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# War or Cooperation?

## – The Role of Water in the Future of the Jordan River Basin

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# Abstract

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The scarcity of freshwater and its outcomes have been investigated by many researchers during several decades. This is another research that, opposed to most of the publications existing, focuses on the next forty years from 2010.

In this thesis I investigate three outcomes of freshwater scarcity, with regard to the Levant and the Jordan River: war, international cooperation, and a third path which is that each country for themselves tries to solve the scarcity by producing or importing freshwater.

In order to do such investigation I have used a scenario planning method with both quantitative and qualitative approaches. The qualitative approach includes an interview with a professor in water engineering.

The conclusions of this master thesis are that the freshwater scarcity situation would get worse because of increasing demand. However it would not result in war or serious cooperation between the Israelis and the Arabs. Nor will there be any war between the Arab countries over water. The cooperation between the Arabs themselves will more or less increase to meet the increasing power of Israel in the region.

*Key words:* Water Scarcity, the Levant, War, Cooperation, Scenario Planning

*To the thirsty people of the world,  
To those who thirst for water, peace and love*

# Preface and Acknowledgements

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“Ecological’ or ‘environmental’ security has become one of the most controversial and stimulating issues in the field of international security studies today”, Peter H. Gleick, one of the most known researchers in environmental studies, wrote in 1993 (p.80). Controversial not least because of the fact that scholars such as Stephen M. Walt (1991) and Lawrence Freedman (1998) were against the idea of taking environmental issues into consideration in security studies. They are of the thought that non-military threat to national security will expand the security studies and create confusion.

However, researchers such as Lester Brown (1977), Richard H. Ullman (1983), Jessica Tuchman Mathews (1989), Michael Renner (1989) and Peter H. Gleick all argued for the importance of environmental security to be integrated into the security studies. Today the importance of environmental security studies is increasing with international organizations such as United Nations emphasizing it. The global warming summit in Copenhagen between the 7<sup>th</sup> and 18<sup>th</sup> of December 2009, shows the importance of environmental security. The 11 September 2001 attacks and the “war on terror”, however, removed some of the attention environmental issues had gained during the 1990s.

All four of the scholars mentioned in the previous paragraph have environmental security as common ground, but there is a difference between Brown, Ullman and Mathews on one side and Gleick on the other one. The first three mentioned believe that security should be redefined. Mathews wrote in her article that “Global developments now suggest the need for another analogous, broadening definition of national security to include resource, environmental and demographic issues” (1989:162). Gleick, believes that redefining security is not necessary. He wrote “What is required is not a redefinition of international and national security, as some have called for, but a better understanding of the nature of certain threats to security, specifically the links between environmental and resource problems and international behavior” (1991:17).

This discussion about environmental security has been fruitful and contributed to a better understanding of national, regional, and global security by re-examining the meaning of security and enriching the discussion of resource distribution and social problems. Today it is a common knowledge that environmental issues, such as resource scarcity, have a serious impact on security and can create intra- or interstate violence. Gleick deems that “The focus on security analysts must now be *when* and *where* resource-related conflicts are most likely to arise, not *whether* environmental concerns can contribute to instability and conflict” (1993:82-83). Michael T. Klare emphasizes the geographical importance of identifying future conflict regions. He wrote in his article “The New Geography of Conflict” that “Identifying areas of potential conflict over

natural resources is also becoming increasingly important as the pressure on these fault lines grows” (2001:56).

The pre-studies on this thesis, as it will be shown in this thesis, revealed that the Levant in Middle East is the region which highly risks erupting into resource related war over freshwater. I have therefore implicitly answered *the where* question of Gleick and Klare. As I will show, my intention is to investigate this region during the next forty years, with 2010 as a starting point, the year that I started to sketch on and write this thesis. Hence, I hope that I have been able to answer *the when* question of Gleick.

During the time I have been writing this thesis many people have supported and helped me. First and foremost, I must use this opportunity to acknowledge that I owe a huge debt to my *family* for their eternal support. Especially my mother *Nahid Khoshnood* and my father *Dr Masoud Khoshnood* who have always been a source of inspiration. Without your support this thesis would never have been completed.

I also want to thank my supervisor, *Professor Franz-Michael Rundquist*, at the Department of Human Geography, Lund University. Your views on this thesis helped me write a better thesis. I am especially grateful for your support and understanding of my situation. With regard to this, thanks must also go to *Professor Magnust Jirström*, the Head of the Department.

Many thanks to *Docent Ola Jonsson*, Department of Human Geography. Docent Jonsson was my supervisor on my bachelor thesis, and have taught me many things about writing a thesis and about the field of Human Geography.

*Borhan Yassin*, senior lecturer in Arabic Studies at the Centre for Languages and Literature, must also be thanked. Yassin was my lecturer when I studied a course called “Middle Eastern Studies: Regional Security in the Middle East” fall 2009. In this course I wrote a short paper on the water issues of the Levant. Later when I had told Yassin about my plans to write a master thesis about this issue he advised me about some publications on the subject of this thesis.

I am especially thankful to *Professor Kenneth M. Persson*, who agreed to be interviewed for this thesis about water technology. Kenneth M. Persson is professor at the division of Water Resource Engineering at the Department of Building and Environmental Technology, also at Lund University.

Last but absolutely not least, a great thanks to all my *friends* who mentally supported me.

I am alone responsible for the flaws of this thesis.

*Arvin Khoshnood*  
*Malmö, January 2011*

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# 1 Introduction

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The only matter that could take Egypt  
to war again is water.

– Anwar Sadat

One important resource which has been the object of much research for many decades is freshwater, hereby only called water. “Water scarcity is a pivotal environmental security issue. Fresh, renewable water is a precious resource today in much of South Asia, northern China, parts of Africa and the Middle East” (Soslund 2002:106). Water is life and has no substitutes. As Peter H. Gleick correctly put it, “human well-being, ecosystems health and function, even economics and politics all depend on how much, when and where water is available” (2000:9). Water is also of great interest for strategic matter, where water has been the cause, the set off, the instrument, and the consequence of violent conflict in and between countries.

Water has often been compared to oil as an important resource for economic development and military strength. However, there is a great difference between freshwater and oil. Kent H. Butts illuminates this difference correctly (1997):

[...] [I]n terms of its [=petroleum] relative scarcity and the ability for economics and technology to mitigate the imbalance of its supply and demand, water poses different and potentially more difficult problems for strategist. Efforts to manipulate the global supply of petroleum have been a leading phenomenon of the final decades of the 20th century. Control of the sources of fresh water could be equally significant in the opening decades of the next.

The significance of water for human existence and its effect on security matters makes the resource important for continued research. Some scholars suggest that water scarcity eventually will cause war, while other scholars deem that this scarcity will create cooperation between states. Water is, therefore, not only an interesting subject for political science and, peace and conflict studies. Studying the causes and consequences of water scarcity is also an important issue for the environmental and resource geographers, and for political geographers who views water as a geopolitical and geostrategic matter.

Where, when, and why the next conflicts or cooperation’s over water will erupt, is important questions from a human geographers view. As it will be illuminated in this paper, the geographical position of countries competing over water, the location of water, and the overall water scarcity, political, military, economic and technological situation in the area, is important issues and must be



studied in order to understand the relation between water scarcity and conflicts, and water scarcity and cooperation.

The importance of knowing the consequences of water scarcity has increased with the debates on global warming. Oli Brown and Alec Crawford, working at International Institute for Sustainable Development, have in their report from 2009, “Rising Temperatures, Rising Tensions – Climate change and the risk of violent Conflict in the Middle East”, highlighted the relation between global warming and rising security tensions, with focus on the countries in the Middle East (p. 6):

[...] [C]limate change – by redrawing the maps of water availability, food security, disease prevalence, population distribution and coastal boundaries – may hold serious implications for regional security. [...] The Middle East is frequently presented as one of the regions that is most likely to erupt into conflicts as a result of climate change – a function of its existing water stress and history of conflict.

As mentioned before and as illuminated by the above citation from the report, the Middle East is one of the most troubled regions badly hit by water scarcity. In this region water has turned to a great national security matter, and the increasing global political, economic and social tensions of the 21<sup>st</sup> century have also contributed much to the securitization of water in this region. In 2002 Jeffrey Sosland emphasized the importance to investigate the water scarcity issue in the Middle East by claiming (p.106):

[...] Middle East, the region most likely to experience future conflict over water. By looking at this region, we are better able to understand the issue of water scarcity and conflict, and to develop and test an approach to analysing environmental security, in general.

The opening quote of this chapter, from the late President of Egypt – Anwar Sadat in 1979, illuminates this issue. The quotation also shows that the water conflict issue is nothing new in the Middle East.

## 1.1 Purpose, Question at Issue and Limitations

With this background, it is necessary to again stress the importance of studying environmental security, especially the relation between water scarcity and conflicts. Wendy Barnaby says that “[...] it is important that the popular myth of water wars somehow be dispelled once and for all. This will not only stop unsettling and incorrect predictions of international conflict over water. It will also discourage a certain public resignation that climate change will bring war, and focus attention instead on what politicians can do to avoid it [...]” (2009:283).

Therefore, it is of great significance for national, regional, and global security to understand the relation between water scarcity and war.

However, it is just as important to study the relation between water scarcity and cooperation. Most of the scholars in environmental security studies focus on either verifying or falsifying the war-theory. There is not as much research on whether or not water scarcity generates cooperation between states. I hope that I can contribute to filling this gap, although the main purpose of this thesis is not to make generalizations of the relation between resource scarcity and cooperation.

In this matter it is particularly central to investigate water scarcity in geographical areas with higher tensions between the countries, and where outbreak of violent conflict is more likely. The most important argument for this is that it is more important to stop acute or potentially acute problems, than problems over which there is more time to think and reflect.

One region, which is more likely to erupt into violent conflict, is by the literature on water scarcity identified to be the Levant located in the Middle East (see part 1.3 for geographical description). In 1993 Gleick asserts that “In modern times, the most pressing water conflicts in this region have centered on control of the Jordan River basin” (p. 85). This basin is located in the Levant with a long history of conflict over the water resources. Falkenmark and Widstrand (1992), Zeidler-Blomberg (1993), J. A. Allan (2003), Raphaeli (2007), Brown et al (2009) and Gleick et al (1994) are experts which identify the Levant as an important region to investigate.

Hence, the purpose of this thesis is to investigate the water scarcity situation in the Levant during a forty-year period, from 2010, and examine whether this situation will erupt into war or international cooperation. The Jordan River will be the focal point of this research and three different scenarios will be analyzed and discussed with regard to the river. The water flow of this river is shared by many countries and it is an important source of renewable water in the region.

Based on this purpose the question at issue of this thesis will be: *will the water resources of the Jordan River be a source of international war, international cooperation or neither of them?* The three scenarios, based on this question, are: 1) *the war scenario*, where the countries go to war over water, 2) *the cooperation scenario*, where the countries cooperate to solve the water scarcity of their country, and 3) *the alternative resource scenario*, implying that there will neither be war nor cooperation; instead the countries would help themselves through technology, or for example by importing water.

The period of forty years, from 2010, has been chosen with regard to the empirical material more or less available for these countries. A larger time period would make the conclusions less reliable and more as a guess.

## 1.2 Definitions

With “international” I mean the relation between two or more states.

“Cooperation”, in this thesis, is defined as two or more states solving the problems with water scarcity with the help of each other. This definition is almost like the definition of conflict resolution which Peter Wallensteen uses in his book “Understanding Conflict Resolution: War, Peace and the Global System”. He defines conflict resolution as “a situation *where the conflicting parties enter into an agreement that solves their central incompatibilities, accept each other’s continued existence as parties and cease all violent action against each other*” (2005:8).

“Central incompatibilities” are in this thesis the Levant states’ thirst for the Jordan River’s water. However, despite the similarities between mine and Wallensteen’s definitions, there is one great difference. In Wallensteen’s definition it is assumed that a violent conflict is ongoing between the countries, which I have chosen to exclude from my definition. I believe that a conflict does not need to be violent.

When it comes to the definition of “conflict” it can be stated that conflict is the opposite of cooperation: there will be no agreement that solves the central incompatibilities of respective parties. Wallensteen’s definition of conflict is similar to mine and very explicit: “[conflict] contains a severe disagreement between at least two sides, where their demands cannot be met by the same resources at the same time. This is an *incompatibility*. Positions are incompatible. There is a form of scarcity.” (2005:15)

It is also important to add that a conflict can exist although no parties take to any actions. Such conflicts are called “latent conflicts” (Wallensteen 2005:15). Conflicts in which the parties take to actions are called “manifest conflicts” (Wallensteen 2005:15). It is the act of war which is of special interest to this paper, due to the direct and acute effect of war on people’s life.

Wallensteen uses the definitions of the Uppsala Conflict Data Project to describe war. War is going on when more than 1,000 people are killed during a period of one year. However, I would not use this definition of Wallensteen in my thesis. This because such limited definition is not practical to use. If 999 individual is killed during a year or some days less, should this act not be considered as a war? Instead I have a more open definition when it comes to war. The definition of war would be less complex if it is studied by economic means. The definition of war and how it will be used in this thesis will further be explained in part 5.6.

### 1.3 Geographical Position of the Levant

The Levant is the name of a region in West-Asia including the countries Israel, Jordan, Lebanon, Palestine<sup>1</sup> and Syria (see map 1.1 for location and table 1.1 for fast facts about the countries). The Levant is situated in the east of the Mediterranean Sea, and both the Sea of Galilee and the Dead Sea is located in the region.



Map 1.1: Map over the Levant with the Jordan River in Centrum. This map shows only some of the tributaries to the Jordan River. (source: based on the map from <http://mapsof.net/jordan/static-maps/png/jordan-river-map/full-size>)

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<sup>1</sup> With Palestine I mean the Gaza Strip and parts of the West Bank. The Gaza Strip is governed by the Hamas (Ismail Haniyeh is the head of government), and the Palestinian West Bank is governed by the Palestinian National Authority (Mahmoud Abbas is the president).

The Jordan River is one of the main sources for water in this region, shared by all of the Levant countries. The river is placed in the middle of the Levant countries passing them from north to south. It has its source in the Mount Hermon which is located in the middle of Lebanon and Syria.

