer periods tend to often visit. Although the perpetrators are unknown, this attack could have been in retaliation of the Israeli hydro-hegemony over water related resources in the West Bank. This can be seen as an opportunity-based attack from a Palestinian standpoint, however it triggered further tensions over the allocation and availability of the resource.

Water as a casualty of conflict

As the database records, water as a casualty of conflict has occurred six times. In 2011, the Israeli military destroyed nine water tankers in the Bedouin village of Amniyr, near Hebron in the West Bank. Later, soldiers destroyed further pumps and wells in the Jordan Valley of Al-Nasriyah, Al-Agrabiyah and Beit Hassan (Water Conflict Chronology 2019). That same year a number of Israeli settlers attacked wells in Qasra, another village in the West Bank, destroying water systems and 6 000 crops (Water Conflict Chronology 2019). In 2013, an Egyptian and Israeli blockade of Gaza aimed at cutting fuel supplies, results in the uneventful closure of Gaza's wastewater treatments plants, subsequently causing extensive sewage overflows (Water Conflict Chronology 2019). In 2014, Gaza's water infrastructures were gravely damaged due to the ongoing conflict with Israel. The World Health Organization and other humanitarian groups reported that a water facility, wastewater treatment plants and a desalination facility were damaged during Israel's military attack (Water Conflict Chronology 2019). That same year, Israeli warplanes further hit water supply wells, pipelines and wastewater treatment plants which provided for hundreds of thousands of Palestinians in Gaza (Water Conflict Chronology 2019). Palestinian officials stated that the attack was intentional and that it posed a serious war crime in accordance to the Geneva Protocol. Lastly, in 2017, it is recorded that Israeli troops destroyed water pipes in rural areas and clashed with local Palestinians in Jenin, the West Bank (Water Conflict Chronology 2019).

Water as a weapon of conflict

The data gathered, shows how water has been utilized as a source of conflict since 2011. Up until 2015, Israel has tempered with Palestinian water supplies numerous times, creating water shortages or impeding flows to arrive in villages. In 2015, the Israeli government planned a billion-dollar city for the Palestinian citizens, however it was continuously slowed and delayed for years while the Israeli government withheld access to basic

water systems (Water Conflict Chronology 2019). Accordingly, the delay was due partly cause of the conflicting ideologies towards the Israeli-Palestinian Joint Water Committee. Later in 2015, the water supply was finally agreed upon, however the quantity was only sufficient for the 640 families that lived there, instead of the planned 25 000 residents (Shuttleworth 2015). Lastly, in 2019, Israel reportedly cut off water systems which supplied 1500 Palestinians. The Palestinian News Network reported that 17 Palestinian communities' water was shut off around Hebron in the West Bank. It was further stated that it was an intentional cause by the Israeli forces to force Palestinian locals out of their homes and open up space for the creation of new Israeli settlements (Water Conflict Chronology 2019).

5. Analysis

This section will analyze the various hypotheses, as introduced in the methodology section, in order to check whether the results match the expected assumptions. Moreover, this section will aim to produce a holistic approach of the impact of water as a key catalyst on conflict related issues.

Firstly however, a brief summary of the number of water related incidents (trigger, casualty, weapon), prior to the Arab Spring extracted from the Water Conflict Chronology database will be portrayed in order to have a better understanding on whether the instrumentalization of water augmented since the uprisings.

Table 1: Water related conflicts between 2000 and 2009

	Israel/Palestine	Iraq	Syria	Yemen
Weapon	3	0	0	0
Trigger	0	0	0	3
Casualty	3	33	0	0

Source: Water Conflict Chronology 2019

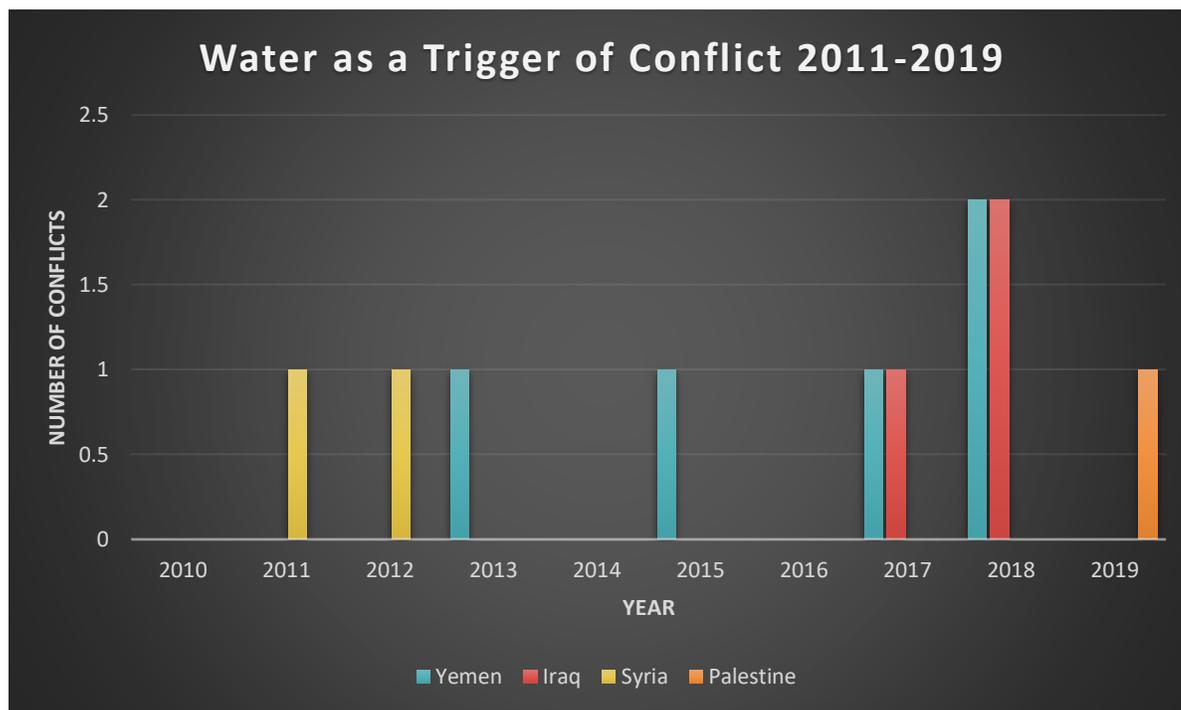
This table shows how water was instrumentalized 42 times prior to the Arab Spring in comparison to the 204 water conflict related results between 2011 and 2019 (Water Conflict Chronology 2019). It can thus be clearly stated that the Arab Spring had a wide impact on non-state and state actors towards implementing a new means of strategic warfare in the long-lasting uprising which blurred borders, involved a variety of actors and had vast international outreach. A point worth noting however, is the 33 casualty related incidents in Iraq. Most of the events were of relatively small nature, other than a couple of air strikes which inflicted damages upon water systems. It is however incomparable to the strategic military and geopolitical thoughts behind the exploitation of water since the Arab Spring in which groups such as IS specifically utilized certain water facilities to progress in

their Islamic Caliphate territorial acquisition objectives. The relative deprivation theory, which highlights how people are bound to rebel when they are being deprived of political, economic, social, humanitarian or any other fundamental right, underlines how the Arab Spring introduced a long-standing period of instability and uncertainty. This reinforces how water was instrumentalized five times more than prior to the uprisings.

H1: Water scarcity is a key factor in conflict related issues.

Water scarcity has been an ongoing issue since many centuries. However, the ongoing drought in the Middle East, together with the civil uprisings during the Arab Spring and the emergence of additional insurgent groups such as the Islamic State, has increased the feud over natural resources. Over the decades, various scholars such as Homer Dixon, part of the Toronto School of thought, one of the most outspoken scholars on water and conflict which follows neo-Malthusian predictions (water scarcity will lead to future ‘water wars’ and how water will act as a strategic goldmine in conflict), together with Peter Gleick, (where he highlights various ways in which water fits into modern warfare), have continuously debated in favor of this divide (Tir & Stinnet 214, 2012). Hence, they argue that water scarcity is a trigger of conflict and a contributing factor to escalating disputes. The table below shows the number of incidents, taken from the Water Conflict Chronology Database, in which water has acted as a trigger (where due to water disputes conflict has risen). As figure 7 demonstrates, the number of occurrences in the various cases is minimal.

Figure 7:



Source: Water Conflict Chronology 2019

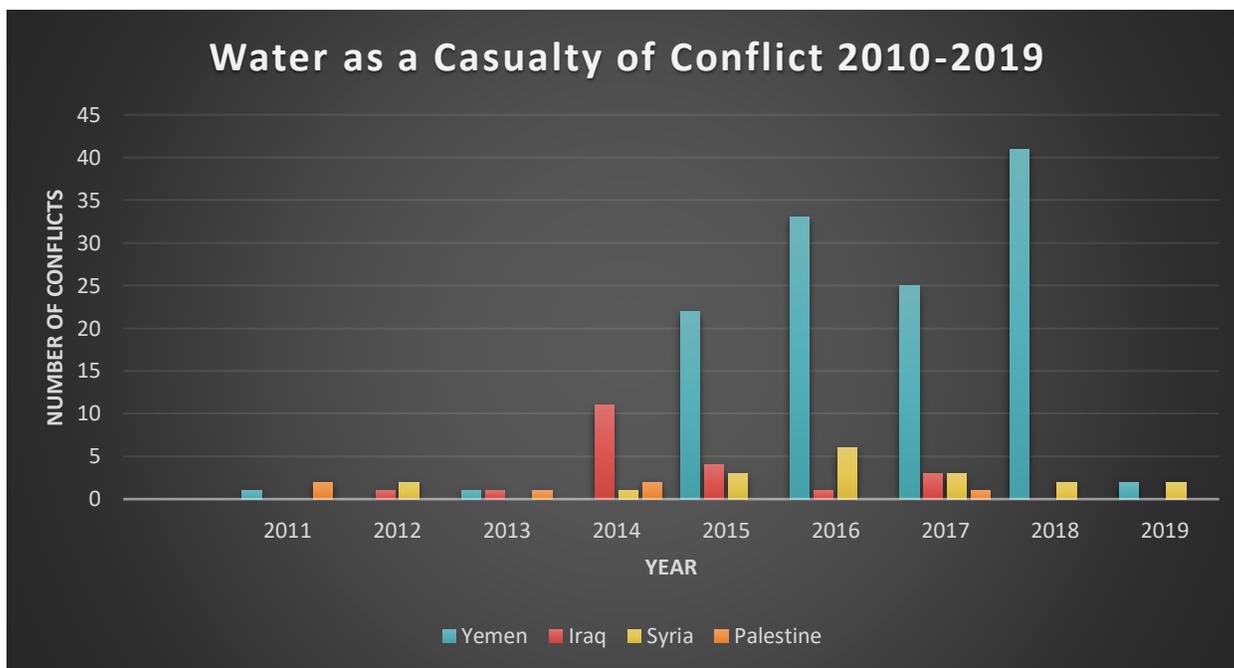
Firstly, the extracted data shows how water was a triggering factor in Syria's civil conflict which emerged in 2011 during the Arab Spring. As it has been stated in multiple documents written by the UN, EU and research institutes such as the CNA and the Atlantic Council, water seemed to be a contributing factor to the ongoing conflict (CNA 2017 & Suter 2017 & EC Europa 2019). Several droughts have hit the Middle East, creating agricultural shortages, ethnic disputes (clashes between villages), civil discomfort, rising prices and unemployment. A collection of all these variables, together with the ongoing corruption, can be said to have determined the local population to take to the streets and protests against Bashar Al-Assad government. Based on the data, it is not sufficient to blame the escalating conflict in Syria alone to water scarcity, rather it should be based on a mixed variety with geopolitical and socio-economic factors which contributed to the spark of the civil war. Yemen which has a significant smaller number of rivers, only one dam and a much lower precipitation index (167 cubic meters in comparison to Syria 252) (See Figure 10), has demonstrated how tensions over water have turned to be a key catalyst of emerging conflict. Former Yemeni Minister, Abdul Rahman al-Eryani, said 'wherever in Yemen you see aquifers depleting, you have the worst conflicts' (Friedman 2013). As the data has shown, most of the conflicts have been triggered between tribesmen due to the limited availability of water in mountain springs and wells (Water Conflict Chronology 2019). In 2014, the interior minister said that water disputes claim thousands of life's per year, thus emphasizing on the critical nature of the resource in the region (Water Conflict Chronology 2019). This complexity could show why in Yemen for instance, water scarcity would have a much bigger effect than in other places. 2017 and 2018, again showed clashes between tribesmen and pro-Houthi forces over water projects. Iraq also experienced water a trigger of conflict during those two years after experiencing contaminated water which affected thousands in the city of Basra. This led to escalating violence and the deaths of multiple people. However, once again the number of minimal incidents does allow for a generalized conclusion of how water is definitively the major contributing factor. Lastly, 2019, shows one example in Palestine, where settler disputes in the West Bank over a spring turned violent. Thus, in total 11 incidents of how water served as a trigger to conflict can be found. Although the number is low, it still should not diverge international organizations, researchers and the local governments to face the issue at hand. Water scarcity can continue to escalate over the years, further weakening the currently fragile regions. Hence, what now may not seem as a critical point of nature, in a few years' time, might be the key to understanding and solving disputes. For instance, the United Nations has estimated that by 2025, around 1.8 billion people will be living in regions throughout the world with absolute water scarcity, and moreover how two thirds of the world's population could be under water stress (CNA 7, 2017). Many predictions follow similar lines to the above statements, however due to the lack of empirical cases linking conflict to water scarcity, researchers, politicians and key figures both in the international and national arena, seem to be skeptical about the connection. Does water scarcity really lead to conflict?