Table 1.1: Fast facts of the Levant countries. (source: Landguiden)

Country	Capital	Area (km <sup>2</sup> )	Population (2009)	Political leader
<b>Israel</b>	Jerusalem	20,145	7,200,000	Prime Minister B. Netanyahu
<b>Jordan</b>	Amman	89,213	6,300,000	King Abdullah II
<b>Lebanon</b>	Beirut	10,452	4, 200,000	Prime Minister S. Hariri
<b>Palestine</b>		6,165	4,100,000 <sup>2</sup>	See footnote 1
<b>Syria</b>	Damascus	185,180	21,900,000	President B. al-Assad

## 1.4 Why More Research on the Water Scarcity of the Levant?

A lot of research can be found on the relation between water scarcity and war respectively cooperation. Some of them have already been mentioned. Works by Peter H Gleick have very often been quoted by many researchers and journalists. Publications by Malin Falkenmark, Jessica H Hamner, Thomas Homer-Dixon, Miriam R Lowi, Joyce R Starr, Aaron T Wolf, Tony Allan etcetera has been of great significance in the field of security studies with regard to water scarcity. Most of these scholars' works will be used in this thesis. It is also important to mention the interdisciplinary research project between the department of political science, department of peace and conflict research, and department of water resources engineering at Lund University about cooperation and conflict over the Jordan River<sup>3</sup>.

With all this research about water scarcity and its relation to war and cooperation, there is still need for more contributions to the field from different academic disciplines. My hope is that this thesis will be an input to this subject from one more human geographer and political scientist. However, there are some differences between mine and the existing publications in this field which I am

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<sup>2</sup> The statistics are from 2008 and do not include the Jewish settlers in the West Bank. Since 2005 there are no Jewish settlers in the Gaza Strip.

<sup>3</sup> For more information about the project the Internet address [http://www.svet.lu.se/css\\_forskning.lasso?-token.page=forskningsprojektdetaljer&-token.topmenu=forskning&-token.course=17](http://www.svet.lu.se/css_forskning.lasso?-token.page=forskningsprojektdetaljer&-token.topmenu=forskning&-token.course=17) can be visited.

aware of. Below, four of the frequent differences are mentioned without any special order.

- This thesis attempts to investigate the water scarcity and international relations between the countries in the Levant during the next forty years through a scenario planning method. The researches existing today treats the future of the region only slightly if any at all. Analyses and discussion about the region's past is on the other hand numerous.
- This thesis attempts to *also* investigate the relation between water scarcity and international cooperation in the Levant, instead of only verifying or falsifying the war-theory as most of the scholars have done. Unlike the publications I have read and used for this thesis, with exception of the book by Lowi (1995), I have presented a theory about international cooperation and used it to understand possible future changes in the relation of the Levant states towards each other over water.
- In their attempt to falsify or verify the war- and cooperation theory, most experts forget that a third scenario exists. This third scenario, which will be investigated in this paper, is that neither war nor cooperation will take place. Instead the countries of the Levant would solve their problems by using technology and/or import water.
- In most of the publications I read for this thesis the definition of war was ambiguous. The lack of definitions or unclear definitions created some confusion in understanding the conclusions of the publications. In this thesis I have defined this concept to eliminate such confusions.

## 1.5 Disposition

Chapter two and three constitute the theory part of this thesis. While chapter two presents the theory about why and how water scarcity creates war, chapter three illuminates the relation between scarcity and international cooperation. In chapter four the method used to answer the question at issue is put forward. Chapter five is used to operationalize central concepts in this thesis, gathered from the theory chapters. Chapter six through nine are the analyzing chapters. In chapter six the water scarcity situation is presented. In chapter seven I have investigated the military strength of the Levant countries. Chapter eight treats past antagonism and cooperation in the region. Chapter nine discusses and analyzes the costs of war, cooperation and using alternative methods to fill the lack of water in the region. In chapter ten the thesis is concluded. Lastly the references used are presented.

## 2 Theory: War over Water

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Many of the wars of this century were  
about oil, but wars of the next century  
will be about water  
– Ismail Serageldin

The opening citation of this chapter from Ismail Serageldin, former vice-president at the World Bank, in 1995 expresses the view of many experts that conflict over water will be transformed to water wars. Similar thoughts, but with focus on the Middle East, have also been expressed by the former Egyptian foreign minister and former Secretary-General of the UN, Boutros Boutros-Ghali and the late King Hussein of Jordan. Even the former Israeli Prime Minister, Levi Eshkol, declared his concerns about the water scarcity situation in the Levant in 1965, although more implicitly. He said that “water is a question of life for Israel”, hence “Israel would act to ensure that the waters continues to flow” (Eshkol quoted in Gleick 1993:85).

The rivalry over the Jordan River water in the Levant is high and can therefore be regarded as a source of conflict. Some, such as Thomas Naff and Ruth C. Matson (1984), John Bulloch and Adel Darwish (1993), Ze’ev Schiff (1993) and Hussein A. Amery (1997) go as far as to claim that water scarcity was one of the principal causes of the Arab-Israeli war in 1968. Amery concludes in one of his works that (1997:102):

[...] the Israeli initiated war of 1967 and the ensuing territorial expansion are likely to have been related to the following factors: the construction of, and riparians’ reactions to, the National Water Carrier<sup>4</sup>], hence Israel’s desire to secure the continuous inflow of transboundary water resources; in augmenting existing resources by managing demand in the occupied territories; and perhaps Israel’s desire to strengthen its legal position by controlling additional upstream sources such as the Baniyas River.

There has already been explained in part 1.2 that conflict is a disagreement between rivals – in this case between the countries of the Levant – over a resource – in this case the water of the Jordan River basin – which could not supply the different parts at the same time. With this background about the already existing

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<sup>4</sup> The National Water Carrier is an Israeli water project since the beginning of the 1950s with the aim to transfer water from the Jordan River in the north to the southern and costal parts of the country.

conflict over water in the Levant, it is important to ask what factors affect the conflict between these countries. Or more explicitly, what are the factors which influence possible war between the Levant countries over the water resources of the Jordan River? Figure 2.1 illustrates five factors, which will now be presented.

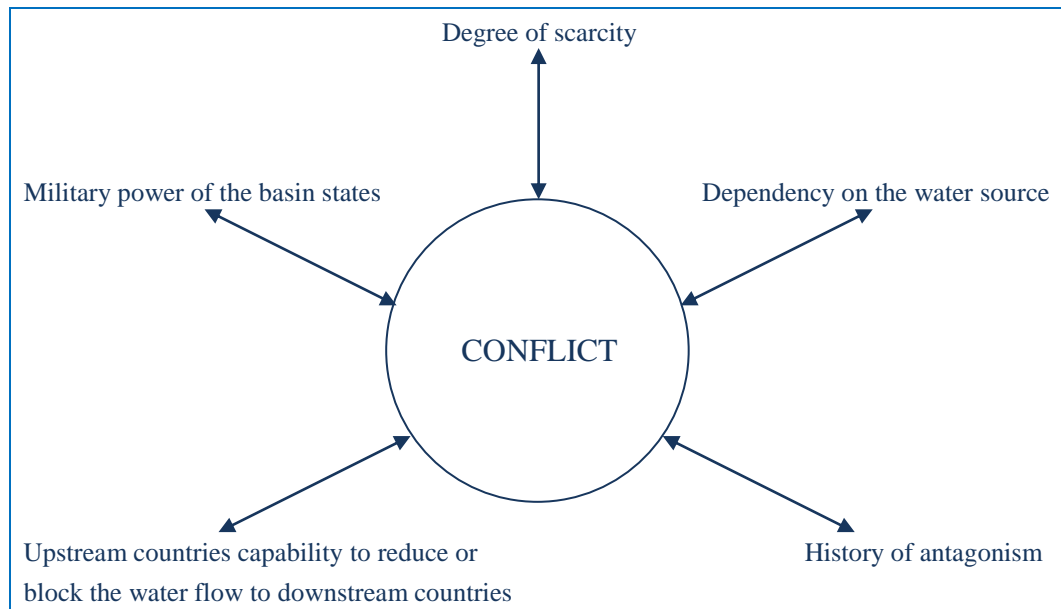


Figure 2.1: Five factors which influence the degree of conflict over river water. The arrows show that the factors can both increase and decrease the degree of the conflict.

## 2.1 Factors Affecting the Degree of Water Conflicts

In his article, “Water and Conflict: Fresh Water Resources and International Security”, Gleick points out four factors that affect the degree of international conflict over water (1993:84–85):

- (1) the degree of scarcity, (2) the extent to which the water supply is shared by more than one region or state, (3) the relative power of the basin states, and (4) the ease of access to alternative fresh water sources.

Gleick’s first factor is explicit; the higher the scarcity is, the more likely is the risk for war. The three other factors, however, need to be more explained. The second factor clarifies the importance of the specific source of water shared by the basin states. If the source is the main source for water supply for two or more countries the risks for war would increase. Thus, this factor illuminates the basin states dependency on the specific water source.

Gleick’s third factor shed light on the basin states relative power as regard to each other. Unfortunately, Gleick does not define what he means with power, but



both Jeffery Sosland (2002:116) and Jesse Hamner (2000) define power in military means. Hamner (2000) writes that “If both states believe they can successfully defeat the other, war become likely. Similar, if one side underestimates an opponent’s willingness to fight (for any reason) then war becomes more likely”. At the same time, when the involved states are equally strong and they know about it, they also know that violent conflict will create the same damage for everyone without solving the problem.

The forth factor of Gleick is about alternative sources for water. This includes access to technology which for example can create water, and trade relations which a country can use to import water. Kent Hughes Butts explains the alternative access to water, including water management, more explicitly. He writes that “Technology, pricing, conservations, trade and industrial and agricultural policy changes *may* mitigate water scarcity and alter the prescription for conflict” (1997).

However, I want to argue against this forth factor. I believe that access to alternative sources for water is a part of the second factor, namely dependency on the water source investigated. If a country has access to alternative sources of water the dependency on the specific water source will decrease. When it comes to water management, what Butts among others mentioned as pricing and conservations, it does affect the degree of water scarcity and should therefore not be considered as a factor affecting the dependency factor directly. The technology has *also* an effect on the first factor, namely the water scarcity.

In his attempt to explain the relation between water scarcity and international conflict, Gleick (1993) missed one important geographical factor which affects the grade of conflict. What he missed was the *geographical position* of the basin countries towards the investigated water source, in this thesis a river. A look at a map reveals that the upstream countries has easier access to the water sources of a river than the downstream countries. Therefore, it is more likely that the downstream countries use violent force to “solve” the conflict. In this matter, it is also important to investigate the upstream countries’ capability to reduce or block the water supply flowing in the river. Thomas Homer-Dixon writes (1996:48):

The renewable resource most likely to stimulate interstate war is river water. However, wars over river water between upstream and downstream neighbors are likely only in a narrow set of circumstances: The downstream country must be highly dependent on the water for its national well-being; the upstream country must be able to restrict the river’s flow; there must be a history of antagonism between the two countries; and, most important, the downstream country must be militarily much stronger than the upstream country.

To bring this theory chapter to an end, a last factor must be explained, namely what Homer-Dixon in the citation above calls “history of antagonism” between the involved countries. Gleick writes in his article from 1989 that “[...] it is widely acknowledged that resource constraints or environmental degradation can lead to conflict when other pressure and tensions exist between states” (p. 333).

# 3 Theory: Cooperation over Water

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But the water problems facing our  
world need not be only a cause of  
tension; they can also be a catalyst for  
cooperation

– Kofi Annan

In opposite to those scholars who believe water scarcity to be a source of international conflicts, not least wars, there are also scholars who believe that the water issue is a source of peace, a catalyst for cooperation as Kofi Annan, former Secretary-General of UN quoted above, said on the World Day for Water in 2002.

One well-known scholar supporting the latter believes is the geography professor Aaron T. Wolf. In several of his works (e.g. Wolf 2008, Wolf 2004, and Yoffee & Wolf 1999) Wolf states that the historical evidence shows cooperation between states over water issues, not wars. Yoffee and Wolf write that “In modern history, only seven minor skirmishes have been waged over international water – invariably other inter-related issues also factors in. Of those seven skirmishes, none escalated to war. [...] In fact, there has been only one war ever fought over water, that between the Sumerian city-states of Lagash and Umma, in 2,500 BC. Conversely over 3,600 treaties have been signed over different aspects of international waters [...]” (2008).

An objection against scholars defending the cooperation theory is that they very often do not define what they mean with conflict/war and cooperation, and very often incorrectly mix wars with other sorts of conflicts. In this work international cooperation is defined as two or more countries working together and that help each other to solve the existing water scarcity in the region.

A second criticism against the scholars who defend the cooperation theory is the lack of explicit explanation of the cooperation process in many works. Leaning upon historic evidence is not sufficient enough to draw conclusions, not least because of the fact that history may not always repeat itself. Therefore, it is important to ask why the water scarcity situation generates cooperation between states.

Frey and Naff state that the water is of such great importance that the scarcity can create international cooperation. They wrote that “[...] precisely because it is essential to life and so highly charged, water can – perhaps even tends to – produce cooperation even in the absence of trust between concerned actors” (1985:67). In order to understand this cooperation issue better, a central international relations theory, the *structural realism*, will be presented.

### 3.1 The Structural Realism Approach

The realist approach in the field of international studies gained a recognized position with the work “Politics Among Nations: The Struggle for Power and Peace” written by Hans J. Morgenthau, published in 1948. In this book Morgenthau introduces the concept of political realism and emphasized the relation between power and national security and interest. In 1979, however, this classical version of realism was developed into a structural version, called structural realism, by Kenneth N. Waltz in his publication “Theory of International Politics”.

The structural version deems that the states are the main actors in the world politics which do not have the luxury of a world government protecting them, and establishing and maintaining world peace and security. Therefore, it is the responsibility of each state to protect itself and ensure survival in an anarchic world through self-help. The problem of the anarchic world and self-help is better understood through the words of John J. Mearsheimer which he calls “the ’911’<sup>[5]</sup> problem – the absence of the central authority to which a threatened state can turn for help” (2001:32). Because of the absence of a supranational emergency central, states have no other choice than protecting themselves on their own.