Few of the above examples demonstrate how indeed it does, but then again, they do not seem to be sufficient to change the argument towards the ongoing relationship. The absence of full-scale wars also seems to be one of the reasons to why such claims are made. Many scholars such as Giordano and Wolf, Duda and Uitto, Jarvis and Dauoudy, have reinforced how cooperation between states tend to happen more often, for instance through RBO's or international organizations before conflict (Ribeiro & Sant'Anna 14, 2014). This however does not take in consideration the vast amount of localized conflicts between various ethnic groups, tribes and villages which in the long run can have a vast national effect. SIDA, a Swedish International Development Agency, has further reinforced this link by coming to an overall conclusion of how there is not sufficient consensus by the research community as well as the International Panel on Climate Change (IPCC), of how water is directly linked to the emergence of conflict (SIDA 9, 2017). Further examining how water scarcity is a contributing factor to the underlying roots of conflict. The report further states how the fragility of a state, in which in this case all except Israel, face institutional declines, and the lack of legitimacy, further complicate water disputes, consequently escalating conflict around it (SIDA 60, 2017). For instance, a UN factsheet on the water conditions of Iraq stated how water scarcity has the potential to increase tribal and ethnic conflict in the region due to the regular emergence of water-like disputes (UN 2013). Baconi, writing on behalf of the European Council on Foreign relations concluded that water has acted as a catalyst to conflict and instability in the Middle East throughout the past decade (Baconi 20, 2018). Baconi stresses how water scarcity can have a three-faceted result; it can lead up to domestic social unrest, were a ruler's lack of regulations and reliable supply of water is contested by citizens, eventually leading to protest. It can have environmental stress impacts, were states are unable to deal with the unexpected weather conditions, such as for instance drought, which again can lead to conflict. And lastly, it can incite transboundary conflict were a state's pursue for water leads to confrontations with their neighbors (Baconi 21, 2018). Schaar further argues that a series of historical confrontations based on the Sunni vs Shia divide, Arab versus Israeli, the ongoing Arab order versus disorder over the years which have led to the fragility of states, and the radicalization into Islam, have all contributed into the so called water crises (Schaar 6, 2019). Overall, water scarcity has played a key role in all of the examined cases as described in the case study section. Water is an element which can substantiate conflict, increase disputes and displace populations. Generally, the available literature is skeptical to make a direct link between scarcity and conflict, due to the lack of empirical data and field research (Schmeier & Baker & Blauw & Iceland & Meijer & Sasse 4, 2019). However, as the analyzed cases have shown, the lack of water availability, drought and the high levels of aridity in the regions have widely triggered conflict on numerous occasions. Water per say might not have been the only factor, as public discontent of the socio-economic and political backdrops of the country have also seemed to perpetrate the arena, have also contributed to the ongoing dispute. Nevertheless, a link can still be formally introduced in which water scarcity plays a substantial role in the emergence of conflict in an already fragile environment.

H2: Water is being instrumentalized as a tool of war by states and insurgent groups to gain military and geopolitical advantages

World War I already demonstrated how water could be instrumentalized for strategic military geopolitical advantages. Belgium, provides a good example, where in 1914 they opened locks on rivers and canals in order to produce a high tide, and flood out their enemies (Lossow 3, 2016). Today, water continues to be utilized as a tool in times of conflict. This approach however has disrupted the conventional tactics of warfare, introducing a hybridity of techniques into modern day combat. Resulting in the conceptualization of new notions such as hydro-terrorism, part of the environmental terrorist divide (Dubois King 2016). Figure 8 shows how water has been a casualty of conflict; thus, were water systems, resources and infrastructures are intentional or unintentional casualties of violent conflict. Water as a casualty of conflict emerged the most times with 171 incidents while water as a weapon occurred only 24 times. This could be due to the high levels of drought in the region which leads to high levels of water scarcity, disallowing the weaponization of water in abundance.

Figure 8:



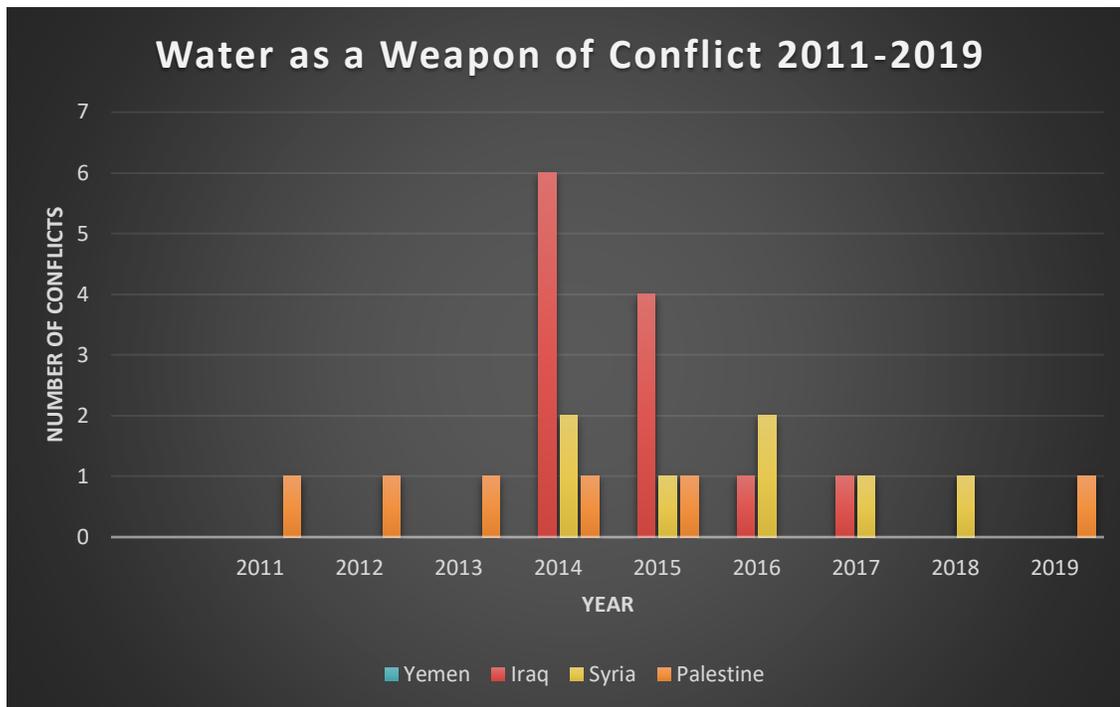
Source: Water Conflict Chronology 2019

Figure 8 shows a gradual increase from the beginning of the Arab Spring in 2011, then a very steep increase between 2015 and 2018, and a sharp decrease in 2019. There is however a significant difference amongst the three cases, were Yemen experienced 125 incidents, Iraq 21, Syria 19 and Israel/Palestine 6. The high number of incidents are mainly based in Yemen, due to the outbreak of the civil war in 2015, when a Saudi led coalition

backed by the US, started bombing many cities and villages in the country in order to re-instate president Hadi, after being overthrown by Houthi rebels. A total of 20,330 air raids were recorded by the Yemen Data Project (Yemen Data Project 2018). Air-strikes by the military, non-military and unknown sources perpetrated Yemen during the years. Water tanks, systems, dams, projects, wells, factories and any other type of infrastructure were destroyed during the conflict. This had catastrophic effects as for instance in 2016, 20 million people were deprived of access to clean water (Water Conflict Chronology 2019). In Iraq and Syria, the Islamic State had the most impact on water systems. Their seizures of various dams such as Fallujah and Mosul in Iraq, and Tishreen and Tabqa in Syria, demonstrated how water had become a new tactic to the conflict. In Iraq, most of the incidents occurred in 2014, when Islamic State forces had been rapidly growing (lots of foreign fighters joining the ranks), which resulted in one of the most devastating years to the countries water infrastructures (Water Conflict Chronology 2019). This gradually decreased towards 2019, when IS started to lose territory and control over the dams. In 2017, IS lost one of its final strongholds in Abu Kamal, Syria, near the border with Iraq (The Guardian 2019). This would be a credible explanation to the sharp decrease. The incidents recorded in Syria in 2018 and 2019, are based on Turkish offenses towards water infrastructures and in regaining the Afrin Dam, which largely contributed to the countries water sources (Rudaw 2018).

Palestine only shows six incidents of water as a casualty of conflict. It varies between the eight years, with incidents in 2011, 2013, 2014 and 2017. The incidents, all mainly based on Israeli forces targeting Palestinian water pumps, wells or springs demonstrate how water in the ongoing Arab-Israeli has become a key source of conflict. The European Union for instance has written multiple reports criticizing Israeli attacks on water treatment facilities which go against international treaties and regulations on the access to water (Sustainable development goal 6) (European Parliament 17, 2015). Israeli settlers have also partaken in this mission, destroying further facilities in the fight towards gaining territory in the West Bank. It can then be argued that Israeli forces deliberate targeting of water sources, serve as a key objective to gain geopolitical advantages and flush out Palestinian inhabitants in the West Bank. Another example is 2013's blockade of Gaza's wastewater treatment plant, which resulted in a massive overflow of sewage (Water Conflict Chronology 2019). This can be seen as a military attempt to drive out, oppress and deprive the people of Gaza from essential resources.

Figure 9:



Source: Water Conflict Chronology 2019

The weaponization of water has been deployed on numerous occasions (24), however it does not match the number of incidents of water as a casualty of conflict. As above mentioned, the weaponization of water systems, resources and infrastructures is not a new phenomenon. WWI, and the 1990s with Saddam Hussein, provide two examples of how water was instrumentalized to gain geopolitical or military advantages by using flooding techniques or contaminating water flow to drive out the opposition. In Palestine 6 incidents have been recorded, spread evenly between 2011 and 2019, in Iraq 12 recorded incidents can be examined, mainly in 2014 and 2015 and in Syria, 6 incidents also emerged starting in 2014 up to 2018. As examined during the case study, the ongoing political dispute between the Arabs and Israeli has extended beyond the negotiation table, creating numerous other tensions such as the distribution of natural resources and disputes over land (eg. settlers in the West Bank). Through air strikes, manual cuts and population displacement Israel has managed to deprive Palestinians from accessing water resources. They have thus weaponized water by having a hydro-hegemonic advantage around all supplies (rivers, springs, aquifers, wells etc), and utilizing it as a tool to create shortages to Palestinian towns, with the eventual goal of pushing them out and expanding the settler territories. Iraq faced its peak of incidents in 2014 and 2015, as that was when the Islamic State had strongest support and a wide majority of the territory. Some of the key tactics were to occupy dams, in order to play around with the hydrologic chambers by either opening them, causing floods, or closing the gates and depriving towns or nearby enemy camps from water resources (Lossow 2, 2016). Poisoning water flows also became a key strategy of the Islamic State, were

for instance they contaminated water flows with crude oil in Syrian villages (Water Conflict Chronology 2019). Psychological warfare or terrorism can be the results of such strategies, instilling fear in local populations and enemy forces when attempting to feed on the natural resource (DuBois King 158, 2016). The table below shows the various ways by which the involved actors have utilized water as a weapon.

Image 9:

Different ways of Weaponizing Water (Hydro-terrorism):

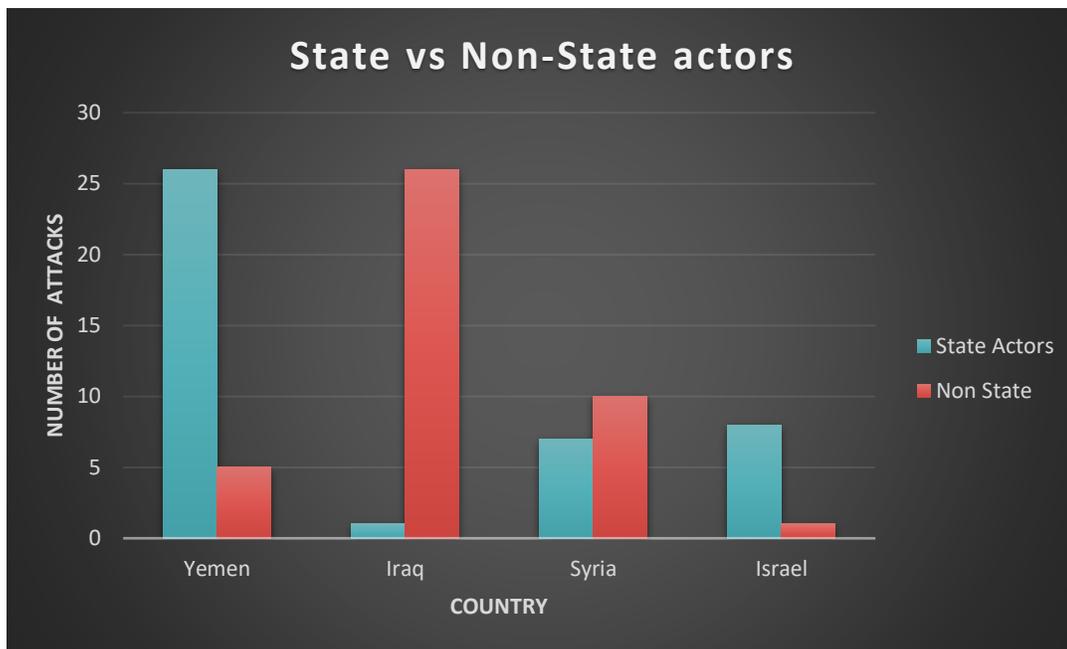


In 2012 the US intelligence community created an assessment on the possible water security implications that the globe could face in the future. Amongst water shortages, increased demand but declining supply and poor water management, water as leverage, water as a weapon and water terrorism were three categories highlighted in the report (Intelligence Community, 4 2012). In all of their conclusions, they estimated that in 10 years’ time the three above mentioned variables would be highly problematic, depicting key concerns within the international community. As the results have demonstrated, water has incited a new wave of unconventional warfare, attracting both state and non-state actors to the table. This remark leads to the hypothesis below;

H3: Non-state actors are more likely than states to violate the rules of war in relation to water issues.

First of all, it can be concluded that non-state actors have weaponized water on more numerous occasions than state actors. As the database has shown, the Islamic State has been the group which has weaponized water the most. It has imprinted a blueprint for other militias but also state actors through which one can analyze how water can be used for military and geopolitical advantages. Water had been instrumentalized before, though not to the extend in which IS managed to exploit it since the Arab Spring. Together with climate change and the uncertainty of weather patterns (eg long standing droughts), it has benefitted the groups growth to put more emphasis into utilizing water systems and infrastructures. However, as the figure below shows, the overall instrumentalization (eg. casualty) of water between state and non-state actors has shown some similarities.

Figure 10:



Source: Water Conflict Chronology 2019

It is firstly important to establish that the data extracted for this state vs non-state incident analysis does not encompass the whole spectrum of instances in which water has been instrumentalized. Instead it only pinpoints events where the data clearly states who the perpetrator was (eg. name of a country or insurgent group/militia). All further attacks (eg air raids, manual destruction of pipelines), which do not have a personal label on them have not been considered for this figure. Examining the graph above, Yemen shows a high number of state-based attacks due to the elevated number of air raids under the Saudi-led coalition since 2015 (falling under water as a casualty). In Iraq, the number is largely focused upon the Islamic State as above mentioned. In Syria the number of incidents tends to deviate, however non-state actors demonstrate a higher occurrence. While in Israel, the Israeli government and the IDF are the two main responsible agents for the instrumentalization. The table below provides a summary of the various non-state actors and the means by which they have instrumentalized water. The most common variable is the blockage of water supplies or the destruction of water tanks, wells and pipelines. These have been key strategies to drive out and repress oppositions from essential resources, with the goal of acquiring further territory.