The self-help is by both the classical realists and the structural realists believed to foremost be about rearming of the military. However, the structural realists, in opposite to the classical ones, also believe that sometimes cooperation can be achieved between the states in order to ensure the security of the state. This cooperation happens only when the state relatively others will get stronger (Waltz 1979: 104–107). Therefore, through a cost-benefit analysis, states, which are rational actors, will decide whether it is worth to enter into cooperation or even to start a war (Keohane 1984:27). In this aspect, military, political, and economic gains and losses will be calculated before decision making, with the knowledge that miscalculations also can occur. This part of the theory is of a special interest for this thesis.

Some extra attention should be directed to economic factors because of the fact that economic strength easily can be transformed into political and military strength. It is based on this belief that the structural realists for example explain the birth of EU and NATO. It is also of importance to underline that, based on previous discussion in chapter two about “history of antagonism”, a “history of cooperation” is a vehicle of future cooperation. Previous cooperations, if worked, creates trust between the countries and therefore will improve formation of new cooperations.

A second distinction between the classical realism and the structural realism is their beliefs of what affects the states to behave as they do. The classical theory states that human nature is evil and because of the reason that states are run by humans, the states will act only in their own interests. The neo-realist on the other

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<sup>5</sup> 911 is the emergency telephone number in the US.

hand explains the selfish behavior of the states by emphasizing the anarchic structure of the world where states because of fear of elimination, compete with each other (Waltz 1979:102–103).

In 2001 Mearsheimer, in his work “The Tragedy of Great Power Politics”, developed a new structural realist theory called offensive realism. Based on this offensive version Mearsheimer named the previous presented structural realism theory the defensive realism. In this thesis I will use the name structural realism to discuss the theory which Mearsheimer calls defensive theory.

The difference between these two schools is the states’ wishes for power (see table 3.1 for differences and similarities between these three schools of realism). The neo-realists believe that the states try to achieve a balance of power and therefore do not strive to get more power than necessary needed for this balance to take place (Waltz 1979: 117–122). When this balance is achieved, peace and security exist. Balance of power does not necessarily mean equal strength. What is important is a balance that creates peace and stability. The offensive realists, on the other hand, believe that, in agreement with the classical realism, the states strive to get as much power as possible to increase their chance for survival (Mearsheimer 2001:21–22). I would, however, argue against the offensive realism with respect to what John Herz called the security dilemma (1950:117).

When one country tries to increase its relative power towards other states, among other things through rearmament, other states also start to increase their strength. In this way the states will be caught in a dilemma where the competition of power will result in conflicts and decrease the chances of survival. This is avoided through a balance of power. That is also why I have chosen not to use offensive realism as a theoretical tool for my analysis.

Table 3.1: Differences and similarities between different schools of the realism.

School	Developer	Why do states compete for power?	How much power is needed?
<b>Classical realism</b>	Morgenthau (1948)	Human nature is evil and therefore strives for more power.	As much as possible to maximize the chance of survival and to finally achieve a hegemonic world status.
<b>Structural realism</b>	Waltz (1979)	The anarchy creates fear and it is this fear which forces states to compete with each other.	As much as needed to maintain the balance of power.
<b>Offensive realism</b>	Mearsheimer (2001)	The anarchy creates fear and it is this fear which forces states to compete with each other.	As much as possible to maximize the chance of survival and to finally achieve a hegemonic world status.

### 3.1.1 Liberal Criticism and Criticism against Liberal Theory

The structural realism is not spared from criticism. The greatest criticism against the structural realism comes from the liberal theory. The liberal schools believe that, in accordance with the realists, the main actors in international relations are the states. However, the liberals criticize the realists for not including the internal environment of the states in their analyses, because the internal environment affects the behavior of the state. Thus, due to distinct characters of the states the states behave differently from each other. As an example, different types of national political systems result in different types of state behavior on an international level. Democratic states have never gone to war against other democratic states, the liberal theorists argue. (cf. Mearsheimer 2001 15–17, Bengtsson et al 2001:27–34 & Lamy 2001:188–191)

Finally, the liberals believe that states have some things in common, such as need for peace, and therefore would cooperate with each other to achieve it. This cooperation will result in creation of different types of international institutions which in turn will shape the behavior of the states. This cooperation would get easier with more international trade and other international activities, such as encouragement of tourism, not least because such activities would make states dependent on each other – the so called interdependency theory. (cf. Mearsheimer 2001 15–17, Bengtsson et al 2001:27–34 & Lamy 2001:188–191)

However, the liberal theory has weaknesses which make it hard to use in analyzing relations between states. The theory about the internal environment of the states is mostly based on the fact that democratic states do not fight each other. Although this is empirically true, the liberals cannot really explain other sorts of conflicts than wars which exist between the democratic countries.

Despite that democracies do not go to war against each other, the democratic countries compete for power in order to achieve a balance of power. The competition for influence in the Middle East between EU and USA is an example of this. Another example is the competition of influence within the EU, between the member states. The conflict does not disappear. It can also be argued that democratic states do not go to war against each other because of the balance of power existing. If USA was to attack Sweden, other EU member states would be involved.

Thus, as the structural realists believe states cooperate to ensure their survival. USA cooperated with West-European states to create EU in order to balance the Soviet Union. If these external threats did not exist would EU still exist? If France, one of the states competing with the USA, believed that they would not gain anything relatively powers, such as USA or Russia, would it still be a part of the union? The liberal theory fails to answer these questions.

The liberal theory fails also to answer why democratic states, such as USA, attacked non-democratic states, such as Iraq, although the UN, were against it. The answer of structural realism is a matter of national security, a fight for survival.

# 4 Research Design

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The eyes of the future are looking  
back at us and they are praying for us  
to see beyond our own time  
– Terry Tempest Williams

In opposite to natural sciences the social sciences are harder to reconstruct in order to see if the theory and method used supports the conclusions of a research and if the method is appropriate for this kind of investigation. This problem of intersubjectivity in social sciences has among others been noticed by the distinguished professor Lennart Lundquist (1993:52). In order to increase the intersubjectivity of this thesis it has been my intention to account for my method as explicitly as possible. This way the reconstruction of this thesis and testing its conclusions would be as easy as possible, with the awareness that the choice of the theory of this thesis, method and material are based on my experience and knowledge, which can differ from others’.

In this thesis I have used a theory consuming method through which the theory is used to analyze and to understand the future of the Levant region, regarding water scarcity. To answer the question at issue I have used a scenario planning method which will be presented in this chapter. It is also needed to mention that this thesis is also of a comparative character, because the factors mentioned in chapter two and three will not only be compared over time but also between the investigated countries.

An operationalization of the notions and concepts needed to analyze the future, including presenting main sources, will together with an overall material discussion take place in the next chapter. Here, it can shortly be mentioned that a quantitative and qualitative has been used to measure the notions and concepts operationalized. The qualitative method comprises literature study and an interview which will be presented at the end of this chapter.

## 4.1 Scenario Planning Method

Paul J. H Schoemaker writes in his article “Scenario Planning: A Tool for Strategic Thinking” that “Scenario planning is a disciplined method for imaging possible futures [...]” (1995:25). By using this method we can more or less predict the future and make us ready to meet problems and crisis. The quotation of

the American author Terry Tempest Williams from 2001, in the beginning of this chapter, shed light on the importance of such methods. If we cannot see beyond our time to stop possible crises, our future generations will have a harder life if any life at all.

Scenario planning method gives us the opportunity to change several factors, during the investigated time period, without keeping any other factors constant. In other words: “Scenarios explore the joint impact of various uncertainties, which stand side by side as equals” (Schoemaker 1995:26). Hence, there is a difference between scenarios and prognoses, and between scenarios and visions. In opposite to scenarios prognoses do not take greater surprises in consideration while studying the future, and when it comes to visions, scenarios do not describe a wanted future. Scenarios are “well deliberated answers to the question ‘What can happen?’ and ‘What happens if...?’ [...]” as Mats Lindgren and Hans Bandhold wrote (2008:31, my translation).

Mats Lindgren and Hans Bandhold have developed a scenario planning method called the TAIDA-process (2008:50). TAIDA is short for: tracking, analyzing, imaging, deciding and acting. Tracking is used to track changes, to find possible threats and opportunities. Analyzing is used to analyze the consequences of the changes found during tracking, and to make scenarios. Imaging is used to making visions of the future which are desired. In the deciding part it is time to discuss and find different strategies about how the vision, based on the information gathered and analyzed, can be reached. Finally it is time to act and in this part, short term goals are created. In this thesis, however, I will only use the tracking and analyzing part of the TAIDA-process, because my intention is not to create visions, taking decisions or putting decisions into action.

To understand the future, Lindgren and Bandhold asserts that it is important to understand the present and the past. They write that “Scenario planning is foremost about the future but it is important that as a starting point have a clear image about the now and the past” (2008:67, my translation). Therefore, it is also my intention to look at the past with regard to the water issue in the Levant. I will study the past from the year Israel was announced in 1948, as much as existing materials allow me.

The advantage of a scenario planning method is that it creates an opportunity to think about the future with the knowledge that unthinkable factors can turn into reality. However, it is hard to take everything into consideration. As an example, an attack from space or other galaxies against the earth can change everything in the world, but how likely is this matter? Therefore, it is important to have in mind that even a scenario planning method cannot give a one hundred percent certain answer about the future.

Then, based on this discussion, what are the indications of a good scenario planning method? What is important to think about during the scenario planning period? Lindgren and Bandhold mentions seven indications: 1) *power to make decisions* – the scenarios must be good enough for decisions to be made upon them, 2) *possibility* – the scenarios must be realistic, meaning that it is possible that the scenarios can take place, 3) *plausibility* – the scenarios must be plausible and it is important that all scenarios are equally plausible, 4) *consistency* – the

scenarios must have an internal logic where the connection between the different factors affecting the future are consistent, 5) *differentiation* – the scenarios must be different in their structure and nature, 6) *memorable* – the scenarios must be easy to remember and separate from each other, and 7) *challenging* – the scenarios must challenge existing beliefs about the future.

When it comes to possibility, the three scenarios in this thesis are realistic. These scenarios are also equally plausible. The scenarios would also be consistent because they are based upon theories.

Differentiation is also taken into consideration in this thesis. These scenarios are based on two different theories and are also of different nature. The scenarios are not hard to remember; they challenge people's views, depending on what group – the war thesis, the cooperation thesis or the alternative resource thesis – one belong to. Thus, based on this discussion and based on my attempt to increase the intersubjectivity of this thesis through explicit account of theory, method and material, this thesis can be used as decision material by those in power, although I have not thought of this paper for that purpose.

## 4.2 Three Scenarios

As mentioned in the introduction part, I will investigate three scenarios during a period of forty years. The three scenarios will now shortly be explained:

- *The War Scenario*: One or several of the countries in the Levant would sometime during the period investigated meet a scarcity situation where they do not have other alternatives than to go to war and secure the water flow of the Jordan River, which they are highly dependent on. The cost of war would be less than the cost of not having water, or obtaining water in other ways, for example through cooperation or technology.
- *The Cooperation Scenario*: One or several of the countries in the Levant would sometime during the period investigated meet a scarcity situation. This country is highly dependent on the water of the Jordan River. The cost of cooperation would be less than the cost of war or the cost of creating water by other means. Hence, the country or the countries would seek cooperation and the other countries would accept this cooperation to avoid war. This cooperation could mean sharing the water sources fairly, helping each other with technology, or producing water with technology, for export to those in need.
- *The Alternative Resource Scenario*: One or several of the countries in the Levant would sometime during the period investigated meet a scarcity situation. The cost of war and of cooperation would be more



than the cost of producing or importing water. Therefore, the country or the countries would choose to neither fight a war nor cooperate. Instead they would help themselves through using alternative sources, such as producing water with the help of technology or by importing water. The alternative sources would make the country or the countries independent of the water of the Jordan River.

### 4.3 Interview

Due to the importance of water technology for this thesis and my lack of knowledge in the field, I interviewed professor Kenneth M. Persson in his office at Lund University on the 20<sup>th</sup> of December, 2010 to find answers to my questions. Kenneth M. Persson is professor at the division of Water Resource Engineering at the Department of Building and Environmental Technology.

I decided to interview Professor Persson because I knew him from my time as a student representative in the board of the Center for Middle Eastern Studies at Lund University, in which he was and still is a board member. Professor Persson has research cooperation with, among others, the country of Jordan.

The interview was a semi-structural interview. I believe that this method is much more profitable compared to structured interviews, in cases when the interviewer does not have sufficient knowledge in the field. This, because a semi-structured interview gives more room for attendant questions.

I had three basic questions which I wanted the interview to revolve around. These questions will be presented below, without any special order<sup>6</sup>.

- What technical instruments exist today for creating freshwater? How effective are they and how much do they cost?
- How do you believe the technology regarding solving the problem with water scarcity will develop during the next forty year?
- Do the countries of the Levant have the resources to reduce or block the water flow of the Jordan River?

I started this interview by first presenting myself and my thesis. I had also in advance, through e-mail, presented the purpose of this thesis and some general questions to the professor, in order to work more effectively.

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<sup>6</sup> The order was chosen during the interview in accordance to the discussion.

## 4.4 Two Problems and Their Solutions

There are two great obstacles in this research. One is the lack of explicit data and information about the climate change, water availability, and technological capacity to produce water and so on. Example of such problems could be found in the next chapter. The other problem is a personal one. I am a social scientist with lack of understanding technological issues. I do not understand how a specific water technology work or how important a specific military technology is. I have tried to solve these problems by using information from the works of experts on the field and the interview explained above.

# 5 Operationalization

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As mentioned in the previous chapter, some factors presented in chapter three and four must be operationalized in order to investigate them better. A discussion about whether the factors will be studied through a quantitative or qualitative method, together with main sources used, will also take place for each factor.

## 5.1 Water Scarcity

To understand water scarcity the issue must be separated into a water supply part and a water demand part. The water supply part can be measured through the following way:

- Renewable water resources are measured in  $\text{m}^3/\text{capita}/\text{year}$ . This resource, according to the Aquastat Database, which belongs to the Food and Agriculture Organization of the United Nations, has since the 1950s been constant for each of the Levant countries until 2012 (see table 5.1). I have assumed a best case scenario which means that this resource would still be the same until 2050. In this aspect I have not taken environmental damages on the water into consideration. One reason is that I could not find any information about how environmental damages would influence the waters of the Jordan River. To calculate renewable water resources per capita I have used population data obtained from UN Data where a medium variant of their estimation has been used.
- The reference literature used (e.g. Wolf 1996:10 & Allan, J. A. 2003) and my interview with Professor Persson indicate that there are three alternative water sources which is important to investigate: desalinated water, virtual water and reuse of wastewater. When I use the term importing water I do mean importing virtual water. Professor Persson and none of the references used believe that any miracle technology will come during the next forty years to solve the water scarcity situation of the Levant rapidly. Sources which will be used are Aquastat and works of well-known scholars in the field.

- Climate is also an important factor, not least because it can affect the rainfall. Work of the scholars Bou-Zeid and El-Fadel from 2002 will be used to investigate this issue.

Table 5.1: Annual renewable water resources in the Levant (source: Aquastat Database)

Country	10 <sup>6</sup> m <sup>3</sup> /year
<b>Israel</b>	1780
<b>Jordan</b>	937
<b>Lebanon</b>	4503
<b>Palestine</b>	837
<b>Syria</b>	16800

On the water demand side Professor Falkenmark has identified two factors affecting the demand of water scarcity, namely population and climate (1989:118). Increasing population calls for more water for personnel use, for agriculture, and for industrial products. It should here also be mentioned that global demand on water and agriculture also affects the water demand in this region. If, as an example, the demand for orange increases globally the Israelis may want to export their oranges. However, this global demand will not be discussed in this thesis, because of one important reason: if the water is not enough for internal use the state will stop export of products which put further pressure on the already pressured water situation. That is, if the export would not help the country to import water or products which need water to produce.

When it comes to the climate it does affect the agriculture. Warmer climates demand more water for agricultural use, and of course for human use. The warmer it is the more we drink. As a human geographer, nevertheless, I would add one more factor to the demand side of the water issue, namely urbanization. Urbanization demands more water because of several reasons, not least infrastructural matters.<sup>7</sup>

However, with regard to these factors it must here be mentioned that some limits for water need per person each year will be presented and discussed in part 5.1.1. These boundaries show how much water is demanded per capita in order to have different quality of life, including living in urban cities. These limits will, compared to the water supply measured in m<sup>3</sup>/capita/year, reveal how the water situation of the Levant will be in the future. Possible changes in the climate would, as mentioned, demand more water for drinking, but unfortunately there is no data on how more much water is needed if the climate gets warmer. Therefore,

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<sup>7</sup> While working with this thesis I found support for my thought that urbanization should be taken into consideration. Both Dr Ayman Rabi (2000:34) and Dr Nimrod Raphaeli (2007) had mentioned urbanization in their works.

I have to limit myself to the boundaries that exist, which means a best case scenario. The climate change, especially if coming rapidly, would make everything worse.

The literature on water scarcity mentions also water management as an important factor regarding water demand. This has shortly been touched in chapter three where Kent Hughes Butts was quoted. Butts mentioned pricing of the water as a method to meet the increasing water scarcity. If people had to pay more, or pay at all, for the water they use, they would use less. Another method is to make people more aware of the water situation and how water can be used more efficiently. Changing the mouthpieces of the water faucet with ones which contribute to efficient water use is a third method that can be used to control the demand factor (Persson 2010). The water management will not be further discussed, of the reason that the best water management can decrease the demand only to a limit of water need, a limit which cannot be reduced. These limits will, as said, be discussed in part 5.1.1.

### 5.1.1 Water Scarcity Boundaries

Several researchers have used 1,000 m<sup>3</sup>/capita/year as the boundary for water scarcity (e.g. Gleick 1993, Bou-Zeid et al 2002, Morrisette et al 2004 & Brown et al 2009). If a country has less water than this they are suffering from water scarcity.

Falkenmark and Widstrand writes that “To assure adequate health, people need a minimum of about 100 liters [= 0,1 m<sup>3</sup>] of water per day for drinking, cooking, and washing” (1992:14). One year is in this thesis calculated to be 365 days, which mean that an individual need 36,5 m<sup>3</sup> water per year. It must be noticed that this measure have excluded water for agricultural use and for industrial production. Falkenmark et al continues and states that “By practicing efficient water management, Israel uses only 500 cubic meters annually per person” (1992:15). Gleick and colleges wrote that “Although no minimum water requirement has been formally defined, present urban water use suggest that an appropriate level may be between 75 and 150 m<sup>3</sup>/y per person” (1994:37).

Ayman Rabi deems that “to maintain a good quality of life, per capita water availability must be at least 300 m<sup>3</sup>/capita/year, although it exceeds 2000 m<sup>3</sup>/capita/year in the water rich countries such as northern Europe and Canada; but the average capita availability should be 500 m<sup>3</sup>/c/year in order to maintain an average requirement of good social and economic life conditions” (2000:33-34).

It is important here to again underline the importance of national security and survival in an anarchic world based on the structural realism theory. An annually 36.5 m<sup>3</sup> water need per person as Falkenmark et al wrote, or 75–150 m<sup>3</sup> as Gleick wrote, cannot be sufficient through a security perspective. In Falkenmark and Widstrand’s measuring agricultural and industrial need is excluded, and Gleick et al measure “the minimum basic human needs for drinking water, sanitation, and domestic use and for moderate urban industrial and commercial uses” (1994:37).

So, agriculture which is important from a food security perspective has been excluded in their limits of water need.

However, something between 300 m<sup>3</sup>/capita/year and 500 m<sup>3</sup>/capita/year, which Rabi stated, and with Falkenmark and Widstrand's reference to the Israeli water use, could be a better measure for water need with respect to national security.

## 5.2 Military Power

Measuring military power can be separated in a quantitative and qualitative part. On the quantitative part some factors, which are used by many experts (e.g. Hollis 2005) to compare military strength, will be measured. These quantitative factors, with main sources used in brackets, are:

- Population between 15 and 59 years. This is an age where the individual could go and fight. Of course, based on a normative discussion, it would be better to investigate the population above 18 year. However, I did not find such data. At the same time, how sad and depressing it might be, a 15 year old child can use weapon. (UN Data)
- Number of the armed forces personnel, separated in the army, the navy, the air force, the paramilitary and other units. (The Military Balance)
- Military expenditure in absolute numbers, not least because if presented as in percent of GDP a misleading picture would be given. The percentage might decrease but the absolute number could at the same time increase. (Stockholm International Peace Research Institute, SIPRI)
- GDP growth measured as purchasing power adjusted GDP per capita. (Indexmundi, a database in which different information is gathered from different databases)

Growth in GDP shows economic power, and as mentioned in the theory economic power can easily be transformed into military and political power. Number of population is important because the more inhabitants a country have the larger can the military be.

These quantitative factors, gathered from different publications written by experts, will be completed with following qualitative factors:

- Military alliances.
- Military technology, especially access to nuclear weapon.
- Historical experience and results, which show how prepared the military is and their access to military technology.
- Discussion about the countries defense systems and plans.

## 5.3 Dependency on the Waters of the Jordan River

Unfortunately there is no primary statistics over time that I know of which shows how dependent the different countries in the Levant are on the water flows of the Jordan River. However, how important is this factor to be investigated?

Consider, for example, that Israel is 100 percent dependent on the waters of Jordan River; this would mean that Israel would do almost anything to secure this water. But, as mentioned above and as it will be discussed more thoroughly in the chapter six, Israel has access to other sources of water, for example desalinated water. Based on this discussion it must be asked whether it would be cost effective for Israel to go to war in order to secure the waters of the Jordan River instead of spending the money on desalinating water from the sea. Therefore, to answer this question of dependency we have to look at the costs of war and of producing water by other means. The same discussion is also relevant for the other four countries of the Levant.

If the outcome is that war costs more than producing or importing water, or more than cooperating, it can be assumed that the waters of the Jordan River is not so important to fight a war on. In opposite, if the cost of war is less than other alternatives the importance of the waters of Jordan River will increase. To better understand this issue I will briefly present the structure of the Jordan River. By knowing how much water the river has we can make conclusions about the cost of producing or importing the same amount of water. An updated verision of Miriam R. Lowi's book, "Water and power – The politics of a scarce resource in the Jordan River Basin", published in 1995, will be used.

### 5.3.1 Structure of the Jordan River

According to Lowi, from the starting point of the Jordan River to its end in the Dead Sea, in average more than 1,200 million m<sup>3</sup> water flows annually if not used. This river has four main sources: 1) the Hasbani in Lebanon with 138 million m<sup>3</sup>/year water, 2) the Baniyas in the Syria with 121 million m<sup>3</sup>/year, 3) the Dan in Israel with 245 m<sup>3</sup>/year, and 4) Yarmouk in Syria with 400 m<sup>3</sup>/year (see map

1.3.1). The rest of the water comes from smaller tributaries in the west and east side of the Jordan River (Lowi 1995:28).

## 5.4 Capability to Stop or Reduce the Water Flows

An important question regarding this factor is whether or not the Levant countries have the economic and technological capability to reduce or block the water flow of the Jordan River by economic means. Some would also add the world politics perspective to this. Would these states have the international support for their behavior or would they meet protests? I would argue against this belief based on the structural realism. If a country's survival is threatened they have no other choice to act based on their security situation. Of course, if this country would receive help from other countries to solve their water security issue they would do otherwise. Hence, the international pressure is subordinated the national security.

It is, based on the water projects in the region, explicit that the countries of the Levant have the knowledge to for example build dams to stop the water flow, or water plants to reduce the water flow. Diverting the Jordan River or the rivers main tributaries through canals are other ways through which the countries can stop or reduce the water flow. Hence, the knowledge exists. When it comes to the economic capabilities there is no need for major finances according to professor Persson (2010, see also part 8.2). However, the situation would be different for Palestine which has a very weak economy with an insufficient government.

The discussion of this factor will end here and not be further investigated in the analyzing chapters. This, because of the fact that there is not much more to tell about the factor. The countries, maybe except for Palestine with regard to some methods, have the knowledge and the economic strength to stop or reduce the water flows of the Jordan River.

## 5.5 History of Antagonism and Cooperation

A history of antagonism and cooperation will show the past relations of the Levant countries. A deep history of antagonism impregnated by war and other armed and unarmed conflict can be a hinder for cooperation. On the other hand, if there were a history of negotiations and cooperation, especially over water, the cooperation over water would be more likely to take place. This, due to the reason that past cooperation gives rise to trust between countries.

I would still emphasize the issue that past cooperation would not eradicate the states skeptical view towards cooperation and relative gains from cooperations. Past cooperations would only give more chance to other methods before the whole matter turns violent. I will only shortly review this factor because the Israeli-Arab relations are already known to most people and there are a lot of publications on



this subject. My intention is through a short presentation remind the already conversant reader about the issue, and give a short chronological overview to the reader not familiar to this matter.

To write about the history of antagonism I have used my own knowledge which has been obtained by reading and discussion this subject with different people during several years. Mostly this knowledge is obtained from university studies and private reading. The history of cooperation will be based on the work of Aaron T. Wolf from 1996 called “Middle East Water Conflicts and Directions for Conflict Resolution”, and the work of Freimuth and colleges from 2007 called “Climate Change: A New Threat to Middle East”.

## 5.6 Costs of War, Cooperation and Alternative Sources

In chapter three, where the theory about cooperation was presented, it was stated that countries will decide, through a cost-benefit analysis, whether to cooperate or go to war. Or, if the costs of both of these two alternatives are high compared to the cost of alternative water sources, for example producing or importing water, they would do neither of them. Therefore, it is important to discuss the cost of war, the cost of cooperation and the cost of alternative water sources.

The cost of war is very difficult to measure. This, because of the fact that no one knows about the strategic war plans each country have. No one knows what weapons will be used. If a country possesses nuclear weapon would it use it at the beginning and maybe save time and money instead of several years of war, or would the country not use it at all? What are the targets?

Of course war would have economic impact. Infrastructures like energy plants, roads, schools, hospitals, and dwellings would be destroyed; the military would be damaged and must be rebuilt after the war; the state would lose labor force; foreign investment would decrease if not totally disappear during the war period; domestic capital would be moved abroad to be placed in foreign banks; energy and food prices would increase and so on. A war would make a state weak and in that way more vulnerable in the anarchic world.

At the same time there are damages in a war which cannot be measured. The loss of one human life can never be compensated. And think about all the families who would be destroyed. All the people, especially children, who will suffer from bad memories, with one or two parents missing.

Still I have to measure the cost of war to answer the question at issue of this thesis. How can this be done? There is no data because of mentioned problems. One way to go around this issue is to study past wars in the region and compare their economic costs with the ones of cooperation and the ones of alternative sources. It must be added here that it is the economic cost which is most relevant for this thesis, bearing in mind that human loss also can mean weaker military strength if the numbers of military personnel are counted. This is a cold treating of

war cost, but no other way is possible. By measuring the economic costs the war definition of Wallenstein is no longer needed and the problem that his definition brought can be solved.

Unfortunately the only data which exists is the cost for Israel in their conflict with Hezbollah in 2006, the conflict by media called the second Lebanon war. The cost of this armed conflict will be presented in chapter 9, based on a report from the organization DARA called “Lebanon: Crisis of Civilian protection” from 2007. However, I believe, and as will be shown, it is enough with this one data. Although, it is important to bear in mind that this armed conflict was between the *state* of Israel and the *organization* Hezbollah, without any military interference of the Lebanese or other Arab government. The costs would otherwise increase.

How can then cooperation be measured? Cooperation cannot be measured in quantitative means. Instead it is necessary, based on the structural realism, to investigate how the cooperation will affect the balance of power. With regard to this it must here shortly be mentioned that if cooperation would make country A dependent on country B, the cost would be high for country A. The more dependent the country is the higher is the cost. This higher dependency of country A on country B can therefore be an incitement for country B, because of the power relation, to take initiative for cooperation.

It is important to here again resemble the geographical perspective on war over water. The downstream country, because of its last access to the water of the Jordan River, is the country which has to go to war over the water. This, because of the reason that the upstream country has a great access to the water before it reaches the downstream one.

### 5.6.1 Cost of Produced Water and Virtual Water

How much is then the cost of alternative resources, that is to produce or import water? According to Persson (2010) the average cost of producing 1 m<sup>3</sup> water through desalination plants are today 0.5 to 1 US dollar. Bashitialshaar and Persson writes that “Although the investment and operational cost of desalination plants depend on where they are located, total production cost decreased from roughly \$2,5/m<sup>3</sup> in the late 1970s to \$1,5/ m<sup>3</sup> in the early 1990s to around \$0,5/ m<sup>3</sup> 2003” (2009:38). One reason for this is that these plants have got more energy sufficient (Bashitialshaar et al 2009:38). When it comes to water reuse the treatment of sewage water costs half the price of desalinating seawater to freshwater, that is 0.25–0.5 US dollar per m<sup>3</sup> (Persson 2010).