Table 2:

Non-State Actors	Means of instrumentalization on water systems & infrastructures
Islamic State	<ul style="list-style-type: none"> ○ Seizing Dams ○ Flooding (opening hydrologic chambers) ○ Creating water shortages (closing hydrologic chambers) ○ Blocking water supplies (cutting off irrigation systems) ○ Poisoning water ○ Recruitment (incentivizing people to join by offering the resource)
Al-Qaeda & AQAP	<ul style="list-style-type: none"> ○ Destruction of water tankers ○ Mortar round striking water facility ○ Recruitment (incentivizing people to join by offering the resource)
Jabhat al-Nusra	<ul style="list-style-type: none"> ○ Bombing of pipelines
Houthi Rebels	<ul style="list-style-type: none"> ○ Destruction of water wells
Free Syrian Army	<ul style="list-style-type: none"> ○ Cutting off water supplies
Unknown militias or civilians	<ul style="list-style-type: none"> ○ Blocking water supplies ○ Kidnapping ○ Air strikes

Source: Water Conflict Chronology 2019

Records also show how various states have instrumentalized water during the Arab Spring conflict. Yemen's civil war in 2015, in which the Houthi rebels attempted to overthrow President Hadi, eventually leading to a Saudi led coalition with the US, had devastating effects to the water infrastructures and systems of Yemen (7003 military airstrikes were accounted for since 2015 in the Yemeni region) (Yemen Data Project 2019). Russian forces together with Bashar Al-Assad regime also bombed various water infrastructures in Syria. Additionally, Turkey was further involved with aerial offensives targeting hospitals and water facilities in various Syrian districts (Water Conflict Chronology 2019). Lastly, Israel is the main actor instrumentalizing water in the Arab-Palestinian conflict. Through air strikes as examined in the example of Gaza's sewage water disruptions and the various attacks by settlers and the IDF (Israeli Defense Forces), towards wells and springs in the West

Bank, all have conclusively raised international concerns on Israel’s strategic tactics. The table below shows the various ways in which state-actors have instrumentalized water during conflict.

Table 3:

State Actors	Means of instrumentalization on water systems & infrastructures
Saudi Arabia	○ Air strikes
United States	○ Air strikes
Russia	○ Air strikes
Syria	○ Air Strikes
Israel	○ Air strikes ○ Blockading supplies ○ Ground forces destroying wells, springs, pipes
Turkey	○ Air Strikes ○ Blockading river flow
Iraq	Unknown

Source: Water Conflict Chronology 2019

It can thus be concluded that both state and non-state actors have violated *The Rules of War* on numerous times. States have mainly instrumentalized water through air-strikes (casualty), while non-state actors have physically weaponized water systems and infrastructures to a greater extend. The image below emphasizes upon two key conventions (The Geneva and The Hague Conventions), which set a framework in which water related facilities and sources should be protected in times of war. The latter two, provide additional rules to the protection of civilians and the environment from military purposes (Madrid 1976), and introduce regulations to the navigation in transboundary waters (eg. rivers) in order to prevent future intrastate clashes and exploitation of water resources by set parties (1997 Convention) (Geneva Water Hub 20, 2019 & Gleick 106, 1993).

Image 10:

Jus in Belo (The Rules of War):



Looking at the above image and the underlying variables of each convention and treaty, one can conclude that the Geneva Convention, the Hague Convention, the Madrid Rules and the Conventional Law of the Non-Navigational use of International Watercourses, have all been violated during the Arab Spring of 2011 up until 2019. Furthermore, the only example of the ICC penalizing Omar Hassan Ahmad Al Bashir, President of the Republic of Sudan, for contaminating wells and water pumps, further highlights the weakness of the intentional humanitarian law system (International Criminal Court 2009). Laws on the exploitation of water are clearly stated on paper, and many reports have been written on them, however when it comes down to the actual effectiveness and implementation of them, a lack of consensus and enforcement, demonstrate the fact that they are still at an early stage of enforcement. Additionally, the cases examined are all experiencing certain types of conflict (eg civil unrest, ethnic clashes, civil war), are fragile states, lacking the democratic institutionalization of the western world (except Israel to an extent), making it difficult to force those regimes to abide by international laws and regulations. Thus, a more comprehensive and holistic approach, such as for instance through Early Warning Systems and reinforcing current water infrastructural systems (adaptive capacity), could be a better means of going forward. This will be further discussed in the recommendation's sections.

H4: Violent water disputes are more prone to emerge at the intrastate level than the interstate level.

CNA, a non-profit research organization in the US, working closely with the American government and homeland security, produced a conflict spectrum portraying the various types of disputes that may arise (CAN 2, 2017). The image below shows four types of conflicts, which will be linked with the chosen cases of this study.

Image 11:

The Conflict Spectrum



Source: CNA 2017

Overall, from the examined data, violent water disputes have mostly emerged at the intrastate, local level. In the Yemen case, all the fighting has taken place within the country, however multiple state actors such as Saudi Arabia and the United States have been involved in the fight. They were fighting Houthi rebels, and thus the Yemeni government was in support of the Saudi led coalition. Yemen would thus provide a scale of conflict between civil unrest and instability to terrorism, insurgencies and civil war. To put a label to it, Yemen could be categorized as an internationalized civil war, in which multiple states have participated within Yemeni territorial boundaries. Similarly, Iraq and Syria would fall between the first three categories, mainly focusing on terrorism, insurgencies and civil war. Repeatedly, multiple state actors have been involved in various attacks (Turkey, Russia and the US), however, they were not state on state conflicts but rather disputes against certain insurgencies (eg IS). This has been a problem as it has created an uncertainty of traditional warfare, which tended to be state on state based. The multiplicity of actors involved for various interpersonal reasons, plus the emergence of the Islamic State which significantly grew and operated in Syria and Iraq, blurred the traditional state and geopolitical boundaries. This has made it more difficult for international relations experts and moreover for international laws to be effectively be implemented. The ease in cross-border operations by militant groups, aiming to establish an all greater Islamic Caliphate, introduced a perspective of understanding the conflict spectrum and the way by which current NSGA's might operate. International regime theory is thus limited in the sense by which the transboundary nature of the conflict at hand makes it difficult to institutionalize a set of legitimate regulations