These two ways of producing water has, as mentioned, one problem and that is their requirement for electricity. Growing energy price would mean higher production price. At the same time, the information above shows a decrease in the cost of desalination because of better energy use. However, data from the US Energy Information Administration on the price of energy will in average, between 2007 and 2035, increase with 0.9 percent annually, which is not a dramatic rise.

Another alternative source of water in the region is, as mentioned before, virtual water. Importing 1,000 kg potatoes would mean importing 160 m<sup>3</sup> water (Hoekstra 2003:16). The world market producer price of potatoes, calculated from data obtained from Food and Agriculture Organization of the UN, were 2008 ca 412 US dollar per ton. If the same amount of money were used to desalinate water at the highest cost of 1 US dollar per m<sup>3</sup>, 412 m<sup>3</sup> water could be produced.

However, it would be more cost-efficient than desalinating water if wheat was imported to the country. To grow 1,000 kg wheat 1,000 m<sup>3</sup> water is needed (Allan, J. A. 2003:137). Based on the same source used for the potatoes, the average global producer price of wheat was in 2008 ca 321.5 \$/ton. Thus, by importing wheat a country could save about 678.5 m<sup>3</sup> instead of producing the water themselves through desalination.

The purpose of this discussion is to show that virtual water is an important alternative resource for renewable freshwater; however, it is hard to calculate the cost of this resource. To do so one needs data on how much virtual water product is imported into the country, how much it costs, how much the country would need to import in the future, and so on. Such calculation cannot be done, that is if data on this issue exist, because of the limitations a master thesis forth brings. Instead, the cost of virtual water would be discussed theoretically.

These three alternative sources have also one cost in common. Importing energy for desalination or treating sewage water, and importing virtual water makes the country dependent on the exporting country which according to structural realism should be avoided. Dependency puts the country into a vulnerable situation where the exporting country would gain relative power towards the importing country..

In these costs I have excluded the environmental costs. This, based on the short discussion on acute problems in the introduction chapter. Environmental problems are not acute problems compared to the water scarcity. Of course, here I have excluded the water issue from the environmental problems. What I mean is that having water is a much more acute problem than for example the pollution to which using fossil fuel for desalination contributes. At the same time it must be emphasized that the technology is being more environmental friendly. The desalination plants, for example, use less energy today than some years ago.

## 6 Water Scarcity

Diagram 6.1 and 6.2 show the amount of renewable water resources per capita per year for the five Levant countries. I have chosen to separate these countries in two different diagrams to show the situation of the renewable water resources better.

The diagrams illuminate a rapid decrease of the renewable water resources in the Levant. The situation for Jordan has been worse. Since the 1950 until 2010 their renewable water resources have decreased with more than 1,370 percent. Today Jordan has less renewable water resources per capita per year than Palestine. But until 2050 Palestine would have the worst water situation followed by Jordan and then Israel. Both Lebanon and Syria would have enough water, only renewable water resources calculated, to maintain a good standard for their inhabitants.

Diagram 6.1: Renewable water resources in Israel, Jordan and Palestine, m<sup>3</sup>/capita/year, 1950–2050. (source: Aquastat Database and UN Data)

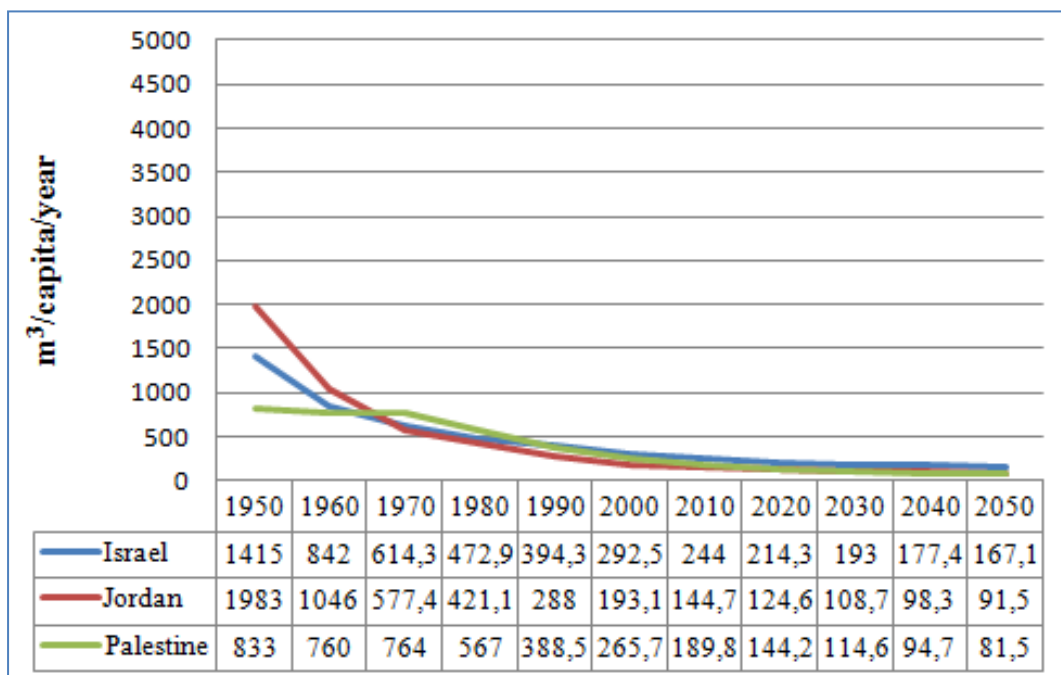
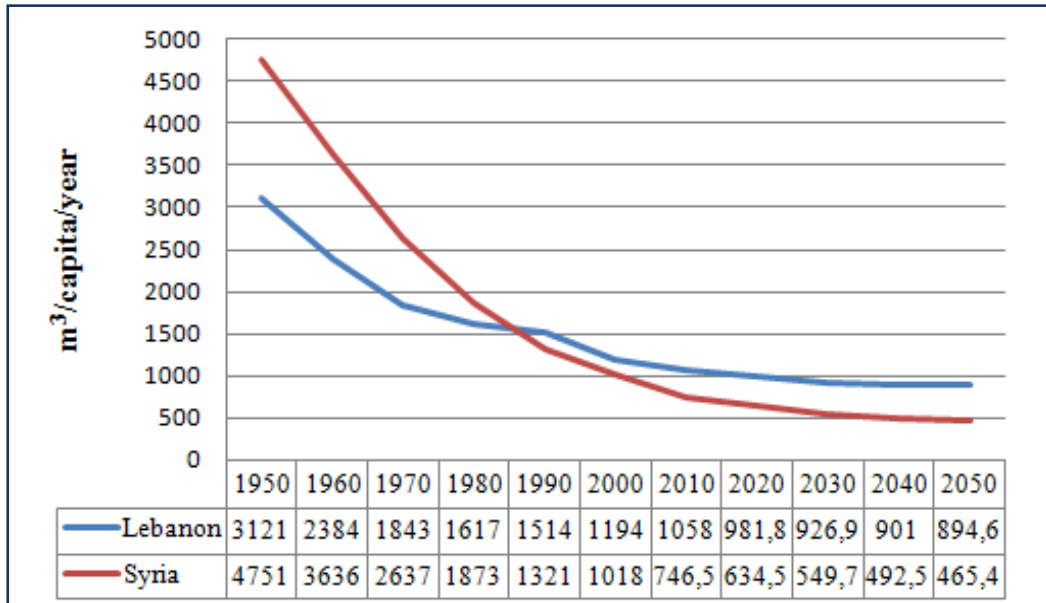


Diagram 6.2: Renewable water resources in Lebanon and Syria, m<sup>3</sup>/capita/year, during the period 1958–2012. (source: Aquastat Database and UN Data)



The water situation could be exposed to more pressure due to the global warming and the increasing temperature in the region. Bou-Zeid and El-Fadel concludes in their work that “Climate change is expected to further exacerbate existing water shortage” (2002:343). The reason is that warmer climate would mean more use of water and can also reduce the rainfall which also would mean more water demand from the agricultural sector. In the case of the Levant, plus Iraq, Bou-Zeid and El-Fadel writes (2002:347):

[...][The] results show minor changes in mean precipitation in all seasons. Mean summer temperatures, already high in the region, will rise significantly (0,8-2,1°C). Areas bordering the Mediterranean (Lebanon, Israel, Palestinian Authority, and costal Syria) would be the least affected. However, groundwater aquifers in these areas will be under the hazard of increased seawater intrusion due to higher sea levels.

The mean rainfall will according to these two researchers not change, but the warmer temperature would put the already pressured groundwater into more danger. This means, as I mentioned in previous chapter, that the data from the diagrams must be handled carefully. The situation can get worse than what appears.

### 6.1.1 Water Desalination Plants

Lebanon and Syria are the least affected by the water scarcity, in the sense that, according to the projected numbers for water availability, they can, at least during the coming forty years, more or less rely on their renewable water resources. 300–500 m<sup>3</sup>/capita/year is according to Rabi enough to be self-sufficient when it comes to agriculture and other human needs. The situation for Israel, Jordan, and Palestine are most critical.

Still, both Lebanon and Syria has a marginal water desalination production. According to the Aquastat country profile (2008) on Lebanon and Syria, the two countries produce about 47.3 million m<sup>3</sup>/year and less than 3 million m<sup>3</sup>/year respectively. According to Wardeh, Morvan and Wright (2005), Syria has the potential to develop their desalination program not least because of the Syrian access to energy sources such as oil and gas.

Desalination plants need much energy to work and this is one of the problems with such plants. “At present 1 cubic meter of desalinated water consumes 3.7 kWh of energy, mainly electricity” (Bashitialshaaer et al 2009:38). According to Bashitialshaaer and Persson the main energy supply for desalination was in 2002 oil, coal and gas (2009:38). Hence, countries such as Lebanon which do not have access to their own cheap energy have problems to develop their desalination programs. The same is relevant for Israel, Jordan and Palestine with no or little access to cheap energy.

Yet, both Israel and Jordan has, compared to Lebanon and Syria, a more developed desalination program. In 2006 Israel produced less than 24 m<sup>3</sup>/capita/year water, and the same amount for Jordan was 15.7 m<sup>3</sup>/capita/year (calculated with water information from Al-Jamal et al 2009:487 on population information from UN Data for year 2005)<sup>8</sup>. Table 6.1 shows predicted values for 2011, 2016, and 2025 regarding Israeli and Jordanian use of desalinated water.

Table 6.1: Israeli and Jordanian desalination capacity, m<sup>3</sup>/capita/year. (source: calculated on the basis of information from Al-Jamal et al 2009:487)

Country	2011 <sup>a</sup>	2016 <sup>b</sup>	2025
Israel	50	83.5	133.7
Jordan	30.5	47	69.5

<sup>a</sup> Population data from UN Data for 2010 has been used.

<sup>b</sup> Population data from UN Data for 2015 has been used.

To bring this part to an end it should be stated that desalination of water has one serious impact on costal groundwater aquifers. Desalination separates the salt from the water, and the salt is often discharged into the sea resulting in increasing

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<sup>8</sup> To compare with presented information for Lebanon and Syria: Israel produced about 160 million m<sup>3</sup>/year in 2006, and Jordan produced about 87.6 million m<sup>3</sup>/year.

salinity. This, in turn, would intensify the intrusion of seawater into the costal groundwater (Bashitalshaaer et al 2009:45).

### 6.1.2 Virtual Water

“Virtual water is the water ‘embodied’ in a product, not in real sense, but in virtual sense. It refers to the water needed for the production of the product.” (Hoekstra 2003:13). This concept was first introduced by Tony Allan at the beginning of the 1990s. To produce one ton of wheat 1,000 m<sup>3</sup> water is required, thus importing one tone wheat means producing/saving 1000 m<sup>3</sup> water (Allan, J. A. 2003:137).

According to Tony Allan the virtual water is one of reasons that the water scare countries of Middle East, including the Levant, have managed the water situation (1998). By importing virtual water these countries, with the help of other methods such as desalination, could more or less balance the decreasing renewable water supply and the increasing water demand. Table 6.2 shows the import and export of virtual water in all the countries placed in the Levant, excluding Palestine. This virtual water consists only of crop and livestock but gives a good picture of the effects of the virtual water.

Table 6.2: Net import of virtual water, only crop and livestock for four Levant countries in an average year period of 1995–1999. (source: Chapagain et al 2003:70, 72)

Country	Population (average for 1997–2001)	Crop (10 <sup>6</sup> m <sup>3</sup> /year)	Livestock (10 <sup>6</sup> m <sup>3</sup> /year)	Net import of virtual water (m <sup>3</sup> /capita/year)
<b>Israel</b>	6,100,032	4,598.2	983.9	915.1
<b>Jordan</b>	4,742,815	4,481	56.5	956.7
<b>Lebanon</b>	4,267,969	746.8	1,157.2	446.1
<b>Syria</b>	15,798,242	-4,378.6	213.5	-263.6

Table 6.2 shows an amazing picture. By importing virtual water the countries suffering from extreme scarcity can reach the limit of 1,000 m<sup>3</sup>/capita/year. To these data it should be added that a complete statistics about virtual water over time is, what I am aware of, impossible to find (cf. Hoekstra 2003:21). The data for Syria, regarding its import of crop and the net import of virtual water, is negative and indicates that the country exports virtual water, hence a negative import.

### 6.1.3 Water Reuse

Water reuse, or water recreated through sewage treatment to be more concrete, is a third alternative water resource. By treating and cleaning wastewater freshwater can be created. According to Persson (2010) water reuse is still something not used efficiently globally, especially in the Levant countries. Rabi writes that “Wastewater is considered the major non-conventional water resource that is still misplaced in the basin. It is not fully utilized.” (2000:34) The reason for this misplacement is the human feeling. Persson (2010) asked me a rhetorical question as an answer to my question of why this method was not developed more: think that you are at a hotel near the sea and someone gives people a glass of water saying that this water is desalinated water, most people would drink it, but now think if the same person said this is treated water from the sewage, where among other things urine go, would anyone drink the water?