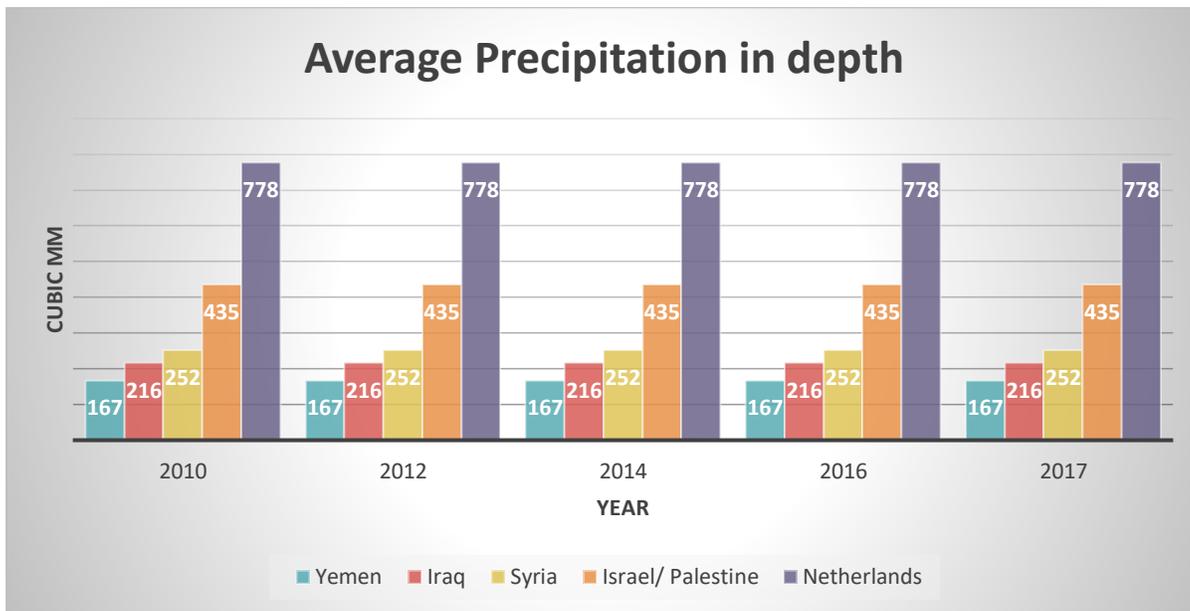
under international law, to facilitate the easing of tensions. Lastly, the Arab-Israeli conflict would fall under the first two criteria, civil unrest and instability, and localized violence, as most of the attacks have been deployed by the IDF or settlers. Although, Hamas (based in Gaza), proclaimed as a terrorist group has been involved in multiple offenses (eg. firing rockets back to Israeli territory in nearby towns of Gaz), it has not been linked to any water like incidents (Water Conflict Chronology 2019). At the intra-states level, few disputes have emerged for instance between Turkey, Iraq and Syria due to the Euphrates and Tigris Rivers. Conflict still remains of a relatively small nature, in which the above countries have not engaged in full scale war with each other (Schaar 14, 2019).

Conclusively, violent disputes over water are more prone occur at the local, intrastate level, were the instability due to ethnic clashes, political divide, insurgencies, socio-economic reasons or just civil war, will much more likely trigger the instrumentalization of water within conflict. IHE Delft, a research institute in collaboration with the Dutch Ministry of Foreign Affairs UNESCO, the World Resource Institute and other research institutes, further reinforce the fact that local level conflicts are more prone to emerge (UN-IHE 2019). As of now, there has not been a set of examples in which two states have gone to war due to water.

H5: Climate Change acts as a threat multiplier by making the weaponization of water more lethal than during stable environmental patterns.

The fluctuating weather patterns which climate change has had on the chosen cases can be seen as a major concern to the stability of states. Long periods of drought, unexpected rainfall or decreased levels of precipitation can largely influence day to day activities and the way by which societies operate. In the Middle East, this uncertainty, topped with fragile institutionalization, ethnic divides, socio-economic problems and political turmoil has had a catastrophic consequence. Climate change can pose a threat to food and health security, and thus human security. Figure 11 shows the average precipitation depth per year in comparison to the Netherlands (in purple). Yemen for instance has the lowest average precipitation per year with 167 cubic mm. Overall, the same results have been recorded over the past decade.

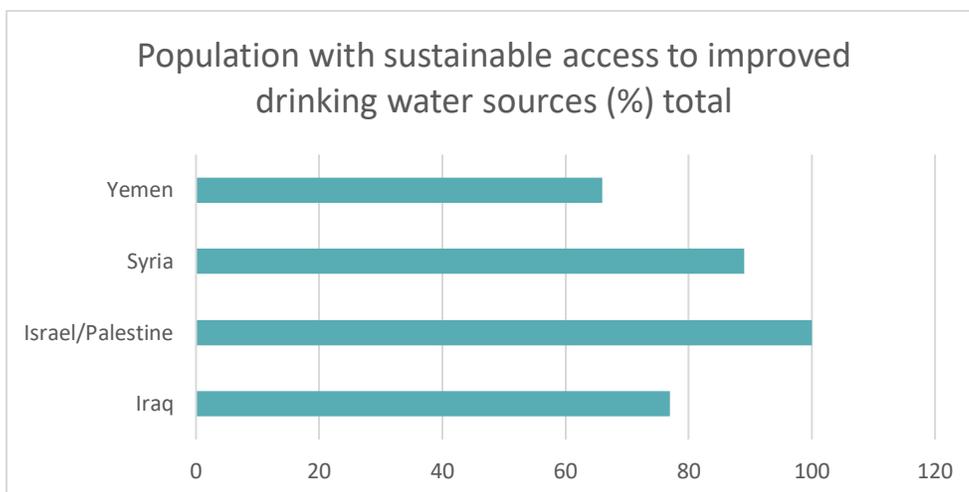
Figure 11:



Source: AQUASTAT UN

Figure 11 further shows the percentage to which the population has access to improved drinking water sources. In Yemen, around 65% have access, in Syria it's close to 90%, Israel 100% and in Iraq almost 80%. These figures however vary due to the outbreak of the civil wars and localized violence. In Syria and Iraq for instance, the presence of the Islamic State and their instrumentalization of water through conquering various dams, has minimized and disrupted the access to potable water resources. In Palestine, the Israeli hydro-hegemonic position over the countries water sources puts the Palestinian population in a tough spot when it comes to sustainable access, thus even though it might be provided for it does not mean that communities will benefit the same amount as others. Thus, these figures get disrupted in the sense that conflict has damaged what Sustainable goal 6 of the UN aims to achieve, an equitable and hygienic access of water to all.

Figure 12:



Source: World Health Organization

On top of the humanitarian injustices and power-imbalances over water sources, climate change augments the level of water scarcity, as well as the likeliness of a conflict occurring. Schaar points out that over 60% of the MENA population live in areas with high water stress, in which more water is used than what is actually being replenished. Moreover, how temperatures could reach an average of 50C by the end of the century, which subsequently would have grave impacts to biological and societal systems (Schaar 5, 2019). He thus brings in the notion of *adaptive capacity* which aims to examine how resilient are societies to changing circumstances and how through the right institutions, knowledge, technology, infrastructure, economic resources and level of justice they can overcome set challenges (Schaar 5, 2019). Hence, can the existing institutions solve the problem of resource scarcity and the instrumentalization of water which breaks numerous international laws? Yemen, Iraq and Syria all clearly demonstrate how due to the current circumstances and country background (ethnic divides, large history of conflict, insurgencies), it is not possible as of now for them to effectively combat climatic changes which are exacerbating water scarcity and feeding ongoing conflict. There would have to be an institutional re-structuring as well as an end to the perpetrating civil conflict. On the other hand, Israel demonstrates a different outlook. It is the most similar country to western democratization and legitimate institutional arrangement. As Figure 10 shows, it has the highest precipitation in depth per year (almost of all the three other countries combined), and moreover as Figure 11 further shows, it has an estimated 100% sustainable access to improved drinking water. However, the problem is the repression towards the Palestinian community, which is deprived from accessing or limited to, sustainable water resources.