Rabi writes that “GTZ (96) estimated the total production of wastewater in the basin at 450 mcm<sup>9</sup> / year. Only a very limited quantity of treated wastewater of 213 and 59 mcm / year is being used in both Israel and Jordan respectively” (2000:34). GTZ is a German organization working in the field of international cooperation for sustainable development. For Palestine the amount of wastewater may reach 10 million m<sup>3</sup> (Rabi 2000:34 referring to the Palestinian Ministry of Planning and International Cooperation 1998).

According to the Aquastat Database Israel treated 79 percent of its wastewater during the years 1998–2002, and of this they reused about 89 percent, which means about 43 m<sup>3</sup>/capita/year. During the same period Jordan reused 90 percent of its treated wastewater, that is. ca 13.4 m<sup>3</sup>/capita/year. About 88 percent of the wastewater was in this country treated. In Syria 40 percent of the wastewater was treated, that is ca 33 m<sup>3</sup>/capita/year, and all of it was used. Data for Lebanon and Palestine was not available. It is also important to mention that the sewage of all of these countries can be developed so that it includes everyone.

Most of the reused wastewater was used for agriculture and some was pumped in to the groundwater aquifers and rivers. Aquastate country profile (2008) on Israel states that it is the aim of the Israeli government to treat all of the country’s wastewater in the way that it can be used for irrigation.

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<sup>9</sup> Million m<sup>3</sup>.



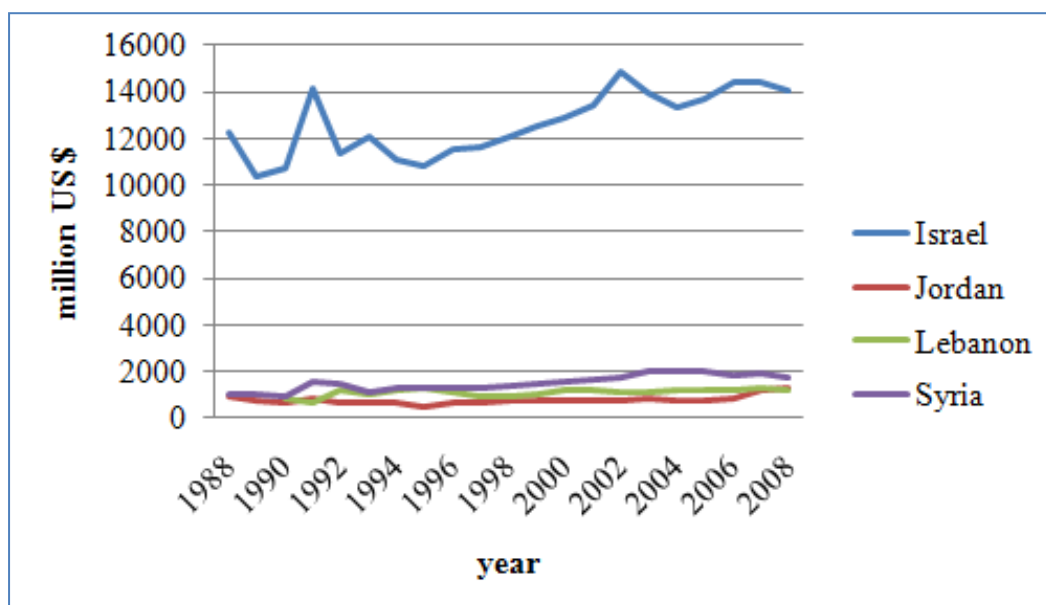
## 7 Military Power

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By studying the past wars between the Israelis and their Arab neighbor countries the supremacy of Israeli armed forces compared to the Arabs emerge. Winning the wars of 1948, 1967, and 1973 is an evidence for this. Of course winning these wars had also much to do with the good Israeli relation towards USA and military technology. These wars have given both sides good experiences. The very bad Israeli relation to Palestine has in addition given the Israeli military good experience of urban wars.

The Federation of American Scientists (2007) writes that “the existence of Israeli nuclear weapons is a "public secret" by now due to the declassification of large numbers of formerly highly classified US government documents which show that the United States by 1975 was convinced that Israel had nuclear weapons” (2008). Israel having access to nuclear weapons is also supported by many scholars. “Israel’s missile arsenal includes the C50 Jericho II, claimed to have a range of at least 1500 km. Analysts believe this missile is capable of carrying a nuclear warhead, at least 200 of which Israel is thought to possess, although Israeli government policy is neither to confirm or deny whether this is the case” Holis wrote in the Yearbook of Stockholm International Peace Research Institute, SIPRI (2005:242, cf. The Military Balance 2010).

Diagram 7.1: Military expenditure for the Levant countries, 1988–2008, in constant US dollar for 2008. (source: SIPRI)



The military strength of Israel compared to its neighbors is more explicit in diagram 7.1 above. In this diagram and the rest of this chapter Palestine is excluded because of the countries lack of resourceful military. The diagram shows that the military expenditure has, between 1988 and 2008, increased for all countries. It also shows that Israel invests more in the military than what its neighboring countries do together.

Based on this diagram and Israel’s access to nuclear weapons, it is not strange to conclude that the Israeli armed forces are more technological developed than the others. According to SIPRI, four of the top hundred major arms producing companies in the world in 2008 were placed in Israel. These companies are the Elbit Systems, Israel Aerospace Industries, Rafael, and Israel Military Industries. Except for Israel no other countries from the Middle East and North Africa is included in this list. In 2007 the country was, after USA, Russia and France, the world’s largest weapon exporter (Landguiden). Israel possesses three reconnaissance satellites, the Ofeq-5, the Ofeq-7, and the TecSAR I launched 2008 in cooperation with India (Landguiden & The Military Balance 2010).

In addition, the country has the Arrow Weapon System, which according to the webpage of Israel Ministry of Defense, is the “first operational ATBM system [Anti Theater Ballistic Missiles system] in the world developed specifically to defend against Theater Ballistic Missiles”. Theater Ballistic Missiles are missiles that can reach a target in-theater, which is the operational area, with a range between 300 and 3,500 km. The Israeli people, in opposite to the Arabs, is also well defended against chemical and biological weapons, among other things because of the reason that new buildings and all state buildings have an airtight security room with metal doors (Landguiden).

Diagram 7.2: GDP/capita (ppp-adjusted) for the Levant countries in US dollar during the period 1980–2010. (source: Indexmundi)

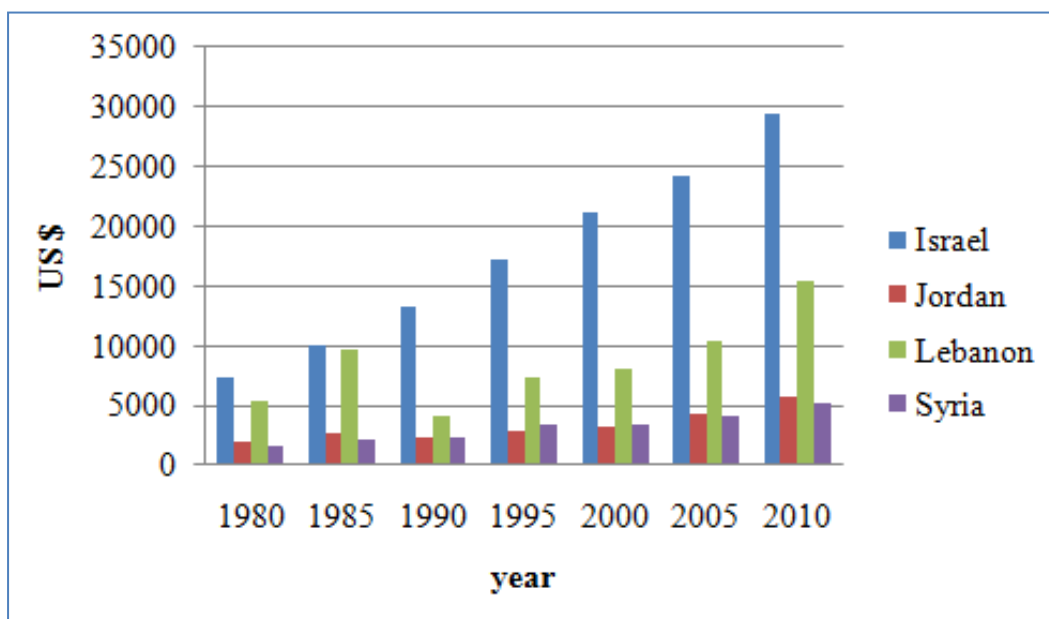


Diagram 7.2 shows ppp-adjusted GDP/capita for the countries in the Levant. During the period shown Israel has had the largest GDP/capita since 1980 until 2010. Lebanon has had the largest GDP/capita among the Arab countries in the region. Because of this high Israeli GDP amount, the Israelis could invest more in the military compared to their neighbors.

Unfortunately no data is available, at least to my knowledge, on these four countries regarding their ppp-adjusted GDP/capita for the next forty years. However, by looking at the average growth in the ppp-adjusted GDP/capita for the past thirty years an image, however dimly, can be created. For Israel the growth was 4.8 percent annually. The same amount was ca 3.8 percent for Jordan, ca 5.2 for Lebanon and ca 4 percent for Syria. If these growth rates stay constant Israel would still have the highest ppp-adjusted GDP/capita. As an example, based on these rates, Israel would in 2050 have a ppp-adjusted GDP/capita at ca 191,800 US dollar and Lebanon, which had the highest growth rate, would have ca 116,300 US dollar. These numbers illuminates Israel's higher economic position compared to the other countries in the Levant, although this discussion is based more on speculation than hard facts.

There are no indications that the Israeli economy would fall behind the Arab countries of the Levant during the period investigated in this paper. This, among other reasons, because of the fact that the Israeli investment on advanced research and education has paid off. The history of wars and conflicts in the region, since the creation of Israel in 1948, has never been an obstacle for the Israeli economy to grow.

Table 7.1: Armed forces ( $10^1$ ) in respective Levant countries, inclusive reserves, 1997 and 2010. (source: The Military Balance 1997 & 2010)

	Israel		Jordan		Lebanon		Syria	
	1997	2010	1997	2010	1997	2010	1997	2010
<b>TAF</b>	60,500	74,150	16,905	16,550	5,510	29,173.5	82,000	63,900
<b>A</b>	49,900	63,300	12,000	14,800	53,300	57,000	61,500	50,000
<b>N</b>	1,900	1,950	65	50	100	110	1,300	900
<b>AF</b>	8,700	8,900	1,340	1,200	80	100	13,200	5,000
<b>ADC</b>	0	0	0	0	0	0	6,000	8,000
<b>PM</b>	605	805	1,000	1,000	1,300	2,000	800	10,800

Abbreviations: TAF = Total Armed Forces. A = Army. N = Navy. AF = Air Force. ADC = Air Defense Command. PM = Paramilitary (e.g. the police).

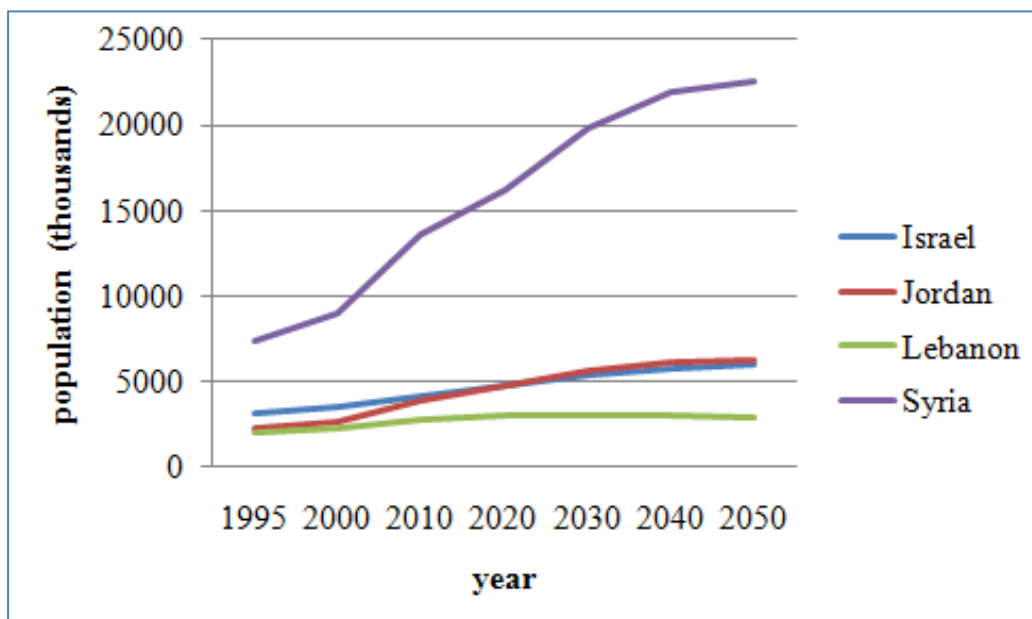
Notes: PM is not included in the TAF. In some of the countries it was not clear were some of the reservist would be active in, but they are included in the TAF.

Table 7.1 shows the number of armed forces and the paramilitary in the Levant countries for the years 1997 and 2010. At the same time the Israeli armed forces

has increased with 136,500 people, the armed forces of Jordan, Lebanon, and Syria has decreased. Thus, not only does Israel has nuclear weapon, not only are their military technology more developed, and not only do they have a much better economic situation compared to their neighbors, but according to table 7.1 they also have a stronger military with regard to total personnel.

With respect to Israeli investments in their military and the high ranking of their military technology companies globally, and with regard to their economic situation, the Israeli armed forces will for a very long time in the future be supreme in the region. As diagram 7.3 shows, Israel would neither have difficulties with old population. The diagram shows that Syria would have the largest increase in population between 15–59 years, but if this diagram is compared with table 7.1 it can be stated that Syria does not use its population optimally for military means. The economic situation can be one reason for that. Instead Israel has used its population more efficiently. When it comes to Jordan it will almost have the same young population as Israel, but Lebanon would meet problems, because its young population will slowly decrease from 2020.