Climate change can thus have a variety of effects which would jeopardize national and international security. Scientific estimates show that precipitation will decrease in the near future, creating further drought and scarcity (Tir & Stinnet 213, 2012). Climate change can thus magnify tensions between states over fresh water related sources (eg. springs, rivers, dams), it can have socio-economic impacts depending on whether states are either upstream or downstream from their counterparts, and it can further increase localized conflict (village or ethnic disputes, which could eventually lead to civil war) (Tir & Stinnet 214, 2012). This brings the neo-Malthusian way of thinking, which predicts that water scarcity is a factor which could lead to future full scale 'water wars'. This is reinforced by the UN, EU, multiple scholars such as Burker, Hsiang and Miguel, as well as research institutes such as Adelphi (sponsored by the German Federal Foreign Office) who speculate that future 'water wars' could be in the horizon. Buker, Hsiang and Miguel, conducted a study in which they concluded that contemporary temperature deviations will have the widest impact, in which each additional degree will increase the likeliness of interpersonal conflict by 2.4% and intergroup conflict by 11.3% (Burke & Hsiang & Miguel 577, 2015). Further arguing how climatic changes effect many factors which could alter conflict such as agricultural income, human health and residential mobility (Burke & Hsiang & Miguel 577, 2015). Thus, a country's adaptive capacity plays a key role to how susceptible they will be to the climatic changes and how effectively they will be overcome them.

The German’s Federal Foreign Office came up with similar results in their study. The results of a large-N research showed that climatic variables influence conflict risk in 48% of the time, 28% showed mixed results and 24% stated that climatic variables do not influence conflict risk (Adelphi 2, 2017). Thus, the research illustrates that the probability of experiencing violent conflict following a swift climatic shock is very much dependent on, once again, the adaptive capacity of a country, to efficiently tackle climate-induced challenges to livelihood and political stability (Adelphi 2, 2017). Although the majority of results saw climatic changes as a direct effect to emerging conflict, opinion still varies on the underlying circumstances by which conflicts may arise. In February 2019, the European Council stated that climate change is a ‘direct and existential threat’ which could fuel violent extremism as seen in the examples of the Islamic State (Middendorp & Bergerma 1, 2019). However, it is not seen as the main factor to violent conflict, but rather a threat multiplier. Poverty, unemployment, food insecurity, erosion of livelihoods, population displacement, increased local demand over resources (land and water) and fueling social tensions, are seen as they major factors inciting conflict (Middendorpo & Bergema 1, 2019). The UN further reinforced the argument of climate change as a threat multiplier, by concluding how changes in temperature, rainfall, drought, floods and sea level rise are contributing factors to the overall socio-economic, political and demographic dilemmas of the specific country (UN Interagency Framework Team 27, 2012).

Image 12:

Climate change as a threat multiplier to the weaponization of water



Conclusively, the above criteria can be applied to the examined cases. In Syria, Iraq and Yemen long drought and low levels of rainfall can be set to have contributed to making the instrumentalization of water deadlier and more dangerous to those who use it. Climatic uncertainty has thus facilitated NSAGs to leverage the fragile environmental situations for strategic military and geopolitical means. For instance, IS’s persistent dam

acquisition to cause hardships in water scarce areas by redirecting water flows, have aided the group to gain further leverage on opposing forces and to expand their territorial control over Iraq and Syria.

Additionally, IS and Al-Qaeda have attempted to recruit by offering essential resources and protection (human and food security). Climate change has thus acted as a threat multiplier to the above cases. It can also be stated that climate change can directly be linked to conflict, in terms of localized violence, instability and terrorism. It is however too early to state that climate change is the direct consequence to state on state conflict or civil war. Consequently, the recommendations section will examine the importance of hydro-diplomatic measures through for instance Early Warning Systems in order to prevent and augment the adaptative capacity of states from future water related exploitations in conflict. However, beforehand, the research outcomes of this paper will be examined.

Meaning of research outcomes

After examining the various hypotheses, it can be concluded that to an extent, the expectations that this research had, were reached. Going through each hypothesis, H1 has demonstrated how water scarcity indeed is a key factor in conflict within the various examined countries. Drought, lack of rainfall and tensions over necessary resources have escalated localized violence. H2, has also been significantly reinforced, water has been largely instrumentalized since the Arab Spring, in which both state and non-state actors have utilized the resource for strategic military and geopolitical means. Surprisingly, H3 was partly correct, however by examining international humanitarian law on the protection of civilians and the environment, state actors infringed those regulations on numerous times. Even though insurgent groups like IS were the main perpetrators to instrumentalize water, the multiple state-based infringements can aid to open new pathways for future research and introduce stricter laws and penalties when it comes to the treatment of water facilities. H3 expectations were thus contested with the acquired information, which could be open to further debate. H4, was proven right, as most of the water related conflicts were based at the intrastate level. However, it is worth noting that IS blurred geographical boundaries (Iraq-Syria), as they operated in multiple countries at once. Additionally, the Saudi led collusion against the Houthi rebels in Yemen was also of a more complex conflict, involving multiples states, introducing the notion of internationalized civil war. Lastly, H5 has shown how climate change is an immediate threat multiplier to the instrumentalization of water, magnifying the resources capacity to inflict harm. However, more empirical evidence would be needed in order to formally state that climate change is a direct factor to war. Conclusively, climate change has been a significant driver of conflict at the localized level as examined with the consequences that water scarcity has had on the demographics of states. This research, with the compilation of online quantitative databases and a wide variety of qualitative records through government reports, academic literature, newspapers, recordings and other factsheets has demonstrated how in the modern era, water has become

a key factor in Middle Eastern warfare tactics. The paper has thus provided an overview of the different dilemmas by which climate change, in this case water scarcity can inflict upon Middle Eastern societies and how this leverage can be further utilized for strategic military and geopolitical advantages by both state and non-state actors.

6. Recommendations

This section will provide a series of recommendations from the analyzed results, in relation to various research institutes and scholars which have come up with conclusive remarks towards the instrumentalization of water in conflict. The image below will point a series of future measures which could be implemented to reduce the resources exploitation. Although it will not be possible to completely prevent non-state and state actors from utilizing or targeting water in times of conflict, the recommendations below can help to introduce a more stable framework to minimize future water related incidents.

Image 13:

Preventing the instrumentalization of water in future conflicts



Hydro-diplomacy

Joint Fact Finding
International River Basin Organizations
Regional Multilateral Water Centers
Integrated Water Resource Management (IWRM)
Multinational Joint Task Force (MJTF)



Early Warning Systems (EWS)

Reduce vulnerability
Disaster risk reduction
Rapid and effective response times
Increased security measures (eg. dams)



Adaptive Capacity

Increasing resilience (securitizing the environment)
Improving (water) governance
Improved local institutionalization



International law

Making laws more adaptable to current water threats (both towards state and non-state actors)
Further enforcement and continuous inspections

Hydro-diplomacy sums up the way forward in order to have a more equitable and sustainable future when it comes to water resources. For instance, introducing an IWRM, will aim to establish a comprehensive approach towards peacebuilding in water related issues by; advocating a multi-level, multi-stakeholder dialogue, introducing a broad range of actors (state, non-state, private vs public, academic, civil society), third party mediators (Kim & Swain 102, 2018). This can then be reinforced through MJTF's and RBO's to facilitate the negotiation process and implement further security measures, and international laws by actually enforcing and penalizing those who obstruct international humanitarian regulations. Hydro-diplomacy, however, aims at an inter-state basis of cooperation to solve the issues. Thus, when states are in periods of civil war and demonstrate

weak institutional development and legitimacy, EWS and improved adaptive capacity should come in play in order to minimize the impacts. Overall, these are recommendations which could be applied universally, which in the latter could then be specifically tailored per case depending on how each country responds to the developments.