Diagram 7.3: Population between 15–59 years for the countries in the Levant. (source: UN Data)



## 7.1 Military Alliances

When it comes to the strength of the Israeli military it can be stated that it has the strongest military in the Middle East and North Africa, not least because of the

possession of nuclear weapon and high-tech military equipment. But what if the Arab countries go together against Israel? According to a treaty signed on the 13<sup>th</sup> of April, 1950 in Cairo seven Arab states agreed to defend each other if one or several of them was attacked. As it appears from the name of the agreement, “Joint Defense and Economic Cooperation Treaty between the States of the Arab League”, this defense alliance includes all members of the Arab league which today consists of 22 states. The Article 2 of this agreement states:

The contracting States consider any act of armed aggression made against any one or more of them or against their forces, to be directed against them all, and therefore in accordance with the right of legal defence, individually and collectively they undertake to hasten to the aid of the State or States against whom such an aggression is made, and to take immediately, individually and collectively, all means available including the use of armed force to repel the aggression and restore security and peace.

To this defense alliance even Iran should be added. Although the country is not an Arab country and have many issues with the Arabs, the country have since the Islamic revolution 1979 been an enemy of Israel. It has not passed many years since the Iranian president Mahmod Ahmadinejad declared that the state Israel must be eradicated from the world map. At the same time Iran and Syria are allies, among others because of the respect Syrian government, especially the Al-Assad family, have for the first Shiite Imam, namely Ali the fourth caliph of Islam after the death of the prophet of Islam.

Syria and Iran is the main supporter of the Lebanese terrorist organization Hezbollah which also is a Shiite organization. Hence, although there is no any reliable information about defense treaties between these two countries, Iran should be taken into consideration as a fighting part on the Arabs’ side against Israel.

Merely the Arab countries together has a larger military and much more money than Israel. With Iran on their side, their strength would be significantly increased. It must be mentioned that Iran’s nuclear activity is also of great fear. The Military Balance writes (2010:238):

Iran’s nuclear activities continue to be of great concern to the international community. Israel, in particular, considers a nuclear-armed Iran an existential threat and refuses to rule out the possibility of a pre-emptive or preventive strike against Iran’s nuclear infrastructure. But while Iran in early 2009 had already produced enough low-enriched uranium for one nuclear weapon if further enriched, it had not yet crossed the line of weaponisation that would present an imminent threat.

The Iranian government believes that most of the world media is controlled by the Jewish with ties to Israel. This was among other things mentioned on the Islamic Republic of Iran’s News Network, a news channel sent through satellite, the 30<sup>th</sup> of December, 2010. Therefore, Israel is regarded as a serious threat against the Islamic identity on which the Iranian government has based their reign. Identity of

the state, or as Barry Buzan called the “idea of the state”, is the most important element of national security (Buzan 1991).

When it comes to the Israelis they have no formal defense pact with any country. However, the country has very close ties to the US, not least because of the many Jewish people living in the country (Landguiden). In January 2009, a short time after President Obama was installed in his office, he stated that he considers Israel as a strong ally (Migdalovitz 2009:Summary). Such statements, although tougher was stated by President Bush. Migdalovitz says that “President Bush has said several times that the United States would defend Israel militarily in the event of an attack” (2009:30). The great help Israel received during 1973 should not be forgotten as an example of these close ties (see chapter 8).

From 1976 to 2003 Israel was the largest recipient of US foreign aid (Migdalovitz 2009:29). In 2010 Israel received 2,800 million US dollar as aid, which of course is a decrease compared to 2000, the highest amount since 1997, when Israel received ca 4,130 million (Sharp 2010:24).

It must also be stated that if Iran would become a nuclear power in military terms, it is correct to assume, based on the structural realism, that USA would increase their support to Israel. There is as well a rivalry between Iran and the Arabs, especially between Iran and Saudi Arabia, about the power over influencing the Middle East and about the different schools of Islam, Shiites vs. Sunnites. The Iranians are as mentioned Shiites and most of the Arabs are Sunnites. Hence, the Arabs would also do what they can to stop a nuclear Iran.

Finally, it must be added that USA has a good relation with Saudi Arabia, Egypt and many other Arab countries. This relation can be a significant factor in the Arab-Israeli relations.

# 8 History of Antagonism and Cooperation

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This chapter will be separated in two parts. In the first part the history of antagonism will be presented and in the second one the history of cooperation will be outlined.

## 8.1 History of Antagonism

There are a lot of reasons for the Arab-Israeli conflict. I can categorize them in two main reasons. One is about power politics, survival and security as discussed in the theory part 3.1. This includes also economic and geopolitical conflicts. The last one is among other the conflict over the water resources. Another main reason is a conflict between ideas. This includes the conflict between two different religions of Islam and Judaism, and the different cultures Arabs and the Jewish/Israeli culture. A main fuel to this fire is world politics. The power politics between the super- and great powers of the world, where the Arab-Israeli conflict are used as a battleground, makes the conflict more complex and harder to solve.

The Jewish have in most countries, even in their own country in Israel/Palestine during the Roman Empire, been persecuted. At the end of the 19<sup>th</sup> century the Jewish T. Herzl took initiative to build a Zionist movement. They had their first meeting in Basel, Switzerland in 1897 and their aim was to gather the Jewish people in Israel.

During World War I Palestine was a part of the Ottoman Empire which fought on the German side. To fight the Ottomans the British promised both the Palestinians and the Israelis their own country. However, the British did not keep their promises and gradually a conflict was created between the Palestinians and the Jewish migrants. The British took advantage of this and a war between these two people started. For example, to stop Palestinians they gave weapon to the Jewish secret armed organization Hagana. But in order not to make the Palestinians a friend of Nazi-Germany they made it harder for the Jewish people to migrate to Israel.

However, soon everything got worse, partly because of illegal Jewish migration to Palestine. The Hagana now started to attack the British. In 1947 the British gave up and the UN suggested a two-state-solution. The Arabs rejected the idea, and when Israel on the 14<sup>th</sup> of May, 1948 declared Israel as a state a war started in 1949. The Arabs attacked Israel but was defeated not least because of

the support which the Soviet Union and USA gave them. Both countries thought that the new country could be their ally in the Middle East.

In 1956 another crisis took place. Egypt with Nasser as President took control over the Suez Canal, something which provoked the British and the French. Together with Israel that saw Egypt as a great enemy, they attacked Egypt. This attack was however met with protest from the Soviet Union and the USA which resulted in the pull back of the Israeli, British and French troops.

In June 1967 a third crisis started. The Israelis attacked Egypt, Jordan and Syria and crushed the Arab countries. In this six-day long war Israel took over the Sinai Peninsula, the Gaza, the West Bank, and the Golan Heights. According to several scholars (see chapter two) one of the main reasons for this war was the water of the Jordan River. Adel Darwish writes for BBC in 2003 that “Ariel Sharon [= former Israeli Prime Minister and one of the main Israeli commanders during the war] went on record saying that the Six Day War started because Syrian engineers were working on diverting part of the water flow away from Israel”. Darwish quotes Ariel Sharon saying “People generally regard 5 June 1967 as the day the Six-day war began. That is the official date. But, in reality, it started two-and-a-half years earlier, on the day Israel decided to act against the diversion of the Jordan”. The UN demanded in resolution 242 that Israel returned occupied territories but Israel did not do so.

Not many years after the Six Day War another war started in October 1973. During all this time until today the Israeli-Palestinian conflict has increased in periods and decreased in other times. This conflict has however been fuel to all these conflicts. Nevertheless, in order to support the Palestinians and regain their position, the Arab countries Egypt, Syria, Jordan and Iraq with economic and some military support of the rest of the Arab world attacked Israel. In the beginning of the war the Israeli suffered a lot of damage, but soon, with the help of USA, Israel changed the situation and once more defeated the Arab countries.

In 1982 Israel attacked the southern parts of Lebanon and a new crisis began. The Israeli intended to attack some organizations in Lebanon which had attacked Israel. In 2006 Israel again attacked southern parts of Lebanon. This time their aim was the Hezbollah organization that had killed three Israeli soldiers and captured two. Media called the event war.

During all these wars and crises the Israeli-Palestinian conflict, as mentioned, was ongoing. Three major events with regard to this must be mentioned. The first is the Palestinian Intifada, uprising, in 1987 which led to great confrontation between the Palestinians and the Israeli forces. The second was another Intifada which took place in 2000. The third event was at the end of 2008, when Israel attacked Hamas in Gaza after several missile attacks against Israel from Gaza. This was by media called the Gaza war.

Several thousand humans, on both the Arab and the Israeli side, have died since the creation of Israel. More have been injured and the economic cost has been devastating. It should be added that there has not been any greater war or crisis between the Arab countries of the Levant, with a small exception for the Jordanian and Lebanese conflict with Palestinian refugees in their countries.



## 8.2 History of Cooperation

The history of cooperation over water between the Arab countries and Israel started in 1953 when Eric Johnston, special envoy of the US President Dwight Eisenhower, went to the Middle East. It can already here be stated that the cooperation between the Arab countries, as was shown in the previous part, goes back further. The aim of Johnston's was to find a solution for sharing the waters of the Jordan River (Wolf 1996:5). Both the Arabs and the Israelis said no to the main plans of Johnston's, and presented their own. In 1955 Johnston presented a new plan which resulted in some compromise, but this plan died soon because of political matters (Wolf 1996:6). However, Israel and Jordan has since then until at least 1995–1996 stuck to the Johnston plan, and during this time the technical representatives and engineers from both of the countries has met two or three times (Wolf 1996:6).

In 1964 Israel had almost come to an end with its Water Carrier system which aimed to divert the Jordan River and carry water from this river to their Mediterranean coast. This made the Egyptian President Naser call the Arab countries to a summit and they decided in September 1964 to divert the northern tributaries of the Jordan River into Arab countries so that they did not reach Israel. Their construction began in 1965 and became a very important reason for Israel to start the 1967 war. (Wolf 1996:6)

With the fall of the Soviet Union and the Kuwait War the Arabs and Israelis decided to meet again. This time in Madrid on the 30<sup>th</sup> of October, 1991. In this meeting the countries decided to meet again to discuss regional issues, amongst which the water problem. Since the meeting in Madrid in 1991, six more meetings with multilateral working groups have been held: January 1992 in Moscow, May 1992 in Vienna, September 1992 in Washington, D.C., April 1993 in Geneva, October 1993 in Beijing, and 1994 in Muscat, Oman. (Wolf 1996:13)

Although some problems emerged during the talks, the meeting mostly went well. In his conclusions Wolf writes (1996:23):

Despite the relative success of the multilateral working group on water and its stated objective to deal with nonpolitical issues of mutual concern, one might wonder where the process goes from here. The working group on water has performed admirably in the crucial early stages of negotiations as a vehicle for venting past grievance, presenting various views of the future, and, perhaps most important, allowing for personal 'de-demonization' and confidence building. Currently, however, many of the participants in the working group are frustrated that it is not, by design, a vehicle for actually resolving conflicts.

Wolf wrote that the working group had successes, but at the same time questioned how much they could contribute to conflict resolution in the region. It must also be added that Syria and Lebanon was not participating in any of the multilateral working groups (Wolf 1993:23).

Yet, one can be more optimistic or less pessimistic when it comes to peace in the region. In September 1993 Israel and Jordan agreed on an agenda for peace talks, and based on this agenda, In June 1994 Israel and Jordan announced that they had agreed to a “subagenda for cooperation”. All this resulted in a peace treaty on the 26<sup>th</sup> of October, 1994 which ended the formal war between these two countries. (Wolf 1993:15)

In this peace treaty a water sharing agreement was included. This agreement stated among others that Israel and Jordan should cooperate to find 50 million m<sup>3</sup>/year potable water. But at least until the end of 2007 this never succeeded. (Freimuth et al 2007:10). The agreement also stated that Israel must store water for later transfer to Jordan. The tension between these two countries “mounted in 1999, when a severe drought caused Israel to indicate that it was unable to meet its water delivery schedule to Jordan and, therefore, to raise the possibility that it would not transfer the requisite water allocation” (Freimuth et al 2007:10). Jordan made some threats against Israel but nothing more happened.

In 1995 Israel and the Palestinian Authority (PA) signed an Interim Peace Agreement in Oslo. This agreement included the water issue. The Palestinians had required 450 million m<sup>3</sup>/year water, but the agreement only “allocated 28.6 mcm/year to the Palestinians for domestic consumption and recognized that the PA will need approximately 70-80 mcm/year water in the future” (Freimuth et al 2007:11).

Still today there is no peace agreement or any water agreement between Israel and Syria, nor Israel and Lebanon. At the same time there is also some tension over water between the Arab countries in the Levant. Although Jordan and Syria have water allocation agreement, Jordan has from time to time felt that their share has been put at risk, partly because of Syrian diversion of the Yarmouk River (Freimuth et al 2007:11, 12).

Throughout the history of cooperation the Levant has shown that efforts have been made but mostly these efforts have met high political problems. Wolf writes “past attempts at resolving water issues separately from the political framework, from the early 1950 to 1991, have all failed” (1996:23). The peace treaties between Israel and Jordan, and between Israel and Palestine are however points of light in a dark region. More needs to be done. Today Gaza and the West Bank, mostly, are controlled by the Palestinians. Israel has until this day not fully pulled back to their boundaries of 1967 stated by the UN. Hence the absence of peace with Syria. With Syria and Lebanon still in formal war with Israel it is hard to deal with other issues.

## 9 Costs of War, Cooperation and Alternative Resources

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The Israeli attack on southern Lebanon 2006 against the Hezbollah, which was ongoing during less than one month, resulted in many deaths. According to DARA about 1,400 militants and civilians were killed and 4,400 injured on the Lebanese side. On the Israeli side 19 soldiers and 43 civilians were killed, and 894 civilians were injured.

The economic cost was also devastating. For Israel, according to DARA, the cost of war was about 5.8 billion US dollar. The cost for Lebanon is estimated to 31.15 billion US dollar. If the Lebanese state had participated in the war against Israel, and asked for help from other Arab states based on the Arab defense alliance, the cost for Israel would have increased drastically. But, because of lack of data there is no other way for this thesis than to base the discussion on the presented costs.

If it is assumed that going to war for controlling the 1,200 million m<sup>3</sup> waters of the Jordan River would cost 5.8 billion US dollar, that is the least cost presented, it would be more sufficient to for example desalinate seawater into freshwater. With 5.8 billion dollars 5.8 billion m<sup>3</sup> water could be desalinated, and in this calculation I have used the highest desalination price 1 dollar/m<sup>3</sup>. If it is assumed that the price of desalination increases with 100 percent to 2 dollar/m<sup>3</sup>, for example because of higher energy costs, still it would be more favorable to desalinate seawater to freshwater.

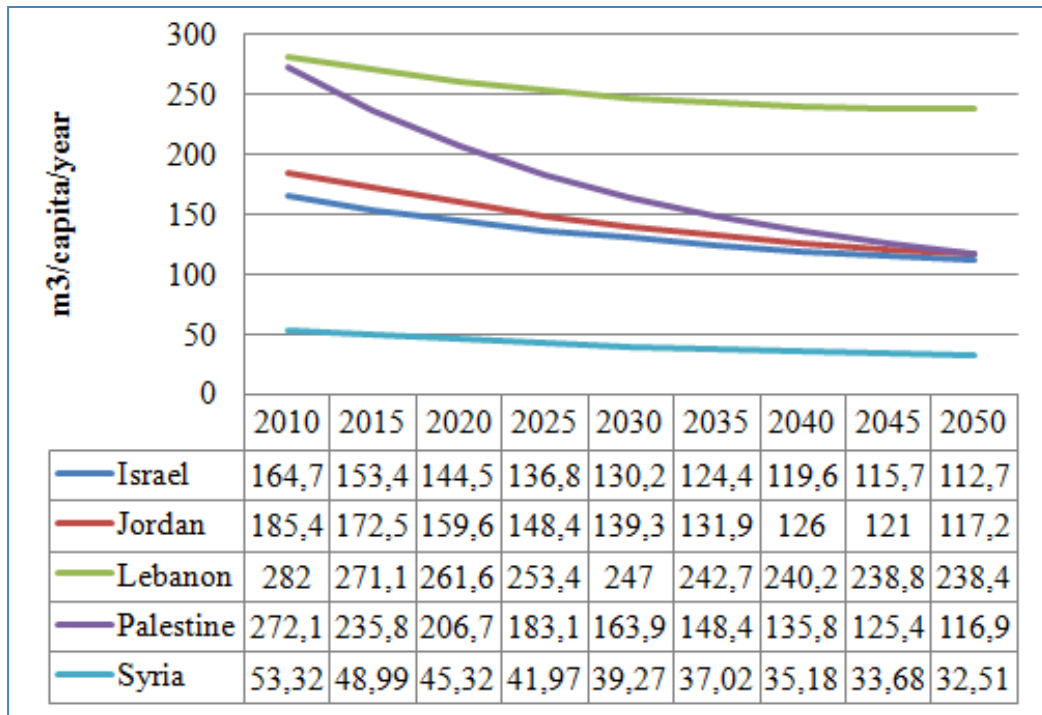
If these 5.8 billion dollar were separated in all the three alternatives presented, desalination, water reuse and virtual water, much more water could be saved. With this money 1,200 million m<sup>3</sup> water could be desalinated and brought to the people for at least ca 5 years.

It is also important to ask how much it would cost to protect the Jordan River if captured during a war. I did not find any data on this issue, but it can be assumed that the costs would be high because the defeated side, if not totally eliminated, would try to get back at least their share of the river. As J. A. Allan wrote “Water is too important to be left to the uncertainties of *rappports de force*” (2003:137). War would be an economic solution if the winning side could control the river with a cost less than the cost of alternative sources at least for several years ahead. It should be added that statistics regarding this issue is a matter of national security and therefore not available for those who do not “need to know”.

In part 6.1.1 it was stated that Syria would have the capacity to develop its desalination program because of access to energy. When it comes to Israel and Jordan both have desalination plants today, with plans to increase them. As it was mentioned Israel can in 2025 produce 133.7 m<sup>3</sup>/capita/year desalinated water. For

Jordan it would be 69.5 m<sup>3</sup>/capita/year. If these amounts are compared to the diagram 9.1 one could see that desalination is a major source of water for Jordan and especially Israel.

Diagram 9.1: Water of the Jordan River divided with the population of each country for the years 2010–2050, ca m<sup>3</sup>/capita/year. (source: calculated with information from Lowi 1995:28 and UN Data)



This shows that both Jordan and Israel can somehow, at least until 2025, handle their energy need for desalination. Israel has access to nuclear plants and can, if needed, increase them. Jordan can rely on the help of other Arab countries with huge access to oil and gas. For Lebanon and Palestine the situation is more extreme. Palestine does not have a serious economy and Lebanon does not have access to oil. Having the best Arab economy in the Levant, and compared to Jordan, Lebanon can also import energy for their need if necessary. Importing virtual water can also be another cheaper way instead of importing energy. For Syria, the diagram shows that a more developed desalination program, which Syria has the capability required, will decrease the country’s dependency on the Jordan River.

Based on this discussion, I will argue against the conclusion of Raphaeli who writes that “The ‘virtual’ water trade could become a ‘real’ threat to the security and independence of the importing countries” (2007) I will also argue against Brown and Crawford who say that “Wealthy and oil-rich countries can – to some degree – defer their water shortages with desalination (‘manufacturing’ water) or importing food (buying ‘virtual’ water). These options are less available in much of the Levant. They are very expensive and can swap a dependence on

transboundary energy supplies – unpalatable options for the region strategists” (2009:12).

Of course both Raphaeli and Brown et al are right in that importing water and energy would make the importing countries less independent and more dependent on the exporting country. And I agree with Brown et al that the Levant countries, compared to the oil-rich countries, have it harder to use desalination plants or virtual water. However, two sides of this must be discussed and it is based on these two I argue against the mentioned researchers and reject Brown et al’s comparison between the Levant countries and the oil-rich countries: 1) what are the other options? War costs more and makes the state relatively weak compared to other states, and 2) just like as a business man spreads his investment risks, the states can do the same.

Israel could for example, if needed, import energy from different countries in the Central Asia, Europe, Africa, and America. They can also import virtual water from a lot of different countries in order not to mainly be dependent on one or two countries. To this should be added that all the countries in the Levant, based on discussions in part 6.1.2, have been an importer of virtual water without any greater security problems. Regarding Syria they are exporting more crop than importing.

When it comes to cooperation it must be stated that Israel, Jordan and Palestine have a worse geographical position in comparison to Syria and Lebanon which are the upstream countries. Israel has a better geographical position compared to Jordan and Palestine.

Before any cooperation can take place between Israel and Lebanon, and between Israel and Syria, a peace agreement must be signed. To sign such agreement Syria and Lebanon require having back the Golan Heights. This area, because of its position high up in the north of the Jordan River, is a geostrategic point which Israel refuses to leave. Controlling this area means controlling a great part of the Jordan River’s water. If Israel gives this area back it will be more dependent on the good will of Lebanon and Syria not to reduce or stop the water flows of the river. Based on the structural realism, leaving the heights would mean a strategic lost for Israel. Jordan would have less problems cooperating with other Arab countries in the region. This, because both Syria and Lebanon would win by having an extra Arab ally if a war with Israel would begin. The same is true with regard to other Arab countries.

However, because of the great Israeli economy compared to the other countries of the Levant, Israel is in less need of cooperation. If needed they can produce or import water. That is harder for the Arabs in the region. Therefore, if Israel cooperated with the Arabs the Arabs would relatively gain more than Israel. Some would maybe argue that this will not be the case. Israel would gain more, or at least the same as the Arabs, because the situation would be more stable, peace agreements and negotiations would come, and finally Israel would be able to decrease their spending on military.

I, however, am skeptical to this view. First of all, the Arabs can also decrease their spending on the military. So what would the real gain or loss be for both sides? This discussion is based on theories and assumptions, not real cost-benefit

data, which makes it harder to analyze. But my skeptical view is based on the fact that water is not the only issue in the Arab-Israeli conflicts. The issue of Palestine and other power- and ideal political issues are incorporated, and the super power games should not be forgotten. Islamic republic of Iran would for example win by stopping possible peace between Arabs and Israelis, because they regard the Israelis as enemy, and as the old proverb says “my enemy’s enemy are my friend”. This is one reason Islamic republic of Iran supports Hamas in Palestine and Hezbollah in Lebanon.

To conclude: the cost of war is more than the costs of cooperation and alternative resources. Going to war makes the state weak, especially by economic means. The cost of cooperation between Arab countries is less among others because they need each other’s support against common rivals, such as Israel, Iran and so on. The cost of cooperation between Israel and the Arab countries would for Israel be more than the cost for alternative resources. The Arabs could maybe win on such cooperation because of the Israelis’ access to technology and money. But it does not matter much that the Arabs could be interested in cooperating with Israel, because Israel would not gain on this. However, an Iranian access to nuclear weapon could bring the Arabs and the Israelis closer to each other.

# 10 Conclusion

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The aim of this thesis was to investigate three scenarios in the Levant through a scenario planning method with regard to the water scarcity situation in the region. The first scenario was that the situation would result in war over the water of the Jordan River. The second scenario was that the situation would result in cooperation. And the last scenario was that the situation would result in neither war nor cooperation, instead the countries would solve their own problems through producing water or importing water. I have investigated these three scenarios based on two theories, one about how water scarcity results in war, and the second about the behavior of states and whether water scarcity results in cooperation.

I have used both a quantitative and qualitative method to study these three different scenarios. In the time of writing this thesis I met several obstacles. One great obstacle was the lack of data, especially on the costs of war, cooperation and alternative resources. The chapter about the costs of these different paths, analyzed and discussed in chapter nine, is too much based on theoretical discussions and not empirical. One problem, for example, was that I could not find any quantitative or qualitative information at all on how much it would cost for a country in the Levant to control the Jordan River after a possible war victory. These kinds of obstacles have unfortunately decreased the reliability of this thesis to some extent. However, I will emphasize, that conducting such theoretical discussion is highly accepted in the academic world and gives a good picture about the past and the future. It is because of such conducting that this thesis has been theory consuming, that is the theories have been used to analyze several scenarios. Now, to the results of this thesis.

## 10.1 War, Cooperation or Alternative Resources?

The water scarcity situation, as shown, is very bad in the region. There is not enough renewable water for the countries to be more or less self-sufficient when it comes to agriculture. For this 300–500 m<sup>3</sup>/capita/year is needed. The water needed only for domestic use is 36.5 m<sup>3</sup>/capita/year. This limit is hard for Palestine to keep. The Oslo Accord between Israel and Palestine allocated only 28.6 m<sup>3</sup>/capita/year to the Palestinians for domestic use. The Israelis did however recognize that the Palestinians would need 70–80 m<sup>3</sup>/capita/year water in the future. If the Palestinians today are getting 70–80 m<sup>3</sup>/capita/year is hard to say, but if they did it would still be not enough to be sufficient. Gleick et al placed

their water need limit to 75–150 m<sup>3</sup>/capita/year which only includes water for domestic use and for a moderate commercial uses.

The actual water demands are more than what I have discussed. I have in this thesis assumed that to avoid wars and conflicts over water the states will do what they can to decrease the water demand of their people to the minimum limits needed.

All of the countries in the Levant are trying to mitigate the water scarcity situation by using alternative sources. Israel and Jordan have developed, compared to other countries in the region, great desalination programs. All countries are importing water through virtual water. Studying only the data on import and export of crop and livestock, Syria is exporting virtual water. All the countries have also some kind of water reuse program.

Both Syria and Lebanon are better off when it comes to water scarcity. It is the downstream countries Israel, Jordan and Palestine who have more problems. From the theory it is known that upstream countries do not go to war because they have first access to the water flow of the river. It is the downstream countries who are more likely to go to war. With this said it must be emphasized that all the countries in the region, especially the upstream countries, have capabilities to somehow stop or reduce the water flow of the Jordan River.

The question is now if they would do so and how the downstream countries would react. The discussion about military strength shows that Israel is the dominant military power in the Levant, if not in the Middle East and North Africa. Therefore, it is less likely that the upstream country tries to stop or reduce the water flows of the Jordan River. If they would do something like that Israel would react violently and go to war as in 1967. However, going to war would not be about the water. It would be about power politics and prestige. This because, as it was discussed in chapter nine, the costs of war, with only water in mind, would be too much. The war of 1967 was not entirely about water. Many other issues were incorporated in this war. This means that the dependency of the countries in the Levant on the Jordan River is not as high as some believe.

It must also be added that the relation between Israel and USA, and some Arab states and USA, can be significant in preventing a war. However, maintaining a good international relation, as mentioned, is subordinated national security. Even a nuclear Iran could bring the Arabs and Israelis closer.

What about cooperation? Theoretically, the cost of cooperation is more than the cost of using alternative sources of water (see discussion in chapter nine). Israel and Jordan, and Israel and Palestine have a cooperation although there have, as mentioned in chapter eight, been some problems. This cooperation is not enough to solve the water problems. For a real cooperation in the region a peace agreement must exist between Israel and Lebanon, and Israel and Syria. However, Lebanon and Syria refuse to accept peace as long as Israel controls the Golan Heights, which are of geostrategic importance for these three countries. For cooperation trust is also needed, something that does not exist between countries according to structural realism. In the Levant the situation is much worse because of past antagonism. It must also be added that “Even under favorable circumstances, states may shy away from cooperating, when they can afford to”



(Lowi 1995:2). Cooperation between Arab countries exists and will develop with the increasing power of Israel.

The cost of alternative resources is much less than the two other paths presented. Therefore, I will argue against Falkenmark and Widstrand who wrote that technology “[...] are expensive, especially for the low-income countries suffering the worst shortages” (1992:4). In this thesis I have shown that technology and importing virtual water is relatively cheaper than war and cooperation. Hence, it is more likely that Israel takes a unilateral way when it comes to water, and so would the Arabs do but with more cooperation between themselves. On this path the countries will spread their import of virtual water and energy in order not to be too much dependent on the exporting countries. Therefore, some degree of cooperation between the Arabs and the Israelis will exist, something like today, maybe a little less or a little more. Cooperation is a way to spread the risk and would decrease the environmental costs.

Hence, there will be no war over purely over water in the Levant during the next forty years. Neither will there be any significant water cooperation in the region during the same period. Instead, the use of desalination and sewage treatment plants, and import of virtual water will increase.

To bring this conclusion to an end I will argue against J. A. Allan who wrote “Water is therefore a key strategic natural resources, and realist theory, as well as popular intuition, has it that the scarcity of water in the region will lead to water wars” (2003:137). It is true that water is a key strategic natural resource, but it is not true that realist theory, the structural realism I mean, has it that the water scarcity situation in the region will erupt into water wars.

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