6.1 Future research

This paper has aimed to examine the instrumentalization of water since the outbreak of the Arab Spring and the extent to which state and non-state actors have utilized the resource for strategic military and geopolitical means. However, this research could be more fruitful by examining the underlying socio-economic and political roots which might have exacerbated conflict. In addition, with analyzing hydrological data, which could provide a more scientific perspective to the dilemma at hand. Moreover, climate change could be analyzed in a set timely manner, examining whether water has been further instrumentalized in certain periods where there were higher weather variations or whether its exploitation remained the same. Lastly, a comparison on previously utilized tactics from insurgency groups and state actors in relation to military and geopolitical operations could serve as a framework for understanding how the environment has been exploited and whether there has been a shifting discourse and manipulation over the years.

7. Conclusion

This paper has examined the instrumentalization of water since the uprising of the Arab Spring in 2011 up until 2019, and how both state and non-state actors have utilized the resource for military and geopolitical advantages. Throughout the decade, water, an essential resource to agriculture, livelihood and overall human security as stated in the United Nation's Sustainable Goal 6, has widely been exploited. The instrumentalization of water has emerged in conflict in a variety of ways as the three categories; water as a trigger, casualty and weapon of conflict, have shown. This division has provided an opportunity to frame the various purposes that water has played in times of conflict. As the results have shown, water as a casualty of conflict occurred the most times throughout the selected timeframe. The Yemeni civil war, experienced the most casualties to water resources due to the high number of airstrikes, mainly led by the Saudi led coalition (US was an ally), creating catastrophic damages to water facilities and systems. Although, the damages could have been unintentional and as a result of a wider military objective, the damages inflicted upon water resources had wide consequences to the overall water sustainability and access in the country. Furthermore, groups such as Al-Qaeda utilized the fragility over the resource to recruit new members by offering them basic services and protection as well as by targeting wells and springs, in order to cut off supplies from nearby towns and enemy camps. Consequently,

further increasing water scarcity and inciting further tensions between various ethnic groups and factions. Similarly, in Syria and Iraq, the various seasonal drought's and climatic changes posed a grave threat to water resources. This drastic and uncertain predictability of weather patterns have transformed water into the 'new oil', a very competitive and essential resource within the region. The variety of factions and geopolitical divisions within the country have subsequently resulted in what could be called 'water wars', as whoever had control over water resources would to an extent have an upper hand in conflict. The most catastrophic impact which clearly showed the geopolitical and military incentives of exploiting water resources was the Islamic State. One of IS's key strategies, as the results have demonstrated, was the acquisition of various dams and water facilities. By controlling the hydrologic infrastructures, they were able to deploy water as a weapon by either opening up the gates, subsequently flooding nearby areas, or closing them, subsequently depriving nearby towns and military camps from acquiring the basic service. IS has thus introduced a blueprint of exploiting water for the insurgency's own growth and strategic acquisition. This new instrumentalization, termed as hydro-terrorism (part of environmental terrorism), has raised international concerns and shifted the discourse of what was characterized as conventional warfare. This hybridity of tactics was not only utilized by non-state actors but also by states such as Saudi Arabia, Syria, The United States, Russia and Turkey, were mainly through air-strike interventions, targeted (intentionally and unintentionally), key water resources in the Middle Eastern region. International law concerning the rules of war, which aims to protect civilians and the environment from military attacks, mainly regulated in the Hague and the Geneva Convention were widely obstructed throughout the Arab Spring. Mainly led by insurgency groups, states also infringed various norms which aimed to protect water infrastructures and systems from systematic attacks. As records and online data displayed, penalties were not applied to those who assaulted the norms, consequently portraying the weakness of the international system when it comes to protection of water sources. Israel, a country that has been widely accused by the international community (eg. UN and EU), from infringing critical human rights of the Palestinian community, continues to conduct national attacks towards Palestinian water systems. The destruction of wells, springs, the creation of settlements in the West Bank and the air raids in Gaza which have contaminated water systems are some of the examples by which Israel continues to instrumentalize water for geopolitical advantages. Water has been a catalyst of disputes in the Arab-Israeli conflict, which continues to magnify tensions and demonstrate the partial division of water resources between the two groups.

Overall, most of the water related disputes have taken an intra-state nature by which localized violence, civil unrest, insurgencies or most catastrophically, civil war, has erupted, further facilitating the utilization of water in conflict related issues. Insurgency groups such as IS have however blurred state boundaries, introducing a new means of analyzing disputes of transboundary nature. Furthermore, Saudi led coalition air-strikes in Yemen, have shown the intervention of another state into national boundaries, coining the conflict as 'internationalized civil war'. As of now, there are no clear examples of an inter-state conflict by which two or more countries have gone

to full scale war due to water resources or have weaponized water against each other. As of now, Turkey's upstream strategic tactics of creating a series of dams to block the Euphrates and Tigris river flow downstream towards Syria and Iraq, which has caused some tension, is the closest of water being instrumentalized in interstate conflict related incidents. This, however, should not push away attention to future large-scale wars in which water could be the main catalyst of conflict. As the United Nations has reported, water supply is decreasing, demand is increasing, population growth is rapidly augmenting, and people are further exploiting water related sources. The UN has thus hypothesized that by 2030 in most of the arid places in the world (mainly in MENA), water scarcity will displace somewhere between 24 to 700 million people (UN Water 2019). Consequently, a recommendations section was added, in order to pinpoint a series of measures which could attempt to minimize future conflicts and strengthen water governance in a historically unsecure geographical area of the world. Hydro-diplomacy can thus serve as a way to intensify and institutionalize current water related policies and attempt to find a way to solve conflict through a multi-agency and comprehensive approach where all actors (public vs private, state vs non-state), aim to legitimately address the issue in an impartial manner. In addition to improving a countries adaptive capacity by strengthening its current institutions and disaster management such as through Early Warning System (EWS), the involved parties can attempt to enforce international humanitarian laws which directly impact the exploitation of water. Additionally, a series of measures could be introduced in order to further securitize the environment (eg. strengthened security in dams or any water related infrastructures and systems). Insurgencies and their thirst to break international regulations will not be prevented, however one can attempt to minimize their effect by creating a securer environment which will limit their scope of operation. Conclusively, water related conflicts and the continuous instrumentalization of the resource will persist over the decades, climate change and the intensified nature of the rapidly technological world will continue to harm the environment and thus create unpredictable weather patterns which will increase the likelihood of water scarcity. Water governance will thus have to be a key policy issue in national security in order to effectively and legitimately combat those who aim to exploit it, and to instill a certain assurance of peace and stability in the involved region at hand.

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